SIEMENS

SIMOVERT Master Drives

Betriebsanleitung
Operating Instructions

Technologiebaugruppe T300
Technology Board T300

Ausgabe / Edition: 12.99

Bestell-Nr. / Order-No.: 6SE7087-6CX84-0AH1

Von dieser Betriebsanleitung sind folgende fremdsprachige Ausgaben lieferbar:
These Operating Instructions are available in the following languages:

Sprache Language	**Französisch French**		
Bestell-Nr. Order-No.	6SE7087-7CX84-0AH1		

Inhalt / Contents

Englischer Teil / English part

8 Definitions

- **QUALIFIED PERSONNEL**

  For the purpose of these Operating Instructions and product labels, a „Qualified person“ is someone who is familiar with the installation, mounting, start-up and operation of the equipment and the hazards involved. He or she must have the following qualifications:

  1. Trained and authorized to energize, de-energize, clear, ground and tag circuits and equipment in accordance with established safety procedures.

  2. Trained in the proper care and use of protective equipment in accordance with established safety procedures.

  3. Trained in rendering first aid.

- **DANGER**

  For the purpose of these Operating Instructions and product labels, „Danger“ indicates death, severe personal injury and/or substantial property damage will result if proper precautions are not taken.

- **WARNING**

  For the purpose of these Operating Instructions and product labels, „Warning“ indicates death, severe personal injury or property damage can result if proper precautions are not taken.

- **CAUTION**

  For the purpose of these Operating Instructions and product labels, „Caution“ indicates that minor personal injury or material damage can result if proper precautions are not taken.

- **NOTE**

  For the purpose of these Operating Instructions, „Note“ indicates information about the product or the respective part of these Operating Instructions which is essential to highlight.

NOTE
The information in these Operating Instructions does not purport to cover all details or variations in equipment, nor to provide for every possible contingency to be met in connection with installation, operation or maintenance. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser’s purposes, please contact your local Siemens office. Further, the contents of these Operating Instructions shall not become a part of or modify any prior or existing agreement, committment or relationship. The sales contract contains the entire obligation of Siemens. The warranty contained in the contract between the parties is the sole warranty of Siemens. Any statements contained herein do not create new warranties nor modify the existing warranty.

CAUTION

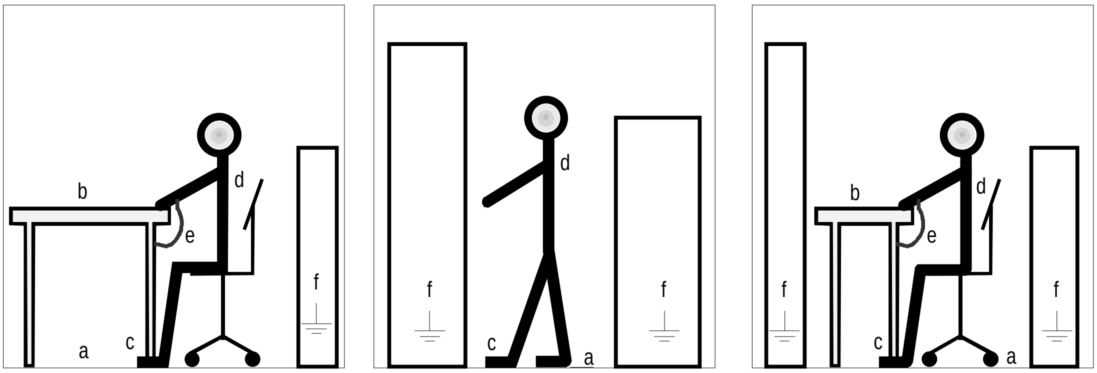
Components which can be destroyed by electrostatic discharge (ESD)

The drive converter contains components/devices which can be destroyed by electrostatic discharge. These components/devices can be easily destroyed if incorrectly handled. If it is absolutely necessary to work on/handle electronic boards, please observe the following:

- ♦ Generally, electronic boards should only be touched when absolutely necessary.
- ♦ The human body must be electrically discharged before touching an electronics board
- ♦ Boards must not come into contact with highly-insulating materials – e.g. plastic foils, insulated desktops, articles of clothing manufactured from man-made fibers.
- ♦ Boards must only be placed on conductive surfaces.
- ♦ When soldering, the soldering iron tip must be grounded.
- ♦ Boards and components should only be stored and transported in conductive packaging (e.g. metalized plastic boxes, metal containers)
- ♦ If the packing material is not conductive, the boards must be wrapped with a conductive packing material, e.g. conductive foam rubber or household aluminum foil.

The necessary ESD protective measures are clearly shown in the following diagram:

a	=	Conductive floor surface	d	=	ESD overall
b	=	ESD table	e	=	ESD chain
c	=	ESD shoes	f	=	Cabinet ground connection



Seated   Standing   Standing / sitting

WARNING

Electrical equipment has components which are at dangerous voltage levels.

If these instructions are not strictly adhered to, this can result in severe bodily injury and material damage.

Only appropriately qualified personnel may work on this equipment or in its vicinity.

This personnel must be completely knowledgeable about all the warnings and service measures according to these Operating Instructions

The successful and safe operation of this equipment is dependent on proper handling, installation, operation and maintenance.

9 Product description

9.1 Application

The T300 technology board is used in SIMOVERT Master Drives and is used to implement supplementary technological functions.

Applications are, for example, higher-level closed-loop controls for:

- tension
- position
- winders, coilers
- (angular) closed-loop synchronous control
- positioning
- drive-related open-loop control functions

Refere also to Sec. 4

9.2 Function description

The T300 board can be freely-configured using the STRUC configuring language. However, for standard applications, complete, standard software packages are available on pre-programmed memory modules (MS300).

The board consists of a 16-bit microprocessor and powerful periphery. The computation performance obtained permits sampling times down to 1 ms. By using a specially developed real time operating system, response times, required for sophisticated open- and closed-loop control tasks, can be achieved.

Data transfer between the basic electronics and a possibly available communications board is realized through an almost delay-free parallel interface (dual port RAM).

The monitor program (HEX monitor, diagnostics monitor), can be used, e.g. via a terminal with RS232 connection (V.24) for fault diagnostics (hardware- or software errors/faults). In addition, up to 3 cyclically flashing LEDs indicate that the board is functioning perfectly.

The T300 has several binary and analog inputs and outputs, 2 speed sensing inputs, as well as 2 serial interfaces, which can be used e.g. for a fast digital setpoint cascade (peer-to-peer) and to connect a parameterizing- and service program (SIMOVIS).

Data save via NVRAM (Non-Volatile-RAM):

A maximum of twelve 16-bit values can be stored simultaneously in a non-volatile manner by means of a NVRAM device (Non-Volatile RAM). The STRUC standard configured package can acess the NVRAM and use it for storing N2 variables, e.g. setpoint and actual values, and recall them after power shutdown or power loss.

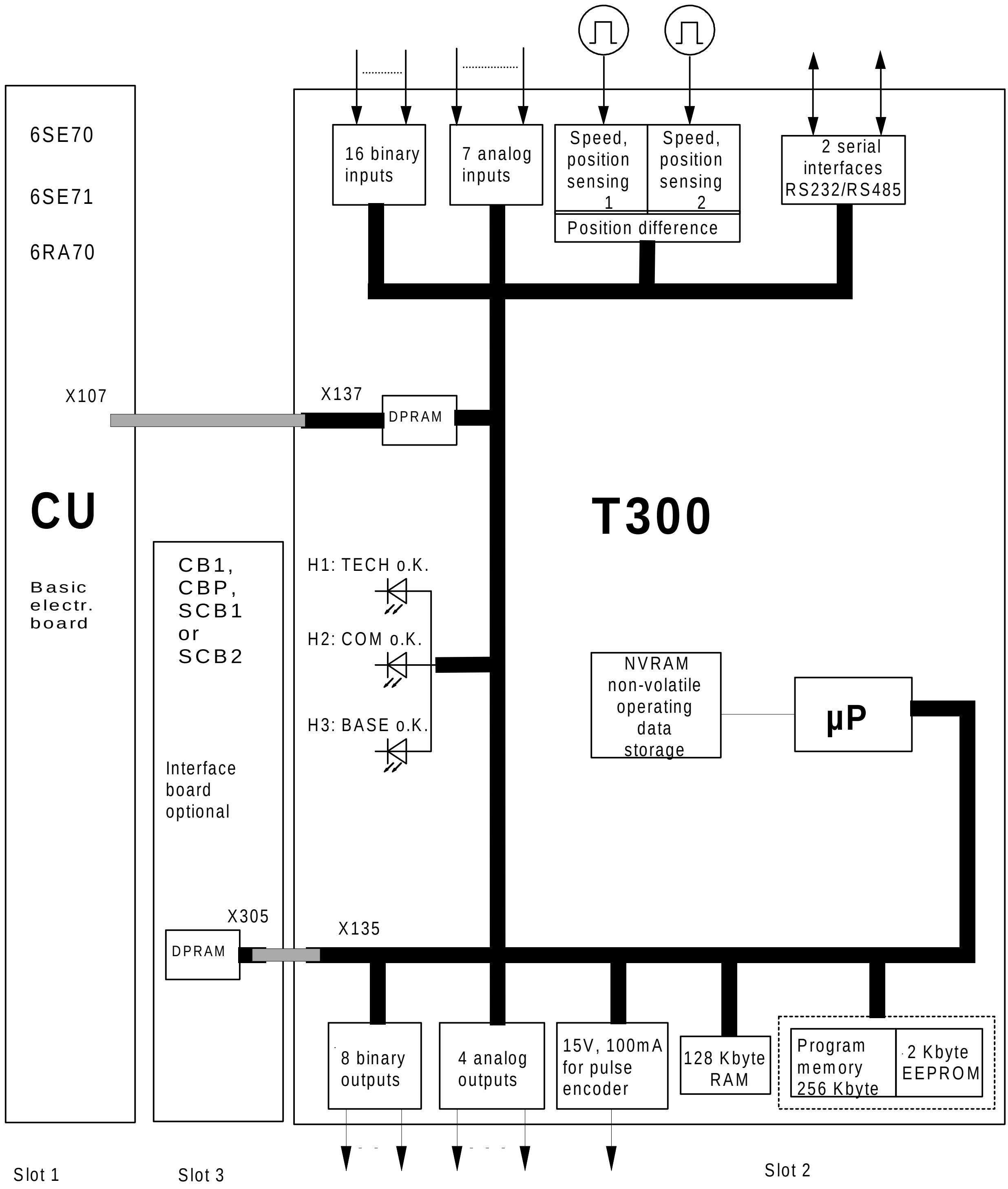


Fig. 1.2 Hardware and function block diagram of the T300

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9.3 Hardware/Software requirement

9.3.1 MASTERDRIVES basic units

MASTERDRIVES basic units (new Series, introduced from 1998)
The T300 has been approved for operation in the following MASTER DRIVES basic units:

- ❑ SIMOVERT VC with electronic board CUVC: Software release ≥ 3.11

- ❑ SIMOVERT MC with electronic board CUMC: Software release ≥ 1.2.

The T300 can only be used with Compact-, Chassis- and Cubicle-type units. The use with "Compact Plus" type units is not possible.

MASTERDRIVES basic units (older series, introduced from 1995)
The T300 has been approved for operation in the following MASTER DRIVES basic units:

- ❑ SIMOVERT VC with electronic board CU2: Software release ≥ 1.2

- ❑ SIMOVERT SC with electronic board CU3: Software release ≥ 1.1

CAUTION
When a T300 board is installed in a SIMOVERT SC unit, the pulse frequency of the converter must not be increased above the factory setting value of P761 = 5 kHz to avoid overloading the converter processor.

SIMOREG basic units
The T300 has been approved for operation in the following SIMOREG basic units:

- ❑ SIMOREG DC_MASTER 6RA70: Software release ≥ 1.7

9.3.2 Communication boards

The T300 can be combined with the following communications boards

- ❑ PROFIBUS-DP interface CBP , Software release ≥ 1.0 or CBP2, Software release ≥ 2.1
  Only one fieldbus communication board can be used. It must be mounted in mounting location 3 (middle location). Communication boards which are designed as Mini-Slot-Boards (e.g. CBP, CBP2) must additionally be mounted in Slot "G" of an ADB Adaption Bord before inserted in mounting location 3.
  The T300 can not communicate with a communication board mounted on the CU (slot A or C).

- ❑ PROFIBUS interface module CB1, software release ≥ 1.3

- ❑ SCB2 Board software release ≥ 1.3
  The SCB2 has an opto-isolated serial interface which is capable of operating with either a USS protocol or a peer-to-peer protocol.

- ❑ SCB1 board
  The SCB1 is equipped with a fibre-optic interface for peer-to-peer communication or terminal extension modules SCI1 and/or SCI2.

- ❑ SLB SIMOLINK interface board for CUVC or CUMC.
  If a Peer-to-Peer communication in not possible (for example for „Compact Plus“ type units) the SLB board can be installed instead of the T300 Peer-to-Peer interface.

- ❑ CAN-BUS interface CBC , Software release ≥ 2.0
  Only one fieldbus communication board can be used. It must be mounted in mounting location 3 (middle location). Communication boards which are designed as Mini-Slot-Boards (e.g. CBC) must additionally be mounted in Slot "G" of an ADB Adaption Bord before inserted in mounting location 3.
  The T300 can not communicate with a communication board mounted on the CU (in slot A or C).

CAUTION
- An optinal SLB SIMOLINK Interface Board must be mounted in a slot on the CUVC or CUMC base electronics board, most preferably in Slot A. -The combination T300 and SLB SIMOLINK Interface mounted in location 3 is not possible! - The SLB borad communicates directly with the base unit. Signal interconnections to the T300 board must be softwired via Binectors-/ Connectors. - A T300 board with Hardware release ≥ B, or newer, is needed for use with an SLB SIMOLINK interface board. The correct hardware release code can be detected on the component side of the T300 in the neighbourhood of the lower backplane connector.

9.3.3 T300 parameter settings

The following devices can be used to set the parameters of the T300 board:

- ❑ Standard parameterizing unit (PMU) for basic converters
- ❑ A PC or programmer with the SIMOVIS service program
- ❑ Optional OP1S plaintext operator device, Software release ≥ 2.3
- ❑ Optional OP1 plaintext operator device version 1.1 or higher

Note: MASTERDRIVES basic drive parameter and T300 Parameter can be read and write thrue all the serial Interfaces (with the exception of Peer-to-Peer interface and SIMOLINK interface board).

10 Installation, connecting-up

10.1 Inserting the memory module

The memory module must be placed on the board before it is inserted into the electronics box.

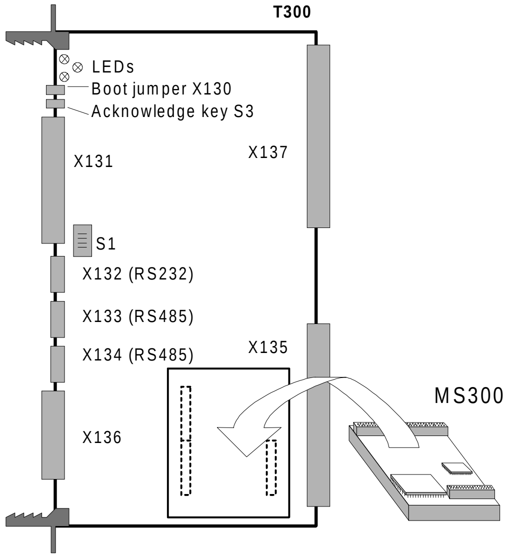

Fig 10.1 Inserting a memory module

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	DANGER
	It must be ensured that the memory module is inserted correctly into the T300 connector, as otherwise the memory module could be damaged.

10.2 Installing the board

Slots in the electronics box		**Boards**
Left	Slot 1 (CU)	CU
Center	Slot 3 (options)	CB1 / CBx with ADB / SCB1 / SCB2 / (TSY, not for T300)
Right	Slots 2 (options)	CB1 / CBx with ADB / SCB1 / SCB2 / TSY / **T300**

NOTE

Only one of each option board type may inserted in the electronics box.

TB (technology boards, e.g. T300) must always be inserted at slot 2.

When a TB board is used, a TSY board may not be inserted.

If only one option board is used it must always be inserted at slot 2.

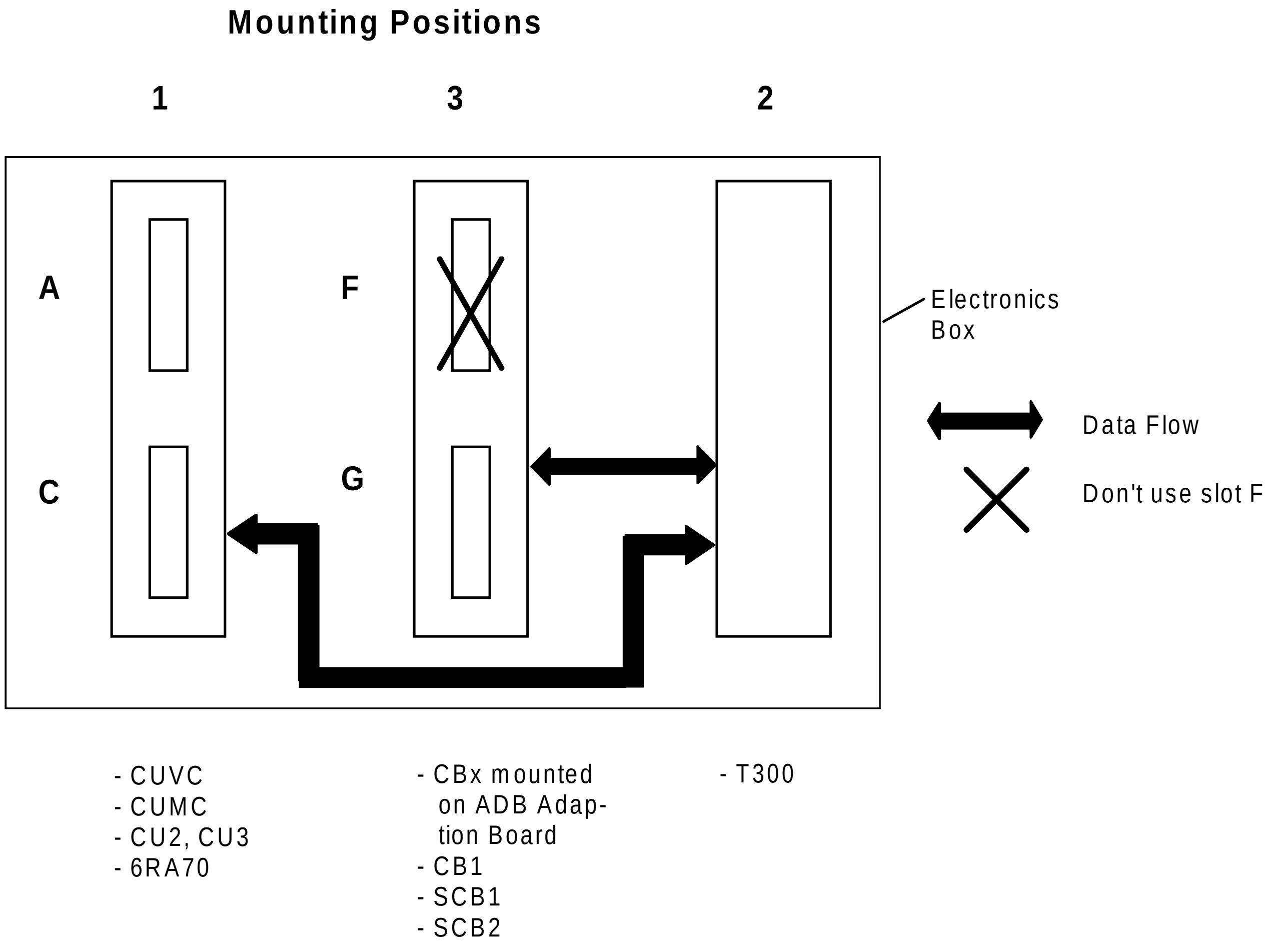
Option board Order Nos. and their descriptions are found in the Instruction Manual of the Master Drive converter.

Examples of possible arrangements:

Slot 1	Slot 3	Slot 2
CU	---	SCB
CU	---	CBx
CU	---	**T300**
CU	SCB	**T300**
CU	CBx	**T300**
CU	TSY	SCB

Please adhere to the following rules for mounting the T300 and other supplementary boards into the electronics box.

Please note: Only the following combinations and mounting positions are allowed.



– The T300 must be mounted in mounting location 2 (rightmost mounting location)

– Only one fieldbus communication board can be used. It must be mounted in mounting location 3 (middle location). Communication boards which are designed as Mini-Slot-Boards (e.g. CBP, CBC) must additionally be mounted in Slot "G" of an ADB Adaption Bord before inserted in mounting location 3. The T300 can not communicate with a communication board mounted on the CU (in slot A or C).

– The Communication Board communicates directly with the T300 board.

– An optinal SLB SIMOLINK Interface Board must be mounted in a slot on the CUVC or CUMC base electronics board, most preferably in Slot A..

The combination T300 and SLB SIMOLINK Interface mounted in location 3 is not possible!

CAUTION
A T300 board with Hardware release $\geq$ B, or newer, is needed for use with an SLB SIMOLINK interface board. The correct hardware release code can be detected on the component side of the T300 in the neighbourhood of the lower backplane connector.

Before installing option boards in the electronics box, the LBA (local Bus Adapter) has to be inserted.

Install the LBA bus expansion:

- ♦ Remove the CU (lefthand slot in the electronics box) using the handles after first removing the connecting cable to the PMU and both retaining screws
- ♦ Insert the LBA bus expansion in the electronics box (position, refer to the diagram) so that it snaps into place
- ♦ Re-insert the CU into the lefthand slot, screw the retaining screws on the handles tight, and insert the connecting cable to the PMU

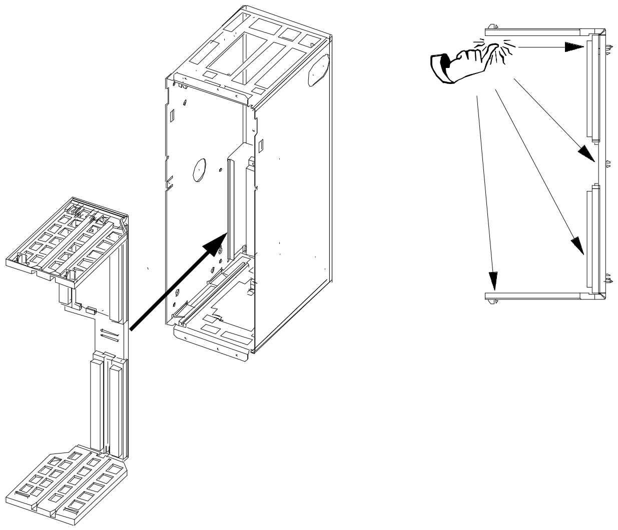


Fig. 10.2.a Installing the local bus adapter

Insert the option board in the righthand or center slot of the electronics box and screw into place. Only one of each option board type may be inserted in the electronics box. If only one option board is inserted, then it must always be at slot 2 (right).

Installing a new board

- ♦ Undo the two fixing screws on the handles above and below the board.
- ♦ Pull the board out of the electronics box using the handles
- ♦ Insert the new board. The board must be pressed tightly onto the plug connector.
- ♦ Screw the board tight at the fixing points in the front section of the board using the two screws attached.

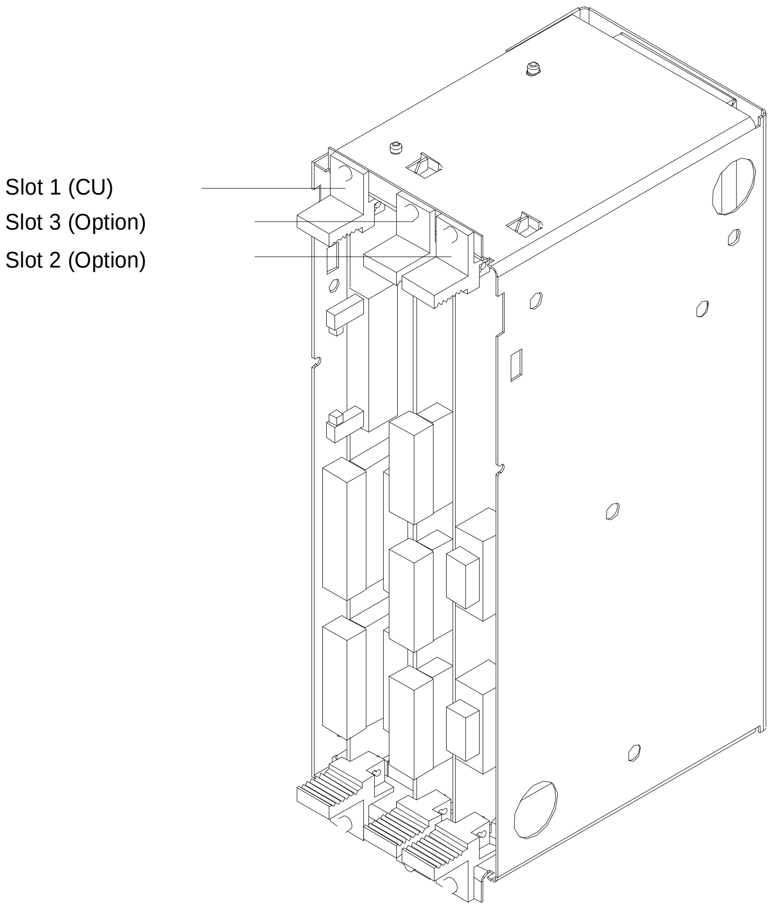


Fig. 10.2.b: Elektronics box, with CU (Slot 1) and Options (Slot 2 (left) and 3 (right))

10.3 Connections

10.3.1 T300 and SE300 terminal module connections

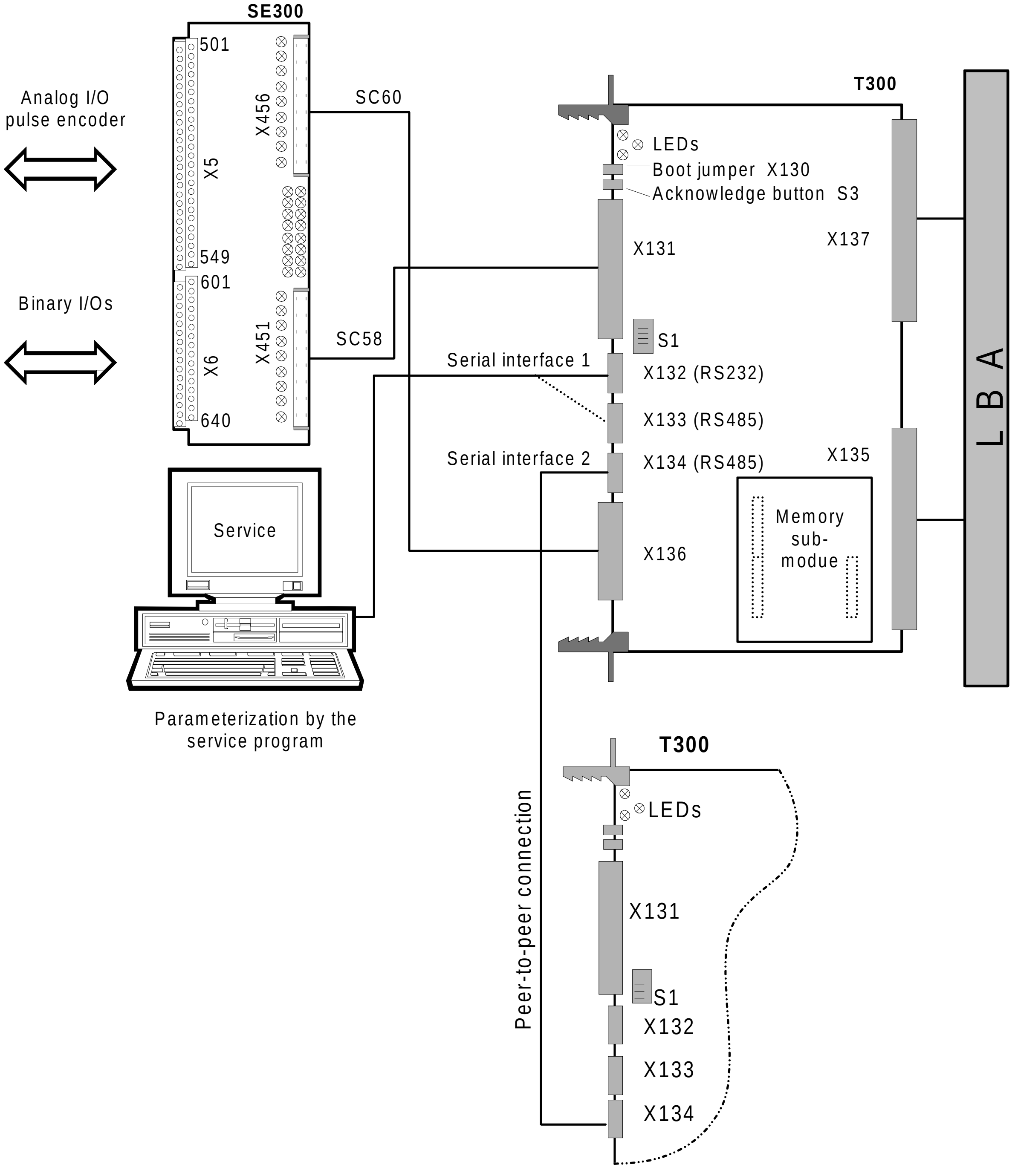


Fig. 10.3.a: T300 connections

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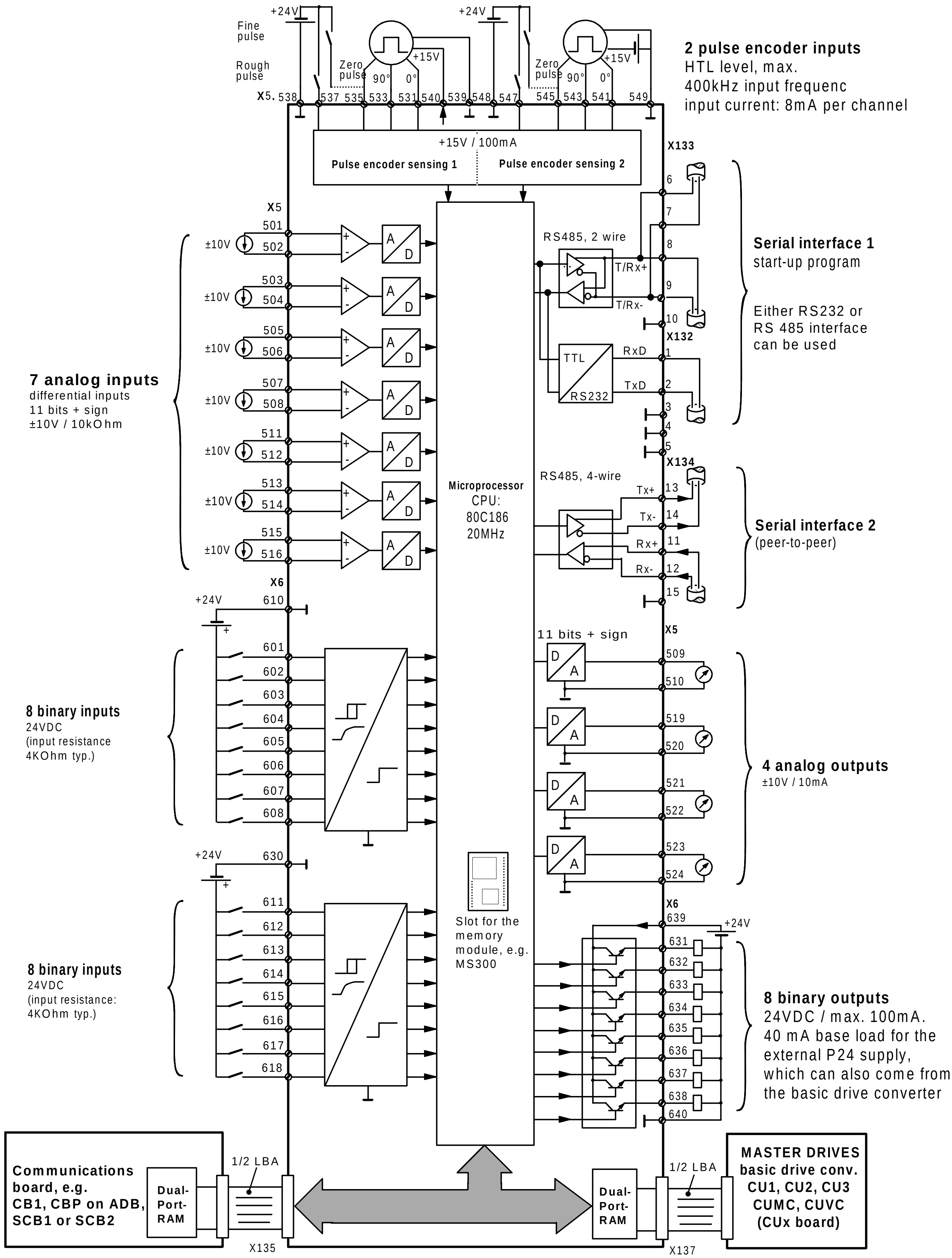

Connecting diagram, T300,SE300

Terminal series X5, X6: Connect at terminal block SE300
Terminal series X132, X133, X134: Connect at T300

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Note: For the first **SE58 which were supplied** (Order No.: 6DD3460-0AB0, Item No.. 465460.9001.00) terminals 630...640 are designated as 620...630!

10.3.2 SE300 terminal module

The SE300 terminal module is used to connect the plant-side input-, output- and pulse encoder signals. The terminal module is snapped onto a 35mm (DIN EN 50 022-35) mounting rail. The terminal module has LEDs which permits fast diagnostics of the binary input-, output- and pulse encoder signals.

The connection to the T300 is realized through the two, shielded ribbon cables SC58 (40-core, for analog and pulse encoder signals) and SC60 (34-core, for binary signals).

The serial interfaces are connected directly at the T300.

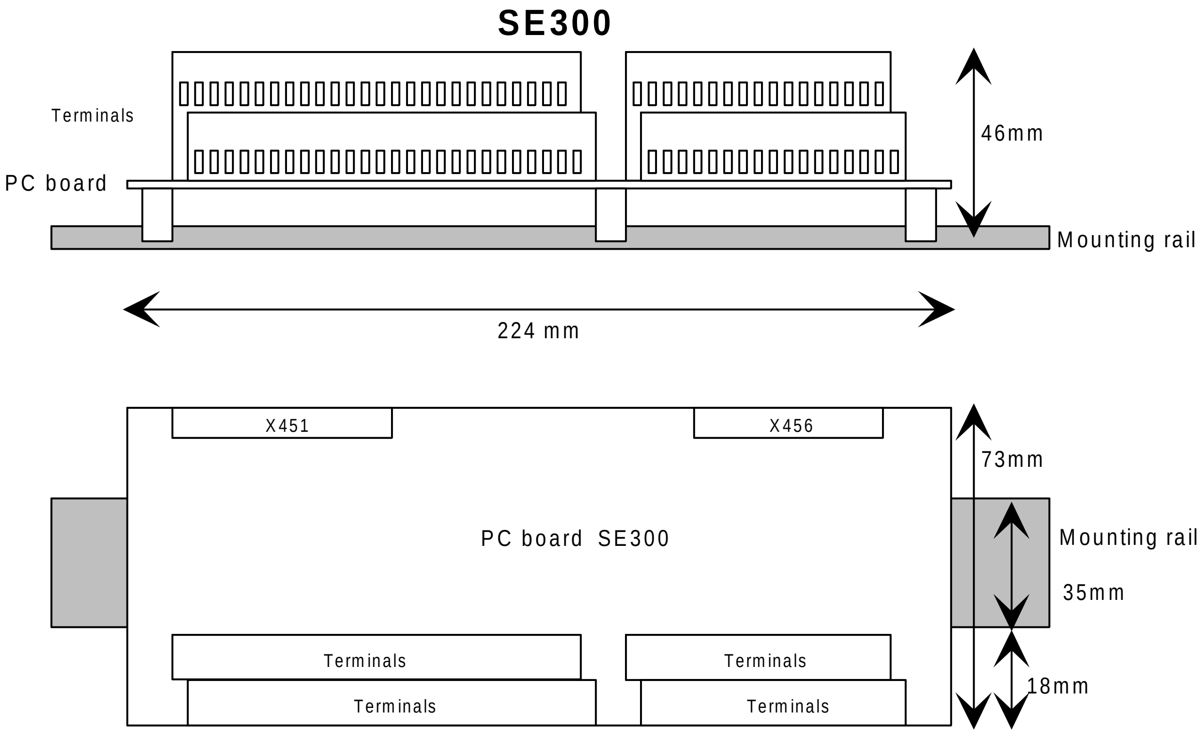

Fig. 10.3.2: SE300 dimensions

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10.3.3 Connecting-up pulse encoders (digital tachometers) at SE300

10.3.3.1 Connection possibilities

The T300 provides a 15 V voltage via the SE300 for **one** pulse encoder, so that either pulse encoder 1 **or** pulse encoder 2 can be supplied without having to use an external power supply.

24 V pulse encoders can also be used, whereby it should be observed, that the pulse encoder could be overloaded if long cable are used in conjunction with high frequencies (e.g. 150m, 40kHz), which could result in speed actual value sensing errors.

The speed actual value can also be lost, if the cable capacitance prevents the input voltage decreasing to less than 5 V for a pulse encoder LOW signal.

Only unipolar encoder signals can be evaluated.

The encoder reference potentials must be connected with the speed input reference points of the SE300:
    Terminal 531, 533, 535 or 539 for encoder 1
    Terminal 541, 543, 545 or 549 for encoder 2

When using an external power unit, its ground must also be connected to SE300 (e.g. terminal 539).

An external power supply unit can also supply both pulse encoders, whereby in this case, terminals 539 and 549 must be connected to the power supply ground.

The zero pulses are only required for certain applications (e.g. synchronizing drives).

Using a rough signal, a window can be defined, in which a zero pulse can be identified and evaluated. Such a rough signal can be generated, for example, from a contact switch or proximity switch. The zero pulse is evaluated when the rough signal = 1.

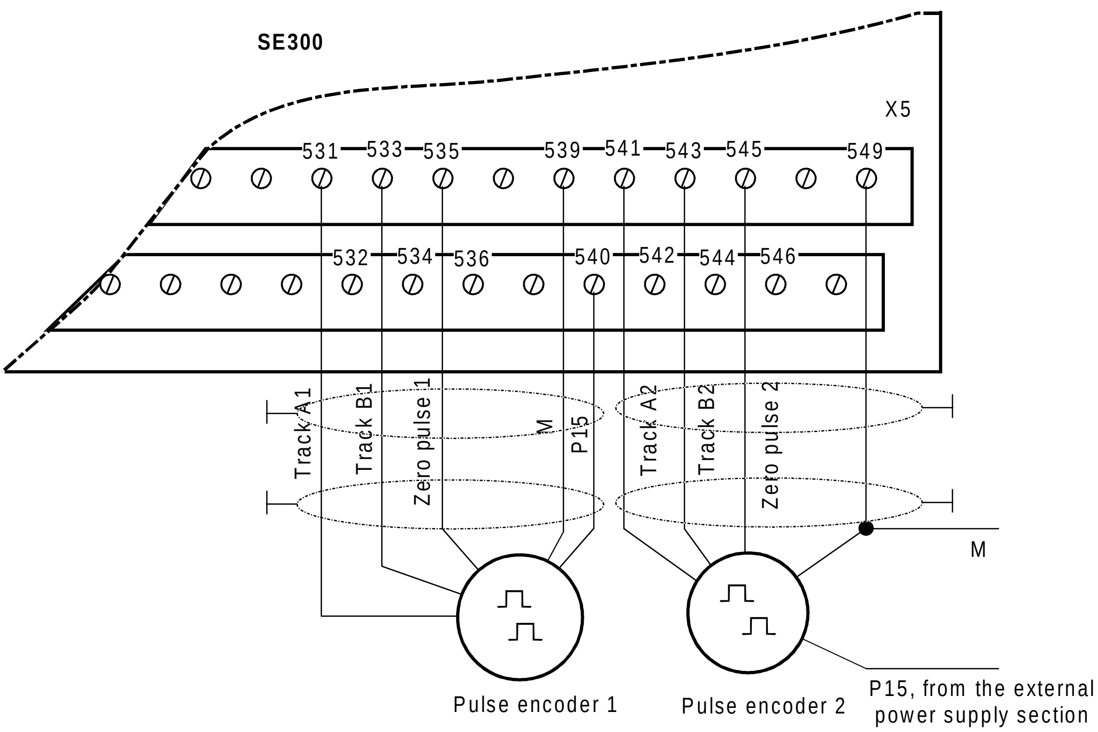

Fig. 10.3.3.1.a: Connecting pulse encoders with zero pulse

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Using a **single-track pulse encoder**:

- the pulse encoder pulse track is connected at track A1 or A2 (terminals 531 or 541)
- the track inputs B1 or B2 of the pulse encoder sensing (terminals 533 or 543) are connected to ground.

As the **SIMOVERT VC** includes closed-loop speed control, then typically, an encoder („encoder input 1“) is directly connected to control board CU2 (**terminals X103.35 to X103.40**) or CUVC (**terminals X103.35 to X103.40**) . The pulses, fed to CU2, are supplied to the T300 via the LBA.
This does not load the pulse encoder connected at the CU.

For servo converters SIMOVERT SC (CU3 control board) or MASTERDRIVE Motion Control (CUMC control board), the **resolver signals** are transformed into pulse encoder signals (tracks A1, B1, N) and are also fed to T300 via the LBA.

For SIMOREG DC_MASTER (6RA70) typically, an encoder is directly connected to control board (**terminals X173.26 to X173.33**).
The pulses, fed to CU, are supplied to the T300 via the LBA.
This does not load the pulse encoder connected at the CU.

In this case, these pulses are not just available on the control board for speed sensing, but also on the T300 via the LBA.

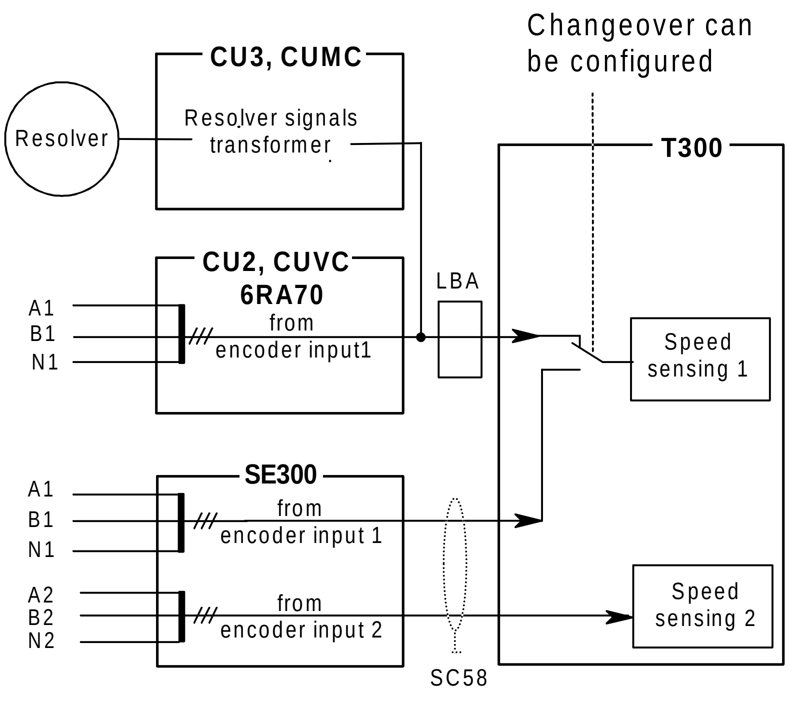

Fig. 2.3.3.1.b: Connecting the pulse encoder

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10.3.3.2 Information regarding the pulse encoder cable

Capacitance per unit length of the pulse encoder cable:

Core - shield: approx. 265 pF/m
Core - core: approx. 120 pF/m

1. For long cables, it must be ensured, that there is still enough voltage at the pulse encoder to ensure correct operation.

2. Max. pulse encoder output frequency:

Max. Pulse Encoder Frequency as a Function of the Cable Length with the HTL Encoder Inputs of MASTERDRIVES and T300.

Below you can find a pulse frequency vs. cable length characteristic curve. The following assumptions have been made for this curve:

1. Encoder types: Heidenhain 1XP8001-1 and Hübner ROD9 / HOG9

2. Stabilized +15 VDC encoder power supply . Both, the CU board and the T300 board provide output terminals each supplying one encoder with the appropriate power-supply voltage. (i.e. two encoders can be supplied in total).

3. With pulse frequencies above 50 kHz or cable lengths above 50 m, two parallel-connected conductors have to be used for the 15VDC and GND encoder supply leads in order to make the voltage drops as low as posible.
   Four parallel-connected conductors have to be used with cable lengths above 100m. As an alternative, you can use 15VDC and GND conductors with a minimum cross-section of 1 mm^2 each.

4. Appropriate encoder cables:
   - Siemens 6SX7002... according to Motor-Catalog DA65.3
   - other shielded twisted -pair cables with the following features:
     - min. cross-section of the conductors: 0,25 mm^2
     - max. capacitance per unit length: 120 pF/m

5 For cable lengths above 150m, the use of an encoder with additional complementary HTL signals is highly recommended (differential pulse signals A/A_inverted, B/B_inverted, N/N_inverted).
A Siemens DTI "Digital-Tacho Interface" module has to be employed in this case, refer to MASTER-DRIVES-Catalog DA65.10.
The 1XP8001-1 encoder type is equipped with the complementary outputs as a standard. The ROD9 / HOG9 types can be ordered, as a special version, from Hübner with complementary outputs. Use the Hübner-Order No suffix " ...I" for ordering.

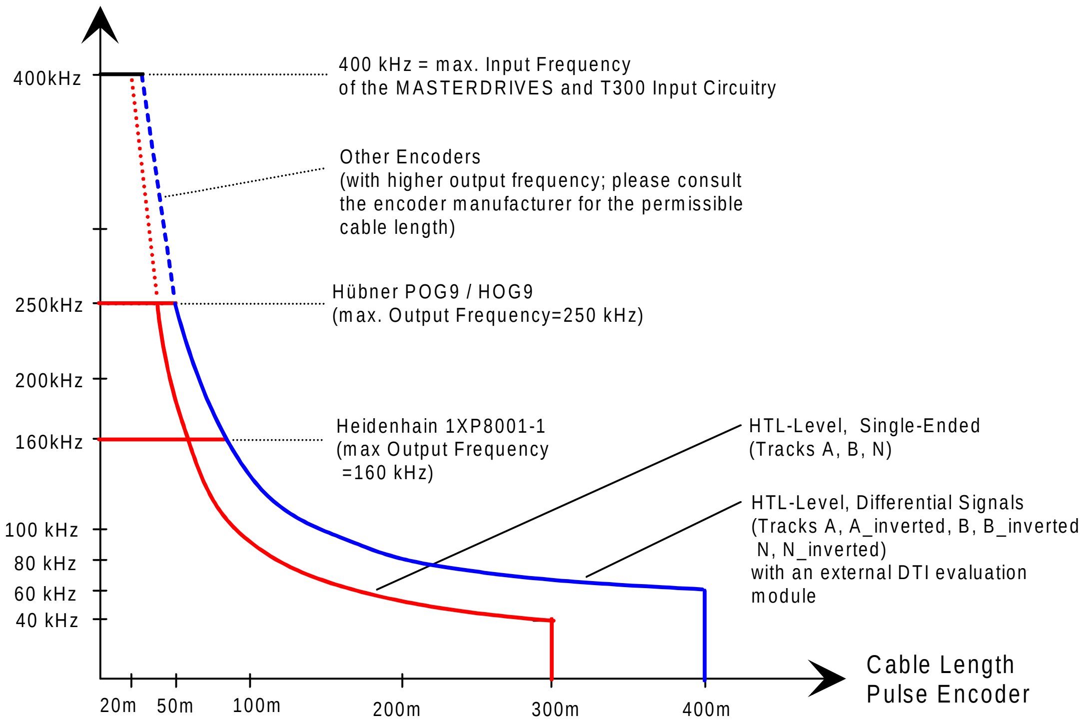

Fig. 10.3.3.2: Permissible pulse encoder output frequency

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10.3.3.3 Connecting a TTL encoder to the T300 via a DTI converter module

A downstream-connected DTI module can be employed for converting the pulse levels from HTL (15 to 24V) to TTL. In this case, the T300 cannot evaluate encoder frequencies above 25 kHz without additional measures.

This restriction is due to the passive pull-up output of the DTI (output transistor switches to GND, no push-pull stage) and the RC-type T300 input filter circuit resulting in slow rising edges and fast falling edges.

Higher pulse frequencies can be achieved by removing the filter elements on the T300 board according to the following table. These filters are no longer needed in connection with the DTI. Each filter consits of an R (resistor) and a C (capacitor) which are series-connected. An **R or a C component must be removed** for each encoder track.

Encoder 1:	Track A Track B Index Pulse	C43 C44 C45	or R195 or R197 or R198
Encoder 2:	Track A Track B Index Pulse	C46 C47 C48	or R205 or R207 or R208

10.3.3.4 Rough signal processing

The T300 allows the zero pulse only to be evaluated if the „rough signal“ is present. If such a AND logic operation is to be made (in the sense of a filter function), then the speed sensing (function function block NAV015) must be appropriately parameterized.

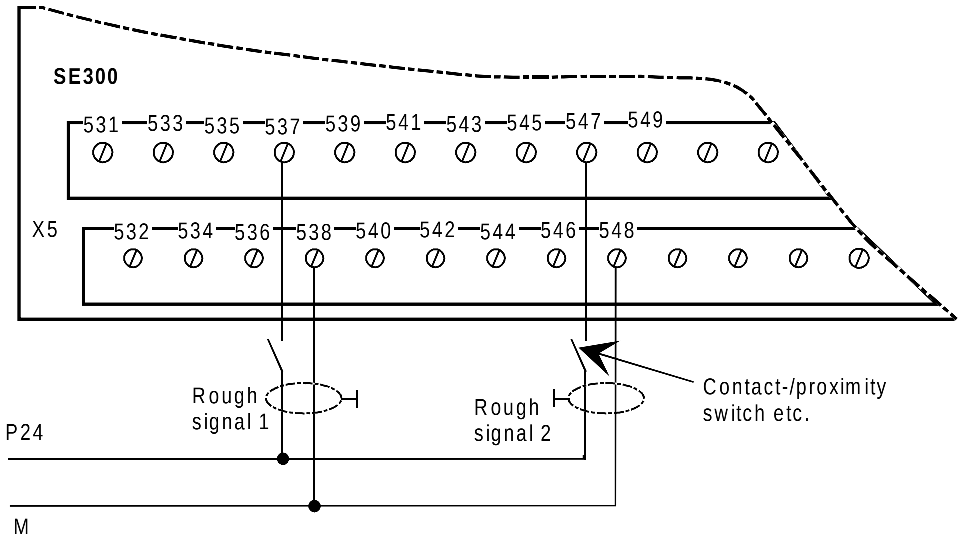

Fig. 10.3.3.4.a: Rough signal speed sensing 1 and 2

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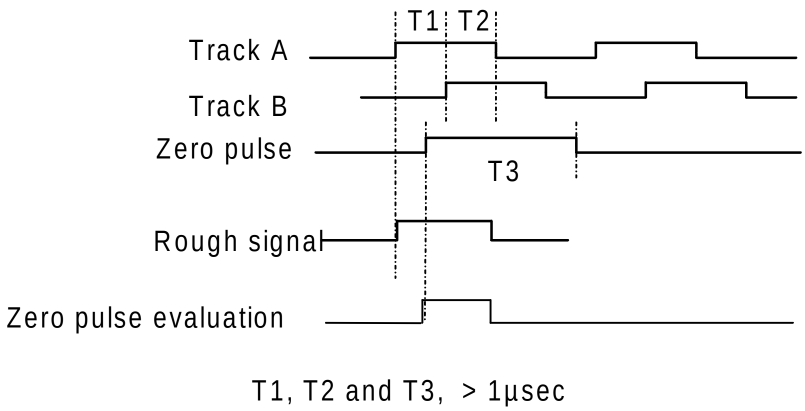

Fig. 10.3.3.4.b: Zero pulse evaluation with rough signal

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10.3.4 Connecting-up the analog inputs

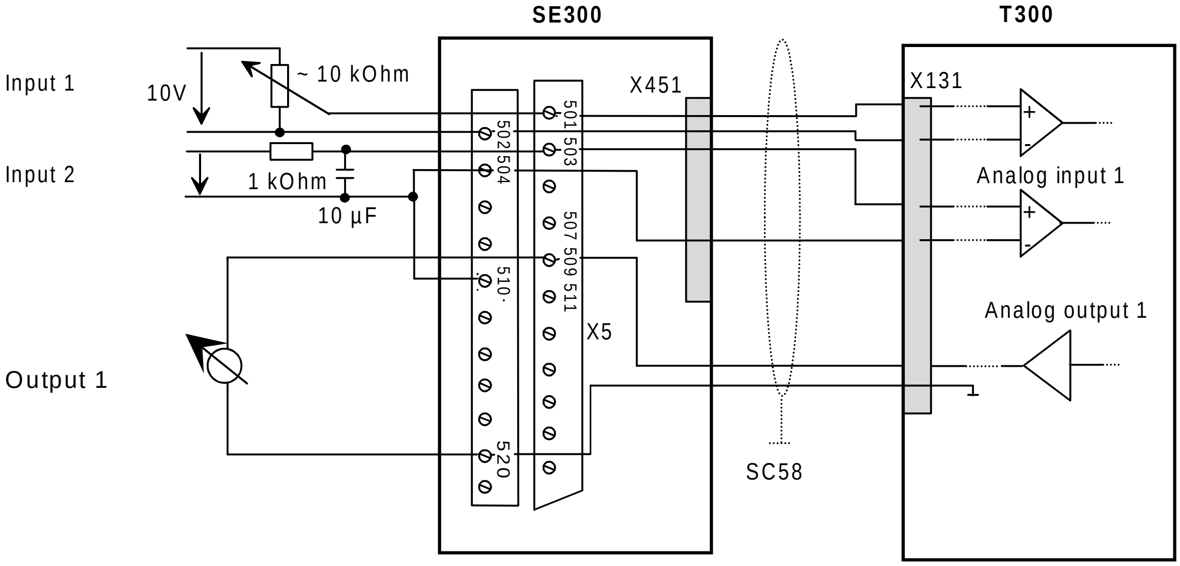

Fig. 10.3.4: Connecting the analog inputs and analog outputs

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- The analog inputs are **differential inputs**, in order to suppress common-mode noise and disturbances. The „reference potential“ (e.g. terminal 502 for input 1) must therefore also be connected!
  Further, it should be noted that the inputs are **non-floating** via the A/D converter!

- For unipolar signals, the inverting inputs must be connected at the analog signal reference points.
- Noisy signals must be smoothed using a low-pass filter, which is externally mounted. The recommended circuit, illustrated in fig. above refers to analog input sampling times of $\geq$ 8ms.

10.3.5 Connecting-up the binary inputs

Binary signals have a 24 V DC signal level referred to M24 (SE300 terminals 610, 630 or 640).

Low signal level (logical zero) is identified for
- an open-circuit input
- signals below +6V.

A **high signal level** is defined for voltages between 13 V and 33 V.

The input current at 24 V is typically approx. 5 mA and the delay time, approx. 1 ms.

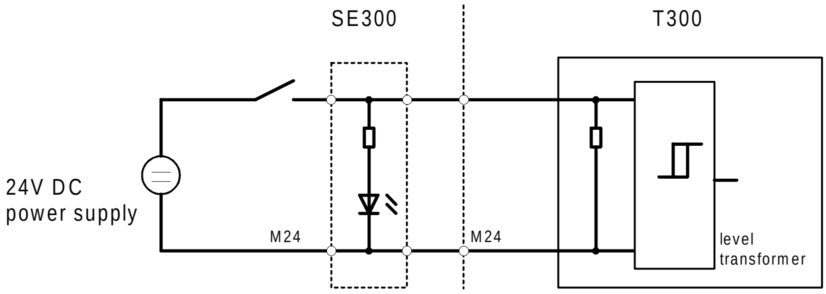

Fig. 10.3.5.a: Circuit diagram of a binary input

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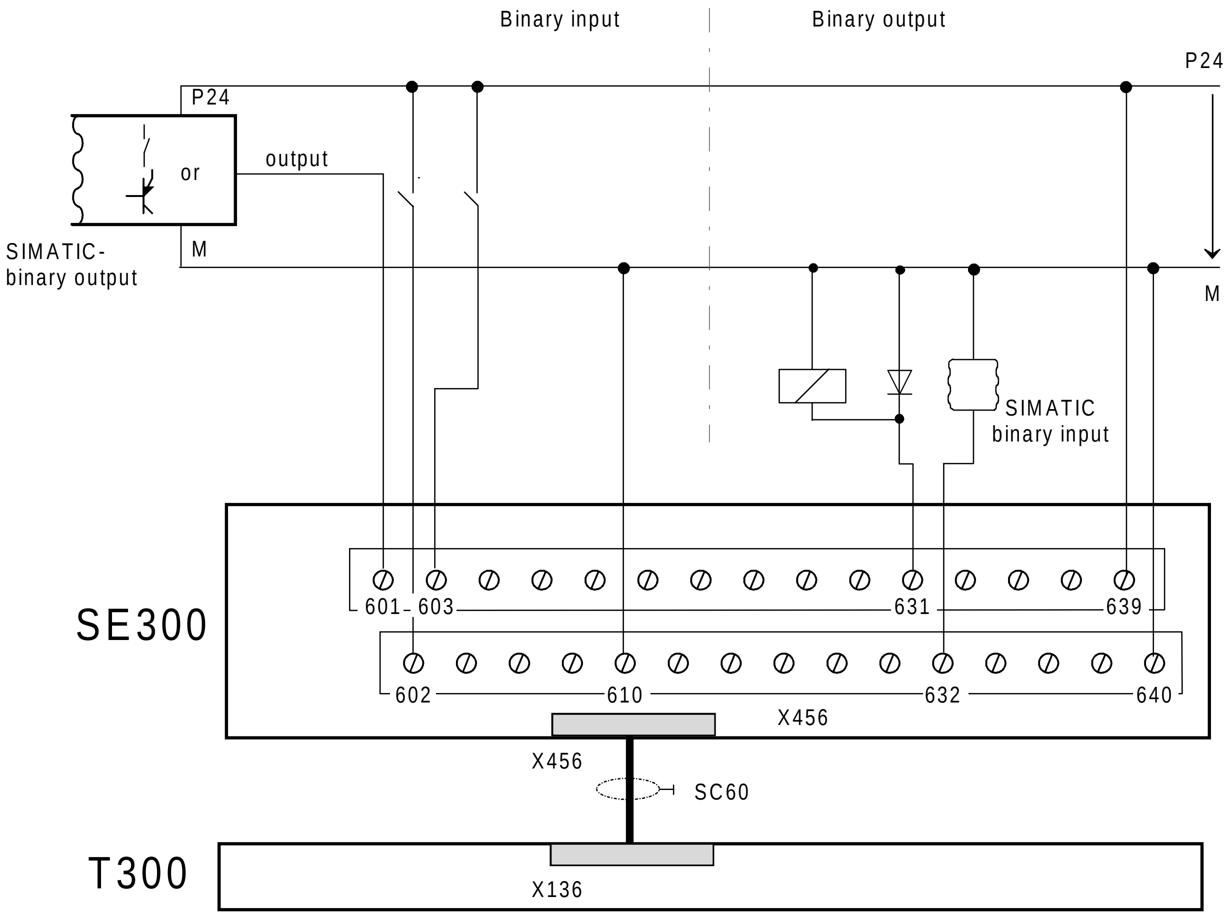

Fig. 10.3.5.b: Connecting-up the binary inputs and outputs

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10.3.6 Connecting-up the binary outputs

The binary outputs are also 24V DC signals, which are referred to M24 (terminal 610, 630 or 640 of the SE300). They are supplied from the P24 terminals (609, 619 or 639).

Each of the 8 outputs (terminals 631 to 638) can drive 0.2 mA to 100 mA, which is sufficient to control small signaling lamps or interface relays. A free-wheeling diode is provided on the T300, however, for inductive loads, it is recommended that a **free-wheeling diode** is directly connected at the load.

The outputs have electronic short-circuit protection to ground and P24.

The total of all outputs may not exceed 400 mA; the operating voltage range is +20 V to +30 V.

The switching delay is approx. 300 µs.

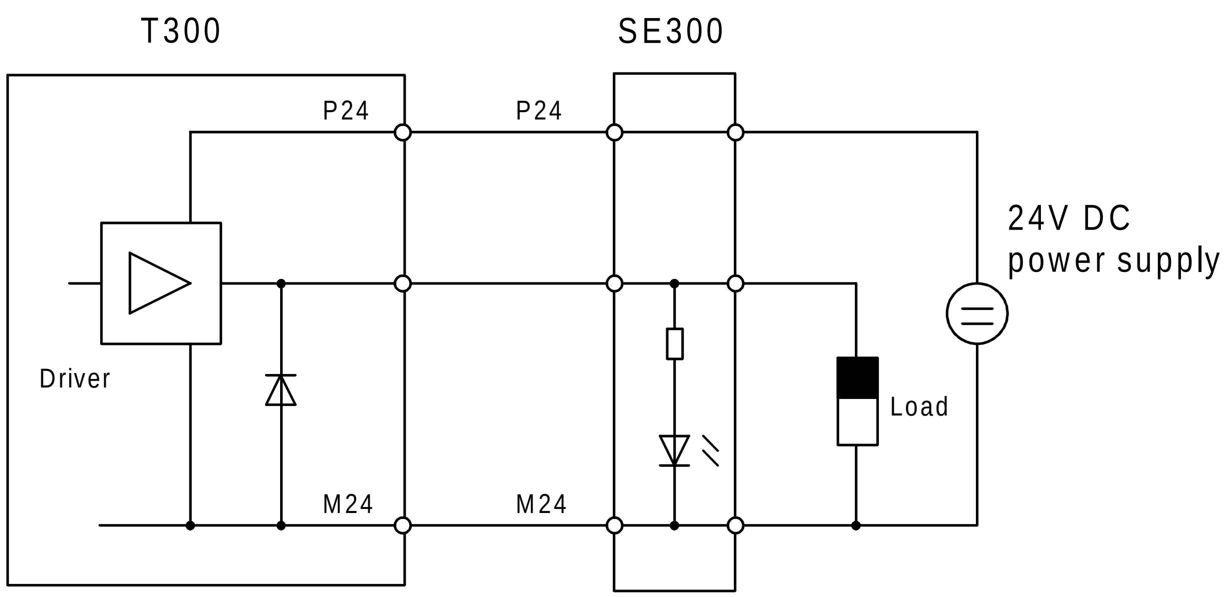

Fig. 10.3.6: Circuit diagram of a binary output

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P24 power supply voltage:

Binary inputs:

- The power supply voltage can either be taken from the drive converter (connector X101, terminals 13 and 23) or from an external power supply source.

Binary outputs:

- The power supply voltage can be taken from the converter or an external power supply.
  It should be noted, that a maximum of 150 mA can only be taken from the converter P24 supply (also refer to Section 10.4)

10.3.7 Connecting-up the serial interfaces

10.3.7.1 Serial connections, X132

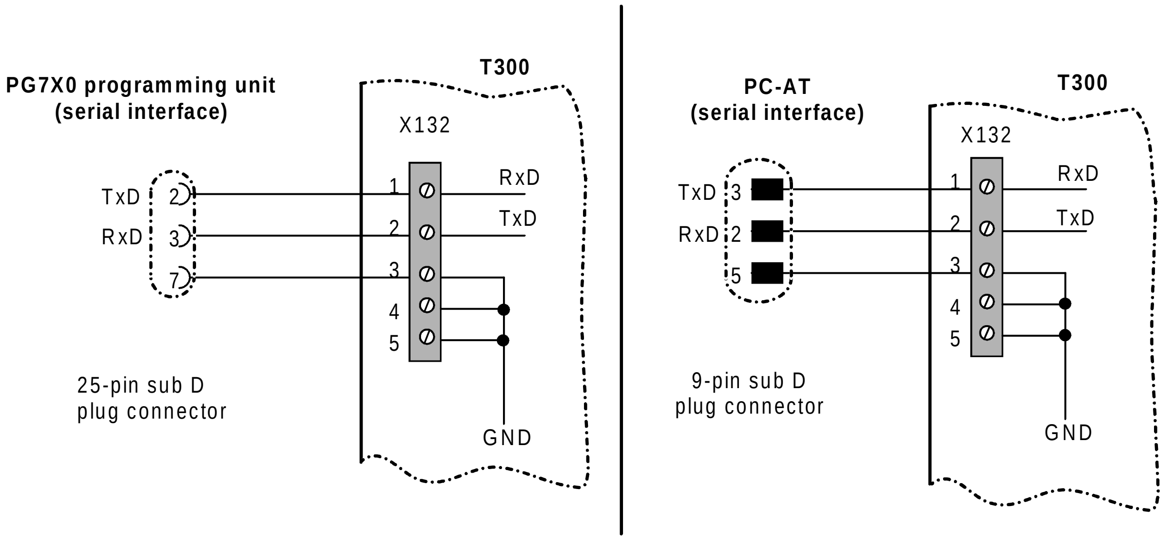


Fig. 10.3.7.1: T300 serial connections

File: X132_E.DRW

10.3.7.2 Peer-to-peer connection, X134

The peer-to-peer connection is used to cascade the setpoint between the drives .

- ♦ A transmitter only supplies **one** receiver:
  ⇒ For the receiver, the terminating resistors must be switched-in.
- ♦ A transmitter can supply up to 31 receivers:
  ⇒ All receivers must be connected as for a serial bus due the cable characteristic impedance. This means, that an incoming and an outgoing bus cable connector must be connected at each receiver.
  The terminating resistors must be effective for the last receiver in the chain. It is not permissible to connect-up the receivers in a star configuration!

Refer to Section 10.6 for further details regarding the terminating resistors.

Every cable section must be shielded!

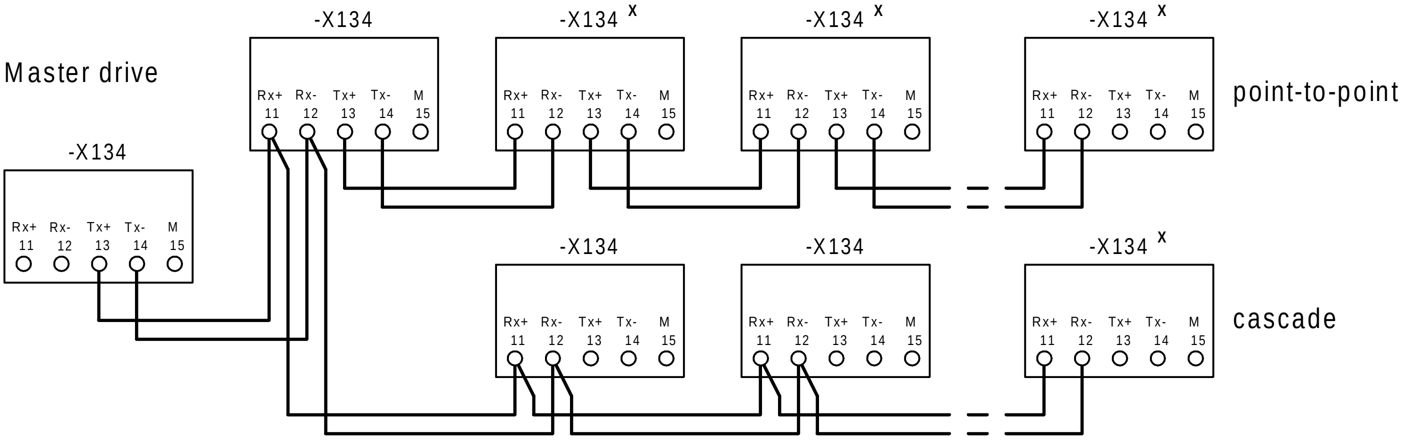


Fig.10.3.7.2: Peer-to-peer connection

File: PEER_E.DRW

x: For this T300, the **bus terminating resistors** must be switched-in,
i.e. at bus terminating switch S1, coding switches S1.3 and S1.4 must be set to ON!

11 Technical data

11.1 Hardware configuration

- 233mm x 100mm PC board format
- CPU 80C186, 20 MHz
- RAM 128Kbyte
- NVRAM 256*4 bit
- Possibility of connecting to the base drive electronics board (e.g. CU2) via a 1Kx16 bit dual port RAM
- Possibility of connecting to a communications board for data transfer (e.g. CB1)
- 7 differential analog inputs
- 4 analog outputs
- 16 binary inputs
- 8 binary outputs
- 2 pulse encoder inputs
- 2 serial interfaces: a) serial interface 1: Connector X132 with RS232 (e.g. PC connection) or
  connector X133 with a 2-wire RS485
- b) serial interface 2: Connector X134 with RS485, 2- or 4-wire
- Pushbutton, freely configurable or to start the diagnostics monitor
- 3 diagnostic LEDs
- Boot bridge for future expansions

11.2 Watchdogs

Several watchdogs are provided to monitor the functioning of the board (both the hardware and software); the following is checked.

- Ready signal delay for hardware accesses
- Double address coding errors
- Cyclic board operation
- Interrupt-control of the serial interface, timers and inputs

If a watchdog identifies an error/fault condition, the processor generates a „non-maskable interrupt“ (NMI), and attempts to create a normal operating status. If the processor itself is faulted, the board switches itself into an inactive condition, i.e. the analog and binary outputs are set to 0 V.

11.3 General technical data

Dimensioning the creepage distances and clearances	Pollution level 2 according to DIN VDE 0110
Degree of protection	IP00
Ambient temperature	0 to +50°C for self-cooling
Storage temperature	– 40 to + 70°C
Humidity class	F acc. to DIN 40040 (IEC 721 Part 3-3 Class 3K3), moisture condensation not permissible
Mechanical strength	According to DIN IEC 68-2-6 / 06.90
Dimensions	233.4 * 100mm
Weight	Approx. 1.5kg including 2 x round cables, SE300 and memory module
Current drain	P5: 1000mA typical P15: 130 mA typical + encoder load N15: 93 mA typical
Current drain for a 24 V external supply (Part of T300)	1A Referred to a minimum voltage of 20 V (incl. encoder power supply, terminals, SE300 LEDs

11.4 Inputs/outputs

All analog and binary inputs and outputs are **non-floating**! If the permissible signal level is exceeded, in addition to the input- or output stages, the complete board could be damaged!

Analog inputs

Number	7, multiplexed
Minimum input voltage	–10V
Maximum input voltage	+10V
Input resistance	10kΩ
Resolution	12 bits (corresponding to 4.88 mV)
Accuracy, absolute	+/– 3 LSB
Linearity error	≤ 1 LSB
Low pass filter	1.5kHz (-3dB transition frequency)

Analog outputs

Number	4, multiplexed
Minimum output voltage	– 10V
Maximum output voltage	+ 10 V
Output current, max.	10mA, short-circuit proof to ground
Internal resistance	56Ω
Resolution	12 bits (corresponding to 4.88 mV)
Accuracy, absolute	+/– 3 LSB
Linearity error	≤ 1 LSB
Voltage rise time (slew rate) of the outputs	3 V/µs

Binary inputs

Number	16, interrupt-capable
Input voltage	+24V nominal value
Input voltage for 0 signal	–1V to +6V or open binary inputs
Input voltage for 1 signal	+13V to +33V
Input current for a 1 signal	8mA typical
Input smoothing	< 700µs

Binary outputs

Number	8,
Power supply voltage	Must be fed-in externally
Nominal value	24V DC
Ripple	3.6V peak-to-peak (smoothing not required)
Permissible range	+ 15 to + 40V, including ripple
Short-time loading	+ 40V < 0.5s
Basic loading (all outputs open)	< 40mA
Output current for a 1 signal Nominal value Permissible range Only loaded by the LED	 100mA (92mA at SE300 terminal) 0.2mA to 100mA 8mA
Short-circuit protection	Continually short-circuit proof with respect to ground and P24
Total loading	Summed current of all outputs < 400mA
Signal level for 0 signal	Max. 2 V for load < 5kΩ
For a 1 signal	External supply voltage –2.5V
Switching delay	Max. 300µsec.

Pulse encoder connection (speed actual value sensing):

Number of pulse encoders which may be connected	2
Max. pulse frequency	**400kHz**
Min. duration for the signals A, B, N:	> 1µsec
Nominal displacement between tracks A and B	> 1µsec at every speed
Pulse level	0 – 30V
Signal level with input hysteresis: 1 signal 0 signal (optimized for pulse encoders with 15 V power supply voltage)	 > 8V < 5V
Input currents	8mA typical
Rough signal	Values as for binary inputs

Voltage at the external terminals (SE300) for the pulse encoder supply:

Output voltage	Nominal value: 15V, typically 14V
Output current, max.	0.1A, electronically limited to 0.15A under short-circuit conditions

11.5 Serial interfaces

The T300 has 2 serial interfaces:

1. Serial interface 1 terminals X132 or X133 on T300

Serial interface 1 is a 2-wire cable according to RS485 (X133) and RS232 (X132).

In the STRUC master program, this interface corresponds to connector **X01.**

NOTE
Serial interface 1 can **either** be used as RS485 **or** as RS232; this means, it is **not** permissible to **simultaneously** use the physical interfaces at terminal series X132 and X133!

2. Serial interface 2, terminals X134 on T300

Serial interface 2 is a 2- or 4-wire cable according to RS485 (X134). Changeover to 2- or 4-wire cable is realized automatically corresponding to the protocol set at the interface.

In the STRUC master program, this interface corresponds to connector **X02.**

The subsequent two diagrams show a schematic of serial interfaces 1 and 2, in conjunction with the bus terminating switch S1.

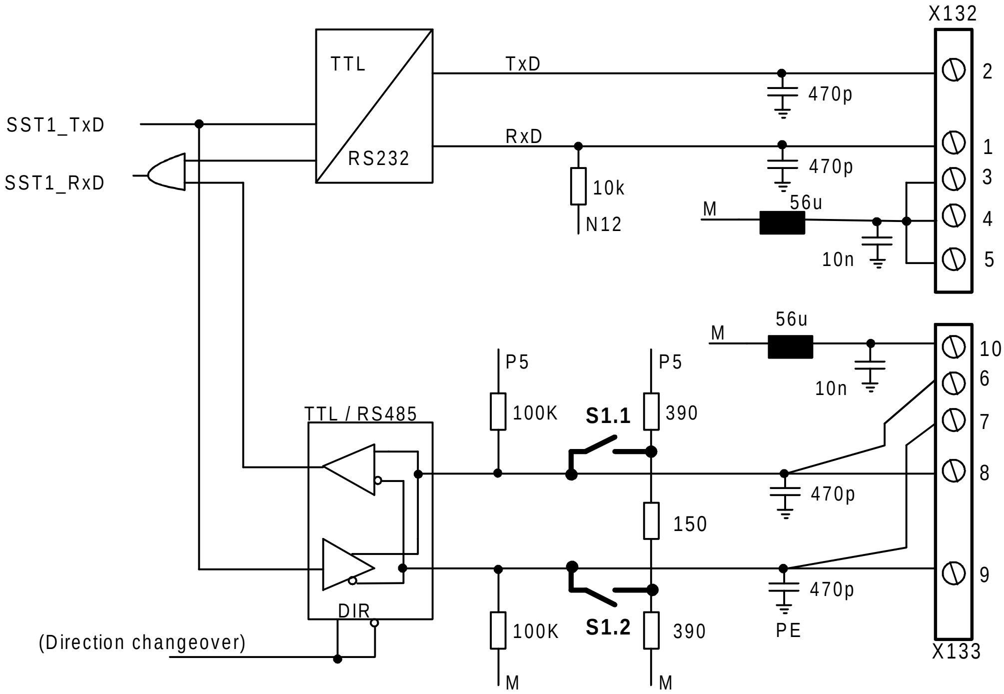


Fig. 11.5.a: Connecting serial interface 1 (RS485/RS232)

File: SST1_E.DRW

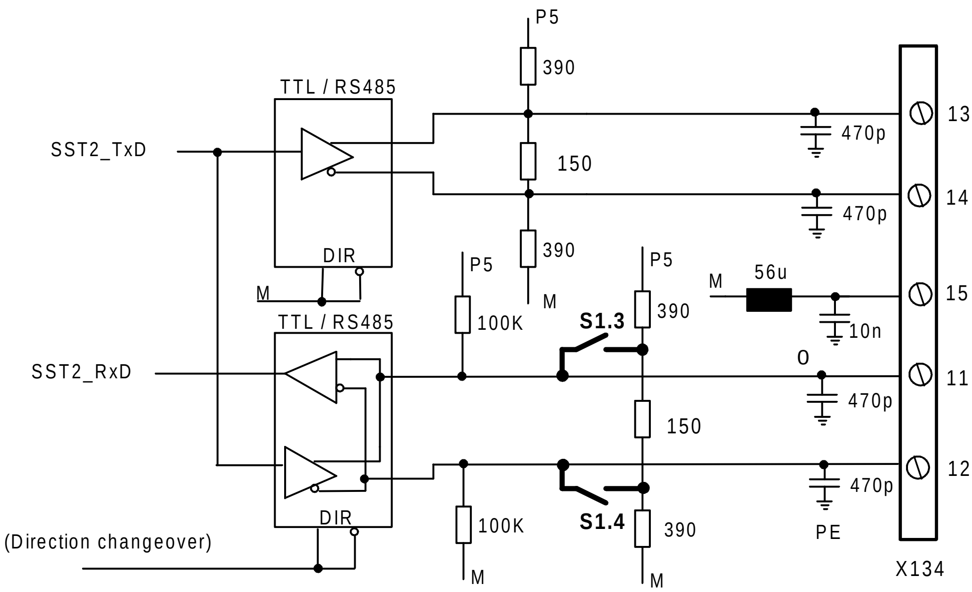


Fig. 11.5.b: Connecting serial interface 2 (RS485)

File: SST2_E.DRW

11.6 Bus terminating switch S1

The bus terminations are switched-in when switch S1 is in the ON position (coding switches 1-4).
The bus terminating resistance is approx. 120 Ohm.

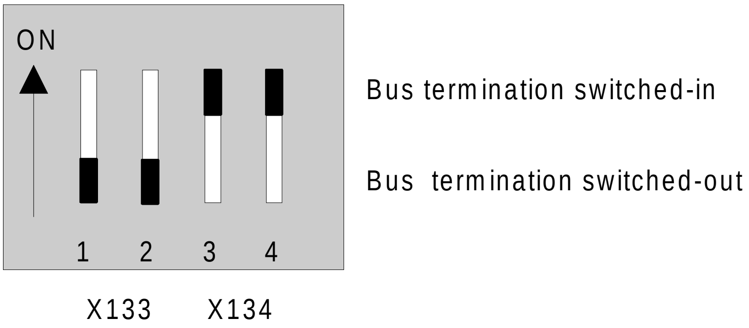


Fig. 11.6: Bus terminating switch S1
File: BUSABS_E.DRW

NOTE
Coding switches 1 and 2 or 3 and 4 must always be in the same setting so that the bus terminations are either switched-in or -out.

11.7 Pushbutton S3

A) Using the pushbutton, the SIMADYN D diagnostics monitor (9.6 kbaud, no parity bit) can be started when the voltage runs-up. It is only effective at interface 1 (connector X132/X133), which is then no longer available for other applications once the monitor has started!
Generally, the user does not use this monitor.

a) If a fatal T300 error/fault is identified during operation, which prevents the T300 operating correctly, then the diagnostics monitor can be started by actuating the pushbutton.

b) Independent of a possibly occuring error/fault, the monitor can be started at voltage run-up. The pushbutton must be depressed until the system goes into a READY status **(°008** or **°009)**!

B) The pushbutton can also be implemented (configured) with a switch function within the software. The diagnostic monitor can still be started (as described under A).

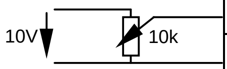
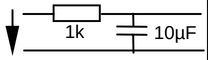
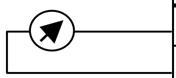
11.8 Diagnostic LEDs

Flashing of the LED indicates that the unit is in a perfect operating status. The associated LED is either lit or dark if a fault condition is present.

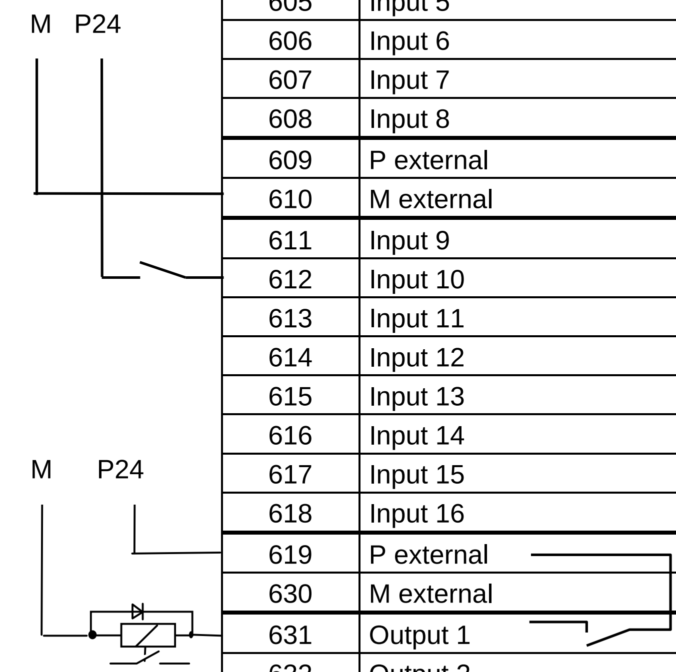
H1	**Red** LED	Dependent on the particular configuring: The flashing frequency is the sampling time of the function package @SIMD (TY-connector of T300 Board mask) In case of error it is 4 times lower!
H2	**Green** LED	Data transfer to the communications board O.K.; The flashing frequency is the sampling time of the DCCZ function function block
H3	**Yellow** LED	Data transfer to the basic drive converter O.K.; The flashing frequency is the sampling time of the DCCZ function function block

11.9 Connector assignments

Analog inputs/outputs and pulse encoder

Connection example	SE300 X5	Function	T300 X131	AD connector (FB)	Explanation
	501	Input 1 +	1	X5 A	Analog **in**puts 1 - 4
	502	Input 1 -	2		
	503	Input 2 +	3	X5 B	
	504	Input 2 -	4		
	505	Input 3 +	5	X5 C	
	506	Input 3 -	6		
	507	Input 4 +	7	X5 D	
	508	Input 4 -	8		
	509	Analog output 1	9	X5 H	Analog **out**put 1
	510	Ground analog (=520)	**10**		
	511	Input 5+	11	X5 E	Analog **in**puts 5 - 7
	512	Input 5-	12		
	513	Input 6+	13	X5 F	
	514	Input 6-	14		
	515	Input 7+	15	X5 G	
	516	Input 7-	16		
	519	Analog output 2	17	X5 J	Analog **out**puts 2-4
	520	Ground analog (=510)	**10**		
	521	Analog output 3	19	X5 K	
	522	Ground analog (=524)	**18**		
	523	Analog output 4	20	X5 L	
	524	Ground analog (=522)	**18**		
	531	Track 1A+	21	X5 M	Speed sensing 1
	532	Ground track 1A	22		
	533	Track 1B+	23		
	534	Ground track 1B	24		
	535	Zero pulse 1+	25		
	536	Ground zero pulse 1	26		
	537	Rough pulse 1	27		
	538, 539	Ground, encoder supply 1, Ground rough pulse 1	28, 29		
	540	15V encoder supply	30,39		
	541	Track 2A+	31	X5 N	Speed sensing 2
	542	Ground track 2A	32		
	543	Track 2B+	33		
	544	Ground track 2B	34		
	545	Zero pulse 2+	35		
	546	Ground zero pulse 2	36		
	547	Rough pulse 2	37		
	548, 549	Ground, encoder supply. 2, Ground rough pulse 2	38, 40		

Binary inputs/outputs



Connection example	SE300 X6	Function	T300 X136	AD connector (FB)	Explanation
	601	Input 1	1	X6 A	Binary inputs 1 - 8
	602	Input 2	2		
	603	Input 3	3		
	604	Input 4	4		
	605	Input 5	5		
	606	Input 6	6		
	607	Input 7	7		
	608	Input 8	8		
	609	P external	9		External supply for inputs and outputs
	610	M external	10		
	611	Input 9	11	X6 B	Binary inputs 9 - 16
	612	Input 10	12		
	613	Input 11	13		
	614	Input 12	14		
	615	Input 13	15		
	616	Input 14	16		
	617	Input 15	17		
	618	Input 16	18		
	619	P external	19		External supply for inputs and outputs
	630	M external	20		
	631	Output 1	21	X6 C	Binary outputs 1 - 8 (NO contacts)
	632	Output 2	22		
	633	Output 3	23		
	634	Output 4	24		
	635	Output 5	25		
	636	Output 6	26		
	637	Output 7	27		
	638	Output 8	28		
	639	P external	29		External supply for inputs and outputs
	640	M external	30		

Note: For the first **SE58** (Order No.: 6DD3460-0AB0, Item No. 465460.9001.00) which were supplied, terminals 630...640 are designated as 620...630!

„Associated“ ground- and P24 terminals:
On the T300 the following terminals are connected directly:

X131	10=18 28=29=38=40	(Ground Analog outputs) (Ground Speed sensing)
X136	10=20=30	(Ground external for binary inputs/outputs)
X136	9=19=29	(P24 external for binary inputs/outputs)

These 3 different grounds are connected via reactors with the T300 grounding.
However, it is recommended that the „associated“ grounds are used in order to prevent possible overload conditions and to achieve a structure which is, as far as possible, in line with the EMC regulations.
The T300 ground is connected to PE through 0 Ohm resistors.

Serial interfaces

Connector X132 (serial interface 1)	
Terminal No.	**RS232**
1	RxD
2	TxD
3	Ground
4	Ground
5	Ground

Connector X133 (serial interface 1)	
Terminal No.	**RS485 2-wire operation**
6	+ RxD / +TxD
7	- RxD / - TxD
8	+ RxD / +TxD
9	- RxD / - TxD
10	Ground

Connector X134 (serial interface 2)		
Terminal No.	**RS485 for 2-wire operation**	**RS485 for 4-wire operation**
11	+RxD / +TxD	+RxD
12	- RxD / -TxD	- RxD
13	No function (+TxD)	+TxD
14	No function (-TxD)	-TxD
15	Ground	Ground

12 Application software

The T300 control software can either be generated, user-specific using STRUC (refer to the next section), or pre-configured standard software packages may purchased from Siemens.

12.1 Standard software packages

Four different standard software packages are available in the form of pre-programmed memory modules:

- MS320 Axial winder
- MS340 Angular synchronous control
- MS360 Multi-motor drive
- MS 380 Positioning

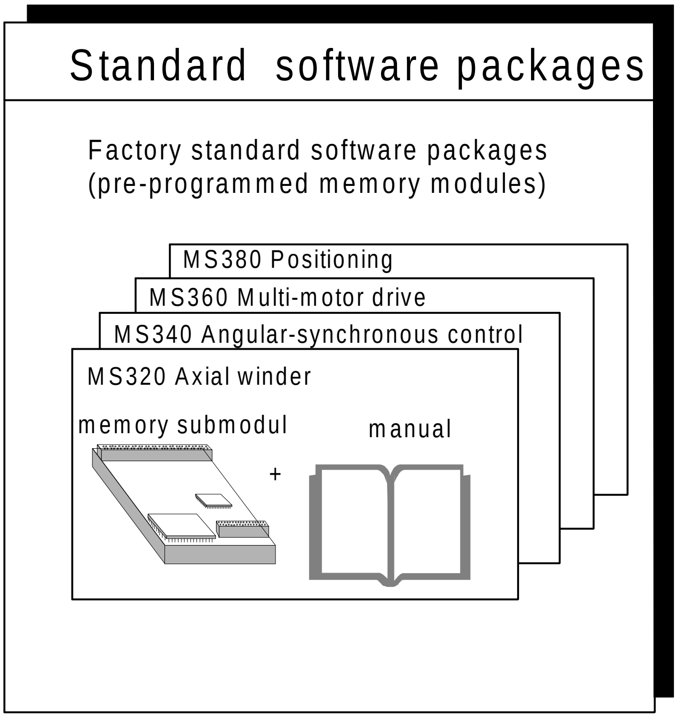


Fig. 12.1: Standard software packages

File: STANDPR_E.DRW

RELEASE Standard software packages
The T300 standard software packages MS320, MS340, MS360, MS380 are released for operation in the **MASTER DRIVES** basic units (CU2, CU3, CUVC, CUMC). The T300 standard software packages MS320, MS340, MS360, MS380 are **not released** for operation in the **SIMOREG DC_MASTER** 6RA70. In this case the T300 control software can be generated, user-specific using STRUC.

12.2 User-specific software configuring

If other solutions are required in addition to the standard software packages, then the user can simply generate his own open- and closed-loop control solutions.
To start off with, the required closed-loop control structure is configured using STRUC, and from this, a binary code program generated which is then executed on the T300.

The MS300 memory module, which is inserted on the T300 board, is used as memory medium both for the user program (binary code) of the board as well as for the system software (operating system, function function block code etc).
A parallel programmer (PP1X) and UP3 adapter are used to program the memory module, whereby the parallel programmer is connected at the parallel interface of a PG/PC.

As the memory module can be erased using an UV lamp, a new application software package can be programmed on the module after the previous contents have been erased.

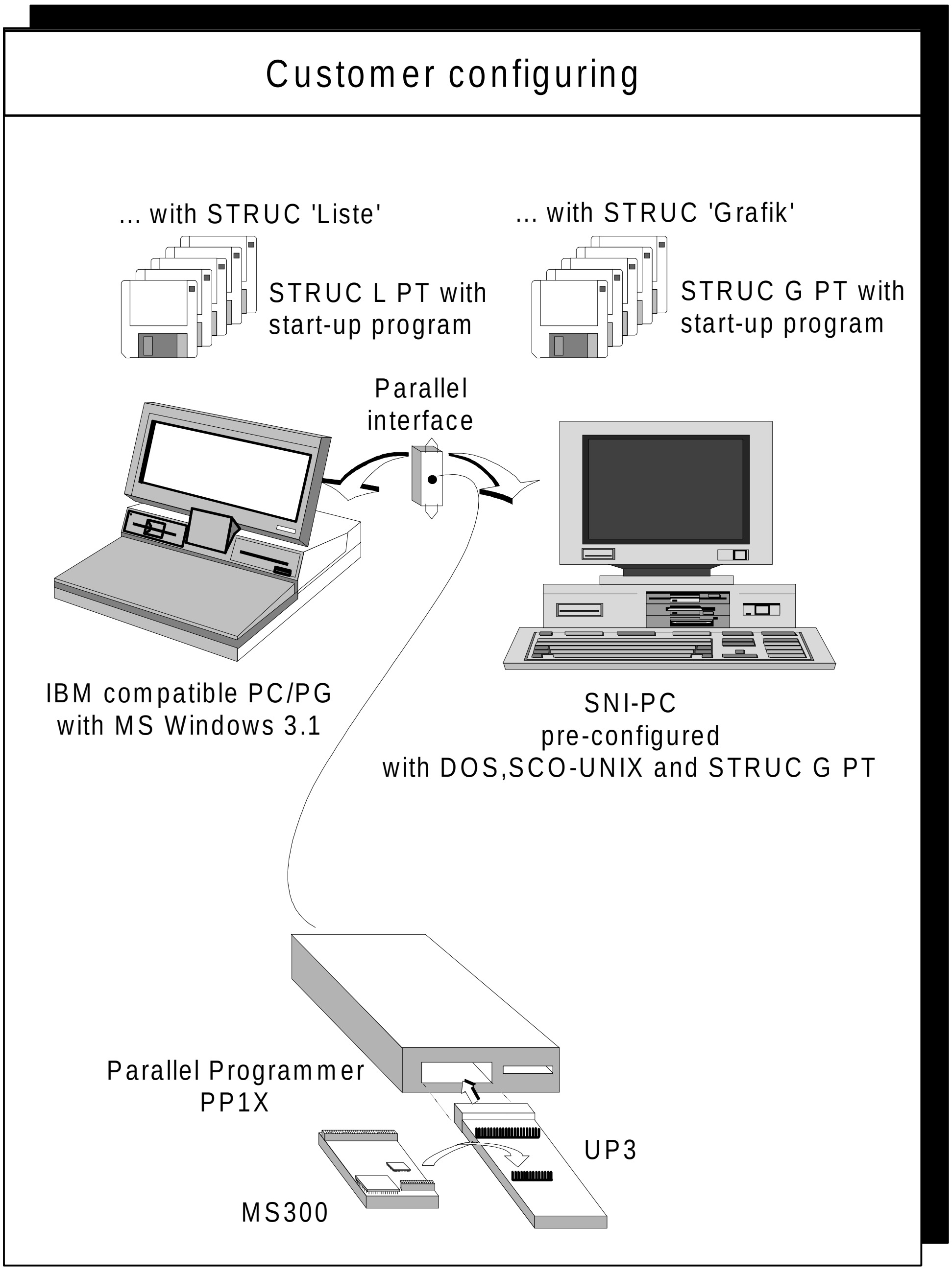


Fig. 12.2: Customer configuring

File: STRUC1_E.DRW

13 Configuring the T300 for SIMOVERT 6SE70 and DC_MASTER 6RA70

The following instructions assume that you have prior knowledge of SIMADYN D configuring!.

When using the T300 in the drive converter, the function blocks, described in this section, must be configured. The configuring rules and regulations and possibilities of SIMADYN D are valid. Only the T300-specific configuring measures are presented in this Section.
The function blocks, presented here, are available **from software version 4.2.0 (March 95)**.

The function blocks required for the „fast“ peer-to-peer protocol, are available from STRUC-software release 4.2.3!

Information regarding the notation:
For the examples shown in STRUC L, the (function block) names to be assigned by the configuring engineer are shown in *italics*, if they are also required elsewhere in the software.
Important (function block) types are printed in **bold**.

13.1 Master program

13.1.1 SR6 subrack

An SR6 subrack must be selected (a dedicated type was <u>not</u> created for the converter electronics box). T300 is configured at the 1st slot of the SR6 subrack mask (connector S01). If a communications board is used, then a slot must be specified **before** the basic drive converter control board (CU1, CU2, CU3).

Configuring example:

```
 30 EBOX      : SR6                    "Subrack with 6 slots, L bus"
  31 L01 6S = '.      .       .          .      .      .      '"Descr.-"
  32 S01 8N = D01_P1,SW23V0            "Slot.1:T300 board- + mem.module name
  33 S02 8N = 0
  34 S03 8N = CS                       "User name of the comm. board."
  35 S04 8N = GG                       "User name of the CU control board."
  36 S05 8N = 0
  37 S06 8N = 0
```

13.1.2 Board mask T300

Contrary to other SIMADYN D board masks, the following points must be observed:

As the binary- and analog signals as well as the pulse tachometer must **always** be fed, for the T300, via the SE300 terminal module, no information is required for the appropriate connectors in the processor mask (X5A to X6B).

13.1.3 T300 synchronization to the base drive cycle time

The T300 synchronization to the base drive cycle time is only approved for the MASTER DRIVES basic. A T300 synchronization to the base drive Simoreg DC_MASTER 6RA70 is not applicable.

The MASTERDRIVES base drive control board generates at the start of its 4 times basic cycle time, i.e. **4*P308** (CU2), **4*P357** (CUVC) a pulse via the backplane bus LBA to T300.
The T300 can synchronize its basic cycle time to this base drive cycle time.

If the clock cycle, generated by the base drive control board is to be used on the T300, an appropriate (equivalent time) **constant**, with the value TG = **4 * P308** or **4*P357** must be specified in the T300 board mask at the connector for the basic cycle time T0.

T0 **TG = xxx[ms]**

Further, the **basic clock cycle source** must be configured. The backplane bus LBA, which transfers the base drive cycle time from CUx to T300, establishes a so-called „L bus“ for the STRUC configuring language.
Thus, the following must be specified when synchronizing to the base drive:

T0 TG = xxx[ms] **,SRC=TL**

In order to optimally harmonize data processing on the control board and T300, it is recommended that an additional **start delay** is specified for the T300 cycle time. This can either be realized at the connector, base cycle time T0 using an additional attribute

T0 TG = xxx[ms] ,SRC=TL ,**TDL=yyy[ms]**

or using the **DTS function block**. The function block has the advantage, that the delay can be changed without making any master program changes and can therefore be made online (in this case, it is only necessary to reset the T300.)

13.1.4 MS300 memory module

MS300 memory modules are configured for the T300.

13.1.5 Converter log-on using the DPZ initialization block

13.1.5.1 Block description

The initialization block (IB) DPZ („<u>D</u>evice <u>P</u>rocessor module <u>Z</u>“) signals to the T300 that there is a control board CU at its dual port RAM.

The block name (in the example „GG“), which is assigned by the configuring engineer, is specified at the CTS- and DTS connectors of other function blocks (refer below).

Configuring example:

```
87 GG        : DPZ            "IB for the control board (basic drive conv.)"
88 T0  TG = 4.8[MS],SEND=TL    "Cycle time, CU provides the basic clock"
```

13.1.5.2 CU as source for the basic clock cycle

The DPZ initialization function block has a connector T0, where a **transmitter for the basic clock (T0)** of the T300 can be specified (as was shown in the previous section, the T300 can be configured so that it receives the basic clock from the LBA backplane bus („L bus“ in STRUC).
In the drive converter, this basic clock is generated by the CU control boards, via the backplane bus LBA and sent to T300, so that the following connector attribute must be specified (refer to the example below)

,SEND=TL

To calculate the cycle time dependent time constants, an (equivalent time) **constant** = **4 * P308** (drive converter cycle time) must also be specified at the T0 connector. This constant corresponds to the clock supplied from the CU.

13.1.6 Logging-on a communications board with CSZ

The initialization function block (IB) CSZ („Communication Submodule Z“) signals to the T300 that there is a communications board connected at its X135 connector (e.g. CB1, SCB1, SCB2).
In order to permit configuring standards, this function block can also be configured, even if there is no communications board.

The function block name, to be assigned by the configuring engineer (under „CS“ in the example below), is specified at the CTS- and DTS connectors of other function blocks (refer below).

Configuring example:

```
85 CS        : CSZ                      "IB for the interface board"
```

13.1.7 Example of a master program (as excerpt)

```
.........
  30 EBOX      : SR6                  "Subrack 6 slots, L bus"
  31 L01 6S = '.       .       .       .       .       .       '"Description"
  32 S01 8N = D01_P1,SW23V0          "Slot 1:T300 board- + mem. module name
  33 S02 8N = 0
  34 S03 8N = CS                     "User name of the comm. board"
  35 S04 8N = GG                     "User name of the CU control board"
  36 S05 8N = 0
  37 S06 8N = 0
........
  40 D01_P1    : T300                 "Processor board type T300"
  41 PIJ 1N = 0                      "Interrupt processing FP"
  42 SFJ 1N = 0                      "System error FP"
  43 PRX 1N = @RXD                   "Special communications FP - transmit"
  44 PJ1 1N = CONF                   "1. permanent processing-FP"
  45 PJ2 1N = SYNCON                 "2. permanent processing-FP"
  46 PJ3 1N = CONTRL                 "3. permanent processing-FP"
  47 PJ4 1N = PARA                   "4. permanent processing-FP"
.........
  52 PTX 1N = @TXD                   "Special communications FP - transmit"
  53 T0  TG = 4[MS]                  "Basic cycle time"
  54 T1  TS = 1                      "1.sample. time *T0, gen. LB- and CB conn."
  55 T2  TS = 4                      "2.sample time.           ''                 "
  56 T3  TS = 0                      "3.sample time.           ''                 "
  57 T4  TS = 32                     "4.sample time.           ''                 "
  58 T5  TS = 64                     "5.sample time.           ''                 "
  59 TY  TX = T5                     "System FP sample. time"
  60 CCT 8R = 0                      "Transmit telegram names Tx"
  61 CCR 8R = 0                      "Receive telegram names Tx, e.g. PKW.T4"
  62 COP 8R = 0                      "Op. control telegram names Tx"
  63 X01 1N = 0                      "1. serial interface"
  64 X02 1N = PEER                   "2. serial interface"
  65 X5A 1K <                        "Analog input 1"
  66 X5B 1K <                        "Analog input 2"
  67 X5C 1K <                        "Analog input 3"
  68 X5D 1K <                        "Analog input 4"
  69 X5E 1K <                        "Analog input 5"
  70 X5F 1K <                        "Analog input 6"
  71 X5G 1K <                        "Analog input 7"
  72 X5M 4K <                        "Speed sensing 1"
  73 X5N 4K <                        "Speed sensing 2"
  74 X6A 8K <                        "Binary inputs 1, interrupt-capable"
  75 X6B 8K <                        "Binary inputs 2, interrupt-capable"
  76 X5H 1K >                        "Analog output 1"
  77 X5J 1K >                        "Analog output 2"
  78 X5K 1K >                        "Analog output 3"
  79 X5L 1K >                        "Analog output 4"
  80 X6C 8K >                        "Binary outputs"
.........
  82 SW23V0    : MS300                "Memory submod.:512K,2K EEPROM,0WS"
.........
  85 CS        : CSZ                  "IB for interface board"
.........
  87 GG        : DPZ                  "IB for control board (basic drive conv.)"
  88 T0  TG = 4.8[MS],SEND=TL        "Cycle time, CU provided basic clock"
.........
```

13.2 Function blocks in function packages for initialization

The function blocks described in this section

@GRZ
DCCZ

must be configured so that the T300 can run in the drive converter.

The function blocks presented in the subsequent sections

TFAW
PRP
TXT
PTR
@PTP
@PTP01

are only configured, if the specified functions are actually required.

13.2.1 Central block @GRZ in the transmit communications FP

The „GRZ“ (drive response Z)“ function block initializes (connects) the T300 to one board, connected via a dual port RAM. A @GRZ must be configured, both for the CU as well as for a communications board!

To be configured **in the transmit communications FP**!

Input conn.	Type	**Explanation, @GRZ**
CTS	CR-	Depending on the CPT conn., either the board name of the drive converter (refer to IB DPZ in the MP) or the board name of the comm. board (refer to IB CSZ in the MP) must be specified.
CPT	B1-	=0: Basic drive converter and =1: Comm. board should be initialized

Output conn.	Type	**Explanation, @GRZ**
QTS	B1	Transfer status to the basic drive converter or communications board : 0: Data transmission faulted 1: O.K.
YTS	O2	Error code (refer to the Manual /1/ Sect. 6)

Configuring example:

```
52 CU_DPR    : @GRZ
53 CTS CR - GG
54 CPT B1 - 0                      "=0: comm. with the drive conv. (GG)"
55 QTS B1 >
56 YTS O2 >
57 +
58 CS_DPR    : @GRZ
59 CTS CR - CS
60 CPT B1 - 1                      "=1: comm. with the comm. board"
61 QTS B1 >
62 YTS O2 >
```

13.2.2 Dual port RAM administration using DCCZ in the standard FP

The „Device Configuration Control Z“ function block initializes and administers the communication channels (process data, parameters) to the base drive (CU), **and** a possibly available communications board. It processes the heartbeat counter monitoring, and controls monitoring LEDs H2 and H3 on the T300.

It may only be configured in the standard FP and in cycle times 100ms <= Ta <= 256ms
If this is not the case, initialization is not correctly executed.

Information regarding the address connectors AR, AT:
A specification must be made at the AR/AT connectors of the telegram blocks or the direct transmitter/receiver, for the coupling to the basic drive converter (CU) or communications board (SCB1/2, CB1), e.g.

AR NS - ‘0’
AT NS - ‘0’

Input conn.	Type	**Explanation, DCCZ**
DTS	CR-	The FB name of the IB DPZ in the MP is specified (board name of the basic drive converter)
CTS		The FB name of the IB CSZ in the MP is specified (board name of the communications board): A 0 must be entered if a communications boad is not used.

Output conn.	Type	**Explanation, DCCZ**
QTS	B1	Data transmission status to the basic drive converter or communications board : 0: Data transmission faulted 1: O.K.

Configuring example:

```
279 KOPINI    : DCCZ
280 DTS CR - GG
281 CTS CR - CS
282 QTS B1 >
```

13.3 Error- and alarm function block TFAW

The „Technology Faults and Warnings“ function block transfers the binary signals (V2 type) available at its input connectors, to the base drive as converter faults (the drive is then shutdown) or alarms.
A set bit generates a fault or alarm.

When the fault/alarm cause has disappeared, the software must reset the appropriate bit. Faults are only acknowledged on the base drive control board.
The signals present at the TFAW are not influenced by an acknowledgement. The binary values of all connectors are transferred to the base drive at every cycle time.

Can be configured in the standard FP; multiple configuring not possible!

Input conn.	Type	**Explanation, TFAW**
DTS	CR-	Board name of the base drive (DPZ in the MP)
F01	V2	Faults F116 - F131 (e.g. bit 0 generates F116)
F02		Faults F132 - F147
A01		Alarms A097 - A113
A02		Alarms A114 - A129

Output conn.	Type	**Explanation, TFAW**
QTF	B1	Data transmission status, fault channel 0: Faulted 1: Operational
YTF	O2	Error code, fault channel 0: Error-free
QTA	B1	Data transmission status, alarm channel
YTA	O2	Error code, alarm channel
QTS	B1	Data transmission status (central administration)
YTS	O2	Error code (central administration)

Error codes, refer to the Manual /1/ Sect. 6!

13.4 Parameter processing

Restrictions:

1.) Parameters defined on the T300 can be read and changed for

- SIMOVERT MASTER DRIVES **FC/VC** (CU1,CU2) only from **software release V1.2** (supplied since 7.95).

- SIMOVERT MASTER DRIVES **SC** (CU3) with **software release V1.1** (supplied since 9.95).

- SIMOVERT MASTER DRIVES **VC** (CUVC) only from **software release V3.11** (supplied since 97).

- SIMOVERT MASTER DRIVES **MC** (CUMC) only from **software release V1.2** (supplied since 97).

- SIMOREG DC_MASTER **6RA70** only from **software release V1.7**

The software release can be read using drive converter parameter **r720.1** (CU1, CU2, CU3), **r69.1** and **r828.1** (CUVC, CUMC), **r60** (6RA70).

2.) Parameters, which represent a time, can presently only be configured with in „ms“ units!

3.) Time-reciprocal connector types, which refer to another cycle time than their own (e.g. R2:T2“ of a function function block in cycle time T1), presently cannot be defined as parameter.
Remedy: Configure a DUMY function block in the associated reference cycle time
(in the example, T2) and
feed the signal via a $ connection into the required cycle time (in the example T1).

13.4.1 Defining parameters using signal designators

A connector can also be read and changed as parameter. In this case, a signal designator as connector attribute must be configured in the following form at the input- or output connectors involved:

‚’TP_xxx’ with 0<= xxx <= 999 as parameter number

Technology board parameters are displayed as follows, depending on where they are defined on the base drive operating control panels (PMU, OP1):

at the output connector: **„dxxx“** (display, cannot be changed),

at the input connector: **„Hxxx“**

A parameter at an input connector can only be practically (effectively) changed, if this connector is not connected-up, i.e., if a **constant** is configured at the input connector.
A connected input connector can be changed via the parameter, however the value is effective for the maximum of one cycle time (depending on the execution sequence of the function blocks).

It is not permissible to assign parameter numbers twice!

It is recommended that a parameter is configured with the number „TP_000“ in order to be able to easily use the OP1.

13.4.2 Reading and changing parameters using PRP

The connectors, defined on the T300 as parameters, can be read and changed using the „Parameter Reply“ function block. This is simultaneously possible from several sources, for example, from the base drive:

PMU operator control panel or via the
serial interfaces SST1 (e.g. OP1), SST2 or from
communication boards (CB1, SCB2).

The PRP function block can be configured **once** in a standard FP and only in a **samping time ≥ 100 ms**! The parameter read and change tasks from all of the interfaces are responded to in this cycle time.

Connector types correspond generally directly to the parameter types. Several **type conversions** are realized on the T300 due to the resolution and the value range required:

Connector type	**Parameter type**
N2, E2	I4
D2, T2, R2	I4 (O4 is **not** defined in the base drive (CU))

Input conn.	Type	**Explanation, PRP**
DTS	CR-	Board name of the base drive (refer to DPZ in the MP)
CTS		Board name of the comm. board (refer to CSZ in the MP)
NP	O2	Number of the existing parameters (<1000); Conn, reserves the appropriate space in the administration tables. More parameters than are actually available can be specified.
LID		Selecting 2 different parameter names at the string connectors of the TXT-FBs configured tests; is also used to select the language: **0:** Selecting texts from the connectors designated with the 'TP**T**xxx' attribute (xxx: Parameter number); **<>0:** Selecting the connectors with the Tp**t**xxx attribute
MEN		Defined access rights of all parameters: **0:** Parameters can be read and **changed**, 1: Can only be be read

Output conn.	Type	**Explanation, PRP**
NPF	O2	Number of configured parameters
NTF		Number of available parameter names
NPD		Number of parameter numbers which have been assigned twice
NTD		Number of parameter names which have been assigned twice
NPE		Number of the parameters which have not found space in the administration list as the NP conn. is too small
NTE		Number of unavailable parameter names, because not configured with TXT function block
YTB		Error code, basic converter channel
QTB	B1	Operating status, basic converter channel: 0:Faulted 1:Ready
YTC	O2	Error code, comm. board channel
QTC	B1	Operating status, comm. board channel
YTK	O2	Error code, operator panel channel
QTK	B1	Operating status, operating panel channel
YTS	O2	Error code (central administration)
QTS	B1	Operating status (central administration)

Error code, refer to the Manual (Section 6 /1/)

13.4.3 Parameter names defined using TXT

Using the TXT text function block, parameters, defined using the signal designator, can be assigned **up to 2 parameter** names.
The assignment of the parameter names specified here to the parameter numbers is realized via the attributes attached to the parameter names in the following form:

T1 NS - **'Drehzahlistwert' ,'TPT001'**

or

T2 NS - **'speed actual val' ,'TPt001'**

The two different parameter names, assigned to a parameter number are selected via the LID connector of the PRP function block (refer there).

Input conn.	Type	**Explanation, TXT**
T1	NS-	Parameter name 1
T2		Parameter name 2
...		...
T16		Parameter name 16

Output conn.	Type	**Explanation, TXT**
		None!

13.4.4 Configuring example, parameters

```
PARAMS    : PRP                  "Parameter function block"
DTS CR - GG
CTS CR - CS
NP  O2 - 200                     "No. of parameters"
LID O2 - 0
MEN B1 < 0                       "Inhibit par. changes"
NPF O2 >                         "Number of found par."
NTF O2 >                         "Number of texts found"
NPD O2 >
NTD O2 >
NPE O2 >                         "Number n. of par. entered"
NTE O2 >                         "Number n. of texts entered"
YTB O2 >
QTB B1 >
YTC O2 >
QTC B1 >
YTK O2 >
QTK B1 >
YTS O2 >
QTS B1 >
.................
P001      : DUMY
X   N2 < 1.1,SCAL=163.84         "Software release"
Y   N2 > ,SCAL=163.84,FORM=1 ,'TP_001'
.................
TEX000    : TXT
T1  NS - 'Synch. contr. SW21','TPT001'
T2  NS - 'Language D/E=1/2' ,'TPT002'
T3  NS - 'Spec handle. V2/B1','TPT003'
T4  NS - ''
T5  NS - 'Encoder par. SLAVE','TPT018'
T6  NS - 'Encoder par. MASTE','TPT019'
T7  NS - ''
T8  NS - ''
T9  NS - 'Enc. pulse No. SLAVE','TPT010'
T10 NS - 'Enc. pulse No. MASTE','TPT011'
.................
T16 NS - 'Pos. act. val. MASTER' ,'TPT017'
```

13.5 Base drive parameters via the comm. board with PTR

If parameters of a base drive (CUx) are to be read or changed via a communications board, the „Parameter Transport“ PTR function block must be configured. It transfers the parameter orders and parameter replies via the T300, located between the communications board and the base drive.

The PTR function block is configurable **once** in a standard FP.

Input conn.	Type	**Explanation, PTR**
DTS	CR-	Board name of the basic converter (refer to IB DPZ in the MP)
CTS		Board name of the comm. board (refer to IB CSZ in the MP)

Output conn.	Type	**Explanation, PTR**
YTS	O2	Error code
QTS	B1	Operating status: 0: Faulted 1: Ready

Error code, refer to the Manual /1/ section 6!

Configuring example:

```
269 TRANS     : PTR         "Param.transport CU <-> CBx"
270 DTS CR - GG
271 CTS CR - CS
272 QTS B1 >
273 YTS O2 >
```

13.6 Peer-to-peer coupling

A fast serial coupling to partners, for example, T300 and SCB2 boards for SIMOVERT Master Drives as well as to SIMOVERT P 6SE12 and SIMOREG K 6RA24 drives can be established using the „Peer-to-peer“ coupling.

For baud rates up to 115.2 kbaud, a maximum of 5 data words can be transferred in full duplex.

Only 1 telegram can be defined in the transmit direction and receive direction, i.e., only one transmit- and receive function block may be configured.

The net data length of the transmit- and receive function blocks can be different. However, a receiver only accepts data from a received telegram, if the configured length corresponds with the received telegram length (LTW- or LT connector).

Different versions are available depending on the particular STRUC version:

STRUC V4.2.3: Configuring with function blocks @PTP01, CTPP, CRPP
(max. baud rate: 115.2kbaud; requires little computation time)

for V4.2.1 to be asked (special libaries KFSLIB, FBSLT1 required)!

STRUC V4.2, V4.2.1 and V4.2.2: Configuring with function block @PTP
(max. baud rate: 38.4kbaud)

13.6.1 Configuring a peer-to-peer telegram with @PTP01, CTPP, CRPP

A peer-to-peer protocol is avaialble with STRUC release V4.2.3, which

- has a high baud rate,
- has minimum telegram delay times and
- only loads the T300 with low computation time.

Initialization:

The **@PTP01 function block must be configured in the special FP transmit**.
The cycle time can be freely selected, as it only takes over the initialization of the serial interface..

As a result of the 4-wire RS485 interface, the peer-to-peer protocol can only run at **connector X134**, i.e. serial interface 2 (**connector X02** of the board mask).This „connector“ X02 must be configured, together with the T300 board names at the **CTS connectors** of @PTP01, CTPP and CRPP.

Input-conn.	Type	**Explanation @PTP01**
CTS	CR-	T300 board name (refer to MP) and, separated by a point, connector „**.X02**“
BDR	O2	Baud rate (coding as for the SCB board): 0: 150 bit/s 1: 300 bit/s 2: 600 bit/s 3: 1200 bit/s 4: 2400 bit/s 5: 4800 bit/s 6: 9600 bit/s 7: 19200 bit/s 8: 38400 bit/s 9: 57600 bit/s 10: 76800 bit/s 11: not permitted (=93750 of the SCB) 12: 115200 bit/s

Outp.-conn.	Type	**Explanation @PTP01**
QTS	B1	Operating status: 0: Faulted 1: O.K.
YTS	O2	Error/status display: 7B90H/31632dec: Init still running (wait for KSIPP0) 7B91H/31633dec: Init error: KML is full 7B92H/31634dec: Connector is not X02 7B93H/31635dec: Excessive baud rate ID (>12) 7B94H/31636dec: Baud rate ID 11 (93750Bd) not permitted 7B95H/31637dec: other KSIPP0- errors (e.g. DUST init)

Transmit:

Up to 5 data words can be sent using function block **CTPP**. It has to be configured in a standard FP.

A send telegram operation is started immediately within the function block processing. The telegram of the previous cycle time must have been completely transmitted. Thus, it is recommended to adapt the baud rate as well as the telegram length (both together specify the telegram transmission time) to the cycle time (refer below, telegram transmission time table).

Computation time required for a 5-word telegram (including the time to transmit all characters): **230µsec** (this includes a processing time of 28µsec /data word.)

Input conn.	Type	**Explanation CTPP**
CTS	CR-	T300 board name (refer to MP) and, separated by a point, connector „**.X02**“
LEM	O2-	Error message limit: If the telegram cannot be sent within the specified number of cycle times (e.g.: Due to a low baud rate with respect to the cycle time), this is signaled in QTS (=0) and YTS
LTW	O2-	The net data **word** quantity to be transmitted (1 word = 2 bytes); maximum number:0 to 5 (from 1.96 A change is only effective after the system has been powered-down and powered-up again!
EN	B1	1 enables transmit, 0 inhibits transmit
X1	N2	1st data word
X2	N2	2nd data word
X3	N2	3rd data word
X4	N2	4th data word
X5	N2	5th data word

Outp. conn.	Type	**Explanation CTPP**
QTS	B1	Operating status: 0: Faulted 1: O.K.
YTS	O2	Error/status display: 7D04H/32004dec: Telegram length configured too long 7D08H/32008dec: Transmitter inhibited (EN conn.) 7D09 H/32009dec: Transmitter still full 7D10H/32016dec: Init still running (wait for KSIPP0) 7D11H/32017dec: KM name double (configuring) 7D12H/32018dec: Init error: Refer to KML 7D13H/32019dec: Init ready, wait for 1st telelgram, as long as LEM>0 7D14H/32020dec: LTW=0

Receive:

Telegrams with up to 5 data words can be received with the **CRPP** function block. It has to be configured in a standard FP.

The telegram is received in the background, asynchronously to the cycle time of the receive function block. The cycle time of the receive function block is therefore the maximum **delay time** between the telegram being received and the received data being processed.

Computation time required for a 5-word telegram (including all characters being received): **267 µsec** (this includes a processing time of 34 µsec/data word).

Input conn.	Type	**Explanation CRPP**
CTS	CR-	T300 board name (refer to MP) and, separated by a point, connector „**.X02**“
LEM	O2-	Error message limit: If a correct telegram has not been received within the specified number of cycle times (e.g.: incorrect length), this is signaled in QTS (=0)
LTW	O2-	The net data word quantity to be transmitted (1 word = 2 bytes); maximum number: 5 A change is only effective after the system has been powered-down and powered-up again!

Outpu tconn.	Type	**Explanation CRPP**
Y1	N2	1st data word
Y2	N2	2nd data word
Y3	N2	3rd data word
Y4	N2	4th data word
Y5	N2	5th data word
QTS	B1	Operating status: 0: Faulted 1: O.K.
YTS	O2	Error/status display: 7D00H/32000dec: no telegram received after LEM expired 7D01H/32001dec: BCC error, as generally the telegram length of the transmitter is greater than that of the receiver 7D02H/32002dec: Telegram length of the receiver is greater than that of the transmitter 7D03H/32003dec: Baud rate possibly incorrect 7D04H/32004dec: Excessive telegram length configured. 7D10H/32016dec: Init still running (wait for KSIPP0) 7D11H/32017dec: KM name double (configuring) 7D12H/32018dec: Init error: refer to KML 7D13H/32019dec: Init ready, wait for first telegram, as long as LEM>0

Telegram transmission times

(examples)

General formula:

for LTW <=3:
t = 1/Baud rate *11 *(2*LTW +3)

for LTW >=4:
t = 1/Baud rate *11 *(2*LTW +4)

Baud rate	Number of net data words (LTW conn.)	Telegram transmission time (**in ms**)
9600	1 2 5	5.7 8 16
19200	1 2 5	2.8 4 8
38400	1 2 5	1.43 2 4
115200	1 2 5	0.47 0.67 1.34

13.6.2 Peer-to-Peer Communication in Version V4.2 / V4.2.1 / V4.2.2 with @PTP

In STRUC-Version V4.2, V4.2.1 and V4.2.2, the Peer-to-Peer communication has to be realized by means of the @PTP function block. The data interchange can be configured according to the normal SIMADYN D mechanism, i.e. using the Telegram Function Blocks @CTD/@CRD oder direct Transmit/Receive blocks.

In **V4.2.3**, this configuring method for the Peer-configuring (FB @PTP) **is no longer supported!**

13.6.2.1 Configuring a Peer-to-Peer Telegram in Version V4.2 / V4.2.1 / V4.2.2

Due to the 4-wire RS485-interface, the Peer-to-Peer-Protocol is only available on the T300 **Connector X134**, i.e. on Com Port 2 (**Connector X02** of the Hardware-Module Mask). This „Connector“ X02 and the T300 Board Name have to be hooked up to the **CTS-Connectors** of @PTP, @CTT/@CRT or the direct Transmit/Receive Blocks respectively.

Only one telegram in transmit direction and one telegram in receive direction can be defined. This is the reason why only one Send and one Receive Block can be configured at maximum. At the Address Connectors AT/AR, differring (Telegram-) Names have to be noted as arbitrary strings.

Up to **5 Net-Data Words** can be transferred. The net-data length of Transmit and Receive Blocks can differ. But a reciever only accepts data from a received telegram if the configured receive-telegram length (LT-Connector, e.g. of the @CRT Block) equals the length of the actually received telegram..

The @PTP block must be configured within the **„Send“ Communications FB** and in **sampling times between 32 ms and 255 ms**. The configured sampling time does not influence the transfer speed.

Input-Conn.	Type	**Explanation @PTP**
CTS	CR-	T300-Board Name (refer to. MP) and – separated by a dot - „**.X02**“ connector
BDR	O2	Baud Rate with the follwing code: 0: 300 Bit/s 1: 600 Bit/s 2: 1200 Bit/s 3: 2400 Bit/s 4: 4800 Bit/s 5: 9600 Bit/s 6: 19200 Bit/s 7: 38400 Bit/s (differs from @PTP01!)
TBM		Telegram Timeout Time („Tlg.-Breakdown-Monitoring“); In case of expiration, the transceiver will be disabled. This makes a monitoring and a „Breakdown Control“ of a closed multi-drop Peer-Ring possible. Setting range: 0 to 32000**ms** The timeout monitoring is started with power-on!
TWU		Alarm Cycle Time („Time Wake Up“) Setting rage: 1 to 32000**ms**

Outp.-Conn.	Type	**Explanation @PTP**
ECL	O2	Error Class; Evaluation in combination with the ECO-Connector; ECL>0: Hardware/Software Error
ECO		Error Code: ECO=ECL=0: no error; ECO>0 and ECL=0: Configuring Error
CDM	B1	State of the Communication: 0: Initialization is running 1: Telegram Interchange is running
QTS		Operating Status: 0: Error pending 1: no Error

Error Codes: Refer to Manual (Chapter 6 /1/) !

13.6.2.2 Principle of Operation and Time Response in Version V4.2 , V4.2.1 and V4.2.2

After the „Alarm Time“ specified at Connector **TWU** has been expired, the function block processes an evetually received telegram and makes the telegram’s net data available for the Receive Function Block(s) in the „Normal“ FPs. If the Send Funktion Blocks have provided net data in the meantime, this data will be „packed“ now into a Peer-to-Peer telegram and transmitted.
This Alarm Cycle runs asynchronously to the sample times!

Set the alarm time as short as possible for minimizing the dead times caused by the alarm processing. This maximizes the time which can be used for the effective data transfer. The minimum allowable value of the alarm time is 2 ms due to the processing time of approx. 1 ms for the transmit and the receive routine. So enough processing time will be available for the normal tasks.

Only transmit data actually generated by the Transmit Function Blocks is transmitted. If long alarm and sampling times and high baud rates (i.e. short telegram transfer times) are configured, telegramm pause intervals can occur on the transfer line.

13.6.2.3 Peer-to-Peer Configuring example for Version V4.2 / V4.2.1 / V4.2.2

1. In the „Send“ Communication FP:

```
 39 PEER      : @PTP
 40 CTS CR - D01_P1.X02
 41 BDR O2 - 7                        "38400 Baud"
 42 TBM O2 - 50                       "Report a Telegr Loss after 50ms"
 43 TWU O2 - 5                        "Telegram Processing every 5ms"
 44 ECL O2 >
 45 ECO O2 >
 46 CDM B1 >
 47 QTS B1 >
```

2. In a „normal“ FP:

```
 184 PEERRX   : CRD401               "4 Words Receive Data"
 185 CTS CR - D01_P1.X02
 186 AR  NS - 'ADRPEER'
 187 MOD B1 - 1
 188 LEM O2 - 3
 189 Y1  N2 > @TYP=V2, $STWT3P ,INIT=0H6  "1st word received"
 190 Y2  N2 > $LSWT3P                  "2nd word received "
 191 Y3  N2 >                          "3rd word received, not used in this case"
 192 Y4  N2 > @TYP=V2, $ZW1T3P         "4th word received "
 193 QTS B1 >
 194 YTS O2 >
.................
 133 PEERTX    : CTD501              "501: Telegr.Length can be changed after RESET"
 134 CTS CR - D01_P1.X02
 135 AT  NS - 'A_PEER'
 136 MOD B1 - 1
 137 LEM O2 - 3
 138 LT  O2 - 4                        "Telegr. Length = 4 Words
 139 EN  B1 < 1                        "Transmitter Enable
 140 X11 N2 < $TB_CW                   "Control Word for Master generated by TB"
 141 X12 N2 < 50%
 142 X13 N2 < BAUST1.Y1
 143 X14 N2 < BAUST2.Y
.................
 179 X58 N2 < 0%
 180 QTS B1 >
 181 YTS O2 >
```

13.7 Erasing the EEPROM

The T300 parameters („H-Parameters“) are reset to their factory values by erasing the nonvolatile EEPROM parameter memory chip loctated on the MS300 board..

Also in non-standard situations, it can become necessary to erase the EEPROM, e.g. if

- all modifications made should be made „undone“,
  (This can also be performed with an EPE funktion block if such a block has been configured and the board is still functionable)

- if the T300 doesn't longer start-up correctly after unauthorized modifications of connectors or parameters had been made.

- if an EEPROM overflow has been occurred.

The T300 stores **all** technology parameters (H- or 1xxx-parameters) received from a PC download file into the T300 EEPROM regardless of whether the parameter value is differring from the factory setting or not. This is due to the SIMADYN D operating system. According to our experience, approx. 250 to 290 parameters can be stored in the EEPROM until an overflow occurs. An EEPROM overflow is signalled by the SIMOVIS message "Write Error" or, during download, by the message "Not Written".

Please Note: In the EEPROM, binary quantities occupy 6 Bytes, word quantities 7 Bytes and double-word quantities 9 Bytes. The hardware EEPROM chip mounted on the MS300 memory module has a parameter capacity of 2000 Bytes.

- If your T300 configured software package has more than 250 to 280 H-Parameters, it is an imperative procedure to generate a „File of Changed Parameters“ (containing only those parameters which are differring from the factory settings) which can be used for an error-free parameter download without EEPROM overflow.

13.7.1 Erasing the EEPROMs if an overflow has been occurred

- SIMOVIS signals a "KON: Writing Error" message if an EEPROM overflow occurs when editing the SIMOVIS parameter.

- SIMOVIS signals a „Not Written xxx“ message if an EEPROM overflow occurs during a download procedure.

- The EEPROM can only be erased when the storage mode „Storing in EEPROM“ is changed to „Storing in RAM“ by clicking on the small RAM symbol.

- Afterwords use the respective H-Parameter for erasing the EEPROM. The number of this „Erase EEPROM“ parameter depends on the T300 software Configured Package. Refer to the appropriate manual of your Standard Configured Package (e.g. MS320...380) or the SIMADYN D Function-Block Catalog to get information on the correct parameter settings for the EEPROM erasing procedure. Subsequently please switch the electronics power supply off and on again.

13.7.1.1 Erasing the EEPROM in case of memory overflow by means of the Hex-Monitor

The EEPROM also can be erased by means of the SIMADYN D Hex-Monitor .

In this case two EEPROM Bytes have to be modified via the Hex-Monitor according to the following procedure:

1. Connect a COM port of your PC to terminal X132 of the T300. Configure your COM port to 9,6kBd and No Parity Bit by one of the following two alternatives:

   a) Use the SIMADYN D SERVICE-Programm: Select the „Hex/Debug-Monitor“ option in the „Activities“ menue.

   b) Launch a terminal emulation program on your PC, e.g. the „Terminal“ programm with DEC VT100 emulation if you are using WINDOWS.

2. Start the Hex-Monitor:
   Push the small pushbutton on the T300 board during Power-On and keep it pressed until operating state °003 is displayed. A Hex-Monitor start-up message should now be displayed on the screen.

3. Use the „S“ command („Subsitute“) to change the following memory locations in the EEPROM memory:

   7C00:0=AA
   7C00:2=0 (End Specifier)

   Type in the following Hex-Monitor command sequence (strictly adhere to the noted command syntax; <CR> designates the Enter key. XX designates any two arbitrary hexadecimal digits):

   S7C00:0 <CR>

   Now you will be prompted on the screen. Subsequently type in the following commands:

7C00:0	XX	**AA,**	input AA, proceed
7C00:1	XX	**,**	go to the next location
7C00:2	XX	**0,**	input 0 and proceed
7C00:3	XX	**.**	termination

4. Switch the the electronics power supply OFF and ON again.

13.7.2 Erasing the EEPROM for restoring the factory settings:

- Erase the EEPROM according to chapter 13.7.1. Switching over the storage mode from EEPROM to RAM is not necessary.

After the EEPROM is erased and power has beeen switched on again, it is highly recommended to reset those parameters back to „0“ which have been used to accomplish the erasing procedure.

14 Literature

/1/ SIMADYN D „General diagnostics“
Item No.: 465 983.9010.00

15 Order numbers

Type:	Order No. (MLFB)	Designation
T300- HW package	6SE7090-0XX87-4AH0	Hardware package (complete, without software (MSxxx)!)
T300	6SE7090-0XX84-0AH2	T300 processor board
SE300	6SE7090-0XX84-3EH0	Terminal function block for T300
SC58	6DD 3461-0AB0	Round cable to transfer analog- and pulse encoder signals between SE300 and T300, shielded, 40 core
SC60	6DD 3461-0AE0	Round cable to transfer binary signals between SE300 and T300, shielded, 34-core
MS300	6SE7098-**0**XX84-0AH0	MS300 memory module, empty
MS320	6SE7098-2XX84-0AH0	MS300 memory module with standard software package „Axial winder“ AW
MS340	6SE7098-4XX84-0AH0	MS300 memory module with standard software package „Angular synch.“ WGL
MS360	6SE7098-6XX84-0AH0	S300 memory module with standard software package „Multi-motor drive“ MMA
MS380	6SE7098-8XX84-0AH0	S300 memory module with standard software package „Positioning“ POS
Doc. T300	6SE70**87**-**6**CX84-0AH1	Description of the T300 board and general software **(dt.,engl.)**
Doc. T300	6SE70**87**-**7**CX84-0AH1	Description of the T300 board and general software **(fr.)**
Dok. AW	6SE70**80**-**0**CX84-**2**AH1	Description, standard app. software. axial winder **(dt.)**
Dok. WGL	6SE7080-0CX84-**4**AH1	Description, standard app. software. ang. synch. **(dt.)**
Dok. MMA	6SE7080-0CX84-**6**AH1	Description, standard app. software.multi-motor drive **(dt.)**
Dok. POS	6SE7080-0CX84-**8**AH1	Description, standard app. software. positioning **(dt.)**
Doc. AW	6SE70**87**-**6**CX84-**2**AH1	Description, standard app. software. axial winder **(engl.)**
Doc. WGL	6SE7087-6CX84-**4**AH1	Description, standard app. software. ang. synch. **(engl.)**
Doc. MMA	6SE7087-6CX84-**6**AH1	Description, standard app. software.multi-motor drive **(engl.)**
Doc. POS	6SE7087-6CX84-**8**AH1	Description, standard app. software. positioning **(engl.)**
Doc. WGL	6SE70**87**-**7**CX84-**4**AH1	Description, standard app. software. ang. synch. **(fr.)**

MD320	6S**W17**98-**2**XX84-0AH0	MS320 standard app. software axial winder on a $3^1/_2$ inch floppy disk (without documentation)
MD340	6SW1798-**4**XX84-0AH0	MS340 standard app. software angular synchronous control on a $3^1/_2$ inch floppy disk (without documentation)
MD360	6SW1798-**6**XX84-0AH0	MS360 standard app. software multi-motor drive on a $3^1/_2$ inch floppy disk (without documentation)
MD380	6SW1798-**8**XX84-0AH0	MS380 standard app. software positioning on a $3^1/_2$ inch floppy disk (without documentation)

Bisher sind folgende Ausgaben erschienen:

Ausgabe	Sachnummer/ Materialnummer
02.96	Sach.Nr. 477 407.4000.76
12.99	A5E00857366

Ausgabe 12.99 besteht aus folgenden Kapiteln:

Kapitel		Änderungen	Seiten zahl	Ausgabe datum
0	Definitionen	überarbeitete Ausgabe	2	12.99
1	Produktbeschreibung	überarbeitete Ausgabe	4	12.99
2	Montieren, Anschließen	überarbeitete Ausgabe	18	12.99
3	Technische Daten	überarbeitete Ausgabe	10	12.99
4	Projektierung	überarbeitete Ausgabe	2	12.99
5	Projektierung der T300 für SIMOVERT 6SE70 und DC_MASTER 6RA70	überarbeitete Ausgabe	20	12.99
6	Literatur	überarbeitete Ausgabe	2	12.99
7	Bestellnummern	überarbeitete Ausgabe	2	12.99

The following editions have been published so far:

Edition	Internal Item Number
02.96	Item Nr. 477 407.4000.76
12.99	A5E00857366

Version 12.99 consists of the following chapters:

Chapter		Changes	Pages	Version date
8	Definitions	reviewed edition	2	12.99
9	Product description	reviewed edition	4	12.99
10	Installation, connecting-up	reviewed edition	18	12.99
11	Technical data	reviewed edition	10	12.99
12	Application software	reviewed edition	2	12.99
13	Configuring the T300 for SIMOVERT 6SE70 and DC_MASTER 6RA70	reviewed edition	20	12.99
14	Literature	reviewed edition	2	12.99
15	Order numbers	reviewed edition	2	12.99

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SIEMENS

Standard Software Package

Axial Winder MS320 for T300 technology board

for SIMOVERT MASTER DRIVES 6SE70/71

Software release 1.5

Operation instructions

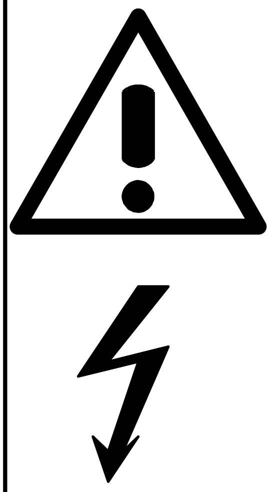
Edition **04.99** Order No.: 6SE7087-6CX84-2AH1

This Instruction manual is available in the following langages:

Sprache Language	**German**		
Bestell-Nr. Order-No.	6SE7080-0CX84-2AH1		

English

0 Warning information and product limitation



WARNING

Hazardous voltages are present in this electrical equipment during operation.
Non-observance of the safety instructions can result in severe personal injury or property damage.

Only qualified personnel should work on or around this equipment after becoming thoroughly familiar with all warnings, safety notices and maintenance procedures contained herin.

The successful and safe operation of this equipment is dependent on proper transportation, storage, installation and assembly, and on careful operation and maintenance.

Pay particular attention to the warnings in the SIMOVERT Instruction Manuals.

Definitions

- **QUALIFIED PERSONNEL**

A "qualified person" as used in this Manual and in the warnings on the products themselves is one who is familiar with the installation, assembly, commissioning and operation of the equipment and the hazards involved. In addition, he/she has the following qualifications:

1. Is trained and authorized to energize, de-energize, ground and tag circuits and equipment in accordance with established safety practices.
2. Is trained in the proper care and use of protective equipment in accordance with established safety practices.
3. Is trained in rendering first aid.

- **DANGER**

"Danger" as used in this Manual and in the warnings on the products themselves means that death, grievous injury or extensive damage to property will occur if the appropriate precautions are not taken.

- **WARNING**

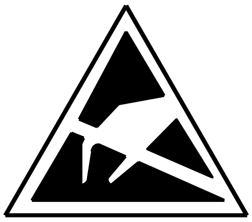
"Warning" as used in this Manual and in the warnings on the products themselves means that death, grievous injury or extensive damage to property may occur if the appropriate precautions are not taken.

- **CAUTION**

"Caution" as used in this Manual and in the warnings on the products themselves means that minor personal injury or damage to property may occur if the appropriate precautions are not taken.

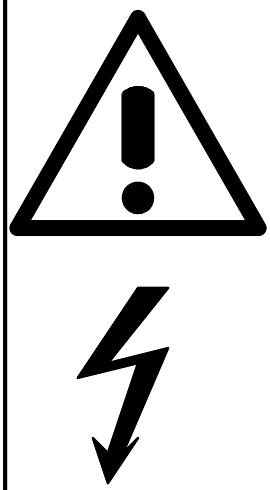
- **NOTE**

"Note" as used in this Manual highlights an important item of information about the product or a section of the instructions which requires careful attention.



CAUTION

The boards contain components which can be destroyed by electrostatic discharge. Before touching an electronic board, the human body must be electrically discharged. This can be simply done by touching a conductive, grounded object immediately beforehand (e.g. a bare metal cabinet component, protective conductor contact).



WARNING

Hazardous voltages are present in this electrical equipment during operation. Non-observance of the safety instructions can result in severe personal injury or property damage.

Only qualified personnel should work on or around this equipment after becoming thoroughly familiar with all warnings, safety notices and maintenance procedures contained herein.

The successful and safe operation of this equipment is dependent on proper transportation, storage, installation and assembly, and on careful operation and maintenance.

The warning information supplied with the SIMOVERT Instruction Manuals must be observed.

NOTE
This Instruction Manual does not purport to cover all details or variations in equipment, not to provide for every possibly contingency to be met in connection with the installation, operation or maintenance. Should further information be desired or should particular problems arise, which are not covered sufficiently for the purchasers purposes, please contact your local Siemens office.. The contents of this Manual shall neither become part of nor modify an prior or existing agreement, commitment or relationship. The sales contract contains the entire obligation of Siemens. The warranty contained in the contract between the parties is the sole warranty of Siemens. Any statements contained here do not create new warranties nor modify the existing warranty.

1 Overview

1.1 General overview

The digital SIMOVERT MASTER DRIVES 6SE70/71 can be expanded by a T300 technology board and various interface boards. **Standard software packages** are available for these boards for frequently occuring applications, e.g. *angular synchronism, multi-motor drive or axial winder control.* These software packages are supplied as EPROM modules. If the technological functions of the standard software packages have to be expanded to fulfill specific customer requirements, then software packages can be obtained on floppy disk, and modified using SIMADYN D tools from (STRUC release 4.2).

The standard software packages can run with and without interface boards (e.g. CBP/CB1, SB2). For operation without interface board, warning A103 is output; it can be suppressed per parameter, refer to Section 9.2.

Note: For Help and commissioning see also

1. Design see Sec. 5.10 to 5.16
2. Block diagrams Üp, refer to the Appendix
3. Winder software package is controlled via CBP/ CB1, SCB1/ SCB2 and terminals, refer to the Block diagram, Sheets 16 to 18

1.2 Validity

This User Manual is valid for the MS320 *"**Axial winder**" software package*, **release 1.50**. Differences to previous releases are listed in Section 12 "Changes".

With the exception of the expanded functionality, described in the ”Changes” section, this software release is compatible to the previous releases. This is the reason that this Manual can be used for the start-up of previous versions.

The MS320 standard software package can only run on the T300 technology board.

The functions described here regarding SIMADYN D and the T300 technology board refer exclusively to the standard MS320 axial winder software package, and do not represent a general statement regarding SIMADYN D or the technology board. For example, "fastest cycle time 8 ms", only means that a faster cycle time is not used in the MS320 standard software package.

This standard software package is enabled for the following SIMOVERT MASTERDRIVES (6SE70, 6SE71) drive converters described in the next section.

1.2.1 Hardware/Software requirement

<u>MASTERDRIVES basic units</u>

MASTERDRIVES basic units (new Series, introduced from 1998)
The T300 has been approved for operation in the following MASTER DRIVES basic units:

❑ SIMOVERT VC with electronic board CUVC: Software release ≥ 3.11

❑ SIMOVERT MC with electronic board CUMC: Software release ≥ 1.2.

The T300 can only be used with Compact-, Chassis- and Cubicle-type units. The use with "Compact Plus" type units is not possible.

MASTERDRIVES basic units (older series, introduced from 1995)
The T300 has been approved for operation in the following MASTER DRIVES basic units:

❑ SIMOVERT VC with electronic board CU2: Software release ≥ 1.2

❑ SIMOVERT SC with electronic board CU3: Software release ≥ 1.1

CAUTION:	When a t300 board is installed in a SIMOVERT SC unit, the pulse frequency of the converter must not be increased above the factory setting value of P761 = 5kHz to avoid overloading the convertre processor.

Communication boards

The standard software packages can run with and without communication board (CB1/CBP or SCB1/2). In this case the parameter H011 and H012 (Alarm-/ Fault mask) has to be set.

The T300 can be combined with the following communications boards

- ❑ PROFIBUS-DP interface CBP , Software release ≥ 1.0
  Only one fieldbus communication board can be used. It must be mounted in mounting location 3 (middle location). Communication boards which are designed as Mini-Slot-Boards (e.g. CBP, CBC) must additionally be mounted in Slot "G" of an ADB Adaption Bord before inserted in mounting location 3. The T300 can not communicate with a communication board mounted on he CU (in slot A or C).

- ❑ PROFIBUS interface module CB1, software release ≥ 1.3

- ❑ SCB2 Board software release ≥ 1.3
  The SCB2 has an opto-isolated serial interface which is capable of operating with either a USS protocol or a peer-to-peer protocol.

- ❑ SCB1 board
  The SCB1 is equipped with a fibre-optic interface for peer-to-peer communication or terminal extension modules SCI1 and/or SCI2.

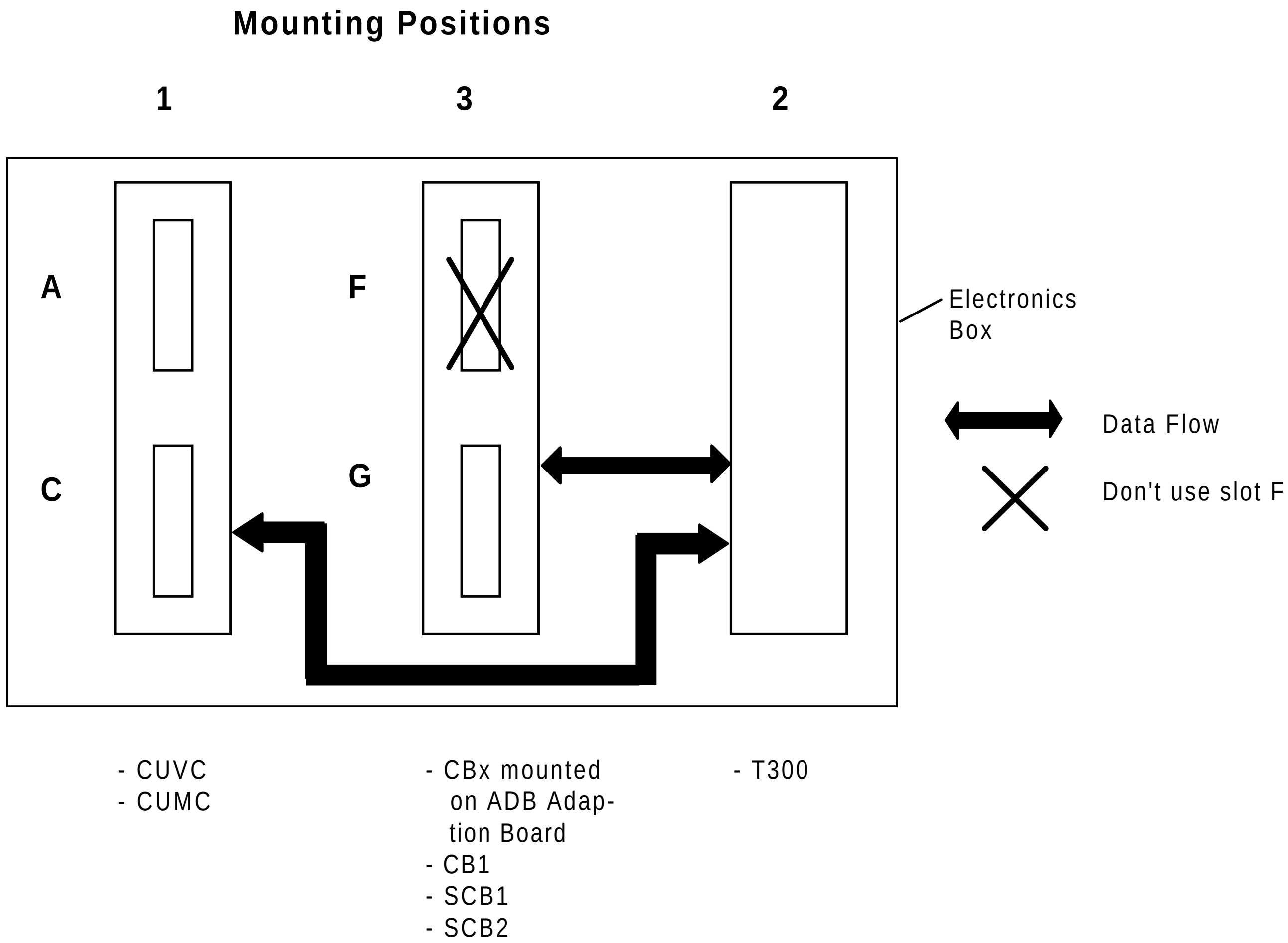
- ❑ SLB SIMOLINK interface board for CUVC or CUMC.
  If a Peer-to-Peer communication in not possible (for example for „Compact Plus“ type units) the SLB board can be installed instead of the T300 Peer-to-Peer interface.

CAUTION:	- An optinal SLB SIMOLINK Interface Board must be mounted in a slot on the CUVC or CUMC base electronics board, most preferably in Slot A. The combination T300 and SLB SIMOLINK Interface mounted in location 3 is not possible! The SLB borad communicates directly with the base unit. Signal interconnections to the T300 board must be softwired via Binectors-/ Connectors. - Example for Binectors-/ Connectors softwiring, refere to Section 8.2.9. - A T300 board with Hardware release ≥ B, or newer, is needed for use with an SLB SIMOLINK interface board. The correct hardware release code can be detected on the component side of the T300 in the neighbourhood of the lower backplane connector.

Note: MASTERDRIVES basic drive parameter and T300 Parameter can be read and write thrue all the serial Interfaces (with the exception of Peer-to-Peer interface and SIMOLINK interface board).

Allowed mounting combinations / Mounting positions

Please adhere to the following rules for mounting the T300 and other supplementary boards into the electronics box.
Please note: Only the following combinations and mounting positions are allowed.



– The T300 must be mounted in mounting location 2 (rightmost mounting location)
– Only one fieldbus communication board can be used. It must be mounted in mounting location 3 (middle location). Communication boards which are designed as Mini-Slot-Boards (e.g. CBP, CBC) must additionally be mounted in Slot "G" of an ADB Adaption Bord before inserted in mounting location 3. The T300 can not communicate with a communication board mounted on the CU (in slot A or C).
– The Communication Board communicates directly with the T300 board.
– An optinal SLB SIMOLINK Interface Board must be mounted in a slot on the CUVC or CUMC base electronics board, most preferably in Slot A..
The combination T300 and SLB SIMOLINK Interface mounted in location 3 is not possible!

CAUTION:	A T300 board with Hardware release ≥ B, or newer, is needed for use with an SLB SIMOLINK interface board. The correct hardware release code can be detected on the component side of the T300 in the neighbourhood of the lower backplane connector.

T300 parameter settings

The following devices can be used to set the parameters of the T300 board:

- ❑ Standard parameterizing unit (PMU) for basic converters
- ❑ A PC or programmer with the SIMOVIS service program (refer also to section 8.1.3)
- ❑ Optional OP1S plaintext operator device
- ❑ Optional OP1 plaintext operator device version 1.1 or higher

1.2.2 T300 technology board

The T300 technology board is a processor board which can be freely configured using STRUC. It is compatible to SIMADYN D and is especially designed for applications with 6SE70/71 SIMOVERT drive converters. The function of the boards is defined using the function block-oriented **STRUC L / STRUC G** programming language. The application software is programmed in a program memory submodule, which is inserted on the processor board. An EEPROM is provided on the program memory submodule to store parameter changes. Communications with the basic converter is realized via a parallel interface which is implemented as **DUAL PORT RAM** (DPR).

Processor / clock frequency	80C186 / 20 MHz		
RAM memory	128 KByte		
Comm. with the converter	Parallel bus, dual port RAM 2 kbyte		
Program memory submodule	MS300 with 512 kbyte EPROM and 2 kbyte EEPROM		
Binary inputs	16	non-floating	24 V
Binary outputs	8	non-floating	24 V
Analog inputs	7	11 bits + sign	± 10 V (differential inputs)
Analog outputs	4	11 bit + sign	± 10 V, 10 mA
Serial interfaces	2	1 * RS232 and RS485 1 * RS485 (2- or 4 wire)	(2 wire)
Pulse encoder inputs	2	2 * track A,B, zero, fmax = 400 kHz	

Table 1.2.1: Overview of the T300 technology board. For details refer to the Instruction Manual and T300 connecting-up diagram, refer to Fig. 1.2.2.

The following components are required to operate the winder module:

Product description	Comment	Order No.
T300 technology board including SC58 and SC60 connecting cables, SE300 terminal block and German/English Instruction Manual of the modules		6SE7090-0XX87-4AH0
Local bus adapter LBA for MASTER DRIVES electronics box	Is used to install T300 and possibly a communications board	6SE7090-0XX84-4AH0
Adaption board ADB for the mounting of the CBP board	Is used to install a communications board	6SE7090-0XX84-0KA0
MS320 axial winder software package on a memory module without Manual		6SE7098-2XX84-0AH0
Manual, MS320 axial winder or **Handbuch Achswickler MS320**	english or german	6SE7087-6CX84-0AH1 6SE7080-0CX84-2AH1

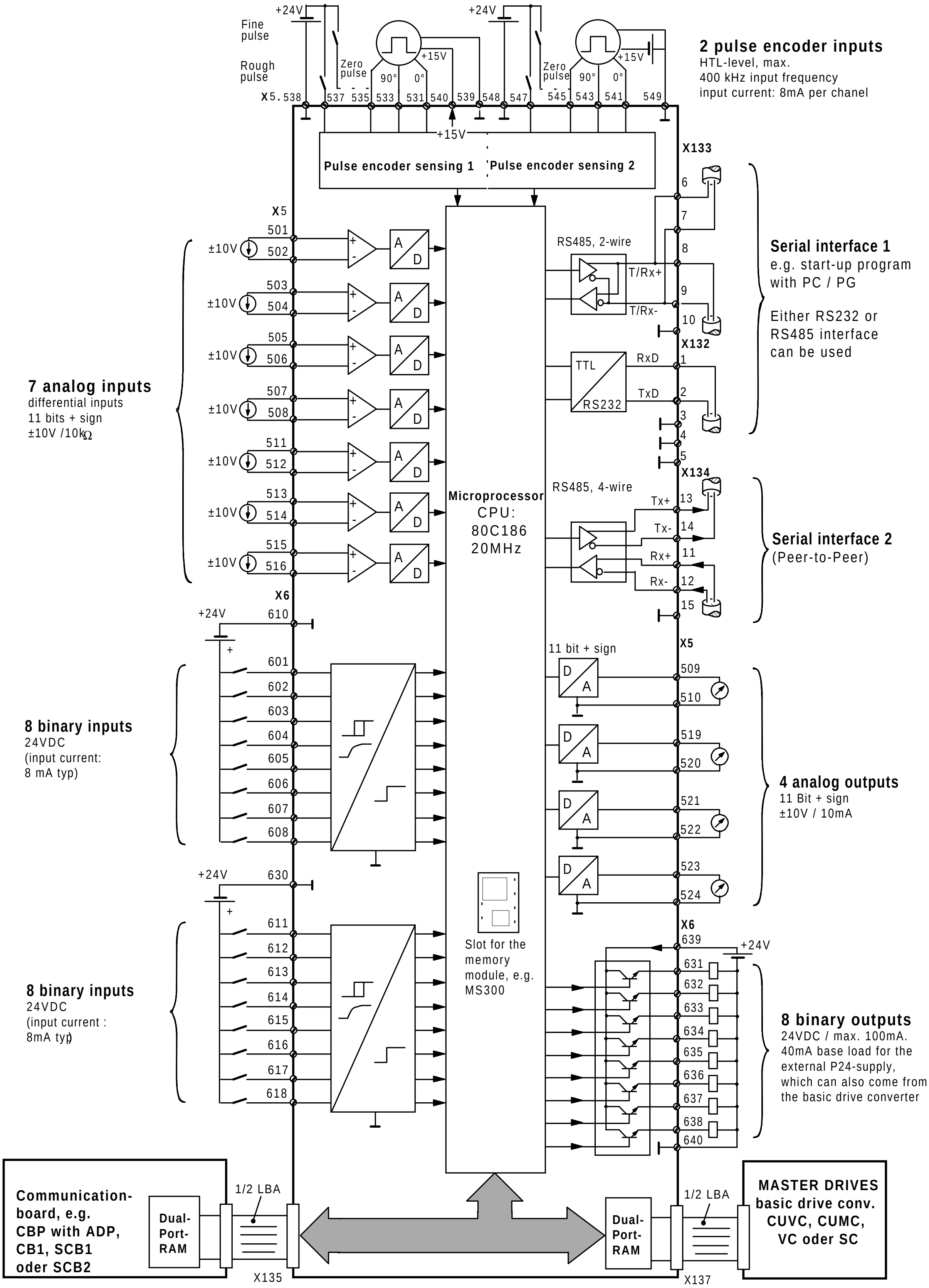
The individual components are also available as spare parts:

T300 technology board	6SE7090-0XX84-0AH2
T300 Instruction Manual, German/English	6SE7087-6CX84-0AH0
SC58 connecting cables	6DD3461-0AB0
SC60 connecting cables	6DD3461-0AE0
SE300 terminal block	6SE7090-0XX84-3EH0

Further the following are available, if the standard software package is to be modified:

- STRUC L PT to implement dedicated functions in a list form. This can run on a PC under WINDOWS.
- STRUC G PT to implement dedicated functions in a graphics form. This can run on a PC under SCO-UNIX.
- Prommer for memory modules with connection via a PC parallel interface.
- STRUC service program for the symbolic monitor.
- STRUC axial winder software package on floppy disk.

Also refer to section 1.2.3 and Catalog DA65.10 for precise data.



terminal series X5, X6:connect at terminal bloc SE300.
terminal series X132, X133, X134: connect at T300.

Figure 1.2.2: Connecting-up

1.2.3 Standard software package on floppy disk

The source codes of the MS320 standard software package are available as STRUC files on floppy disk (designation, MD320). When required, the angular synchronous control function can be adapted to specific requirements using conventional SIMADYN D resources.

Components to adapt the standard software package with STRUC:

Designation	Explanation	MLFB / Order No.
MD320	MS320 angular synchronous control on a $3^1/_2$ inch floppy disk (without documentation)	6SW1798-2XX84-0AH0
MS300	EPROM for T300 -**empty**-	6SE7098-0XX84-0AH0
PP1X	Parallel Programmer (PC-) external	6DD1672-0AD0
UP3	Programming adapter for MS47/MS300	6DD3462-0AB0
STRUC	A STRUC version 4.2.4 or higher is required	Refer to Catalog DA99
	If required, start-up program (SIMOVIS, IBS/SERVICE-program)	Refer to Catalog DA99

Table 1.2.3: Components to adapt the standard software package using STRUC

1.2.4 Interface board

For all applications, which require a coupling between the SIMOVERT 6SE70/71 drive converter units (with or without technology board) to a higher-level automation system, then various interface boards are used, depending on the bus protocol used. Thus, it is possible to read and change setpoints and actual values, technological- and basic drive converter parameters from the automation system.

PROFIBUS DP is the preferred communications type. Interface modules CBP with ADP or CB1 are required.

1.3 Overview of the closed-loop winder control

The standard "axial winder" software package, allows, using the appropriate converters and technology boards, winders and unwinders to be engineered for the widest range of applications, for example, plastic foil machines, all types of printing machines, coating systems, paper finishing systems, coilers for wire drawing machines, textile machines, and sheet steel coilers.

1.3.1 Winder control features (excerpt)

- Suitable for both winders and unwinders with and without flying roll change for flying splice mechanical design.
- Flexible as it is possible, within the axial winder software package, to freely connect analog and binary inputs, analog outputs and sections of the dual port RAM to the interface board and the basic drive converter.
- Direct closed-loop tension control (using a web tension transducer or position sensing with a dancer roll) or indirect closed-loop tension control via the torque actual value.
- Either a triggerable speed controller (tension controller acts on the motor torque) or a speed correction technique (tension controller acts directly on the speed setpoint) can be selected.
- Diameter calculation with a control function for "set diameter" and "hold diameter", the diameter actual value is stored in a NOVRAM in a non-volatile fashion when the power fails;
  the diameter calculation is realized integrating, thus guaranteeing an extremely precise and stable diameter actual value and a good overall control characteristics. The maximum rate of change of the diameter actual value depends on the diameter.
- The tension controller- and speed controller gain are adapted as a function of the diameter.
- The winding hardness control can be parameterized via a polygon characteristic with 5 points, as a function of the diameter.
  The characteristic gradient is fixed or can be entered via a reference value. The thus obtained tension setpoint can also control a dancer roll control via an analog output.
- Speed-dependent friction compensation using a polygon characteristic with 5 points which can be parameterized.
- Acceleration pre-control as a function of the diameter as well as web width, gearbox stage and material thickness. The thickness can be automatically "learnt".
- Tension pre-control as a function of the diameter and tension setpoint.
- A pulse encoder can be connected to measure the web speed.
- Constant line speed control possible (e. g. master drive of a winder).
- Winder-related open-loop control with alarm- and fault evaluation.
- Web break signal, if parameterized, which inhibits the tension controller and diameter calculation.
- Inching and crawl.
- Automatic standstill tension signal input.
- Two motorized potentiometers which can be flexibly used. One of these potentiometers can store the output value in a non-volatile fashion at power failure.
- Shutdown without overshoot for a fast stop along a braking characteristic.
- Tachometer to sense the diameter actual value.

2 Interfaces

2.1 Interface between the technology board - and basic converter

Data transfer between the T300 technology board and the basic converter is realized through a parallel interface (**D**UAL **P**ORT **R**AM). The **process data** - i.e. the setpoints and actual values - are cyclically written into and read-out of the technology board and basic converter in the fastest cycle time.

Data is transferred in 16-bit words (2 bytes).

For the standard function package, the basic converter has to have a specific parameterization, also refer to Section 7 and the 6SE70/71 Instruction Manual.

2.1.1 Setpoints, technology board > converter

The technology board transfers a total of 16 words to the basic drive converter. The setpoints required by the converter are selected by parameterization. The transferred control word is formed from the control word from the automation (higher-level open-loop control, data transfer via bus and interface board) and from the T300 terminals and fixed values.

Transferred value	Word No.	Explanation
Control word 1	1	Hex
Speed setpoint	2	100% = rated speed
Unused	3	Fixed, 0%
Unused	4	Fixed, 0 hex
Supplementary torque setpoint	5	100% = rated torque
Positive torque limit	6	100% = rated torque
Negative torque limit	7	100% = rated torque
Kp adaption factor	8	1 = 400 hex
Status word 1 MS320	9	For expansion
Status word 2 MS320	10	For expansion
Select value 1 MS320	11	For expansion
Select value 2 MS320	12	For expansion
Select value 3 MS320	13	For expansion
Select value 4 MS320	14	For expansion
Select value 5 MS320	15	For expansion
Select value 6 MS320	16	For expansion

Table 2.1.1.a: Values transferred between the T300 → 6SE70/71

Control word bit	Significance for the basic converter		Source or fixed value
0	ON (main contactor)	1 = ON	PLC or T300 terminal
1	/OFF2 (voltage-free)	0 = OFF2 1)	PLC or T300 terminal
2	/OFF3 (fast stop)	0 = OFF3 1)	PLC or T300 terminal
3	Enable operation	1 = enable	PLC or T300 terminal
4	/Inhibit ramp-function generator	0 = inhibit	Fixed 1
5	Ramp-function generator STOP	1 = STOP	Fixed 0
6	Ramp-function gen. setpoint enable	1 = enable	Fixed 1
7	Acknowledge fault	1 = acknowledge	PLC
8	Inching 1 ON	1 = ON	Fixed 0
9	Inching 2 ON	1 = ON	Fixed 0
10	Control from PLC	1 = yes	Fixed 1
11	Clockwise phase sequence		Fixed 0
12	Counter-clockwise phase sequence		Fixed 0
13	Raise motorized potentiometer		Fixed 0
14	Lower motorized potentiometer		Fixed 0
15	Fault external 1		Fixed 0

Table 2.1.1.b: Control word, T300 → 6SE70/71

1) /OFF2 and /OFF3 are always effective from each source in the basic drive converter

2.1.2 Actual values, drive converter > technology board

The technology board receives a total of 16 words from the basic drive converter. The sequence and contents are defined using P694(CU2,CU3), P734(CUVC,CUMC). The transferred status word 1 is logically combined with the T300 status messages and transferred to the automation. Various status bits are evaluated in the software.

Transferred value	Word No.	Explanation
Status word 1	1	Hex
Speed actual value	2	100% = rated speed
Any	3	Unused
Status word 2	4	Hex, unused
Torque setpoint	5	100% = rated torque
Torque actual value	6	100% = rated torque
Select value 1 from the CU	7	100% = 4000H
Select value 2 from the CU	8	100% = 4000H
Control word 1 from the CU	9	For expansion
Control word 2 from the CU	10	For expansion
Setpoint 1 from the CU	11	For expansion
Setpoint 2 from the CU	12	For expansion
Setpoint 3 from the CU	13	For expansion
Setpoint 4 from the CU	14	For expansion
Setpoint 5 from the CU	15	For expansion
Setpoint 6 from the CU	16	For expansion

Table 2.1.2.a : Actual values transferred between the 6SE70/71 and T300

Status word 1 bit	Significance		Acts on
0	Ready-to power-up	1=ready	Power-up control
1	Ready	1=ready	Power-up control
2	Operation enabled	1=enabled	Contr. enable signals
3	Fault	1=fault	Power-up control
4	OFF2 is active	1=inactive	Power-up control
5	OFF3 is active	1=inactive	Power-up control
6	Power-on inhibit	1=inhibit	-
7	Alarm	1=alarm	-
8	Setp./act. val. diff. within tol. bandw.	1=yes	-
9	Control requested	1=yes	Contr. enable signals
10	f/n limit reached	1=yes	-
11	Fault, undervoltage	1=yes	-
12	Main cont. energized	1=yes	-
13	Ramp-function generator active	1=yes	-
14	Clockwise rotating field	1=yes	-
15	Kinetic buffering active	1=yes	-

Table 2.1.2.b: Status word1, 6SE70/71 → T300

2.2 Interface, automation ⇔ technology board

Note:

The software package can be operated with and without interface board. If the interface board is not used, parameters H011 and H012 (alarm/fault suppression) must be appropriately set (also refer to Section 9.3).

For 6SE70/71, different interface boards can be used as coupling to the higher-level automation unit, depending on the particular protocol.

Data transfer between the interface boards and the technology board is realized via the dual port RAM. Process data (setpoints and actual values) are written into and read out of the T300 in the fastest cycle time (8 ms). Parameter handling runs in 16 x the sampling time (i.e. 128ms).

2.2.1 Setpoints, automation ⇒ technology board

The standard MS320 software package expects a maximum of 8 words of process data (6 setpoints and 2 control words) from a higher-level automation system. The transferred setpoints can be freely-connected within the software package so that they are not assigned a fixed significance (refer to the overview diagram, Figs 11-13). The number of process data transferred depends on the particular application; the telegram net contents can be freely selected as the setpoints can be freely connected. The telegram structure for SINEC L2-DP (6 process data with parameter handling) and USS (8 process data with parameter handling) are shown in Table 2.2.1.a.

Data word No. in the receive telegram				Significance
PROFIBUS DP		USS - protocol		
PPO 1,2,5	PPO 3,4	PKW=4	PKW=0	
1	-	1	-	Parameter ID
2	-	2	-	Index
3	-	3	-	Parameter value, high word
4	-	4	-	Parameter value, low word
5	1	5	1	Control word 1 from CB
6	2	6	2	Setpoint 1 from CB
7	3	7	3	Setpoint 2 from CB
8	4	8	4	Control word 2 from CB
9	5	9	5	Setpoint 3 from CB
10	6	10	6	Setpoint 4 from CB
11	-	11	7	Setpoint 5 from CB
12	-	12	8	Setpoint 6 from CB

For setpoints, which are to be transferred to the T300, the following is always valid: 4000h=100%

Table 2.2.1.a: Telegram structure, automation → technology board

Control word 1 bit	Significance		Effect / explanation
0	ON	1 = ON	Converter on, sys. operational
1	/OFF2 (voltage-free)	0 = OFF	Transfer to the converter
2	/OFF3 (fast stop)	0 = OFF	Transfer to the converter
3	System start Speed contr. enable, basic conv.	1 = start	Contr. enable, sys. operational
4	Inhibit ramp-function generator	1 = inhibit	RFG output=0
5	Hold ramp-function generator	0 = hold	Hold RFG
6	Enable setpoint	1 = free	Inject setpoint
7	Acknowledge fault	1 = acknowledge	Transfer to the converter
8	Inching 1	1 = ON	Inching, local forwards
9	Inching 2	1 = ON	Inching, local reverse
10	Control from the PLC	1 = yes*)	CB accepts setpoints
11	Tension controller on	1 = ON	Switch-in cl.-loop tens. control
12	Tension controller, inhibit	1 = inhibited	Tension controller output = 0
13	Standstill tension on	1 = ON	Switch-in standstill tension
14	Set diameter	1 = set	Accept setting diameter
15	Hold diameter 1 = hold		Inhibit diameter computer

*) is not evaluated by T300

Table 2.2.1.b: Control word 1, automation → technology board

Control word 2 bit	Significance		Effect / description
0	Switch-in suppl. setpoint	1 = yes	Add supplementary setpoint
1	Local positioning	1= pos.	Operation with positioning setp.
2	Motor. potentiometer 2, raise	1 = raise	Output, motor pot. 2, raise
3	Motor. potentiometer 2, lower	1 = lower	Output, motor pot. 2, lower
4	Local operator control	1 = local	Local / system changeover
5	Local, stop	1 = stop	Stop for local operation
6	Local, run	1 = run	Operation with local setpoint
7	Local, crawl	1 = crawl	Operation with crawl setpoint
8	Maneuver	1 = yes	Enter maneuvering setpoint
9	Hold V_{set} setting	1 = stop	Freeze setpoint
10	Motor. potentiometer 1, raise	1 = raise	Output, motor pot. 1, raise
11	Motor. potentiometer 1, lower	1 = lower	Output, motor pot. 1, lower
12	Reset length computer	1 = reset	Web length computer = 0
13	Winding from below	1 = from below	Invert speed setpoint
14	Tachometer (web)	1=applied	Enable diameter computer
15	-		-

Table 2.2.1.c: Control word 2, automation → technology board

2.2.2 Actual values, technology board ⇒ automation

The standard MS320 software package supplies 8 words of process data (6 select values and 2 control words), to the higher-level automation system. The transferred actual value can be selected (refer to the block diagram, Sheet 15). The following telegram structure is obtained, analog to 2.2.1:

Data word No. in the transmit telegram				Significance
PROFIBUS DP		USS - protocol		
PPO 1,2,5	PPO 3,4	PKW=4	PKW=0	
1	-	1	-	Parameter ID
2	-	2	-	Index
3	-	3	-	Parameter value, high word
4	-	4	-	Parameter value, low word
5	1	5	1	Status word 1, MS320
6	2	6	2	Select value 1, MS320
7	3	7	3	Select value 2, MS320
8	4	8	4	Status word 2, MS320
9	5	9	5	Select value 3, MS320
10	6	10	6	Select value 4, MS320
11	-	11	7	Select value 5, MS320
12	-	12	8	Select value 6, MS320

For the actual values, supplied from the T300 (select values), the following is always valid: 4000h=100%

Table 2.2.2.a: Telegram structure, technology board → automation

Status word 1 bit	Significance		Source
0	Ready to power-up	1=ready	6SE70/71
1	Ready	1=ready	6SE70/71
2	Operation enabled	1=enabled	6SE70/71
3	Fault	1=fault	6SE70/71 or T300
4	OFF2	0=active	6SE70/71 or T300
5	OFF3	0=active	6SE70/71 or T300
6	Power-up inhibit	1=inhibit	6SE70/71
7	Alarm	1=warning	6SE70/71 or T300
8	Set./act. val. diff. within the tolerance bandwidth	1=yes	6SE70/71
9	Control requested	1=yes	6SE70/71
10	f/n limit reached	1=yes	6SE70/71
11	Fault, undervoltage	1=yes	6SE70/71
12	Main contactor energized	1=yes	T300
13	Tension controller at its limit	1=yes	T300
14	Clockwise phase sequence	1=yes	6SE70/71
15	Kinetic buffering active	1=yes	6SE70/71

Table 2.2.2.b: Status word 1, MS320 → automation

Stauts word 2 bit	Significance		Source
0	Controller enable, system operation	1=enabled	T300
1	Local stop	1=stop	T300
2	OFF3	0=active	6SE70/71 or T300
3	Operating mode, local run	1=active	T300
4	Operating mode, local crawl	1=active	T300
5	Operating mode, local, inching forwards	1=active	T300
6	Operating mode, local, inching reverse	1=active	T300
7	Operating mode, local positioning	1=active	T300
8	Speed setpoint zero	1=setpoint0	T300
9	Web break	1=yes	T300
10	Closed-loop tension control on	1=on	T300
11	Mode, system operation	1=active	T300
12	Standstill	1=yes	T300
13	Output, limit value monitor 1	1)	T300
14	Output, limit value monitor 2	1)	T300
15	Local/system operation	1=local	T300

1) Status of the outputs of the limit value monitor depending on the parameterization [Block diagram, Sheet 10]

Table 2.2.2.c: Status word 2, MS320 → automation

2.2.3 Setpoints/actual values via the serial interface

The software assigns serial interface X02 (connector X134) to the peer-to-peer protocol. It is used for fast transfer of setpoints/actual values between the converters without using an interface board; refer to T300 Instruction Manual for the wiring (also refer to section 3 and the overview diagram, Sheet 14).

Up to five words can be transferred via the peer-to-peer protocol; any word can be defined as control word 1. The baud rate (up to 38400) and the number of transmit/receive words can be parameterized as well as the setpoint/actual value connections.

The transferred control word 1 can be freely connected; refer to Table 2.2.1.b for the significance of the individual bits.

3 Terminal assignment

Control signals and setpoints can be read-in and actual values and status signals output via binary and analog signals. With the standard MS320 axial winder software package, **16 binary inputs** and **8 binary outputs** as well as **7 analog inputs** and **4 analog outputs** are used.

Connector X131 (analog inputs / outputs, pulse encoder connections) and X136 (binary inputs / outputs) of the T300 board, are connected to the SE300 terminal block through shielded ribbon cables. For the 40-pin connector X131, an SC58 cable must be used and for the 34-pin connector X136, an SC60 cable. The terminal assignment, described in this document, is only valid when using the SE300 interface module. The terminals, assigned to connector X5, are designated with 5xx, and those with connector X6, with 6xx.

Caution:
Shielded SC58 and SC60 ribbon cables **must** be used.
The described terminal assignment is only valid when using the SE300 interface board.

3.1 Connector X6, binary inputs and outputs

The binary inputs and outputs of the T300 board require or supply 24 V signals. The 24 V power supply voltage for the binary output must be provided externally (i.e. via the interface board), and the binary inputs require no external power supply voltage.

3.1.1 Binary inputs

0 V = low = logical 0
Not connected = low = logical 0
Low-pass filter with smoothing time of approx. 700 µs

24 V = high = logical 1
Switching thresholds <6V =low, >13V =high
Input current for a high signal, approx. 8 mA at 24 V

<u>**Terminal strip X6:**</u> **Permanently wired control signals from the terminal**
Terminals 601 to 610 (STRUC configuring: partial connector X6A)
Only effective, if the appropriate parameters H021 to H028 are set to 0 (presetting).

Terminal	Assignment	Explanation
601	System start	1 = Controller enabled for system operation
602	Tension controller on	1 = On, tension control enabled
603	Tension controller inhibit	1 = Inhibit, tension controller output = 0
604	Set diameter	1 = Set, accept setting diameter
605	Inject supplementary setpoint	1 = Yes, addition of the speed supplementary setpoint
606	Local positioning	1 = Yes, local operation with positioning setpoint
607	Local operator control	1 = Local, local/system operation changeover
608	Local stop	1 = Stop for local operation
609	P 24 external *)	Terminals 609, 619 and 639 are connected via T300
610	M 24 external	Terminals 610, 630 and 640 are connected via T300

Table 3.1.1.a: Terminal strip X6, assignment of terminals 601 to 610

**) only connect if binary outputs are used*

Terminal strip X6: **Freely-connectable control signals from the terminal**
Terminals 611 to 630 (STRUC configuring: Partial connector X6B)

Terminal	Assignment	Explanation
611	Select input	The binary select inputs must be assigned to the control signals of the winder software by parameterizing, refer to block diagram, sheets 16, 17
612	Select input	
613	Select input	
614	Select input	
615	Select input	
616	Select input	
617	Select input	
618	Select input	
619	P 24 external *)	Terminals 609, 619 and 639 are connected via T300
630	M 24 external	Terminals 610, 630 and 640 are connected via T300

Table 3.1.1.b: Terminal strip X6: Assignment of terminals 611 to 630

**) only connect if binary outputs are used*

3.1.2 Binary outputs

When the drive is first powered-up, all outputs are first inhibited (high ohmic state). The output registers are preset with 0 in the initialization phase, and they are then enabled. When the drive is shutdown, or a processor crashes (e.g. due to a hardware fault), all outputs are inhibited.

0 V = low = logical 0 24 V = high = logical 1
max. output current 100 mA, short-circuit proof

Terminal strip X6: **Binary outputs and status messages**
Terminals 631 to 640 (STRUC configuring: Partial connector X6C)

Terminal	Assignment	Explanation
631	Web break	Web break identified
632	Standstill	Speed actual value < H157
633	Tension control on	Tension / position controller on, speed contr. enable
634	Basic drive converter on	Operating signal from the basic converter
635	Alarm, T300	At least one PT alarm present
636	Speed setpoint = 0	Speed controller setpoint < 0.1%
637	Limit value monitor 1	Output can be parameterized, H114
638	Limit value monitor 2	Output can be parameterized, H114
639	P 24 external	Terminals 609, 619 and 639 are connected via T300
640	M 24 external	Terminals 610, 630 and 640 are connected via T300

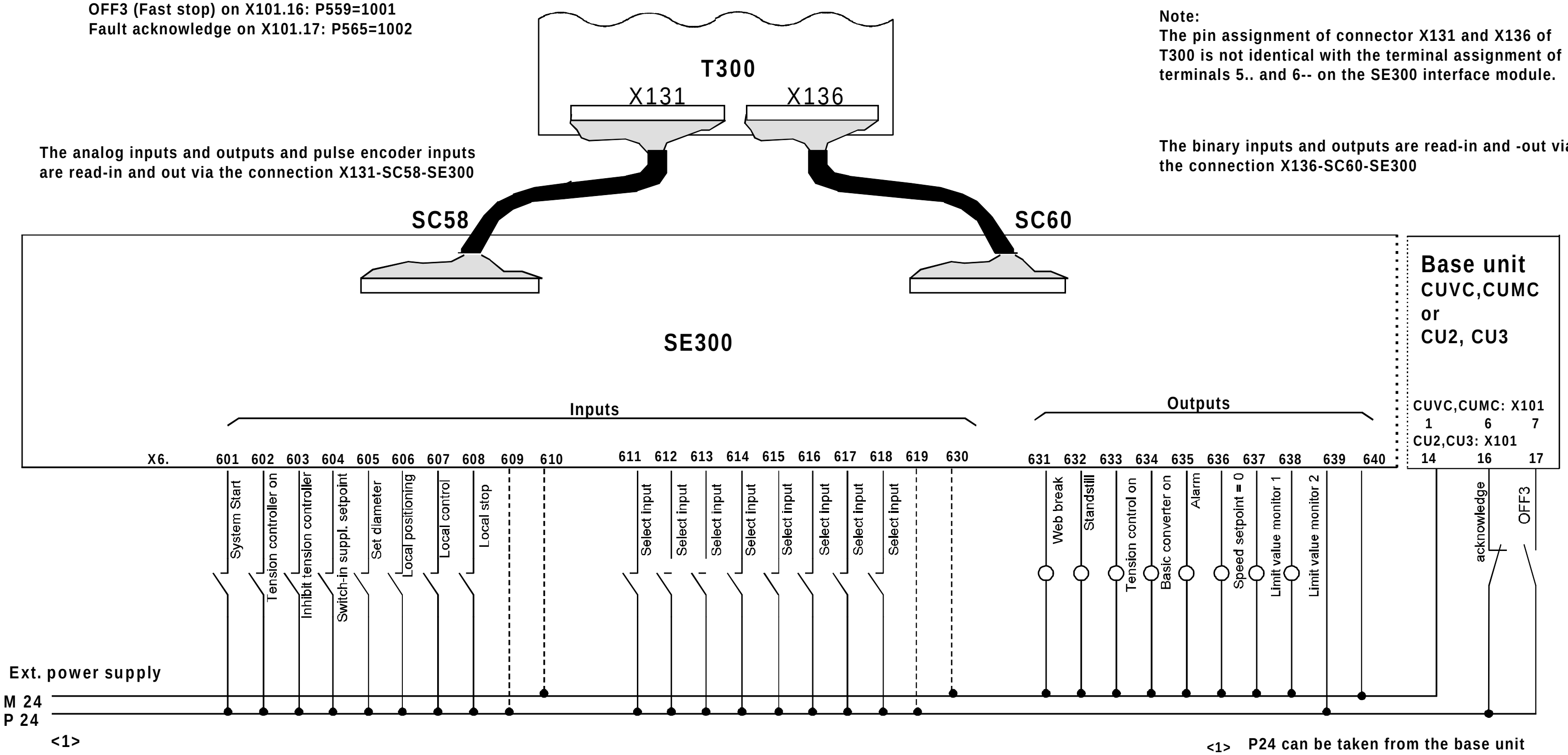
Table 3.1.2: Terminal strip X6, assignment of terminals 631 to 640

Note - It is possible, but not necessary, to connect control and setpoint signals to the base drive.
Examples for signals to the base drive:
CUVC or CUMC:
OFF3 (Fast stop) on X101.6: P559=16
Fault acknowledge on X101.7: P565=18
CU2 or CU3:
OFF3 (Fast stop) on X101.16: P559=1001
Fault acknowledge on X101.17: P565=1002

Note:
The pin assignment of connector X131 and X136 of T300 is not identical with the terminal assignment of terminals 5.. and 6-- on the SE300 interface module.

The analog inputs and outputs and pulse encoder inputs are read-in and out via the connection X131-SC58-SE300

The binary inputs and outputs are read-in and -out via the connection X136-SC60-SE300



<1> P24 can be taken from the base unit when the current is less than 150 mA

Fig. 3.1: Connecting-up the binary inputs to T300

3.2 Connector X5, analog inputs and outputs

The analog inputs and outputs have a **12-bit** resolution over the input or output voltage range of **-10 V to +10 V (4.88 mV resolution)**. In this case, **5 V** corresponds to an internal value of **100 %.**

3.2.1 Analog inputs

Differential inputs (connect all reference potentials !),
Low-pass filter with 0.66 ms time constant Input resistance = 10 kΩ

Terminal strip X5: **Analog inputs 1 to 7**
(STRUC configuring: Partial connector X5A to X5G)

Terminal / reference	Assign.	Samp. time in ms	Partial connection	Adaption via parameter Gain	Offset
501 / 502	Select input	8	X5A	H054	H055
503 / 504	Select input	8	X5B	H056	H057
505 / 506	Select input	8	X5C	H058	H059
507 / 508	Select input	8	X5D	H060	H061
511 / 512	Select input	8	X5E	H062	H063
513 / 514	Select input	32	X5F	H064	H065
515 / 516	Select input	32	X5G	H066	H067

Table 3.2.1: Terminal assignment, analog inputs

Connecting-up, refer to the overview diagram, sheets 11-13

It is conceivable, that the internal analog signal smoothing must be increased (e.g. for tension actual value). This can be achieved by switching-in an external RC element in series, refer to Fig. 3.2. Configured on a terminal block, e.g. EMG 50-89 from Phönix

3.2.2 Analog outputs

When the drive is powered-up, all outputs are first inhibited (zero volt). The output registers are pre-set with 0 in the initialization phase and are then enabled. When the drive is shutdown or a processor crashes (e.g. due to a hardware fault), all outputs are inhibited.

max. output current = 10 mA

<u>Terminal strip X5:</u> **Analog outputs 1 to 4**
(STRUC configuring: Partial connector X5H to X5L)

Terminal / reference	Assignment Resolution, presetting	Partial connector	Selected via	Adaption with Offset	 Gain
509 / 510	Speed actual value 10 V = 100 % rated speed	X5H	Fixed	H097	H098
519 / 520	Actual diameter 10 V = 100 % D_{max}	X5J	Fixed	H099	H100
521 / 522	Selected value 1 10 V = 100 %	X5K	H127	H101	H102
523 / 524	Selected value 2 10 V = 100 %	X5L	H128	H103	H104

Table 3.2.2: Terminal assignment, analog outputs

Assignment of the select signals, refer to the overview diagram, Sheet 10

3.3 Pulse encoders

Generally, only the tachometer (web speed tachometer) is connected to the T300. On the other hand, the pulse encoder to measure the motor speed is connected to the basic drive converter and terminals 531 to 534 thus remain unassiged.

3.3.1 Information regarding pulse encoder types

Pulse encoders, with two tracks, displaced through 90 degrees, must be used.

Encoders with supply voltages from 15 V - 24 V can be connected. Generally, only 1 pulse encoder can be supplied with the power supply (15 V, max. 100 mA) provided from the T300 board. The second pulse encoder must be supplied from an external voltage source or from the basic converter.

– The pulse encoder cable should be **very carefully shielded**. The cable shield should be connected at both ends, if possible through cable clamps, through the lowest impedance and over the largest possible surface area, to ground potential.

3.3.2 Pulse encoder inputs

T300 has 2 pulse encoder inputs; they have identical circuit configurations. The switching thresholds are optimized for pulse encoders with a 15 V supply voltage. Pulse encoders with a 24 V supply voltage can be connected; under certain circumstances a somewhat lower maximum pulse encoder frequency may be expected.

<u>Technical data:</u>
- input current, typically 8 mA
- input signal level, 0 - 30 V
- digital filter, max. frequency 500 kHz
- average switching threshold, approx. 7 V
- **maximum frequency** (per track) **400 kHz**.

<u>Terminal strip X5:</u> Pulse encoder - axial tachometer inputs
(STRUC - configuring: Partial connector X5M)

The pulse encoder for the axial tachometer is connected at the basic drive converter; the pulse tracks are transferred to the T300 via the backplane bus. The pulse encoder signals need not be connected twice. H217 is used for parameterization.

Terminal	Assignment	Explanation
531	Track A	
532	Ground	Ground
533	Track B	
534	Ground	Ground
535	Zero pulse *)	Unused
536	Ground	Ground
537	Rough pulse *)	Unused
538	Ground	
539	Ground	
540	P 15 output	**Max.100 mA**

Table 3.3.2.a: Pulse encoder inputs, axial tachometer

**) not used for axial winders*

<u>Terminal strip X5:</u> Pulse encoder inputs, web tachometer
(STRUC configuring: Partial connector X5N)

Terminal	Assignment	Explanation
541	Track A	
542	Ground	Ground
543	Track B	
544	Ground	Ground
545	Zero pulse *)	Unused
546	Ground	Ground
547	Rough pulse *)	Unused
548	Ground	
549	Ground	
540	P 15 output	**Max.100 mA**

Table 3.3.2.b: Pulse encoder inputs, web tachometer

**) not used for axial winders*

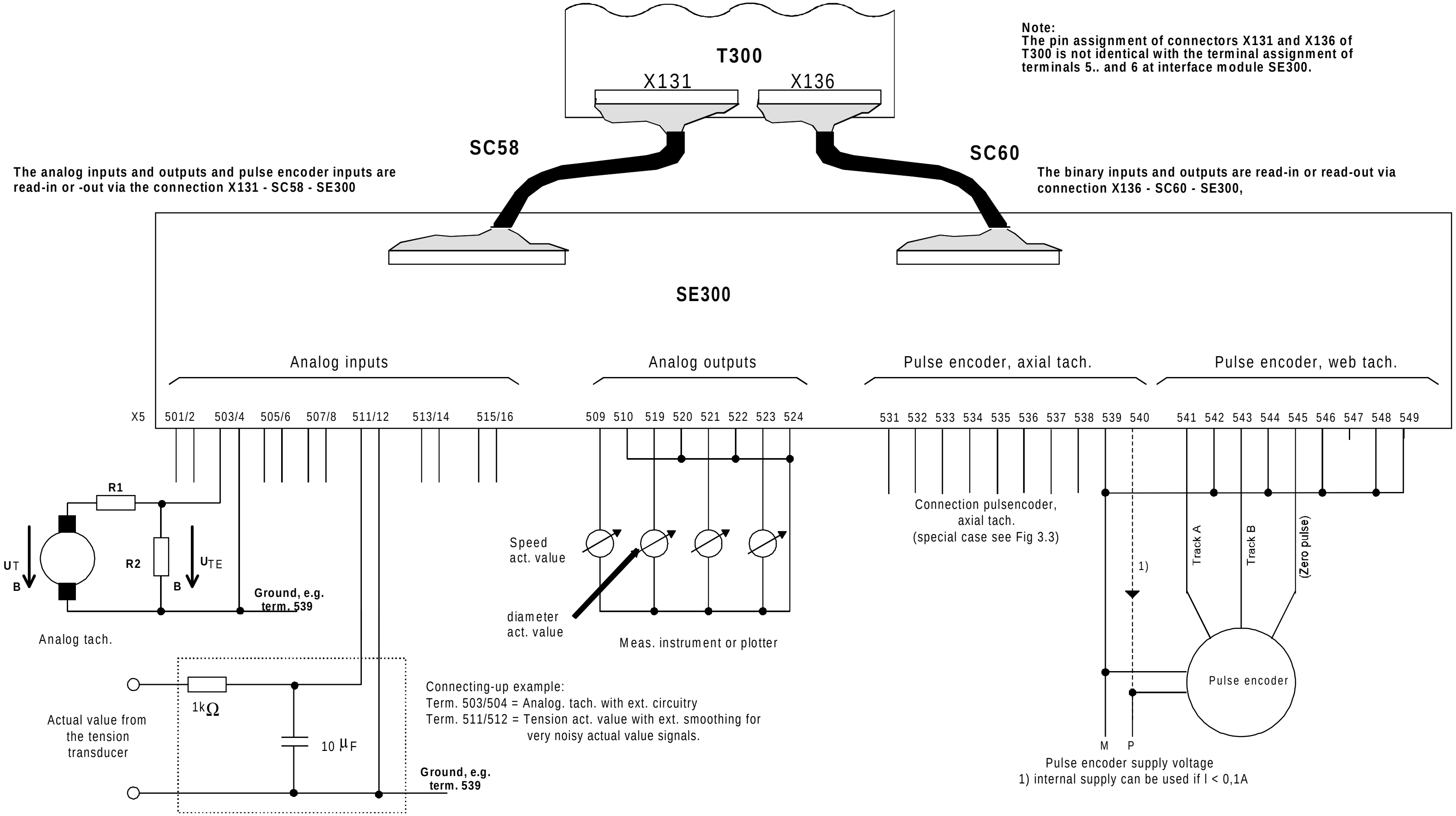


Fig. 3.2: Connecting analog inputs and outputs and pulse encoder inputs, for the web tachometers at T300

3.4 Connecting example

The example is valid for winders and unwinders as well as all of the tension-controlled operating modes (H203 = 0 to 3 and 5). In the example, only winders are discussed.

3.4.1 Diagram and the required control signals

Fig. 3.3 shows as an example, the connections and parameterization for a simple winder for entering the control signals via binary inputs, setpoints and actual values via analog inputs:

Control signals, local operation:

- Inching forwards
- Inching reverse
- Local operator control
- OFF3

Control signals, system operation:

- Set diameter
- Wind from below
- OFF3 (fast stop)
- System start
- Tension controller on
- OFF1/ON

Setpoint/actual values:

- Speed setpoint
- Tension setpoint
- Tension actual value

Output signals:

- Standstill signal
- Web break signal
- Diameter actual value

Notes: In system operation, the "local operation" command must be inactive.

All analog and binary inputs and outputs can be connected without any additional circuitry, directly to the appropriate S5 board.

All analog inputs and the speed sensing inputs are designed as differential inputs and a reference potential (ground) must always be connected.

OFF3 (fast stop) can also be connected at the basic converter.

3.4.2 Control sequences

Information regarding the control signals:

- For unwinders with closed-loop tension control via the torque limits, H041 should be set to 12 via the torque limits (H203 = 0 to 2).
- In addition to the switching sequences indicated, others are also conceivable.
- The signals listed in Fig. 3.4 Control sequences, are illustrated in the Block diagram on Sheet 17.

> **Important note:**
> **OFF3 (fast stop) is only effective, if OFF2 = 1, refer to H047.**

Explanations regarding the numbers in circles in Fig. 3.4:

① The winder is closed-loop speed controlled. In this case, it is assumed that the diameter setpoint is set according to the mechanical diameter of the roll, refer to d310, Sheet 9 Block diagram!
The up and down ramps for the speed setpoint can be set at the ramp-function generator for the speed setpoint, Sheet 5 Block diagram.
The speed-controlled operation is required, among other things, for the flying roll change.

② The winder mode (closed-loop tension controlled mode) is switched-in at this instant.
If closed-loop speed controlled operation is not required, the tension controller can be enabled together with the system start signal.

③ The tension controller is inhibited and the winder drive decelerates along the selected down ramp (ramp-function generator for the speed setpoint, Sheet 5 Block diagram).

④ The winder drive can be powered-down.
If the winder is decelerated to zero speed to change a roll, the tension controller and the winder drive can be simultaneously switched-off after the winder has come to a standstill.

Comment regarding local operator control:

– Local operator control, such as inching forwards etc. can also be achieved by the closed-loop speed controlled operation and the appropriate setpoint inputs.
– Refer to the Block diagram, Sheet 18
– Inching forwards (or inching backwards):
  OFF1/ON = 0!
  OFF3 (= OFF2) = 1
  Afterwards, local operator control = 1,
  Afterwards, select inching forwards or inching backwards.
  Return to system operation (winder operation): Beforehand OFF1/ON, local control = 0!

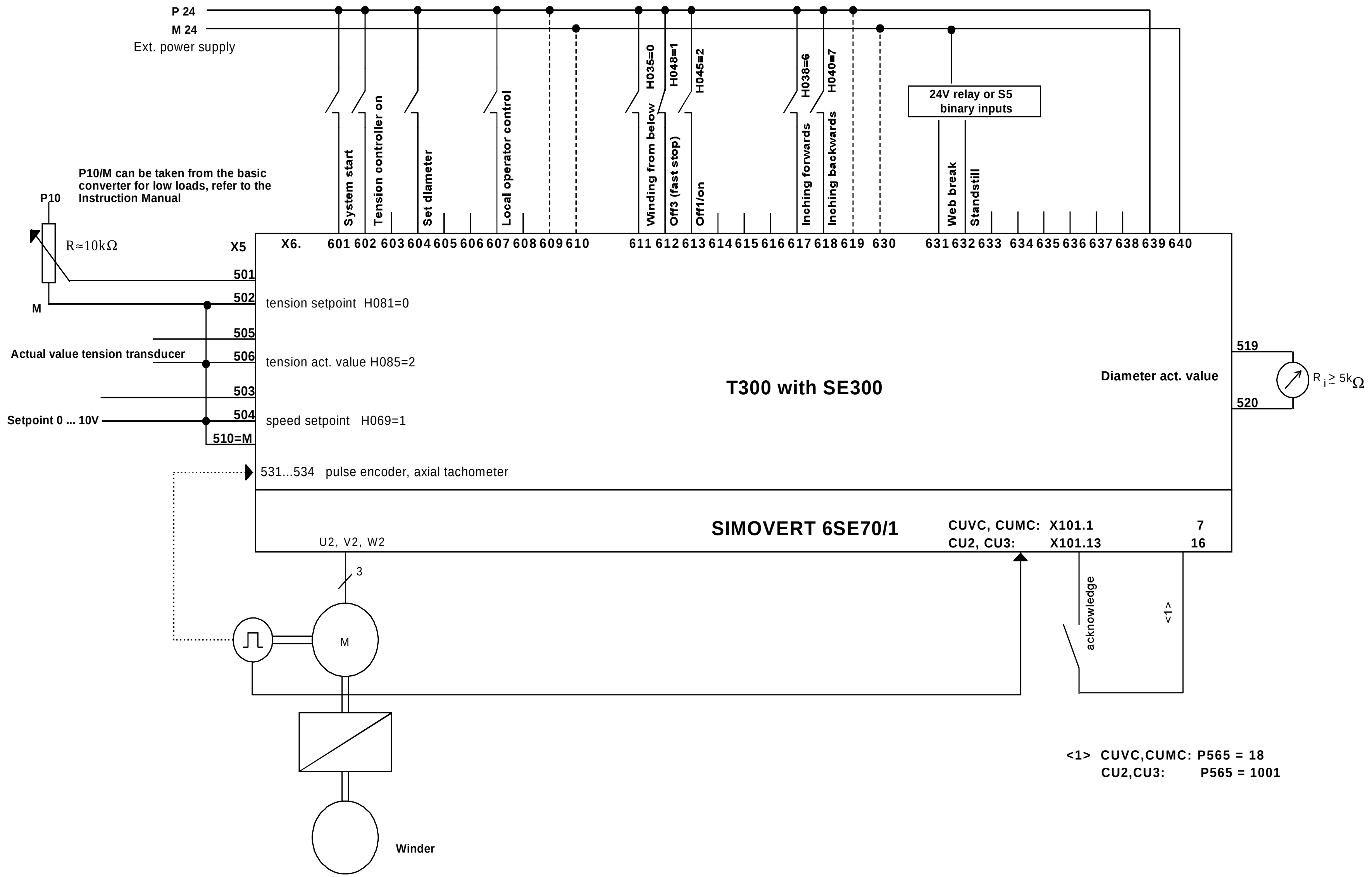


Fig. 3.3: Connecting-up example at T300/SE300

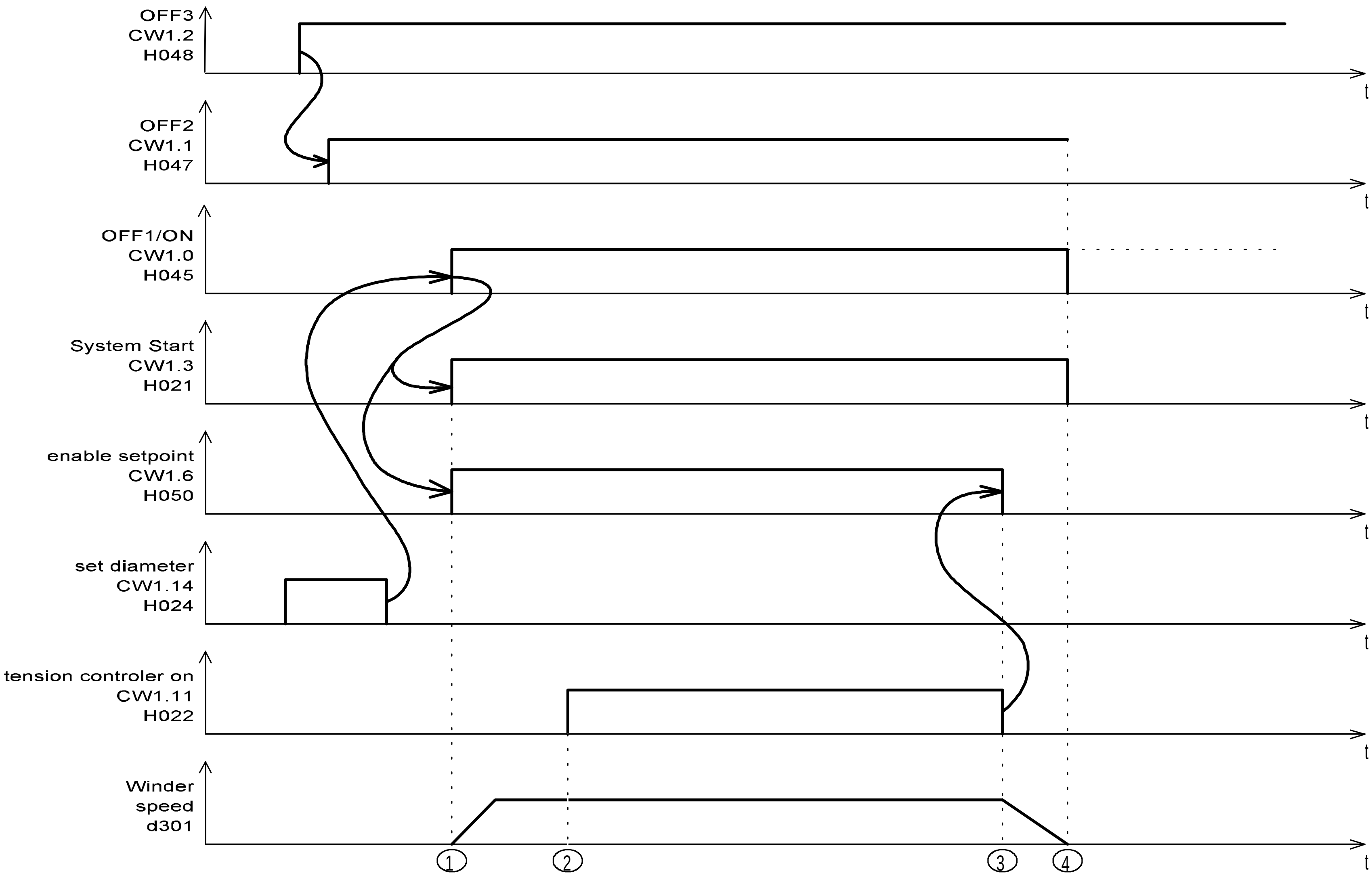


Fig 3.4: Control sequence for the signals Fig. 3.3

Note:
- OFF2 in fig. 3.2 is set to 1. By using PROFIBUS-DP, the control from OFF2 is recommended
- In the figure the control bits by using PROFIBUS-DP are indicated.

3.5 Serial interface X01

Serial interface 1 (STRUC board connector X01) is configured as RS232 (V24) - X132 or RS485 - X133 start-up interface to connect TELEMASTER.

Note:
Serial interface can **either** be used as RS485 **or** as RS232; this means, it is **not** permissible to **simultaneously** use the physical interfaces at terminal series X132 and X133!

The Baudrate is set to 9600 Baud.

RS232

Pin number (referred to connector X132):	Pin number (referred to the labels on the T300 connector):	**Connector X132** (RS232)
1	1	Receive data RxD
2	2	Transmit data TxD
3	3	Ground GND
4	4	Ground GND
5	5	Ground GND

Table 3.5.a: Connector X132

RS485

Pin number (referred to connector X132):	Pin number (referred to the labels on the T300 connector):	**Connector X133** (RS485)
1	6	Receive / Transmit +RxD / +TxD
2	7	Receive / Transmit -RxD / -TxD
3	8	Receive / Transmit +RxD / +TxD
4	9	Receive / Transmit -RxD / -TxD
5	10	Ground GND

Table 3.5.a: Connector X133

3.6 Serial interface X02

Serial interface X02 is assigned the peer-to-peer protocol per software; it is available at X134 as RS485 (4 wire).

Further information to connect-up the interfaces can be taken from the T300 Instruction Manual,

or Fig. 1.2.2 and Block diagram Sheet 14.

Please refere also to Note 3, section 8.1.3.3

Peer-to-Peer serial interface X134

Pin number (referred to connector X134):	Pin number (referred to the labels on the T300 connector):	**Connector X134 4-wire RS485**
1	11	Receive data +RxD
2	12	Receive data -RxD
3	13	Transmit data +TxD
4	14	Transmit data -TxD
5	15	Ground GND

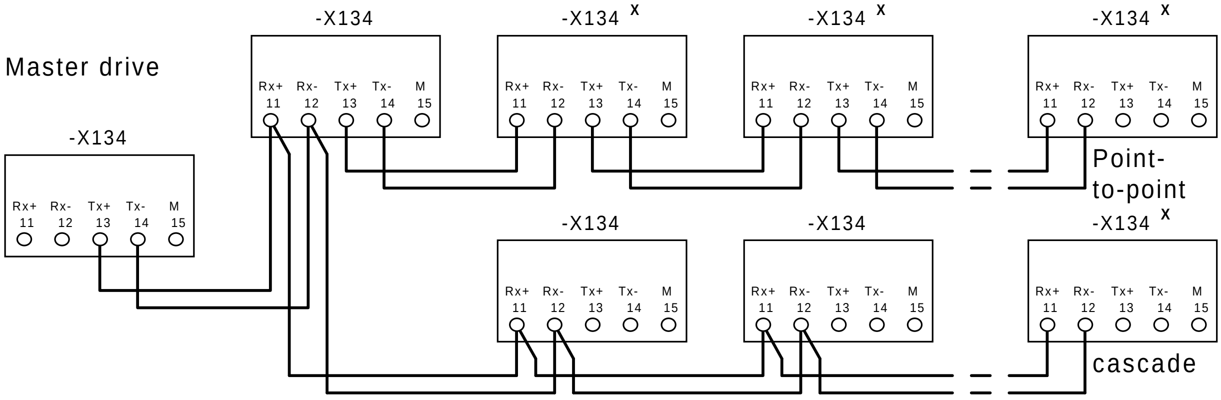
Table 3.6: Connector X134

Possible types of peer-to-peer connection
The peer-to-peer connection is flexible.

- The signals can flow through the drives in a **series connection**; with this connection type, each drive processes the data as required before passing them on to one other drive (classic setpoint cascade).

- In a **parallel connection**, a total of 31 drives can be connected in parallel to the transmit cable of one drive. All these drives receive their (identical) data sets simultaneously. The signal delay time (see table 3.6.b above) occurs only once with the parallel connection.

- Any desired **mixed combinations** of series and parallel connections can be implemented.



x: For this T300, the bus terminating resistors must be switched-in, i.e. at bus terminating switch S1, coding switches S1.3 and S1.4 must be set to ON!

Signal delay time (Example) **:**

Baud rate	Telegramm lenght in Word	Net transmission time im ms
9600	1 2 5	5,7 8 16
19200	1 2 5	2,8 4 8
38400	1 2 5	1,43 2 4
115200	1 2 5	0,47 0,67 1,34

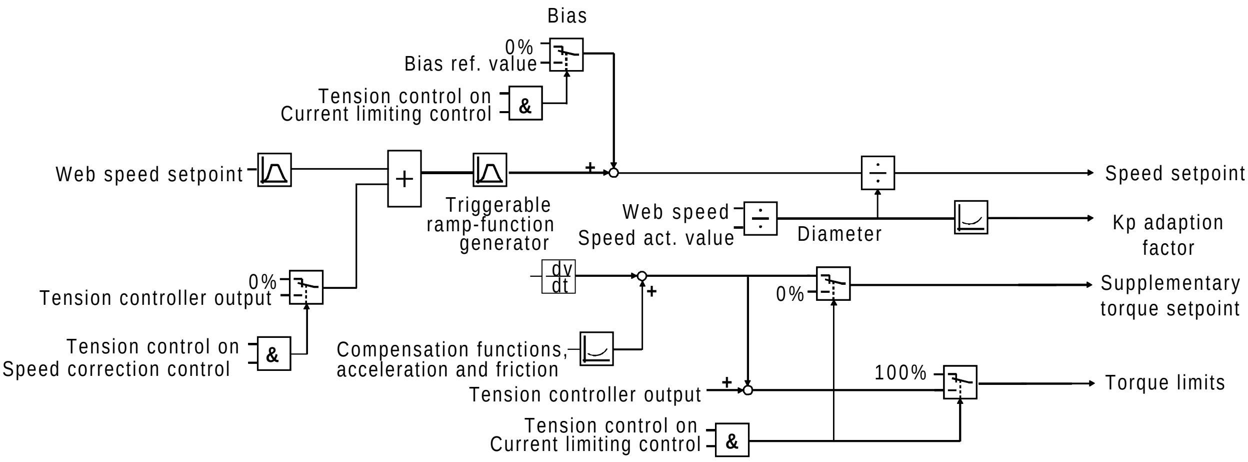
Table 3.6.b: Signal delay time Peer-to-Peer

4 Function description

4.1 Overview

The standard axial winder software package was developed with the aim of being able to cover many of the known winder applications with one single software package. Using the freely-configurable T300 technology board and its STRUC block language, universal function units were created, which can be easily adapted to the particular system configuration by parameterizing. Flexible connection of control signals and setpoints allows control from a higher-level system as well as operator control via the technology board terminals. "Mixed operation" is also possible. The parallel interface to the basic converter is guaranteed by fast data transfer via a dual port RAM.

4.1.1 Closed-loop control (block diagram 4)



Sheet 4 of the overview diagram provides an overview of the complete closed-loop control structure.

The tension control influences the speed controller in two different ways. For the closed-loop current limiting control, the higher-level tension controller acts on the speed controller limits, thus maintaining the required web tension. To relieve the tension controller, compensating torques for friction and inertia compensation are generated, which are added with the correct polarity before limiting. With this control technique, the speed controller is kept at its limit by switching-in a saturation setpoint and when a web break occurs, the winder accelerates up to the sum of the speed setpoint and saturation setpoint.

When selecting speed correction control, a cascade structure is obtained, and the tension controller influences the speed controller setpoint. The compensation torques are added as supplementary setpoint after the speed controller.

For constant speed control (V constant), the tension controller is disabled (output limit=0%) and the winder operates with the specified web speed setpoint.

4.1.2 Setpoints (block diagrams 11-13)

The setpoints to be processed are selected via a multiplexer which can be parameterized. Every setpoint can be freely selected from a max. of 32 sources. The following input signals are available:

7 analog inputs of the T300 board
6 setpoints from the interface board
6 setpoints from the CU board
5 setpoints from the serial interface via peer-to-peer protocol
2 select values from the CU board
2 motorized potentiometers
one fixed setpoint as parameter

The standard multiplexer setting switches the fixed setpoint through which is assigned 0%.

4.1.3 Control signals (block diagrams 16/18)

The source of the control commands required for the particular application is freely selectable. The individual commands can be input from the interface board, the basic drive converter via USS, the T300 serial interface, or via binary inputs. The individual bits of the control words are permanently assigned to control commands (refer to Section 2.2), as well as terminals 601 to 608. For these 8 fixed control signals, it is possible to toggle between terminal control and input via a control word (from the CB, CU or peer-to-peer).

The freely-selectable control commands are outputs of multiplexers which can be parameterized. Binary inputs X6, terminals 611 to 618, the appropriate bit of the possible control words and fixed values 0 and 1 are available as sources. Control bits, which are not included in the control words, can be addressed as dedicated parameters.

As standard, the fixed control signals are connected to the T300 terminals; and the freely-connectable control signals are disabled via the appropriate multiplexer setting.

For diagnostics, all of the possible winder control commands are combined in 3 visualization parameters (d332, d333 and d334). These parameters indicate the status of the control signals directly before internal processing.

4.2 Selecting the speed actual value (block diagram 13)

The basic drive is always operated in the closed-loop speed controlled mode. The axial winder requires the speed actual value to calculate the diameter. There are two ways to transfer the speed actual value to the T300; either via the dual port RAM (DPR), which is preferred or via the pulse encoder tracks of the backplane bus.

Preferred solution via DPR, H92=7:
The speed actual value adjustment is made on the basic drive; no settings are required on the T300. It is unimportant which type of actual value encoder (resolver, pulse encoder etc.) is used. Also refer to Section 7, Comments.

H92=8, pulse encoder signals via the backplane bus are used:
From the basic drive instruction manual, it can be determined how many pulses per revolution the encoder outputs. Parameters H212, H214 and H217 should then be set corresponding to the parameter list (example: Pulse encoder at the basic drive with 1024 pulses/ revolution, speed at v-max and core diameter: 2347RPM: H212=1024, H214=2347, H217=0024)

H92=8, pulse encoder signals via SE300, terminals X5.531, 533 are used:
Analog as above, H217=0002.

Note: Changes made at H212, H214 and H217 only become effective after the electronics voltage is powered down and up again.

The actual speed value can be monitored at display parameter d307 as a percentage of the maximum motor speed.

The analog value of the speed actual value is available at terminal strip X5, terminals 519 and 520.

4.3 Selecting the speed setpoint input (block diagram 5)

The main setpoint for the winder drive web speed is selected using parameter H069 (block diagram 11). The web speed setpoint is normalized using parameter H139 so that the required speed ratio is obtained for the winder. The effective web speed setpoint after normalization and taking into account a gearbox stage changeover is available as monitoring parameter d301.

4.4 Stretch compensation for the speed setpoint (block diagr.5)

The main web speed setpoint can be influenced in the sense of a "stretch compensation", if the material thickness is reduced before winding, e.g. due to expansion or stretching. In this case, a compensation setpoint should be selected using parameter H071. A fixed value is selected via H071 with H071 = 31; pre-setting 0%. The web speed compensation can be normalized using parameter H137.

The web speed compensation should only be set, if a deviation has been identified between the web speed setpoint and web speed actual value. This difference influences, among other things, the accuracy of the diameter calculation and the speed of the winder shaft for a flying roll change (flying splice).

4.5 Maneuvering speed setpoint (block diagr.5)

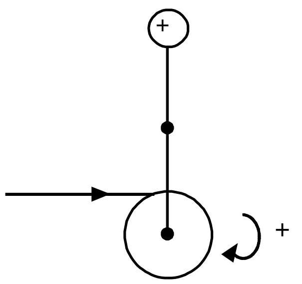
A "positioning" function is provided for positioning the material roll. When the function is activated using the "manouver" command, parameter H140 is multiplied by the speed setpoint, thus providing a setpoint, which is a % of the web speed setpoint. H140 can be set to values between zero and ± 200 %.

4.6 Winder overspeed protection (block diagr.5)

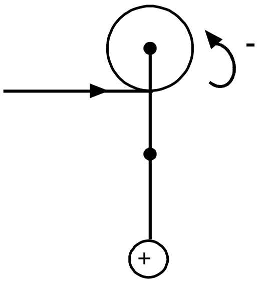
In order to prevent a full roll reaching an inadmissible speed when the web breaks, the web speed setpoint is divided by the diameter calculated during winding. The speed controller is thus supplied with the correct speed setpoint which means that the circumferential velocity of the roll coincides with the web speed. In order to develop a motor torque for operation with the closed-loop current limiting control, parameter H145, as saturation setpoint, is added to the actual setpoint. Thus, it is ensured, that the drive remains torque controlled (closed-loop control), when the web is intact (speed controller is at its limit with the correct polarity). When the material web breaks, the motor only accelerates by the supplementary value of the basic speed setpoint. For most applications, H145 can be set between 5% and 10%.

4.7 "Winding from above / below" operating modes

In order to change the motor direction of rotation, when changing between the "wind from above" and "wind from below" modes, the "wind from below" command (block diagr.6, 9) can be activated. This reverses the polarity of the speed setpoint signal when 4-quadrant drives are used (refer to the sketch).



Winding from above



Winding from below

Note: The "winding from below" command should only be activated, if both types are required in an application. Otherwise, "winding from above" should always be selected, independent of the web routing.

4.8 Speed setpoint for winder operation (block diagr.5)

4.8.1 System operation

This operating mode is always required for winding and is activated using the command "off 1/on" =1 with the "local operator control" control signal 0. The basic converter is powered-up (main contactor in). The software and basic converter wait for a controller enabled issued through "system start". The winder accelerates up to the parameterized setpoint after an enable signal has been issued.

For system operation, a central ramp-function generator for the speed setpoint is effective.

The ramp-up/ramp-down times and rounding-off for acceleration/deceleration are set using parameters H133, H134, H135 and H136. The upper and lower limits can be specified using parameters H131 and H132. The value from H130 can be switched-in as new setpoint using the "accept setpoint B" command. The "accept setpoint A" command injects a new setpoint, which can be selected using H96 (block diagram13). The ramp-function generator is held using the "ramp-function generator stop" or set speed setpoint to stop" commands.

The speed setpoint, is directly transferred to the control bypassing the ramp-function generator for H154 = 1; an adjustable smoothing is also possible in this case using H155. This operating mode is conceivable, if the available setpoint is already available as ramp-function generator output (winder as slave drive, setpoint from the central machine control or from another drive).

Note: The ramp-function generator can also be used as a smoothing element, e.g. for setpoint input using a web tachometer. The ramp-up and ramp-down times should be set somewhat lower than the web speed changes which occur.

Using the "inject supplementary setpoint" command, a setpoint source, which can be selected with H073, can be directly added in front of the speed controller (block diagr.5).

4.9 RPM / line speed setpoints in local operation (block diagr.5)

The standard axial winder software package has, in local operation, its own setpoint system with separate ramp-function generator (can be disabled). Dependent on the selected local mode, the setpoint is switched-through and the ramp-function generator is only effective after an operating mode change (block diagr.18). Ramp-up and ramp-down times are both set using H161. The active setpoint can be monitored using d344. H146 = 0/1 can be used to toggle between RPM / speed controlled local operation.

4.9.1 Local operating modes (block diagr. 16/17)

The following operating modes are available:

Local run	Setpoint selection using H075 from 32 sources (block diagram11)
Local crawl	Crawl setpoint = H142
Local positioning	Setpoint selection via H091 from 32 sources (block diagr.12), X^2/X^3 characteristic, adaption using H163
Local inching forw.	Inching setpoint = H143
Local inching rev.	Inching setpoint = H144

Local operation must be selected using the "local operator control" signal. There is a dedicated control signal for each local operating mode and the commands are "latching", i.e. they are internally stored. The commands are mutually interlocked, so that only one is effective. To exit the run, crawl and positioning modes, the "local stop" command is required, or the "local operator control" must be withdrawn.

When a local operating mode is selected, the basic converter is switched-on (main contactor), and the controller is automatically enabled after operating readiness has been signaled.

For inching, controller enable in the basic converter is extended by a time which can be parameterized with H014. Before this time expires, the inching setpoints can be changed as required by activating the inching commands; it is also possible to change into another local operating mode during this time.

It is possible to switch-in the local setpoints in system operation using H166 = 1. Only the appropriate setpoint is switched-through with the local control signals, and added to the speed setpoint.

4.10 Speed control

The speed sensing and closed-loop control are implemented in the basic drive converter. The axial winder standard software package specifies the speed setpoint, influences the torque limits and transmits a supplementary torque setpoint for the necessary compensation factors.

4.10.1 Influence, speed controller (block diagr. 6)

For closed-loop tension controlled operation, either the speed controller limits are influenced (closed-loop current limiting control) or the speed setpoint (closed-loop speed correction control). It is possible to adapt the gain to the variable moment of inertia. The controller setting is determined during start-up using the automatic optimization runs.

4.10.2 Kp adaption

The controller gain adaption to the variable moment of inertia is realized on the T300 using a straight line which can be parameterized. The input quantity is the calculated variable moment of inertia; the output operate to the controller proportional gain in the converter. The initial- and final points of the adaption have to be set and the associated multiplication factors. The characteristic is linearly interpolated between these points.

For the correct setting, the Kp values are required for a full and empty roll, which is determined during start-up (refer to Section 8.2.4).

When determining the controller gain with full roll (as full as possible), the associated variable moment of inertia can be read-off as monitoring parameter d308, or calculated using the known diameter. For gearbox stage 1, constant material thickness and width, the following is valid:
J_V [%] ≈ D^4 [%] - $D_{core}{}^4$ [%]. The factor to be entered as H153 must be referred to 100% J_V,
ie. H153 = ((determined $K_p/K_{p\text{-empty}}$) * 100%/determined Jv [%]).

For the basic winder setting, with H151 = H153 = 1 , adaption is not effective, and the actual adaption factor is displayed with d345.

Note: **Kp adaption is recommended for winding ratios >3.**

CUVC,CUMC: For the adaption settings refer to section 8.2.4.1

4.11 Generating the torque setpoint (block diagr. 6)

The speed setpoint is output from the T300 as pre-control torque for closed-loop speed correction control and coupled-in as supplementary torque setpoint. For closed-loop current controls, it acts, in addition to the tension controller output, on the speed controller limits.
Converter parameterization required for this procedure is specified in Section 9 (block diagr.3).

4.11.1 Compensation factors (block diagr.9)

To compensate friction losses and the accelerating/braking torques, the appropriate compensation factors are calculated and added, with the correct polarity to the torque setpoint. Winding direction, web routing, closed-loop control type, material density and width and the gearbox stage are automatically taken into account.

The friction losses are compensated using a polygon characteristic which can be parameterized with 5 characteristic points; this is set during start-up, refer to Section 9, using parameters H230 to H235 in 20% steps. The characteristic output can be monitored using d314.

The variable moment of inertia is calculated to compensate the accelerating torque. This includes diameter, material density (H224), -width (selected using H079), and a possible gearbox stage changeover (H138). The feed-forward control torque for inertia compensation is obtained from the fixed moment of inertia after the actual diameter has been included and the internal or external (H226) acceleration signal; it is available as d316.

The precise compensation setting is especially important for indirect tension control, so that the armature current represents, as accurately as possible, the material tension, refer to Section 8.

The compensation factors for friction and acceleration are also effective in the closed-loop speed controlled mode (e.g. for acceleration and braking during a roll change).

4.12 Setpoint for closed-loop tension/position control (block diagr.7/8)

The setpoint source is selected using H081; for closed-loop position control with dancer roll, a fixed position setpoint can be entered using H081 = 31 via H080.

The main setpoint is fed through a ramp-function generator with ramp-up and ramp-down times which can be parameterized, H175 and H176. H206 can be used to select as to whether a winding hardness characteristic is subsequently applied. The supplementary tension setpoint is added after the characteristic; the source is selected via H083. The resulting total setpoint can again be smoothed using H192 and is available as monitoring parameter at d304.

4.12.1 Winding hardness control (block diagr.7)

The winding hardness control reduces the tension with increasing diameter and is generally only used for winders to wind-up the inner layers more firmly.

For dancer roll controls, the position setpoint can be entered as supplement tension setpoint.The characteristic output, available as d328, can be output at one of the analog outputs as setpoint for the dancer roll support (H177 = 1).

The winding hardness characteristic is a polygon characteristic with 5 characteristic points which can be parameterized. The actual diameter and the main tension setpoint after the ramp-function generator are the input signals. The source for the maximum tension reduction, referred to the setpoint, can be freely selected using H087. The tension setpoint starts to decease, when the diameter reaches the value set at H183. It follows the parameterized curve, which is set using the parameters shown in the block diagr.(block diagr.6). The diameter values D - D4 for parameters H183 to H187 must be set in an increasing sequence. The tension reduction factors for diameters D1, D2 and D3 are input via H180, H181 and H182 as % of the maximum tension reduction.

Example1: Tension setpoint at D1 = main setpoint - (max. tension reduction * main setpoint * H180)

Example 2: H086, as fixed value for the maximum tension reduction, is parameterized using H087=31 and H086=60%; the main tension setpoint is 50%, and the winding hardness control has the following characteristic:

a) If the diameter is less than or equal to the initial diameter, set in H183, then the winding hardness characteristic output is 50%.

b) If the diameter is greater than or equal to the final diameter H187, then the winding hardness characteristic output is 20%.

c) If the diameter lies between the initial diameter H183 and the final diameter H187, the output value follows the programmed winding hardness characteristic and has values between 50% and 20%.

If a decreasing winding hardness is not required - e.g. for unwind stands, then parameter H206 should be set to 1.

4.12.2 Standstill tension (block diagr.7)

When the winder is at standstill, it can be changed-over from operating tension to standstill tension using the "standstill tension on" control signal. The prerequisite in this case is that the standstill limit H157 (block diagr.6) is fallen below, and a delay time has expired, H159 (block diagr.6).

The following can be selected for the standstill setpoint:

H188 = 1 & H191 = 0 The standstill setpoint is a fixed value which is set using H189

H188 = 0 & H191 = 0 The standstill setpoint is a % of the operating tension setpoint and is set using H189.

H188 = 1 & H191 = 1 The standstill setpoint is the operating tension setpoint or the fixed standstill tension setpoint set at H189 - depending on which of the two values is lower.

H188 = 0 & H191 = 1 Inadmissible operating status

4.13 Closed-loop tension / dancer roll control (block diagrs.7,9)

Five different control characteristics are implemented to control the material tension; selection is realized using H203 and the following possibilities exist:

H203 = 0 : Indirect closed-loop tension control with direct open-loop armature current control via the current limiting signal. This is the preferred solution for indirect tension controls.

H203 = 1 : Direct tension control using a tension transducer, whereby the tension controller controls the armature current via the current limiting signals.
This is the preferred solution if a tension transducer is used.

H203 = 2 : Direct tension control using a dancer roll potentiometer as tension actual value transmitter, whereby the closed-loop dancer roll/position controller controls the armature current via the current limiting signal.
This control technique is seldomly used; it may be practical for materials which are less flexible, e.g. cable, textiles, paper etc.

H203 = 3 : Direct tension control using a tension transmitter or a dancer roll potentiometer as tension actual value transmitter, whereby the tension controller acts on the speed controller via a speed correction setpoint.
This control technique should be used, if there is a dancer roll. If there is a tension transducer, this control technique is occassionally used for elastic, extremely stretchable materials, e.g. thin plastic foils.

H203 = 0 : Presently not used, is free for expansion.

H203 = 5 : As for H203=3, however, the tension control output can be multiplied by the web speed signal. The "lower limit value" for the multiplication factor of the web speed on the tension controller output can be defined using parameter H201.
Normalization can be realized using parameter H202.

The tension controller is a proportional-integral controller, whose integral action time can be set using parameter H199. The controller is a pure proportional controller for H196=0. The tension controller operates as closed-loop dancer roll/position controller if there is a dancer roll.

For applications with tension transducer or dancer roll in "speed correction" operation (H203 = 3, 5), the tension controller is usually operated as proportional controller.

The tension controller output signal is limited depending on the setting of parameter H194 and H195:

H194 = 0 : The output signal is limited to the postive value, which is set at H195. Negative values are limited to 0. This setting is only practical for single-quadrant drives, for H203=0, 1 and 2.

H194 = 1 : The output signal is limited to values between ±H195.

H194 = 2 : The upper limit corresponds to the absolute speed actual value or a minimum value which can be selected with H193. The negative limit value is zero.

H194 = 3 : The upper limit corresponds to the absolute speed actual value or a minimum value which can be selected with H193 and the lower limit, the inverted signal.

4.13.1 Kp adaption

Analog to the speed controller, the controller proportional gain is adapted to the variable moment of inertia, so that the effect of diameter, material width and density and a possible gearbox can be automatically taken into account.

Setting parameters:

$K_{p\ min}$	H197	Controller gain for an empty roll
$K_{p\ max}$	H198	Controller gain at 100% J_V [1])
$J_{V\ start}$	H207	Start adaption point, e.g. at 0%
$J_{V\ end}$	H208	Final adaption point, e.g. at 100%

[1]) When determining the controller gain with full roll (as full as possible), the associated variable moment of inertia can be read-off as monitoring parameter H308, or calculated using the known diameter. For gearbox stage 1, material density and width constant, the following is valid: J_V [%] $\approx D^4$ [%] - $D_{core}{}^4$ [%]. The factor to be entered as $K_{p\ max}$ must be referred to 100% J_V, ie. $K_{p\ max}$ = calculated K_p * 100% / calculated J_V [%].

For the basic winder setting, with $K_{p\ min} = K_{p\ max}$, adaption is not effective, and the actual Kp value is displayed with d346.

Note: It is recommended that the Kp adaption is used for winding ratios >3.

4.14 Derivative action, tension/position act. value (block diagr.7)

The differential component of the tension/position actual value generation is used to compensate the phase rotation, which is caused by an integral loop element (dancer roll). The differential component must be disabled (H174=1) if the tension is measured using a transducer, as the loop has PT1 characteristics.

For dancer roll controls (H174=0) with or without a low derivative action, the position actual value could oscillate. These can be effectively suppressed by increasing H173.

The duration of an actual value oscillation period without derivative action is a good approximate value for the time constant of the derivative action (differential time constant H173). This value should not be exceeded. Excessive time constants could result in instability!

4.15 Web break detection (block diagr.7)

The following prerequisites must be fulfilled so that this function responds:

- Tension control switched-in
  For the closed-loop current limiting control (H203=0,1,2) the difference from the torque actual value minus the tension controller output, referred to the tension controller output, must be less than the value in H275.

- The limit, set using H204, for the torque/tension actual value must be fallen below, but the setpoint must be above this limit. For indirect tension control (H203=0), this limit value refers to the torque actual value; for all other control techniques, it is referred to the tension actual value.

- The delay time, set using H205 must have expired; it is essentially used to suppress erroneous signals if the actual values are not smooth.

The web break signal is available at terminal strip X6, terminal 631. This can be used to energize a 24 V relay or contactor.

The internal response of the winder software to a web break signal can be defined using H178. The web break signal is stored with H178=1 and the diameter computer is inhibited (prevents calculation of incorrect values) and the tension control disabled (the winder continues to run with the specified web speed). This stored signal must be acknowledged by withdrawing the "tension controller on" control command.
The web break is only signaled with H266=0.

Note: If only low tensions are used (e.g. for thin foils), then web break detection using the torque- or tension actual value signal is problematical and it is recommended that an external web break sensing system is used, e.g. using optical sensors or dancer roll limit switches.

Caution: The web break detection is **not** effective with the closed-loop constant speed control.

4.16 Freely-connectable limit value monitor (block diagr.10)

Two freely connectable limit value montors are available - they have identical functions and the only difference is the parameter numbers for setting.

One of the monitoring parameters d301 to d331 can be selected as input signal. Absolute value generation, inversion and smoothing can be parameterized for the input signal

One of the monitoring parameters d301 to d331 or a fixed value available as parameter can be selected as comparison signal; inversion or absolute value generation are possible as adaption.

Interval limit, hysteresis and output signal to be displayed can be selected for the actual limit value monitors. The limit value monitor outputs are available at terminal strip X6, terminal 637 for limit value monitor 1 and terminal 638 for limit value monitor 2.

4.17 Analog outputs (block diagr.10)

A total of four analog outputs are available at strip X5. Two are permanently assigned, and the others are used as select outputs for monitoring parameters d301 to d330.

The speed actual value is output at terminals 509/510. An offset is subtracted using H097; multiplication adaption using H098.

The actual diameter is output at terminals 519/520. An offset is subtracted using H099, multiplication adaption using H100.

Select output 1 is available at terminals 521/522. Using H105, it is possible to toggle between monitoring parameters d301 to d330 and two select signals from the basic converter as output value. An offset is subtracted using H101 and adaption can be realized using H102.

Select output 2 is available at terminals 523/524. Using H106, it is possible to toggle between monitoring parameters d301 to d330 and two select signals from the basic converter as output value. An offset is subtracted using H103 and adaption using H104.

All analog outputs are normalized as standard, so that an internal value of 100% is represented for 10 V, -100% then correspond to -10 V.

4.18 Diameter computer (block diagr.9)

The diameter is calculated from the speed setpoint and the actual motor speed. An integrating calculation technique is applied to generate the smoothest possible output signal.

The diameter computer works in %, between core diameter and maximum diameter (=100%). The core diameter has to be set using H222 (as a % of maximum diameter).

Caution: A condition for a proper diameter calculation is a correct speed actual value calibration ! Refere to section 4.20 and 8.2.1.

When an external web speed actual value is used for the calculation, this is selected with H094 (block diagram13) and H211 must be set to 1. Gearbox stage changeover is automatically taken into account.

When using a digital web tachometer, parameters H213 pulse number, H215 rated speed and H218 encoder type for the pulse sensing on the T300 must be set. Refer to Fig. 3.2 for the connections.

If an analog web tachometer is used, an analog input is used to sense the tachometer voltage. The connection is only possible with external series resistors, refer to Fig. 3.2.

Dimensioning the external resistors:
Voltage V_{TE} should be approx. 9V at rated line speed, so that the two resistors R_1 and R_2 should be dimensioned as a function of the tachometer voltage. R_2 should not exceed 5 kOhms.

Example: Tachometer voltage = 104 V at the rated line speed
$V_T/V_{TE} = R_1/R_2$ = approx. 11.5
with R_2 = 3.3 kOhms, 39 kOhms is obtained as the next standard value for R_1
R_2 has an approx. load of 0.25 W and a 1 W rating resistor should be used.

To increase the control stability:

– A calculation interval time (time for one revolution at D_{min} and V_{max}) can be entered using H216. (fastest allowed diameter changing)

Example: Core diameter D_{core} = 140 mm,
Max. web speed V_{max} = 200 m/min = 3333 mm/s
Time for one revolution: $t = D_{core} * \pi / V_{max}$ = 132 ms

Caution: If this time lower than 120ms (i.e. for extremly small diameters), the diametre computer, due to his integrating calculation technique, may not work properly. In this case, an external diameter sensor is recommanded.

– The diameter change per time can be limited using H238. H238 should be selected, so that the maximum change is still possible (occurs at V_{max} and V_{min}).

The selected change speed is automatically adapted to the actual diameter.

Example: Core diameter D_{core} = 140 mm,
Max. diameter D_{max} = 1000 mm
Max. web speed V_{max} = 200 m/min = 3333 mm/s
Material thickness d=1 mm, i.e. 2 mm diameter increase/revolution
Time for one revolution: $t = D_{core} * \pi / V_{max}$ = 132 ms

Thus, a maximum diameter change of 15.15 mm/s is obtained. This value is converted, and the total change (D_{max} - Dcore) is entered at H238.

H238 = 860 mm / 15.15 mm/s = 56.76 s, with a safety reserve of 10%, 55 s is entered.

– An additional interlock can be enabled using H236. For H236=1, the diameter for the winder can only increase, and for the unwinder, only decrease. The interlock is cancelled by setting the diameter with "set diameter.

It is possible to decouple the winder diameter computer, and to inject an externally calculated actual diameter. In this case, the "set diameter" control signal must be permanently available, and the external value injected as diameter setting value, selected via H089.

Example a:	Diameter actual value from the analog input, terminals 515/516	⇒ H089 = 6
	Set diameter from binary input, terminal 604	⇒ H024 = 0
	24 V must be connected at terminal 4	
Example b:	Diameter actual value from the interface board, setpoint 3	⇒ H089 = 9
	Set diameter from the interface board, control word 1, bit 14	⇒ H024 = 1
	Control word 1.14 from CB=1	

The diamater computer can also be enabled without an active tension controller using a binary signal which can be selected with H013 (web tachometer function). The web speed actual value, which is involved for the calculation, can be selected with H093.

4.19 Gearbox stage changeover

The software package allows changeover between two gearbox stages. This is generally used to operate with a higher tension but with the same motor output with the possible disadvantage of a lower web speed, e.g. for thick materials. The changeover signal is selected using H042, the ratio from the standard gearbox stage to gearbox stage 2 must be entered with H138.

Operation with gearbox stage 2, at the same motor speed, always results in a lower axial winder speed. The influence of gearbox stage 2 on the speed setpoint, moment of inertia, diameter computer and acceleration compensation is automatically taken into account by the winder software package.

Calculation formula for H138:

$$\boxed{H138 = \frac{\text{Standard gearbox ratio}}{\text{Gearbox ratio 2}} * 100\ \%}$$

Example:
Winder motor speed / winder axis speed = 5 / 1 for standard gearbox stage
Winder motor speed / winder axis speed = 7 / 1 for gearbox stage 2

H138 = 5 / 7 * 100 % = 71,4 %

4.20 Speed actual value calibration

The speed actual value calibration for the winder must always be executed for the standard gearbox ratio:

When entering a speed setpoint (preferably 100%) without web speed compensation and without saturation setpoint (tension control disabled!), the actual value measured at the winder shaft must correspond to the entered setpoint. The actual diameter in the control (d310) must be identical with the mechanically measured diameter of the winder shaft. For practical reasons, the core diameter is calibrated using an empty winder mandrel.

For calibration, the following actual value data must be provided:

- Enter the core diameter H222
- Select the core diameter as diameter setting value, H89=28
- Actuate the "set diameter" command (minimum pulse duration, 100 ms)

Refere to Section 8.2.1
Note: Observe Section 4.2

4.21 Power-up control (block diagr.19)

For the winder there are two operating modes: System operation and local operation. It is not possible to toggle between these modes without shutting the system down. Toggling between these modes is realized using the "local operator control" command, either via terminal 607, or via control word 2.14 from CB or CU, the source is selected using H027. The operating modes are mutually interlocked, i.e. if the "local operator control" signal level changes during operation, the system is always shutdown.

System operation:

The operating mode is switched-in using the control signal OFF1/ON = 1. The switch-on command is transferred to the basic converter, the main contactor is switched-in and the DC link is charged. After operational readiness is signaled back by the basic converter, the winder waits for the controller enable using the "system start", and after enabling accelerates to the entered setpoint; refer to Section 4.8.

The control signal "OFF1/ON" must be set to 0 to shut the system down. When the winder comes to a stanstill, the basic converter is shutdown, and if the winder is still running, the speed setpoint is is set to 0. The system is shutdown once the standstill limit has been fallen below.

In system operation, the winder can only operate in the closed-loop tension control mode.

Using H166 = 1, it is possible to add local setpoints in system operation to the speed setpoint, with tension control switched-in. For a speed setpoint = 0%, the appropriate inching setpoint can be switched-in via the triggerable ramp-function generator using the "inching forwards" command. It is possible to add each individual local setpoint with the appropriate command; the same interlocking functions are valid as for the local operating modes. A change, from e.g. tension-controlled inching to winder operation can be easily realized via the "enable setpoint" control input of the central ramp-function generator.

Local operation:

The "local operator control" control signal must be 1 to select a local operating mode. The operating modes, run, crawl and positioning are activated with a positive edge of the appropriate control signal, and are internally stored. For inching, the operating mode remains active, as long as the appropriate control command is available. The modes are mutually interlocked, i.e. only one can be active at any time.

The associated setpoint is transferred to the control via the triggerable ramp-function generator when the system is powered-up/down, and the ramp-function generator is set to the actual value at each mode change. This is realized both at power-up and power-down. For the basic converter, a power-up command is generated to close the main contactor. Controller enable is automatically issued after operating readiness has been signaled back, which also causes the ramp-function generator to be set. When inching, the winder runs with the appropriate setpoint only while the inch command is active, and after that the drive remains powered-up for a time which can be selected using H014. The drive automatically shuts down after this delay time has expired.

It is possible to cancel or shutdown all local operating modes using the "local stop" command or by withdrawing "local operator control". The winder decelerates to 0% web speed, and when the standstill limit has been fallen below, shuts down.

The local setpoints refer, as standard, to the web speed; closed-loop speed controlled operation can be selected with H146=1.

Local run

The source for the control command is selected with H052.
The source for the setpoint is selected with H075, presetting H074 = 0%

Local crawl

The source for the control command is selected with H039.
The crawl setpoint is entered using H142, pre-setting, 10%.

Local inching, forwards/backwards

The source of the inching forwards/backwards command is selected using H038 and H040.
The setpoints are selected with parameters H143 and H144, and are, as standard +5% and -5%.
In the inching modes, the drive only operates with the selected setpoint as long as the control command is present.
It is possible to change from inching into any other local operating mode without shutting down the drive.

Local positioning

The positioning command source is selected using H026.
The positioning setpoint source is selected using H091. This mode is used to manouver the drive (e.g. coupling-in using the manouvering potentiometer). The setpoint is internally used as X^2 or X^3 characteristic, and can be triggered using H163.

For all local operating modes, the setpoint is transferred through the internal triggerable ramp-function generator. The ramp-up and ramp-down times are entered with H161 and they are referred to a 100% setpoint.

Figure 4.21 shows as an example, the control signals using PROFIBUS-DP.
In addition to the switching sequences indicated, others are also conceivable (binary inputs, Peer-to-Peer).
Mixed combinations are also conceivable.

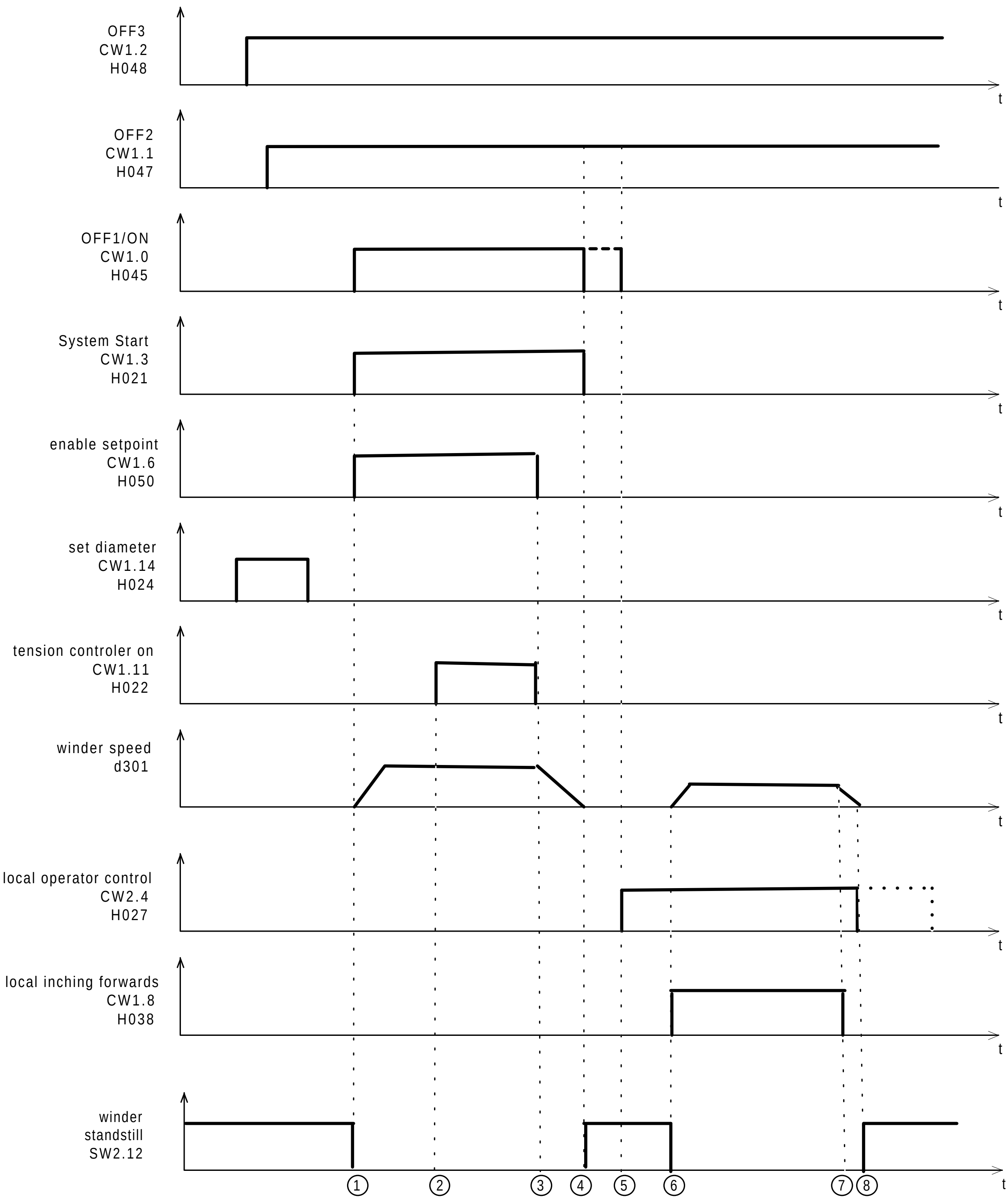


Figure 4.21: example, control signals using PROFIBUS-DP

Explanations regarding the numbers in circles in Fig. 4.21:

① The winder is closed-loop speed controlled. In this case, it is assumed that the diameter setpoint is set according to the mechanical diameter of the roll, refer to d310, Sheet 9 Block diagram!
The up and down ramps for the speed setpoint can be set at the ramp-function generator for the speed setpoint, Sheet 5 Block diagram.
The speed-controlled operation is required, among other things, for the flying roll change.

② The winder mode (closed-loop tension controlled mode) is switched-in at this instant.
If closed-loop speed controlled operation is not required, the tension controller can be enabled together with the system start signal.

③ The tension controller is inhibited and the winder drive decelerates along the selected down ramp (ramp-function generator for the speed setpoint, Sheet 5 Block diagram).

④ The winder drive can be powered-down.
If the winder is decelerated to zero speed to change a roll, the tension controller and the winder drive can be simultaneously switched-off after the winder has come to a standstill.

Comment regarding local operator control:

– Local operator control, such as inching forwards etc. can also be achieved by the closed-loop speed controlled operation and the appropriate setpoint inputs.
– Refer to the Block diagram, Sheet 18

⑤Inching forwards (or inching backwards):
OFF1/ON = 0!
OFF3 (= OFF2) = 1
Afterwards, local operator control = 1,
⑥ Afterwards, select inching forwards or inching backwards.
⑦⑧ After inching forwards or inching backwards, and after the inching time H014, the drive is switched-off.

– Return to system operation (winder operation): Beforehand OFF1/ON, local control = 0!

4.22 Motorized potentiometer functions (block diagr.19)

The standard winder software has two separate motorized potentiometer functions, and the outputs are connected, so that they can be coupled-in everywhere as setpoint.

Motorized potentiometer 1 can also be parameterized as ramp-function generator to create defined ramps during commissioning, e.g. for inertia compensation. The ramp-function generator mode is switched-in using H267=1 and the setpoint parameterized with H268 and the ramp-up and ramp-down times parameterized with H269. The ramp-function generator runs up to the entered setpoint with the command "raise motorized potentiometer 1", and towards 0% with "lower motorized potentiometer 1".

With the motorized potentiometer function, the appropriate output can be changed either up or down using the control inputs. If the commands are briefly activated (<300 ms), the output is changed bitwise. If the commands are activated for a longer period of time, the parameterized ramp-up/ramp-down times are applied, for motorized potentiometer 1 using H265 and for motorized potentiometer 2, with H263. If the control commands are available for longer than 4 s, then the ramp-up/ramp-down ramps are changed-over to H266 (Mop 1) and H264 (Mop 2). The motorized potentiometer outputs are available as monitoring parameters d305 and d306.

4.23 Monitoring functions and messages (block diagr.20)

4.23.1 Overspeed

Overspeed detection prevents undesirable drive operating statuses. If an overspeed condition is detected, i.e. the determined speed actual value is greater than the positive limit value or less than the negative limit value, then the drive system is shutdown with a fault message -**fault number 116 and 117-**.

H Nr	Significance	Explanation / condition for signal	
H001	Positive overspeed	as a % of the rated speed	exceeded
H002	Negative overspeed	as a % of the rated speed	fallen below

Table 4.23.1: Parameters for detecting overspeed

Note:
An overspeed condition is only detected if the speed actual value sensing is functioning correctly.

4.23.2 Overcurrent

When an overcurrent condition is identified, i.e., the current actual value determined by the basic converter is greater than the positive limit value or lower than the negative limit value, then, if required, the drive is shutdown with a fault message -**fault number 118 or 119-**.

H Nr	Significance	Explanation / condition for the message	
H003	Positive overcurrent	as a % of the rated motor current	exceeded
H004	Negative overcurrent	as a % of the rated motor current	fallen below

Table 4.23.2: Parameters to detect an overcurrent condition

4.23.3 Stall protection

This function has the task of detecting if the drive has stalled, and if required, shuts down the drive with a fault message. The stall signal is derived from the actual values of speed, current (torque) and speed controller error:

- **Absolute speed actual value** is less than the value of the speed actual value threshold **&**
- **Absolute current act. value** is greater than the value of the current actual value threshold **&**
- **Absolute control error** is greater than the control error threshold

If these three conditions are present over a response time which can be parameterized, the stall protection signal is generated, and the drive is shutdown - **fault number 120-**.

HNr	Significance	Explanation / condition for the message	
H007	Speed actual value threshold	as a % of the rated speed	fallen below
H008	Current actual value threshold	as a % of the rated motor current	exceeded
H009	Control error threshold	as a % of the rated speed	exceeded
H010	Response time	in ms	exceeded

Table 4.23.3: Parameters to detect a stall condition

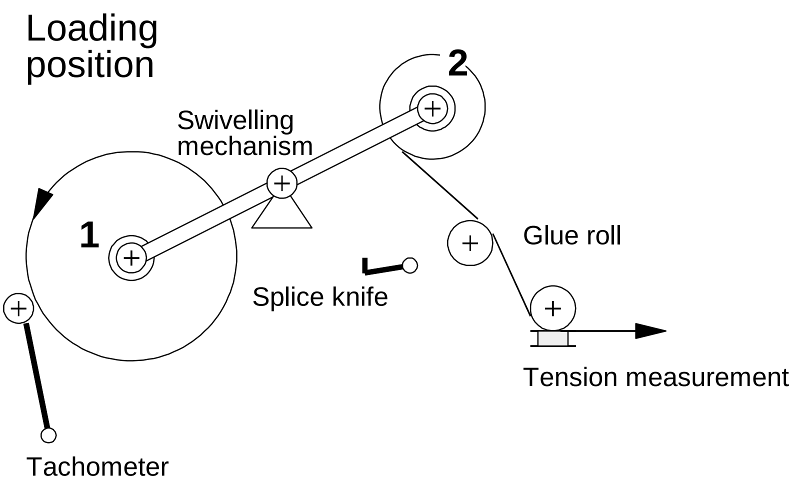
4.24 Splice control (block diagr.21)

Note:
– **Generally, the external machine control is used to fully control the roll change including all of the signals required to control this software package.**   – **The splicing functions are only provided for the requirements described here. The requirements regarding the actual functions to be implemented must be precisely discussed with the manufacturer of the splicing mechanical system.**

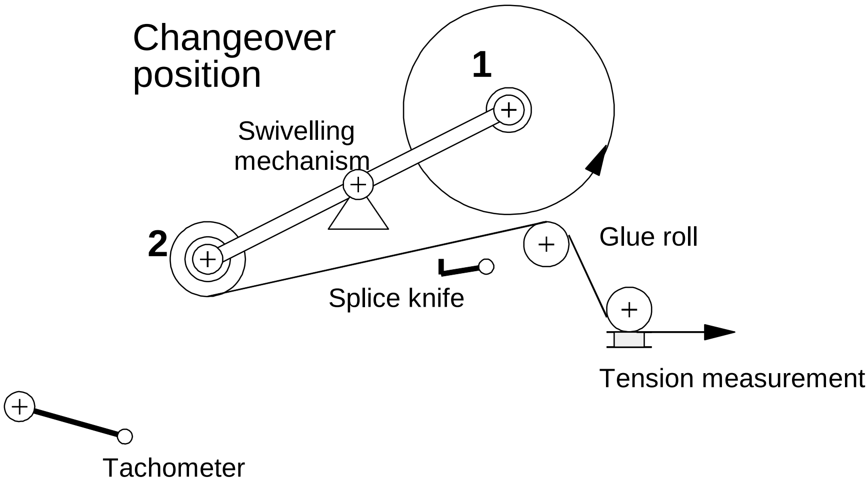
The splice logic controls the drive functions for a flying roll change. The closed-loop tension control, fast stop, reverse winding after a splice and synchronization are implemented on the T300. The sequence control for the automatic splice functions (mechanical rotation, power-up commands for synchronizing and splicing, controlling the glue roll and knife) must be realized in a PLC control.

The splice control is activated via H148 (reverse winding time) as soon as a value not equal to zero is entered there. Further, H022 must be set to 6 or 7, dependent on whether the command to enable the tension controller is received from a terminal or via a control bit from the CB. The setpoint for the reverse winding function is entered at H149 (the value must be negative!).

To sense a new diameter, a diameter must first be set (e. g. average value from the highest- and smallest possible diameter for a splice). The new reel is then powered-up with a local operating mode and runs at a low speed. The tachometer is then applied and signaled via a binary signal. The diameter computer is enabled and calculates the actual diameter of the new roll. The drive is then shutdown again.



The swivelling mechanism is rotated into the changeover position for splicing. The drive with the new roll is powered-up again. If it is running in system operation, it synchronizes to the web speed. The "tension control on" signal is issued; however the drive still stays in the closed-loop speed control mode until the "knife in the cutting system" signal becomes active. It then switches over to closed-loop tension control. The partner drive which was previously in the closed-loop tension control mode goes into a fast stop mode. Depending on the parameterization of H148/149 it rotates backwards for some time before it shuts down.



It is necessary to establish a connection from the "tension control on" output to the "partner drive is in the tension controlled mode" input of the partner so that the drives can be mutually interlocked. The terminals are permanently assigned (refer to block diagr.21).

4.25 Length measurement and length hold (block diagr.13)

The length measurement function requires a digital pulse encoder at the web tachometer input (refer to Fig. 3.2). This can either be an actual web tachometer or the pulse tachometer signals of the master machine drive. After H217 (encoder type) and H213 (pulse number) and H215 (rated speed) have been input, a length (travel) actual value is available. However, this must be adapted to the actual normalization.
In this case, the rated length L_n (length, where 100% travel is measured) of the configuration according to the following equation:

$$L_n = \frac{\Pi \cdot D_w}{i} \cdot \frac{32,767 \cdot 65,536}{4 \cdot r} = 1685,58. \frac{D_w}{i \cdot r}$$

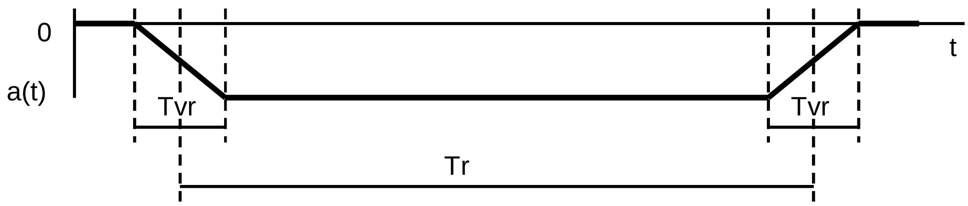
D_w.....roll diameter in [mm]
i.........gearbox factor nmot/nroll
r........pulse encoder pulse number

The normalization length 75 [km] is now divided by the rated length. If the result is approximately in the range up to 190%, then this value is entered into parameter H239. If the ratio is above this, then H239 is left at 100% and the inverse value is generated: L_n/75 [km]. This then lies below 50% and is entered in H240.

$$H239 = \frac{75[km]}{L_n} \cdot 100\%, \quad H240 = 100\% \quad \text{if } H239 < 190\%;$$

otherwise: $$H240 = \frac{L_n}{75[km]} \cdot 100\% \quad H239 = 100\%,$$

The actual length is a percentage of the normalization length of 75 [km] and can be monitored at parameter d309.
For the stopping distance, the braking travel must be calculated. This is the material length, which still runs through the machine for a standard stop, until the complete machine comes to a standstill. It is determined from the machine ramp-function generator data. The maximum line speed (H244), and the deceleration time from the maximum line speed T_r (H241) and the rounding-off time at deceleration T_{vr} (H242) must be entered. The calculation assumes operation at constant line speed and a linear deceleration ramp for a standard stop. The braking travel can then be precisely calculated.



The braking distance can be monitored at d350. It is added to the length actual value and compared with a length setpoint, selected using H262. If this setpoint is exceeded, the "length stop" signal becomes active, which is connected to the limit value monitor multiplexers. It can directly initiate a standard stop via a binary output, or can be signaled to the automation via the status word. The "length stop" signal is canceled if the machine operates at less than 4% of rated speed or the drive is powered-down.

Note:

- The braking distance is continuously calculated and displayed. However, it is only precise if the drive is operated with v=const. The value is too small during the acceleration phase and too high during deceleration. The error is a function of the ratio T_{vr}/T_r.
- The length actual value can be a maximum of 149.99 [km] (199.99% at d309), in this case the resolution is 0.0061% of 75 [km] or approx. 4.5 [m]. The same scaling is also valid for the braking distance.
- Using parameter H280, the resolution of the length measurement can be increased to the detriment of the total length. For H280 >0, the following is valid for the complete length and resolution:

  Total length (H280 >0) = 75/(2 to the power of H280)

  Resolution: Total length /(H280 >0) x 0.0061%/100%

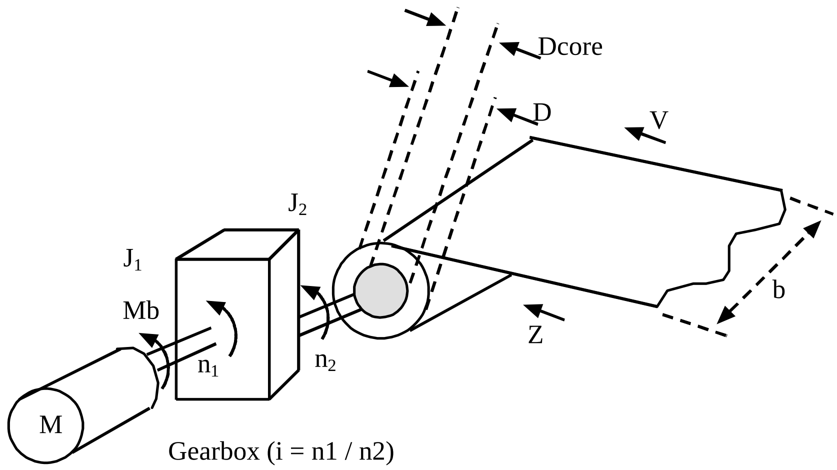
  Example:

  A total length of 10 km is required. Which resolution is obtained from this?
  H280 = 3, this results in a total length of 75/(2 to the power of 3) = 9.375km
  The resolution (H280 >0) is then 9.375km x 0.0061%/100%= 0.571m
  After the complete length of 10km has passed, 10km/9.375 x100% = 106.67% can be seen at visualization parameter d309.

  Comment: The value at d309 can be used up to a maximum of 199.99%. In this particular example this would correspond to a maximum measurable length of 18.7km.

5 Configuring instructions

5.1 Formulas for a winder drive



(1) Winding ratio:

$$\boxed{q = \frac{Dmax}{Dcore}} \quad \frac{[mm]}{[mm]}$$

(2) Speed [RPM]:

$$\boxed{n = \frac{1000 * V}{D * \Pi}} \quad \frac{[m/min]}{[mm]}$$

(3) Winding torque referred to the motor shaft [Nm]:

$$\boxed{MW = \frac{Z * D}{2000 * i}} \quad \frac{[N\ mm]}{1}$$

(4) Winding power [kW]:

$$\boxed{Pw = \frac{Z * V}{60 * 103}} \quad \frac{[Nm/min]}{1}$$

(5) Gearbox ratio, maximum motor speed/maximum core speed

$$\boxed{i = \frac{n1}{n2} = \frac{\Pi * Dcore * nmax}{1000 * vmax}} \quad \frac{[mm/min]}{[m/min]}$$

(6) Moment of inertia, full cylinder [kg m^2]:

$$J = \frac{m}{8 * 10^6} * D^2 = \frac{\Pi}{32 * 10^{12}} * b * \rho * D^4 \qquad \frac{[mm\ kg\ mm^4]}{[dm^3]}$$

(7) Moment of inertia, hollow cylinder [kg m^2]:

$$J = \frac{m}{8 * 10^6} * (D^4 - D^4_{core}) = \frac{\Pi}{32 * 10^{12}} * b * \rho * (D^4 - D^4_{core})$$

(8) Moment of inertia reduction through a gearbox

$$J_1 = \frac{J_2}{I^2}$$

(9) Fixed moment of inertia [kg m^2]
caused by the fixed winder components (motor, gearbox and winder core) referred to the motor shaft

$$J_F = J_{Motor} + J_{gearb.} + \frac{J_{Core}}{i^2}$$

(10) Variable moment of inertia [kg m^2]

$$J_V = \frac{\Pi * b * \rho}{32 * 10^{12} * i^2} * (D^4 - D^4_{core}) \qquad \frac{[mm\ kg\ mm^4]}{[dm^3]}$$

(11) Accelerating torque referred to the motor shaft [Nm] for the accelerating time t_b

$$M_b = \frac{100 * i}{3 * D} * \frac{\Delta V}{t_b} (J_f + J_V)$$

(12) Acceleration power [kW]

$$P_b = \frac{i * V}{30 * D} * M_b = \frac{10 * i^2 * V}{9 * D^2} * \frac{\Delta V}{t_b} (J_f + J_V)$$

(13) Rated motor torque [Nm]

$$M_N = \frac{9549 * P_N}{n_N}$$

(14) Winding capacity for flat material [m]:

$$l = \frac{\Pi}{4000 * d} * (D^2_{Max} - D^2_{core})$$

(15) Winding capacity for round material [m]:

$$l = \frac{\Pi * b}{2000 * \sqrt{3} * D^2_R} * (D^2_{Max} - D^2_{core})$$

(16) Relative capacity depending on the winding ratio:

q	2	3	4	5	6	7	8	9	10
$\frac{l}{l_{max}} = 1 - \frac{1}{q^2}$	75 %	88.9%	93.8%	96%	97.2%	98%	98.4%	98.8%	99%

(17) Winding time [s]:

$$t = 60 * \frac{l}{V}$$

Abbreviations and dimensions

b = Material width [mm]
b_{max} = Maximum material width of the roll [mm],
d = Material thickness [mm]
D = Actual diameter [mm]
D_{core} = Core - or sleeve diameter [mm]
D_{max} = Maximum diameter [mm]
D_R = Material diameter for round materials [mm]
i = Gearbox ratio (refer to (5))
J = Moment of inertia [kgm^2]
J_F = Fixed moment of inertia caused by the fixed winder components (motor, gearbox + core) referred to the motor shaft [kgm^2]
l = Material length [m]
l_{max} = Maximum material length (for 0 mm core diameter) [m]
$J_{gearb.}$ = Gearbox moment of inertia referred to the motor shaft [kgm^2]
J_{core} = Moment of inertia of the winder core [kgm^2]
J_{motor} = Motor moment of inertia [kgm^2]
J_V = Variable moment of inertia caused by the wound material, referred to the motor shaft [kgm^2] (refer to (10))
m = Mass [kg]
M_W = Winding torque referred to the motor shaft [Nm]
M_b = Accelerating torque referred to the motor shaft [Nm]
$M_{bF}\%$ = Percentage accelerating torque due to the permanent moment of inertia J_F at the minimum diameter [% of M_N] (refer to formula (1.2))
$M_{bV}\%$ = Percentage accelerating torque due to the variable moment of inertia J_V at maximum diameter and maximum width [% of M_N] (refer to formula (1.5))
M_N = Rated motor torque [Nm] (refer to (13))
n = Speed [RPM]
n_{max} = Max. motor speed [RPM] (No-load speed at maximum field weakening)
n_N = Rated motor speed at rated voltage and rated field current [RPM]
P_b = Accelerating power [kW]
P_M = Required motor output [kW]
P_N = Rated motor output [kW]
P_W = Winding power [kW]
q = Winding ratio (refer to (1))
r = Specific weight (density [kg/dm^3]
t = Winding time [s]
t_b = Accelerating time [s]
t_h = Accelerating time for the web speed from 0 to V_{max} [s]
V = Web speed [m/min]
V_{max} = Maximum web speed [m/min]
Z = Tension [N]
ΔV = Speed difference [m/min]

5.2 Calculating the parameters for inertia compensation

The standard axial winder software package calculates the required accelerating torque for accelerating and braking

$$M_b = \frac{\pi}{30} * J * \frac{\Delta n}{t_b} \qquad (1.1)$$

and controls it via the armature current (block diagrams), so that the tension torque remains as constant at possible.

Acceleration dv/dt can be calculated from the winder software, or entered externally. Moment of inertia J is not constant due to the increasing material being wound-up, and it consists of two components:

a) Fixed moment of inertia J_F (parameter H228), caused by the fixed winder components.

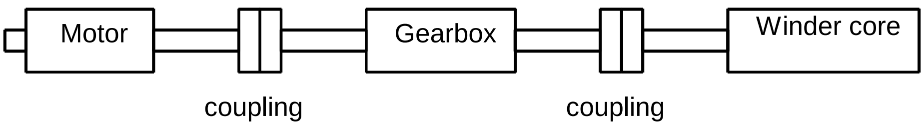
b) Variable moment of inertia J_V (adapted using parameter H227) caused by the wound material.

This section includes instructions how parameter H228 can be calculated for fixed moment of inertias, and H227 for the variable moment of inertia, from the system data. The equations are numerical equations. The abbreviations and dimensions are listed in Section 5.1.

5.2.1 Determining parameter H228 for the fixed moment of inertia

The fixed moment of inertia consists of the sum of the following moments of inertia:

- Motor moment of inertia
- Gearbox moment of inertia referred to the motor shaft
- Moment of inertia of the winder core, referred to the motor shaft
- Remaining moments of inertia as a result of couplings, tachometer etc.



The following formula is valid for the fixed moment of inertia (refer to (9)):

$$J_F = J_{motor} + J_{gearbox} + \frac{J_{core}}{i^2}$$

The moments of inertia of the motor and gearbox can be taken generally from the rating plates or data sheets. The winder core moment of inertia must be calculated. If cardboard cores are used, their moment of inertia can be neglected.

The higher the gearbox ratio, the smaller is the effect of the winder core and the variable moment of inertia on the total moment of inertia.

The "remaining moments of inertia" are generally small with respect to the other moments of inertia and can be neglected.

Determining H228

It is recommended that the value of H228 is determined in two steps:

1) Calculating the % accelerating torque $M_{bF\%}$ using the fixed moment of inertia J_F and the accelerating time t_b :
Prerequisite : $D = D_{core}$ and $t_b = t_h$

$$M_{bF\%} = \frac{J_F * n_N * i}{2.865 * D_{core} * P_N} * \frac{\Delta V}{t_b} \tag{1.2}$$

Formula characters and dimensions:
Refer to Section 5.1

This equation is obtained by dividing the formulas (11) and (13), which calculates the accelerating torque referred to the rated torque as a %.

2) Determining the setting value for parameter H228

$$H228 = \frac{M_{bF\%} * t_h}{H264} * 100\% \tag{1.3}$$

Formula characters and dimensions:
Refer to Section 5.1

The value of H264 should be the same as the shortest ramp, e.g. inertia compensation may be required for a fast stop. The equation is always valid for internal dv/dt calculation (H226=0) and H225=100 %.

Example for the fixed moment of inertia

Drive system data

-	Fixed moment of inertia:	J_F = 38.77 kg m^2
-	Rated motor speed:	n_N = 400 RPM
-	Gearbox ratio, $n_{mot}/n_{winder\ shaft}$	i = 5.8
-	Core diameter	D_{core} = 508 mm
-	Rated motor output	P_N = 186 kW
-	Max. web speed:	V_{max} = 339 m/min
-	Ramp-up time 0 to V_{max}:	t_h = 20 sec
-	Ramp-down time for fast stop	H220 = 5 sec

The following is obtained from equation (1.2):

$$M_{bF\%} = \frac{38.77 * 400 * 5.8}{2.865 * 508 * 186} * \frac{339}{20} = 5.63\% \quad (1.4)$$

Formula characters and dimensions:
Refer to Section 5.1

The following is obtained from equation (1.3):

$$H228 = 5.63\% * 4 = 22.52\% \quad (1.5)$$

Formula characters and dimensions:
Refer to Section 5.1

With H228 = 22.52 % and acceleration via a 20 sec. ramp at the minimum diameter, the inertia compensation generates a torque of 5.63%.

5.2.2 Determining parameter H227 for the variable moment of inertia

The maximum variable moment of inertia is obtained from the maximum diameter and maximum width from equation (10) as follows:

$$J_{Vmax} = \frac{\pi * bmax * \rho}{32 * 10^{12} * i^{2}} (Dmax^{4} - Dmin^{4}) \quad (1.6)$$

It is recommended that the correct value of H227 is determined in two steps:

1) Calculating the % accelerating torque M_{bV}% for a full roll using the maximum variable moment of inertia J_{Vmax}:
Required : $D = D_{max}$, $t_b = t_h$ and $J_F = 0$

$$M_{bV\%} = \frac{bmax * \rho * (D^{4}max - D^{4}core) * n_N}{29.18 * 10^{12} * i * Dmax * P_N} * \frac{\Delta V}{t_b} \quad (1.7)$$

Formula characters and dimensions:
Refer to Section 5.1

This equation is obtained if equation (1.4) is inserted in equation (11), and the result is divided by equation 13, then the accelerating torque is calculated referred to the rated torque as a %.

2) Determining the setting value for parameter H227:

$$H227 = \frac{M_{bV\%} * th}{H264} * 100\%$$

Formula characters and dimensions
Refer to Section 5.1

(1.8)

This equation is valid for internal dv/dt calculation (H226=0) and H225=100 %.

Example for the variable moment of inertia

Drive system data:

-	Specific weight (density) of the material	r = 7.85 (steel)
-	Rated motor speed	n_N = 400 RPM
-	Gearbox ratio $n_{mot}/n_{winder\ shaft}$	i = 5.8
-	Max. diameter	D_{max} = 1500 mm
-	Core diameter	D_{core} = 508 mm
-	Rated motor output:	P_N = 187 kW
-	Max. material width	b_{max} = 420 mm
-	Max. web speed	V_{max} = 340 m/min
-	Ramp-up time from 0 to V_{max}	t_h = 20 sec
-	Ramp-down time for fast stop	H220 = 5 sec

The following is obtained from equation (1.7):

$$M_{bV\%} = \frac{420 * 7.85 * (15004 - 5081) * 400}{29.18 \;\; 1012 * 5.8 * 1500 * 187} * \frac{340}{20} = 2.36\%$$

Formula characters and dimensions
Refer to Section 5.1

(1.9)

The following is obtained from equation:

$$H227 = 2 .36\% * 4 = 9.44\%$$

Formula characters and dimensions
Refer to Section 5.1

(1.10)

With H227 = 9.44 % and acceleration via a 20 sec. ramp, at maximum speed and maximum web width the inertia compensation generates a torque of 2.36 %.

5.3 Selecting the winder ratio (winder range)

Winder operation is handled in the following.

Unwinding is essentially the same. Winding ratio is the following quotient:

$$\frac{\textit{Max. roll diameter } (D_{max})}{\textit{Winder core diameter } (D_{core})}$$

The useful wound quantity as a % is, according to the formula (14) :

$$(D^2_{max} - D^2_{core}) \cdot \frac{\pi}{4}$$

For a 6:1 winding ratio, the useful wound length is $\approx$ 97 %.

5.4 Power and torque

The power required for winding is constant over the complete range, if the selected speed of the selected winding tension is kept constant (also refer to formula (4)).

(3.1) Winding power P_W :

$$P_W = \frac{Z_s \cdot b \cdot d \cdot V}{60 \cdot 10^3} \text{ kW}$$

b = Operating width in mm
d = Operating thickness in mm
V = Web speed in m/min
Z_S = Specific web tension in [N/(mm^2 material cross-section surface)]

The required torque increases linearly with the roll diameter.

5.5 Selecting the motor

The standard axial winder software package is suitable for both synchronous- as well as for induction motors without any differences in the control behavior. The induction motor frequently permits a more favorable motor dimensioning in comparison to a synchronous motor as it can also be used in the field-weakening range.
We recommend that Rotec induction motors are used instead of standard motors (e. g. Rentec motors) for the following reasons:

- The actual value encoder is already integrated in the motor
- Good field-weakening properties allows the motor to be optimally dimensioned
- Forced ventilation is integrated in the motor as standard. This offers adequate cooling at low speeds and also a high torque. For operation at field-weakening speeds, there is no increased noise from the fan in comparison to non-ventilated motors.
- Compact and lightweight motors

Refer to the PATH dimensioning program and McWin (this can be obtained from A&D DS A) as well as the Engineering Manual for Motors for engineering information on synchronous- and induction motors.

5.6 Dimensioning the gearbox

The gearbox is dimensioned together with the machine manufacturer (OEM).

5.7 Selecting the converter

The drive converter is dimensioned using PATH and the Engineering Manual for Drive Converters.

5.8 Selecting the closed-loop control concept

The axial winder technology module allows the following closed-loop control concepts to be implemented:

- Indirect closed-loop tension control (without tension tranducer)
- Direct closed-loop tension control with dancer role or tension transducer
- Closed-loop constant speed control (if there is no nip position)

These closed-loop control concepts are briefly discussed in the following. The following Sections 5.10 to 5.16 include individual configuring examples: Parameter H203 is used to toggle between the various closed-loop control concepts.

5.8.1 Indirect closed-loop tension control

This technique does not require a tension tranducer (H203=0). The closed-loop tension controller is not used, but the tension setpoint is multiplied by the diameter, and the result is directly pre-controlled as torque setpoint, so that the armature current linearly increases with increasing diameter and the tension is kept constant (refer to the configuring examples, Sections 5.10 and 5.11).

In this case, it is important to precisely compensate the friction- and accelerating torques, so that the pre-controlled torque setpoint tracks with good approximation, the required material tension.

For this control type, it must be observed that the mechanical losses must be kept as low as possible, i.e. no worm gears, no open intermediate ratios, for herringbone teeth, the direction of rotation should be the same as that specified, the loss difference between gearboxes in the warm and cold states should be as low as possible.

5.8.2 Direct closed-loop tension control using dancer rolls

The web is fed over a dancer roll. The dancer roll tries to deflect the material with a defined force. The dancer role position is detected using a potentiometer, e.g. a magnetoresistive potentiometer which represents the material tension.

The material tension is a function of the dancer roll weight, the return force of the suspension elements and the distance between possible deflecting rolls.

The higher-level controller to the speed controller (designated as "closed-loop tension controller" in this manual) is used as dancer-position controller, and controls the dancer roll position to the position setpoint (e.g. dancer roll center position). The position controller then normally outputs a speed correction setpoint to the speed controller (H203 = 3 or 5).

The position setpoint is generally not fed-in from the outside, but parameterized as fixed value, H081 = 31; the position setpoint is entered via H080.

For dancer rolls with pneumatic or hydraulically adjustable support, a decreasing winding hardness can be implemented using the winding hardness characteristic of the PT board. In this case, the output signal d328 of the characteristic block is output at an analog output, and is used as setpoint for the dancer support system (refer to the configuring examples, Sections 5.12 and 5.13).

The dancer roll concept as actual value transducer has the advantage that it simultaneously acts as material storage medium (when the stroke is selected high enough). Thus, it already is a "tension controller". Dancer roll controls are complex but they offer the best control performance.

The web storage function has a damping effect for
- concentric paper rolls
- layer jumps, e.g. when winding cables
- at roll changes

5.8.3 Direct closed-loop tension control with tension measuring transducer

The material tension is directly measured using a tension transducer (e.g. tension transducer from FAG Kugelfischer or Philips). The output signal is proportional to the tension, and is fed to the tension controller as actual value signal.

The tension controller generally specifies the armature current setpoint by appropriately controlling the current limit (closed-loop current limiting control, H203 = 1, refer to configuring examples Sections 5.14 and 5.15).
The tension setpoint can either be internally or externally entered.

5.8.4 Closed-loop constant speed control

The control techniques, discussed up until now, with either indirect or direct tension control assume, that the web speed outside the winder is kept constant by a nip position, e.g. by two rolls which are pressed together through which the material is fed, and which are driven at a speed corresponding to the web speed.

If there is no nip position, then closed-loop tension control cannot be implemented, and the winder is then generally only controlled to have a constant circumferential speed.
For this closed-loop control concept, the web speed must be sensed using a web tachometer so that the diameter can be calculated.
The closed-loop constant speed control is described in more detail in Section 5.16, using a configuring example.

5.8.5 Selecting a suitable closed-loop control concept

The most important criteria for selecting a suitable closed-loop control concept are summarized in the following table

Closed-loop control concept	Indirect tension control	Direct tension control with dancer roll	Direct tension control with tension tranducer	Closed-loop constant speed control
Notes regarding actual tension sensing	No actual value tension sensing required	Intervenes in the web run, has material storage capability	Sensitive to overload, generally doesnt effect the web run	-
Winding ratio Dmax/Dcore	Up to approx. 10:1: excellent compensation of dv/dt and friction required	From experience, up to approx. 15:1.	From experience up to approx. 15:1, precise dv/dt compensation required	Up to approx. 15:1
Tension range Z_{max}/Z_{min}	Up to approx. 6:1 for good compensation of friction and dv/dt	Can only be changed for selectable dancer roll support	Up to approx. 20:1 with precise dv/dt compensation	-
Winding ratio x tension range $\frac{D_{max}}{D_{core}} \times \frac{Z_{max}}{Z_{min}}$	Generally up to 40:1	Very dependent on the dancer roll support design, up to approx. 40:1	Up to 100:1, essentially dependent on the tension actual value signal	-
Friction / tension force which cannot be compensated	From experience, over the complete range < 1	-	-	-
Web speed	Up to 600 m/min for excellent compensation	up to 2000 m/min	Up to 2000 m/min for precise dv/dt compensation	-
Closed-loop control concept preferably used for	Sheet steel, textiles, paper	Rubber, cable, wire, textiles, foils, paper	Paper, thin foils	Sorting winder
Nip position required	yes	yes	yes	-
Web tachometer required	-	-	-	yes

5.9 Defining the polarity

These definitions are independent of the particular mode for winders or unwinders.

Note: The specified polarities refer both to the T300 board and the basic converter.

The values for the line speed setpoint, tension setpoint and tension actual value must be positive. The remaining signs and polarities are then obtained according to Tables 5.9.a and 5.9.b (a negative value can be entered for the line speed setpoint for reverse operation, if forwards and reverse are required).

<u>Caution, the following is always valid:</u>

The speed setpoint is positive; monitoring parameter d340.   ***For indirect closed-loop tension control and closed-loop tension control with tension measuring transducer, the tension setpoint is always positive, monitoring parameter d304.***   ***For closed-loop pos. control (e.g. dancer roll) the position setp. is 0% or positive, monitoring parameter d304.***

The following winding types are possible for axial winder operation:

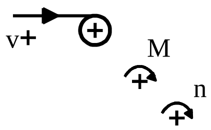
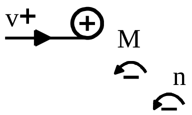
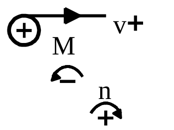
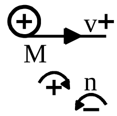
Winding type A	Windig type B	Winding type C	Winding type D
Winder, winding from above 	Winder, winding from below 	Unwinder, winding from above 	Unwinder, winding from below 
Control signal level: Winder=1 winding from below=0	Control signal level: Winder=1 winding from below=1	Control signal level: Winder=0 wining from below =0	Control signal level: Winder=0 winding from below =1

Table 5.9.a Defining the winding types and the appropriate control signals for winders (selected using H043) and winding from below (selected using H035).

Winder type	Speed actual value d307, CUVC,CUMC:r219 CU2: r214 CU3:r219	Bias ref. value/ actual value H145 / d341 1)	Torque setpoint d329 CUVC,CUMC:r269 CU2: r246 5)	Direct closed-loop tension control with tension trans-ducer Tension setpoint/ actual value d304 / d317		Indirect tension control, tension setpoint d304	Tension control with dancer roll Position setpoint/ actual value d304 / d317	
A	positive	positive	positive	positive	positive	positive	≥ 0%	6)
B	negative	positive	negative	positive	positive	positive	≥ 0%	6)
C	negative	negative	negative 2)3)	positive	positive	positive	≥ 0%	6)
D	positive	negative	positive 2)4)	positive	positive	positive	≥ 0%	6)

Table 5.9.b Defining the polarity

Notes:

1) Only set the bias reference value for the closed-loop current limiting control (H203 =0,1,2), otherwise enter 0%.

2) The unwinder can also go from braking to motoring, e.g. for low diameters or low tensions

3) For inching (<u>without</u> material), positive polarity

4) When inching (<u>without</u> material), negative polarity

5) Positive = torque direction 1, negative = torque direction 2

6) The tension actual value is dependent on the dancer roll position

Winder:	Dancer roll at the top :	Winder too fast, tension actual value > tension setpoint
	Dancer roll at the bottom :	Winder too slow, tension actual value < tension setpoint
	Dancer roll in the center :	Winder running with the web speed, tension setpoint = tension actual value
Unwinder:	Dancer roll at the top :	Winder too slow, tension actual value > tension setpoint
	Dancer roll at the bottom :	Winder too fast, tension actual value < tension setpoint
	Dancer roll in the center :	Winder running with the web speed, tension setpoint = tension actual value

5.10 Configuring example: Winder with indirect closed-loop tension control

Fig. 5.10. shows, as an example, how a winder can be configured with indirect closed-loop tension control.

<1> **Tension setpoint and web speed - setpoint** ("machine speed") are output as analog signals from the automation or as parameter.

<2> A **pulse encoder** as axial tachometer is used for sensing the actual speed.

<3> The **diameter computer** continually calculates the diameter according to the following formula

$$\text{Diameter} \approx \frac{\text{Web speed}}{\text{Speed}}$$

<4> A speed setpoint is fed to the speed controller <5>; the speed setpoint corresponds to the actual web speed plus the saturation setpoint H145 <6> (set H145 to approx. 5 % ... 10 %). The saturation setpoint, means that the speed controller goes into saturation when the material web is present <7>, i.e. it goes to its positive output limit. When attempting to increase the axial speed by the saturation setpoint, the speed controller output reaches the current limits B+ <8>, as a result of the selected tension setpoint.

<8> The **tension setpoint** specifies the current controller current setpoint by appropriately controlling current limit B+.

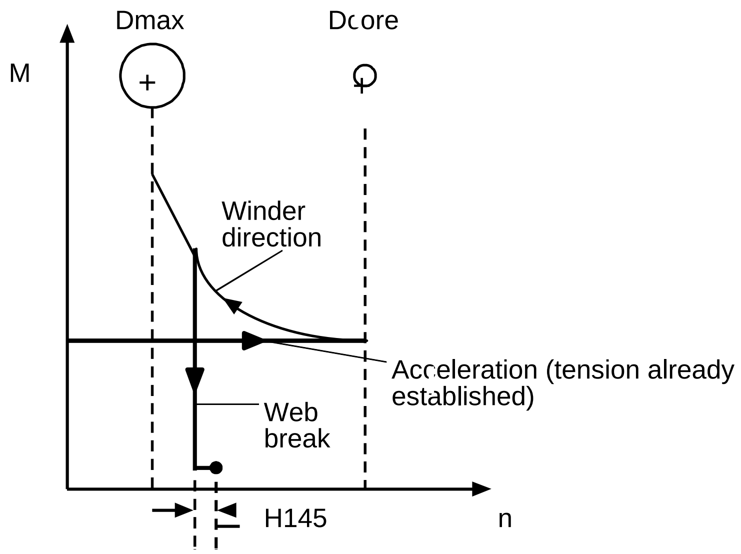
<9> The main function of the indirect closed-loop tension control is that the tension setpoint, multiplied by the normalized diameter D is input as armature current (max. diameter and max. tension setpoint" results in the max. armature current.

<10> Precise **compensation** of the friction- and accelerating torques <11> are required, so that the entered armature current, results in the closest possible required web tension. The friction torque is always added, and the inertia compensation, acts, in a braking, fashion when decelerating, and accelerating when the winder is accelerating.

<12> For web breaks, the speed controller is activated and prevents the winder drive from accelerating by controlling the circumferential velocity to the web speed + saturation setpoint (overspeed protection). Web break, refer to Section 4.15.

Web threading:
When threading the web in system operation, there is an automatic transition from closed-loop speed to closed-loop tension control. In this case, the tension setpoint should be injected when accelerating, and the tension controller enabled, whereby the torque limit is set corresponding to the required tension <9>. When the tension is built-up, the current limit automatically takes over drive control.

Torque/speed characteristic



Note: The tension-setpoint becomes effective when the tension controller is enabled.

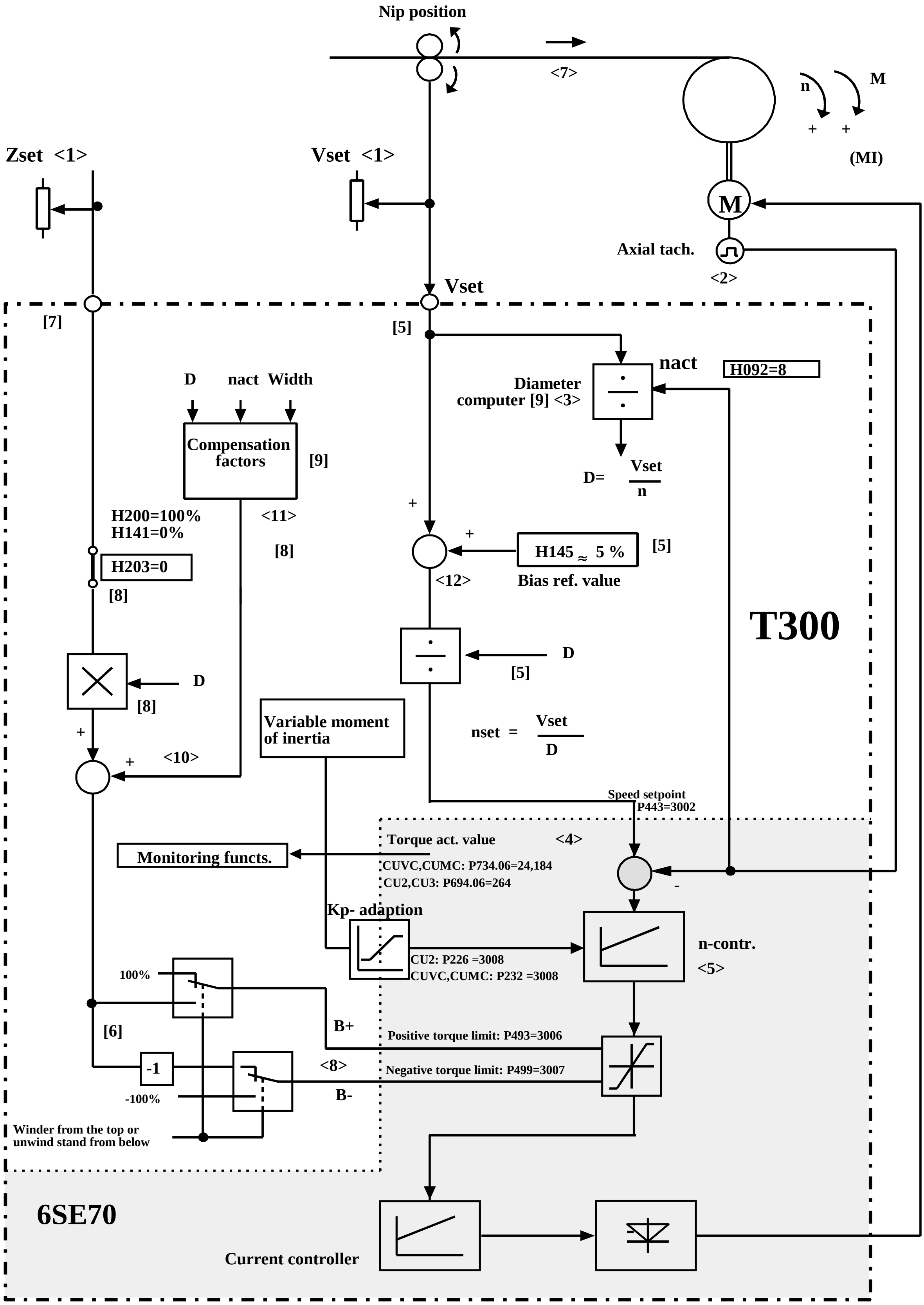


Fig. 5.10: Example of a winder with indirect closed-loop tension control
[3] = Page 3 in the block diagram
<2> = Note in the text

5.11 Configuring example: Unwind stand indirect closed-loop tension control

In Fig. 5.11, an example is illustrated as to how an unwind stand with indirect closed-loop tension control can be configured.

<1> **Tension setpoint and web speed - setpoint** ("machine speed") are output as analog signals from the automation or as parameter.

<2> A pulse encoder as axial tachometer is used for sensing the actual speed

<3> The **diameter computer** continually calculates the diameter according to the following formula

$$Diameter \approx \frac{Web\,speed}{Speed}$$

<4> During unwinding, the **speed controller** is over-controlled (it goes into saturation), as a low negative bias reference value is injected into it (H145=0...- 5 %), and the web speed setpoint is switched-out (H041=8 and H140=0%). Thus, when a material web is available, the speed controller is at its negative output limit. When an attempt is made to "retrieve" the unwound material, the speed controller reaches the specified torque limit B- as a result of the selected tension setpoint.

<8> The **tension setpoint** specifies the torque setpoint by appropriately controlling current limit B- (braking in the counter-clockwise direction).

<9> The main function of the **indirect closed-loop tension control** is that the tension setpoint, multiplied by diameter D, is entered as torque (max. diameter and max. tension setpoint results in maximum torque).

<10> Precise **compensation** of the friction- and accelerating torques are required so that the entered armature current results in the closest possible required web tension.

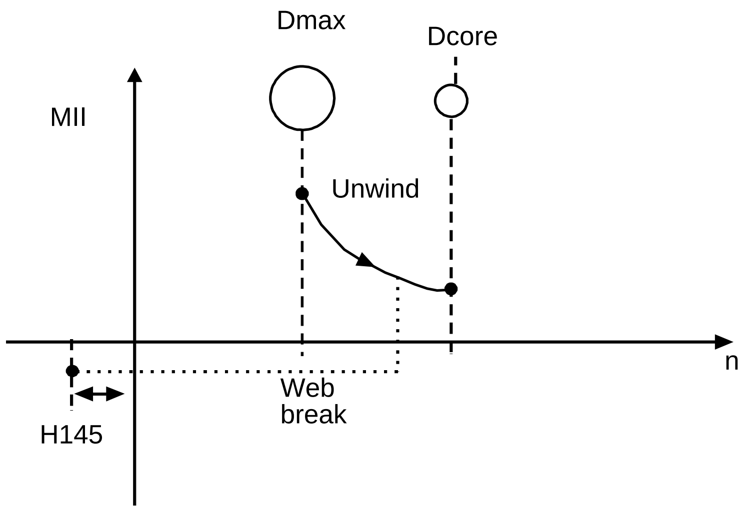
<12> If the unwind stand was to continue to rotate or even accelerate when the web **breaks** this would be a potential hazard due to uncontrolled material rejection (centrifugal force). This is prevented by activating the speed controller as the specified limit current is now sufficient to approach the saturation setpoint, set using H145. The drive continues to rotate slowly in the wind direction and winds up possible residual material still left in the machine, refer to Section 4.15.

<13> The web speed setpoint input can be used when **threading** the web material. In this case, a positive web speed setpoint is entered, and enabled using H041=9. In this case, the negative bias reference value H145 must be taken into account.
The speed setpoint is disabled with H041 = 8 once the web has been threaded. After the tension control has been switched-in, the material tension can be established. The speed setpoint can also be switched-in and output via terminal; selection using H041.

Note:

Motor operation can also be required for an unwind stand, if the accelerating torque when braking is greater than the tension torque.

Torque/speed characteristic:



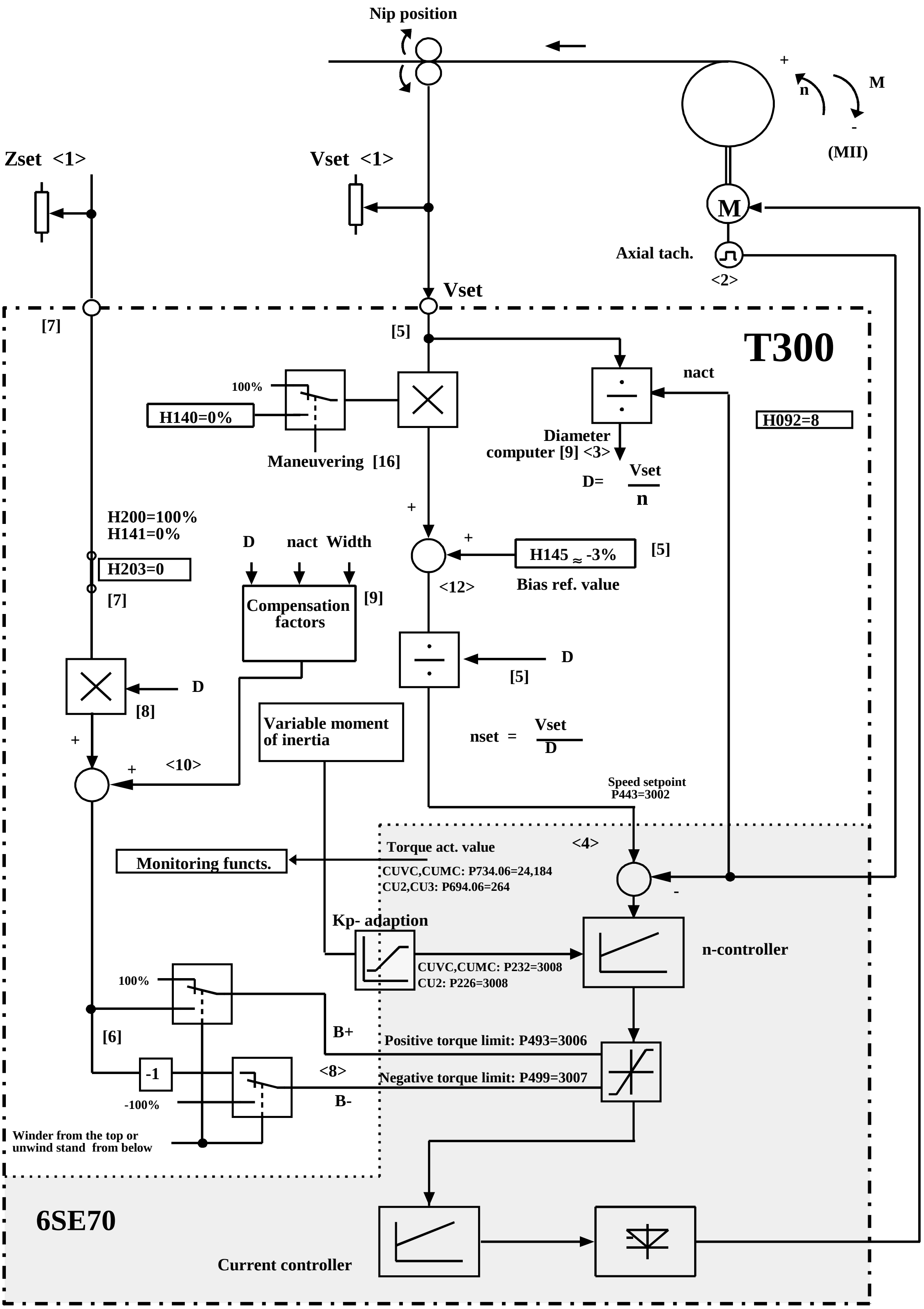


Fig. 5.11: Example of an unwinder with indirect closed-loop tension control
[3] = Page 3 in the block diagram
<2> = Note in the text

5.12 Configuring example: Winder with dancer roll, closed-loop speed correction control

Fig. 5.12. show, as an example, how a winder with dancer roll can be configured.

<1> The **web speed setpoint**, is input in this case as analog signal at terminals 503, 504.

<2> An analog tachometer is used for speed actual value sensing. This is connected-up at the basic converter. The actual value is transferred via the dual port RAM to the T300.

<3> The **diameter computer** continually calculates the diameter according to the following formula

$$Diameter \approx \frac{Web\,speed}{Speed}$$

<4> The analog actual dancer roll position is connected at terminals 501, 502. The D component is used to damp the dancer roll and prevents oscillation between the dancer roll and winder.

<6> The dancer roll position reference value is permanently entered with H083=11 via parameter H082; generally, the voltage is set for a dancer roll center position. The tension setpoint channel is isolated using H244=1 so that the winding hardness control can be used for the dancer roll control.

<7> The "tension controller" operates as **closed-loop dancer roll position controller**, and generally generates a supplementary speed setpoint, which is injected into the speed controller with positive polarity, so that the dancer position actual values tracks the entered position setpoint.

<8> The **speed setpoint** is obtained from the total speed setpoint divided by the diameter.

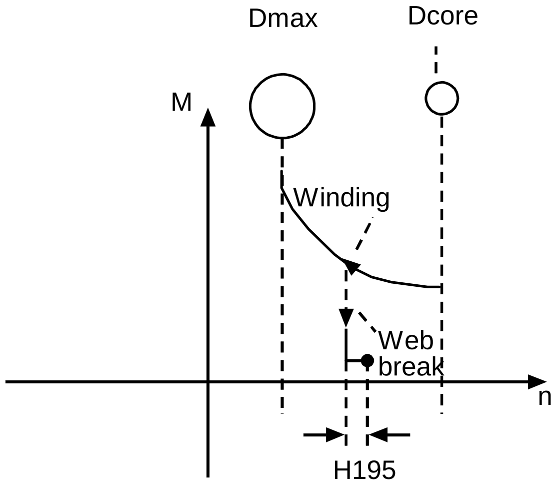
<9> Generally, the closed-loop position controller output has a relatively small influence, of approx. 2...10% on the speed controller. The tension controller output can be limited using H195; the influence on the speed setpoint can be normalized with H141.

<10> The **compensating torques** for friction and acceleration are added as supplementary torque setpoints after the speed controller. Generally, friction compensation is not requried for the closed-loop dancer roll position control and generally, inertia compensation can also be omitted.

<9> When the **material web breaks,** the dancer roll falls to the lower endstop, and the position controller reaches its output limit, as it can no longer maintain the reference position. Thus, the speed is increased by the value set using H195 - refer to Section 4.15.

<13> Normally, there is no **external tension setpoint**, for a winder with dancer roll. For a dancer roll with adjustable support force, as illustrated in Fig. 5.12, a tension setpoint can be injected into the technology board in order to use its winding hardness control. The winding hardness characteristic output, can then, for example, be output at terminals 521/522, and be used as setpoint for the pneumatically adjustable dancer roll support.

<1> When **threading the material web,** the normal web speed setpoint input can be used (in this case, terminals 503, 504). After threading, the parameterized tension is established after the tension control has been switched-in.



Speed/torque characteristic for a web break condition

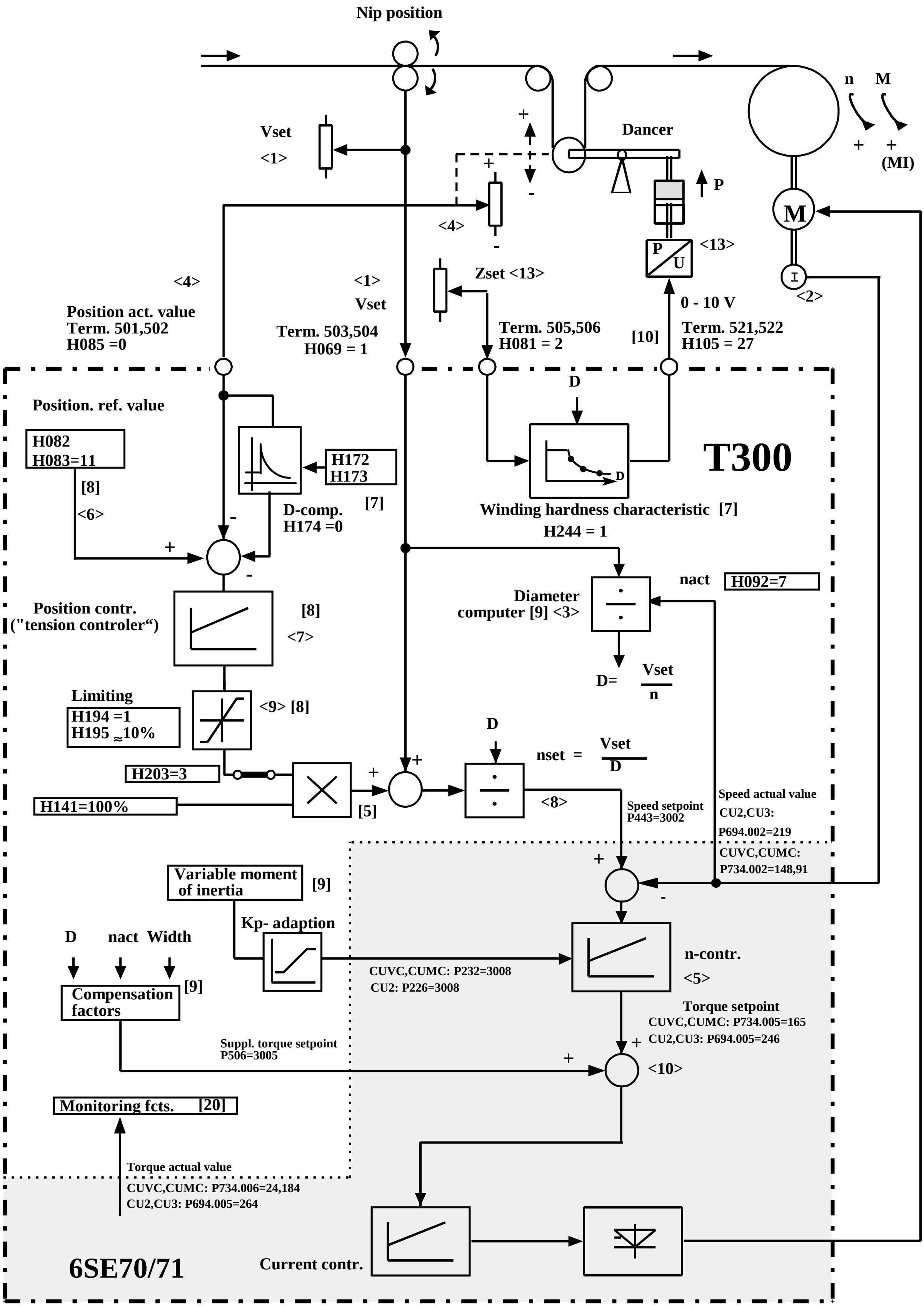


Fig. 5.12: Winder with dancer roll, closed-loop speed correction control

[3] = Page 3 in the block diagram

<2> = Note in the text

5.13 Configuring example: Unwind stand with dancer roll, closed-loop speed correct. cntrl

Fig. 5.13 illustrates, as an example, how a winder with dancer roll can be configured.

<1> The **web speed setpoint**, is input in this case as analog signal at terminals 503, 504.

<2> An analog tachometer is used for **speed actual value sensing.** This is connected-up at the basic converter. The actual value is transferred to the T300 via the dual port RAM.

<3> The **diameter computer** continually calculates the diameter according to the following formula

$$\text{Diameter} \approx \frac{\text{Web speed}}{\text{Speed}}$$

<4> The analog **dancer roll position actual value** is connected at terminals 501,502. The D component is used to damp the dancer roll and prevents oscillation between the dancer roll and winder.

<6> The **dancer roll position setpoint** is permanently entered via parameter H082 using H083=11; generally the voltage is set for a dancer roll center position. The tension setpoint channel is isolated with H244=1 and the winding hardness characteristic can then be used to control the dancer roll

<7> The **tension controller** operates as closed-loop dancer roll position controller, and generally generates a supplementary speed setpoint, which is injected into the speed controller with negative polarity, so that the dancer position actual values track the entered position setpoint.

<8> The **speed setpoint** is obtained from the total speed setpoint divided by the diameter.

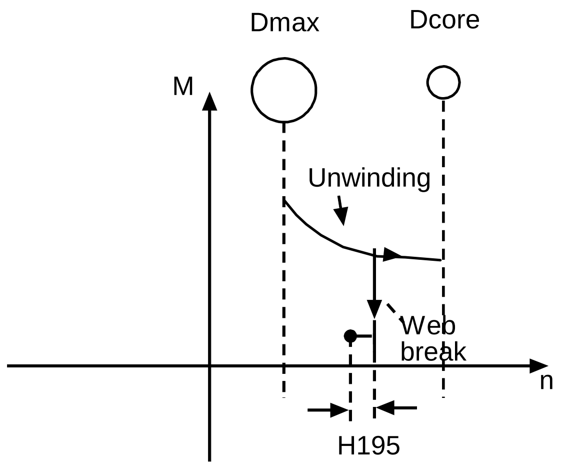
<9> Generally, the closed-loop position controller output has a relatively small influence of approx. 2...10% on the speed controller. The speed controller output can be limited using H195; the influence on the speed setpoint can be normalized with H141.

<10> The **compensating torques** for friction and acceleration are added as supplementary torque setpoints after the speed controller Generally, friction compensation is not required for the closed-loop dancer roll position control, and generally inertia compensation can also be omitted.

<11> When the **material web breaks**, the dancer roll falls to the lower endstop, and the position controller reaches its output limit, as it can no longer maintain the setpoint position. Thus, the speed is increased by the value set using H195. The drive can be shutdown, by appropriately parameterizing the web break detection and evaluating the web break signal; refer to Section 4.15.

<13> Normally, there is no **external tension setpoint**, for a winder with dancer roll. For a dancer roll with adjustable support force, as illustrated in Fig. 5.13, the technology board can be provided with a tension setpoint in order to use its winding hardness control. The winding hardness characteristic output, can then, be output at terminals 521,522, and be used as setpoint for the pneumatically adjustable dancer roll support.

<1> When **threading the material web,** the normal web speed setpoint input can be used (in this case, terminals 503,504). After threading, the parameterized tension is established after the tension control has been switched-in.



Speed/torque characteristic for a web break

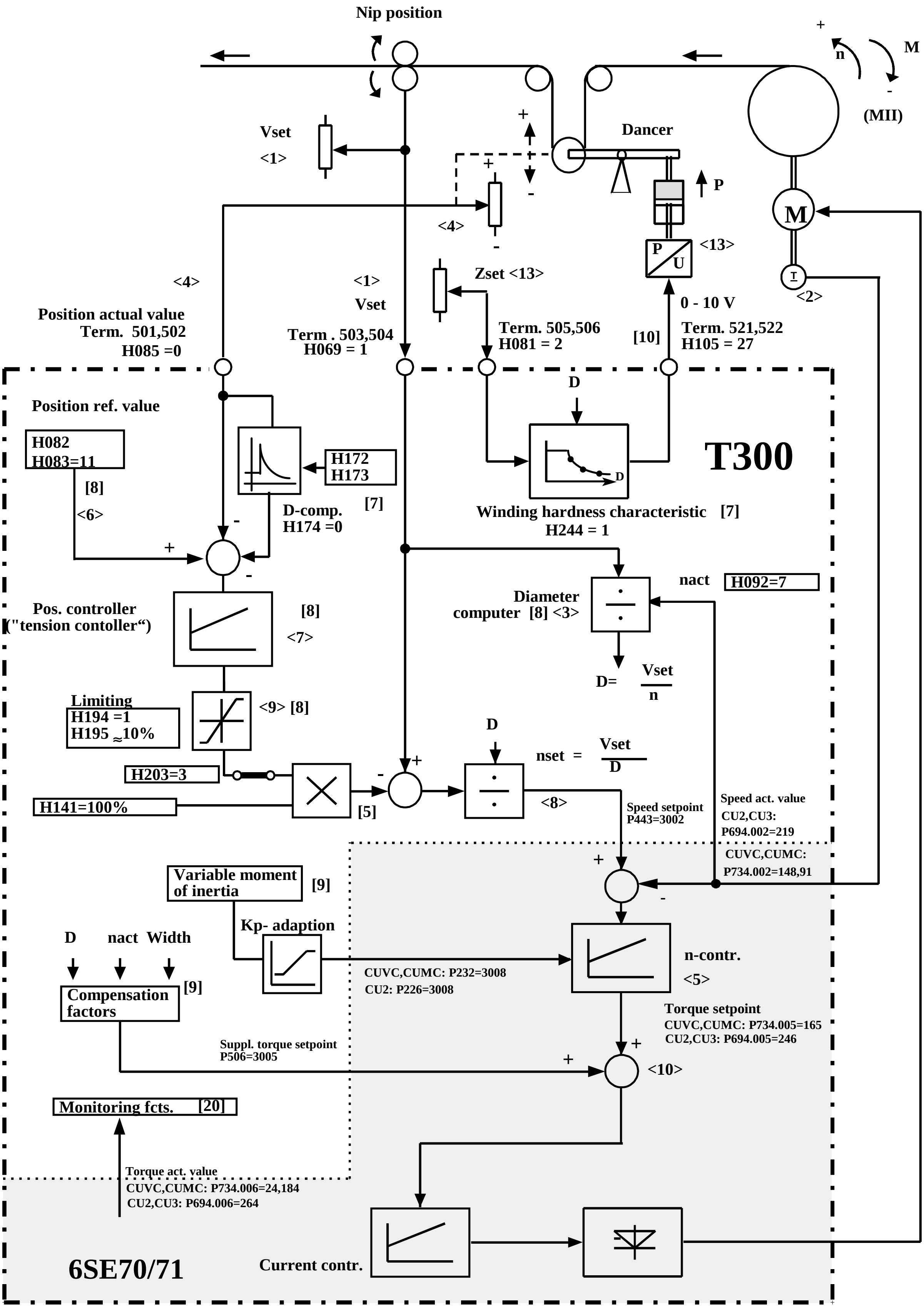


Fig. 5.13: Unwind stand with dancer roll, closed-loop speed correction control
[3] = Page 3 in the block diagram
<2> = Note in the text

5.14 Configuring example: Winder with tension transducer

Fig. 5.14. show examples for winders with tension transducer and closed-loop current limiting control.

<1> **Tension setpoint and web speed setpoint** ("machine speed") are output as analog signals at terminals 501, 502 and 505, 506.

<2> A pulse encoder as axial tachometer is used for sensing the **actual speed**

<3> The **diameter computer** continually calculates the diameter according to the following formula

$$\text{Diameter} \approx \frac{\text{Web speed}}{\text{Speed}}$$

<4> The **speed setpoint** is fed to the speed controller, where the speed setpoint corresponds to the actual web speed plus the **bias reference value** H145 (set H145 to approx. 5%...10%). The bias reference value, means that the speed controller goes into saturation when the material web is present, i.e. it goes to its positive output limit. When an attempt is made to increase the axial speed by the bias setpoint, the speed controller output reaches the specified current limit as a result of the selected tension setpoint.

<5> The **tension actual value** is sensed as analog signal at terminals 503, 504. It may be necessary to provide external smoothing here; refer to Fig. 3.2.

<9> The tension setpoint is controlled via the **winding hardness characteristic.** This allows a decreasing tension to be set for increasing diameter.
The characteristic output is the setpoint input for the tension controller and tension feed-forward control. H200 permits an adjustment to be made between tension- and torque setpoint for the feed-forward control.

<11> The **tension controller** compares (it could be smoothed through a filter) the tension actual value with the tension setpoint, and outputs an appropriate correction signal.

<14> The tension controller output signal and the parameterized feed-forward control are added, and are used to limit the speed controller output after being **multiplied by the actual diameter** (max. diameter and max. tension setpoint result in max. torque).

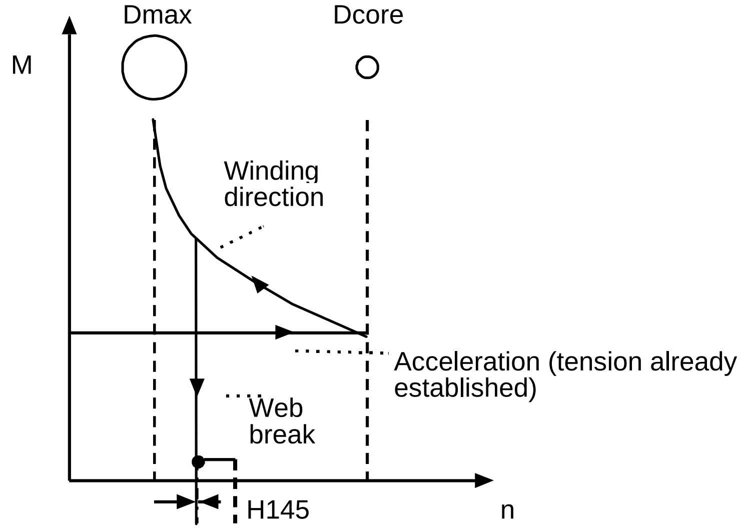
<15> The **tension controller output** is limited via H195 (typical value: 10%).

<16> The **compensation torque** consists of loss- and accelerating torques, and must be additionally overcome, and is therefore added to the tension torque.

<6> When the **web breaks,** the speed controller becomes active, and prevents the winder drive from accelerating, by controlling the circumferential speed to the web speed + bias reference value (overspeed protection).
The drive can also be shutdown by appropriately parameterizing the web break sensing and evaluation of the web break signal; refer to Section 4.15.

Web threading

When threading the web, it is possible to automatically changeover from closed-loop speed to closed-loop tension control. In this case, when accelerating, the threading setpoint should be connected to the normal speed setpoint input. The current limit should be enabled when the tension setpoint is connected-in. When establishing the tension, the drive is automatically controlled via the current limit.



Speed//torque characteristic for a web break

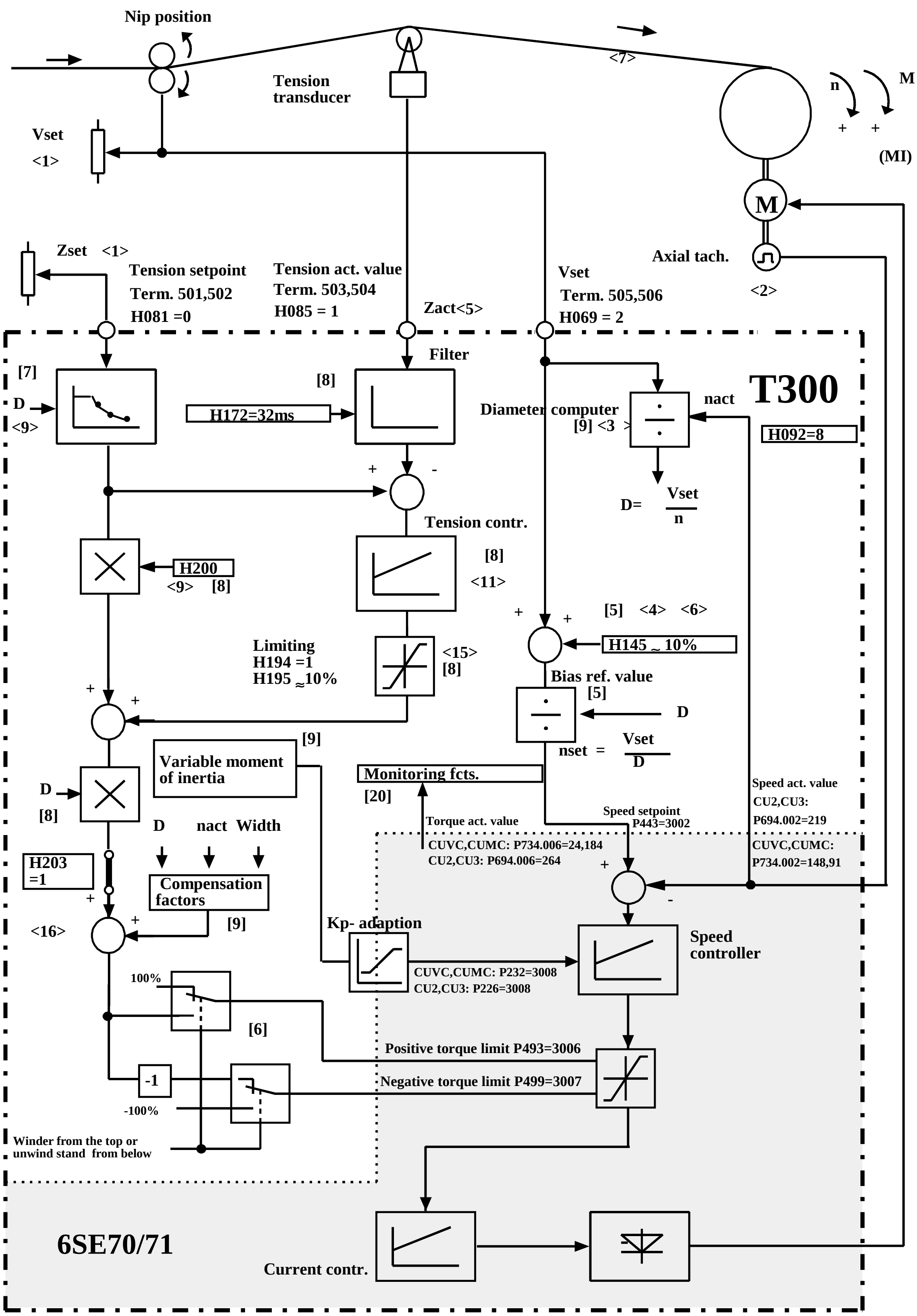


Fig. 5.14.: Winder with tension transducer, closed-loop current limiting control

[3] = Page 3 in the block diagram
<2> = Note in the text

5.15 Configuring example: Unwind stand with tension transducer

Fig. 5.15 illustrates an example of an unwind stand with tension transducer and closed-loop current limiting control.

<1> **Tension setpoint and web speed setpoint** ("machine speed") are output as analog singals at terminals 501,502 and 505,506.

<2> A pulse encoder as axial tachometer is used to sense the **actual speed**

<3> The **diameter computer** continually calculates the diameter according to the followig formula

$$Diameter \approx \frac{Web\,speed}{Speed}$$

<4> During unwinding, a low negative setpoint (H145=0...- 5 %) is injected into the **speed controller.** The speed setpoint is disabled with H140=0% and H041=8 (maneuvering). The speed controller always operates at its negative limit if there is a material web; the negative limit is entered from the tension controller.

<5> The **tension actual value** is sensed as analog signal at terminals 503,504. It may be necessary to provide external smoothing here; refer to Fig. 3.2.

<9> The **tension setpoint** is applied to the tension controller setpoint input, and simultaneously controls the torque setpoint. H200 permits adjustment between the tension- and torque setpoint for the feed-forward control. Generally, a decreasing winding hardness is not required for unwind stands; the characteristic can be disabled with H206=1.

<11> The **tension controller** compares (it could be smoothed through a filter), the tension actual value, with the tension setpoint, and outputs an appropriate correction signal.

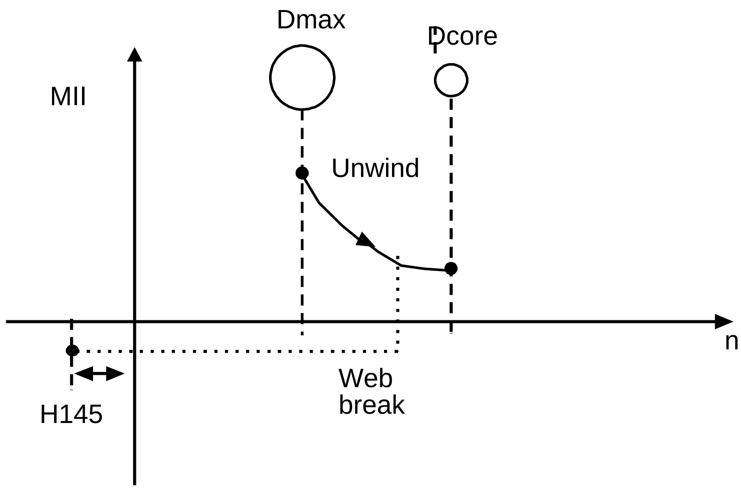
<14> The tension controller output signal and the parameterized feed-forward control value are added, and are used, after **multiplication by the actual diameter** (max. diameter and max. tension setpoint result in max. torque). to limit the speed controller output.

<15> The **tension controller output** is limited via H195 (typical value: 10%)

<16> The **compensation torque** consists of loss- and accelerating torques, and must be subtracted from the tension torque; it supports braking when unwinding.

<6> When the **web breaks,** the speed controller becomes active and moves away from the negative torque limit. The winder is braked, and rotates with a speed, parameterized at H145, in the direction opposing the winding direction.
By appropriately parameterizing the web break detection and evaluating the web break detection signal, the drive can be shutdown and the diameter computer inhibited, refer to Section 4.14.

<17> When **threading** the web, if required, the normal web speed setpoint input can be used. In this case, a positive web speed setpoint should be entered and enabled with H041=9; the bias setpoint H145 must then be taken into account. Once the web has been thread, the speed setpoint is disabled with H041=8, and after the tension control has been switched-in, the material tension can be established. The speed setpoint can be inhibited and enabled with the "maneuver" control input, also via a binary input; refer to block diagram 16.



Speed/torque characteristic when the web breaks

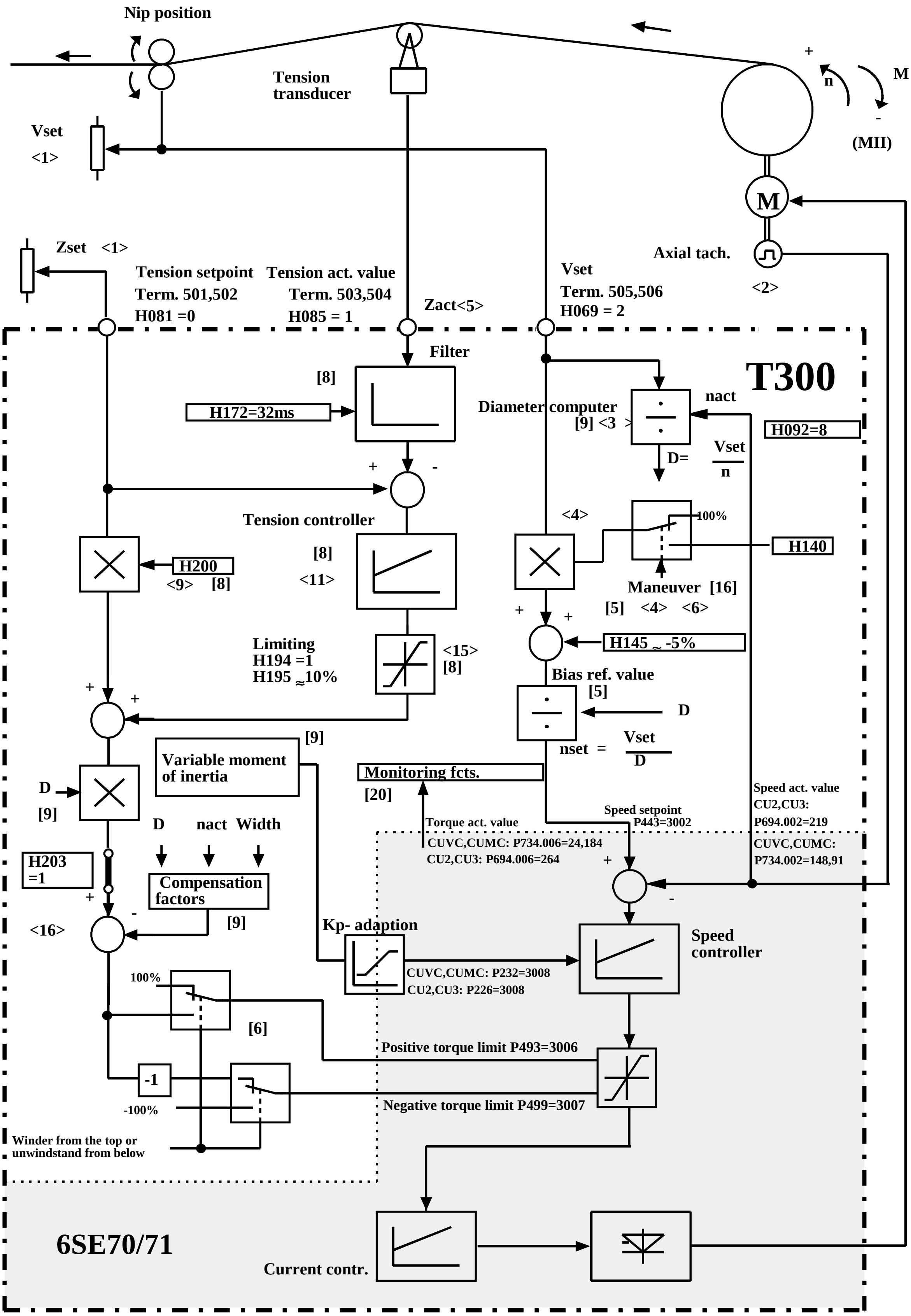


Fig. 5.15 : Unwind stand with tension transducer, closed-loop current limiting control
[3] = Page 3 in the block diagram
<2> = Note in the text

5.16 Configuring example: Winder with closed-loop constant speed control

If there is a nip position between an unwind stand and a winder, thus maintaining the web speed constant (e.g. for a "doctor winder"), then the winder should be operated with just pure closed-loop speed control.

For winders with closed-loop speed control, a web tachometer, or an external diameter sensor, is always required for the diameter calculation.

Fig. 5.16. shows an example of a winder with closed-loop constant speed control and web tachometer.

<1> The tension controller is disabled and its output is shutdown using H195=0%. Closed-loop speed correction control is cancelled using H203; the correction setpoint is now 0%

<2> Instead of the speed setpoint, the actual web speed from the web tachometer is used for the diameter computer. The tension control must be switched-in to enable the diameter computer.

<3> The diameter is calculated from the measured web speed actual value and the speed actual value of the axial tachometer. The quotient of the speed setpoint and the actual diameter results in the winder speed setpoint.

<5> The compensation factors for friction and acceleration are switched-in as supplementary torque setpoint after the speed controller.

<6> A pulse encoder should always be used as web tachometer.

<7> The web tachometer signal always goes to zero when the web breaks. The diameter attempts to go towards Dmin according to the ramp-up/ramp-down time parameterized using H238 and appropriately the winder speed tries to increase.
For H236=1, the winder diameter can only increase i.e., when the material web breaks, the winder would continue to run with the same speed.

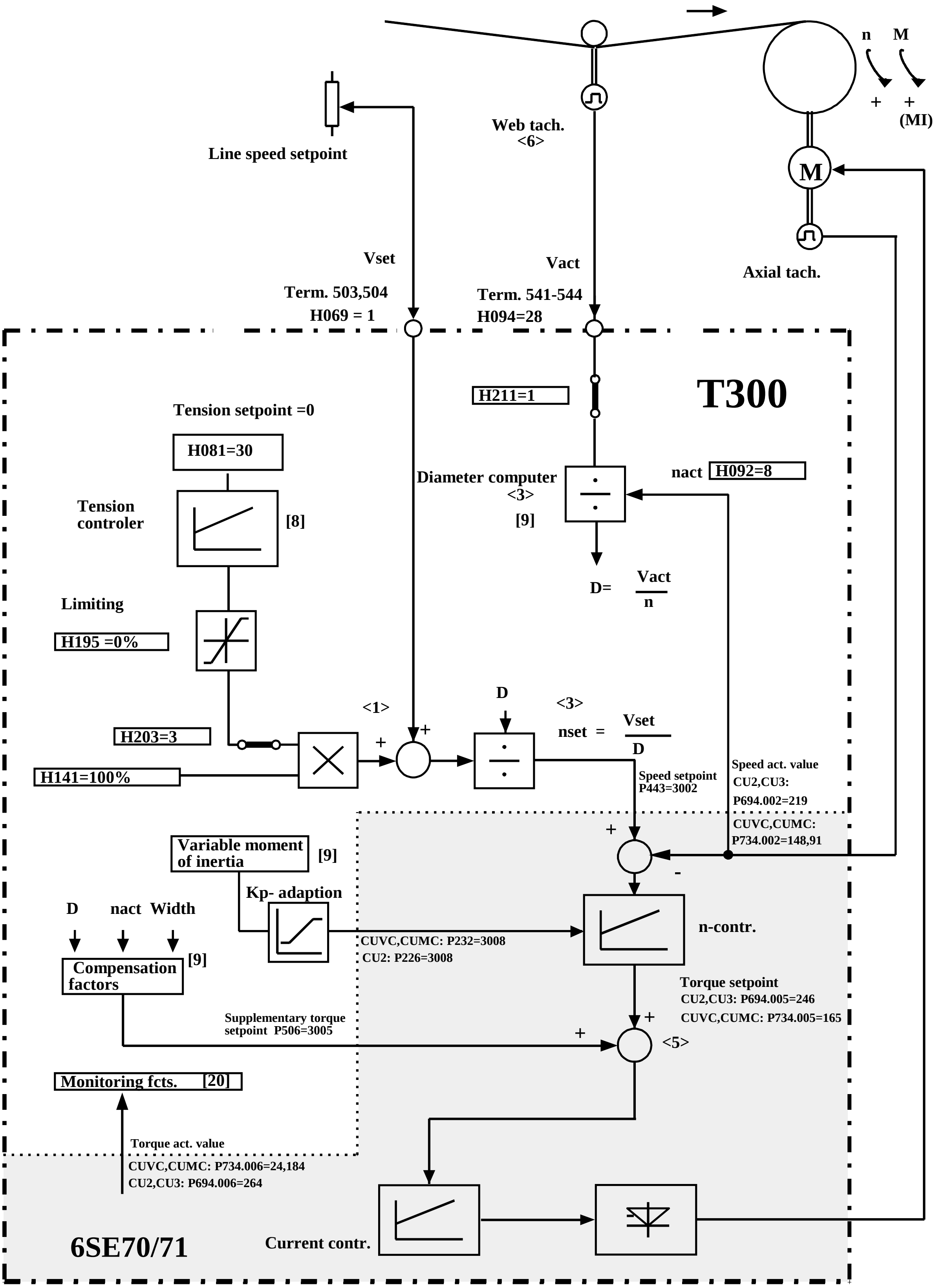


Fig. 5.16: Winder with closed-loop constant speed control
[3] = Page 3 in the block diagram
<2> = Note in the text

6 Parameters

6.1 Parameter handling

All parameters, which are implemented on the technology board, are called *technology parameters.* These parameters are always designated with **TP_xxx** in the STRUC software (xxx stands for the parameter number). Variable quantities are displayed as **Hxxx**, and display quantities as **dxxx** at the converter operator control panel and for SIMOVIS. The technological parameters can be read and changed from several locations:

- operator control panel (PMU)
- SST1 serial interface (RS232) or SST2 (RS485) from the basic drive converter
- interface board (if available)
- SIMADYN D monitor, can be addressed with the start-up-, SIMOVIS- or SIMOVIS basic service program via the serial interface X132 of the technology board (DUST1M)

The axial winder is parameterized, as **standard** via SIMOVIS and the basic drive converter interface or via the operator control panel (PMU or OP1).

When the **operator control panel** is used, the technological parameter is first selected using the raise/lower keys. The T300 parameters are located after the basic drive parameters, i.a after P999. With OP1 T300 parameters can be selected by numeric keys, starting with a "1" (selecting the parameter range 1000 to 1999). A thus selected technological parameter can then be changed using the raise/lower keys and stored; parameters are changed in the same way as changing the basic drive converter parameters (refer to the basic drive converter manual).

Start-up via SIMOVIS is extremely user-friendly; the parameter values are numerically entered; several parameters can be displayed. SIMADYN D knowledge is not required.

To change technology parameters using the **SIMADYN D monitor (basic STRUC knowledge required)**, the path name of the appropriate connector must be entered.

Please refer to Section 10.2 for further information regarding the start-up programs.

Note:
- The technological parameters (exept INIT-parameter) can be read and changed in all states of basic drive converter.
- init-parameter: Comment, if the parameter value is only evaluated once when the converter is run-up, i.e. at power-up (initialization). The converter must be **powered-down and -up again** so that this parameter change becomes effective.

6.2 Parameter lists

6.2.1 SIMADYN D connector types

Parameters can only be changed within a certain value range. The value range is dependent on the parameter data type, and is, for several parameters, restricted to a narrow range (MIN-/MAX limits). The value range, which is defined by the data type, is valid if no information is provided in the parameter lists in the value range column:

Type	Designation	Explanation	Value range	Resolution
Type	Designation	Explanation	Value range	Resolution
B1	Binary signal		Logical 0 or 1	
V2	Binary vector	Status word	10...00 to 11...11 bin.8 8000 to 7FFF hex	1
N2	Normal signal	Percent. value	-200 % to 199.99 %	0.006103 %
I2	Integer	Integer number	-32768 to 32767	1
O2	Ordinal number	Natural No.	0 to 32767	1
E2	Extended signal	Decimal value	-256.0 to 255.99	0.0078125
R2	Time information	Reciprocal	1 TA to 16384 TA	dep. on the value
T2	Time information	Proportional	0 TA to 32767 TA	1 TA
D2	Time information	Proportional	0 TA to 1.99 TA	0.006103 TA

Table 6.2.1 .a: Value range and resolution for the data types in the standard software package (SIMADYN D data types) TA = Sampling time,

For the time-dependent data types R2, T2 and D2, in the sampling times used, the following value ranges are obtained:

	TA = T1 = 8 ms (closed-loop control)	TA = T3 = 32 ms (open-loop control)
R2:	8 ms to 131072ms (= 2.2 min)	32 ms to 524288 ms (= 8.7 min)
T2:	0 ms to 262136 ms (= 4.4 min)	32 ms to 1048544 ms (=17.5 min)
D2:	0 ms to 16 ms	0 ms to 64 ms

Bit	Hexa-decimal value	Decimal value (I2.O2)	Percentage value (N2)	Extended signal (E2)	Time reciprocal signal (R2 8 ms)	Time proportional signal (T2 8 ms)
0	1	1	0.0061 %	0.0078125	131072.0 ms	8.0 ms
1	2	2	0.0122 %	0.015625	65536.0 ms	16.0 ms
2	4	4	0.0244 %	0.03125	32768.0 ms	32.0 ms
3	8	8	0.0488 %	0.0625	16384.0 ms	64.0 ms
4	10	16	0.0976 %	0.125	8192,0 ms	128.0 ms
5	20	32	0.1953 %	0.25	4096.0 ms	256.0 ms
6	40	64	0.3906 %	0.5	2048.0 ms	512.0 ms
7	80	128	0.7812 %	1.0	1024.0 ms	1024.0 ms
8	100	256	1.5625 %	2.0	512.0 ms	2048.0 ms
9	200	512	3.125 %	4.0	256.0 ms	4096.0 ms
10	400	1024	6.25 %	8.0	128.0 ms	8192.0 ms
11	800	2048	12.5 %	16.0	64.0 ms	16384.0 ms
12	1000	4096	25.0 %	32.0	32.0 ms	32768.0 ms
13	2000	8192	50.0 %	64.0	16.0 ms	65636.0 ms
14	4000	16384	100.0 %	128.0	8.0 ms	131072.0 ms
15	8000	-32768	-200.0 %	-256.0	-	-

Table 6.2.1.b: Conversion table for data types

6.2.2 Parameter types

Generally, parameters are normalized via the interfaces as they are displayed on the converter operator control panel (PMU).
However, the decimal point is eliminated.
The smallest possible increment can be read from the *step* column. It should be noted that the value can be entered via the interface for certain parameter types with a smaller step than can be implemented by T300. In this case, the value is rounded-off.

The value ranges and steps which can be realized by the technology board can, if you in doubt, be taken from the Tables in Section .

The parameters can either be 1-bit-, 16-bit- or 32-bit quantities. There are various parameter types depending on the specification.

An overview of the available parameter types is provided in the subsequent table:

Parameter type	**Significance**
Boolean	Binary value
O2	Unsigned 16-bit value
I2	Signed 16-bit value
I4	Signed 32-bit value
V2	16-bit word (binary vector)

Example:
140% is to be entered for parameter H004. The parameter type is I4.

Required value for H004	Value range/step for H004	Value for H004 to be entered via the interface
140%	-200.000% ... 199.993% / 0.006%	140*000* as decimal number

The step information indicates that the parameter has 3 decimal places, i. e. 3 zeros must be attached to the number 140.

6.2.3 Parameter lists

All of the parameters used for the *MS320 axial winder* standard software package are listed on the following pages. The listing is realized in the general form:

HxxxParameter code xxxxd xxxxh Explanation and if relevant, parameter information	Steps	Value range	Factory setting
Block diagram n FP-FPNAME.FBNAME.K SIMADYN D:XX PKW type:XX	**(init)**		

Table 6.2.3.a: Listing type for input parameters

dxxx Parameter code xxxxd xxxxh Explanation and if relevant, parameter information Block diagram FP-FPNAME.FBNAME.K SIMADYN D:xx PKW type:XX	Steps	A

Table 6.2.3.b: Listing type for display parameters

Hxxx / dxxx	Parameter number xxx
xxxxd	Parameter number via interface as decimal number
xxxxh	Parameter number via interface as hexadecimal number
Step	Step and units of the parameter
Value range	Lowest up to the highest parameter value which can be set.
Factory setting	Parameter factory setting
A	Display parameter code
Block diagram n	Reference to the block diagram, page n (not every parameter exists in the block diagram)
FP-FBNAME.FBNAME.K	Parameter path name (only important for operator control from the SIMADYN D monitor)
SIMADYN D:XX	SIMADYN D connector format
PKW-TYP:XX	Parameter type when accessed via interface

Note:
- The technological parameters (exept INIT-parameter) can be read and changed in all states of basic drive converter.
- init-parameter: Comment, if the parameter value is only evaluated once when the converter is run-up, i. e. at power-up (initialization). The converter must be **powered-down and -up again** so that this parameter change becomes effective.

H001 Overspeed limit, positive 1001d / 03E9h Upper speed actual value limit as a % of the rated speed Fault signal and -trip at n_{act} > H001 Prerequisite: Fault is not suppressed Block diagr.20 FP-CONTZ.SU010.LU SIMADYN D:N2 PKW:I4	0,006%	-200,000%... 199,993%	120,000%
H002 Overspeed limit, negative 1002d / 03EAh Lower speed actual value limit as a % of the rated speed ... 1999 Fault signal and -trip at n_{act} < H002 Prerequisite: Fault is not suppressed Block diagr.20 FP-CONTZ.SU010.LL SIMADYN D:N2 PKW:I4	0,006%	-200,000%... 199,993%	-120,000%
H003 Overcurrent limit, positive 1003d / 03EBh Upper current actual value limit as a % of the rated current Fault signal and -trip at I-act > H003 Prerequisite: Fault is not suppressed Block diagr.20 FP-CONTZ.SU040.LU SIMADYN D:N2 PKW:I4	0,006%	0%... 199,993%	120,000%
H004 Overcurrent limit, negative 1004d / 03ECh Lower current actual value limit as a % of the rated current Fault signal and -trip at I-act < H004 Prerequisite: Fault is not suppressed Block diagr.20 FP-CONTZ.SU040.LL SIMADYN D:N2 PKW:I4	0,006%	-200,000%... 0%	-120,000%

H005 Initialization time for couplings 1005d / 03EDh Time delay, after the T300 has been powered-up (voltage on or reset) before the coupling monitoring functions to CU, CB and the PTP interface are activated. Block diagr.16 FP-CONTZ.SU130.T SIMADYN D:T2 PKW:O4	128,0ms	0ms... 2097152ms	20000ms
H006 Telegram failure, PTP coupling 1006d / 03EEh Number of sampling cycles (8ms) which may expire before a new telegram is received. The setting is dependent on the selected baud rate, the telegram length and the intervals between 2 consecutive telegrams. A failure is signaled as alarm, can be suppressed using H011. A fault is only displayed, if a valid telegram was first received, i. e. the coupling was in operation for the first time. The fault signal can be suppressed using H012. 0 = monitoring disabled Block diagr.14 FP-IQ1Z.RPTP.LEM SIMADYN D:O2 PKW:O2	1 **init**	0... 32767	10

Anti-stall signal:

H007 Anti-stall protection threshold n_{act} 1007d / 03EFh Absolute speed actual value which must be exceeded for the "anti-stall protection" fault signal. Condition 1 for the anti-stall protection signal: |n-act| > H007 Prerequisite: Fault is not suppressed Block diagr.20 FP-CONTZ.SU080.L SIMADYN D:N2 PKW:I4	0,006%	0%... 199,993%	2 %
H008 Anti-stall protection threshold I_{act} 1008d / 03F0h Absolute current actual value which must be exceeded for the fault signal "anti-stall protection". Condition 2 for the anti-stall protection signal: $\|I_{act}\|$ > H008 Prerequisite: Fault is not suppressed Block diagr.20 FP-CONTZ.SU090.L SIMADYN D:N2 PKW:I4	0,006%	0%... 199,993%	10%

H009 Anti-stall protection threshold, control error 1009d / 03F1h Absolute value of the control error YE of the speed controller, which must be exceeded for the fault signal "anti-stall protection". Condition 3 for the anti-stall protection signal: |YE| > H009 Prerequisite: Fault is not suppressed Block diagr.20 FP-CONTZ.SU100.L SIMADYN D:N2 PKW:I4	0,006%	0%... 199,993%	50%
H010 Anti-stall protection, response time 1010d / 03F2h Time, where conditions 1-3 must be simultaneously available for the fault signal "anti-stall protection" = condition 4 for the anti-stall protection signal. Prerequisite: Fault is not suppressed Block diagr.20 FP-CONTZ.SU120.T SIMADYN D:T2 PKW:O4	16,0ms	0...524272ms	500ms

H011 Alarm mask 1011d / 03F3h Bitwise coding of the errors/faults which should lead to an alarm (a set bit results in an alarm): also refer to sections 9.2 to 9.5 Bit Alarm Significance 0 A097 Overspeed, positive 1 A098 Overspeed, negative 2 A099 Overcurrent, positive 3 A100 Overcurrent, negative 4 A101 Anti-stall protection 5 A102 Reception faulted from CU 6 A103 Reception faulted from CB 7 A104 Reception faulted from PTP Block diagr.20 FP-CONTZ.SE030.IS2 SIMADYN D:V2 PKW:V2	0001 Hex	0 ....FF	FF
H012 Fault mask 1012d / 03F4h Bitwise coding of the faults/errors which should lead to a fault message (a set bit results in the appropriate fault/error): also refer to sections 9.2 to 9.5 Bit Fault Significance 0 F116 Overspeed, positive 1 F117 Overspeed, negative 2 F118 Overcurrent, positive 3 F119 Overcurrent, negative 4 F120 Anti-stall protection 5 F121 Reception faulted from CU 6 F122 Reception faulted from CB 7 F123 Reception faulted from PTP Block diagr.20 FP-CONTZ.SE040.IS2 SIMADYN D:V2 PKW:V2	0001 Hex	0 ....FF	FF
H013 Source, tachometer on 1013d / 03F5h Selects the source for the calculate diameter command using the tachometer 0 = Binary input X6, terminal 611 1 = Binary input X6, terminal 612 2 = Binary input X6, terminal 613 3 = Binary input X6, terminal 614 4 = Binary input X6, terminal 615 5 = Binary input X6, terminal 616 6 = Binary input X6, terminal 617 7 = Binary input X6, terminal 618 8 = Fixed value 1 9 = Fixed value 0 10 = Control word 2.13 from CB 11 = Control word 2.13 from CU Block diagr.17 FP-IQ1Z.B207A.XCS SIMADYN D:O2 PKW:O2	1	0-11	9

H014 Long inching time 1014d / 03F6h Delay, before the basic drive converter is shutdown after an inching command has become inactive Block diagr.18 FP-CONTZ.C2736.X SIMADYN D:T2 PKW:O4	32,0ms	0...524288ms	10000ms
H015 Source, transmit word 1 PTP 1015d / 03F7h Selects the first word in the transmitted PTP telegram 0 = Effective web speed setpoint d301 1 = Actual dv/dt d302 2 = Speed setpoint d303 3 = Variable moment of inertia d308 4 = Actual diameter d310 5 = Pre-control torque d312 6 = Analog input 5, X5 terminals 511/512 d324 7 = Torque setpoint, smoothed d331 8 = Select value 1 from CU 9 = Select value 2 from CU 10 = Receive word 1, PTP 11 = Receive word 2, PTP 12 = Receive word 3, PTP 13 = Receive word 4, PTP 14 = Receive word 5, PTP 15 = Control word 1 d332 16 = Positive torque limit d342 17 = Negative torque limit d343 18 = 10% Block diagr.14 FP-IQ2Z.TPTP1.NC SIMADYN D:O2 PKW:O2	1	0 ... 99	15
H016 Source, transmit word 2 PTP 1016d / 03F8h Selects the second word in the transmitted PTP telegram Refer to H015 for settings Block diagr.14 FP-IQ2Z.TPTP2.NC SIMADYN D:O2 PKW:O2	1	0 ... 99	15
H017 Source, transmit word 3 PTP 1017d / 03F9h Selects the third word in the transmitted PTP telegram Refer to H015 for settings Block diagr.14 FP-IQ2Z.TPTP3.NC SIMADYN D:O2 PKW:O2	1	0 ... 99	15
H018 Source, transmit word 4 PTP 1018d / 03FAh Selects the fourth word in the transmitted PTP telegram Refer to H015 for settings Block diagr.14 FP-IQ2Z.TPTP4.NC SIMADYN D:O2 PKW:O2	1	0 ... 99	15
H019 Source, transmit word 5 PTP 1019d / 03FBh Selects the fifth word in the transmitted PTP telegram Refer to H015 for settings Block diagr.14 FP-IQ2Z.TPTP5.NC SIMADYN D:O2 PKW:O2	1	0 ... 99	15
H020 Source, control word PTP 1020d / 03FCh Selects a receive word as control word PTP. If a control word is not sent, then the factory setting of 5 must be kept. 0 = Receive word 1 PTP 1 = Receive word 2 PTP 2 = Receive word 3 PTP 3 = Receive word 4 PTP 4 = Receive word 5 PTP 5 = 0H6 6 = 0 7 = 0 Block diagr.14 FP-IQ1Z.STWPTP.XCS SIMADYN D:O2 PKW:O2	1	0 ... 7	5

H021 Source, system start 1021d / 03FDh Selects the source for the system start command 0 = Binary input X6, terminal 601 1 = Control word 1.3 from the CB 2 = Control word 1.3 from the CU 3 = Control word 1.3 from the PTP 4 = Fixed value 1 5 = Fixed value 0 Block diagr.17 FP-IQ1Z.B10.XCS SIMADYN D:O2 PKW:O2	1	0 ... 5	0
H022 Source, tension controller on 1022d / 03Feh Selects the source for the tension controller on command 0 = Binary input X6, terminal 602 1 = Control word 1.11 from the CB 2 = Control word 1.11 from the CU 3 = Control word 1.11 from the PTP 4 = Fixed value 1 5 = Fixed value 0 6 = Splicing logic and binary input X6, terminal 602 7 = Splicing logic and control word 1.11 from the CB Block diagr.17 FP-IQ1Z.B11.XCS SIMADYN D:O2 PKW:O2	1	0 ... 7	0
H023 Source, inhibit tension controller 1023d / 03FFh Selects the source for the inhibit tension controller command 0 = Binary input X6, terminal 603 1 = Control word 1.12 from the CB 2 = Control word 1.12 from the CU 3 = Control word 1.12 from the PTP 4 = Fixed value 1 5 = Fixed value 0 Block diagr.17 FP-IQ1Z.B12.XCS SIMADYN D:O2 PKW:O2	1	0 ... 5	0
H024 Source, set diameter 1024d / 0400h Selects the source for the set diameter command 0 = Binary input X6, terminal 604 1 = Control word 1.14 from the CB 2 = Control word 1.14 from the CU 3 = Control word 1.14 from the PTP 4 = Fixed value 1 5 = Fixed value 0 Block diagr.17 FP-IQ1Z.B13.XCS SIMADYN D:O2 PKW:O2	1	0 ... 5	0
H025 Source, supplementary setpoint injection 1025d / 0401h Selects the source for the supplementary setpoint injection command 0 = Binary input X6, terminal 605 1 = Control word 2.0 from the CB 2 = Control word 2.0 from the CU 3 = Fixed value 0 4 = Fixed value 1 5 = Fixed value 0 Block diagr.17 FP-IQ1Z.B14.XCS SIMADYN D:O2 PKW:O2	1	0 ... 5	0
H026 Source, local positioning 1026d / 0402h Selects the source for the local positioning command 0 = Binary input X6, terminal 606 1 = Control word 2.1 from the CB 2 = Control word 2.1 from the CU 3 = Fixed value 0 4 = Fixed value 1 5 = Fixed value 0 Block diagr.17 FP-IQ1Z.B15.XCS SIMADYN D:O2 PKW:O2	1	0 ... 5	0

H027 Source, local operator control 1027d / 0403h Selects the source for the local operator control command 0 = Binary input X6, terminal 607 1 = Control word 2.4 from the CB 2 = Control word 2.4 from the CU 3 = Fixed value 0 4 = Fixed value 1 5 = Fixed value 0 Block diagr.17 FP-IQ1Z.B16.XCS SIMADYN D:O2 PKW:O2	1	0 ... 5	0
H028 Source, local stop 1028d / 0404h Selects the source for the local stop command 0 = Binary input X6, terminal 608 1 = Control word 2.5 from the CB 2 = Control word 2.5 from the CU 3 = Binary input X6, terminal 608, inverted 4 = Fixed value 1 5 = Fixed value 0 Block diagr.17 FP-IQ1Z.B17.XCS SIMADYN D:O2 PKW:O2	1	0 ... 5	0
H029 Source, raise motorized potentiometer 2 1029d / 0405h Selects the source for the raise motorized potentiometer 2 command 0 = Binary input X6, terminal 611 1 = Binary input X6, terminal 612 2 = Binary input X6, terminal 613 3 = Binary input X6, terminal 614 4 = Binary input X6, terminal 615 5 = Binary input X6, terminal 616 6 = Binary input X6, terminal 617 7 = Binary input X6, terminal 618 8 = Fixed value 1 9 = Fixed value 0 10 = Control word 2.2 from the CB 11 = Control word 2.2 from the CU 12 = Fixed value 0 Block diagr.16 FP-IQ1Z.B20.XCS SIMADYN D:O2 PKW:O2	1	0-12	9
H030 Source, raise motorized potentiometer 1 1030d / 0406h Selects the source for the raise motorized potentiometer 1 command 0 = Binary input X6, terminal 611 1 = Binary input X6, terminal 612 2 = Binary input X6, terminal 613 3 = Binary input X6, terminal 614 4 = Binary input X6, terminal 615 5 = Binary input X6, terminal 616 6 = Binary input X6, terminal 617 7 = Binary input X6, terminal 618 8 = Fixed value 1 9 = Fixed value 0 10 = Control word 2.10 from the CB 11 = Control word 2.10 from the CU 12 = Fixed value 0 Block diagr.16 FP-IQ1Z.B40.XCS SIMADYN D:O2 PKW:O2	1	0-12	9

H031 Source, lower motorized potentiometer 2 1031d / 0407h Selects the source for the lower motorized potentiometer 2 command 0 = Binary input X6, terminal 611 1 = Binary input X6, terminal 612 2 = Binary input X6, terminal 613 3 = Binary input X6, terminal 614 4 = Binary input X6, terminal 615 5 = Binary input X6, terminal 616 6 = Binary input X6, terminal 617 7 = Binary input X6, terminal 618 8 = Fixed value 1 9 = Fixed value 0 10 = Control word 2.3 from the CB 11 = Control word 2.3 from the CU 12 = Fixed value 0 Block diagr.16 FP-IQ1Z.B30.XCS SIMADYN D:O2 PKW:O2	1	0-12	9
H032 Source, lower motorized potentiometer 1 1032d / 0408h Selects the source for the lower motorized potentiometer1 command 0 = Binary input X6, terminal 611 1 = Binary input X6, terminal 612 2 = Binary input X6, terminal 613 3 = Binary input X6, terminal 614 4 = Binary input X6, terminal 615 5 = Binary input X6, terminal 616 6 = Binary input X6, terminal 617 7 = Binary input X6, terminal 618 8 = Fixed value 1 9 = Fixed value 0 10 = Control word 2.11 from the CB 11 = Control word 2.11 from the CU 12 = Fixed value 0 Block diagr.16 FP-IQ1Z.B50.XCS SIMADYN D:O2 PKW:O2	1	0-12	9
H033 Source, hold diameter 1033d / 0409h Selects the source for the hold diameter command 0 = Binary input X6, terminal 611 1 = Binary input X6, terminal 612 2 = Binary input X6, terminal 613 3 = Binary input X6, terminal 614 4 = Binary input X6, terminal 615 5 = Binary input X6, terminal 616 6 = Binary input X6, terminal 617 7 = Binary input X6, terminal 618 8 = Fixed value 1 9 = Fixed value 0 10 = Control word 1.15 from the CB 11 = Control word 1.15 from the CU 12 = Control word 1.15 from the PTP Block diagr.16 FP-IQ1Z.B60.XCS SIMADYN D:O2 PKW:O2	1	0-12	9

H034 Source, stop speed setpoint setting 1034d / 040Ah Selects the source for the stop speed setpoint setting command 0 = Binary input X6, terminal 611 1 = Binary input X6, terminal 612 2 = Binary input X6, terminal 613 3 = Binary input X6, terminal 614 4 = Binary input X6, terminal 615 5 = Binary input X6, terminal 616 6 = Binary input X6, terminal 617 7 = Binary input X6, terminal 618 8 = Fixed value 1 9 = Fixed value 0 10 = Control word 2.9 from the CB 11 = Control word 2.9 from the CU 12 = Fixed value 0 Block diagr.16 FP-IQ1Z.B80.XCS SIMADYN D:O2 PKW:O2	1	0-12	9
H035 Source, winding from below 1035d / 040Bh Selects the source for the winding from below command 0 = Binary input X6, terminal 611 1 = Binary input X6, terminal 612 2 = Binary input X6, terminal 613 3 = Binary input X6, terminal 614 4 = Binary input X6, terminal 615 5 = Binary input X6, terminal 616 6 = Binary input X6, terminal 617 7 = Binary input X6, terminal 618 8 = Fixed value 1 9 = Fixed value 0 10 = Control word 2.13 from the CB 11 = Control word 2.13 from the CU 12 = Fixed value 0 Block diagr.16 FP-IQ1Z.B70.XCS SIMADYN D:O2 PKW:O2	1	0-12	9
H036 Source, accept setpoint A 1036d / 040Ch Selects the source for the accept setpoint A command 0 = Binary input X6, terminal 611 1 = Binary input X6, terminal 612 2 = Binary input X6, terminal 613 3 = Binary input X6, terminal 614 4 = Binary input X6, terminal 615 5 = Binary input X6, terminal 616 6 = Binary input X6, terminal 617 7 = Binary input X6, terminal 618 8 = Fixed value 1 9 = Fixed value 0 10 = H251 Block diagr.16 FP-IQ1Z.B90.XCS SIMADYN D:O2 PKW:O2	1	0-10	9

H037 Source, accept setpoint B 1037d / 040Dh Selects the source for the accept setpoint B command 0 = Binary input X6, terminal 611 1 = Binary input X6, terminal 612 2 = Binary input X6, terminal 613 3 = Binary input X6, terminal 614 4 = Binary input X6, terminal 615 5 = Binary input X6, terminal 616 6 = Binary input X6, terminal 617 7 = Binary input X6, terminal 618 8 = Fixed value 1 9 = Fixed value 0 10 = H252 Block diagr.16 FP-IQ1Z.B100.XCS SIMADYN D:O2 PKW:O2	1	0-10	9
H038 Source, local inching forwards 1038d / 040Eh Selects the source for the local inching forwards command 0 = Binary input X6, terminal 611 1 = Binary input X6, terminal 612 2 = Binary input X6, terminal 613 3 = Binary input X6, terminal 614 4 = Binary input X6, terminal 615 5 = Binary input X6, terminal 616 6 = Binary input X6, terminal 617 7 = Binary input X6, terminal 618 8 = Fixed value 1 9 = Fixed value 0 10 = Control word 1.8 from the CB 11 = Control word 1.8 from the CU 12 = Control word 1.8 from the PTP Block diagr.16 FP-IQ1Z.B120.XCS SIMADYN D:O2 PKW:O2	1	0-12	9
H039 Source, local crawl 1039d / 040Fh Selects the source for the local crawl command 0 = Binary input X6, terminal 611 1 = Binary input X6, terminal 612 2 = Binary input X6, terminal 613 3 = Binary input X6, terminal 614 4 = Binary input X6, terminal 615 5 = Binary input X6, terminal 616 6 = Binary input X6, terminal 617 7 = Binary input X6, terminal 618 8 = Fixed value 1 9 = Fixed value 0 10 = Control word 2.7 from the CB 11 = Control word 2.7 from the CU 12 = Fixed value 0 Block diagr.16 FP-IQ1Z.B110.XCS SIMADYN D:O2 PKW:O2	1	0-12	9

H040 Source, local inching reverse 1040d / 0410h Selects the source for the local inching reverse command 0 = Binary input X6, terminal 611 1 = Binary input X6, terminal 612 2 = Binary input X6, terminal 613 3 = Binary input X6, terminal 614 4 = Binary input X6, terminal 615 5 = Binary input X6, terminal 616 6 = Binary input X6, terminal 617 7 = Binary input X6, terminal 618 8 = Fixed value 1 9 = Fixed value 0 10 = Control word 1.9 from the CB 11 = Control word 1.9 from the CU 12 = Control word 1.9 from the PTP Block diagr.16 FP-IQ1Z.B130.XCS SIMADYN D:O2 PKW:O2	1	0-12	9
H041 Source, manouvering 1041d / 0411h Selects the source for the manouver command 0 = Binary input X6, terminal 611 1 = Binary input X6, terminal 612 2 = Binary input X6, terminal 613 3 = Binary input X6, terminal 614 4 = Binary input X6, terminal 615 5 = Binary input X6, terminal 616 6 = Binary input X6, terminal 617 7 = Binary input X6, terminal 618 8 = Fixed value 1 9 = Fixed value 0 10 = Control word 2.8 from the CB 11 = Control word 2.8 from the CU 12 = Tension control on Block diagr.16 FP-IQ1Z.B140.XCS SIMADYN D:O2 PKW:O2	1	0-12	9
H042 Source, gearbox stage 2 1042d / 0412h Selects the source for changing over to gearbox stage 2 0 = Binary input X6, terminal 611 1 = Binary input X6, terminal 612 2 = Binary input X6, terminal 613 3 = Binary input X6, terminal 614 4 = Binary input X6, terminal 615 5 = Binary input X6, terminal 616 6 = Binary input X6, terminal 617 7 = Binary input X6, terminal 618 8 = Fixed value 1 9 = Fixed value 0 10 = H253 Block diagr.16 FP-IQ1Z.B160.XCS SIMADYN D:O2 PKW:1	1	0-10	9

H043 Source, winder 1043d / 0413h Selects the source for the winder command 0 = Binary input X6, terminal 611 1 = Binary input X6, terminal 612 2 = Binary input X6, terminal 613 3 = Binary input X6, terminal 614 4 = Binary input X6, terminal 615 5 = Binary input X6, terminal 616 6 = Binary input X6, terminal 617 7 = Binary input X6, terminal 618 8 = Fixed value 1 9 = Fixed value 0 10 = H254 Block diagr.16 FP-IQ1Z.B150.XCS SIMADYN D:O2 PKW:O2	1	0-10	9
H044 Source, bias setpoint polarity 1044d / 0414h Selects the source to change over the polarity of the bias setpoint 0 = Binary input X6, terminal 611 1 = Binary input X6, terminal 612 2 = Binary input X6, terminal 613 3 = Binary input X6, terminal 614 4 = Binary input X6, terminal 615 5 = Binary input X6, terminal 616 6 = Binary input X6, terminal 617 7 = Binary input X6, terminal 618 8 = Fixed value 1 9 = Fixed value 0 10 = H255 Block diagr.16 FP-IQ1Z.B170.XCS SIMADYN D:O2 PKW:O2	1	0-10	9
H045 Source, off1/on 1045d / 0415h Selects the source for the switch-on command for system operation 0 = Binary input X6, terminal 611 1 = Binary input X6, terminal 612 2 = Binary input X6, terminal 613 3 = Binary input X6, terminal 614 4 = Binary input X6, terminal 615 5 = Binary input X6, terminal 616 6 = Binary input X6, terminal 617 7 = Binary input X6, terminal 618 8 = Fixed value 1 9 = Fixed value 0 10 = Control word 1.0 from the CB 11 = Control word 1.0 from the CU 12 = Control word 1.0 from the PTP Block diagr.17 FP-IQ1Z.B180.XCS SIMADYN D:O2 PKW:O2	1	0-12	9

H046 Source, inhibit ramp-function generator 1046d / 0416h Selects the source for the inhibit ramp-function generator command 0 = Binary input X6, terminal 611 1 = Binary input X6, terminal 612 2 = Binary input X6, terminal 613 3 = Binary input X6, terminal 614 4 = Binary input X6, terminal 615 5 = Binary input X6, terminal 616 6 = Binary input X6, terminal 617 7 = Binary input X6, terminal 618 8 = Fixed value 1 9 = Fixed value 0 10 = Control word 1.4 from the CB 11 = Control word 1.4 from the CU 12 = Control word 1.4 from the PTP Block diagr.17 FP-IQ1Z.B201.XCS SIMADYN D:O2 PKW:O2	1	0-12	9
H047 Source, off2 1047d / 0417h Selects the source for the off2 command; this command is always effective from every source, it is low active 0 = Binary input X6, terminal 611 1 = Binary input X6, terminal 612 2 = Binary input X6, terminal 613 3 = Binary input X6, terminal 614 4 = Binary input X6, terminal 615 5 = Binary input X6, terminal 616 6 = Binary input X6, terminal 617 7 = Binary input X6, terminal 618 8 = Fixed value 1 9 = Fixed value 0 10 = Control word 1.1 from the CU Block diagr.17 FP-IQ1Z.B190.XCS SIMADYN D:O2 PKW:O2	1	0-10	8
H048 Source, off3 1048d / 0418h Selects the source for the off3 command (fast stop). This command is always effective from every source, it is low active 0 = Binary input X6, terminal 611 1 = Binary input X6, terminal 612 2 = Binary input X6, terminal 613 3 = Binary input X6, terminal 614 4 = Binary input X6, terminal 615 5 = Binary input X6, terminal 616 6 = Binary input X6, terminal 617 7 = Binary input X6, terminal 618 8 = Fixed value 1 9 = Fixed value 0 10 = Control word 1.1 from the CU Block diagr.17 FP-IQ1Z.B200.XCS SIMADYN D:O2 PKW:1	1	0-10	8

H049 Source, ramp-function generator stop 1049d / 0419h Selects the source for the ramp-function generator stop 0 = Binary input X6, terminal 611 1 = Binary input X6, terminal 612 2 = Binary input X6, terminal 613 3 = Binary input X6, terminal 614 4 = Binary input X6, terminal 615 5 = Binary input X6, terminal 616 6 = Binary input X6, terminal 617 7 = Binary input X6, terminal 618 8 = Fixed value 1 9 = Fixed value 0 10 = Control word 1.5 from the CB 11 = Control word 1.5 from the CU 12 = Control word 1.5 from the PTP Block diagr.17 FP-IQ1Z.B202.XCS SIMADYN D:O2 PKW:O2	1	0-12	9
H050 Source, enable setpoint 1050d / 041Ah Selects the source to enable the web speed setpoint 0 = Binary input X6, terminal 611 1 = Binary input X6, terminal 612 2 = Binary input X6, terminal 613 3 = Binary input X6, terminal 614 4 = Binary input X6, terminal 615 5 = Binary input X6, terminal 616 6 = Binary input X6, terminal 617 7 = Binary input X6, terminal 618 8 = Fixed value 1 9 = Fixed value 0 10 = Control word 1.6 from the CB 11 = Control word 1.6 from the CU 12 = Control word 1.6 from the PTP Block diagr.17 FP-IQ1Z.B203.XCS SIMADYN D:O2 PKW:O2	1	0-12	9
H051 Source, standstill tension on 1051d / 041Bh Selects the source to inject the standstill tension 0 = Binary input X6, terminal 611 1 = Binary input X6, terminal 612 2 = Binary input X6, terminal 613 3 = Binary input X6, terminal 614 4 = Binary input X6, terminal 615 5 = Binary input X6, terminal 616 6 = Binary input X6, terminal 617 7 = Binary input X6, terminal 618 8 = Fixed value 1 9 = Fixed value 0 10 = Control word 1.13 from the CB 11 = Control word 1.13 from the CU 12 = Control word 1.13 from the PTP Block diagr.17 FP-IQ1Z.B204.XCS SIMADYN D:O2 PKW:O2	1	0-12	9

H052 Source, local run 1052d / 041Ch Selects the source for power-up with the local setpoint 0 = Binary input X6, terminal 611 1 = Binary input X6, terminal 612 2 = Binary input X6, terminal 613 3 = Binary input X6, terminal 614 4 = Binary input X6, terminal 615 5 = Binary input X6, terminal 616 6 = Binary input X6, terminal 617 7 = Binary input X6, terminal 618 8 = Fixed value 1 9 = Fixed value 0 10 = Control word 2.6 from the CB 11 = Control word 2.6 from the CU 12 = Fixed value 0 Block diagr.17 FP-IQ1Z.B205.XCS SIMADYN D:O2 PKW:O2	1	0-12	9
H053 Source, reset length computer 1053d / 041Dh Selects the source to reset the web length computer 0 = Binary input X6, terminal 611 1 = Binary input X6, terminal 612 2 = Binary input X6, terminal 613 3 = Binary input X6, terminal 614 4 = Binary input X6, terminal 615 5 = Binary input X6, terminal 616 6 = Binary input X6, terminal 617 7 = Binary input X6, terminal 618 8 = Fixed value 1 9 = Fixed value 0 10 = Control word 2.12 from the CB 11 = Control word 2.12 from the CU 12 = Fixed value 0 Block diagr.17 FP-IQ1Z.B206.XCS SIMADYN D:O2 PKW:O2	1	0-12	9

Parameterization of the analog inputs:
Input range: +/-10V, 5V = 100%

H054 Adaption, analog input 1 1054d / 041Eh Adaption factor for analog input 1, X5 terminals 501/502 Block diagr.10 FP-IQ1Z.AI15.X2 SIMADYN D:N2 PKW:I4	0,006%	-200,000%... 199,993%	50%
H055 Offset, analog input 1 1055d / 041Fh Offset for analog input 1, X5 terminals 501/502, the offset is added after adaption Block diagr.10 FP-IQ1Z.AI20.X2 SIMADYN D:N2 PKW:I4	0,006%	-200,000%... 199,993%	0%
H056 Adaption, analog input 2 1056d / 0420h Adaption factor for analog input 2, X5 terminals 503/504 Block diagr.10 FP-IQ1Z.AI30.X2 SIMADYN D:N2 PKW:I4	0,006%	-200,000%... 199,993%	50%
H057 Offset, analog input 2 1057d / 0421h Offset for analog input 2, X5 terminals 503/504, the offset is added after adaption Block diagr.10 FP-IQ1Z.AI35.X2 SIMADYN D:N2 PKW:I4	0,006%	-200,000%... 199,993%	0%
H058 Adaption, analog input 3 1058d / 0422h Adaption factor for analog input 3, X5 terminals 505/506 Block diagr.10 FP-IQ1Z.AI45.X2 SIMADYN D:N2 PKW:I4	0,006%	-200,000%... 199,993%	50%
H059 Offset, analog input 3 1059d / 0423h Offset for analog input 3, X5 terminals 505/506, the offset is added after adaption Block diagr.10 FP-IQ1Z.AI50.X2 SIMADYN D:N2 PKW:I4	0,006%	-200,000%... 199,993%	0%
H060 Adaption, analog input 4 1060d / 0424h Adaption factor for analog input 4, X5 terminals 507/508 Block diagr.10 FP-IQ1Z.AI60.X2 SIMADYN D:N2 PKW:I4	0,006%	-200,000%... 199,993%	50%
H061 Offset, analog input 4 1061d / 0425h Offset for analog input 4, X5 terminals 507/508, the offset is added after adaption Block diagr.10 FP-IQ1Z.AI65.X2 SIMADYN D:N2 PKW:I4	0,006%	-200,000%... 199,993%	0%
H062 Adaption, analog input 5 1062d / 0426h Adaption factor for analog input 5, X5 terminals 511/512 Block diagr.10 FP-IQ1Z.AI75.X2 SIMADYN D:N2 PKW:I4	0,006%	-200,000%... 199,993%	50%
H063 Offset, analog input 5 1063d / 0427h Offset for analog input 5, X5 terminals 511/512, the offset is added after adaption Block diagr.10 FP-IQ1Z.AI80.X2 SIMADYN D:N2 PKW:I4	0,006%	-200,000%... 199,993%	0%
H064 Adaption, analog input 6 1064d / 0428h Adaption factor for analog input 6, X5 terminals 513/514 Block diagr.10 FP-IQ1Z.AI90.X2 SIMADYN D:N2 PKW:I4	0,006%	-200,000%... 199,993%	50%

H065 **Offset, analog input 6** 1065d0 / 429h Offset for analog input 6, X5 terminals 513/514, the offset is added after adaption Block diagr.10 FP-IQ1Z.AI95.X2 SIMADYN D:N2 PKW:I4	0,006%	-200,000%... 199,993%	0%
H066 **Adaption, analog input 7** 1066d / 042Ah Adaption factor for analog input 7, X5 terminals 515/516 Block diagr.10 FP-IQ1Z.AI105.X2 SIMADYN D:N2 PKW:I4	0,006%	-200,000%... 199,993%	50%
H067 **Offset, analog input 7** 1067d / 042Bh Offset for analog input 7, X5 terminals 515/516, the offset is added after adaption Block diagr.10 FP-IQ1Z.AI110.X2 SIMADYN D:N2 PKW:I4	0,006%	-200,000%... 199,993%	0%

Selecting the sources for setpoints/actual values:

H068 Line speed setpoint 1068d / 042Ch Enters a fixed value as technological parameter Block diagr.11 FP-IQ1Z.AI200.X11 SIMADYN D:O2 PKW:O2	0,006%	-200,000%... 199,993%	0%
H069 Source, web speed setpoint 1069d / 042Dh Selects the source for the web speed setpoint 0 = Analog input 1, X5 terminals 501/502 1 = Analog input 2, X5 terminals 503/504 2 = Analog input 3, X5 terminals 505/506 3 = Analog input 4, X5 terminals 507/508 4 = Analog input 5, X5 terminals 511/512 5 = Analog input 6, X5 terminals 513/514 6 = Analog input 7, X5 terminals 515/516 7 = Setpoint 1 from the CB 8 = Setpoint 2 from the CB 9 = Setpoint 3 from the CB 11 = Setpoint 5 from the CB 12 = Setpoint 6 from the CB 13 = Setpoint 1 from the CU 14 = Setpoint 2 from the CU 15 = Setpoint 3 from the CU 16 = Setpoint 4 from the CU 17 = Setpoint 5 from the CU 18 = Setpoint 6 from the CU 19 = Receive word 1 from the PTP 20 = Receive word 2 from the PTP 21 = Receive word 3 from the PTP 22 = Receive word 4 from the PTP 23 = Receive word 5 from the PTP 24 = Select value 1 from the CU 25 = Select value 2 from the CU 26 = Motorized potentiometer 1 27 = Motorized potentiometer 2 28 = Digital web tachometer 29 = 0% 30 = 0% 31 = H068 Block diagr.11 FP-IQ1Z.AI200.XCS SIMADYN D:O2 PKW:O2	1	0 ... 31	31
H070 Web speed compensation 1070d / 042Eh Enters a fixed value as technological parameter Block diagr.11 FP-IQ1Z.AI210.X11 SIMADYN D:N2 PKW:I4	0,006%	-200,000%... 199,993%	0%
H071 Source, web speed compensation 1071d / 042Fh Selects the source for the compensation setpoint, settings 0 - 27, refer to H069 28-30 = 0% 31 = H070 Block diagr.11 FP-IQ1Z.AI210.XCS SIMADYN D:O2 PKW:O2	1	0 ... 31	31
H072 Supplementary web speed setpoint 1072d / 0430h Enters a fixed value as technological parameter Block diagr.11 FP-IQ1Z.AI220.X11 SIMADYN D:N2 PKW:I4	0,006%	-200,000%... 199,993%	0%

H073 Source, supplementary web speed setpoint 1073d / 0431h Selects the source for the supplementary web speed setpoint, settings 0 - 27, refer to H069 28-30 = 0% 31 = H072 Block diagr.11 FP-IQ1Z.AI220.XCS SIMADYN D:O2 PKW:O2	1	0 ... 31	31
H074 Setpoint, local operation 1074d / 0432h Enters a fixed value as technological parameter Block diagr.11 FP-IQ1Z.AI230.X11 SIMADYN D:N2 PKW:I4	0,006%	-200,000%... 199,993%	0%
H075 Source, setpoint local operation 1075d / 0433h Selects the source for the setpoint in local operation, settings 0 - 27, refer to H069 28-30 = 0% 31 = H074 Block diagr.11 FP-IQ1Z.AI230.XCS SIMADYN D:O2 PKW:O2	1	0 ... 31	31
H076 External dv/dt 1076d / 0434h Enters a fixed value as technological parameter Block diagr.11 FP-IQ1Z.AI240.X11 SIMADYN D:N2 PKW:I4	0,006%	-200,000%... 199,993%	0%
H077 Source, external dv/dt 1077d / 0435h Selects the source for the external acceleration value, settings 0 - 27, refer to H069 28-30 = 0% 31 = H076 Block diagr.11 FP-IQ1Z.AI240.XCS SIMADYN D:O2 PKW:O2	1	0 ... 31	31
H078 Web width 1078d / 0436h Enters a fixed value as technological parameter Block diagr.11 FP-IQ1Z.AI250.X11 SIMADYN D:N2 PKW:I4	0,006%	-200,000%... 199,993%	100,000%
H079 Source, web width 1079d / 0437h Selects the source for the web width, settings 0 - 27, refer to H069 28-30 = 0% 31 = H078 Block diagr.11 FP-IQ1Z.AI250.XCS SIMADYN D:O2 PKW:O2	1	0 ... 31	31
H080 Tension setpoint 1080d / 0438h Enters a fixed value as technological parameter Block diagr.12 FP-IQ1Z.AI260.X11 SIMADYN D:N2 PKW:I4	0,006%	-200,000%... 199,993%	0%
H081 Source, tension setpoint 1081d / 0439h Selects the source for the tension/position setpoint, settings 0 - 27, refer to H069 28-30 = 0% 31 = H080 Block diagr.12 FP-IQ1Z.AI260.XCS SIMADYN D:O2 PKW:O2	1	0 ... 31	31
H082 Supplementary tension setpoint 1082d / 043Ah Enters a fixed value as technological parameter Block diagr.12 FP-IQ1Z.AI270.X11 SIMADYN D:N2 PKW:I4	0,006%	-200,000%... 199,993%	0%

H083 Source, supplementary tension setpoint 1083d / 043Bh Selects the source for the supplementary tension/position setpoint, settings 0 - 27, refer to H069 28-30 = 0% 31 = H082 Block diagr.12 FP-IQ1Z.AI270.XCS SIMADYN D:O2 PKW:O2	1	0 ... 31	31
H084 Tension actual value 1084d / 043Ch Enters a fixed value as technological parameter Block diagr.12 FP-IQ1Z.AI280.X11 SIMADYN D:N2 PKW:I4	0,006%	-200,000%... 199,993%	0%
H085 Source, tension actual value 1085d / 043Dh Selects the source for the tension/position actual value, settings 0 - 27, refer to H069 28-30 = 0% 31 = H084 Block diagr.12 FP-IQ1Z.AI280.XCS SIMADYN D:O2 PKW:O2	1	0 ... 31	31
H086 Max. tension reduction 1086d / 043Eh Enters a fixed value as technological parameter Block diagr.12 FP-IQ1Z.AI290.X11 SIMADYN D:N2 PKW:I4	0,006%	-200,000%... 199,993%	0%
H087 Source, max. tension reduction 1087d / 043Fh Selects the source for the supplementary tension/position setpoint. Settings 0 - 27, refer to H069 28-30 = 0% 31 = H086 Block diagr.12 FP-IQ1Z.AI290.XCS SIMADYN D:O2 PKW:O2	1	0 ... 31	31
H088 Diameter setting value 1088d / 0440h Enters a fixed value as technological parameter Block diagr.12 FP-IQ1Z.AI300.X11 SIMADYN D:N2 PKW:I4	0,006%	-200,000%... 199,993%	10%
H089 Source, diameter setting value 1089d / 0441h Selects the source for the diameter setting value. Settings 0 - 27, refer to H069 28 = Core diameter 29 = 0% 30 = 0% 31 = H088 Block diagr.12 FP-IQ1Z.AI300.XCS SIMADYN D:O2 PKW:O2	1	0 ... 31	31
H090 Positioning reference value 1090d / 0442h Enters a fixed value as technological parameter Block diagr.12 FP-IQ1Z.AI310.X11 SIMADYN D:N2 PKW:I4	0,006%	-200,000%... 199,993%	0%
H091 Source, positioning reference value 1091d / 0443h Selects the source for the setpoint for the local positioning operating mode. Settings 0 - 27, refer to H069 28-30 = 0% 31 = H090 Block diagr.12 FP-IQ1Z.AI310.XCS SIMADYN D:O2 PKW:O2	1	0 ... 31	31

H092 Source, speed actual value 1092d / 0444h Selects the source for the speed actual value 0 = Analog input 1, X5 terminals 501/502 1 = Analog input 2, X5 terminals 503/504 2 = Analog input 3, X5 terminals 505/506 3 = Analog input 4, X5 terminals 507/508 4 = Analog input 5, X5 terminals 511/512 5 = Analog input 6, X5 terminals 513/514 6 = Analog input 7, X5 terminals 515/516 7 = Speed actual value CU 8 = Speed actual value from the T300 digital tachometer 9 = 0% Block diagr.13 FP-IQ1Z.AI320.XCS SIMADYN D:O2 PKW:O2	1	0 ... 9	8
H093 Source, web speed actual value, tachometer 1093d / 0445h Selects the source for a tachometer web speed actual value; it becomes active with the bit selected by H013 and becomes effective for the diameter calculation instead of the value selected by H094. Settings 0 - 25, refer to H069 26 = Digital web tachometer at T300 27-31= 0% Block diagr.13 FP-IQ1Z.AI329.XCS SIMADYN D:O2 PKW:O2	1	0 ... 31	26
H094 Source, external web speed actual value 1094d / 0446h Selects the source for a web speed actual value; it must activated with H211=1. Settings 0 - 27, refer to H069 28 = Digital web tachometer at T300 29 = Setpoint after the ramp-function generator 30 = 0% 31 = 0% Block diagr.13 FP-IQ1Z.AI330.XCS SIMADYN D:O2 PKW:O2	1	0 ... 31	29
H095 Setpoint A 1095d / 0447h Enters a fixed value as technological parameter Block diagr.13 FP-IQ1Z.AI340.X11 SIMADYN D:N2 PKW:I4	0,006%	-200,000%... 199,993%	0%
H096 Source, setpoint A 1096d / 0448h Selects the source for setpoint A. Settings 0 - 27, refer to H069 28-30 = 0% 31 = H095 Block diagr.13 FP-IQ1Z.AI340.XCS SIMADYN D:O2 PKW:O2.	1	0 ... 31	31

Parameterization of the analog outputs:
Output range, +/-10V, 5V = 100%

H097 Analog output 1, speed actual value offset 1097d / 0449h Offset analog output 1, X5 terminal 609/610 = speed actual value The parameter value is subtracted. Block diagr.10 FP-IQ1Z.AQ50.OFF SIMADYN D:N2 PKW:I4	0,006%	-200,000%... 199,993%	0%
H098 Analog output 1, speed actual value gain 1098d / 044Ah Gain after subtracting the offset Block diagr.10 FP-IQ1Z.AQ50.K SIMADYN D:E2 PKW:I4	0,007	0...±255,9	2
H099 Analog output 2, diameter actual value offset 1099d / 044Bh Offset analog output 2, X5 terminal 619/620 = diameter actual value The parameter value is subtracted. Block diagr.10 FP-IQ1Z.AQ80.OFF SIMADYN D:N2 PKW:I4	0,006%	-200,000%... 199,993%	0%
H100 Analog output 2, diameter actual value gain 1100d / 044Ch Gain after subtracting the offset Block diagr.10 FP-IQ1Z.AQ80.K SIMADYN D:E2 PKW:I4	0,007	0. ..±255,9	2
H101 Analog output 3, offset 1101d / 044Dh Offset analog output 3, X5 terminal 621/622 = select value, can be parameterized via H127. The parameter value is subtracted. Block diagr.10 FP-IQ1Z.AQ110.OFF SIMADYN D:N2 PKW:I4	0,006%	-200,000%... 199,993%	0%
H102 Analog output 3, gain 1102d / 044Eh Gain after subtracting the offset Block gr.10 FP-IQ1Z.AQ110.K SIMADYN D:E2 PKW:I4	0,007	0. ..±255,9	2
H103 Analog output 4, offset 1103d / 044Fh Offset analog output 4, X5 terminal 623/624 = select value, can be parameterized via H128. The parameter value is subtracted. Block diagr.10 FP-IQ1Z.AQ140.OFF SIMADYN D:N2 PKW:I4	0,006%	-200,000%... 199,993%	0%
H104 Analog output 4, gain 1104d / 0450h Gain after subtracting the offset Block diagr.10 FP-IQ1Z.AQ140.K SIMADYN D:E2 PKW:I4	0,007	0. ..±255,9	2

H105 Source, select value, analog output 3 1105d / 0451h Selects the monitoring parameters, which are to be output at X5, terminal 21/22 0 = Effective web speed setpoint d301 1 = Actual dv/dt d302 2 = Speed setpoint d303 3 = Sum, tension/position reference value d304 4 = Output, motorized potentiometer 1 d305 5 = Output, motorized potentiometer 2 d306 6 = Speed actual value d307 7 = Variable moment of inertia d308 8 = Actual web length d309 9 = Actual diameter d310 10 = Tension actual value, smoothed d311 11 = Pre-control torque d312 12 = Output, closed-loop tension control d313 13 = Pre-control torque, friction compensation d314 14 = Free for expansion d315 15 = Pre-control torque, inertia compensation d316 16 = Sum, tension actual value d317 17 = Tension actual value, D component d318 18 = Tension controller output d319 19 = Analog input 1, X5 terminals 501/502 d320 20 = Analog input 2, X5 terminals 503/504 d321 21 = Analog input 3, X5 terminals 505/506 d322 22 = Analog input 4, X5 terminals 507/508 d323 23 = Analog input 5, X5 terminals 511/512 d324 24 = Analog input 6, X5 terminals 513/514 d325 25 = Analog input 7, X5 terminals 515/516 d326 26 = External web speed actual value d327 27 = Tension setp. after the winding hardness char. d328 28 = Torque actual value d330 29 = Torque setpoint, smoothed d331 30 = Select value 1 from the CU 31 = Select value 2 from the CU 32 = Factor, automatic thickness correction d339 33 = Calculated layer thickness d349 Block diagr.10 FP-IQ2Z.AQ10.NC SIMADYN D:O2 PKW:O2	1	0 ... 99	0
H106 Source, select value, analog output 4 1106d / 0452h Selects the monitoring parameter which is to be output at X5, terminal 23/24 0 - 31 Settings, refer to H105 Block diagr.10 FP-IQ2Z.AQ20.NC SIMADYN D:O2 PKW:O2	1	0 ... 99	0

Limit value monitor 1:
Binary output X6, terminal 637

H107 **Source, input value** 1107d / 0453h Selects the input signal for limit value monitor 1 0 = Effective web speed setpoint d301 1 = Actual dv/dt d302 2 = Speed setpoint d303 3 = Sum, tension/position reference value d304 4 = Output, motorized potentiometer 1 d305 5 = Output, motorized potentiometer 2 d306 6 = Speed actual value d307 7 = Variable moment of inertia d308 8 = Actual web length d309 9 = Actual diameter d310 10 = Tension actual value, smoothed d311 11 = Pre-control torque d312 12 = Output, closed-loop tension control d313 13 = Pre-control torque, friction compensation d314 14 = Free for expansion d315 15 = Pre-control torque, inertia compensation. d316 16 = Sum, tension actual value d317 17 = Tension actual value, D component d318 18 = Tension controller output d319 19 = Analog input 1, X5 terminals 501/502 d320 20 = Analog input 2, X5 terminals 503/504 d321 21 = Analog input 3, X5 terminals 505/506 d322 22 = Analog input 4, X5 terminals 507/508 d323 23 = Analog input 5, X5 terminals 511/512 d324 24 = Analog input 6, X5 terminals 513/514 d325 25 = Analog input 7, X5 terminals 515/516 d326 26 = External web speed actual value d327 27 = Tension setp. after the winding hardness char. d328 28 = Torque setpoint d329 29 = Torque actual value d330 30 = Torque setpoint, smoothed d331 31 = 100% Block diagr.10 FP-IQ2Z.G10.XCS SIMADYN D:O2 PKW:O2	1	0 ... 31	0
H108 **Source, comparison value** 1108d / 0454h Selects the comparison value for limit value monitor 1. Settings 0 - 30, refer to H107 31 = H260 Block diagr.10 FP-IQ2Z.G70.XCS SIMADYN D:O2 PKW:O2.	1	0 ... 31	0
H109 **Adaption, input value** 1109d / 0455h Adapts the input signal for limit value monitor 1 0 = No adaption 1 = Absolute value generation 2 = Polarity reversal Block diagr.10 FP-IQ2Z.G40.XCS SIMADYN D:O2 PKW:O2	1	0 ... 2	0
H110 **Smoothing, input value** 1110d / 0456h Smooths the input signal for limit value monitor 1 Block diagr.10 FP-IQ2Z.G60.T SIMADYN D:R2 PKW:O4		16..262144ms	500ms

H111 Adaption, comparison value 1111d / 0457h Adapts the comparison value for limit value monitor 1 0 = No adaption 1 = Absolute value generation 2 = Polarity reversal Block diagr.10 FP-IQ2Z.G100.XCS SIMADYN D:O2 PKW:O2	1	0 ... 2	0
H112 Interval limit 1112d / 0458h Enters the interval limits for limit value monitor 1 Block diagr.10 FP-IQ2Z.G110.L SIMADYN D:N2 PKW:I4	0,006%	0 ... 100%	0%
H113 Hysteresis 1113d / 0459h Enters the hysteresis for limit value monitor 1 Block diagr.10 FP-IQ2Z.G110.HY SIMADYN D:N2 PKW:I4	0,006%	0...100%	0%
H114 Selection, output signal 1114d / 045Ah Adapts the output signal for limit value monitor 1 0 = Input value > comparison value 1 = Input value < comparison value 2 = Input value = comparison value 3 = Input value 0 comparison value 4 = Length reference value reached Block diagr.10 FP-IQ2Z.G130.XCS SIMADYN D:O2 PKW:O2	1	0 ... 4	0

Limit value monitor 2:
Binary output X6, terminal 638

H115 **Source, input value** 1115d / 045Bh Selects the input signal for limit value monitor 2. Settings 0 - 31, refer to H107 Block diagr.10 FP-IQ2Z.G200.XCS SIMADYN D:O2 PKW:O2	1	0 ... 31	0
H116 **Source, comparison value** 1116d / 045Ch Selects the comparison value for limit value monitor 2. Settings 0 - 30, refer to H107 31 = H261 Block diagr.10 FP-IQ2Z.G270.XCS SIMADYN D:O2 PKW:O2	1	0 ... 31	0
H117 **Adaption, input value** 1117d / 045Dh Adapts the input signal for limit value monitor 2 0 = No adaption 1 = Absolute value generation 2 = Polarity reversal Block diagr.10 FP-IQ2Z.G240.XCS SIMADYN D:O2 PKW:O2	1	0 ... 2	0
H118 **Smoothing, input value** 1118d / 045Eh Smooths the input signal for limit value monitor 2 Block diagr.10 FP-IQ2Z.G260.T SIMADYN D:R2 PKW:O4		16..262144ms	500ms
H119 **Adaption, comparison value** 1119d / 045Fh Adapts the comparison value for limit value monitor 2 0 = No adaption 1 = Absolute value generation 2 = Polarity reversal Block diagr.10 FP-IQ2Z.G300.XCS SIMADYN D:O2 PKW:O2	1	0 ... 2	0
H120 **Interval limit** 1120d / 0460h Enters the interval limits for limit value monitor 2 Block diagr.10 FP-IQ2Z.G310.L SIMADYN D:N2 PKW:I4	0,006%	0...100%	0%
H121 **Hysteresis** 1121d / 0461h Enters the hysteresis for limit value monitor 2 Block diagr.10 FP-IQ2Z.G310.HY SIMADYN D:N2 PKW:I4	0,006%	0...100%	0%
H122 **Selection, output signal** 1122d / 0462h Adapts the output signal for limit value monitor 2 0 = Input value > comparison value 1 = Input value < comparison value 2 = Input value = comparison value 3 = Input value 0 comparison value 4 = Length reference value reached Block diagr.10 FP-IQ2Z.G330.XCS SIMADYN D:O2 PKW:O2	1	0 ... 4	0

Select values to the interface board and to the CU:

H123 Source, select value 1 SW320 1123d / 0463h Selects the first value which is to be sent to the higher-level automation system and to the CU. 0 = Effective web speed setpoint d301 1 = Actual dv/dt d302 2 = Speed setpoint d303 3 = Sum, tension/position reference value d304 4 = Output, motorized potentiometer 1 d305 5 = Output, motorized potentiometer 2 d306 6 = Speed actual value d307 7 = Variable moment of inertia d308 8 = Actual web length d309 9 = Actual diameter d310 10 = Tension actual value, smoothed d311 11 = Pre-control torque d312 12 = Output, closed-loop tension control d313 13 = Pre-control torque, friction compensation d314 14 = Free for expansion d315 15 = Pre-control torque, inertia compensation d316 16 = Sum, tension actual value d317 17 = Tension actual value, D component d318 18 = Tension controller output d319 19 = Analog input 1, X5 terminals 501/502 d320 20 = Analog input 2, X5 terminals 503/504 d321 21 = Analog input 3, X5 terminals 505/506 d322 22 = Analog input 4, X5 terminals 507/508 d323 23 = Analog input 5, X5 terminals 511/512 d324 24 = Analog input 6, X5 terminals 513/514 d325 25 = Analog input 7, X5 terminals 515/516 d326 26 = External web speed actual value d327 27 = Tension setp. After the winding hardness char. d328 28 = Torque actual value d330 29 = Torque setpoint, smoothed d331 30 = Select value 1 from the CU 31 = Select value 2 from the CU 32 = Factor, automatic thickness correction d339 33 = Calculated layer thickness d349 Block diagr.15 FP-IQ2Z.AUT10.NC SIMADYN D:O2 PKW:O2	1	0 ... 99	0
H124 Source, select value 2 SW320 1124d / 0464h Selects the second value which is to be sent to the higher-level automation system and to the CU. Settings 0 - 31, refer to H123 Block diagr.15 FP-IQ2Z.AUT20.NC SIMADYN D:O2 PKW:O2	1	0 ... 99	0
H125 Source, select value 3 SW320 1125d / 0465h Selects the third value which is to be sent to the higher-level automation system and to the CU. Settings 0 - 31, refer to H123 Block diagr.15 FP-IQ2Z.AUT30.NC SIMADYN D:O2 PKW:O2	1	0 ... 99	0
H126 Source, select value 4 SW320 1126d / 0466h Selects the fourth value which is to be sent to the higher-level automation system and to the CU. Settings 0 - 31, refer to H123 Block diagr.15 FP-IQ2Z.AUT40.NC SIMADYN D:O2 PKW:O2	1	0 ... 99	0

H127 Source, select value 5 SW320 1127d / 0467h Selects the fifth value which is to be sent to the higher-level automation system and to the CU. Settings 0 - 31, refer to H123 Block diagr.15 FP-IQ2Z.AUT50.NC SIMADYN D:O2 PKW:O2	1	0 ... 99	0
H128 Source, select value 6 SW320 1128d / 0468h Selects the sixth value which is to be sent to the higher-level automation system and to the CU. Settings 0 - 31, refer to H123 Block diagr.15 FP-IQ2Z.AUT60.NC SIMADYN D:O2 PKW:O2	1	0 ... 99	0
H129 Source, alternative on command 1129d / 0469h Selects the command to power-up the drive converter. Generally, this is if a mode is selected. However, one of the binary select inputs can be used. 0 = Binary input X6, terminal 611 1 = Binary input X6, terminal 612 2 = Binary input X6, terminal 613 3 = Binary input X6, terminal 614 4 = Binary input X6, terminal 615 5 = Binary input X6, terminal 616 6 = Binary input X6, terminal 617 7 = Binary input X6, terminal 618 8 = Local- or system operating mode active Block diagr.18 FP-IQ1Z.SELON.X SIMADYN D:O2 PKW:O2	1	0 ... 8	8
H130 Setpoint B 1130d / 046Ah Fixed setpoint as line speed setpoint; it is injected in front of the ramp-function generator with the accept setpoint B control signal Block diagr. 5 FP-SREFZ.S25.X2 SIMADYN D:N2 PKW:I4	0,006%	-200,000%... 199,993%	0%

Parameterization of the central ramp-function generator for the speed setpoint:

H131 Upper limit 1131d / 046Bh Limit, maximum value Block diagr.5 FP-SREFZ.S50.LU SIMADYN D:N2 PKW:I4	0,006%	-200,000%... 199,993%	110%
H132 Lower limit 1132d / 046Ch Limit, minimum value Block diagr.5 FP-SREFZ.S50.LL SIMADYN D:N2 PKW:I4	0,006%	-200,000%... 199,993%	0%
H133 Ramp-up time 1133d / 046Dh Block diagr.5 FP-SREFZ.S50.TU SIMADYN D:R2 PKW:O4		8..131072ms	30000ms
H134 Ramp-down time 1134d / 046Eh Block diagr.5 FP-SREFZ.S50.TD SIMADYN D:R2 PKW:O4		8..131072ms	30000ms
H135 Rounding-off when accelerating 1135d / 046Fh Block diagr.5 FP-SREFZ.S50.TRU SIMADYN D:R2 PKW:O4		8..131072ms	3000ms
H136 Rounding-off when decelerating 1136d / 0470h Block diagr.5 FP-SREFZ.S50.TRD SIMADYN D:R2 PKW:O4		8..131072ms	3000ms
H137 Norm. web speed compensation 1137d / 0471h Normalization factor for the influence of the compensation signal Block diagr.5 FP-SREFZ.S120.X2 SIMADYN D:N2 PKW:I4	0,006%	-200,000%... 199,993%	100%
H138 Ratio, gearbox stage 2 1138d / 0472h Gearbox stage ratio as a % e. g. gearbox stage 1 = 5:1 gearbox stage 2 = 7:1 H138 = stage1 / stage2 = 5 / 7 = 71.428% Block diagr.5 FP-SREFZ.S140.X2 SIMADYN D:N2 PKW:I4	0,006%	-200,000%... 199,993%	100%
H139 Normalization, web speed 1139d / 0473h Normalization factor for the web speed setpoint Block diagr.5 FP-SREFZ.S150.X1 SIMADYN D:N2 PKW:I4	0,006%	-200,000%... 199,993%	100%
H140 Maneuvering setpoint 1140d / 0474h Multiplication factor for the web speed setpoint; it is activated with the manouver command. This is used to switch-out the web setpoint for unwind stands or when the web breaks Block diagr.5 FP-SREFZ.S180.X2 SIMADYN D:N2 PKW:I4	0,006%	-200,000%... 199,993%	100%
H141 Influence, closed-loop tension control 1141d / 0475h Normalization factor to influence the web speed setpoint as a result of the closed-loop tension control for closed-loop speed correction control Block diagr.5 FP-SREFZ.S200.X2 SIMADYN D:N2 PKW:I4	0,006%	-200,000%... 199,993%	100%
H142 Setpoint, local crawl 1142d / 0476h Setpoint for the local crawl operating mode Block diagr.5 FP-SREFZ.S300.X2 SIMADYN D:N2 PKW:I4	0,006%	-200,000%... 199,993%	10%
H143 Setpoint, local inching forwards 1143d / 0477h Setpoint for the local inching forwards operating mode Block diagr.5 FP-SREFZ.S310.X2 SIMADYN D:N2 PKW:I4	0,006%	0. ..±100	5

H144 Setpoint, local inching reverse 1144d / 0478h Setpoint for the local inching reverse operating mode Block diagr.5 FP-SREFZ.S320.X2 SIMADYN D:N2 PKW:I4	0,006%	0..±100	-5
H145 Bias setpoint 1145d / 0479h Supplementary speed setpoint for the line speed setpoint for current limiting control to bias the speed controller Block diagr.5 FP-SREFZ.S360.X1 SIMADYN D:N2 PKW:I4	0,006%	-200,000%... 199,993%	10%
H146 Closed-loop speed control for local operation 1146d / 047Ah 0 = Closed-loop control, local mode 1 = Closed-loop speed control, local mode Block diagr.5 FP-SREFZ.NC112.I2 SIMADYN D:B1 PKW:Boolean	1	0/1	0

Closed-loop speed control settings:

H147 Torque limit compare P492 and P498 1147d / 047Bh (Parameterlist: refer to Section 7, Table 7) Enters the limits for the speed controller in local operation and for closed-loop speed correction control Block diagr.6 FP-SREFZ.C56.X SIMADYN D:N2 PKW:I4	0,006%	-200,000%... 199,993%	20%
H148 Time for reverse winding after the splice 1148d / 047Ch Time that the drive should wind backwards to accept the web after the splice. Block diagr.21 FP-CONTZ.SL70.T SIMADYN D:T2 PKW:O4	32,0ms	0...524288ms	10000ms
H149 Speed setpoint, reverse winding after a splice 1149d / 047Dh Block diagr.6 FP-SREFZ.RW100.X SIMADYN D:N2 PKW:I4	0,006%	-20....0	0
H150 Start of adaption 1150d / 047Eh The speed controller gain is adapted to the variable moment of inertia of the winding core; the start of Kp adaption is defined with H150. Block diagr.6 FP-SREFZ.NC035.A1 SIMADYN D:N2 PKW:I4	0,006%	-200,000%... 199,993%	0%
H151 Kp adaption factor, min. 1151d / 047Fh Multiplier for Kp at the start of adaption; generally 1 for Jv=0%. Block diagr.6 FP-SREFZ.NC035.B1 SIMADYN D:N2 PKW:I4	0,006%	0 ... 19,99	1
H152 End of adaption 1152d / 0480h End of Kp adaption for the speed controller Block diagr.6 FP-SREFZ.NC035.A2 SIMADYN D:N2 PKW:I4	0,006%	-200,000%... 199,993%	100%
H153 Kp adaption factor, max. 1153d / 0481h Multiplier for Kp at the end of adaption, i. e. at the maximum moment of inertia. The setting must be determined during start-up by optimizing the speed controller with an empty and then with the highest possible diameter roll. Block diagr.6 FP-SREFZ.NC035.B1 SIMADYN D:N2 PKW:I4	0,006%	0 ... 19,99	1
H154 Slave drive 1154d / 0482h Disables the central ramp-function generator for the line speed setpoint if the winder operates as slave drive and the setpoint is already available at the ramp-function generator output. 0 = Ramp-function generator effective 1 = Ramp-function generator not effective Block diagr.5 FP-SREFZ.S47.I SIMADYN D:B1 PKW:Boolean	1	0/1	0
H155 Smoothing, web speed setpoint 1155d / 0483h Setpoint smoothing if the ramp-function generator is bypassed with H154=1 Block diagr.5 FP-SREFZ.S10.TSIMADYN D:R2 PKW:O4		0,008..131ms	8ms
H157 Limit value for standstill identification 1157d / 0484h Threshold for the standstill identification; 25% is permanently used as threshold for the hysteresis. Depending on H146, the speed- or line speed actual value is used for the signal. Block diagr.6 FP-SREFZ.S810.X SIMADYN D:N2 PKW:I4	0,006%	-200,000%... 199,993%	1%

H159 Delay, standstill identification 1159d / 0485h Delay time for the standstill signal Block diagr.6 FP-SREFZ.S840.T SIMADYN D:T2 PKW:O4	32,0ms	0...100000ms	0ms
H160 Delete EEPROM 1160d / 0486h A positive edge at H160 deletes the EEPROM and thus establishes the initialize status for all parameters. The key parameter H250 must be set to 165. Block diagr.4 FP-PARAMZ.URLAD.ERA SIMADYN D:B1 PKW:Boolean	1	0/1	0
H161 Ramp-up/ramp-down time, triggerable ramp-function generator 1161d / 0487h Ramp times for the local ramp-function generator; it is set to the particular actual value at each operating mode change and when the controller is enabled. Block diagr.5 FP-SREFZ.S457.X SIMADYN D:R2 PKW:O4		32..524288ms	20000ms
H162 Smoothing, speed controller output 1162d / 0488h Smoothing for monitoring parameter d331, torque setpoint from the CU Block diagr.6 FP-SREFZ.NT130.T SIMADYN D:R2 PKW:O4		32..524288ms	500ms
H163 Selection, positioning reference value 1163d / 0489h Toggles between the x^2 or x^3 characteristic for the positioning reference value. 0 = x^2 characteristic 1 = x^3 characteristic Block diagr.12 FP-SREFZ.S328.I SIMADYN D:B1 PKW:Boolean	1	0/1	0
H164 Smoothing, bias setpoint 1164d / 048Ah Smoothing time for the bias setpoint Block diagr.5 FP-SREFZ.S395.T SIMADYN D:R2 PKW:O4		8...131072ms	8ms
H165 Smoothing, speed actual value 1165d / 048Bh Speed actual value smoothing time for the diameter computer, compensation torques and monitoring functions Block diagr.13 FP-IQ1Z.AI325.T SIMADYN D:R2 PKW:O4		8...131072ms	20ms
H166 Enabling addition, local setpoints 1166d / 048Ch H166 =1 allows a local setpoint to be added in system operation. 0 = Addition inhibited 1 = Addition enabled Block diagr.5 FP-CONTZ.C22.I3 SIMADYN D:B1 PKW:Boolean	1	0/1	0
H167 Limiting, thickness correction 1167d / 048Dh Value by which the thickness correction factor can deviate from one. Block diagr.9 FP-DIAMZ.DC1000.X1 SIMADYN D:N2 PKW:I4	0,006%	0 ... 70%	0%
H168 Integrating time, thickness correction 1168d / 048Eh Time in which the correction factor for the material thickness changes by 100%, if the tension controller output and the acceleration actual value are both 100%. This should be at least 10 x greater than the tension controller integral action time. Block diagr.9 FP-DIAMZ.DC70.TI SIMADYN D:R2 PKW:O4		20000... ...524288ms	200000ms

Tension control settings:

H172 Smoothing, tension actual value 1172d / 0494h Time constant for the actual value smoothing Block diagr.7 FP-TENSZ.T641.T SIMADYN D:R2 PKW:O4		8...131072ms	150ms
H173 Scaling D component 1173d / 0495h D component setting. An actual value change (100% /H173) generates 100% at the differential element output. Block diagr.7 FP-TENSZ.T644.X2 SIMADYN D:R2 PKW:O4		0...131072ms	100ms
H174 Inhibit D component 1174d / 0496h The D component is only added for the tension actual value if the dancer roll position control is used; otherwise the D component remains inhibited. 0 = D component enabled 1 = D component inhibited Block diagr.7 FP-TENSZ.T643.I SIMADYN D:B1 PKW:Boolean	1	0/1	1
H175 Ramp-up time, tension setpoint 1175d / 0497h Ramp-up time for the main tension/position reference value Block diagr.7 FP-TENSZ.T1350.TU SIMADYN D:R2 PKW:O4		32..524288ms	10000ms
H176 Ramp-down time, tension setpoint 1176d / 0498h Ramp-down time for the main tension/position setpoint Block diagr.7 FP-TENSZ.T1350.TD SIMADYN D:R2 PKW:O4		32..524288ms	10000ms
H177 Inhibit tension setpoint 1177d / 0499h When using the winding hardness characteristic for dancer roll support, the tension setpoint must be isolated. The position reference value is then entered via the supplementary tension setpoint. 0 = Normal operation 1 = Tension setpoint inhibited Block diagr.8 FP-TENSZ.T1485.I SIMADYN D:B1 PKW:Boolean	1	0/1	0
H178 Response at web break 1178d / 049Ah 0 = None, only the signal is displayed 1 = Tension control off and the diameter computer is inhibited Block diagr.7 FP-TENSZ.T2110.I2 SIMADYN D:B1 PKW:Boolean	1	0/1	0
H179 Enable tension offset compensation 1179d / 049Bh The control signal, hold diameter, can be used when the tension control is disabled to automatically adjust an offset of the tension actual value sensing. 0 = Adjustment inhibited 1 = Adjustment enabled Block diagr.7 FP-TENSZ.T603.I4 SIMADYN D:B1 PKW:Boolean	1	0/1	0
H180 Tension reduction 1 1180d / 049Ch Tension reduction 1 at diameter D1 as a % of the maximum tension reduction Block diagr.7 FP-TENSZ.T1435.X2 SIMADYN D:N2 PKW:I4	0,006%	0...100%	100%

H181 Tension reduction 2 1181d / 049Dh Tension reduction 2 at diameter D2 as a % of the maximum tension reduction Block diagr.7 FP-TENSZ.T1445.X2 SIMADYN D:N2 PKW:I4	0,006%	0...100%	100%
H182 Tension reduction 3 1182d / 049Eh Tension reduction 3 at diameter D3 as a % of the maximum tension reduction Block diagr.7 FP-TENSZ.T1455.X2 SIMADYN D:N2 PKW:I4	0,006%	0...100%	100%
H183 Diameter at the start of tension reduction 1183d / 049Fh Diameter at the start of tension reduction Block diagr.7 FP-TENSZ.T1470.A1 SIMADYN D:N2 PKW:I4	0,006%	0...100%	100%
H184 Diameter D1 1184d / 04A0h Diameter D1 for tension reduction 1 Block diagr.7 FP-TENSZ.T1470.A2 SIMADYN D:N2 PKW:I4	0,006%	0...100%	100%
H185 Diameter D2 1185d / 04A1h Diameter D2 for tension reduction 2 Block diagr.7 FP-TENSZ.T1470.A3 SIMADYN D:N2 PKW:I4	0,006%	0...100%	100%
H186 Diameter D3 1186d / 04A2h Diameter D3 for tension reduction 3 Block diagr.7 FP-TENSZ.T1470.A4 SIMADYN D:N2 PKW:I4	0,006%	0...100%	100%
H187 Diameter D4, end of tension reduction 1187d / 04A3h Diameter D4 for the end of tension reduction Block diagr.7 FP-TENSZ.T1468.X SIMADYN D:N2 PKW:I4	0,006%	0...100%	100%
H188 Source, standstill tension 1188d / 04A4h The standstill tension is either entered as parameter value or is parameterized as part of the tension setpoint. 0 = Standstill tension is obtained from H189 * tension setpoint 1 = Standstill tension is permanently specified with H189 Block diagr.7 FP-TENSZ.T1500.I SIMADYN D:B1 PKW:Boolean	1	0/1	0
H189 Standstill tension 1189d / 04A5h Enters a fixed value or a multiplying factor for the tension setpoint Block diagr.7 FP-TENSZ.T1505.X2 SIMADYN D:N2 PKW:I4	0,006%	-200,000%... 199,993%	100%
H190 Tension pre-control, dancer roll 1190d / 04A6h Factor for the tension pre-control for a dancer roll control (H203=2). 0%...199.99%: The main tension setpoint before an inhibit is multiplied by this factor and is added, as supplementary torque, to the controller output. -0.0061%...-200%: Analog input 7 (pressure actual value of the dancer roll) is multiplied by the **absolute value** of the factor and is added, as supplementary torque, to the controller output. Block diagr.8 FP-TENSZ.T1936.X SIMADYN D:N2 PKW:I4	0,006%	-200,000%... 199,993%	0%

H191 Minimum selection 1191d / 04A7h A minimum selection between the operating tension and the standstill tension is activated using H191=1; the lower of the values is used as standard setpoint 0 = No minimum evaluation 1 = Minimum evaluation activated Block diagr.7 FP-TENSZ.T1515.I SIMADYN D:B1 PKW:Boolean	1	0/1	0
H192 Smoothing, tension setpoint 1192d / 04A8h Smoothing time constant for the total setpoint after the tension setpoint is added Block diagr.8 FP-TENSZ.T1525.T SIMADYN D:R2 PKW:O4		32..524288ms	300ms
H193 Min. value speed-dep. Tension controller limits 1193d / 04A9h Lower limit for a speed-dependent tension controller output limit Block diagr.8 FP-TENSZ.T1710.X2 SIMADYN D:N2 PKW:I4	0,006%	-200,000%... 199,993%	100%
H194 Selection, tension controller limits 1194d / 04Aah Sets the mode for the tension controller output limit 0 = The tension controller output is limited to + H195 1 = The tension controller output is limited to ± H195 2 = Limited to + H195 * absolute speed actual value 3 = Limited to ± H195 * absolute speed actual value Block diagr.8 FP-TENSZ.T1715.X2 SIMADYN D:O2 PKW:O2	1	0 ... 3	1
H195 Adaption, tension controller limits 1195d / 04Abh The maximum tension controller influence is defined using H195; it acts as a multiplier for the limits, selected with H194. Block diagr.8 FP-TENSZ.T1745.X SIMADYN D:N2 PKW:I4	0,006 %	0 ...199,993%	100%
H196 Inhibit I component, tension controller 1196d / 04Ach For a closed-loop dancer roll position control, the tension controller must be operated as pure P controller; H196 is used to make the selection. 0 = PI controller 1 = P controller Caution: When changing-over this parameter, the tension controller must be inhibited! Block diagr.8 FP-TENSZ.T1790.HI SIMADYN D:B1 PKW:Boolean	1	0/1	0
H197 Minimum Kp, tension controller 1197d / 04Adh Gain at the start of adaption to the variable moment of inertia, generally for Jv=0% Block diagr.8 FP-TENSZ.T1770.B1 SIMADYN D:E2 PKW:I4	0,007	0 ... 128	0,3
H198 Maximum Kp, tension controller 1198d / 04Aeh Gain at the end of adaption, normally at Jv=100% Block diagr.8 FP-TENSZ.T1770.B2 SIMADYN D:E2 PKW:I4	0,007	0 ... 128	0,3
H199 Integral action time, tension controller 1199d / 04Afh Block diagr.8 FP-TENSZ.T1790.TN SIMADYN D:R2 PKW:O4		8..131072ms	1000ms
H200 Adaption, setpoint pre-control 1200d / 04B0h Multiplication factor for the tension pre-control with the tension setpoint Block diagr.8 FP-TENSZ.T1800.X1 SIMADYN D:N2 PKW:I4	0,006%	-200,000%... 199,993%	0%

H201 Lower limit, web speed 1201d / 04B1h Lower limit for the multiplier effect of the web speed for closed-loop control type H203=5 Block diagr.8 FP-TENSZ.T1900.X2 SIMADYN D:N2 PKW:I4	0,006%	-200,000%... 199,993%	100%
H202 Influence, web speed 1202d / 04B2h Factor for the multiplier effect of the web speed for closed-loop control type H203=5 Block diagr.8 FP-TENSZ.T1920.X2 SIMADYN D:N2 PKW:I4	0,006%	-200,000%... 199,993%	100%
H203 Selecting the tension control technique 1203d / 04B3h Selecting the control technique 0 = Indirect closed-loop tension control via current limits 1 = Direct closed-loop tension control with tension transducer via current limits 2 = Direct closed-loop tension control with dancer roll via current limits 3 = Direct closed-loop tension control with dancer roll/tension transducer via closed-loop speed correction control 4 = Reserved for expansion 5 = As for 3, tension controller output multiplied by Vset Block diagr.7 FP-TENSZ.T1945.X SIMADYN D:O2 PKW:O2	1	0 ... 4	0
H204 Lower limit, web break detection 1204d / 04B4h Limit for the web break detection. For indirect closed-loop tension control, the torque actual value is compared with this limit and for direct closed-loop tension control, the tension actual value; the web break signal is activated when this is fallen below. Block diagr.7 FP-TENSZ.T2015.X2 SIMADYN D:N2 PKW:I4	0,006%	-200,000%... 199,993%	5%
H205 Delay, web break signal 1205d / 04B5h Delay time before activating the web break signal which is used to mainly suppress erroneous signals. Block diagr.7 FP-TENSZ.T2100.T SIMADYN D:T2 PKW:O4	16,0ms	16..262144ms	2000ms
H206 Selection, winding hardness characteristic 1206d / 04B6h 0 = Winding hardness characteristic active 1 = Winding hardness characteristic disabled Block diagr.7 FP-TENSZ.T1475.I SIMADYN D:B1 PKW:Boolean	1	0/1	0
H207 Start of tension controller adaption 1207d / 04B7h Start of Kp adaption for the tension controller Block diagr.8 FP-TENSZ.T1770.A1 SIMADYN D:N2 PKW:I4	0,006%	-200,000%... 199,993%	0%
H208 End of tension controller adaption 1208d / 04B8h End of Kp adaption for the tension controller Block diagr.8 FP-TENSZ.T1770.A2 SIMADYN D:N2 PKW:I4	0,006%	-200,000%... 199,993%	100%
H209 Droop, tension controller 1209d / 04B9h Multiplier to parameterize a droop factor with the I component of the tension controller output Block diagr.8 FP-TENSZ.T1795.X1 SIMADYN D:N2 PKW:I4	0,006%	-200,000%... 199,993%	0%

Diameter computer, compensation factors:

H210 Calibration, web speed 1210d / 04Bah Normalization factor to finely adjust the web speed actual value. Block diagr.9 FP-DIAMZ.D910.X2 SIMADYN D:N2 PKW:I4	0,006%	-200,000%... 199,993%	100%
H211 Selection, web tachometer 1211d / 04BBh When sensing the web speed using a web tachometer, the actual value must be parameterized as source for the diameter computer. 0 = No web tachometer 1 = Web tachometer present Block diagr.9 FP-DIAMZ.D1105.I SIMADYN D:B1 PKW:Boolean	1	0/1	0
H212 Pulse number, axial tachometer 1212d / 04BCh This specifies the number of pulses per revolution when using the digital speed sensing on the T300. Block diagr.13 FP-IQ1Z.D900.PR1 SIMADYN D:O2 PKW:O2	1 **init**	0 ... 32767	1024
H213 Pulse number, web tachometer 1213d / 04BDh This specifies the number of pulses per revolution when using a web tachometer Block diagr.13 FP-IQ1Z.D900.PR1 SIMADYN D:O2 PKW:O2	1 **init**	0 ... 32767	600 U/min
H214 Rated speed, winder drive 1214d / 04Beh Maximum speed 100% at minimum diameter and at maximum web speed ***Note:*** *Has to be configured* ***negative*** *for* ***MASTER DRIVES SC****, if encoder tracks A and B are retrieved for bachplane LBA (because of interchanging of tracks A and B).* Block diagr.13 FP-IQ1Z.D900.RS1 SIMADYN D:I2 PKW:I2	1 **init**	0... 32767 U/min	1500 U/min
H215 Rated speed, measuring roll web tachometer 1215d / 04BFh Maximum speed of the measuring roll 100% at maximum web speed Block diagr.13 FP-IQ1Z.D900.RS2 SIMADYN D:I2 PKW:I2	1 **init**	0 ... 32767 U/min	1000 U/min
H216 Calculation interval, diameter computer 1216d / 04C0h Time for one winder revolution at the minimum diameter and maximum web speed. Formula: H216 [ms] = Dcore [mm] * 60 * π / Vmax [m/min] **Caution:** **If this time lower than 120ms (i.e. for extremly small diameters), the diametre computer, due to his integrating calculation technique, may not work properly.** **In this case, an external diameter sensor is recommanded**. Block diagr.9 FP-DIAMZ.D1140.X SIMADYN D:R2 PKW:O4		32ms... ...524288ms	320ms

H217 Selection, encoder type sensing 1 1217d / 04C1h Parameterizes the hardware for speed sensing 1 on the T300 **---x:** Last digit = Digital filter suppression frequency 0 = 2.0 ms8 500 kHz 1 = 0.0 ms8 No filter 2 = 0.5 ms8 2 MHz 3 = 2.0 ms8 500 kHz 4 = 8.0 ms8 125 kHz 5 = 16.0 ms 8 62.5 kHz The filter inhibits all frequencies which exceed the suppression frequency **—x-:** Last but one digit = Encoder type, pulse sources 0 = Pulse encoder with 2 tracks displaced through 90 degrees possibly a zero pulse, signals from X5 at SE300 1 = Separate tracks for up and down pulses (forwards and backwards) signals from X5 at SE300 2 = Signals for tracks A+B from the CU board 4 = Zero pulse from the CU board 6 = Tracks A, B and zero pulse from the CU board **xx--:** Settings to evaluate the zero pulse and rough pulse; always 0 for SW320 Block diagr.13 FP-IQ1Z.D900.IT1 SIMADYN D:V2 PKW:V2	0001 Hex **init**	0 ... FFFF	64
H218 Selection, encoder type sensing 2 1218d / 04C2h Parameterizes the hardware for speed sensing 2 on the T300 **---x:** Last digit = Digital filter suppression frequency 0 = 2.0 ms8 500 kHz 1 = 0.0 ms8 No filter 2 = 0.5 ms8 2 MHz 3 = 2.0 ms8 500 kHz 4 = 8.0 ms8 125 kHz 5 = 16.0 ms 8 62.5 kHz The filter inhibits all frequencies which exceed the suppression frequency **xxx-:** Selects the encoder type, settings to evaluate the zero pulse and rough pulse; always 0 for SW320 Block diagr.13 FP-IQ1Z.D900.IT2 SIMADYN D:V2 PKW:V2	0001 Hex **init**	0 ... FFFF	4
H220 Scaling, dv/dt 1220d / 04C3h Normalization factor for the dv/dt signal. The ramp time should be set at H264 which should generate 100% at the output of the dv/dt calculation. As a result of the internal arithmetic accuracy of 16 bit, long ramp-up times may not be able to be precisely set. This inaccuracy can be compensated by fine adjustment using H225. For inertia compensation, a dv/dt signal, normalized to 10% is generally sufficient; in this case, parameters H227 and H228 must be increased by a factor of 10. The tenth section of the ramp time can then be entered at H264 which significantly improves the resolution. Block diagr.9 FP-DIAMZ.P145.X SIMADYN D:R2 PKW:O4		32..524288ms	1000ms
H221 Minimum speed, diameter computer 1221d / 04C5h The diameter calculation is inhibited when the limit value is fallen below Block diagr.9 FP-DIAMZ.D1030.M SIMADYN D:N2 PKW:I4	0,006%	-200,000%... 199,993%	1%
H222 Core diameter 1222d / 04C6h Winding core diameter as a % of the maximum diameter Block diagr.9 FP-DIAMZ.P100.X SIMADYN D:N2 PKW:I4	0,006%	0 ...199,993%	20%

H223 Smoothing, setpoint for dv/dt calculation 1223d / 04C7h Smoothing for monitoring parameter d331 Block diagr.9 FP-DIAMZ.P142.T SIMADYN D:R2 PKW:O4		8...131072ms	32ms
H224 Material thickness 1224d / 04C8h Thickness of the wound material as a % of the maximum thickness Block diagr.9 FP-DIAMZ.P140.X SIMADYN D:N2 PKW:I4	0,006%	0 ...199,993%	100,%
H225 Fine adjustment dv/dt 1225d / 04C9h Normalization factor for the dv/dt signal. Long ramp-up times may not be able to be precisely adjusted due to the internal 16-bit processing. These inaccuracies can be compensated by fine adjustment. E. g. ramp-up ramp 50s, possible setting at H220 = 52.42s with H225=50s <100% B H220 =104.84% The dv/dt output is 100% for a 50s ramp Block diagr.9 FP-DIAMZ.P500.X2 SIMADYN D:N2 PKW:I4	0,006%	0 ...199,993%	100%
H226 Source, dv/dt 1226d / 04Cah 0 = The internally calculated value is used 1 =An external value is used Block diagr.9 FP-DIAMZ.P160.I SIMADYN D:B1 PKW:Boolean	1	0/1	0
H227 Variable moment of inertia 1227d / 04CBh Compensation factor to compensate the variable moment of inertia during acceleration Block diagr.9 FP-DIAMZ.P331.X SIMADYN D:N2 PKW:I4	0,006%	0 ...199,993%	0%
H228 Constant moment of inertia 1228d / 04CCh Specifies the calculated moment of inertia for the motor, gearbox and winder core Block diagr.9 FP-DIAMZ.P335.X SIMADYN D:N2 PKW:I4	0,006%	0 ...199,993%	0%
H230 Friction torque at 0% speed 1230d / 04Ceh Absolute torque setpoint (d331) at 0% speed Block diagr.9 FP-DIAMZ.P910.B1 SIMADYN D:N2 PKW:I4	0,006%	0 ...199,993%	0%
H231 Friction torque at 20% speed 1231d / 04CFh Absolute torque setpoint (d331) at 20% speed Block diagr.9 FP-DIAMZ.P910.B2 SIMADYN D:N2 PKW:I4	0,006%	0 ...199,993%	0%
H232 Friction torque at 40% speed 1232d / 04D0h Absolute torque setpoint (d331) at 40% speed Block diagr.9 FP-DIAMZ.P910.B3 SIMADYN D:N2 PKW:I4	0,006%	0 ...199,993%	0%
H233 Friction torque at 60% speed 1233d / 04D1h Absolute torque setpoint (d331) at 60% speed Block diagr.9 FP-DIAMZ.P910.B4 SIMADYN D:N2 PKW:I4	0,006%	0 ...199,993%	0%
H234 Friction torque at 80% speed 1234d / 04D2h Absolute torque setpoint (d331) at 80% speed Block diagr.9 FP-DIAMZ.P910.B5 SIMADYN D:N2 PKW:I4	0,006%	0 ...199,993%	0%
H235 Friction torque at 100% speed 1235d / 04D3h Absolute torque setpoint (d331) at 100% speed Block diagr.9 FP-DIAMZ.P910.B6 SIMADYN D:N2 PKW:I4	0,006%	0 ...199,993%	0%

H236 Diameter change, monotone 1236d / 04D4h Only monotone diameter changes are permitted for H236=1. The diameter can only increase for winders; and only decrease for unwind stands. 0 = Standard operation 1 =Only monotone changes permitted Block diagr.9 FP-DIAMZ.D1704.I SIMADYN D:B1 PKW:Boolean	1	0/1	0
H237 Pre-control with n^2 1237d / 04D5h Compensation with the square of the speed actual value is sometimes set for thick materials if the diameter quickly changes at high motor speeds. Block diagr.9 FP-DIAMZ.P940.X2 SIMADYN D:N2 PKW:I4	0,006%	-100,000% 100,000%	0%
H238 Minimum change time, diameter 1238d / 04D6h Time for winding/unwinding at maximum material increase/decrease, i. e. at D_{min} and V_{max} Block diagr.9 FP-DIAMZ.D1650.X SIMADYN D:R2 PKW:O4		128... ...2097152ms	50000ms
H239 Adaption divisor, length computer 1239d / 04D7h Normalization, web length computer Block diagr.13 FP-DIAMZ.W500.X SIMADYN D:N2 PKW:I4	0,006%	0 ...199,993%	100%
H240 Adaption factor, length computer 1240d / 04D8h Normalization, web length computer Block diagr.13 FP-DIAMZ.W510.X SIMADYN D:N2 PKW:I4	0,006%	0 ...199,993%	100%
H241 Ramp-down time for the braking travel calc. 1241d / 04D9h Block diagr.13 FP-DIAMZ.W30.X2 SIMADYN D:N2 PKW:I4	0,03s	0...599,96s	60s
H242 Ramp-down rounding-off time for the braking travel calc. 1242d / 04Dah Block diagr.13 FP-DIAMZ.W520.X SIMADYN D:N2 PKW:I4	0,03s	0...599,96s	6s
H243 Smoothing, web width 1243d / 04DBh Smoothing time constant for web width changes Block diagr.9 FP-DIAMZ.P150.T SIMADYN D:R2 PKW:O4		32..524288ms	1000ms
H244 Rated web speed for the braking travel calc. 1244d / 04DCh Block diagr.13 FP-DIAMZ.W530.X SIMADYN D:N2 PKW:I4	0,006%	0...14999	1000

H245 Baud rate, PTP protocol 1245d / 04DDh Sets the baud rate for the peer to peer protocol. 0 = 150 baud 1 = 300 baud 2 = 600 baud 3 = 1200 baud 4 = 2400 baud 5 = 4800 baud 6 = 9600 baud 7 = 19200 baud 8 = 38400 baud 9 = 57600 baud 10 = 76800 baud 11 = Not permitted 12 = 115200 baud **Please refere also to note 3, Section 8.1.3.3** Block diagr.14 FP-@TXDZ.PTP.BDR SIMADYN D:O2 PKW:O2	1 **init**	0 ... 12	6
H247 Number of receive words, PTP protocol 1247d / 04DFh Telegram length for the receiver. Block diagr.14 FP-IQ1Z.RPTP.LTW SIMADYN D:O2 PKW:O2	1 **init**	0 ... 5	5
H248 Number of transmit words, PTP protocol 1248d / 04E0h Telegram length for the sender. Block diagr.14 FP-IQ2Z.TPTP.LTW SIMADYN D:O2 PKW:O2	1 **init**	0 ... 5	5
H249 Enable, send PTP protocol 1249d / 04E1h 0 = Inhibited 1 =Enabled Block diagr.14 FP-IQ2Z.TPTP.EN SIMADYN D:B1 PKW:Boolean	1	0/1	0
H250 EEPROM key 1250d / 04E2h To establish the initialization status of all parameters with a rising edge at H160, the key parameter H250 must be set to 165. Block diagr.4 FP-PARAMZ.URLAD.KEY SIMADYN D:I2 PKW:I2	1	0 ... 32767	0
H251 Transfer setpoint A 1251d / 04E3h Enters the control signal as parameter Block diagr.16 FP-IQ1Z.B90.I10 SIMADYN D:I2 PKW:I2	1	0/1	0
H252 Transfer setpoint B 1252d / 04E4h Enters the control signal as parameter Block diagr.16 FP-IQ1Z.B100.I10 SIMADYN D:B1 PKW:Boolean	1	0/1	0
H253 Gearbox stage 2 1253d / 04E5h Enters the control signal as parameter Block diagr.16 FP-IQ1Z.B160.I10 SIMADYN D:B1 PKW:Boolean	1	0/1	0
H254 Winder 1254d / 04E6h Enters the control signal as parameter Block diagr.16 FP-IQ1Z.B150.I10 SIMADYN D:B1 PKW:Boolean	1	0/1	0
H255 Polarity, bias reference value 1255d / 04E7h Enters the control signal as parameter Block diagr.16 FP-IQ1Z.B170.I10 SIMADYN D:B1 PKW:Boolean	1	0/1	0

H256 **Braking characteristic, speed point 1** 1256d / 04E8h Speed, below which the reduced braking torque becomes active. Block diagr.6 FP-SREFZ.BD10.A1 SIMADYN D:N2 PKW:I4	0,006%	0...199,993%	0.1%
H257 **Reduced braking torque** 1257d / 04E9h Braking torque at fast stop and low speed. Block diagr.6 FP-SREFZ.BD10.B1 SIMADYN D:N2 PKW:I4	0,006%	0...199,993%	0%
H258 **Braking characteristic, speed point 2** 1258d / 04Eah Speed, above which the max. braking torque is effective Block diagr.6 FP-SREFZ.BD10.A2 SIMADYN D:N2 PKW:I4	0,006%	0...199,993%	2%
H259 **Maximum braking torque** 1259d / 04Ebh Braking torque at fast stop and high speed. Block diagr.6 FP-SREFZ.BD10.B2 SIMADYN D:N2 PKW:I4	0,006%	0...199,993%	199%
H260 **Comparison value, limit value monitor 1** 1260d / 04Ech Enters the comparison value as parameter Block diagr.10 FP-IQ2Z.G70.X31 SIMADYN D:N2 PKW:I4	0,006%	-200,000%... 199,993%	100%
H261 **Comparison value, limit value monitor 2** 1261d / 04Edh Enters the comparison value as parameter Block diagr.10 FP-IQ2Z.G270.X31 SIMADYN D:N2 PKW:I4	0,006%	-200,000%... 199,993%	100%
H262 **Source, length reference value** 1262d / 04Eeh Selects the source for the length reference value with 100% = 75000[m] Settings 0 - 27, refer to H069 28-30 = 0% 31 = 199% Block diagr.12 FP-IQ1Z.AI328.XCS SIMADYN D:O2 PKW:O2	1	0 ... 31	31
H263 **Motorized potentiometer 2, fast rate of change** 1263d / 04Efh Ramp-up and ramp-down times are parameterized together; the fast rate of change is initiated, if the raise or lower control commands are present for longer than 4s. Block diagr.19 FP-IQ2Z.M590.X2 SIMADYN D:R2 PKW:O4		32..524288ms	25000ms
H264 **Motorized potentiometer 2, normal rate of change** 1264d / 04F0h Ramp-up and ramp-down times are parameterized together Block diagr.19 FP-IQ2Z.M590.X1 SIMADYN D:R2 PKW:O4		32..524288ms	100000ms
H265 **Motorized potentiometer 1, fast rate of change** 1265d / 04F1h Ramp-up and ramp-down times are parameterized together; the fast rate of change is initiated, if the raise or lower control commands are present for longer than 4s. Block diagr.19 FP-IQ2Z.M390.X2 SIMADYN D:R2 PKW:O4		8..131072ms	25000ms
H266 **Motorized potentiometer 1, normal rate of change** 1266d / 04F2h Ramp-up and ramp-down times are parameterized together Block diagr.19 FP-IQ2Z.M390.X1 SIMADYN D:R2 PKW:O4		8..131072ms	100000ms

H267 Select operating mode, motorized potentiometer 1 1267d / 04F3h Motorized potentiometer 1 can be parameterized as simple ramp-function generator 0 = Motorized potentiometer 1 = Ramp-function generator Block diagr.19 FP-IQ2Z.M100.I SIMADYN D:B1 PKW:Boolean	1	0/1	0
H268 Setpoint ramp-function generator operation 1268d / 04F4h Setpoint for H267=1 Block diagr.19 FP-IQ2Z.M120.X2 SIMADYN D:N2 PKW:I4	0,006%	-200,000%... 199,993%	100%
H269 Ramp time, ramp-function generator operation 1269d / 04F5h Ramp-up and ramp-down times are parameterized together Block diagr.19 FP-IQ2Z.M130.X2 SIMADYN D:R2 PKW:O4		8..131072ms	10000ms
H270 Smoothing, analog input X5C 1270d / 04F6h Smoothing time constant, analog input 3 Block diagr.10 FP-IQ1Z.AI51.T SIMADYN D:R2 PKW:O4		8..131072ms	8ms
H271 Smoothing, analog input X5D 1271d / 04F7h Smoothing time constant, analog input 4 Block diagr.10 FP-IQ1Z.AI66.T SIMADYN D:R2 PKW:O4		8..131072ms	8ms
H272 Dead zone for dv/dt calculation 1272d / 04F8h Dead zone to calculate the dv/dt value. All accelerating signals lower than this limit are suppressed. The slowest operational speed ramp generates, for H220, a specific value as accelerating signal. The limit value should lie below this. Example: H220=100[s], slowest ramp = 500[s] ⇒ H272=0.2 * (100[s]/500[s]) * 100% = 4% Block diagr.9 FP-DIAMZ.P147Z.TH SIMADYN D:N2 PKW:I4	0.006%	-200,000%... 199,993%	1%
H273 Torque reference value scaling for the T300 1273d / 04F9h - CUVC, CUMC: H273 = 100%: The values of the torque setpoint at r269 (CUVC, CUMC) and d329/d331 (T300) are the same. - CU2: H273=25%: The values of the torque setpoint at r246 (CU2) and d329/d331 (T300) are the same. - CU3: A torque setpoint is not output. Block diagr.3 FP-IQ1Z.BO22.X2 SIMADYN D:N2 PKW:I4	0.006%	-200,000%... 199,993%	100%
H274 Torque actual value scaling for the T300 1273d / 04Fah - CUVC: H274 = 100%: The values of the torque actual value at r007 (CUVC) and d329/d331 (T300) are the same. - CUMC: H274 = 100%: The values of the torque actual value at K184 are connected to a visualization parameter (CUMC) and d329/d331 (T300) are the same. - CU2, CU3: H274=25%: The values of the torque actual value at r007 (CU2, CU3) and d329/d331 (T300) are the same. Block diagr.3 FP-IQ1Z.BO24.X2 SIMADYN D:N2 PKW:I4	0.006%	-200,000%... 199,993%	100%
H275 Response threshold web breakage detector - indirect tension control 1273d / 04FBh Block diagr.7 FP-TENSZ.T2060.M SIMADYN D:N2 PKW:I4	0.006%	-200,000%... 199,993%	50%
H280 Number shifts for web length calculation 1280d / 0500h Skaleing for web length calculation Block diagr 13 FP-DIAMZ.W90.XD SIMADYN D:O2 PKW:I4	0	0...16384	1

Monitoring parameters:

d300 **Software version, axial winder** 1300d / 0514h Block diagr.4 FP-PARAMZ.VER.Y SIMADYN D:N2 PKW:I4	0,1	A
d301 **Effective web speed setpoint** 1301d / 0515h Block diagr.5 FP-SREFZ.S160.Y SIMADYN D:N2 PKW:I4	0,006%	A
d302 **Actual dv/dt** 1302d / 0516h Block diagr.9 FP-DIAMZ.P500.Y2 SIMADYN D:N2 PKW:I4	0,006%	A
d303 **Speed setpoint** 1303d / 0517h Block diagr.6 FP-SREFZ.NC122.Y SIMADYN D:N2 PKW:I4	0,006%	A
d304 **Sum, tension/position reference value** 1304d / 0518h Block diagr.8 FP-TENSZ.T1525.Y SIMADYN D:N2 PKW:I4	0,006%	A
d305 **Output, motorized potentiometer 1** 1305d / 0519h Block diagr.19 FP-IQ2Z.M450.Y SIMADYN D:N2 PKW:I4	0,006%	A
d306 **Output, motorized potentiometer 2** 1306d / 051Ah Block diagr.19 FP-IQ2Z.M650.Y SIMADYN D:N2 PKW:I4	0,006%	A
d307 **Speed actual value** 1307d / 051Bh Block diagr.13 FP-IQ1Z.AI325.Y SIMADYN D:N2 PKW:I4	0,006%	A
d308 **Variable moment of inertia** 1308d / 051Ch Block diagr.9 FP-DIAMZ.P350.Y SIMADYN D:N2 PKW:I4	0,006%	A
d309 **Actual web length** 1309d / 051Dh Block diagr.13 FP-DIAMZ.W410.Y 100%=75000[m] SIMADYN D:N2 PKW:I4	4.0m	A
d310 **Actual diameter** 1310d / 051Eh Block diagr.9 FP-DIAMZ.D1710.Y SIMADYN D:N2 PKW:I4	0,006%	A
d311 **Tension actual value, smoothed** 1311d / 051Fh Block diagr.7 FP-TENSZ.T641.Y SIMADYN D:N2 PKW:I4	0,006%	A
d312 **Pre-control torque** 1312d / 0520h Block diagr.9 FP-DIAMZ.P1060.Y SIMADYN D:N2 PKW:I4	0,006%	A
d313 **Output, tension control** 1313d / 0521h Block diagr.8 FP-TENSZ.T1960.Y SIMADYN D:N2 PKW:I4	0,006%	A
d314 **Pre-control torque, friction compensation** 1314d / 0522h Block diagr.9 FP-DIAMZ.P910.Y SIMADYN D:N2 PKW:I4	0,006%	A
d315 **Free for expansion** 1315d / 0523h Block diagr.- FP-IQ2Z.D15.Y SIMADYN D:N2 PKW:I4	0,006%	A
d316 **Pre-control torque, inertia compensation** 1316d / 0524h Block diagr.9 FP-DIAMZ.P550.Y SIMADYN D:N2 PKW:I4	0,006%	A

d317 **Sum, tension actual value** 1317d / 0525h Block diagr.7 FP-TENSZ.T645.Y SIMADYN D:N2 PKW:I4	0,006%	A
d318 **Tension actual value, D component** 1318d / 0526h Block diagr.7 FP-TENSZ.T644.Y SIMADYN D:N2 PKW:I4	0,006%	A
d319 **Tension controller output** 1319d / 0527h Block diagr.8 FP-TENSZ.T1790.Y SIMADYN D:N2 PKW:I4	0,006%	A
d320 **Analog input 1, X5 terminals 501/502** 1320d / 0528h Block diagr.10 FP-IQ1Z.AI20.Y SIMADYN D:N2 PKW:I4	0,006%	A
d321 **Analog input 2, X5 terminals 503/504** 1321d / 0529h Block diagr.10 FP-IQ1Z.AI35.Y SIMADYN D:N2 PKW:I4	0,006%	A
d322 **Analog input 3, X5 terminals 505/506** 1322d / 052Ah Block diagr.10 FP-IQ1Z.AI50.Y SIMADYN D:N2 PKW:I4	0,006%	A
d323 **Analog input 4, X5 terminals 507/508** 1323d / 052Bh Block diagr.10 FP-IQ1Z.AI65.Y SIMADYN D:N2 PKW:I4	0,006%	A
d324 **Analog input 5, X5 terminals 511/512** 1324d / 052Ch Block diagr.10 FP-IQ1Z.AI80.Y SIMADYN D:N2 PKW:I4	0,006%	A
d325 **Analog input 6, X5 terminals 513/514** 1325d / 052Dh Block diagr.10 FP-IQ1Z.AI95.Y SIMADYN D:N2 PKW:I4	0,006%	A
d326 **Analog input 7, X5 terminals 515/516** 1326d / 052Eh Block diagr.10 FP-IQ1Z.AI110.Y SIMADYN D:N2 PKW:I4	0,006%	A
d327 **External web speed actual value** 1327d / 052Fh Block diagr.13 FP-IQ1Z.AI330.Y SIMADYN D:N2 PKW:I4	0,006%	A
d328 **Tension setpoint** 1328d / 0530h Block diagr.7 FP-TENSZ.T1475.Y SIMADYN D:N2 PKW:I4	0,006%	A
d329 **Torque setpoint** 1329d / 0531h Block diagr.6 FP-IQ1Z.RCUX.Y15 SIMADYN D:N2 PKW:I4	0,006%	A
d330 **Torque actual value** 1330d / 0532h Block diagr.20 FP-IQ1Z.RCUX.Y16 SIMADYN D:N2 PKW:I4	0,006%	A
d331 **Torque setpoint smoothed** 1331d / 0533h Block diagr.6 FP-SREFZ.NT130.Y SIMADYN D:N2 PKW:I4	0,006%	A

d332-d334 indicate the internal, active control commands :

d332 Control word 1 1332d / 0534h Bit 0: ON — 1 = active Bit 1: /OFF2 (voltage-free) — 0 = active Bit 2: /OFF3 (fast stop) — 0 = active Bit 3: System start — 1 = active Bit 4: Inhibit ramp-function generator — 1 = active Bit 5: Hold ramp-function generator — 1 = active Bit 6: Enable setpoint — 1 = active Bit 7: Acknowledge fault — 1 = active Bit 8: Inching 1 — 1 = active Bit 9: Inching 2 — 1 = active Bit 10: Control from CS — 1 = active Bit 11: Tension controller on — 1 = active Bit 12: Inhibit tension controller — 1 = active Bit 13: Standstill tension on — 1 = active Bit 14: Set diameter — 1 = active Bit 15: Hold diameter — 1 = active Block diagr.- FP-IQ1Z.B210.QS SIMADYN D:V2 PKW:V2	0001 Hex	A
d333 Control word 2 1333d / 0535h Bit 0: Switch-in supplementary setpoint — 1 = active Bit 1: Local positioning — 1= active Bit 2: Motorized potentiometer 2, raise — 1 = active Bit 3: Motorized potentiometer 2, lower — 1 = active Bit 4: Local operator control — 1 = active Bit 5: Local stop — 1 = active Bit 6: Local run — 1 = active Bit 7: Local crawl — 1 = active Bit 8: Manouver — 1 = active Bit 9: Stop V_{set} setting — 1 = active Bit 10: Motorized potentiometer 1, raise — 1 = active Bit 11: Motorized potentiometer 1, lower — 1 = active Bit 12: Reset length computer — 1 = active Bit 13: Tachometer — 1 = active Bit 14, 15 = 0 — unused Block diagr.- FP-IQ1Z.B220.QS SIMADYN D:V2 PKW:V2	0001 Hex	A
d334 Control word 3 1334d / 0536h Bit 0: Winding from below — 1 = active Bit 1: Polarity, bias reference value — 1= active Bit 2: Winder — 1 = active Bit 3: Gearbox stage 2 — 1 = active Bit 4: Transfer setpoint A — 1 = active Bit 5: Transfer setpoint B — 1 = active Bit 6 - 15 = 0 — unused Block diagr.- FP-IQ1Z.B230.QS SIMADYN D:V2 PKW:V2	0001 Hex	A

d335 Status word 1 1335d / 0537h Bit 0: Ready to power-up 1 = active Bit 1: Ready 1 = active Bit 2: Operation enabled 1= active Bit 3: Fault 1 = active Bit 4: OFF2 0 = active Bit 5: OFF3 0 = active Bit 6: Switch-on inhibit 1 = active Bit 7: Alarm 1 = active Bit 8: Setpoint/actual value difference within tolerance 1 = active Bit 9: Control requested 1 = active Bit 10: f/n limit reached 1 = active Bit 11: Converter-specific 1 = active Bit 12: Speed controller at its limit 1 = active Bit 13: Tension controller at its limit 1 = active Bit 14: Converter-specific 1 = active Bit 15: Converter-specific 1 = active Block diagr.- FP-CONTZ.SE120.QS SIMADYN D:V2 PKW:V2	0001 Hex	A
d336 Status word 2 1336d / 0538h Bit 0: Controller enable, system oper. 1 = active Bit 1: Local stop 1 = active Bit 2: OFF3 0= active Bit 3: Operating mode, local run 1 = active Bit 4: Operating mode, local crawl 1 = active Bit 5: Oper. mode, local inching forw. 1 = active Bit 6: Oper. mode, local inching reverse 1 = active Bit 7: Operating mode, local positioning 1 = active Bit 8: Speed setpoint is zero 1 = active Bit 9: Web break 1 = active Bit 10: Tension control on 1 = active Bit 11: Operating mode, system oper. 1 = active Bit 12: Standstill 1 = active Bit 13: Output, limit value monitor 1 1 = active Bit 14: Output, limit value monitor 2 1 = active Bit 15: Local operation/system operation = 1/0 Block diagr.- FP-CONTZ.C245.QS SIMADYN D:V2 PKW:V2	0001 Hex	A
d337 Alarms from T300 1337d 0539h Bit 0: Overspeed, positive 1 = active ⇒ A097 Bit 1: Overspeed, negative 1 = active ⇒ A098 Bit 2: Overcurrent, positive 1= active ⇒ A099 Bit 3: Overcurrent, negative 1 = active ⇒ A100 Bit 4: Drive stalled 1 = active ⇒ A101 Bit 5: Receive, CU faulted 1 = active ⇒ A102 Bit 6: Receive, CB faulted 1 = active ⇒ A103 Bit 7: Receive, PTP faulted 1 = active ⇒ A104 Bit 8 - 15 = 0 Block diagr.20 FP-CONTZ.SU150.QS SIMADYN D:V2 PKW:V2	0001 Hex	A

d338 Faults from T300 1338d / 053Ah Bit 0: Overspeed, positive 1 = active ⇒ F116 Bit 1: Overspeed, negative 1 = active ⇒ F117 Bit 2: Overcurrent, positive 1 = active ⇒ F118 Bit 3: Overcurrent, negative 1 = active ⇒ F119 Bit 4: Drive stalled 1 = active ⇒ F120 Bit 5: Receive, CU faulted 1 = active ⇒ F121 Bit 6: Receive, CB faulted 1 = active ⇒ F122 Bit 7: Receive, PTP faulted 1 = active ⇒ F123 Bit 8 - 15 = 0 Block diagr.16 FP-CONTZ.SU170.QS SIMADYN D:V2 PKW:V2	0001 Hex	A
d339 Correction factor, material thickness 1339d / 053Bh Block diagr.9 FP-DIAMZ.P290.Y SIMADYN D:N2 PKW:I4	0,006%	A
d340 Compensated web speed 1340d / 053Ch Block diagr.5 FP-SREFZ.S170.Y2 SIMADYN D:N2 PKW:I4	0,006%	A
d341 Actual bias reference value 1341d / 053Dh Block diagr.5 FP-SREFZ.S395.Y SIMADYN D:N2 PKW:I4	0,006%	A
d342 Positive torque limit 1342d / 053Eh Block diagr.6 FP-SREFZ.NC005.Y SIMADYN D:N2 PKW:I4	0,006%	A
d343 Negative torque limit 1343d / 053Fh Block diagr.6 FP-SREFZ.NC006.Y SIMADYN D:N2 PKW:I4	0,006%	A
d344 Web speed setpoint 1344d / 0540h Block diagr.5 FP-SREFZ.S490.Y SIMADYN D:N2 PKW:I4	0,006%	A
d345 Actual Kp adaption factor, speed controller 1345d / 0541h Block diagr.6 FP-SREFZ.NC035.Y SIMADYN D:N2 PKW:I4	0,006%	A
d346 Actual Kp, tension controller 1346d / 0542h Block diagr.8 FP-TENSZ.T1770.Y SIMADYN D:E2 PKW:I4	0,007	A
d347 Control word, PTP 1347d / 0543h Block diagr.14 FP-IQ1Z.STWPTP.Y SIMADYN D:N2 PKW:I4	0,006%	A
d348 Status word 2 from the CU 1348d / 0544h Block diagr.- FP-IQ1Z.RCUX.Y14 SIMADYN D:V2 PKW:V2	0001 Hex	A
d349 Web speed actual value, web tachometer 1349d / 0545h Block diagr.13 FP-IQ1Z.B207A.Y SIMADYN D:N2 PKW:I4	0,006%	A
d350 Braking travel 1350d / 0546hh Block dagr.13 FP-DIAMZ.W94.Y 100%=75[km] SIMADYN D:N2 PKW:I4	0,006%	A

d361 Module type, standard software package 1361d / 0551h The value is 320 for module type MS320. Block diagr.4 FP-PARAMZ.MODTYP.Y SIMADYN D:N2 PKW:I4	1	A

H998 Drive number 1998d / 07Ceh Number of the drive for reference Block diagr.4 FP-PARAMZ.DRNR.X SIMADYN D:O2 PKW:O2	1	0..32767	0

7 Basic drive converter parameters

The closed-loop speed and torque control is implemented on the basic drive converter (control mode-speed control, CUVC: P100=4; CU2: P136=4). The sum of the speed setpoints is switched-in directly in front of the speed controller; the ramp-function generator on the technology board is used and the torques input as supplementary torques or as limits.

Advantages: System configuration optimized for speed, lowest possible dead times;
the speed controller optimization function of the basic drive converter can be used;
the drive can be initially commissioned without the technology board.

The parameterization for SIMOVERT VC and MC drive converters with the CUVC and CUMC modules is described in Section 7.1. In Section 7.2, this is then followed by the parameterization of the SIMOVERT VC and SC drive converters with the predecessor modules CU2 and CU3.
There are no control-related differences between the current and the predecessor modules, which are of significance for this standard software package.
All of the optimization runs required should be made before the T300 is commissioned.
It is absolutely necessary to enter the following parameters, if a functioning winder is required.

Parameterlist for the SIMOVERT VC, SC and MC base converter using the MS380 axial winder software
Remarks:

Attention:

It is absolutely necessary to set base converter parameters according to the following list. Otherwise the correct functioning of the winder cannot be guaranteed!

- These parameters are best entered after the basic drive has been commissioned. The rated drive converter speed for winding operation should, in this case be already set, also refer to the following parameter list (CUVC, CUMC: P100=4; CU2, CU3: P163=4).
- This list assumes, that, in addition to the parameters, which are required for closed-loop speed control operation, that there is also a factory setting. We recommend that the complete speed range of the winder drive (e. g. via the operator panel at the drive converter (PMU)) is run-through, and only then that the parameters, relating to winder operation, are set.
- Indexed parameters: Always enter index 1 (or the same index).

7.1 Parameterizing SIMOVERT VC and MC using the CUVC and CUMC modules

- A differentiation should be made between the SIMOVERT VC and MC devices:

If no column is appropriately marked: The parameters for VC and MC are the same
Column VC Only for SIMOVERT VC
Column MC Only for SIMOVERT MC

Basic drive parameters which should be set					
Parameter	VC	MC	Significance	Comment	Setting
P100	X		Control type		4
P554			Source, ON/OFF1 command	STW1.0	3100
P555			Source OFF2 command	STW1.1	3101
P558			Source OFF3 command	STW1.2	3102
P561			Source inverter enable	STW1.3	3103
P566			Source, acknowledge error	STW1.7	3107 2)
P352	X		Rated system frequency		1)
P353		X	Rated system speed		1)
P232			KP adaption factor		3008
P443			Source, speed setpoint		3002
P452			Maximum frequency/ speed RDF		1.1 x rated system frequency/ speed = 110%
P453			Maximum frequency/ speed LDF		-1.1 x rated system frequency/ speed = 110%
P456	X		Suppression bandwidth		0
P462			Acceleration time		0
P464			Deceleration time		0
P466	X		OFF3 deceleration time		Required time
P469			Initial rounding-off		0
P470	X		Final rounding-off		0
P354			Rated torque		Rated motor torque (Nm)
P492	X		Positive torque limit		P492 = H147
P493	X		Source, positive torque limit		3006
P498	X		Negative torque limit		P498 = -(H147)
P499	X		Source, negative torque limit		3007
P506	X		Supplementary torque setpoint		3005
P263		X	Positive torque limit		P263 = H147
P265		X	Source, positive torque limit		3006

P264		X	Negative torque limit		P264 = -(H147)
P266		X	Source, negative torque limit		3007
P262		X	Supplementary torque setpoint		3005
P233	X	X	N. controller, adaptation 1		0% 4)
P234	X	X	N. controller, adaptation 2		200% 4)
P235	X	X	N. controller KP1		0 4)
P236	X	X	N. controller KP2		H152 4)
P734.01			Status word 1		32
P734.02	X		Speed actual value		148
P734.02		X	Speed actual value		91
P734.04			Status word 2		33
P734.05	X		Torque setpoint, basic drive to T300		165
P734.06	X		Torque actual value, basic drive to T300		24 for CUVC 184 for CUMC 3)

Table 7.1: Basic drive converter parameters which should be set.

Comments:

1) Example for P352,VC:
Rated winder speed (axis speed at 100% speed setpoint and minimum diameter) :
2759 rev/min (corresponds to 100 % at r447 or r229)
Motor data: 4-pole motor: 50 Hz corresponds to 1500 RPM, without slip
Parameters to be set: P352 = 2759 RPM x 50 Hz / 1500 RPM = 91,97 Hz
Example for P353,MC:
Rated winder speed: 1778 RPM (corresponds to 100% at r461 or r229)
Parameters to be set: P353 = 1778 RPM

2) The binary command acknowledge via terminal (not for PROFIBUS DP) must be connected at the basic drive, refer to e. g. Fig. 3.1.

3) For MASTERDRIVES MC, instead of the torque actual value, the actual value of the torque-generating current ISQ(act) = K184 should be used.

4) Parameters P233 to P236 should be set corresponding to the data in Section 8.2.4.1.
The following parameters are permanently set on the T300:
H150=0%; H152=199,99%; H151=0 and H153=19,99. This setting means that the variable moment of inertia, calculated on Sheet 9 of the Block diagram, is directly transferred to the basic drive.

7.2 Parameterizing SIMOVERT VC and SC with the CU2 and CU3 modules

- There are the following differences between the VC and SC type converters (notice the special handling of H203, winder mode):

No column marked by an "X": Identical Parameter values fpr VC and SC regardless of the H203 setting.

VC column marked: Parameter value applies only for VC and SC regardless of the H203 setting

SC (N) column marked: Parameter value applies for SIMOVERT SC in "speed-trim" mode only (via basic unit technology controller), H203≥3. This is the preferable mode for SC.

SC (I) column marked: for SIMOVERT SC in "current limiting" winder mode (H203 ≤ 2).

Base Converter Parameters which must be adjusted (N) = "Speed-Trim" control mode, (I) = "Current-Limiting" control mode						
Para- meter	VC	SC (N)	SC (I)	Meaning	Remarks	Set Value
P90				Register T300 with MS320		2 3)
P91				Register CB1		only, when CB1 present: P91=1 when no CB1:P91=0 3)
P163				Open-loop/closed-loop contrl.sel.		4 5)
P554				Source, OFF1	CW1.0	3001
P555				Source, OFF2	CW1.1	3001
P558				Source, OFF3	CW1.2	3001
P561				Source, inverter enable	CW1.3	3001
P566				Source, acknowledge via CB1	CW1.7	3001 2)
P420	X 	 X	 X	VC: rated frequency SC: rated speed		1)
P226	X			Source, controller adaption VC		3008
P546		X		Source, conroller adaption SC		3008
P443	X		X	Source, main setpoint		3002
P443		X		Source, main setpoint		0
P452				Maximum frequency FDW		1,1*P420
P453				Maximum frequency REV		-(1,1*P420)
P456	X			Skip frequency skip		0
P462				Acceleration time		0
P464				Deceleration time		0
P466	X			Deceleration time OFF3		required time
P469	X			Initial rounding-off		0
P470	X			Final rounding-off		0
P485				System rated torque		100,00%
P492				Fixed upper torque limit		P492=H147
P493				Source, upper torque limit		3006
P498				Fixed lower torque limit		P498=-(H147)
P499				Source, lower torque limit		3007
P506				Source, supplem.torque setpoint		3005
P517				Deviation frequency		H203≥3: 0,1*fmax/0,1*nmax H203≤2: (1,5*H145)*(fmax)/(nmax)
P308		X	X	Sampling time		1.2 4)
P486		X		Source, torque setpoint		1020

P526		X		Source, setpoint tech. controller		3002
P530		X		Actual value tech. controller		219
P531		X		Source, act. value tech.controller		1100
P541		X		Tech. contrl. output limitation 1		P541=H147
P542		X		Tech. contrl. output limitation 2		P542=-(H147)
P584		X		Source, enable tech. controller	CW2.24	1
P587		X		Source master/slave		1
P694.001				Status word 1		968
P694.002				Actual speed		VC:214 SC:219
P694.003				not used		0
P694.004				Status word 2		553
P694.005				Torque setpoint from base unit to T300		VC:246 SC:0, not present
P694.006				Torque act. value from base unit to T300		007

Table 7.2: Basic drive converter parameters which should be set

Remarks:

1) Example for determining the correct value of P420, VC:
   Rated winder speed (Rotational speed at 100% linespeed reference and minimum diameter):
   2759 rpm (corresponding to 100% at r447 or r223)
   Motor data: 4-pole motor; 50 Hz line frequency. This results to a "synchronous speed" of 1500 rpm, slip not taken into account.
   Set value of P420: P420 = 2759 rpm * 50Hz / 1500 rpm = 91,97 Hz
   Example for P420, SC:
   Rated winder speed: 1778 rpm rotational speed (corresponds 100% at r447 or r223)
   Set value for P420: P420 = 1778 rpm
2) Hook up the binary "Fault Acknowledge" command to a base converter terminal (not for PROFIBUS-DP), e.g. refer to Fig. 3.1.
   Don't use a T300 terminal for this purpose!
3) Setting only with P52=4, hardware configuration possible, see inverter instruction manual
4) Setting only with P52=5, drive set-up possible, see inverter instruction manual
5) When entered P587=1, the setting of P136 changes to 5 (applicable only to SC with speed correction)

Information regarding SIMVERT SC:

- The "Speed-Trim" winder control mode is generally recommended for the SIMOVERT SC converter (H203 $\geq$ 3), even if a load cell is employed in your application.
- kp with H203 $\geq$3
  - kp is set, as usual, via the T300 board (see section 8.2.4 and the block diagram, page 6).
  - the effective kp for the speed controller of the basic unit (technology controller) can be checked via the observation parameter r547.
  - Note:
    r547=P537 (shown value of d345) / 10
    Example P537=30; read value of d345=1. => r547=3 => effective kp=3.
  - recommended starting value for the technology controller:
    P537=30: integral time constant: P538=0,5

7.3 Free function blocks CUVC, CUMC

Free blocks can be used in SIMOVERT MASTERDRIVES CUVC and CUMC, to realise additional function (logic functions with logic blocks, calculation with numeric function blocs...).
To enable function blocks to carry out processing, a time slot (sampling time) must be assigned to each function block. Depending on the number and frequency of the blocks to be processed, the microprocessor system of the units has a varying degree of utilization.

The visualization parameter r829 has to be selected after enabling function blocks for displaying the free calculating time. The reserve of the microprocessor system in the basic unit should not be lower than 5 - 10%.
If this is not the case, please make shure all the enabled function blocs are really necessary, or if some function blocs may be assigned to different time slots.

8 Commissioning the winder

Information is provided in this section which permits fast start-up of the axial winder.

WARNING

Only commence with the start-up work if there are adequate, effective measures for safe electrical and mechanical operation of the equipment and drives.
Ensure that all of the safety and EMERGENCY OFF signals are connected and are functioning absolutely perfectly so that the drive can be disabled and shutdown at any time.

– Note:
  In this Section, it is assumed, that Section 7 was conscientiously followed.
  Only then is it possible to commission the winder.

8.1 Commissioning information

All of the settings to parameterize the standard software package are realized using technological parameters "Hxxx".

The standard software package monitors communications to Basic drive converter (CU), to the communications interface (CB) and to its own serial peer to peer interface.
Faults/errors are always signaled as alarm; they can be suppressed using H011.
Fault messages/signals are only generated if the appropriate coupling had already signaled at some stage error-free operation; suppression is possible using H012.
Alarm A103 is always generated if the interface board is not inserted.

8.1.1 Equipment required

The standard axial winder software package can be parameterized in three ways:
- Using the PMU drive operator control panel,
- using a PG/ a PC with SIMOVIS, via the basic drive interface (this is the preferred procedure) and
- via PROFIBUS DP.

An **oscilloscope** should be available to evaluate the control performance and if required to check the pulse encoder signals. A handheld tachometer must also be available to calibrate the web speed. Additional equipment (e. g. battery box) might be required depending on the system-specific requirements.

8.1.2 Commissioning using the basic converter operator control panel

It is possible to commission the equipment by just using the basic converter operator control panel. It can take a long time to change parameters over a wide value range, as the parameter values can only be changed using the raise/lower keys. However, it is only possible to perfectly keep track of the modified parameters in a handwritten form. In order to eliminate any errors, we recommend that with SIMOVIS, you generate a file of the modified parameters is generated.

8.1.3 Commissioning with SIMOVIS for Windows

Up to Simovis V5.1, the T300 parameterization can be done with SIMOVIS, like the base units thrue the PMU connection. Please refere to section 8.1.3.3.

8.1.3.1 Creating the data base for a technology type.

In order to parameterize every drive and technology type, SIMOVIS requires exact information about the number and characteristics of the available parameters, e.g. parameter numbers, value limits, etc.. This information is stored in data base files.

If a T300 with „unknown“ data base is connected (data base not available in SIMOVIS), the necessary technology data base may be created online.

In both cases it is assumed that the communication to the drives is intact.

<u>Preconditions:</u>

- For the learn process the technology type’s parameter set should be reset to the factory settings (refer to parameter H250).

If during the learn process the technology type’s parameter set was not reset to the factory settings, the functions refer to the status of the technology type when the data base was created and not to the factory settings.

Note: It is recommened, but not essential, that step as described above is carried out. During the learn procedure SIMOVIS also generates a file (by upreading), which is interpreted during offline mode to be the factory setting of a technology type. This file is used for example:

- when opening an offline file as the basis for the factory setting,
- when printing a parameter set, where only the changes compared with the factory setting are to be printed.

- The dialogue to create the data base of a technology type will only be displayed if the base unit, to which SIMOVIS is connected, has a slot for technology boards (MASTERDRIVES Compact units).

- If the technology board has to be registered to the base unit by parameterization (MASTERDRIVES with CU2 or CU3: parameters P90 or P91) the „learning“ process will only start if the technology board is registered.

Proceed as follows:

1. For MASTERDRIVES with CU2 or CU3 the technology board has to be registered

2. Reset the technology board to the factory setting.

In the nenu BUS CONFIGURATION:

3. Dependant on the Baud rate, increase the "number of request repeats" under the "extended" tab(refer to section 8.1.3.3.).

4. Select the drive by clicking on the lefthand mouse key, and establish the connection (clicking toolbar „connect. On/Off). The communication to the drives is intact if this toolbar changes to green colour.

5. Disconnect other drives (if available) to reduce the time required for the „learning process“.

6. Disconnect all other communication systems (Profibus, Peer-to-Peer) for example by pulling off the connecting plug.

7. In the function bar, click on the button „Create data base“ or
7. Select the menu Edit > Create („learn“) data base.

8. In the „Create data base“ dialogue (in the „technology type“ folder), the bus address, type and SW version of the connected base unit can be checked. In the dropdown list box „Name technology type“, select (or enter) the name of the technology type to be learned (default name: TECHN000). If a name is selected, which already exists, the data base will be overwritten by the new one.

   The technology type T300 to be learned does not make use of parameters 3000 ...3999, deactivate the checkbox „L/c parameters“. The „learning“ time will then be significantly reduced.

9. Click on the Start button to start creating the technology type data base

-The following „learn“ process will take several minutes. Progress can be monitored in the displayed dialogue. Upon successful completion, the new technology type is available for all drives (which have a slot for technology boards) in the Add drive or Change drive dialogue. The drive should now be disconnected, and the new technology type selected in the „Change drive“ dialogue.

Note: Should errors be detected at the end of the learn procedure, then further information can be displayed by clicking on the „details“ button. The cause of the errors (e.g. restricted parameter access) should be corrected and the learning process repeated.

8.1.3.2 T300 parameterization

After a technology data base has been created, the T300 can be parametrized with SIMOVIS.
(Please refer to the SIMOVIS help system if you require further information).

- Parameter list complete
  opens a parameter table (same structure as standard parameter table) with all of the parameters of the drive type, which is assigned to the actual drive window. (H and d parameter are displayed after the base unit parameter P and r)
  Double click somewhere in the appropriate line of the table to change the parameter value.

- Free parameterization:
  opens a parameter table, where parameters can be individually listed by entering parameter numbers (e.g. H010 or d303, resp. 1010 or 1303).
  Double click somewhere in the appropriate line of the table to change the parameter value.

- Download: The parameter set (Upread files, offline generated files) can be directly saved in the RAM or EEPROM memory of the drive.
  When downloading, the actual parameter values in the drive are overwritten by the parameter values in the parameter set.

8.1.3.3 Important notes

Note 1: Dependant on the Baud rate, increase the "number of request repeats" under the "extended" tab.

Empirical values:
38400 Baud: Number of request repeats = 200
19200 Baud: Number of request repeats = 100
9600 Baud: Number of request repeats = 50

Refer to: online help (BUSKON): Help topics > Editing projects
> Configuring the interface.

Note 2: Disconnect other drives (if available) to reduce the time required for the „learning process“.
Disconnect all other communication systems (Profibus, Peer-to-Peer) for example by pulling off the connecting plug.

Note 3: If more serial interfaces are used addition to SIMOVIS (e.g. Profibus and T300 Peer-to-Peer interface), the Peer-to-Peer baud rate should be set to values ≤ 19200 Bauds (H245 ≤ 7).
A simultaneous data transmission with several interfaces (and high baudrates) can, under these circumstances, cause a T300 overload.

8.1.4 Establish factory setting

This is usally not necessary because the memory modules (MS320) are shipped with factory setting. Factory setting can be established if there is something which is not clear about the parameter settings.

Factory setting is established by the following (the SIMOVIS kind of storage (RAM or EEPROM) is without significance):

H250=165
H160 change from 0 to 1
switch off the drive

Note:
Factory settings of the parameters are valid only after having switched off and on the drvie.
It is recommended to reset H160 afterwards.

Procedure when the EEPROM is full (parameter changes no longer possible):

Establish the factory setting with SIMOVIS:

- click on the RAM symbol in the main menu, to change the SIMOVIS data save type to save the parameters in the RAM
- establish the "factory setting" as described above.
- click on the EEPROM symbol in the main menu so that the parameters are saved in the EEPROM (non volatile data save).

Establish the factory setting with PROFIBUS-DP:

- Essentially the same as already described.

Establish the factory setting with the PMU:

- This is not possible if the parameter memory is **full**.

Comments:

- If the EEPROM is full, the "KON: Error when writing" message appears in SIMOVIS in the parameter lists, and when downloading in the DOWNLOAD window, the „Not written:xxx“ message.

The EEPROM (parameter memory) cannot become full if the standard axial winder software package was not changed!

8.2 Commissioning the winder functions

8.2.1 Checking the speed actual value adjustment

Principle of the speed actual value adjustment: The maximum speed is available at the maximum web speed and minimum diameter (also refer to Section 4.20).

$n = n_{max}$, if web speed = 100% and
diameter = D_{core} = H222

Procedure:

- The nominal speed has to be set in the base drive converter.
  This value can be calculated:

$$n\ [1/min] = \frac{1000 \ * \ V_{Max}\ [m/min] * \text{Gear ratio}}{D_{Core}\ [mm] \ * \ \Pi}$$

  This calculated value has to be set in the base drive converter as rated speed, resp. after conversion as rated frequency.

  This setting has to be checked !

Caution:
A condition for a proper diameter calculation is a correct speed actual value calibration !

- Insert a mandrel (empty core).
- The winder is operated without material web.
- Enter the actual diameter as setting value and select using H089, activate the setting command (H024=4), check using d310. Generally, the core diameter H222 is used here as reference (empty core), and in this case, H089 should be set to 28.
- Speed-controlled winder operation:

  - If possible use the central machine ramp function generator (Run mode, Tension controller OFF)

  - e.g. by selecting local operation and local inching forwards. The required inching setpoint is entered using H143. H146 = 0 selects the speed controled, local operation.

- Ramp-up the web speed setpoints to a defined value, e.g. 100% (check at d344).
- Check the circumferential speed at the winder using a handheld tachometer.
- If required, correct the speed calibration (refer to Section 4.20)

  Caution: After every significant change in the speed actual value calibration, the speed controller must be re-optimized using an empty roll.

- Check the torque direction. When the winder rotates in the web direction and "winding from above", the speed actual value and torque setpoint must be positive, refer to Section 5.9.

8.2.2 Friction torque compensation (block diagram 8)

Notes:

- The friction component is generally dependent on the winder shaft speed. For most winder designs, the effect of the wound material weight only has a small influence.
- The friction compensation can only compensate friction values, which are dependent on the speed, but otherwise cannot be changed. Frequently, for especially high gearbox ratios, the friction torque is very dependent on the gearbox temperature. This may mean that the friction compensation can only be set with difficulty or not at all.
- For some gearbox designs, high winder mandrel speeds cause the gearbox temperature to rise. This temperature rise results in a significantly changed friction torque. It is recommended that the measuring time to plot the friction characteristic is kept as short as possible; high winder shaft speeds also only occur briefly.
- Under certain circumstances, it will be necessary to post-optimize the friction characteristic after first start-up. (from experience the winder has run-in after 2-30 operating hours).
- Friction compensation should be set, especially for indirect closed-loop tension control configurations, or this is not necessary if the measured motor torques lie |3% over the complete speed range.
- When using a tension transducer or dancer roll, it is often not necessary to parameterize the friction characteristic. However, it significantly simplifies the setting of the inertia compensation and the tension precontrol.

The winder is operated without material web when plotting the friction characteristic.

Caution: If the friction compensation is set too high, the winder can just start to run, and during unwinding with indirect closed-loop tension control, can lead to slack in the material web.

8.2.2.1 Friction characteristic

– Insert a mandrel (empty core).

– The winder is operated without material web.

– Enter the actual diameter as setting value and select using H089, activate the setting command (H024=4), check using d310. Generally, the core diameter H222 is used here as reference (empty core), and in this case, H089 should be set to 28.

– The feed-forward control for inertia compensation is disabled with H227=0% and H228=0% (pre-settings).

– Operate the winder in the closed-loop speed controlled mode:

1) - If possible use the central machine ramp function generator (Run mode, Tension controller OFF)

- Check the entered setpoint at d307, speed actual value.

- In the base drive converter observe the integral component of the speed controler output. Set the values H230 to H235 to reach speed controller integral component < 2%.

2) - e.g. select local operation and local inching forwards. The required inching setpoint is entered using H143. H146 = 0 selects local closed-loop speed controlled operation.

- Check the entered setpoint at d307, speed actual value.

- Read-off the torque setpoint at d331, and enter the value read into H230 to H235.. The torque setpoint display is smoothed using H265; basic setting 0.5 s.

– The measured result should only be evaluated after 10-20 seconds (Acceleration/ deceleration completed)

Speed d307	Setting:
0 %	Select H230, so that the winder just starts to run, or comes to a standstill by itself at low speeds
20 %	Enter the value read at d331 into H231, resp. set H231 to reach speed controller integral component < 2%.
40 %	Enter the value read at d331 into H232, resp. set H232 to reach speed controller integral component < 2%.
60 %	Enter the value read at d331 into H233, resp. set H233 to reach speed controller integral component < 2%.
80 %	Enter the value read at d331 into H234, resp. set H234 to reach speed controller integral component < 2%.
100 %	Enter the value read at d331 into H235, resp. set H235 to reach speed controller integral component < 2%.

- after the points for the friction characteristic have been entered, the calibration at various speeds should be checked. After acceleration, the torque setpoint, monitored at d331, or the integral component of the speed controler output should be ≤2%.

8.2.3 Inertia compensation (block diagram 8)

Note: Inertia compensation should be used for winders with indirect closed-loop tension control and for direct closed-loop tension control with tension transducer, as long as the accelerating torque cannot be neglected.
For closed-loop dancer controls, inertia compensation is generally not required.

General procedure for inertia compensation:

- the winder is operated without "material web".
- gearbox stage 1 is always selected.
- enter the actual diameter as setting value and select using H089, activate the setting command (H024=4) and check using d310.
- operate the winder in the closed-loop speed controlled mode

  1) - if possible use the central machine ramp function generator (Run mode, Tension controller OFF)

  - then select H220 also corresponding to the winder accelerating time

  - during acceleration, observe d302, if necessary adjust H272 and H223.

    - during acceleration, a stable positive value should be displayed on d302.

    - during deceleration, a stable negative value should be displayed on d302.

- In case of external dv/dt, select the source using H077 and H226. The setting of H220 is not required in this case.

  2) - e.g. by selecting local operation and local inching forwards. The required inching setpoint is entered using H143. Using H146=0, local closed-loop speed controlled operation is selected.

  - enter a ramp-up time at H161, which roughly corresponds to the winder accelerating time.

  - then select H220 also corresponding to the winder accelerating time

  - a ramp-up function is started by activating the inching command, and the torque setpoint is monitored during acceleration using d331. The torque setpoint average is generated in the interval between 10 and 90% of the entered setpoint.

8.2.3.1 Constant moment of inertia, H228

It is recommended that the fixed moment of inertia according to Section 5.2.1 is calculated.

H228 is determined by accelerating along a defined ramp:

- disable the influence of the variable moment of inertia using H227=0%.
- insert a mandrel, set the core diameter (H024=4) and check at d310.
- 1) operate the winder in the closed-loop speed controlled mode, if possible use the central machine ramp function generator (Run mode, Tension controller OFF).
  During acceleration, observe the integral component of the speed controler output.
  Set H228 to reach speed controller integral component < 2%.
  - repeat the measurement, the value displayed at d331 must now be very low (< 2%).
- 2) enter a setpoint with H143 and activate the command "local inching forwards"

  - read-out d331 in the range from 10-90% of the setpoint.

  - enter the monitored average value at H228; if H161 and H220 are parameterized differently, the ratio of H161 to H264 must be taken into account, refer to Section 5.2.1.

  This method is to use only if the case 1) is not possible. With method 2) H228 can be set, but a checking of the setting is not possible, the dv/dt signal is not generated in local mode.

Note: Different values at d331 at ramp-up and ramp-down indicate a friction component which is not precisely compensated.

8.2.3.2 Variable moment of inertia, H227

Also here, it is recommended that parameter H227 is first calculated, corresponding to Section 5.2.2. For gearboxes with high ratios, frequently, the variable moment of inertia component can be neglected.

Determine H227 by accelerating along a defined ramp:

- insert, if possible, a full roll, set the diameter to the actual value, and check at d310. Enter the web width (H079, if possible 100%), and the material web density (H224, if possible 100%).

- 1) operate the winder in the closed-loop speed controlled mode, if possible use the central machine ramp function generator (Run mode, Tension controller OFF).
  During acceleration, observe the integral component of the speed controler output.
  Set H227 to reach speed controller integral component < 2%.

  - repeat the measurement, the value displayed at d331 must now be very low (< 2%).

- 2) enter a setpoint using H143 and activate the command "local inching forwards".

  - read-off d331 in the range from 10-90% of the setpoint.

  - enter the monitored average value at H227; if H161 and H220 are parameterized differently, the ratio between H161 and H220 must be taken into account.

  This method is to use only if the case 1) is not possible. With method 2) H228 can be set, but a checking of the setting is not possible, the dv/dt signal is not generated in local mode.

A changeover to gearbox stage 2 is taken into account when calculating the variable moment of inertia.

8.2.4 Setting the speed control Kp adaption

The speed controller proportional gain should generally be adapted to the variable moment of inertia;

For a Dmax/Dmin ratio > 3 to 4, it is absolutely necessary to commission the kp adaption for a good winding characteristics and fast start-up.

Information on the procedure:
Using the ”Set diameter” and the ”Diameter setting value” commands, refer to Sheet 9 of the Block diagram, enter the diameter, which corresponds, as percentage, to the diameter of the full coil or roll at the machine, and which is to be optimized using the speed controller. Generally, this is the mandrel diameter and the maximum diameter (the largest possible diameter).
Always check the diameter which you have entered, at d310 and keep your eye on it!

The adaption is realized using a polygon characteristic with 2 points, which can be parameterized. The variable moment of inertia is the characteristic input parameter, and the start- and endpoints of the adaption must be entered with the appropriate gain factors Kp_{min} and Kp_{max}.

8.2.4.1 Setting for CUVC and CUMC

The following parameters are permanently set on the T300:
H150=0%; H152=199,99%; H151=0 and H153=19,99. This setting means that the variable moment of inertia, calculated on Sheet 9 of the Block diagram, is directly transferred to the basic drive. There, the effective kp for the speed controller is determined from a polygon characteristic.

Procedure, refer to Block diagram CUVCand CUMC (Kompendium), Sheet 360:

- P233=0%; P234=100%
- With an empty (smallest) mandrel, the speed controller kp is optimized using parameter P235 as usual.
- At the largest possible roll diameter, web width and specific weight, re-optimize the speed controller using P236.

The effective kp can be read at parameters r237, basic drive.

8.2.4.2 Setting for CU2 and CU3

Also refer to the Block diagram, Sheet 6.
- Enter H151=1; H150=0; H152=100%
- With an empty (smallest) mandrel, the speed controller kp is optimized as usual using parameter P225 (CU2) and P537 (technology controller CU3).
- At the largest possible roll diameter, web width and specific weight, re-optimize the speed controller using H153.

The effective kp can be read at parameter r228, CU2 or r547, CU3.

8.2.5 Setting closed-loop tension,dancer roll posit. cntrl. (block diagrs.7,8)

For tension measurement via tension transducer:

- check the control sense corresponding to the recommended configurations. If the polarity is incorrect, either changeover the signals at the analog input, or change the polarity using a multiplier function.
- a possible tension transducer offset can be compensated with H179=1. By activating the "hold diameter" control signal, with the closed-loop tension control switched-out, the instantaneous tension actual value is stored, and is then subsequently subtracted as offset.
- the maximum input voltage at the analog input for the tension actual value may not exceed 9 V. The input must be calibrated using the appropriate multiplier, so that the maximum value corresponds to 100%, monitoring parameter d311.
- select the tension setpoint with H081, calibrate to 100% at the maximum tension setpoint. A supplementary tension setpoint can be selected using H083 and it is added after the ramp-function generator for the main setpoint. Monitoring parameter for the total setpoint d304.
- parameterize the ramp-function generator for the tension setpoint with H175 and H176.

e.g.: tension actual value at X5, terminals 501,502, maximum value -9 V
Calibration: -9V corresp. to 100% ⇒ H054 = 5V / -9V = -55.5%

For the closed-loop dancer roll position control:

- enter a fixed position setpoint at H080 with H081=31; the setpoint corresponds to the dancer roll position actual value when it is the center position. When using the winding hardness characteristic as output signal for a dancer roll control, the main setpoint is isolated with H244=1 and the position setpoint entered via the supplementary setpoint with H082 and H083
- the analog input voltage range of the dancer roll position is normalized to 100% at the maximum voltage.

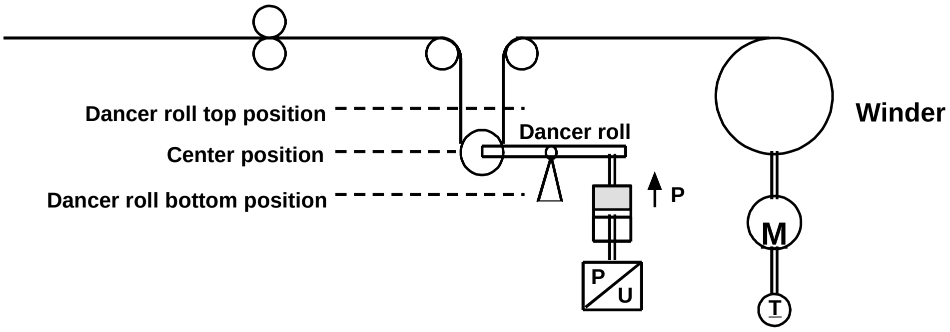
e.g.: 10 V voltage range, dancer roll center position voltage 5 V, actual value X5,
terminals 503,504 =0V for the dancer roll at the bottom and 10 V for the dancer roll at the top.
A winder is running too fast, if the actual value is >5 V, and is too slow for actual values <5 V; this is vice versa for unwind stands.
The position setpoint H080 is set to 50%, the analog input normalization with H056, also to 50%.

- the winding hardness characteristic should be disabled with H206=1.
- A tension precontrol function can be implemented for closed-loop dancer roll controls via the torque limits (H203=2). The main tension setpoint is multiplied by the diameter and H190 and added to the controller output. Alternatively, precontrol can also be implemented if the web tension is neither entered nor known. However, a pressure actual value is required from the dancer roll which is input via anlaog input 5. In this case adaption factor H190 must be negative.
- the D component for the position actual value should be enabled with H174=0; it is always required for the closed-loop dancer roll position control, to prevent the dancer roll from oscillating. When optimizing the D component, starting from the pre-setting, H173 is preferably changed, and when the correct setting is achieved, the dancer roll must remain steady, excluding of course mechanical effects.

Checking the control sense:

- operate the system at a low web speed.
- set the correct diameter and enable the closed-loop tension control.
- check the control sense according to the following table

Tension transducer	Dancer roll	Winder	Unwind stand
Actual val. > setpoint	-	v↓	v↑
Actual val. < setpoint	-	v↑	v↓
-	top [1])	v↓	v↑
-	bottom [1])	v↑	v↓



[1]) Dancer roll positions for the closed-loop dancer position control

8.2.6 Tension controller setting, Kp adaption

It is necessary to adapt the variable moment of inertia for closed-loop current limiting control with direct tension measurement; operating modes, H203=1,2.

For indirect closed-loop tension controls (H203=0), neither adaption is required nor setting of the tension controller.
For closed-loop speed correction control (H203=3,5) adaption may not be set; in this case, for H207=100%, the Kp value of H197 is valid for the complete range.

The characteristic should be parameterized analog to that described in Section 8.2.4.

The tension controller is optimized using the standard technique, e.g. by injecting a low supplementary tension setpoint, and monitoring the speed actual value. A damped stabilization sequence must always be manifested. When other quantities are input as step function, e.g., speed setpoint, the results must be the same.

Optimization should be realized for several different diameters.
Experience values for the controller setting:

Kp for the closed-loop speed correction control:	0.1 - 0.3
Kp for the closed-loop current limiting control and Dmin:	0.1 - 0.3
T_N for the closed-loop current limiting control	0.5 - 1 s

Note: For closed-loop speed correction control, under standard operating conditions, the tension controller output is approximately 0%, and for closed-loop current limiting control, depending on the friction equalization, the output fluctuates between the torque setpoint and 0%.

8.2.7 Setting the saturation setpoint H145

- for closed-loop speed correction control, H145=0%
- current limiting control, winder (H203 ≤ 2), also refer to Section 5.9:
  For winder stands, it is favorable if the bias H145 = +3 ... +10%. The value should be selected, so that the speed controller is always at is limit under normal operating conditions. The speed controller only leaves its limit if the material web breaks so that the winder is prevented from accelerating up to excessive speeds.
- current limiting control, unwinder (H203 ≤ 2), also refer to Section 5.9:
  For unwind stands, it is favorable if the bias H145 = -3 ... -10%. The value should be selected, so that the speed controller is always at is limit under normal operating conditions. By web break,the drive will slowly rotates backwards.

8.2.8 Setting the braking characteristic H256-259

The braking characteristic is used to shutdown the drive without overshoot at fast stop (OFF3). In this case, the braking current is limited to a maximum value (H259). If the drive speed falls below a specific speed (H258), the braking torque is reduced, until it has reached a lower value (H257) at an additional speed (H256).

This allows a high braking torque to be generated but still allows a clean shutdown in the vicinity of zero speed.

Variable moments of inertia, associated with winder drives, are handled by setting the fast stop-deceleration time (P466 in the basic drive converter) so that the drive still does not approach the torque limit at approximately 50% diameter and the drive is cleanly shutdown via the closed-loop speed control. At higher diameters and moments of inertia, the braking characteristic becomes effective and the braking time is appropriately increased.

If the function is not required, 199% can be entered in H257 and H259.

8.2.9 Replacing peer to peer by SIMOLINK

In a multi-motor drive group with Compact Plus units, peer to peer communications is not possible, whereby it is possible to replace the peer to peer functionality using SIMOLINK on the CUVC and CUMC modules.

Using the transfer of the speed- and ratio setpoint via SIMOLINK and the operating setpoint and output of the technology controller, we will briefly see how the basic drive and T300 are to be parameterized. The SIMOLINK interface is inserted in slot A (upper slot). The example is the same for CUVC and CUMC. It is assumed, that SIMOLINK was already commissioned in accordance with the basic drive Instruction Manual (Compendium).

Setpoints sent from SIMOLINK to the T300 via the basic drive:

- Receive SIMOLINK at the basic drive:
  The speed setpoint is available at connector K7001
  The dv/dt signal is available at connector K7002.
- Transfer to T300, refer to function diagram, Sheet 3:
  P734.11=7001: The speed setpoint is available at select value 1 from CU.
  P734.12=7002: The dv/dt signal is available at select value 2 from CU.
- Connect the setpoints on the T300, refer to function diagram, Sheet 11:
  H069 = 13, source web speed setpoint
  H077 = 14, source external dv/dt

(Actual) values from the T300 to SIMOLINK via the basic drive:

- Select the values on the T300, refer to function diagram, Sheet 15:
  As source select value 1, the tension actual value is available: H123 = 10
  As source select value 2, the actual diameter value is available: H124 = 9
- Receiving the values on the basic drive:
  The tension actual value is available at K3011.
  The actual diameter value is available at K3012.
- Connect on SIMOLINK, words 1 and 2:
  P751.01=3011
  P751.02=3012.

CAUTION:	A T300 board with Hardware release ≥ B, or newer, is needed for use with an SLB SIMOLINK interface board. The correct hardware release code can be detected on the component side of the T300 in the neighbourhood of the lower backplane connector.

9 Diagnostic LED, Alarms, Faults

9.1 Diagnostic LED on T300

3 diagnostic LED are provided on T300:

Red LED
Flashes if the software of the T300 is being executed.
This LED always has to flash, even for CU2,CU3 if T300 is not yet "addressed" in the basic drive.

No flashing, fault cause:	Remedy
Defective T300 (or LED)	Replace T300
T300 incorrectly or not completely inserted	Insert T300 in the correct (right side!) slot and screw into place
Defective LBA	Replace LBA
Memory module incorrectly inserted or missing	Correctly insert the memory module
Defective, non-programmed memory module or incorrect module, refer to the information below	replace memory module

Yellow LED
Flashes if T300 is communicating with the basic drive converter (CU). If red LED is flashing, but not yellow, then one of the following faults/errors may be present:

No flashing, fault cause:	Remedy
Defective T300 (Dual-Port-RAM)	Replace T300
CUVC, CUMC: the basic drive did not recognize the T300 CU2, CU3: the basic drive did not recognize the T300	T300 incorrectly or not completely inserted CUVC, CUMC: Replace T300 or CUVC, CUMC CU2, CU3: Log-on T300, refer to Section 7 or replace T300 or CU2, CU3
Incorrect slot for T300 and communication board	Insert T300 in the slot 2, (**right side slot**)

Green LED
Flashes if T300 is communicating with the communications board (e.g. CBP/CB1, SCB1/SCB2).
(CU2,CU3: LED flashes even if the Com. Board is not logged-on (P91))

If red LED is flashing (maybe also yellow), but green not, then one of the following faults/errors may be present:

No flashing, fault cause:	Remedy
Defective T300 (Dual-Port-RAM)	Replace T300
Communications board incorrectly or not completely inserted	Check slots Insert communication board in the slot 3, (**middle slot**)
Communications board failed	Replace communications board

Note: The identification for the MS320 memory module is:
- the order number on printed-circuit board (see sec. 1.2.1)
- the label with „MS320 Vx.y“ on one of the components.

9.2 T300 Faults and alarms

Refere also to Section 4.23

Display parameter d337 : Alarms from T300

Alarm mask H011 : Bitwise coding of the alarms

Bit 0:	Overspeed, positive	1 = active	⇒ A097 (settings using H001)
Bit 1:	Overspeed, negative	1 = active	⇒ A098 (settings using H002)
Bit 2:	Overcurrent, positive	1= active	⇒ A099 (settings using H003)
Bit 3:	Overcurrent, negative	1 = active	⇒ A100 (settings using H004)
Bit 4:	Drive stalled	1 = active	⇒ A101 (settings using H007, H008, H009, H010)
Bit 5:	Receive, CU faulted	1 = active	⇒ A102
Bit 6:	Receive, CB faulted	1 = active	⇒ A103
Bit 7:	Receive, PTP faulted	1 = active	⇒ A104

Bit 8 - 15 = 0

Display parameter d338 : Faults from T300

Alarm mask H012 : Bitwise coding of the faults

Bit 0:	Overspeed, positive	1 = active	⇒ F116 (settings using H001)
Bit 1:	Overspeed, negative	1 = active	⇒ F117 (settings using H002)
Bit 2:	Overcurrent, positive	1 = active	⇒ F118 (settings using H003)
Bit 3:	Overcurrent, negative	1 = active	⇒ F119 (settings using H004)
Bit 4:	Drive stalled	1 = active	⇒ F120 (settings using H007, H008, H009, H010)
Bit 5:	Receive, CU faulted	1 = active	⇒ F121
Bit 6:	Receive, CB faulted	1 = active	⇒ F122
Bit 7:	Receive, PTP faulted	1 = active	⇒ F123

Bit 8 - 15 = 0

9.3 Operation without communications board (CB1/CBP, SCB1/SCB2)

This factory setting assumes a communication board at slot 3 (slot in the middle).
If there is no communications board, H011 and H012 had to be adjusted accordingly, otherwise
alarm A103 and
fault F122 ocurr

Masking of this alarmand fault by parameterizing (all others are still active):
H011=AF
H012=AF

Note: This masking is not allowed while using a communications board!

9.4 Operation without Peer-to-Peer

This factory setting assumes a peer-to-peer coupling.
If there is no peer-to-peer using, H006=0 has to be adjusted. Otherwise
alarm A104 and
fault F123
ocurr if bit 7 at H011 and H012 is set.

Masking of this alarmand fault by parameterizing (all others are still active):
H011=AF
H012=AF

Note: Masking by setting bit7 at H012 or setting H006=0 is not allowed while using peer-to-peer!

9.5 Alarms and Faults of the winder

The generated alarms (A097 - A104) and faults (F116 - F123) are described at parameters H011 and H012.

9.6 Masking of alarms and faults

Alarms and faults are coded with bits at H011 and H012.
They are enabled by setting (=1) the appropriate bits and they are masked by resetting them.

Example:
Operation without communications board and without peer-to-peer:

Reset bit6 and bit7 at H011, H012:

bit:	7 6 5 4 3 2 1 0
value:	0 0 1 1 1 1 1 1

This results in the following parameter values:
H011=H012= 3F

9.7 Frequently occurring faults/errors and the associated counter-measures:

The errors/faults described are initially valid for winders and unwinders and all of the associated operating modes.
The "winder" term in this Section stands for winders and unwinders without going into any more detail.

Fault F122 occurs:

1) Fault: Incorrect parameterization.
   Counter-measure: Refer to Section 9.2.

2) Fault: In word 1 of the PROFIBUS (main control word) all bits = 0.
   Counter-measure: Set a bit (preferably bit 10) to 1.

The calculated diameter and the diameter measured at the machine, do not correspond:

Note: Deviations with an order magnitude ≤ ±2% do not have a negative impact on the closed-loop control function.

1) Fault: Incorrect adjustment
   Counter-measure: Check the diameter- and speed adjustment, refer to Section 4.20, speed actual value calibration.

2) Fault: The web speed is not impressed at the clamping location, refer to e. g. Fig. 5.10. The result is that the web speed actual value and setpoint do not correspond. This can occur, depending on the operating status of the winder, and also as a function of the diameter.
   Counter-measure: Check the function of the clamping location. This can be realized e. g. using mechanical measures or by modifying the tension levels before and after the clamping position: The tensions before and after the clamping location frequently have the same order of magnitude.

3) Fault: The clamping location receives a different speed setpoint than the winder.
   Counter-measure: Enter the correct setpoint.

The winding tension is too low, the web becomes slack.

1) Fault: A tension setpoint is entered, which is either too low or is not present at all.
   Counter-measure: Increase the tension.

2) Fault: Inertia compensation is either not set or incorrectly set.
   Note: This fault generally only occurs with indirect tension control or tension control with tension measuring transducer.
   Counter-measure: Refer to Section 8.2.3

3) Fault: Diameter calculation is incorrect.
   Counter-measure: Refer above, "the calculated diameter and that measured at the machine do not correspond".

4) Fault: For H203 = 0, 1 or 2, the bias is incorrectly set with H145.
   Counter-measure: Select H145 with the correct polarity, if required, increase the absolute value of the over-control value, refer to Section 5.9.

5) Fault: The dancer roll contact pressure is too low:
   Counter-measure: Increase the contact pressure (pneumatic system).

Note:
If the tension is too low but the tension setpoint is adequate, then frequently, the following can be observed as a function of H203:
H203 = 0, 1 or 2:
The absolute value of d313 (Block diagram Sheet 8, column 8) is not equal to the speed controller output value (torque setpoint) after run-up has been completed, without taking into account friction compensation; refer to the relevant equipment Instruction Manual
H203 ≥ 3:
d319 (Block diagram Sheet 8, column 8) is at the tension controller limit, refer to H195, if H194 is 0 or 1.

6) Fault: The diameter actual value "drifts away" for extremely fast speed changes (e. g. winder is linked to the overall process):
Counter-measure: Set the change time of the diameter computer (H239, Sheet 8) as high as the application permits it.

Parameter changes have no effect:

Fault: Example: H212, H214, H217 are changed, no effect can be seen.
Counter-measure: For parameters, which are designated with "init" in the parameter list, the drive converter must be switched into the no-voltage condition before the parameter change becomes effective.
Comment: We would also like to refer, in this circumstance, to the Block diagrams. In this case, it exclusively involves parameters H212 to H215, H217, H218 as well as H006, H245, H247 and H248.

Peer to peer does not transfer any values:

1) Fault: The baud rate or the number of words to be transferred do not coincide between the coupling partners.
Counter-measure: Set the baud rate for the sender and receiver to the same value as well as the same number of send- and receive words.

2) Fault: For the peer to peer nodes, the interconnection of the setpoint/actual values is erroneous.
Remedy: Correct the interconnection.

There is no data transfer established between the basic drive and the T300:

1) Fault: The parameterization is either incorrect or not complete.
Counter-measure: Check that the parameterization instructions in Section 7 were accurately followed , and if required, correct appropriately.

2) Fault: The drive is switched to BICO data set 2 or reserve (P590).
Counter-measure: Establish BICO data set 1 or the basic setting, refer to visualization parameter r012.

Control characteristics are not satisfactory:

1) Fault: Basic drive has not been correctly optimized.
Counter-measure: Commission the basic drive according to the Instruction Manual, and, if necessary, execute an optimization run for the closed-loop torque control.
Comment: No reasonable winding operation is possible without a perfectly optimized closed-loop torque control.

2) Fault: The drive behavior appears to be dependent on the diameter:
Counter-measure: For diameter ratios ≥ 3 to 4 commission the kp adaptation according to Section 4.13.1 Kp adaptation and 8.2.4 and 8.2.6.
Information on the closed-loop control type:
H203 = 0, 1 or 2: Commission the Kp adaptation for the closed-loop speed- and tension controller.
H203 ≥ 3: Only commission the Kp adaptation for the speed controller.

3) Fault: General controller optimization is not O.K. for H203 ≥ 3, speed correction control:
Counter-measure: Starting from the pre-setting, first optimize the speed controller as usual; rise times of between 40 and 200ms can be expected.
Then optimize the tension controller accordingly (generally as P controller, refer to H196). The rise times, referred to the speed controller, are four times longer.

4) Fault: General controller optimization is not O.K. for H203 ≤ 2, closed-loop tension control via the torque limits:
Counter-measure: The tension controller must first be switched as a PI controller, H196 = 0.
Start to optimize with the pre-set values.

5) Fault: The dancer roll oscillates with the closed-loop dancer position control:
The dancer roll oscillates significantly around the dancer roll zero point, and operation is not possible.
Counter-measure: Commission the D component, H173 = 0, start to optimize with the pre-setting of H172.
In extremely seldom cases, it may be necessary to increase the damping of the dancer roll pneumatic system.

Commissioning with SIMOVIS does not work

Comment: It is assumed, that the H- and the d parameters are displayed on the PMU and that the SIMOVIS operate perfectly with the basic drive.

1) Fault: The parameters of the T300 are not displayed, or the technological part of SIMOVIS cannot be called-up.
Counter-measure: Execute the teach function according to the SIMOVIS Instruction Manual.

2) Fault: T300 parameters are displayed, but they cannot be changed or if they can only be changed to 0.
Remedy: Check the parameterization of SIMOVIS and the basic drive, especially the PKW length. This must be 127. Comment: All of the SIMOVIS functions are checked-out in the factory setting of SIMOVIS and the basic drive.

10 SIMADYN D functions

10.1 STRUC G graphic diagram display

10.1.1 Sheet structure

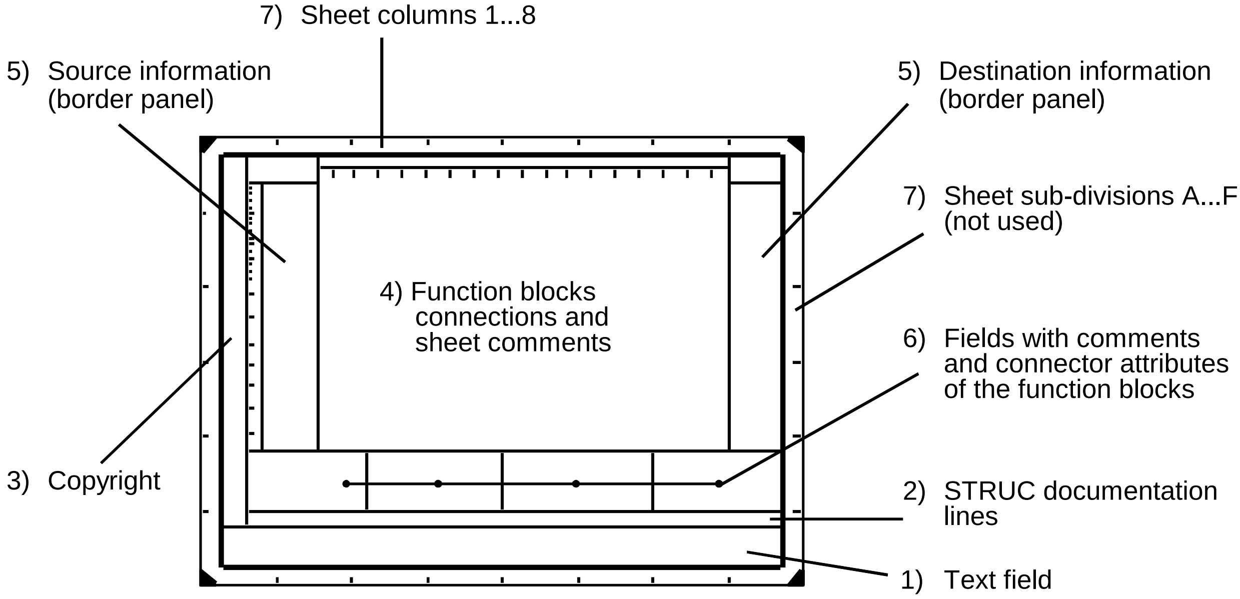


Fig. 10.1.1: Sheet structure for STRUC G

Explanation to Fig. 11.1.1:

1) **Text field**
The text field is laid out according to DIN 6771, Part 5.

2) **STRUC documentation line**
Information regarding the version, compiler times, libraries and STRUC configuring levels.

3) Field for **copyright** and addition documentation information.

4) Field for **function blocks, connections and sheet comments**
The individual function blocks with their connections, constants and signal designators as well as the sheet comments are located here.

5) **Source- and target information**
Function package connections ($ quantities), are specified here with their source- and target function packages and the associated system IDs. Hardware- and communication connections are also entered here.

6) Field for **comments and connector attributes of the function blocks**
The comments in the border strip signals, the function block comments (header line in STRUC L), the connector attributes (MIN, MAX, SCAL, ...) and the connector comments are entered in this four-section field.

7) **Sheet columns**
The display division in the X-axis is subdivided into sections 1 to 8. The displayed, but unused Y axis runs from left to right, from A to F. The information is referred to the sheet columns.

10.1.2 Structure and display of a function block

There is a **graphic function symbol** for every function block which can be used to document the function block and the user-specific features. In addition to the input- and output signal connections, there are also signal values specified and some of the connector attributes, which are significant for the sequence and embedding the function block in the function package. The information is described in the Section, connector supply.

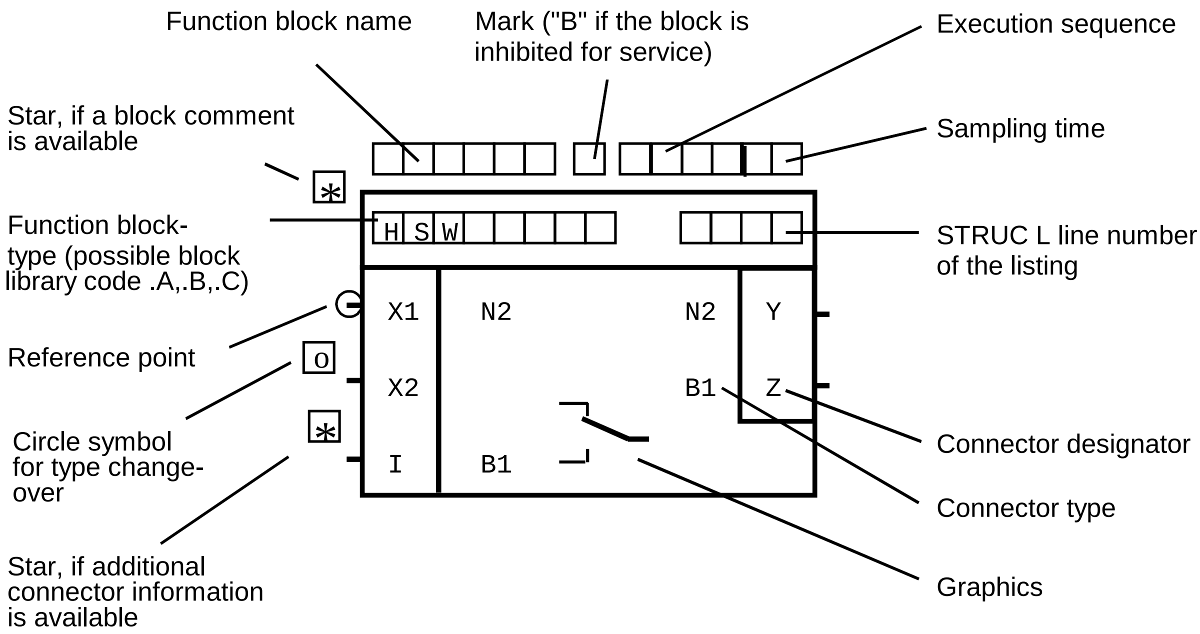


Fig. 10.1.2: Function block layout

10.1.3 Connector supply for the function blocks

The **connectors** are used to supply the function blocks with input information and output the results to other function blocks or peripheral boards.

The connectors are coded in the function blocks via the connector type and the connector designation. The connectors are supplied with signal connections, signal values (constants), signal designators, attributes (MIN, MAX, SCAL, Pn ≡ PAR = n, Mn ≡ MES=n, DATX, INIT, LOG0, LOG1) and comments. As not all of this information can be located in the graphics section, some information is located in the comments fields below the graphic field. A star at the connector indicates that this information is available.

10.1.4 Information in the function package

① **Local sheet connections,** as line, or letter (A..Z) within a sheet.

② **Internal function package connections** to/from another sheet with source/target block, connector, sheet, column. If there is no space at the connector for a target- or source information, or if several target infos are available, then the border strip is used.

③ **External function package connections,** with connection name, bus access, processor, function package, system ID, sheet, column.

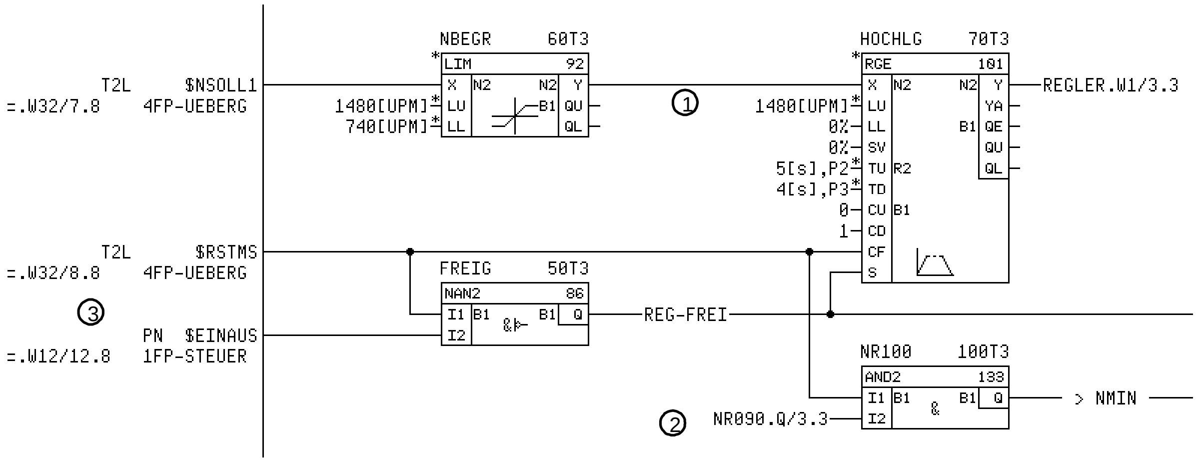


Fig. 10.1.4.a: Signal connection types

Function package connections **($ quantities)** provide signal transfer paths between technological function units in which the individual function packages are realized.

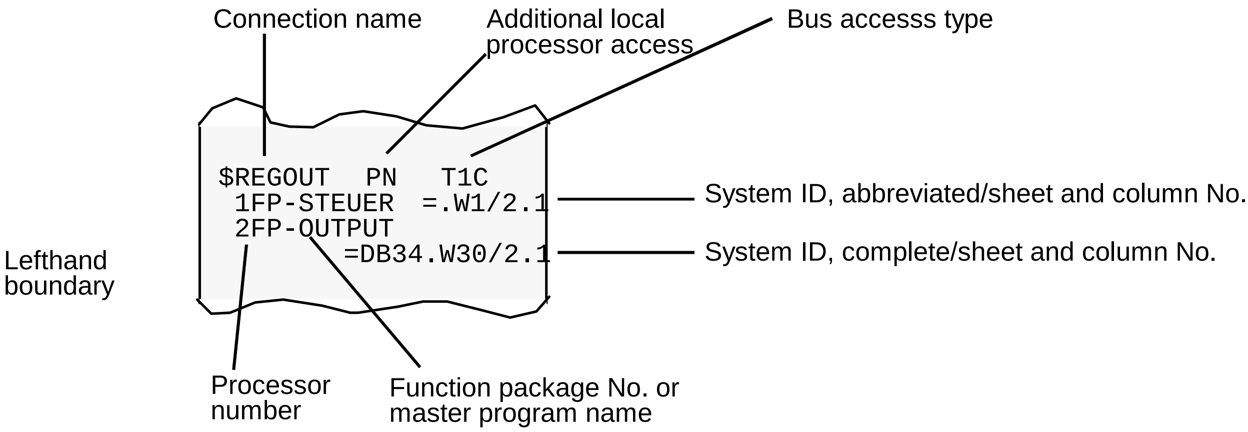


Fig.: 10.1.4.b: Function package connection structure

10.2 Monitor - operator control

The technology board is generally parameterized using the **basic service program,** included in the scope of supply (operator control - and installation instructions are included with the program). This program can run on any standard PC [1)] or PG [1)]. and allows access to all technology parameters. The connection is established through the PC serial interface (V24, 0-modem-cable) or PG with the X01 serial interface on the PT board.

The basic service program uses the "symbolic SIMADYN D monitor" configured on the PT board. This controls the accesses to the technology parameters and all inputs and outputs of the function blocks, and provides the values to the serial interface or retrieves values from the serial interface. In addition to the program supplied with it, the monitor can be controlled with the following programs:

Program	PC / PG type
Start-up program	PG730, PG750
(CPM emulation)	DOS-PC
SIMOVIS-SIMADYN service	PG750, DOS-PC [1)]
Telemaster service (Basic version)	PG750, DOS-PC

[1)] MS-DOS ≥ 5.0, processor ≥ 80386, free memory under DOS: > 580 kbyte, VGA color monitor

Note:
Generally, the monitor is only ready, if the basic converter is in the operator control status. The monitor and the above specified programs are disabled in the *initialized and start-up* statuses.

10.2.1 Start-up using a start-up program

The technology parameters can be changed and displayed with any program, which can address the SIMADYN D monitor. A technology parameter is accessed through a specific *pathname*. The technology parameter pathnames are specified in the parameter list. The pathname consists of the processor number (always 1 for a standard software package), the function package name, the function block name and the connector designator:

1FP-FPNAME.FBNAME.connector designator

Examples:

a) Change parameter TP_331, *display speed controller output,* smoothed:

- Read-out the path name from the parameter list: = FP-IQ2.D31.Y
- **Path name:** 1 FP - **IQ2.D31.Y**

b) Change parameter TP_153, *speed controller integral action time*:

- Read-out the pathname from the parameter list: = FP-SREF.NC120.X2
- **Path name:** 1 FP - **SREF.NC120.X2**

The detailed handling is described in the Instruction Manual or the User Manual of the appropriate program.

11 Others

11.1 Terminology/abbreviations

Üp n	Block diagram, Page n
AG	Automation unit
DUST	Data transfer control
FB	Function block
FP	Function package (function blocks configured to provide a complete function)
GG	Basic converter
MP	Master program (defines the hardware and software configuration)
n	Speed
n_act	Speed actual value
n_set	Speed setpoint
PG	Programming unit (e.g. PG685, PG730, PG750)
PKW	Parameter ID/value
PNU	Parameter number
PT	Technology board
T	Torque
TA	Sampling time
dxxx	Technology parameter number xxx, cannot be changed
Hxxx	Technology parameter number xxx, can be changed

11.2 Literature

/1/	Documentation	*SIMADYN D STRUC G/L/PT*	
		6DD1981-1AA2	German
		6DD1981-1AB2	English

/2/ *Recommendations for EMC-proof cabinet design with SIMOVERT MASTERDRIVES*
Order No.: 6SE7087-6CX87-8CE0

(See also Kompendium CUVC, CUMC)

/1/ = usefull, e.g. when modifying the standard software package
/2/ = general information

Ordering locations:

/1/

SIEMENS AG
PSWER
Postfach 3269
91050 Erlangen

/2/

SIEMENS AG
A&D DS A P1
Postfach 3269
91050 ERLANGEN

12 Changes

Version 1.0: 30.09.94 first edition
The functions of the standard software package correspond to those of the standard software package SW30, version 1.0 for 6RA24/6SE12:
The following changes/functional expansions were made:
- Conversion to STRUC V4.2
- Board T300 is used
- Peer-to-peer protocol with extended setpoint input

Further
- New braking characteristic for fast stop
- New tension pre-control for closed-loop dancer role control
- New automatic density correction
- Extended output multiplexer for analog select outputs and automation actual values
- Improved length measurement and length stop functions
- New sheet thickness calculation
- New tachometer function (tachometer applied to the material web)

Version 1.1: 31.07.95
The following changes/expanded functionality were made:
- Peer-to-peer was improved with extended setpoint for load distribution
- Analog inputs 3 and 4 are smoothed (PT1)
- Overview diagram of the control- and status words
- Alternative power-up command via binary input input, selectable for instantaneous inching (no delay)
- Parameter list has been supplemented
- Dead-zone block for inertia compensation

Version 1.2: 30.09.95
Improving of splice, rewinding

Version 1.30: 06.03.96
- H280 new
- Transmitting of selectable values for Peer-to-Peer (H015-H019)
- d362 deleted
- Improvement or parameter handling with STRUC 4.2.3, especially for using of SIMOVIS

Version 1.40: 25.02.97
- H205 setting changed to 2000 ms
- H273, H274, H275 new
- Web breakage detector: function for indirect tension control changed, see block diagram page 7.
- Conversion to STRUC 4.2.4.

Version 1.50: 22.03.99
- Improving of reset signal lengh counter
- Neu STRUC V4.2.4 Library FBSLT1 with version 990204V420

13 Short parameter list

Explanation:

dxxx	**Display parameters**	Type dim.	A	
Hxxx	**Changeable parameters**	Type dim.	Value	

H001	**Overspeed - positive limit**	N2 %	120	
H002	**Overspeed - negative limit**	N2 %	-120	
H003	**Overcurrent - positive limit**	N2 %	120	
H004	**Overcurrent - negative limit**	N2 %	-120	
H005	**Delay time, communications PT-AG INIT**	T2 s	20	
H006	**Delay time, communications PT-AG ZYKLI**	T2 ms	100	
H007	**Anti-stall protection, threshold n_{act}**	N2 %	2	
H008	**Anti-stall protection, threshold I_{act}**	N2 %	10	
H009	**Anti-stall protection, threshold control difference**	N2 %	50	
H010	**Anti-stall protection, response time**	T2 ms	500	
H011	**Alarm mask**	O2	255	
H012	**Fault mask**	O2	255	
H013	**Polarity, local stop command**	B1	0	
H014	**Long inching time**	T2 s	10	
H015	**Source transmit word 1 Peer**	O2	15	
H016	**Source transmit word 2 Peer**	O2	15	
H017	**Source transmit word 3 Peer**	O2	15	
H018	**Source transmit word 4 Peer**	O2	15	
H019	**Source transmit word 5 Peer**	O2	15	
H020	**Quelle Steuerwort PTP**	O2	5	
H021	**Source, system start**	B1	0	
H022	**Source, tension controller on**	B1	0	
H023	**Source, inhibit tension controller**	B1	0	
H024	**Source, set diameter**	B1	0	
H025	**Source, inject supplementary setpoint**	B1	0	
H026	**Source, local positioning**	B1	0	
H027	**Source, local operator control**	B1	0	
H028	**Source, local stop**	B1	0	
H029	**Source, raise motorized potentiometer 2**	O2	9	
H030	**Source, raise motorized potentiometer 1**	O2	9	
H031	**Source, lower motorized potentiometer 2**	O2	9	
H032	**Source, lower motorized potentiometer 1**	O2	9	

H033	**Source, hold diameter**	O2		9	
H034	**Source, speed setpoint, set stop**	O2		9	
H035	**Source, winding from below**	O2		9	
H036	**Source, accept setpoint A**	O2		9	
H037	**Source, accept setpoint B**	O2		9	
H038	**Source, local inching forwards**	O2		9	
H039	**Source, local crawl**	O2		9	
H040	**Source, local inching reverse**	O2		9	
H041	**Source, maneuver**	O2		9	
H042	**Source, gearbox stage 2**	O2		9	
H043	**Source, winder**	O2		9	
H044	**Source, saturation setpoint polarity**	O2		9	
H045	**Source, off1/on**	O2		9	
H046	**Source, inhibit ramp-function generator**	O2		9	
H047	**Source, off2**	O2		8	
H048	**Source, off3**	O2		8	
H049	**Source, ramp-function generator stop**	O2		9	
H050	**Source, enable setpoint**	O2		9	
H051	**Source, standstill tension on**	O2		9	
H052	**Source, local run**	O2		9	
H053	**Source, reset length computer**	O2		9	
H054	**Adaption, analog input 1**	N2	%	50	
H055	**Offset, analog input 1**	N2	%	0	
H056	**Adaption, analog input 2**	N2	%	50	
H057	**Offset analog input 2**	N2	%	0	
H058	**Adaption, analog input 3**	N2	%	50	
H059	**Offset analog input 3**	N2	%	0	
H060	**Adaption, analog input 4**	N2	%	50	
H061	**Offset analog input 4**	N2	%	0	
H062	**Adaption, analog input 5**	N2	%	50	
H063	**Offset analog input 5**	N2	%	0	
H064	**Adaption, analog input 6**	N2	%	50	
H065	**Offset analog input 6**	N2	%	0	
H066	**Adaption, analog input 7**	N2	%	50	
H067	**Offset analog input 7**	N2	%	0	
H068	**Speed setpoint**	N2	%	0	
H069	**Source, speed setpoint**	O2		11	
H070	**Web speed compensation**	N2	%	0	
H071	**Source, web speed compensation**	O2		11	
H072	**Supplementary speed setpoint**	N2	%	0	

H073	**Source, Supplementary speed setpoint**	O2	11	
H074	**Setpoint, local operation**	N2 %	0	
H075	**Source, setpoint local operation**	O2	11	
H076	**External dv/dt**	N2 %	0	
H077	**Source, external dv/dt**	O2	11	
H078	**Web width**	N2 %	100	
H079	**Source, web width**	O2	11	
H080	**Tension setpoint**	N2 %	0	
H081	**Source, tension setpoint**	O2	11	
H082	**Supplementary tension setpoint**	N2 %	0	
H083	**Source, supplementary tension setpoint**	O2	11	
H084	**Tension actual value**	N2 %	0	
H085	**Source, tension actual value**	O2	11	
H086	**Max. tension reduction**	N2 %	0	
H087	**Source, max. tension reduction**	O2	11	
H088	**Diameter setting value**	N2 %	10	
H089	**Source, diameter setting value**	O2	11	
H090	**Setpoint positioning**	N2 %	0	
H091	**Source, setpoint positioning**	O2	11	
H092	**Source, speed actual value**	O2	7	
H094	**Source, external web speed actual value**	O2	12	
H095	**Setpoint A**	N2 %	0	
H096	**Source, setpoint A**	O2	11	
H097	**Analog output 1, speed actual value offset**	N2 %	0	
H098	**Analog output 1, speed actual value gain**	E2	2	
H099	**Analog output 2, diameter actual value offset**	N2 %	0	
H100	**Analog output 2, diameter actual value gain**	E2	2	
H101	**Analog output 3, offset**	N2 %	0	
H102	**Analog output 3, gain**	E2	2	
H103	**Analog output 4, offset**	N2 %	0	
H104	**Analog output 4, gain**	E2	2	
H105	**Source select value analog output 3**	O2	0	
H106	**Source select value analog output 4**	O2	0	
H107	**Source, input value**	O2	0	
H108	**Source, comparison value**	O2	0	
H109	**Adaption, input value**	O2	0	
H110	**Smoothing, input value**	R2 s	0.5	
H111	**Adaption, comparison value**	O2	0	
H112	**Interval limit**	N2 %	0	
H113	**Hysteresis**	N2 %	0	

H114	**Select, output signal**	O2		0	
H115	**Source, input value**	O2		0	
H116	**Source, comparison value**	O2		0	
H117	**Adaption, input value**	O2		0	
H118	**Smoothing, input value**	R2	s	0.5	
H119	**Adaption, comparison value**	O2		0	
H120	**Interval limit**	N2	%	0	
H121	**Hysteresis**	N2	%	0	
H122	**Select, output signal**	O2		0	
H123	**Source, actual value 1 at CB**	O2		0	
H124	**Source, actual value 2 at CB**	O2		0	
H125	**Source, actual value 3 at CB**	O2		0	
H126	**Source, actual value 4 at CB**	O2		0	
H127	**Source, select value, analog output 3**	O2		0	
H128	**Source, select value, analog output 4**	O2		0	
H129	**Source, alternative on command**	O2		8	
H130	**Setpoint B**	N2	%	0	
H131	**Upper limit**	N2	%	110	
H132	**Lower limit**	N2	%	0	
H133	**Ramp-up time**	R2	s	30	
H134	**Ramp-down time**	R2	s	30	
H135	**Rounding-off at run-up**	R2	s	3	
H136	**Rounding-off at run-down**	R2	s	3	
H137	**Norm. web speed compensation**	N2	%	100	
H138	**Ratio, gearbox stage 2**	N2	%	100	
H139	**Normalization, web speed**	N2	%	100	
H140	**Maneuvering setpoint**	N2	%	100	
H141	**Influence, closed-loop tension control**	N2	%	100	
H142	**Setpoint, local crawl**	N2	%	10	
H143	**Setpoint, local inching forwards**	N2	%	5	
H144	**Setpoint, local inching reverse**	N2	%	-5	
H145	**Saturation setpoint**	N2	%	10	
H146	**Closed-loop speed control, local operation**	B1		0	
H147	**Torque limit, closed-loop speed control**	N2	%	20	
H148	**Time for reverse winding after splice**	T2	ms	10000	
H149	**Speed setpoint, reverse winding after splice**	N2	%	0	
H150	**Start of adaption**	N2	%	0	
H151	**Kp adaption factor, min.**	N2		1	
H152	**End of adaption**	N2	%	100	
H153	**Kp adaption factor, max.**	N2		1	

H154	**Slave drive**	B1		0	
H155	**Smoothing web speed setpoint**	R2	ms	8	
H157	**Limit value for standstill identification**	N2	%	1%	
H159	**Delay standstill identification**	R2	ms	0	
H160	**Delete EEROM**	B1		0	
H161	**Ramp-up/-down time, ramp-function generator**	R2	s	20	
H162	**Smoothing, speed actual value for the control**	R2	ms	8	
H163	**Selection positioning reference value**	B1		0	
H164	**Smoothing, saturation setpoint**	R2	ms	8	
H165	**Smoothing, speed actual value**	R2	ms	20	
H166	**Enable, addition of local setpoints**	B1		0	
H167	**Smoothing, speed actual value to the basic conv.**	R2	ms	8	
H168	**Integrating time thickness correction**	R2	ms	200000	
H172	**Smoothing, tension actual value**	R2	ms	150	
H173	**Scaling, D component**	R2	s	0.1	
H174	**Inhibit, D component**	B1		1	
H175	**Ramp-up time, tension setpoint**	R2	s	10	
H176	**Ramp-down tiem, tension setpoint**	R2	s	10	
H177	**Inhibit tension setpoint**	B1		0	
H178	**Response at web break**	B1		0	
H179	**Enable, tension offset compensation**	B1		0	
H180	**Tension reduction 1**	N2	%	100	
H181	**Tension reduction 2**	N2	%	100	
H182	**Tension reduction 3**	N2	%	100	
H183	**Diameter, start of tension reduction**	N2	%	100	
H184	**Diameter D1**	N2	%	100	
H185	**Diameter D2**	N2	%	100	
H186	**Diameter D3**	N2	%	100	
H187	**Diameter D4, end of tension reduction**	N2	%	100	
H188	**Source, standstill tension**	B1		0	
H189	**Standstill tension**	N2	%	100	
H191	**Min. selection**	B1		0	
H192	**Smoothing, tension setpoint**	R2	s	0.3	
H193	**Min. value, speed-dep. tension controller limits**	N2	%	100	
H194	**Select, tension controller limits**	O2		1	
H195	**Adapt tension controller limits**	N2	%	20	
H196	**Inhibit, tension controller I components**	B1		0	
H197	**Min. tension controller Kp**	E2		0,3	
H198	**Max. tension controller Kp**	E2		0,3	
H199	**Integr. action time, closed-loop tension controller**	R2	s	1	

H200	**Adaption, setpoint pre-control**	N2 %	0	
H201	**Lower limit, web speed**	N2 %	100	
H202	**Influence, web speed**	N2 %	100	
H203	**Select closed-loop tension control technique**	O2	0	
H204	**Lower limit, web break sensing**	N2 %	5	
H205	**Delay, web break signal**	R2 s	1	
H206	**Select, winding hardness characteristic**	B1	0	
H207	**Start, tension controller adaption**	N2 %	0	
H208	**End of tension controller adaption**	N2 %	100	
H209	**Droop, tension controller**	N2 %	0	
H210	**Calibration, web speed**	N2 %	100	
H211	**Select, web tachometer**	B1	0	
H212	**Pulse number, axial tachometer**	O2	600	
H213	**Pulse number, web tachometer**	O2	600	
H214	**Rated speed, winder drive**	I2 RPM	1500	
H215	**Rated speed, measuring roll, web tachometer**	I2 RPM	1000	
H216	**Calculation interval, diameter computer**	R2 ms	320	
H217	**Selection encoder type sensing 1**	V2 Hex	64	
H218	**Selection encoder type sensing 2**	V2 Hex	4	
H220	**Scaling dv/dt**	R2 ms	1000	
H221	**Min. speed, diameter computer**	N2 %	1	
H222	**Core diameter**	N2 %	20	
H224	**Material density**	N2 %	100	
H225	**Fine adjustment, dv/dt**	N2 %	100	
H226	**Source, dv/dt**	B1	0	
H227	**Variable moment of inertia**	N2 %	0	
H228	**Constant moment of inertia**	N2 %	0	
H230	**Frictional torque at 0% speed**	N2 %	0	
H231	**Frictional torque at 20% speed**	N2 %	0	
H232	**Frictional torque at 40% speed**	N2 %	0	
H233	**Frictional torque at 60% speed**	N2 %	0	
H234	**Frictional torque at 80% speed**	N2 %	0	
H235	**Frictional torque at 100% speed**	N2 %	0	
H236	**Diameter change, monotone**	B1	0	
H237	**Feed-forward control with n^2**	N2 %	0	
H238	**Min. change time, diameter**	R2 s	50	
H239	**Pulse number, web tachometer**	N2	600	
H240	**Gearbox ratio, web tachometer**	N2	1	
H241	**Diameter, measuring roll web tachometer**	N2 mm	1527.9	
H242	**ramp-down rounding time for brake travel calc**	N2 s	6	

H243	**Smoothing, web width**	R2	s	1	
H244	**Tension setpoint disconnected**	B1		0	
H245	**Baud rate Peer (PTP)-protocol**	O2		6	
H247	**Number receive words PTP-protocol**	O2		5	
H248	**Number transmit words PTP-protocol**	O2		5	
H249	**Enable send PTP-protocol**	B1		0	
H250	**EEPROM key**	I2		0	
H251	**Sollwert A übernehmen**	B1		0	
H251	**Transfer setpoint A**	B1		0	
H252	**Transfer setpoint B**	B1		0	
H253	**Gearbox stage 2**	B1		0	
H254	**Winder**	B1		0	
H255	**Saturation setpoint polarity**	B1		0	
H256	**Braking characteristic, speed setpoint 1**	N2	%	0.1	
H257	**Reduced braking torque**	N2	%	0	
H258	**Braking characteristic, speed setpoint 2**	N2	%	2	
H259	**Maximum braking torque**	N2	%	199	
H260	**Comparison value, limit value monitor 1**	N2	%	100	
H261	**Comparison value, limit value montitor 2**	N2	%	100	
H262	**Source length reference value**	O2		31	
H263	**Motorized potentiometer 2, fast change**	R2	ms	25000	
H264	**Motorized potentiometer 2, slow change**	R2	ms	100000	
H265	**Motorized potentiometer 1, fast change**	R2	ms	25000	
H266	**Motorized potentiometer 2, slow change**	R2	ms	100000	
H267	**Select, operating mode motorized potentiometer 1**	B1		0	
H268	**Setpoint, ramp-function generator operation**	N2	%	100	
H269	**Ramp time, ramp-function generation operation**	R2	s	10	
H270	**Smoothing analog input X5C**	R2	ms	8	
H271	**Smoothing analog input X5D**	R2	ms	8	
H272	**Deadzone for dv/dt calc.**	N2	%	1	
H273	**Normalization, torque setpoint on T300**	N2	%	100	
H274	**Normalization, torque actual value on T300**	N2	%	100	
H275	**Response threshold, web break monitoring, indirect closed-loop tension control**	N2	%	50	
H280	**Number shifts for web length calc.**	O2		0	

Monitoring parameters:

d300	**Software version, axial winder**	N2	A	
d301	**Effective web speed setpoint**	N2 %	A	
d302	**Actual dv/dt**	N2 %	A	
d303	**Speed setpoint**	N2 %	A	
d304	**Sum, tension/position setpoint**	N2 %	A	
d305	**Output, motorized potentiometer 1**	N2 %	A	
d306	**Output, motorized potentiometer 2**	N2 %	A	
d307	**Speed actual value**	N2 %	A	
d308	**Variable moment of inertia**	N2 %	A	
d309	**Actual web length**	N2 km	A	
d310	**Actual diameter**	N2 %	A	
d311	**Tension actual value, smoothed**	N2 %	A	
d312	**Feed-forward control torque**	N2 %	A	
d313	**Output, closed-loop tension control**	N2 %	A	
d314	**Feed-forward control torque, frict. compensation**	N2 %	A	
d315	**Free for expansion**	N2 %	A	
d316	**Feed-forward control torque, inertia comp.**	N2 %	A	
d317	**Sum, tension actual value**	N2 %	A	
d318	**Tension actual value, D component**	N2 %	A	
d319	**Tension controller output**	N2 %	A	
d320	**Analog input 1, X5 terminals 501/502**	N2 %	A	
d321	**Analog input 2, X5 terminals 503/504**	N2 %	A	
d322	**Analog input 3, X5 terminals 505/506**	N2 %	A	
d323	**Analog input 4, X5 terminals 507/508**	N2 %	A	
d324	**Analog input 5, X5 terminals 511/512**	N2 %	A	
d325	**Analog input 6, X5 terminals 513/514**	N2 %	A	
d326	**Analog input 7, X5 terminals 515/516**	N2 %	A	
d327	**External web speed actual value**	N2 %	A	
d328	**Tension setpoint**	N2 %	A	
d329	**Torque setpoint**	N2 %	A	
d330	**Torque actual value**	N2 %	A	
d331	**Torque setpoint, smoothed**	N2 %	A	
d332	**Active control word 1**	V2	A	
d333	**Active control word 2**	V2	A	
d334	**Active control word 3**	V2	A	
d335	**Status word 1**	V2	A	
d336	**Status word 2**	V2	A	
d337	**Alarm word PT**	V2	A	

d338	**Fault word PT**	V2	A	
d340	**Compensated web speed**	N2 %	A	
d341	**Actual saturation setpoint**	N2 %	A	
d342	**Positive torque limit**	N2 %	A	
d343	**Negative torque limit**	N2 %	A	
d344	**Speed setpoint**	N2 %	A	
d345	**Actual Kp, speed controller PT**	E2	A	
d346	**Actual Kp, tension controller**	E2	A	
d347	**Control word PTP**	N2	A	
d348	**Status word 2 from CU**	V2	A	
d349	**Web speed actual value, web tach.**	N2 %	A	
d350	**Braking distance**	N2 %	A	
d361	**Module type, standard software package**	N2	A	

H998	**Drive number**	O2	0	

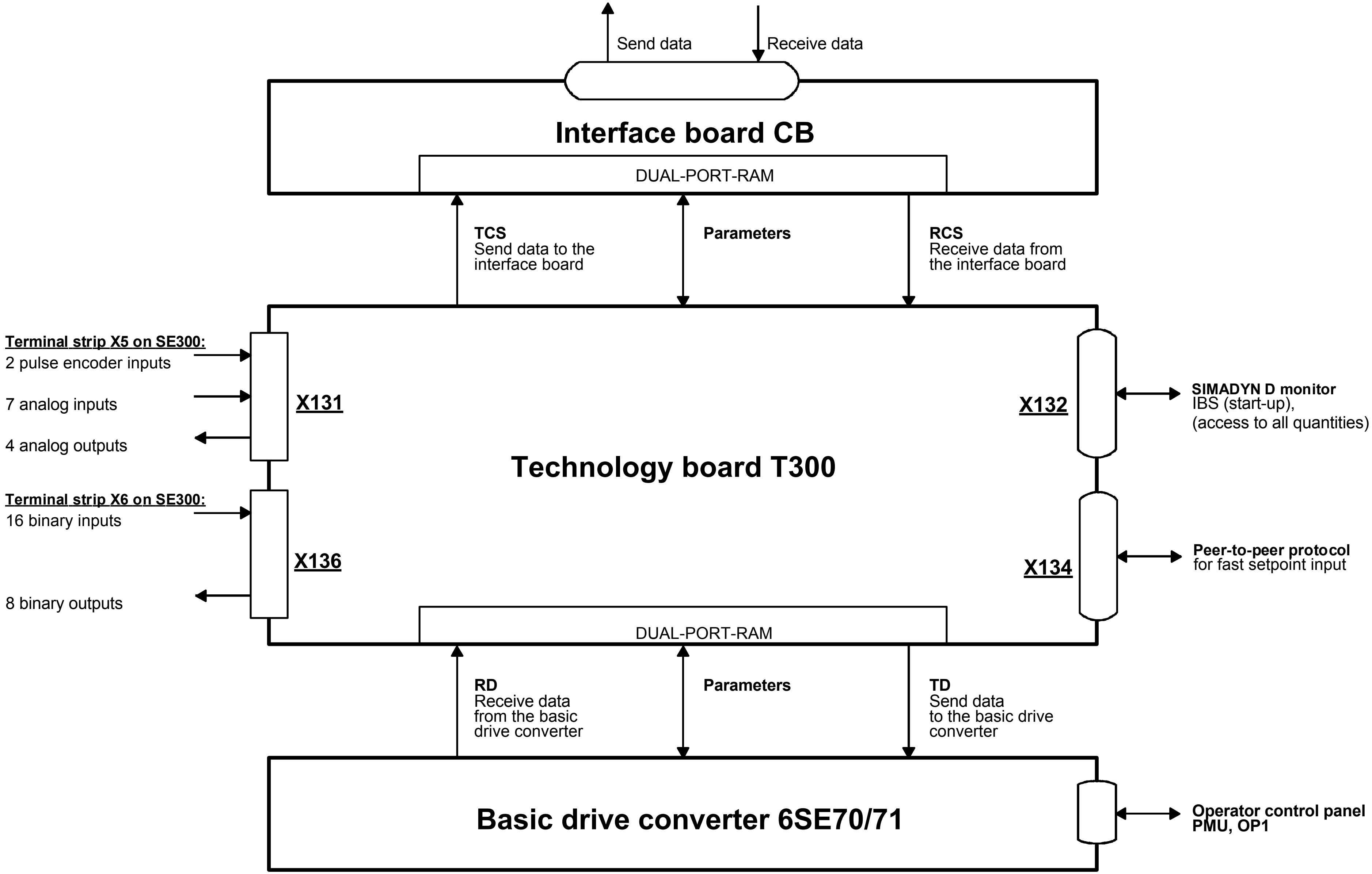
14 Appendix: Block diagrams and STRUC G diagrams

Block diagrams

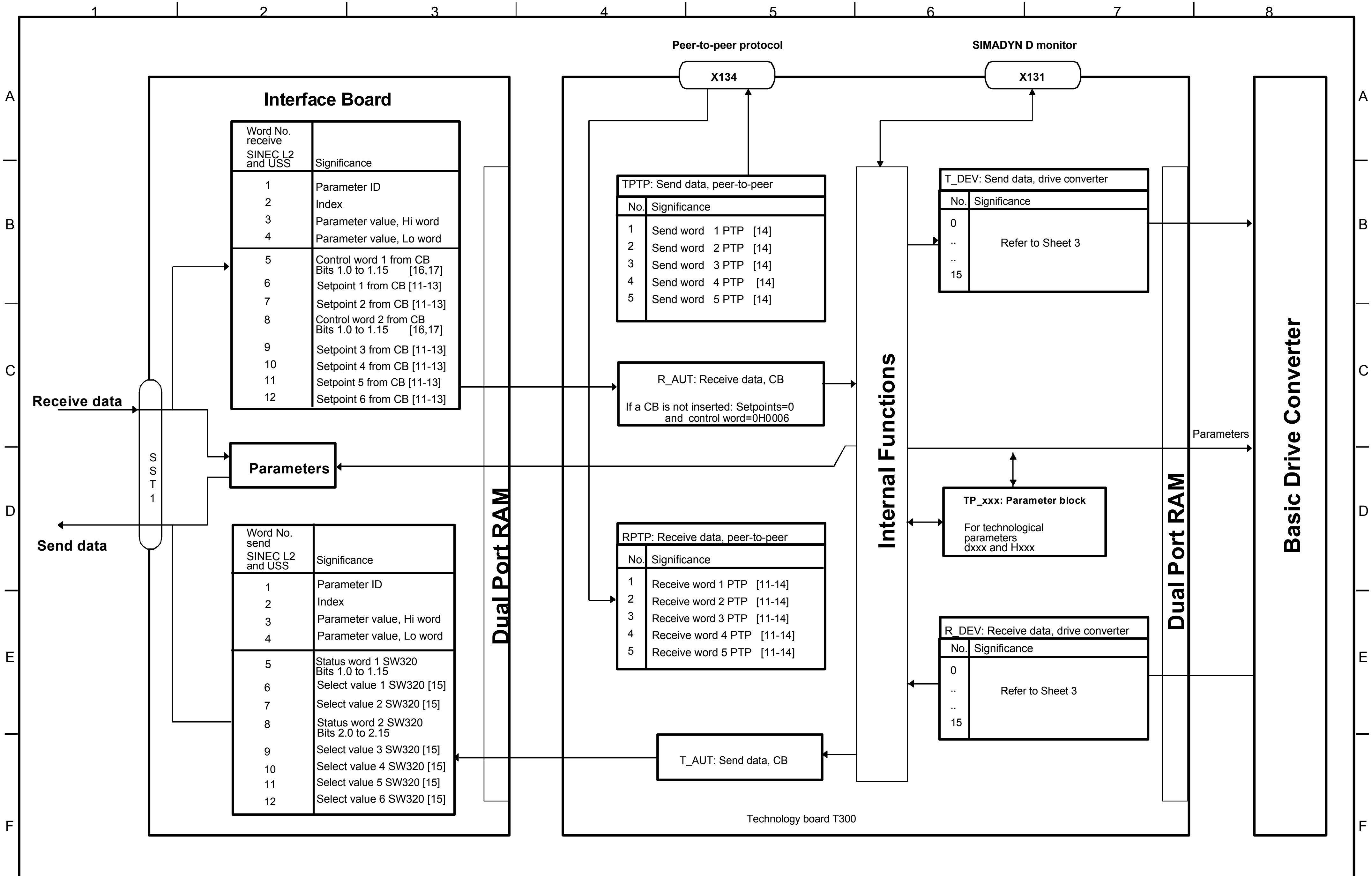
STRUC G function diagrams

Problem, fault profile and improvement

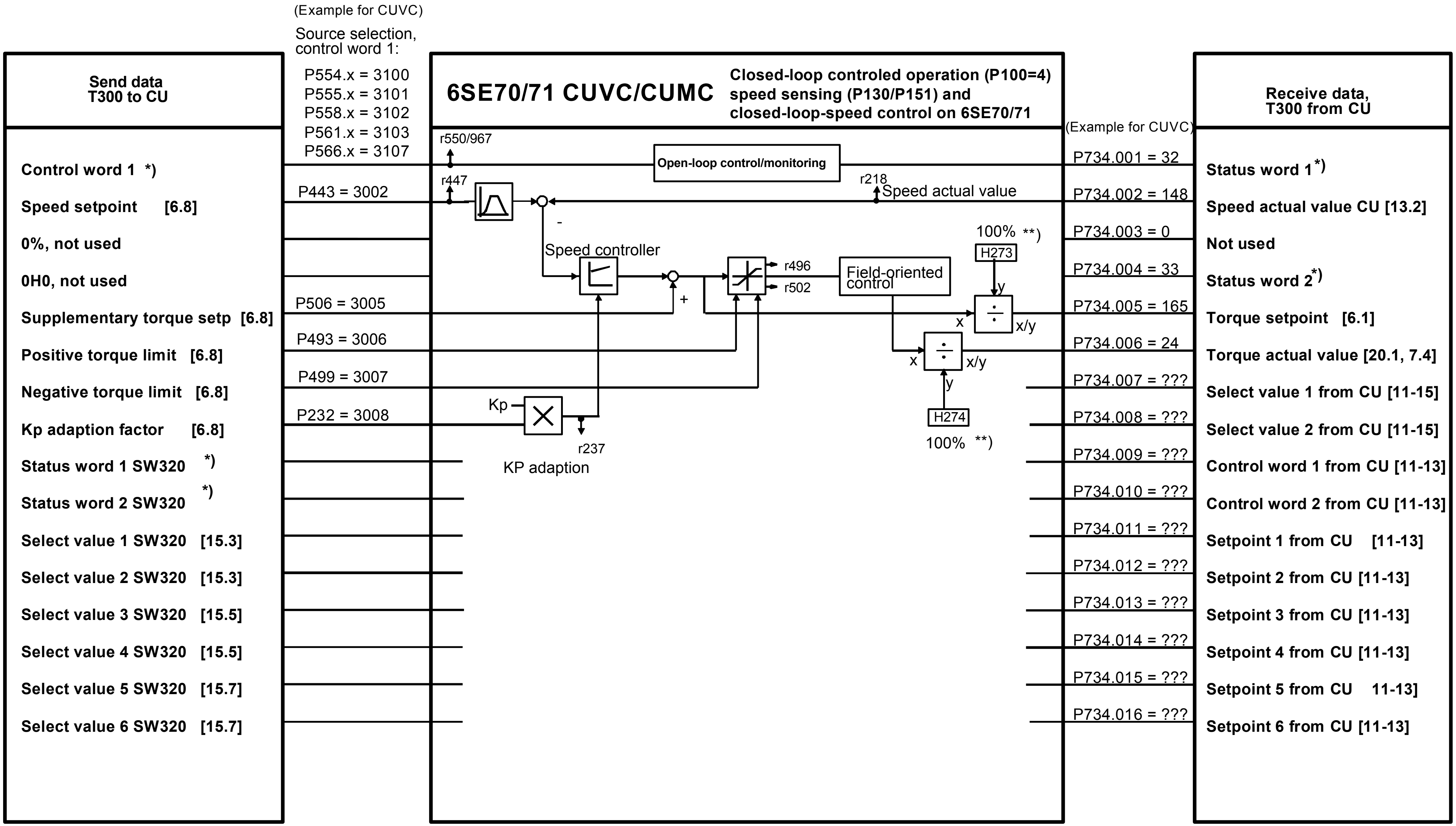
Contents, "Standard axial winder software package" block diagrams for 6SE70/71



Send data
Receive data
Interface board CB
DUAL-PORT-RAM
TCS
Send data to the interface board
Parameters
RCS
Receive data from the interface board
Terminal strip X5 on SE300:
2 pulse encoder inputs
7 analog inputs
4 analog outputs
X131
Terminal strip X6 on SE300:
16 binary inputs
8 binary outputs
X136
Technology board T300
X132
SIMADYN D monitor
IBS (start-up),
(access to all quantities)
X134
Peer-to-peer protocol
for fast setpoint input
DUAL-PORT-RAM
RD
Receive data from the basic drive converter
Parameters
TD
Send data to the basic drive converter
Basic drive converter 6SE70/71
Operator control panel
PMU, OP1



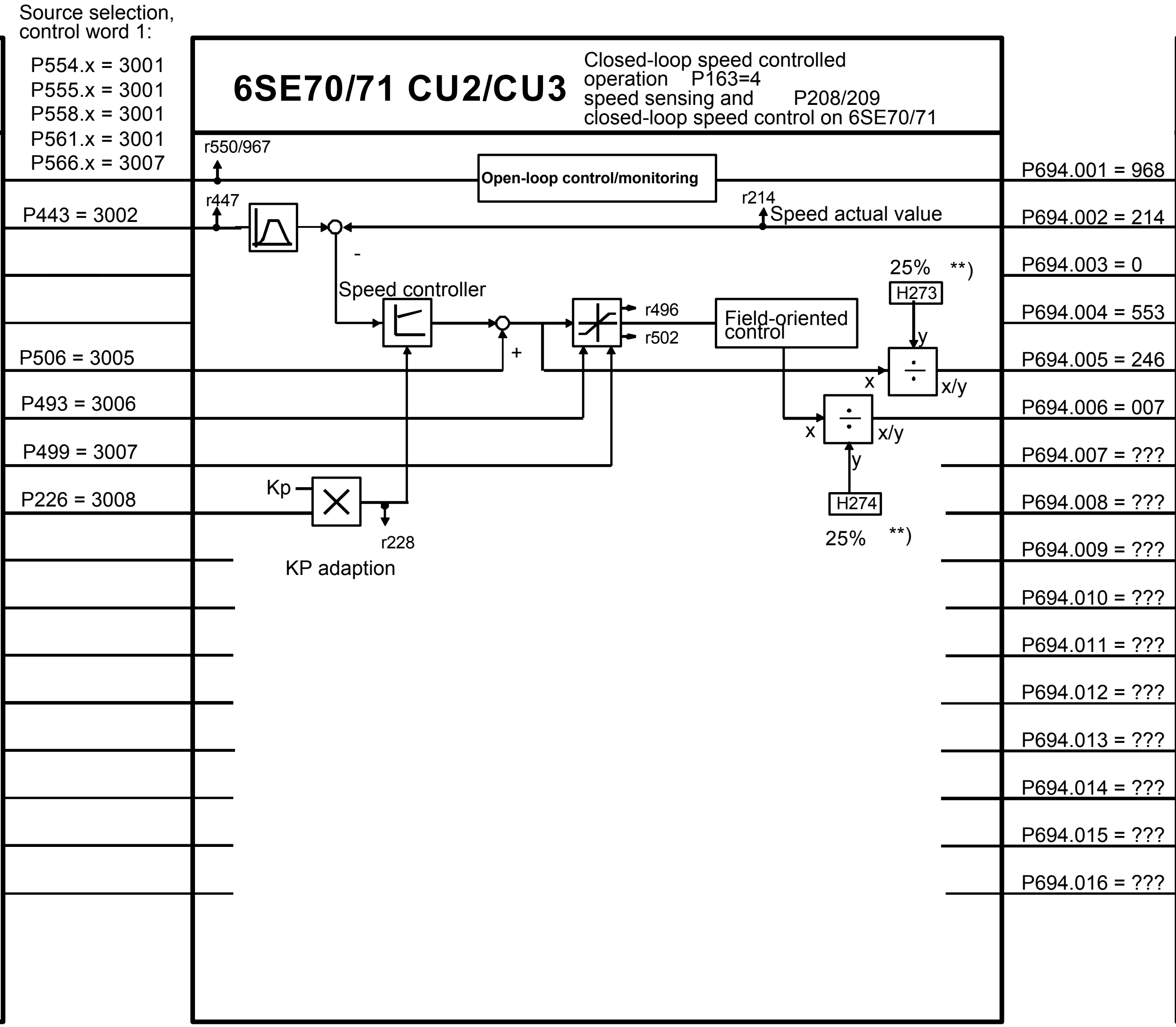
Interface Board
Word No. receive SINEC L2 and USS
Significance
1 Parameter ID
2 Index
3 Parameter value, Hi word
4 Parameter value, Lo word
5 Control word 1 from CB Bits 1.0 to 1.15 [16,17]
6 Setpoint 1 from CB [11-13]
7 Setpoint 2 from CB [11-13]
8 Control word 2 from CB Bits 1.0 to 1.15 [16,17]
9 Setpoint 3 from CB [11-13]
10 Setpoint 4 from CB [11-13]
11 Setpoint 5 from CB [11-13]
12 Setpoint 6 from CB [11-13]
Receive data
SST1
Parameters
Send data
Word No. send SINEC L2 and USS
Significance
1 Parameter ID
2 Index
3 Parameter value, Hi word
4 Parameter value, Lo word
5 Status word 1 SW320 Bits 1.0 to 1.15
6 Select value 1 SW320 [15]
7 Select value 2 SW320 [15]
8 Status word 2 SW320 Bits 2.0 to 2.15
9 Select value 3 SW320 [15]
10 Select value 4 SW320 [15]
11 Select value 5 SW320 [15]
12 Select value 6 SW320 [15]
Dual Port RAM
Peer-to-peer protocol
X134
SIMADYN D monitor
X131
TPTP: Send data, peer-to-peer
No. Significance
1 Send word 1 PTP [14]
2 Send word 2 PTP [14]
3 Send word 3 PTP [14]
4 Send word 4 PTP [14]
5 Send word 5 PTP [14]
R_AUT: Receive data, CB
If a CB is not inserted: Setpoints=0 and control word=0H0006
RPTP: Receive data, peer-to-peer
No. Significance
1 Receive word 1 PTP [11-14]
2 Receive word 2 PTP [11-14]
3 Receive word 3 PTP [11-14]
4 Receive word 4 PTP [11-14]
5 Receive word 5 PTP [11-14]
T_AUT: Send data, CB
Internal Functions
T_DEV: Send data, drive converter
No. Significance
0 15
Refer to Sheet 3
TP_xxx: Parameter block
For technological parameters dxxx and Hxxx
R_DEV: Receive data, drive converter
No. Significance
0 15
Refer to Sheet 3
Parameters
Dual Port RAM
Basic Drive Converter
Technology board T300



*) Control- and status words, refer to Sheet 22
**) on T300

Send data T300 to CU

Control word 1 *)
Speed setpoint [6.8]
0%, not used
0H0, not used
Supplementary torque setp [6.8]
Positive torque limit [6.8]
Negative torque limit [6.8]
Kp adaption factor [6.8]
Status word 1 SW320 *)
Status word 2 SW320 *)
Select value 1 SW320 [15.3]
Select value 2 SW320 [15.3]
Select value 3 SW320 [15.5]
Select value 4 SW320 [15.5]
Select value 5 SW320 [15.7]
Select value 6 SW320 [15.7]

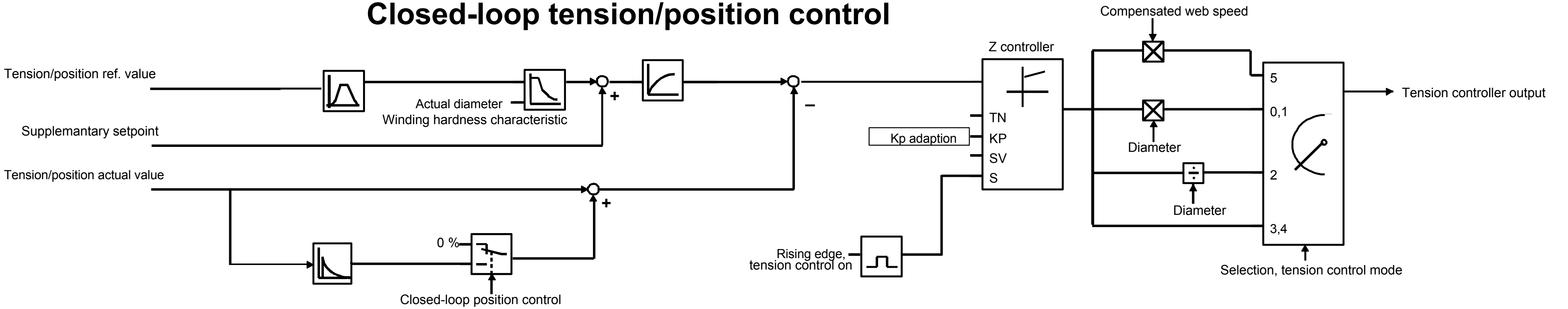


Receive data, T300 from CU

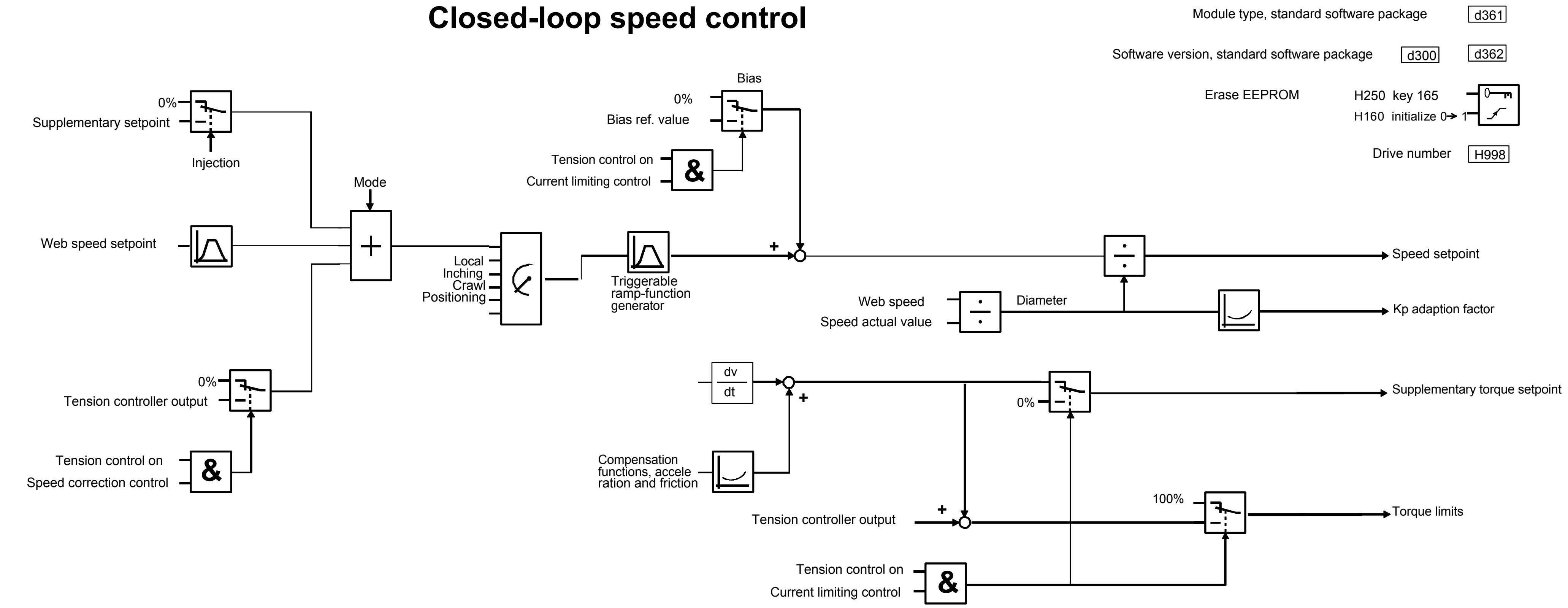
Status word 1 *)
Speed actual value CU [13.2]
Not used
Status word 2 *)
Torque setpoint [6.1]
Torque actual value [20.1, 7.4]
Select value 1 from CU [11-15]
Select value 2 from CU [11-15]
Control word 1 from CU [11-13]
Control word 2 from CU [11-13]
Setpoint 1 from CU [11-13]
Setpoint 2 from CU [11-13]
Setpoint 3 from CU [11-13]
Setpoint 4 from CU [11-13]
Setpoint 5 from CU 11-13]
Setpoint 6 from CU [11-13]

*) Control- and status words, refer to Sheet 22
**) on T300

Closed-loop tension/position control



Closed-loop speed control



Standard axial winder software package MS320
Overview, closed-loop speed - and tension/position control structures

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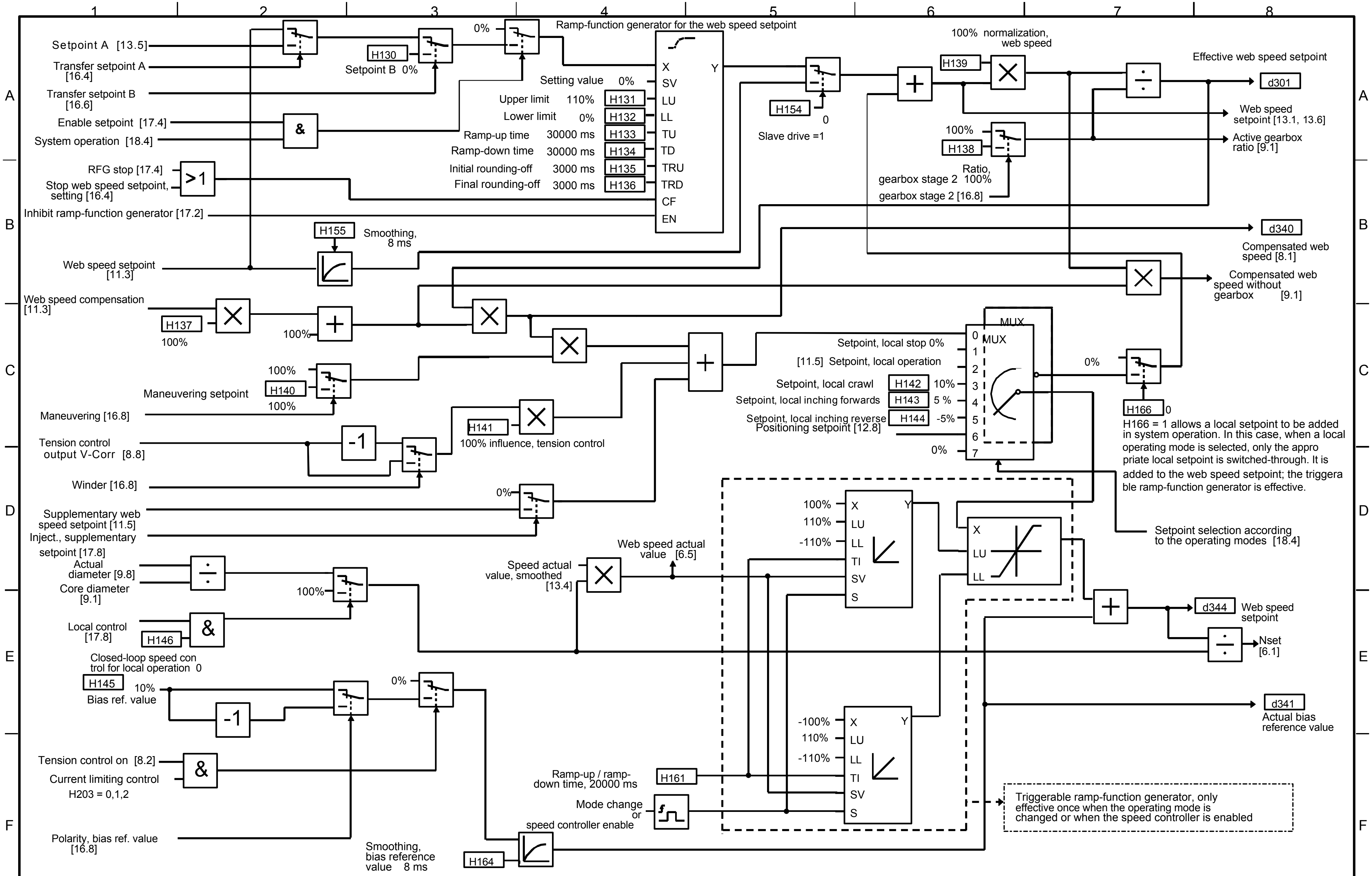
Sheet 4



Standard axial winder software package MS320
Speed setpoint conditioning

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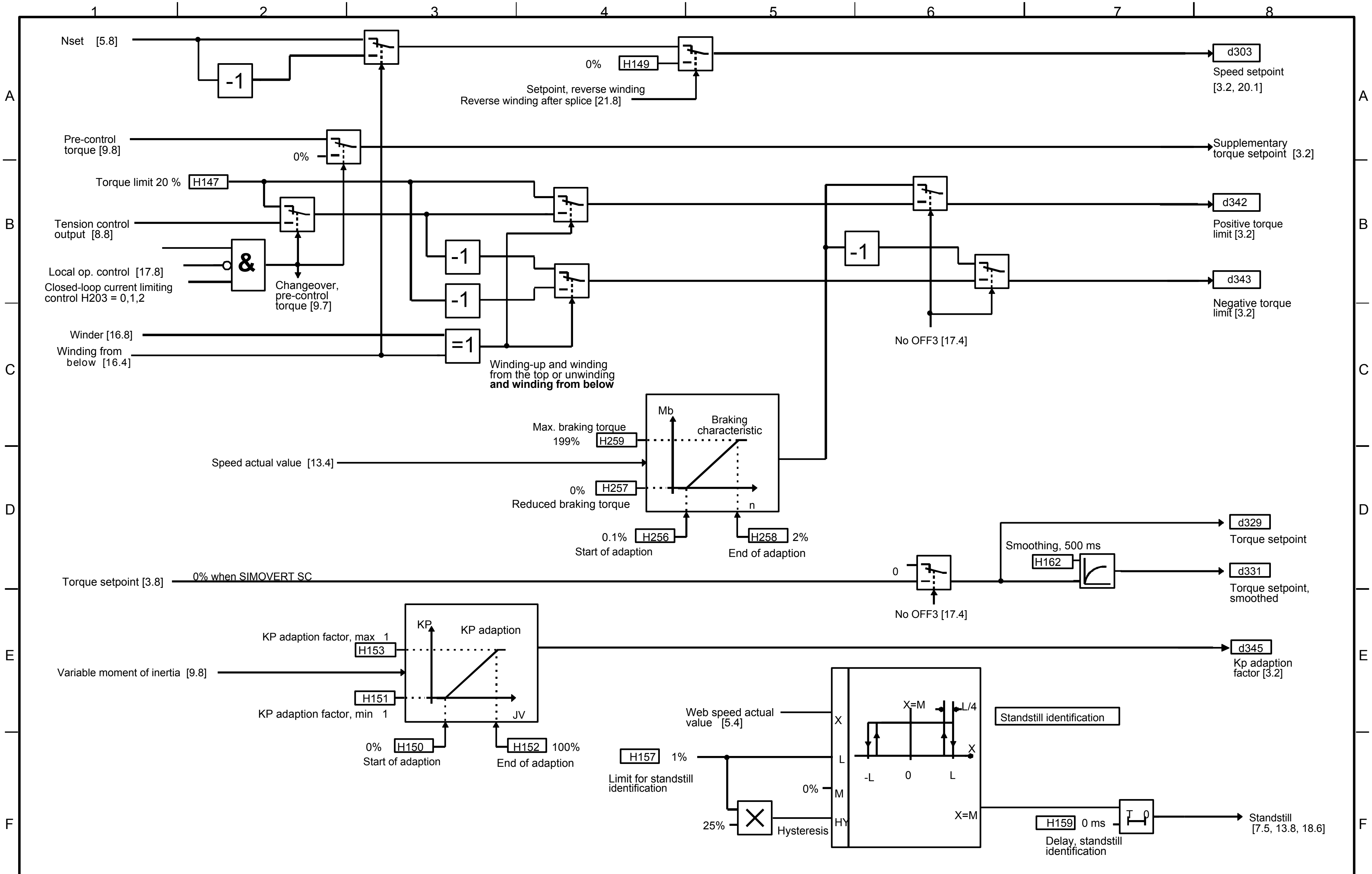
Sheet 5



Standard axial winder software package MS320

Torque limiting, supplementary torque setpoint, standstill identification

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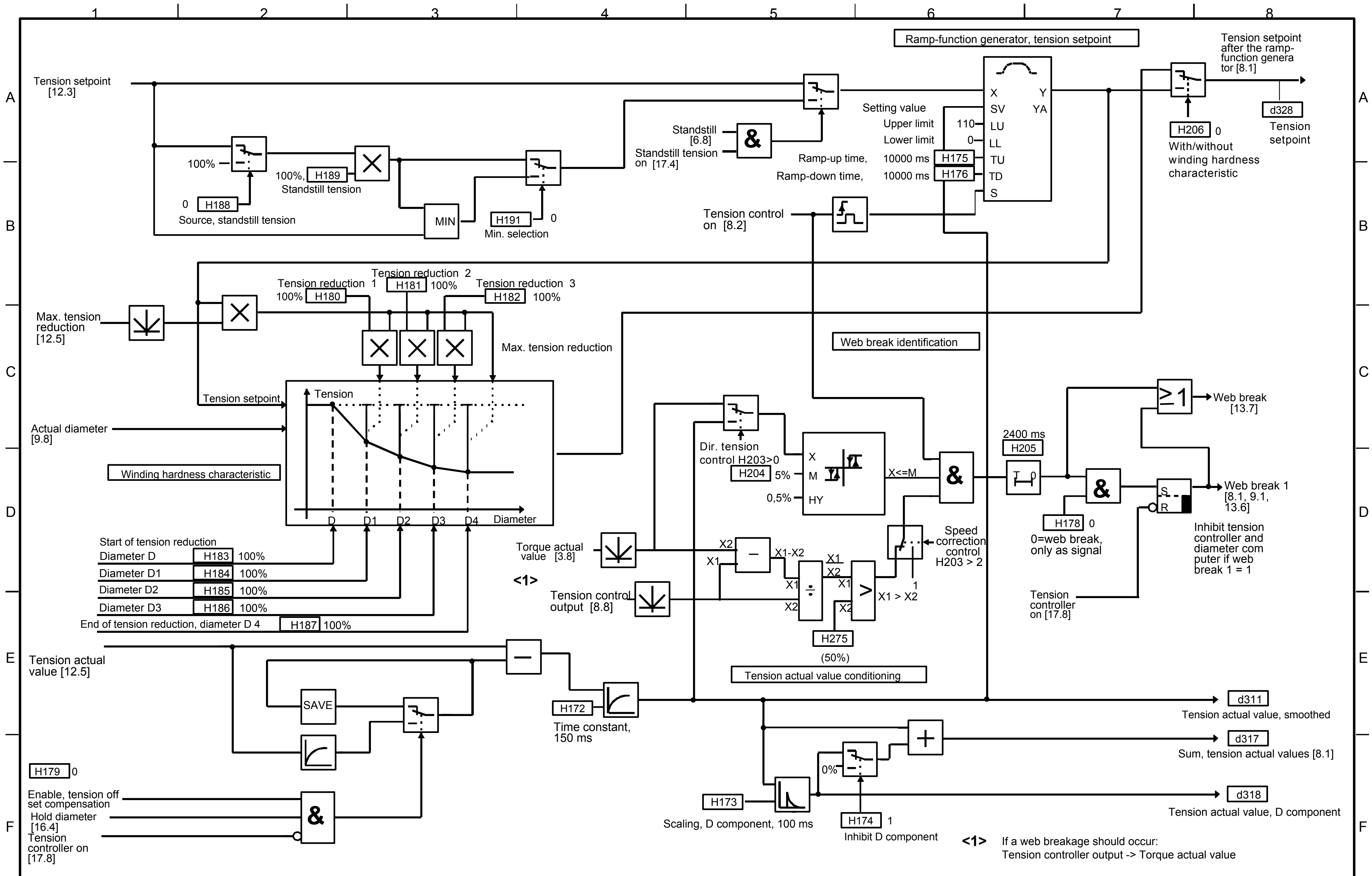
Sheet 6



Standard axial winder software package MS320

Tension setpoint / tension actual value conditioning winding hardness control, web break identification

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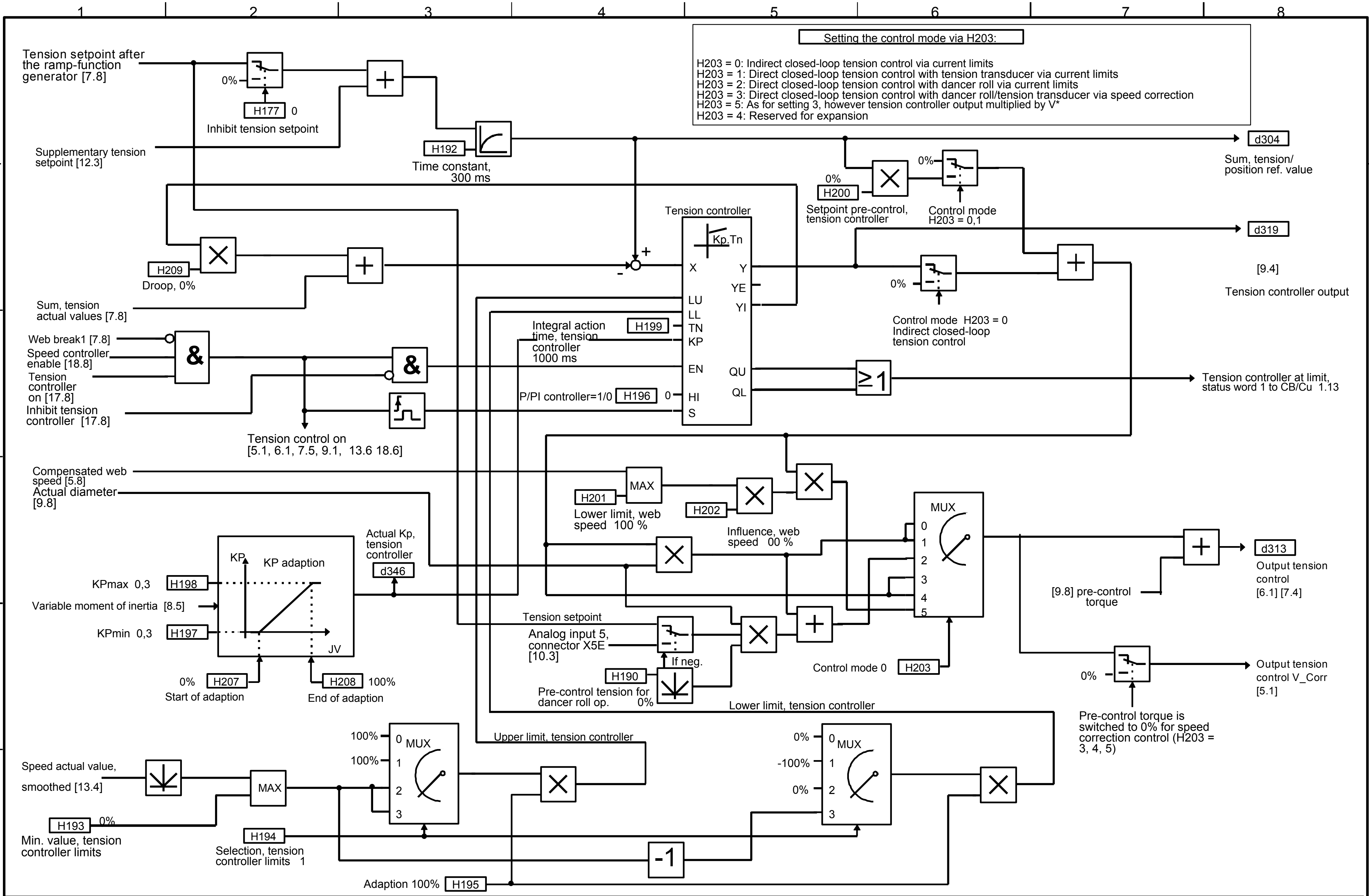
Sheet 7



Standard axial winder software package MS320
Closed-loop tension controller

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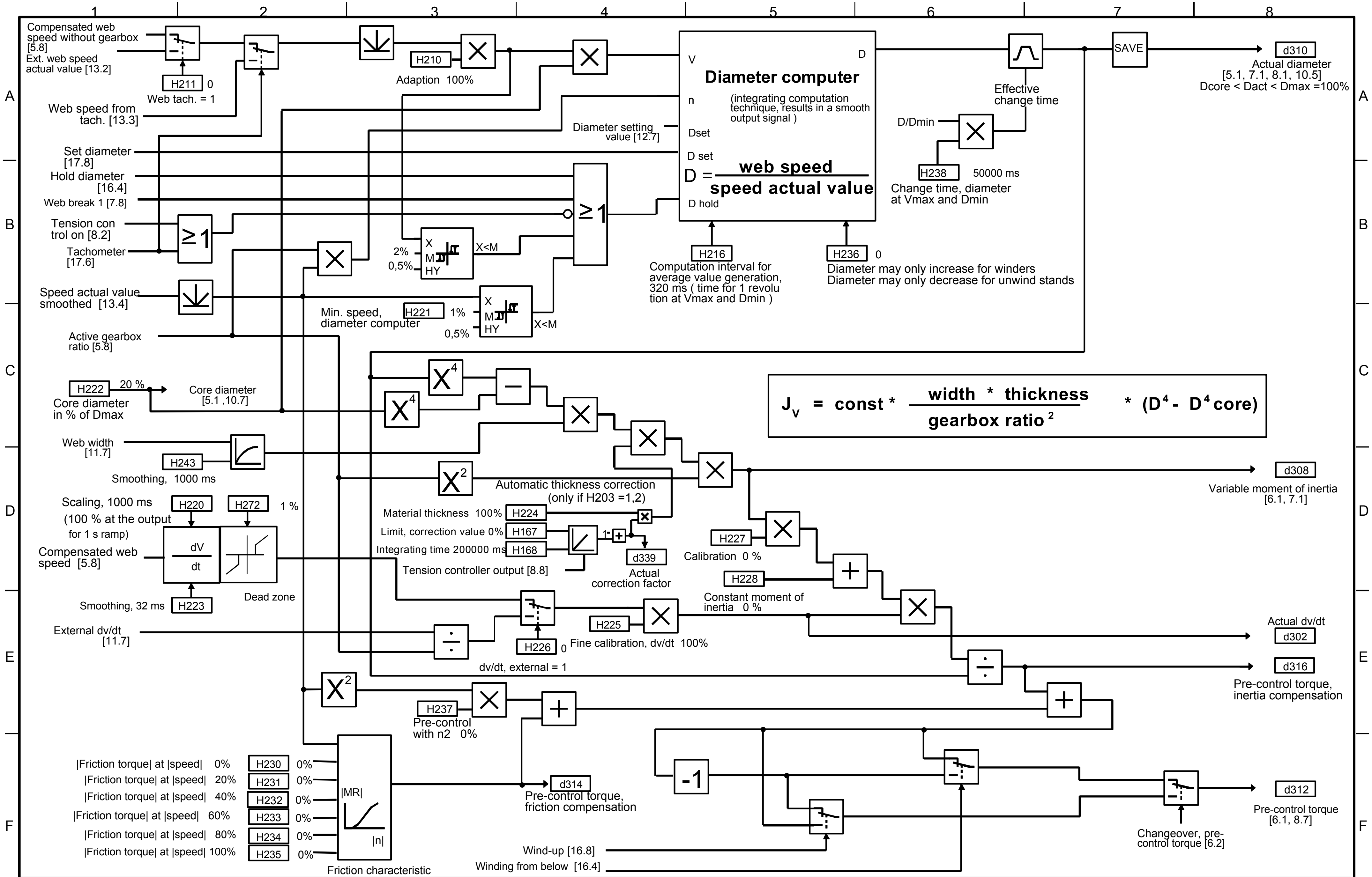
Sheet 8



Standard axial winder software package MS320
Diameter computer, pre-controls

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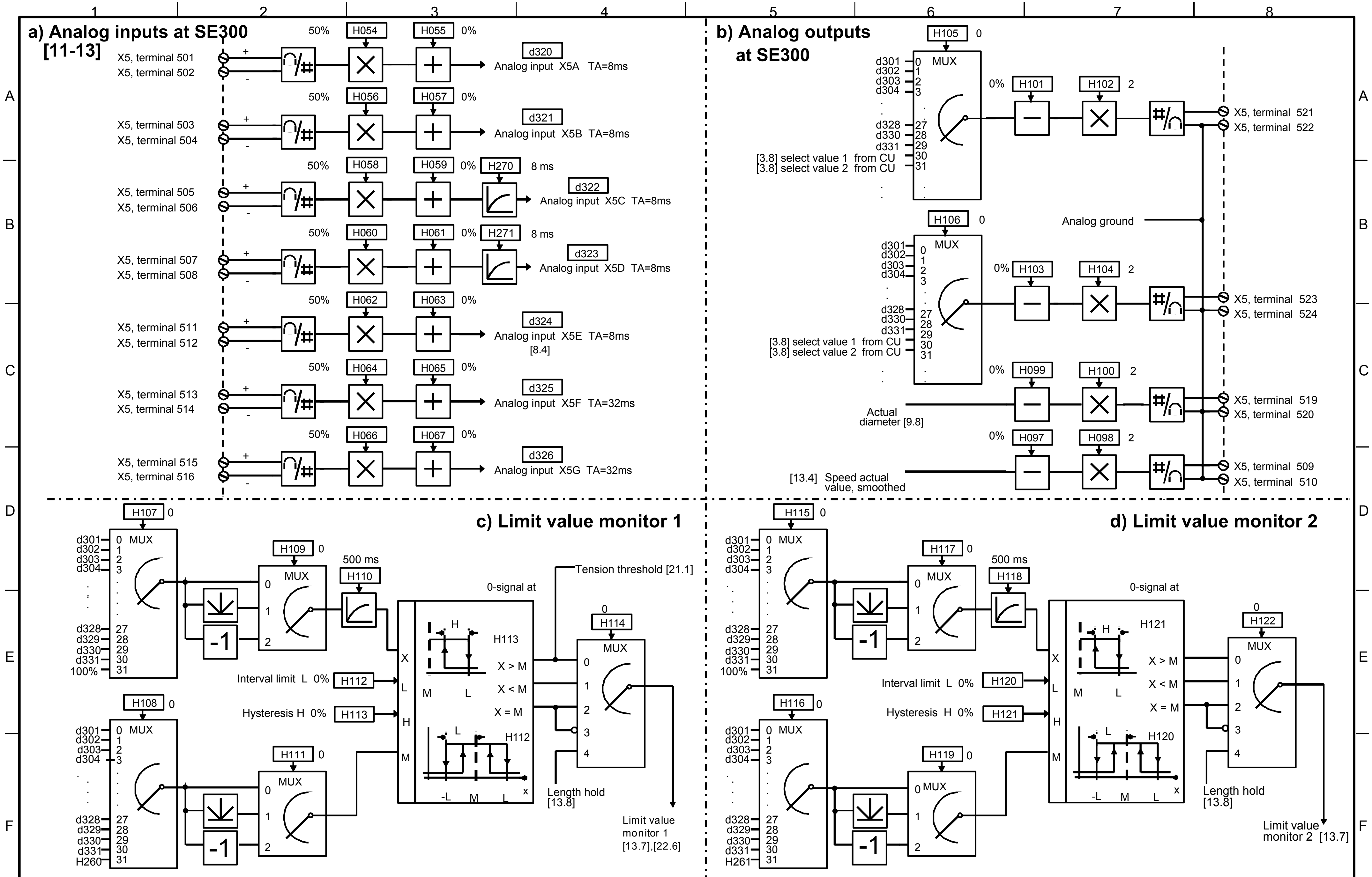
Sheet 9



Standard axial winder software package MS320
Analog inputs / outputs, limit value monitors

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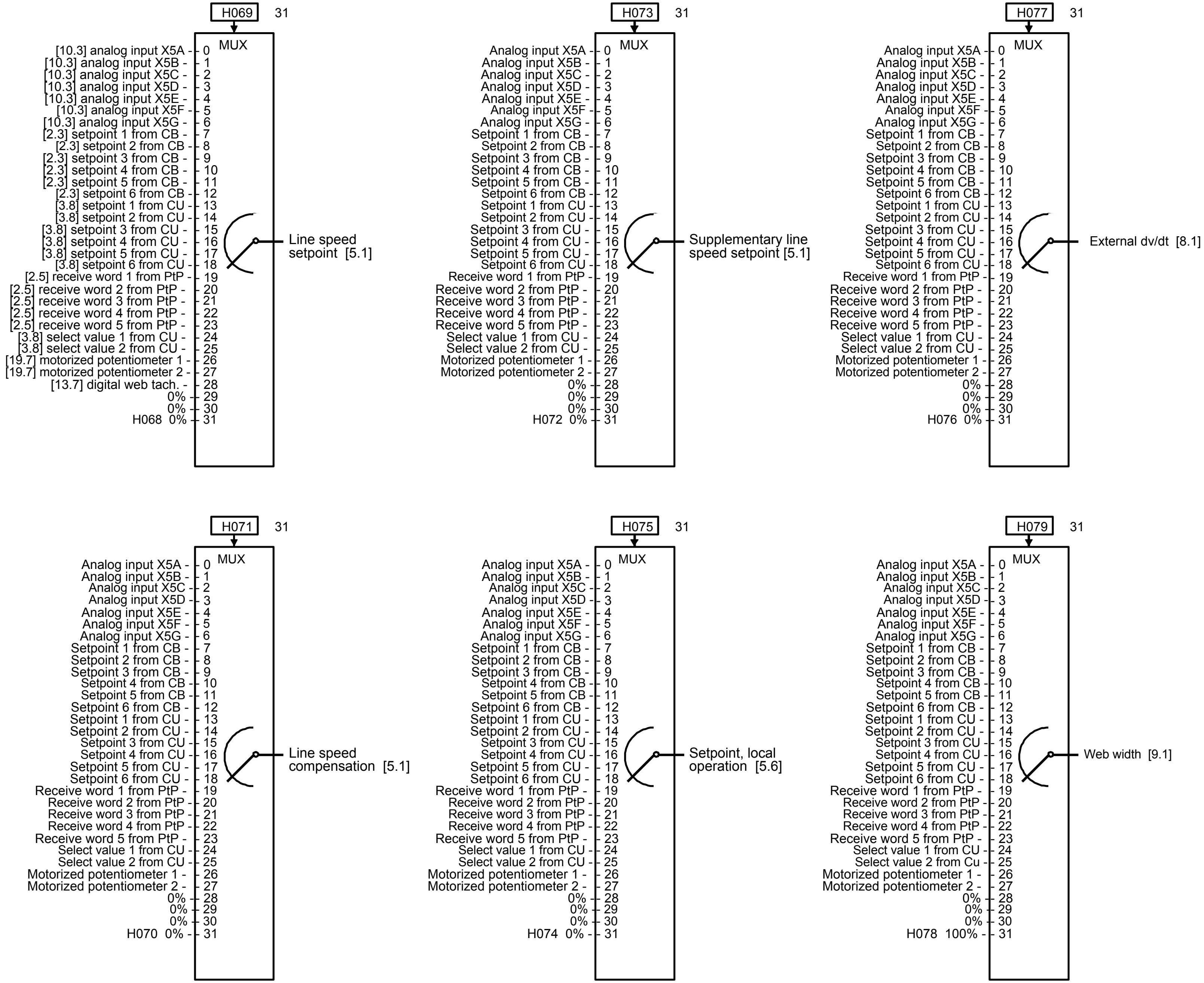
Sheet 10



Standard axial winder software package MS320
Select inputs, setpoints / actual values

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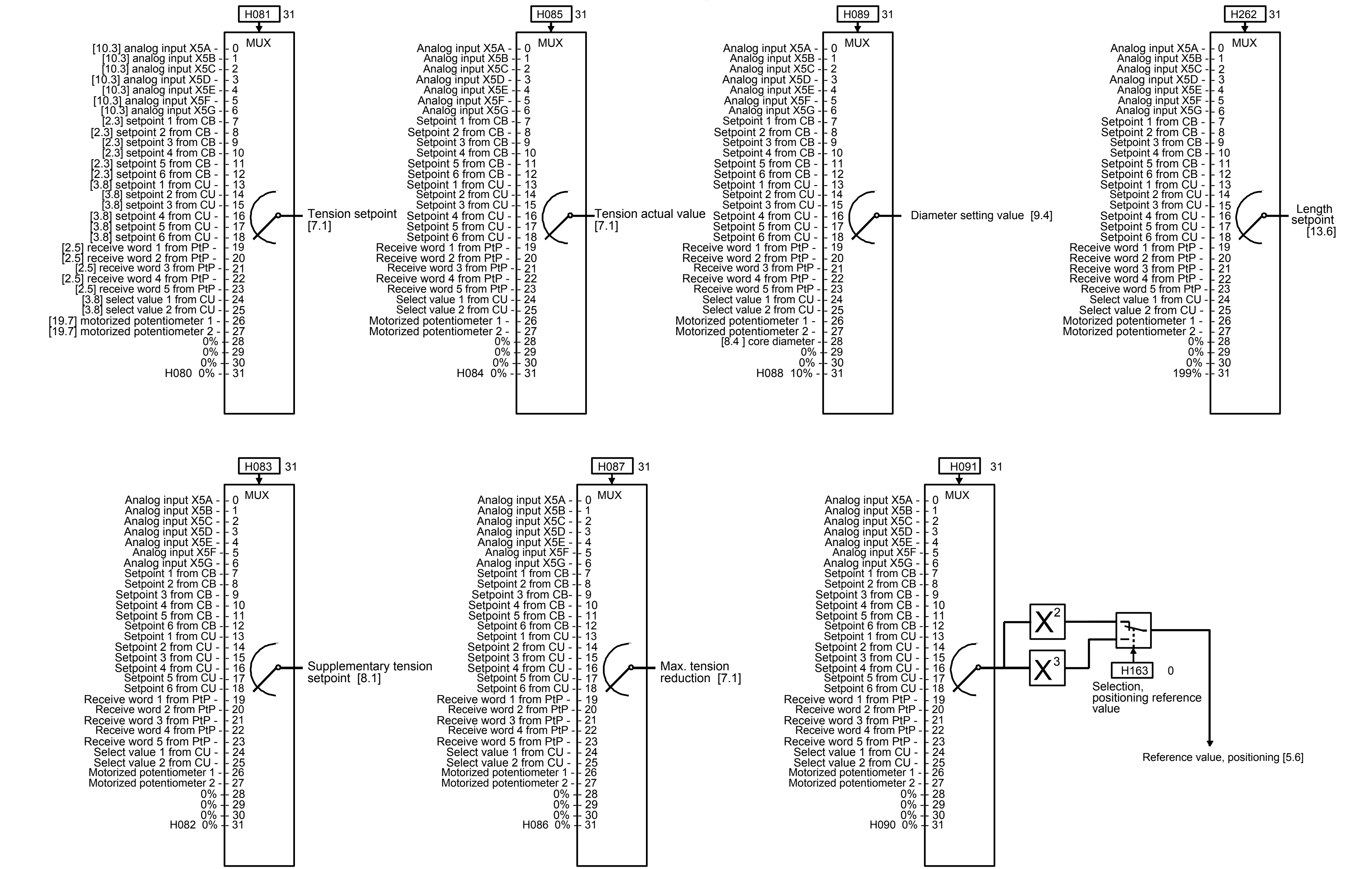
Sheet 11



Standard axial winder software package MS320

Select inputs, setpoints / actual values

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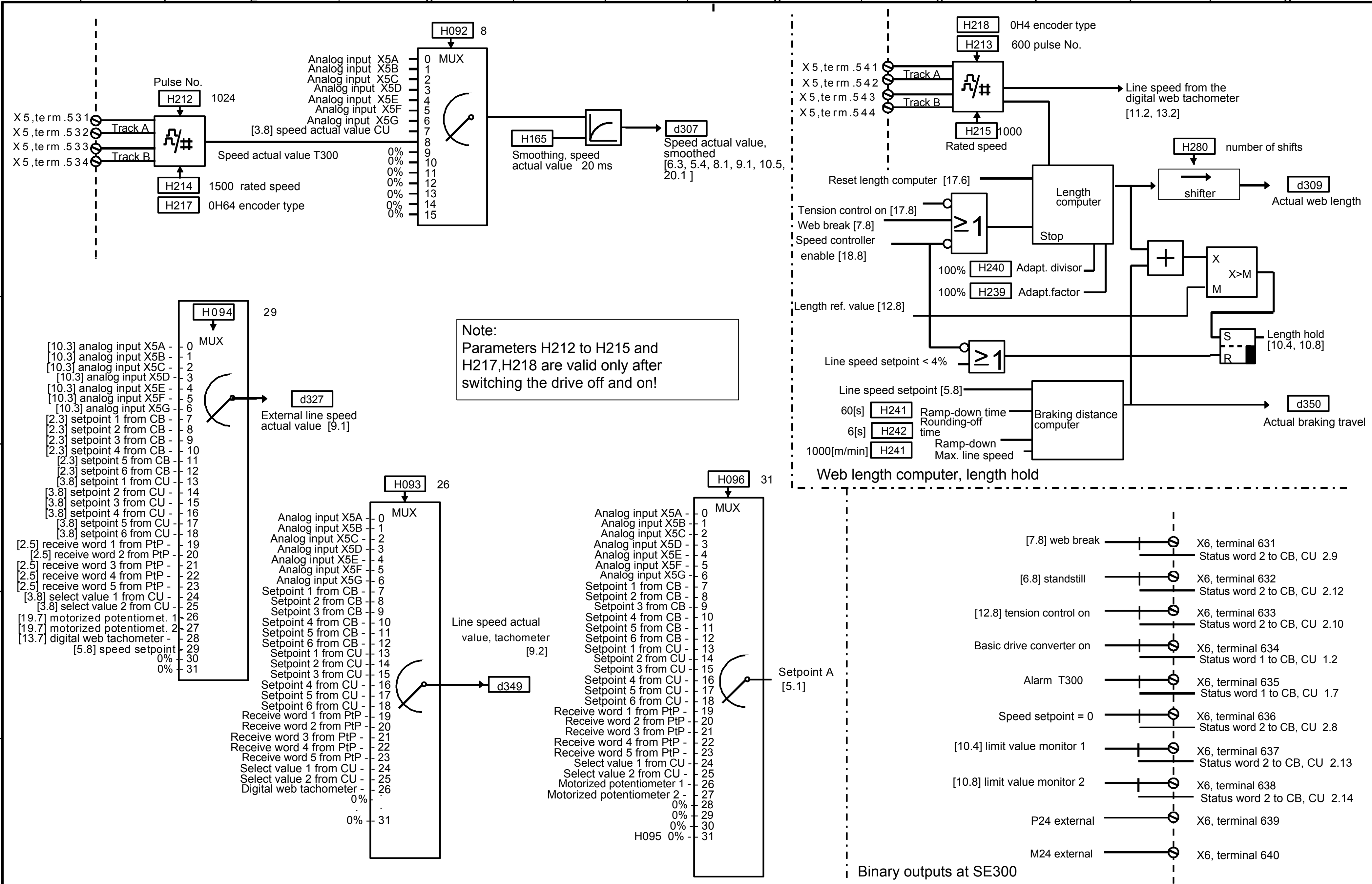
Sheet 12



Standard axial winder software package MS320

Select inputs, setpoints / actual values, digital tachometers, length computer, binary outputs

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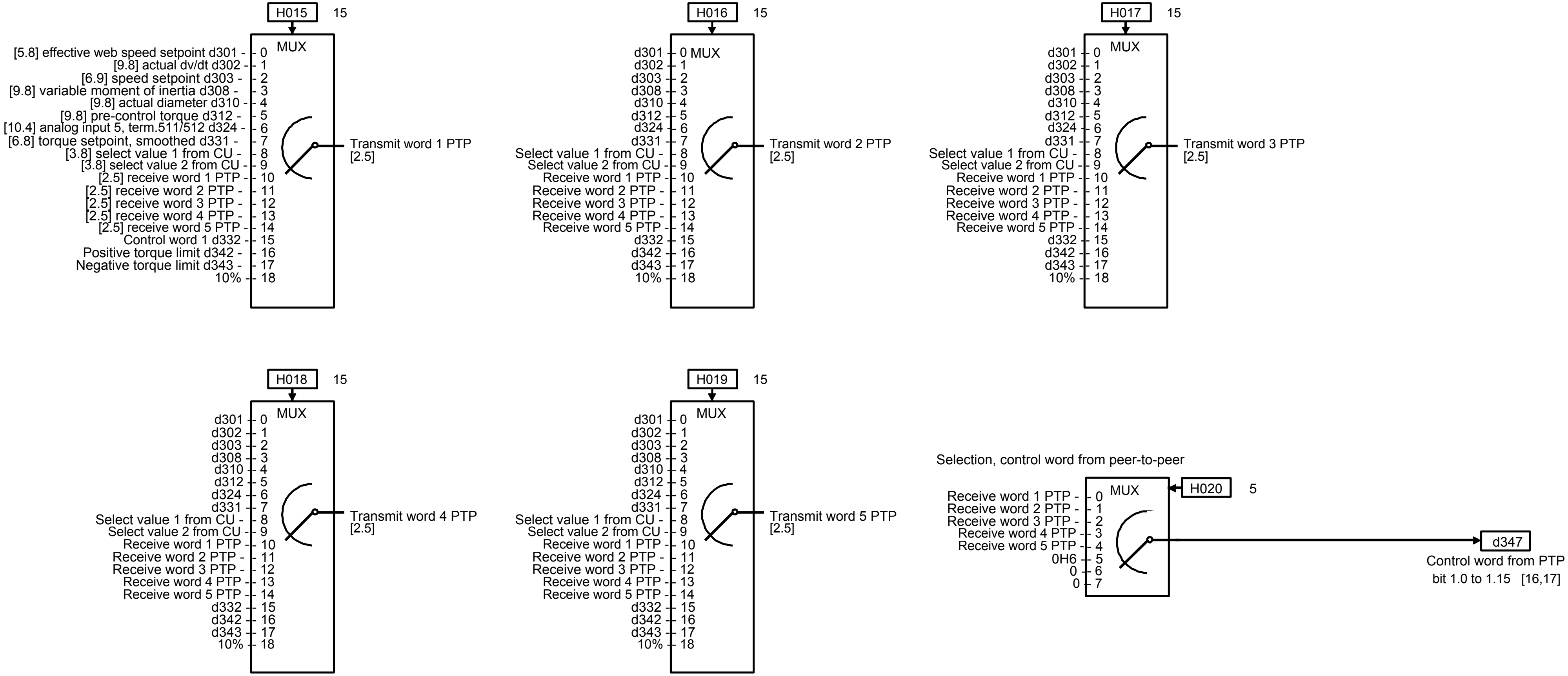
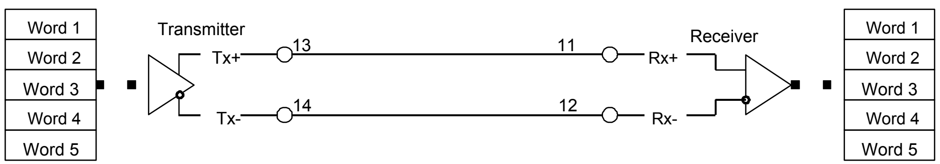
Sheet 13

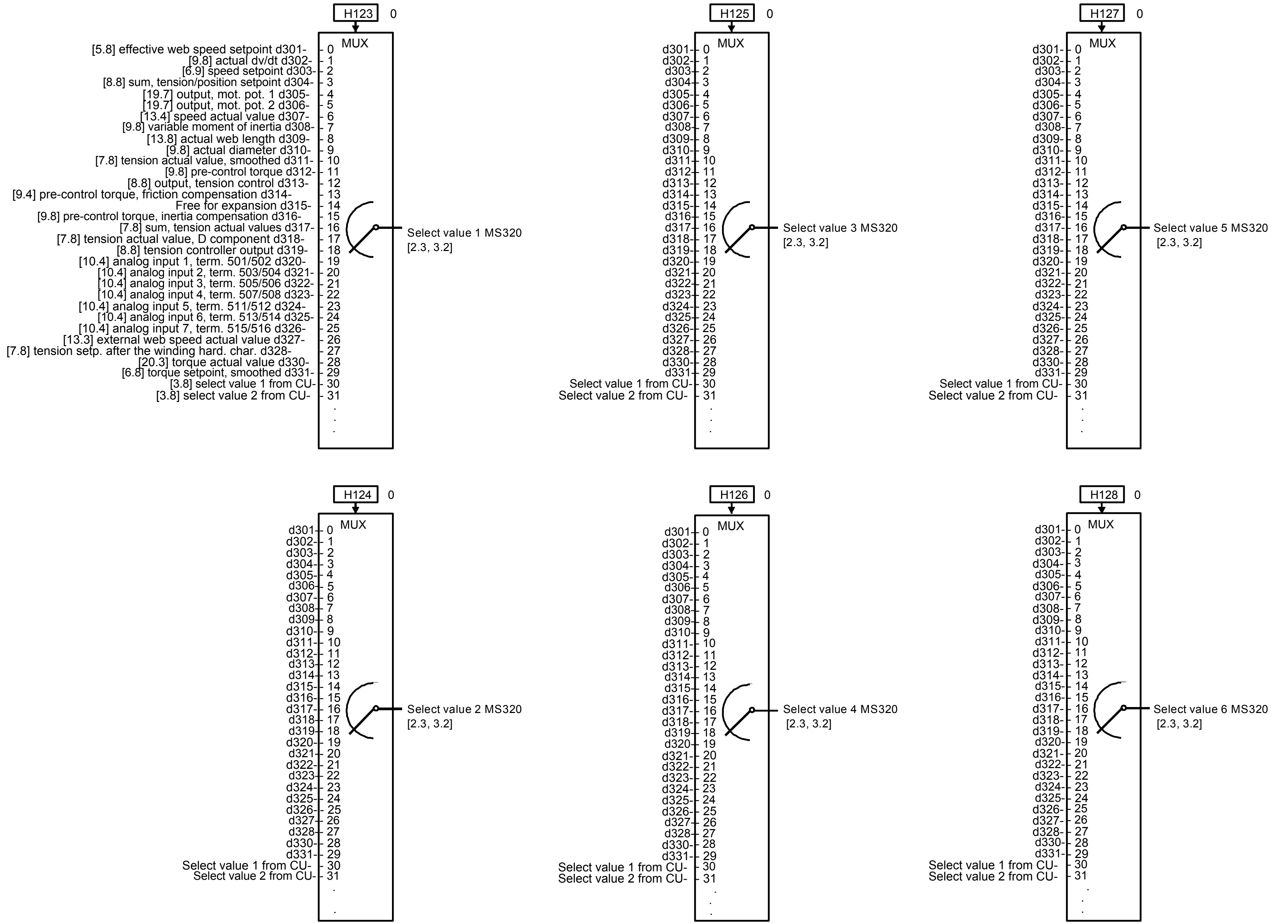


Settings for the peer-to-peer protocol:

H245	6	Baud rate, 2=600, 3=1200, 4=2400, 5=4800, 6=9600, 7=19200
H247	5	Number of receive words
H248	5	Number of transmit words
H249	0	Enable transmitter 0 = off
H006	10	Receive monitoring in nxTa 0 = off



Note: Parameters H006,H245,H247,H248 get valid only after switching the drive off and on!
Please refere also to note 3, Section 8.1.3.3



Standard axial winder software package MS320

Select inputs at CB and CU

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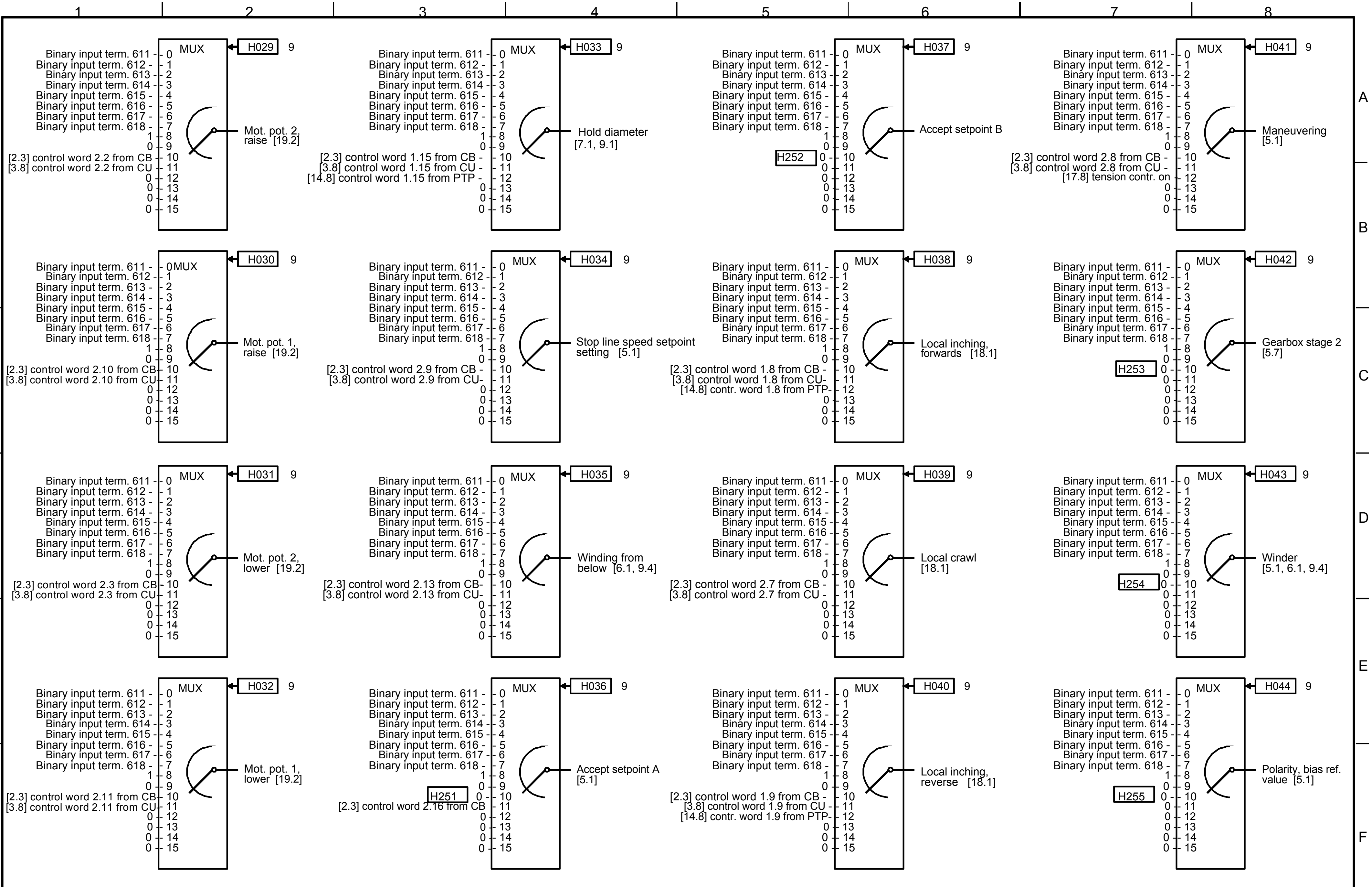
Sheet 15



Standard axial winder software package MS320

Freely - connectable binary inputs, terminals 611 - 618

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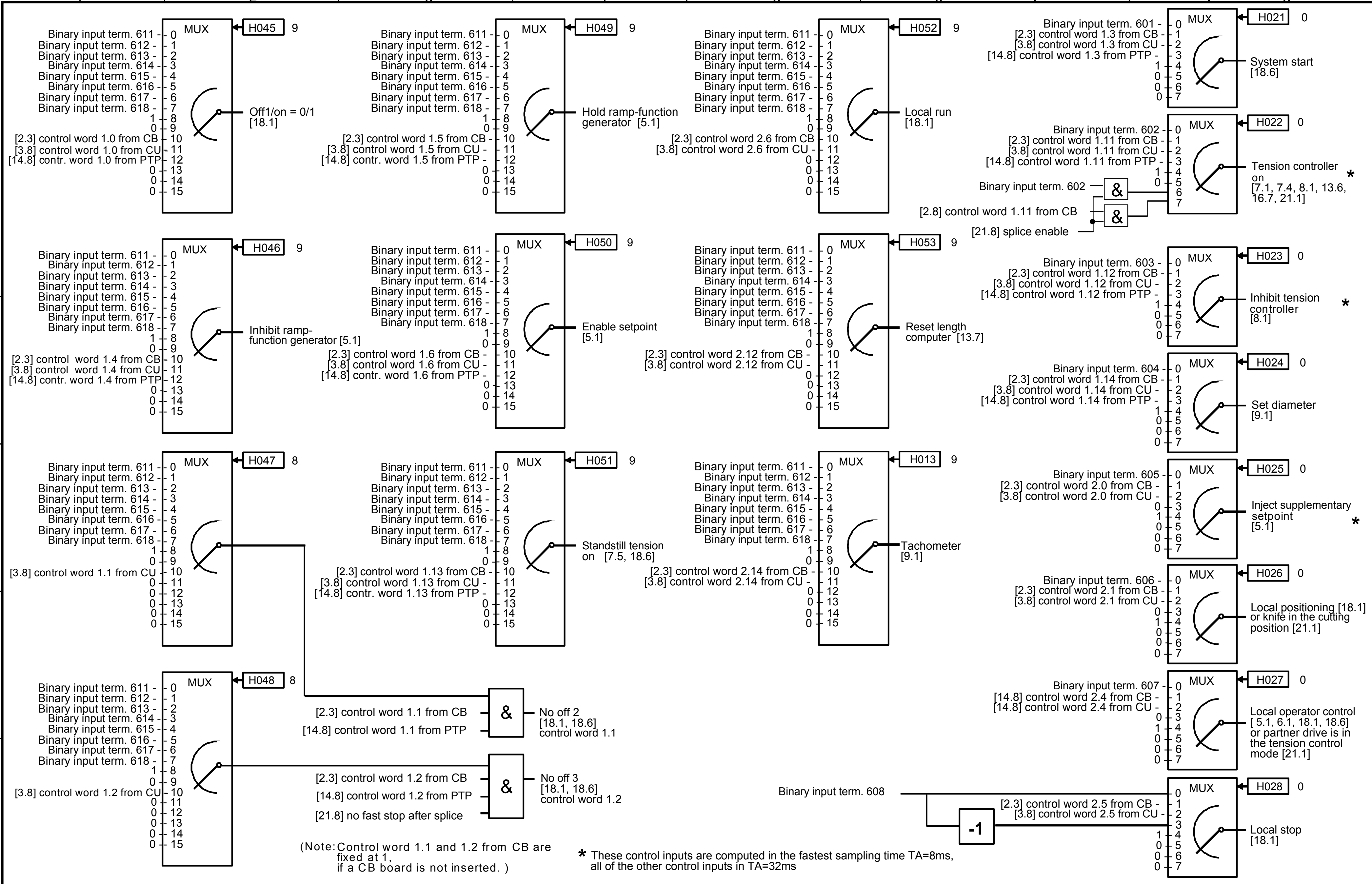
Sheet 16



Standard axial winder software package MS320

Permanently assigned binary inputs, terminals 601 - 608, freely - assignable binary inputs, terminals 611 - 618

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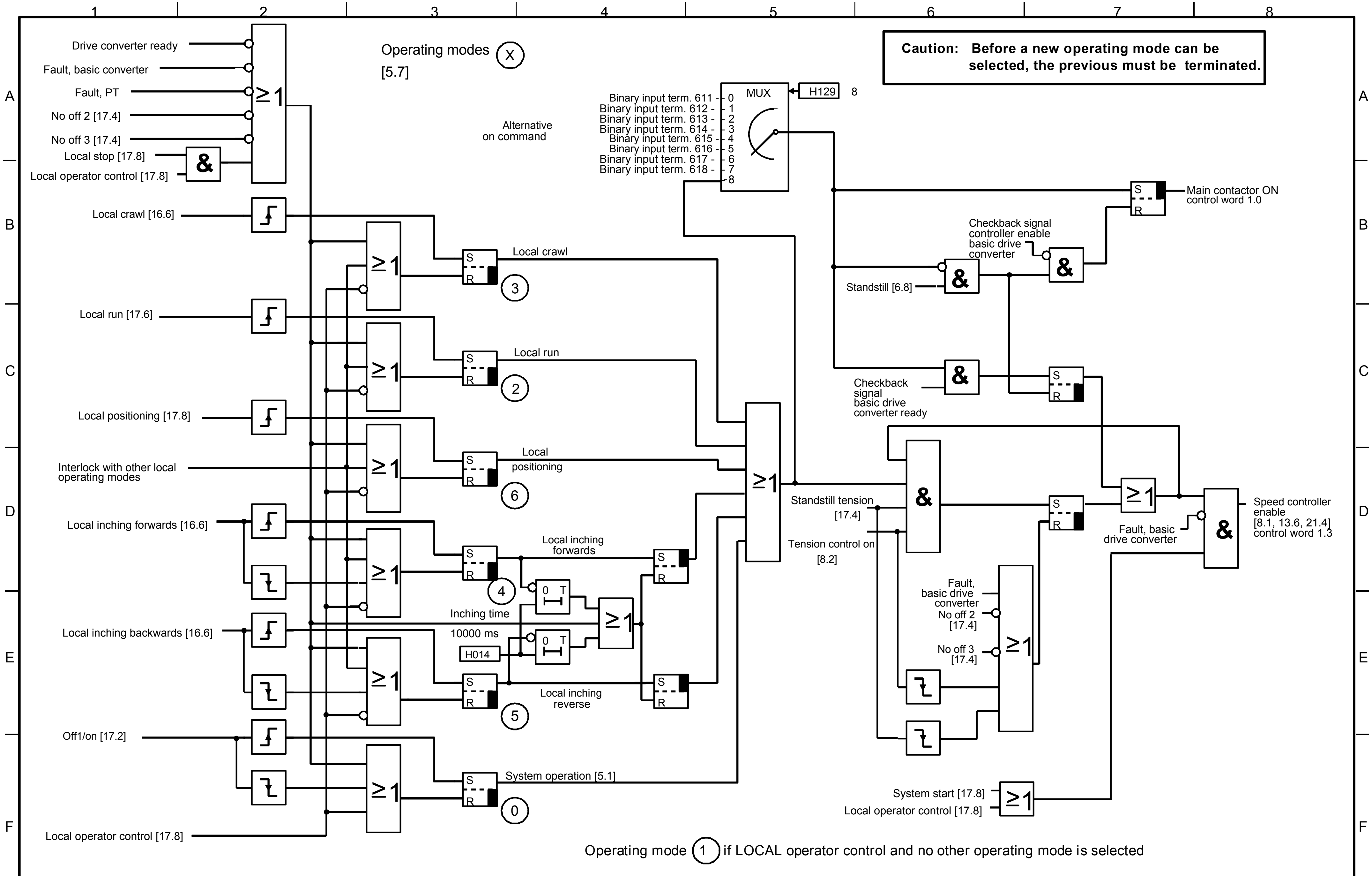
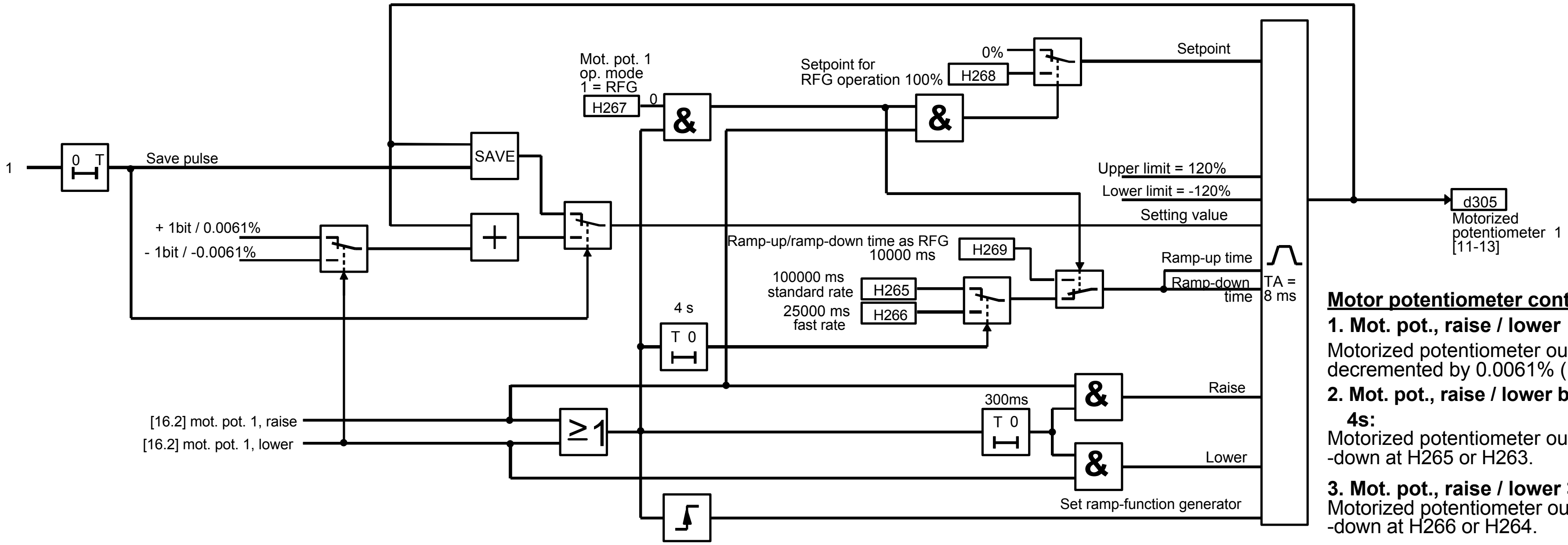

Operating modes X
[5.7]
Caution: Before a new operating mode can be selected, the previous must be terminated.
Drive converter ready
Fault, basic converter
Fault, PT
No off 2 [17.4]
No off 3 [17.4]
Local stop [17.8]
Local operator control [17.8]
Local crawl [16.6]
Local run [17.6]
Local positioning [17.8]
Interlock with other local operating modes
Local inching forwards [16.6]
Local inching backwards [16.6]
Off1/on [17.2]
Local operator control [17.8]
Alternative on command
Binary input term. 611 - 0
Binary input term. 612 - 1
Binary input term. 613 - 2
Binary input term. 614 - 3
Binary input term. 615 - 4
Binary input term. 616 - 5
Binary input term. 617 - 6
Binary input term. 618 - 7
8
MUX
H129
8
Local crawl
3
Local run
2
Local positioning
6
Local inching forwards
4
Inching time
10000 ms
H014
Local inching reverse
5
System operation [5.1]
0
Main contactor ON control word 1.0
Checkback signal controller enable basic drive converter
Standstill [6.8]
Checkback signal basic drive converter ready
Standstill tension [17.4]
Tension control on [8.2]
Fault, basic drive converter
Speed controller enable [8.1, 13.6, 21.4] control word 1.3
Fault, basic drive converter
No off 2 [17.4]
No off 3 [17.4]
System start [17.8]
Local operator control [17.8]
Operating mode 1 if LOCAL operator control and no other operating mode is selected



Motor potentiometer control:

1. Mot. pot., raise / lower <300ms:

Motorized potentiometer output is incremented or decremented by 0.0061% (1bit).

2. Mot. pot., raise / lower between 300ms and 4s:

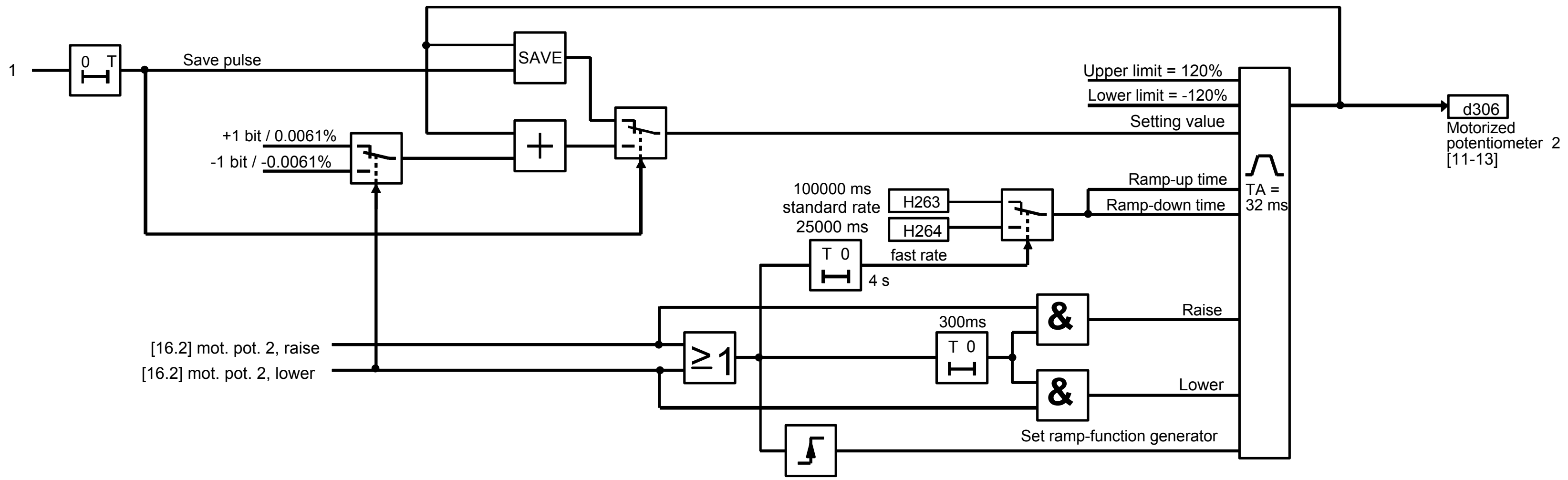
Motorized potentiometer output ramps-up or -down at H265 or H263.

3. Mot. pot., raise / lower > 4s:

Motorized potentiometer output runs-up or -down at H266 or H264.

Mot. pot. 1 as ramp-function generator:

For H267=1, the motorized potentiometer 1 acts like a ramp-function generator.
The ramp-up / ramp-down time is set at H269.
The setpoint is entered at H268.



Standard axial winder software package MS320
Motorized potentiometers 1 and 2

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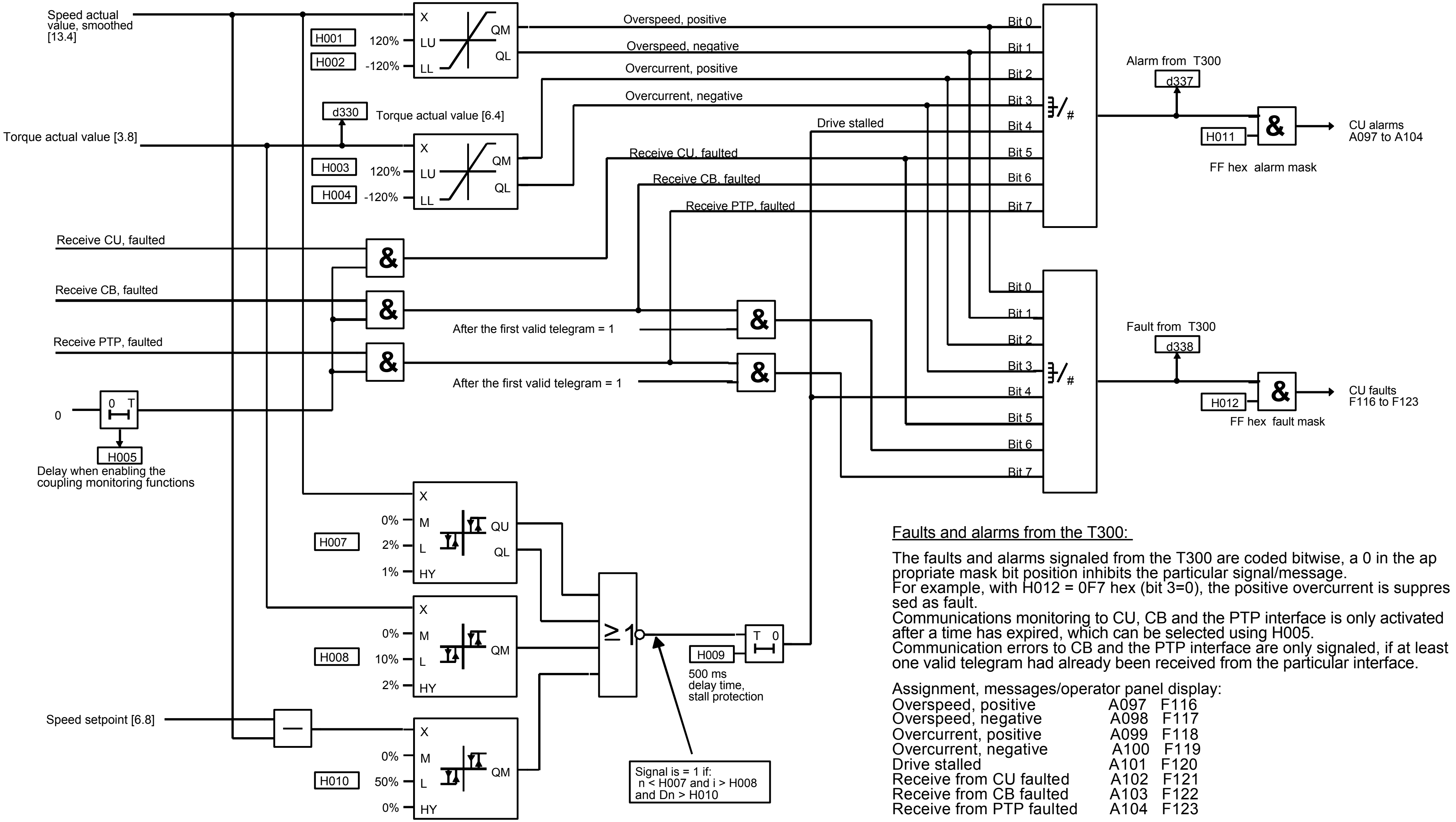
Sheet 19

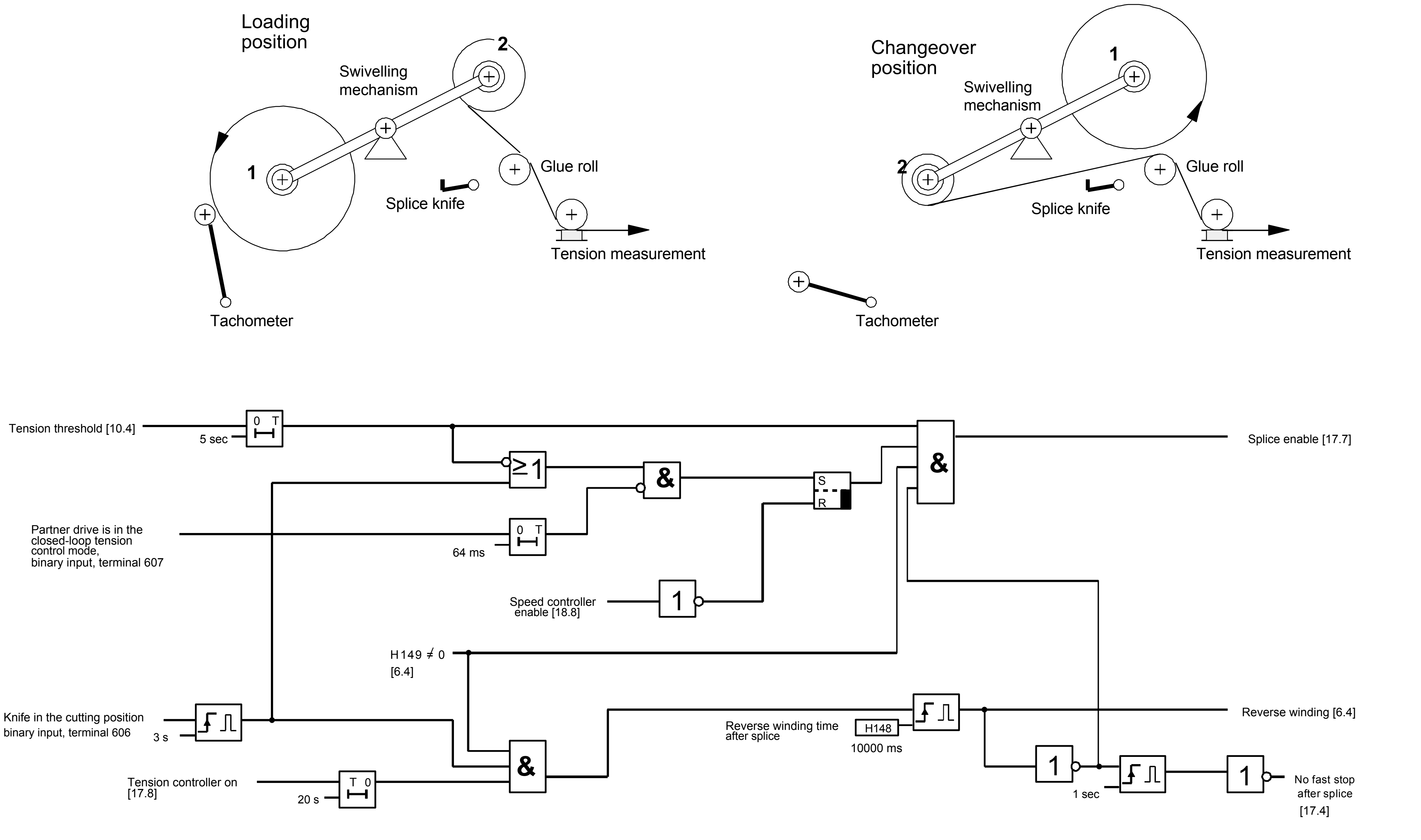


Faults and alarms from the T300:

The faults and alarms signaled from the T300 are coded bitwise, a 0 in the ap propriate mask bit position inhibits the particular signal/message.
For example, with H012 = 0F7 hex (bit 3=0), the positive overcurrent is suppres sed as fault.
Communications monitoring to CU, CB and the PTP interface is only activated after a time has expired, which can be selected using H005.
Communication errors to CB and the PTP interface are only signaled, if at least one valid telegram had already been received from the particular interface.

Assignment, messages/operator panel display:

Overspeed, positive	A097	F116
Overspeed, negative	A098	F117
Overcurrent, positive	A099	F118
Overcurrent, negative	A100	F119
Drive stalled	A101	F120
Receive from CU faulted	A102	F121
Receive from CB faulted	A103	F122
Receive from PTP faulted	A104	F123



Standard axial winder software package MS320
Splice control

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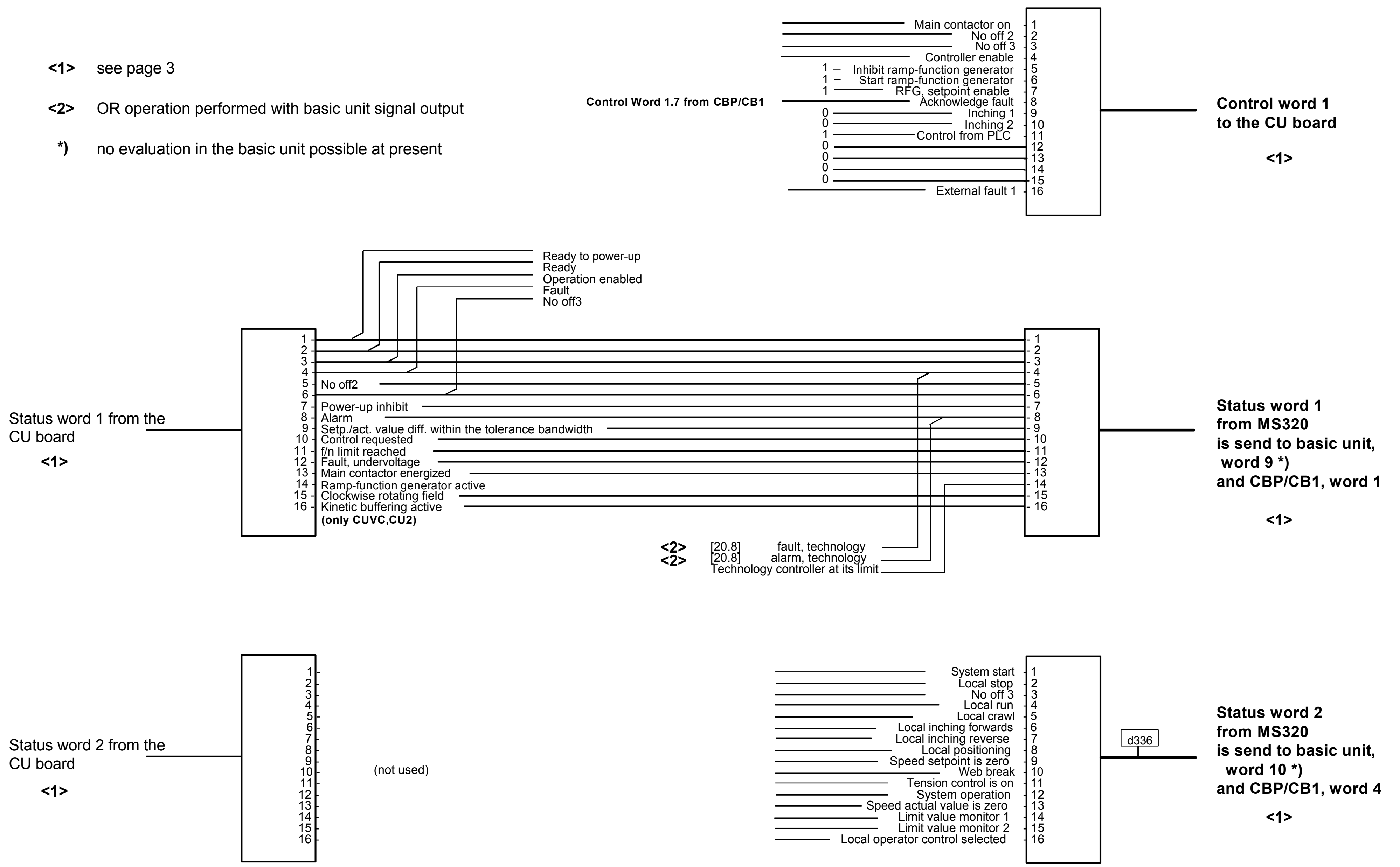
Sheet 21

<1> see page 3

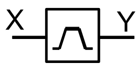
<2> OR operation performed with basic unit signal output

*) no evaluation in the basic unit possible at present

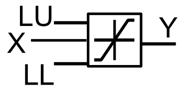


Explanations of the abbreviations and symbols in the block diagram

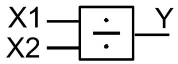
CF = "Output = Set input" command
EN = Controller enable
HY = Hysteresis
KP = Proportional gain
LL = Lower limit value
LU = Upper limit value
M = Threshold
MUX = Multiplexer, changeover switch
PTP = Peer-to-peer protocol
QL = "At the lower limit" signal
QU = "At the upper limit" signal
S = "Setting" command
SV = Setting value
Ta = Sampling time
TD = Ramp-down time
TI = Integrating time constant
TN = Integral action time
TRU = Ramp-up/rounding-off time
TRD = Ramp-down/rounding-off time
TU = Ramp-up time
X = Main input quantity, actual value
Y = Main output quantity, manipulated variable
YA = Acceleration dv/dt
YE = Control error
YI = I component
HI = Hold Integrator



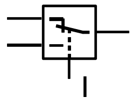
= Ramp-function generator



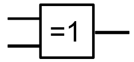
= Limiter (LL<=Y<=LU)



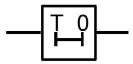
= Divider (Y=X1/X2)



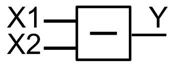
= Changeover switch (quiescent position (I=O) as shown)



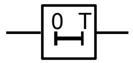
= Exclusive or



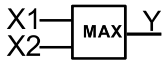
= Switch-on delay, can be retriggered



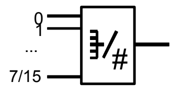
= Subtractor (Y=X1-X2)



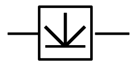
= Switch-out delay, can be retriggered

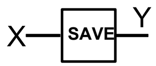


= Maximum value generator (Y=max. of X1 and X2)

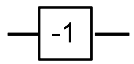


= Conversion, binary quantities into a byte/word quantity

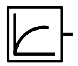

= Absolute value generator

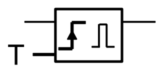


= Block to save X at power failure



= Polarity reversal


= PT1 element



= Monoflop

Die STRUC G Pläne sind aus der Betriebsanleitung „Achswickler MS320“
zu entnehmen.
Bestell-Nr: 6SE7080-0CX84-2AH1

STRUC G function diagrams - refere to the manual „Axial Winder MS320“.
Order-No: 6SE7087-6CX84-2AH1

To SIEMENS AG A&D MC Frauenauracherstr. 80 91056 Erlangen Code word: "Standard software packages" Kcopy to ZN/LG .... Mrs / Mr.	From Contact person Telephone	received
Your reference and your letter from	Our reference	City and date

<u>Problem-/Fault profile: Standard axial winder software package</u>

Standard axial winder software package:

Software-Version: ....

Configuring (Software?) ....

Technological modul:

Type: ....

Release: ....

Interface module:

Type: ....

Release: ....

Software version: ....

Protocol used: ....

Basic drive:

Type: ....

Release: ....

Software version: ....

<u>Problem-/fault profile:</u>

(use the reverse side or a separate sheet)

<u>The problem/fault occured under following conditions:</u>

Urgently required for a precise fault/error diagnostics:

- completed parameter list of the technological module according to Appendix I attached
- completed parameter list of the basic drive, attached

Continuation problem/fault profile:

(use the reverse side or a separate sheet)

The following editions have been published so far:

Edition	Internal Item Number
02.97	477 407.4082.76
08.98	477 407.4182.76
04.99	477 407.4182.76

Version 04.99 consists of the following chapters:

Chapter		Changes	Pages	Version date
0	Warning information and product limitation	Page: 2	2	04.99
1	Overview	reviewed edition	10	04.99
2	Interfaces	Page: 2, 3	6	04.99
3	Terminal assignment	Page: 1, 8, 9, 12, 13, 14	14	04.99
4	Function description	reviewed edition	24	04.99
5	Configuring instructions	Page: 14, 33	34	04.99
6	Parameters	Page: 1, 4, 5, 7, 25, 26, 29, 39, 42, 43, 44, 45, 47, 48, 49	52	04.99
7	Basic drive converter parameters	Page: 6	6	04.99
8	Commissioning the winder	reviewed edition	16	04.99
9	Diagnostic LED, Alarms, Faults	reviewed edition	6	04.99
10	SIMADYN D functions		4	05.98
11	Others		2	05.98
12	Changes	Page: 1	2	04.99
13	Short parameter list	Page: 8	10	04.99
14	Appendix: Block diagrams and STUC G diagrams		2	05.98
	Block diagrams	Sheet: 3a, 3b, 5, 7, 8, 14	26	04.99
	STUC G diagrams	FP_DIAM: page 9 FP_PARAM: page 1	124	04.99
	Problem, fault profile	Page: 1, 2	2	04.99

Group: Automation and Drives (A&D)
Division: Variable-Speed Drive Systems
Postfach 3269, D-91050 Erlangen

SIEMENS

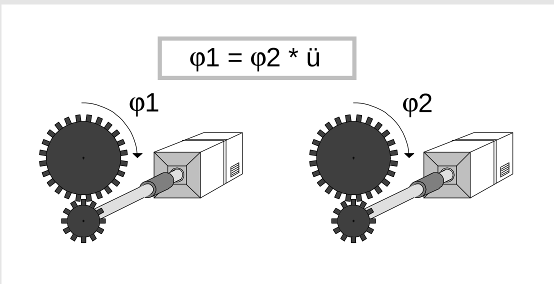
Standard Software Package

Angular Synchronous Control MS 340

for Technology board T300

in SIMOVERT MASTERDRIVES 6SE70/71

Software release 1.7



Operating instructions

Edition **03.99**

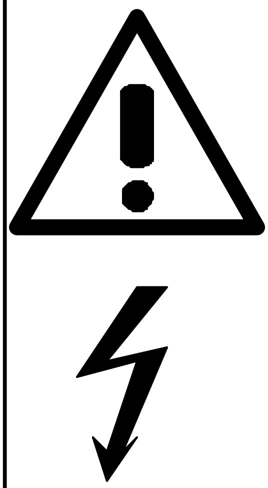
Order No.: 6SE7087-6CX84-4AH1

This Instruction manual is available in the following langages:

Sprache Language	**German**	**French**	
Bestell-Nr. Order-No.	6SE7080-0CX84-4AH1	6SE7087-7CX84-4AH1	

English

0 Warning information and product limitation



WARNING

Hazardous voltages are present in this electrical equipment during operation. Non-observance of the safety instructions can result in severe personal injury or property damage.

Only qualified personnel should work on or around this equipment after becoming thoroughly familiar with all warnings, safety notices and maintenance procedures contained herin.

The successful and safe operation of this equipment is dependent on proper transportation, storage, installation and assembly, and on careful operation and maintenance.

Pay particular attention to the warnings in the SIMOVERT Instruction Manuals.

Definitions

- **QUALIFIED PERSONNEL**

A "qualified person" as used in this Manual and in the warnings on the products themselves is one who is familiar with the installation, assembly, commissioning and operation of the equipment and the hazards involved. In addition, he/she has the following qualifications:

1. Is trained and authorized to energize, de-energize, ground and tag circuits and equipment in accordance with established safety practices.
2. Is trained in the proper care and use of protective equipment in accordance with established safety practices.
3. Is trained in rendering first aid.

- **DANGER**

"Danger" as used in this Manual and in the warnings on the products themselves means that death, grievous injury or extensive damage to property will occur if the appropriate precautions are not taken.

- **WARNING**

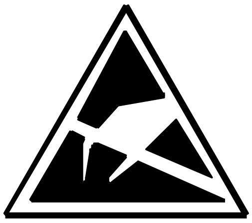
"Warning" as used in this Manual and in the warnings on the products themselves means that death, grievous injury or extensive damage to property may occur if the appropriate precautions are not taken.

- **CAUTION**

"Caution" as used in this Manual and in the warnings on the products themselves means that minor personal injury or damage to property may occur if the appropriate precautions are not taken.

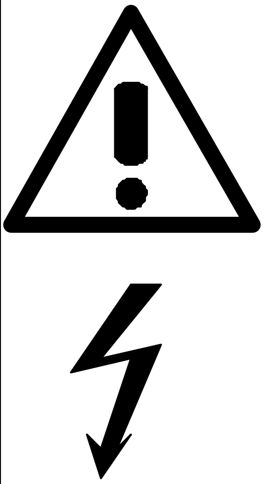
- **NOTE**

"Note" as used in this Manual highlights an important item of information about the product or a section of the instructions which requires careful attention.



CAUTION

The boards contain components which can be destroyed by electrostatic discharge. Before touching an electronic board, the human body must be electrically discharged. This can be simply done by touching a conductive, grounded object immediately beforehand (e.g. a bare metal cabinet component, protective conductor contact).



WARNING

Hazardous voltages are present in this electrical equipment during operation. Non-observance of the safety instructions can result in severe personal injury or property damage.
Only qualified personnel should work on or around this equipment after becoming thoroughly familiar with all warnings, safety notices and maintenance procedures contained herein.
The successful and safe operation of this equipment is dependent on proper transportation, storage, installation and assembly, and on careful operation and maintenance.
The warning information supplied with the SIMOVERT Instruction Manuals must be observed.

NOTE
This Instruction Manual does not purport to cover all details or variations in equipment, not to provide for every possibly contingency to be met in connection with the installation, operation or maintenance. Should further information be desired or should particular problems arise, which are not covered sufficiently for the purchasers purposes, please contact your local Siemens office.. The contents of this Manual shall neither become part of nor modify an prior or existing agreement, commitment or relationship. The sales contract contains the entire obligation of Siemens. The warranty contained in the contract between the parties is the sole warranty of Siemens. Any statements contained here do not create new warranties nor modify the existing warranty..

1 Overview

1.1 General overview

The 6SE70/71 SIMOVERT MASTER DRIVES converters can be expanded with a T300 technology board and a CB1/CBP interface board (PROFIBUS) or SCB1/SCB2 (USS-, peer-to-peer protocol). There are **standard software packages** for the T300 for frequently occuring applications, for example, in this case, the angular synchronous control software package. These software packages are supplied as programmed EPROM submodules (MS300). If the technological functions of the standard software packages have to be expanded to fulfill specific customer requirements, then software packages can be obtained on floppy disk and modified using SIMADYN D tools (STRUC Version 4.2 or higher).

The standard software packages can run with and without CB1/CBP or SCB1/2 interface boards.

1.2 Validity

This User Manual is valid for the standard ***"Angular synchronous control" MS340*** software package, **Release 1.70**. Differences to the previous versions are listed in Section 10 "Changes".

With the exception of the expanded functionality, described in the "Changes" section, this software release is compatible to the previous releases. This is the reason that this Manual can be used for the start-up of previous versions.

The MS340 standard software package can only run on the T300 technology board.
The functions explained here for SIMADYN D and the T300 technology board only refer to the standard **MS340** "**Angular synchronous control**" software package and they do not represent a general statement for SIMADYN D or the technology module. For instance, "fastest cycle time 4 ms" only means that no faster cycle time may be used in the MS340 standard software package.

This standard software package is enabled for the following SIMOVERT MASTERDRIVES (6SE70, 6SE71) drive converters described in the next section.

1.2.1 Hardware/Software requirement

MASTERDRIVES basic units

MASTERDRIVES basic units (new Series, introduced from 1998)
The T300 has been approved for operation in the following MASTER DRIVES basic units:

- ❑ SIMOVERT VC with electronic board CUVC: Software release ≥ 3.11

- ❑ SIMOVERT MC with electronic board CUMC: Software release ≥ 1.2.

The T300 can only be used with Compact-, Chassis- and Cubicle-type units. The use with "Compact Plus" type units is not possible.

MASTERDRIVES basic units (older series, introduced from 1995)
The T300 has been approved for operation in the following MASTER DRIVES basic units:

- ❑ SIMOVERT VC with electronic board CU2: Software release ≥ 1.2

- ❑ SIMOVERT SC with electronic board CU3: Software release ≥ 1.1

CAUTION:	When a t300 board is installed in a SIMOVERT SC unit, the pulse frequency of the converter must not be increased above the factory setting value of P761 = 5kHz to avoid overloading the convertre processor.

Communication boards

The standard software packages can run with and without communication board (CB1/CBP or SCB1/2). In this case the parameter H212 and H213 (Alarm-/ Fault mask) has to be set (refer to section 2)

The T300 can be combined with the following communications boards

- ❑ PROFIBUS-DP interface CBP , Software release ≥ 1.0
  Only one fieldbus communication board can be used. It must be mounted in mounting location 3 (middle location). Communication boards which are designed as Mini-Slot-Boards (e.g. CBP, CBC) must additionally be mounted in Slot "G" of an ADB Adaption Bord before inserted in mounting location 3. The T300 can not communicate with a communication board mounted on he CU (in slot A or C).

- ❑ PROFIBUS interface module CB1, software release ≥ 1.3

- ❑ SCB2 Board software release ≥ 1.3
  The SCB2 has an opto-isolated serial interface which is capable of operating with either a USS protocol or a peer-to-peer protocol.

- ❑ SCB1 board
  The SCB1 is equipped with a fibre-optic interface for peer-to-peer communication or terminal extension modules SCI1 and/or SCI2.

- ❑ SLB SIMOLINK interface board for CUVC or CUMC.
  If a Peer-to-Peer communication in not possible (for example for „Compact Plus“ type units) the SLB board can be installed instead of the T300 Peer-to-Peer interface.

CAUTION:

- An optinal SLB SIMOLINK Interface Board must be mounted in a slot on the CUVC or CUMC base electronics board, most preferably in Slot A.
The combination T300 and SLB SIMOLINK Interface mounted in location 3 is not possible!
The SLB borad communicates directly with the base unit. Signal interconnections to the T300 board must be softwired via Binectors-/ Connectors.

- Only 2 Setpoint interconnections from base unit (respectively SIMOLINK) to the T300 connectors can be softwired via connectors (with the 2 free select values = word 9 and word 10 from Dual-Port-Ram DPR), refEre to section 2.
More than 2 setpoint from base unit (respectively SIMOLINK) **can not be softwired** to the T300!

- The **Control words can not be softwired** via connectors from base unit (respectively SIMOLINK) to the T300.

- For the actual values interconnections (actuals values from T300 to the base unit, respectively SIMOLINK) **only the fixed defined signals can be used** (refere to section 2). **No more values can be selected!**

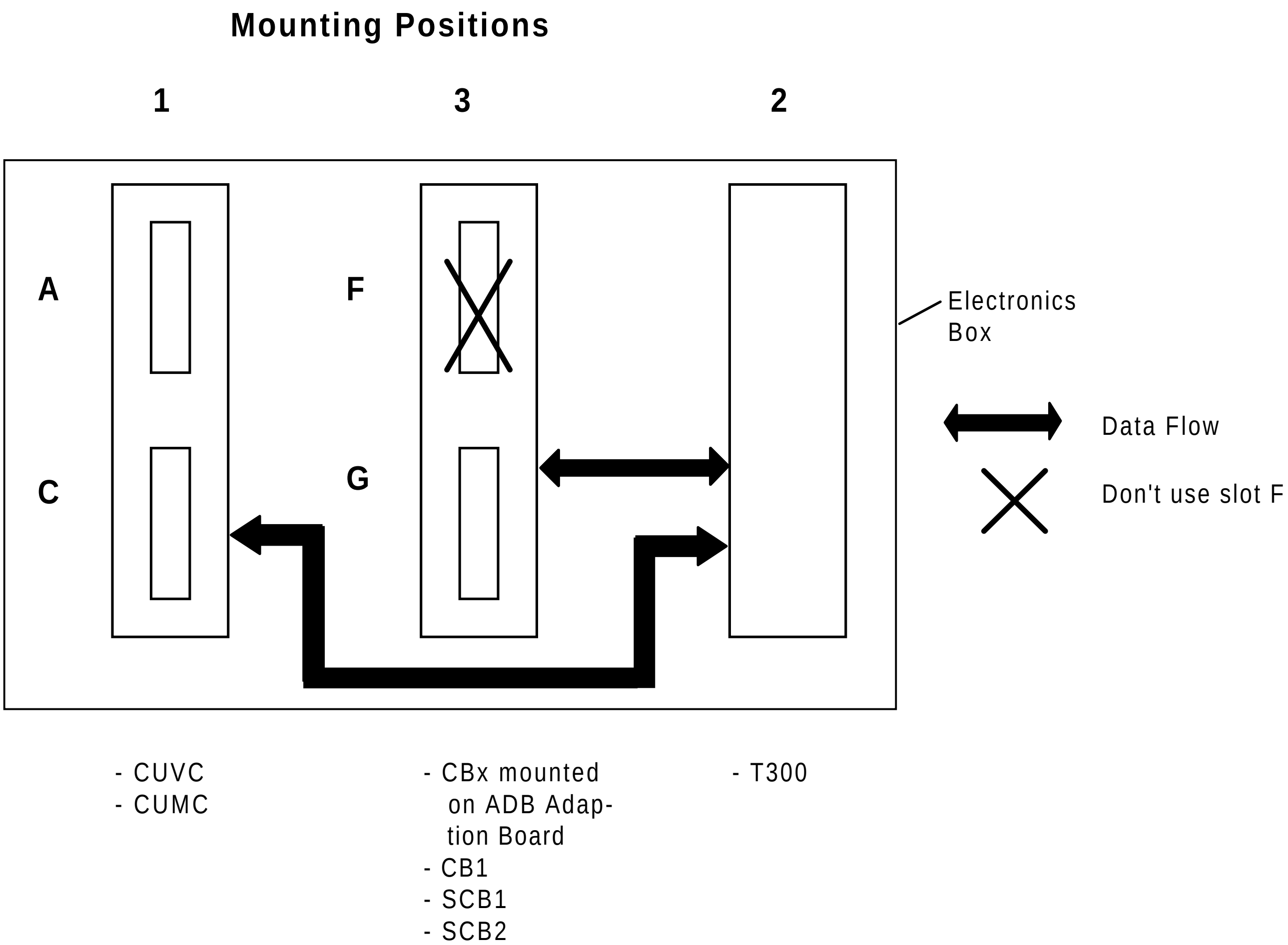
- A T300 board with Hardware release ≥ B, or newer, is needed for use with an SLB SIMOLINK interface board. The correct hardware release code can be detected on the component side of the T300 in the neighbourhood of the lower backplane connector.

An accurate examination is necessary bevor installing a SIMOLINK Interface board with the „Angular synchronous control“ module, to make sure that SIMOLINK is a reasonable and praticable solution.

Note: MASTERDRIVES basic drive parameter and T300 Parameter can be read and write thrue all the serial Interfaces (with the exception of Peer-to-Peer interface and SIMOLINK interface board).

Allowed mounting combinations / Mounting positions

Please adhere to the following rules for mounting the T300 and other supplementary boards into the electronics box.
Please note: Only the following combinations and mounting positions are allowed.



- The T300 must be mounted in mounting location 2 (rightmost mounting location)
- Only one fieldbus communication board can be used. It must be mounted in mounting location 3 (middle location). Communication boards which are designed as Mini-Slot-Boards (e.g. CBP, CBC) must additionally be mounted in Slot "G" of an ADB Adaption Bord before inserted in mounting location 3. The T300 can not communicate with a communication board mounted on the CU (in slot A or C).
- The Communication Board communicates directly with the T300 board.
- An optinal SLB SIMOLINK Interface Board must be mounted in a slot on the CUVC or CUMC base electronics board, most preferably in Slot A..
  The combination T300 and SLB SIMOLINK Interface mounted in location 3 is not possible!

CAUTION:	A T300 board with Hardware release ≥ B, or newer, is needed for use with an SLB SIMOLINK interface board. The correct hardware release code can be detected on the component side of the T300 in the neighbourhood of the lower backplane connector.

T300 parameter settings

The following devices can be used to set the parameters of the T300 board:

- ❑ Standard parameterizing unit (PMU) for basic converters
- ❑ A PC or programmer with the SIMOVIS service program (refer also to section 7.4)
- ❑ Optional OP1S plaintext operator device
- ❑ Optional OP1 plaintext operator device version 1.1 or higher

1.3 T300 technology module

The T300 technology module is a processor module, which can be freely configured using STRUC. It is compatible to SIMADYN D, and it has been especially designed for use with SIMOVERT MASTERDRIVES drive converters. The function of the modules is defined using the function block-oriented STRUC L / STRUC G configuring language. The configured software which is generated is programmed in a program memory sub-module, which is inserted on the processor module. An EEPROM is provided on the program memory sub-module to save parameter changes (EEPROM = electrically write- and deletable memory). Communications with the basic drive is realized through a parallel interface, which is implemented as DUAL PORT RAM (DPR).

Processor / clock frequency	80C186 / 20 MHz		
RAM memory	128 Kbytes		
Communications with unit	Parallel bus, 2 kbyte dual port RAM		
Program memory sub-module	MS300 with 512 kbyte EPROM and 2 kbyte EEPROM		
Binary inputs	16	non-floating	24 V
Binary outputs	8	non-floating	24 V
Analog inputs	7	11 bits + sign	± 10 V (differential inputs)
Analog outputs	4	11 bits + sign	± 10 V, 10 mA
Serial interfaces	2	1* RS232 and RS485 (2 wire) 1* RS485 (2- or 4 wire)	
Pulse encoder inputs	2	2* track A,B, zero, fmax = 400 kHz	

Table 1.3.1: Overview of the T300 technology module. For details refer to the Instruction Manual and connecting diagram T300, refer to Fig. 1.3.2.

The following components are required to operate the angular synchronous operation module:

Product description	Comment	Order No.
T300 technology module including SC58 and SC60 connecting cables, SE300 terminal block and Instruction Manual for the module in German/English		6SE7090-0XX87-4AH0
Local bus adapter LBA for the MASTERDRIVES electronics box	is required to install a T300 and possibly a Com board	6SE7090-0XX84-4AH0
ADB carrier module to accept the CBP	is required to install a Com board	6SE7090-0XX84-0KA0
MS340 angular synchronous operation on the memory module, without manual		6SE7098-4XX84-0AH0
MS340 angular synchronous operation manual or **Manual, Angular Synchronous Control MS340** or **Manuel Marche Synchrone Angulaire MS340**	German or English or French	6SE7080-0CX84-4AH1 or 6SE7087-6CX84-4AH1 or 6SE7087-7CX84-4AH1

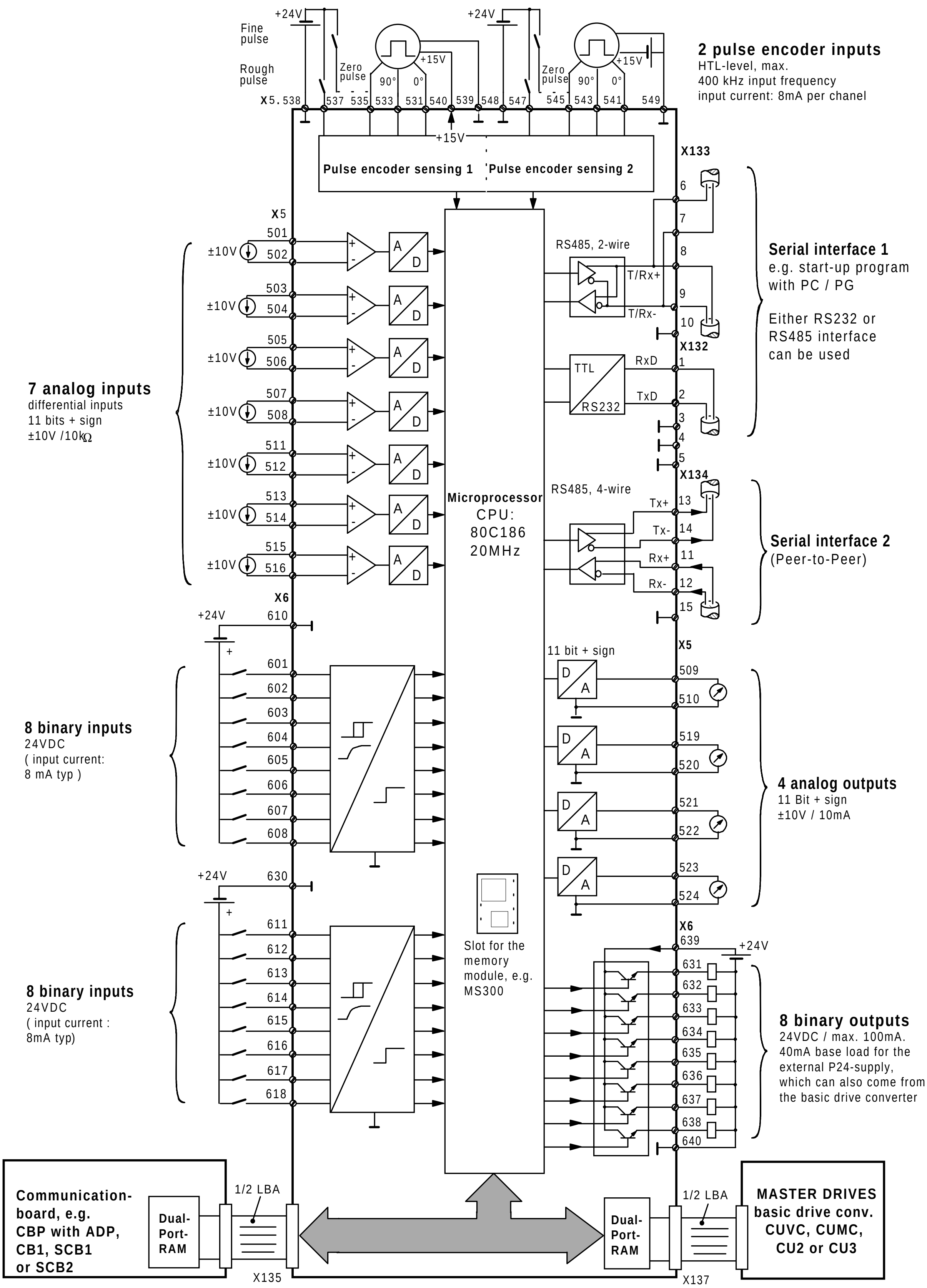
The individual components are also available as spare parts:

T300 technology module	6SE7090-0XX84-0AH2
T300 Instruction Manual, German/English	6SE7087-6CX84-0AH1
SC58 connecting cables	6DD3461-0AB0
SC60 connecting cables	6DD3461-0AE0
SE300 terminal block	6SE7090-0XX84-3EH0

Further, if the standard software package is to be modified, the following is also available:

- STRUC L PT to implement your own functions, in list form. This can run on a PC under WINDOWS.
- STRUC G PT to implement your own functions in a graphic form. This can run on a PC under SCO-UNIX.
- Prommer for memory modules with connection via a parallel PC interface.
- STRUC Service Program for the symbolic monitor.
- STRUC configuring software for the angular synchronous control on floppy disk.

Refer to Section 1.4.2 and Catalog DA65.10 for more precise information.



terminal series X5, X6:connect at terminal bloc SE300.
terminal series X132, X133, X134: connect at T300.

Fig. 1.3.2

1.4 Overview of the angular synchronous control

The standard ”angular synchronous control” software package, permits, in conjunction with the appropriate converters and technology boards, angular synchronism between two or several drives (when using several T300). If required, synchronizing marks, received from the pulse encoder-zero pulse or from BEROs (proximity switch) can be evaluated to establish synchronous (angular) operation. It can be commissioned without any SIMADYN D-specific resources using the PMU and OP1 converter operator control panels or SIMOVIS and TELEMASTER (connected at connector X132 of the T300).

1.4.1 Angular synchronous control features

- Angular synchronism for ratios, which can be set in wide limits
- Synchronizing both drives with one another
- Offset input, which can be selected dependent on the direction of rotation
- Reverse rotation inhibit, selectable
- Overspeed- and anti-stall protection
- Inching
- Speed controller adaption at low speeds possible
- Angular controller adaption as a function of the ratio possible

1.4.2 Standard software package on floppy disk

The source codes of the MS340 standard software package are available as STRUC files on floppy disk (designation, MD340). When required, the angular synchronous control function can be adapted to specific requirements using conventional SIMADYN D resources.

Notes:

Version 1.5: The Peer-to-Peer blocs are now in the Standard library FBSLIB.
For the Version V1.50 **STRUC -Version ≥ V4.2.3** is required!

Caution: The Peer-to-peer software is not available in STRUC V4.2.2.
This standard „angular synchronous control“ software package cannot be adapt with STRUC V4.2.2.

Version 1.7: (STRUC V4.2.4) In this Version Problems by synchonizing with linear axis with only one synchronizing signal where solved, (refere to section 10). Onwards Version 1.7, the library FBSLT1 with version 990204V420, or newer is required.

Components to adapt the standard software package with STRUC:

Designation	Explanation	MLFB / Order No.
MD340	MS340 angular synchronous control on a $3^1/_2$ inch floppy disk (without documentation)	6SW1798-4XX84-0AH0
MS300	EPROM for T300 **-empty-**	6SE7098-0XX84-0AH0
PP1X	Parallel Programmer (PC-) external	6DD1672-0AD0
UP3	Programming adapter for MS47/MS300	6DD3462-0AB0
STRUC	A STRUC version 4.2.4 or higher is required	Refer to Catalog DA99
	If required, start-up program (SIMOVIS, IBS/SERVICE-program)	Refer to Catalog DA99

Table 1.4.2: Components to adapt the standard software package using STRUC

1.5 Information regarding the use of the angular synchronous control

1.5.1 Applications

Angular synchronous control must always be used if it is necessary to establish angular synchronism between mechanical units, for example shafts or gearboxes.

Some examples:

a) Used instead of a mechanical shaft:
- Crane traversing gear
- Elevating tables
- Charging and discharging equipment, for example for furnaces or similar
- Lathes
- Printing machines where there are less stringent requirements on the printed image, for example for tubes and comparable round materials

b) Used instead of gearboxes, especially changeover gearboxes:
- Packing machines
- Book spine gluing machines
- Various machines in the textile industry
- Lathes
- Transfer positions between two machine parts

1.5.2 Applications which may not be practical

These also include applications, which can be solved using closed-loop speed control. Closed-loop speed control is preferable over angular synchronous control as a result of the simpler controller optimization, if the actual task permits this. Generally, angular synchronous control does not result in an improvement in the control dynamic performance.

Examples:

- Stretching units, for example, for fibers
- Roller table operations, which are sub-divided into several drive groups
- Rolling mill drives which are connected with slip through the material itself

1.5.3 Applications which do not permit angular synchronism

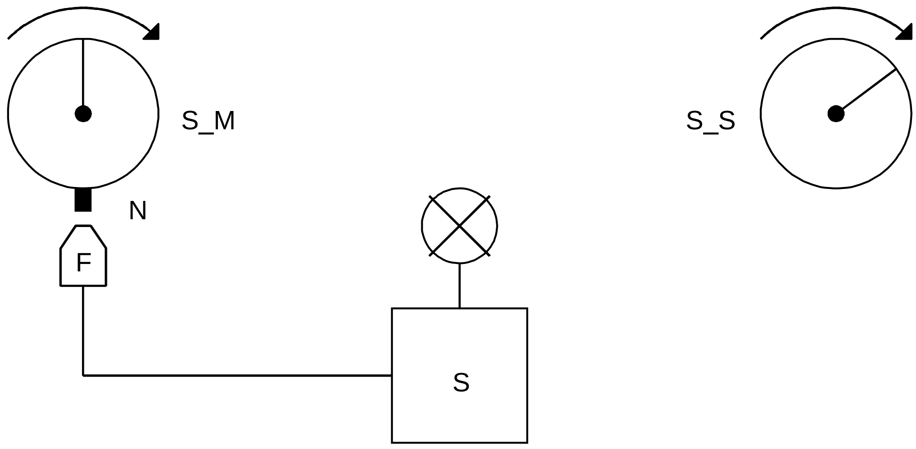
These include, among others, almost all situations which require load equalization or closed-loop tension control.

Examples are:

- Two or several motors operate on a shaft or are otherwise rigidly coupled
- Conveyor belt drives
- Chain conveyors
- Drives, which are coupled rigidly through the material web
- Closed-loop tension controls (tension transducer), or closed-loop position controls (dancer roll).

1.6 Explanation of the most important terminology used

The following model illustrates angular synchronous control:



The two disks ”disk, master drive” (S_M) and ”disk, slave drive” (S_S) rotate in the same direction, with the same speed. Disk S_M has a fixed speed. Disk S_S is operated, either with speed- or angular synchronous control which is referred to disk S_S.

If the line on disk S_M is pointing vertically upwards (i.e. to ”12 a’clock”), stroboscope S is triggered via cam N and sensor F. Thus, although the disks are moving, the observer sees a stationary image of the lines on disks S_M and S_S. Only the disks are illustrated in the following. The position of the marks on the disks with respect to one another is now observed.

Note:
These observations, for reasons of transparency and simplicity, are assuming a 1:1 speed ratio between the disks. These observations are also vaid for other ratios with the exception at synchronization and offset measurement.

1.6.1 Speed synchronism

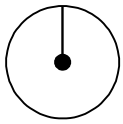
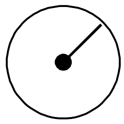
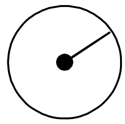
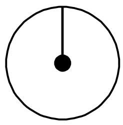
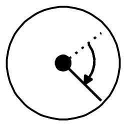
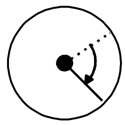
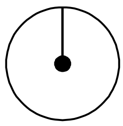
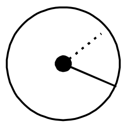
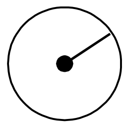
The drives above receive the same setpoint which can have a ratio setting for the individual drives. All drives operate speed controlled.

1.6.2 Angular synchronism

In addition to speed synchronism, the pulses of the master drive and the slave drive, are fed to a closed-loop position control; higher-level control to the speed controller. A ratio can also be set. There is another way of looking at this: The system controls the difference of the pulses received from the master and slave drives, taking into account a possible speed/position ratio between the drives.

1.6.3 Differences between speed- and angular synchronism

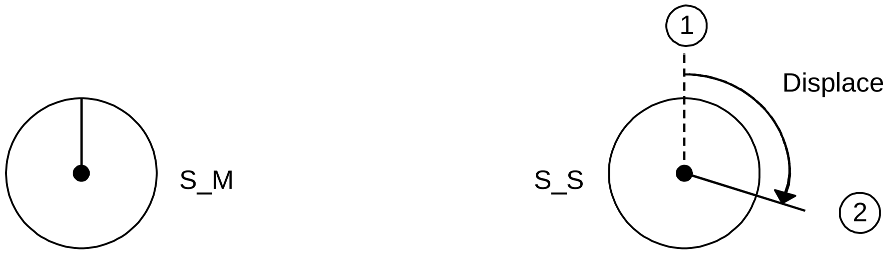
In undisturbed steady-state operation, no differences can be identified, contrary to operation with disturbances. The following table clearly shows the differences.

Status	S_M	Speed synchronism S_S	Angular synchronism S_S
Undisturbed, steady-state operation			
The same disturbance is fed to disk S_S			
Disturbance corrected			

Result:
After the disturbance has been corrected, disk S_S, for angular synchronous control, goes back to the original position, contrary to that which would occur for closed-loop speed control. The synchronous angular controller is operational until the number of pulses received from the master and slave drives is the same. (In this case, it is assumed, that for angular synchronism, the maximum possible pulse difference has not been exceeded!).

1.6.4 Offset and synchronization

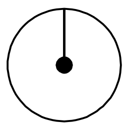
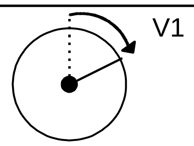
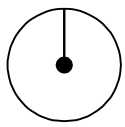
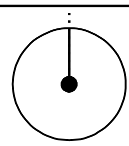
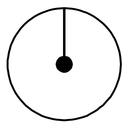
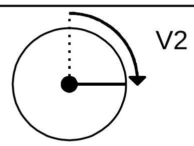
The number of impulses, which are received between the two master- and slave drive synchronizing marks, is known as **offset**. It is assumed, that the number of synchronizing pulses between the master- and slave drive is the same at the machine component which is to be synchronized.



1 Position of the zero mark, master drive

2 Position of the zero mark, slave drive

Synchronization means that the master- and slave drive take-up a specific position to one another as a function of their synchronizing signals (from pulse encoders, contacts, BEROs etc.). This position is either permanently entered internally, or using an external setpoint.

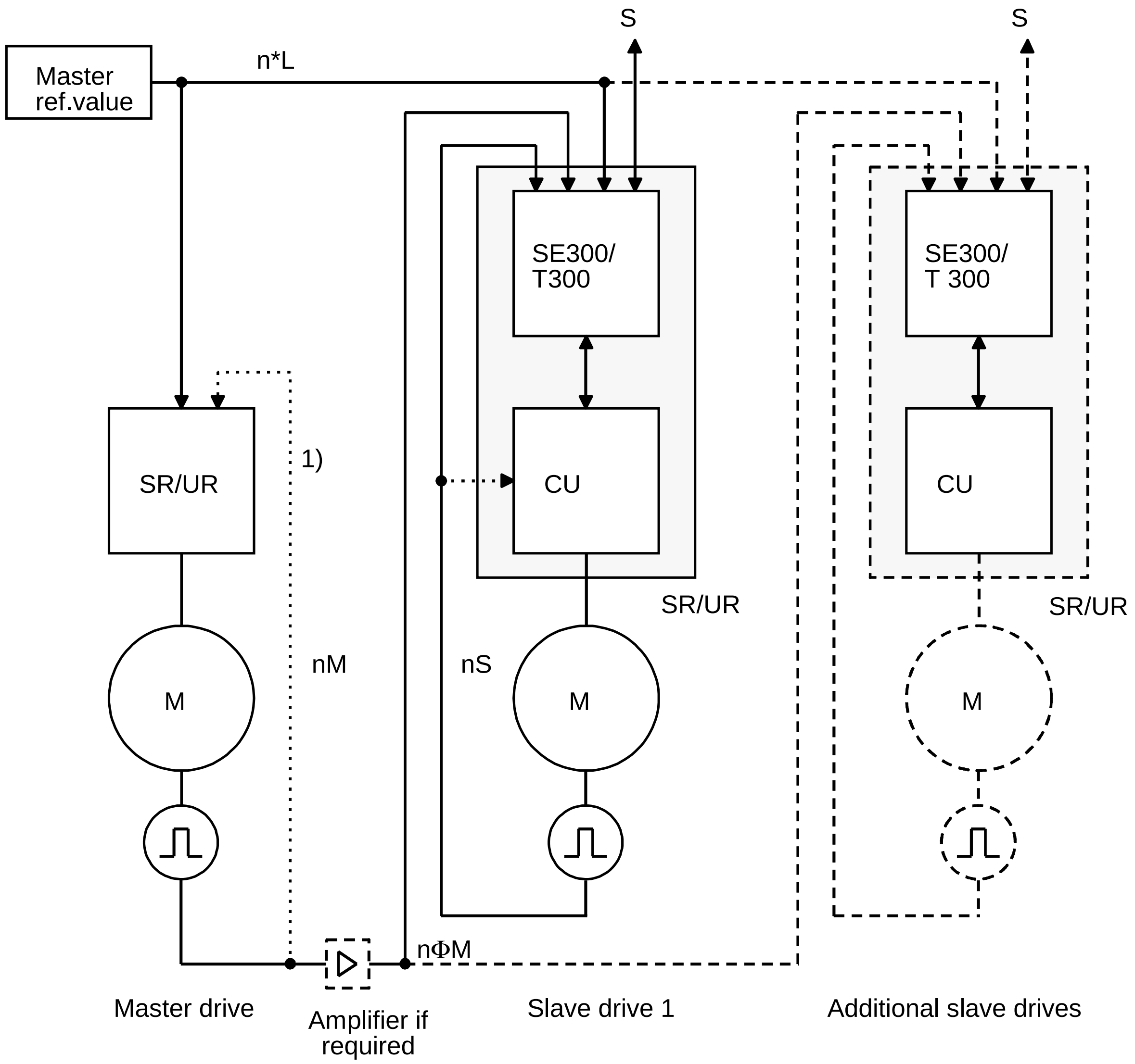
Action, status	Master S_M	Slave S_S
Offset V1 is measured, and is synchronized with an offset input of zero.		
Synchronization completed		
Offset V2 entered		

The offset is entered as pulse number (quadrupled pulses) (refer to Section 5.1.4).

Synchronization and offset input can also be realized simultaneously. This is always the case for permanently entered offset values. In this case, the final value is directly approached.

Offset and synchronization are explained using a rotary movement. These considerations are also essentially valid for linear motion

1.7 Basic structure of angular synchronous control



1) May not be required for open-loop or closed-loop frequency controlled AC drives

SR/UR:	AC/DC converter	S:	Commands and signals, setpoints and actual values
n_M:	Speed actual value, master	n_S:	Speed actual value, slave
n_{*L}:	Master speed setpoint	$n\Phi_M$:	Speed and position information, master

Master- and slave drive(s) have a common reference value, which may be weighted in the slave drive by a ratio. The common reference value is used as feed-forward control of the slave drive, and results in the required speed. The higher-level angular offset controller guarantees angular synchronism, and corrects, essentially steady-state error, in the lower-level speed control loop (also refer to the block diagrams in the Apendix).

Synchronization does not change anything on the basic closed-loop control structure, as, for synchronization, a correction signal for the position difference actual value is generated from the position of the synchronizing marks.

Note:
Synchronization is only necessary if the actual machine requires it. Synchronization, and the availability of the synchronizing marks (zero pulses), are not a prerequisite for the angular synchronism control.

1.7.1 Several slave drives

If angular synchronism has to be established for several drives, then the highest-rating drive or the drive with the longest stabilizing time should be selected as the master drive if no process-related restrictions apply. However, if this drive is not steady, then a smoother-running drive can be selected, thus deviating somewhat from this recommendation.

Notes:
The master drive pulse encoder should be connected in parallel to the appropriate slave drive inputs.
The master drive pulse encoder may not be overloaded!
In addition to the input resistance of the T300 technology board, each 6.3 kΩ, it may be necessary to take into account the significant capacitive load of the pulse encoder cables.

2 Interfaces

Hardware and software (standard software package) support an extremely flexible, i. e. plant-specific interface processing which can be adapted to the task requirements. The basic drive converter (CU board) and the T300 are parameterized to define which interfaces are used and how they are used. In order to obtain a functioning (synchronous) drive, the basic drive converter must be parameterized as explained in Section . When supplied, the standard software package has the pre-set standard interface assignment where all of the necessary open-loop control and setpoint/actual value signals from the SE300 terminals, can run.

2.1 Interface, technology board ⇔ basic drive converter

Data transfer between the T300 technology module and the basic drive is realized through a parallel interface (**D**UAL-**P**ORT-**R**AM) using the backplane bus board LBA. . The **process data**, i. e. the setpoints and actual values are written and read cyclically from the technology module and the basic drive. The data transfer, involving the parameters, is realized in a slow cycle time.

The data to be transferred have 16-bit words (2 byte).

The basic drive has to be parameterized in a certain way for the standard software package; refer to Section 3 and the Instruction Manual for 6SE70/71.

The parameterization for the SIMOVERT VC and MC drive converters with CUVC and CUMC modules is described in the following Sections, as well as the parameterization of the SIMOVERT VC and SC drive converters with the predecessor modules, CU2 and CU3.

2.1.1 Setpoints from the T300 to the basic drive converter

The technology board transfers the following data (as 16-bit values) to the basic drive converter as basic drive converter setpoints:

2.1.1.1 SIMOVERT VC and MC with the CUVC and CUMC modules

Value transferred from the T300	DPR location	Equipment setting	Used on the basic drive converter (if so set) and reference	Value range
Control word 1	1	3100 to 3115	Bit: Use 0: ON (main contactor); 1 = ON 1: /OFF2 (voltage-free); 0 = OFF 2: /OFF3 (fast stop); 0 = OFF 3: from CB/SCB Control word 1 bit 3 directly transferred 1:1 to the basic unit 4: from CB/SCB Control word 1 bit 4 directly transferred 1:1 to the basic unit 5: from CB/SCB Control word 1 bit 5 directly transferred 1:1 to the basic unit 6: Setpoint enable; 1 = enable 7: Acknowledge fault; 1 = ackn.ledge 8: Inching1 9: Inching 2 10: PZD control request (= fixed 1) 15: Fault, external 1	
Speed setpoint (including transformation and inching 1/2)	2	P443=3002	100% =rated speed (H012)	-200%... +199.99%
Reserved for 32 bit	3	3003		
Control word 2	4	3400 to 3415	9: Speed controller enable	
Supplementary speed setpoint(2) from the angular controller	5	P438=3005	100% =rated speed (H012)	Pre-setting (H112) -10%...+10%
Kp adaption for the speed controller	6	P232=3006		
Reserve	7	3007		
Pre-control value for the speed controller	8	P506=3008 P262=3008	P506 for CUVC P262 for CUMC	

Table 2.1.1.a: Setpoints to the basic drive converter CUVC, CUMC

2.1.1.2 SIMOVERT VC and SC with the CU2 and CU3 modules

Value transferred from the T300	**DPR location**	**Equipment setting**	**Used on the basic drive converter (if so set) and reference**	**Value range**
Control word 1	1	3001	Bit: Use 0: ON (main contactor); 1 = ON 1: /OFF2 (voltage-free); 0 = OFF 2: /OFF3 (fast stop); 0 = OFF 3: from CB/SCB Control word 1 bit 3 directly transferred 1:1 to the basic unit 4: from CB/SCB Control word 1 bit 4 directly transferred 1:1 to the basic unit 5: from CB/SCB Control word 1 bit 5 directly transferred 1:1 to the basic unit 6: Setpoint enable; 1 = enable 7: Acknowledge fault; 1 = ackn.ledge 8: Inching1 9: Inching 2 10: PZD control request (= fixed 1) 15: Fault, external 1	
Speed setpoint (including transformation and inching 1/2)	2	P443=3002	100% =rated speed (H012)	-200%... +199.99%
Reserved for 32 bit	3	3003		
Control word 2	4	3004	9: Speed controller enable	
Supplementary speed setpoint(2) from the angular controller	5	P438=3005	100% =rated speed (H012)	Pre-setting (H112) -10%...+10%
Kp adaption for the speed controller	6	P226=3006		
Reserve	7	3007		
Pre-control value for the speed controller	8	P506=3008		

Table 2.1.1.b: Setpoints to the basic drive converter CU2, CU3

The T300 **control word** bits for the basic drive converter consist of fixed values and the control word bit sources, selected on the T300 (terminals, interface boards). The T300 supplies the basic drive converter with the following control word bits, however they are only effective in the equipment when the basic drive converter is appropriately parameterized:

Note:
Only the bits either used or supplied from the standard software package are listed here.

2.1.2 Actual values from the basic drive converter to the T300

Drive converter actual values can be transferred with the drive converter parameter P694 (CU2,CU3), and P734 (CUVC,CUMC) to T300. It must be appropriately set (refer to Section 3). The standard software package requires status word 1 (ZUW1) and if required status word 2 (ZUW2) and control word 1 from the drive converter.
Additional actual values, for monitoring, for output via analog outputs (SE300) or via serial interfaces (CB1/CBP, SCB1/2 and T300 peer) can be sent to the T300. However, they are not required for the angular synchronous control function (can be selected as required).

2.1.2.1 SIMOVERT VC and MC with the CUVC and CUMC modules

Values transferred from the drive converter to the T300	**Dual port RAM location and converter setting**	**Is required for the appropriate T300 setting**
Status word 1	1 P734.1=32	- from the ”RUN” bit2: Setpoint enable control, ON command and reset/enable position sensing; - slave fault can be sent to the master, - stall signal, - ”comparison frequency reached” signal, - supplementary setpoint 2 disabled (=angular controller output) for OFF and RFG=inactive; (RFG=ramp function generator)
Can be selected as required	2	Select value 1, 2, 3 or 4 (display parameter d154)
Can be selected as required	3	Select value 1, 2, 3 or 4 (display parameter d156)
Status word 2	4 P734.4=33	Bit0: ”Excitation ended” for setpoint enable-control (display parameter d155)
Control word 1	5 P734.5=30	Bit0: ”ON/OFF” Supplementary setpoint2 (angular controller output) can be set to 0 if there is an OFF command and if the ramp-function generator is no longer active (the drive is at reference frequency 0). This zero setting must be enabled using H257=0. Thus, this can be used to prevent the drive continuing to run if there is an OFF command and if there is a supplementary setpoint2 signal which is greater than the OFF-shutdown frequency (P800).
Can be selected as required	6	Select value 1 or 3
Can be selected as required	7	Select value 1, 2, 3 or 4
Can be selected as required	8	Select value 2 or 4
Can be selected as required	9 P734.9=20xy (SST1) or P734.9=60xy (SST2)	Speed setpoint selection from the basic unit USS interface (xy = selected word from the appropriate USS telegram). (refer to Sect. 5.4)
Can be selected as required	10 P734.10=20xy (SST1) or P734.10=60xy (SST2)	Speed setpoint selection from the basic unit USS interface (xy = selected word from the appropriate USS telegram). (refer to Sect. 5.4)

Table 2.1.2a: CUVC,CUMC Basic drive converter-actual values to T300

2.1.2.2 SIMOVERT VC and SC with the CU2 and CU3 modules

Values transferred from the drive converter to the T300	Dual port RAM location and converter setting	Is required for the appropriate T300 setting
Status word 1	1 P694.1=968	- from the ”RUN” bit2: Setpoint enable control, ON command and reset/enable position sensing; - slave fault can be sent to the master, - stall signal, - ”comparison frequency reached” signal, - supplementary setpoint 2 disabled (=angular controller output) for OFF and RFG=inactive; (RFG=ramp function generator)
Can be selected as required	2	Select value 1, 2, 3 or 4 (display parameter d154)
Can be selected as required	3	Select value 1, 2, 3 or 4 (display parameter d156)
Status word 2	4 P694.4=553	Bit0: ”Excitation ended” for setpoint enable-control (display parameter d155)
Control word 1	5 P694.5=550	Bit0: ”ON/OFF” Supplementary setpoint2 (angular controller output) can be set to 0 if there is an OFF command and if the ramp-function generator is no longer active (the drive is at reference frequency 0). This zero setting must be enabled using H257=0. Thus, this can be used to prevent the drive continuing to run if there is an OFF command and if there is a supplementary setpoint2 signal which is greater than the OFF-shutdown frequency (P514).
Can be selected as required	6	Select value 1 or 3
Can be selected as required	7	Select value 1, 2, 3 or 4
Can be selected as required	8	Select value 1 or 4
Can be selected as required	9 P694.9=529	Speed setpoint selection from the basic unit USS interface (refer to Sect. 5.4)
Can be selected as required	10 P694.10=534	Speed setpoint selection from the basic unit USS interface (refer to Sect. 5.4)

Table 2.1.2b: CU2,CU3 Basic drive converter-actual values to T300

2.2 Communication boards, CB1/CBP, SCB1/SCB2

Note:
The configured software can be operated with and without the interface module. Parameters H212 and H213 should be appropriately set if the interface module is not used (suppressing alarm/fault messages).

- See also Notes 3, section 7.4.3

Fixed and freely selectable setpoints/actual values can be transferred via the following communication boards

CB1/CBP (PROFIBUS),
SCB1 (peer-to-peer with fiber-optic cable),
SCB2 (peer-to-peer with 2-wire RS485)

The associated parameters to select the values must be appropriately set in the standard software package. The communication boards are parameterized on the basic drive converter (protocol, baudrate, bus adress.
The standard software package defines which net data are to be transferred on the T300. It occupies 6 telegram words which can, to some extent, be set:

The receive status is displayed with the parameter d228. in case of communication fault (d228=0), d229 display the error code.

2.2.1 Send data (actual values, technological functions ⇒ automation) in a 16ms sampling time

2.2.1.1 Telegram structure

The standard MS340 software package supplies 6 words of process data to be higher-level automation system. The select values which are transferred can be selected.

The following telegram structure is obtained:

Data word No. in the send telegram				Significance
PROFIBUS DP		USS protocol		
PPO 1, 2, 5	PPO 3, 4	PKW=4	PKW=0	
1	-	1	-	Parameter identification
2	-	2	-	Index
3	-	3	-	Parameter value, high word
4	-	4	-	Parameter value, low word
5	1	5	1	Status word, MS340
6	2	6	2	Select value 1 MS340
7	3	7	3	Select value 2 MS340
8	4	8	4	Select value 3 MS340
9	5	9	5	Select value 4 MS340
10	6	10	6	Speed actual value, slave
11	-	11	7	Not used (=0)
12	-	12	8	Not used (=0)

The actual values supplied from the T300 (select values) are always valid: 4000h = 100%

Table 2.2.1.a: Telegram structure, technological module → automation

The telegram length can be set using H226; **reset is then required! (initialization value)**

Telegram word	Send data
Status word	Selectable: H217=0: Selected from the T300 fault/alarm word (H219) and the drive converter status word (H218) H217=1: The control word generated for the master drive (e. g. as a result of setpoint enable, acknowledge, external fault)
Select value 1	Select value 1 acc. to H176; so that the drive converter parameter values can also be transferred (display parameter d178)
Select value 2	Select value 2 acc. to H177; so that the drive converter parameter values can also be transferred (display parameter d179)
Select value 3	Select value 3 acc. to H170; so that the drive converter parameter values can also be transferred e.g Statusword 2 Base unit can be transferred: H170=15; H226=H227⇒ 5; P694.4=553 (CU2,CU3) P734.4=33 (CUVC,CUMC)
Select value 4	Select value 4 acc. to H171; so that the drive converter parameter values can also be transferred
Speed actual value	Speed actual value, slave

Table 2.2.1.b: Send data

2.2.1.2 Select status word T300

2.2.1.2.1 Select status word T300 with H217=0:

A bit set in mask H219, transfers the appropriate bit of the T300 fault/alarm word to the interface. A bit set in mask H218, transfers the appropriate bit of status word 1 from the basic drive to the interface.

The resulting status word (d261) is formed from the T300 fault/alarm word, masked using H219 and (logical OR) the basic drive status word 1, which can be masked with H218.
It should be observed, that only different bits can be enabled with masks H218 and H219.

Assignment of the T300 fault/alarm word, basic drive status word 1:

Status word 1 from the basic drive bit / significance	**T300 status word (fault/alarm) bit / significance**
0: Ready to switch-on	F116, A097: Overspeed, positive (H190)
1: Ready	F117, A098: Overspeed, negative (H191)
2: Run	F118, A099: External fault from sources 1 to 3
3: Fault	F119, A100: Angular controller at its limit (H112)
4: OFF2	F120, A101: Telegram error T300-Peer
5: OFF3	F121, A102: Communications fault, T300 drive
6: Switch-on inhibit	F122, A103: Communications fault T300-CB/SCB
7: Alarm	F123, A104: Anti-stall protection (acc. to basic drive-ZUW1, bit8)
8: Setpoint/actual value difference deviation	F124, A105: n act > H180
9: Control requested	F125, A106: n act within H182 ± H183
10: f/n limit reached	F126, A107: n act < H181
11: Fault, undervoltage	F127, A108: Comparison frequency not reached, (ZUW1, bit10)
12: Main contactor controlled	F128, A109: Control difference, angular controller > H200
13: Ramp-function generator active	F129, A110: n act sensing erroneous
14: Clockwise rotating field	F130, A111: Control difference, angular controller < H200
15: Kinetic buffering active	F131, A112: Angular difference outside H201 < DY < H202

Table 2.2.1.c: Status word T300 with H217=0

2.2.1.2.2 Selecting the status word T300 with H217=1:

The control words generated on the T300 from all of the selected sources (d260) is also transferred to the interface.

Assignment, T300 control word:

T300 control word Bit / significance
0: On (=1)
1: Off2 (=0)
2: Off3 (=0)
3: from CB/SCB Control word 1 bit 3 directly transferred 1:1 to the basic unit
4: from CB/SCB Control word 1 bit 4 directly transferred 1:1 to the basic unit
5: from CB/SCB Control word 1 bit 5 directly transferred 1:1 to the basic unit
6: Setpoint enable (=1)
7: Acknowledgment (=1)
8: Inching1 (=1)
9: Inching2 (=1)
10...14: not used
15: Fault, ext. (=0 !)

Table 2.2.1.d: Status word T300 with H217=1

2.2.2 Receive data (setpoint, automation ⇒ technological function) in a 4ms sampling time

2.2.2.1 Telegram structure

All of the data, received from a communications module, are processed on the T300, and, if required, in some cases transferred to the basic drive. The setpoints, which are actually required by the standard software package from the communications module, must be set.

Data word No. in the receive telegram				Significance
PROFIBUS DP		USS protocol		
PPO 1, 2, 5	PPO 3, 4	PKW=4	PKW=0	
1	-	1	-	Parameter identification
2	-	2	-	Index
3	-	3	-	Parameter value, high word
4	-	4	-	Parameter value, low word
5	1	5	1	Control word 1 from the CB
6	2	6	2	Setpoint from the CB
7	3	7	3	Status word 2 from the CB
8	4	8	4	Status word 1 from the CB
9	5	9	5	Offset setpoint from the CB
10	6	10	6	Setpoint, ratio from CB
11	-	11	7	Setpoint, inertia compensation from CB
12	-	12	8	Not used (=0)

For setpoints, which are transferred on the T300, the following is always valid: 4000h=100%

Table 2.2.2.a: Telegram structure, automation → technological module

The telegram length can be set using H227; **reset is then required! (initialization value)**

Telegramm word	**Receive data, can be used as:**
1	Control word (e. g. On) (see d235)
2	Master setpoint (see H70)
3	Status word 2 (due to excitation sequence) (see d236)
4	Status word 1 (due to fault signal, setpoint enable) (see d237)
5	Offset reference value (see H50)
6	Reference value, ratio (see H40)
7	Reference value, inertia compensation (see H80)

Table 2.2.2.b: Receive data

<u>Assignment, control word 1 from CB</u> (display parameter d235)

Control word 1 bit	Significance	Select parameter	Effect / explanation
0	ON	H240	Equipment on
1	/OFF2 (voltage-off)	H241,H242	Transfer to the basic unit
2	/OFF3 (fast stop)	H243,H244	Transfer to the basic unit
3	free control bit	-	Transferred 1:1 to the basic unit
4	free control bit	-	Transferred 1:1 to the basic unit
5	free control bit	-	Transferred 1:1 to the basic unit
6	Enable setpoint	H245,H246	Input setpoint
7	Acknowledge fault	H247,H248	Transfer to the unit
8	Inching 1	H249	Local inching, forwards
9	Inching 2	H250	Local inching, backwards
10	Control from AG *)	-	CB accepts setpoints
11	Synchronizing command	H251	Angular synchronization enabled
12	Not used	-	
13	Angular controller enable	H252	Angular controller enabled
14	Not used	-	
15	Not used	-	

*) is not evaluated by the T300

Table 2.2.2.c: Control word 1 automation → technological module

<u>Assignment, status word 2 from CB</u> (display parameter d236)

Status word 2 bit	Significance	Select parameter	Effect / explanation
0	Restart on the fly active (AND „Run“ Status word 1 bit 2)	H245, H246	enable setpoint after restart on the fly
1...15	not used		

Table 2.2.2.d: Status word 2 automation → technological module

<u>Assignment, status word 1 from CB</u> (display parameter d237)

Status word 2 bit	Significance	Select parameter	Effect / explanation
0	not used	-	
1	Ready to start	H240	Equipment on
2	Run	H240,	Equipment on
	OR / AND		
	Run AND Restart on the fly completed (Status word 2 bit 0)	H245, H246	Enable setpoint
3	External fault	H254,H255,H256	Generate external fault
4	OFF2	H241, H242	OFF2
5	OFF3	H243, H244	OFF3
6	Switch on inhibit	H240	Switch on inhibit
7...15	not used	-	

Table 2.2.2.e: Status word 1 automation → technological module

2.3 T300 Monitor interface (SS1, term. X132, X133)

An operator control program, based on the SIMADYN D monitor (IBS/SERVICE-program (TELEMASTER)) can be connected at interface 1, i. e. connector X132 (RS232) or connector X133 (RS485). This allows all of the connectors to be viewed and changed. Further, connection changes are possible.
Selected connectors, which are defined as parameters, can be viewed and changed via the basic drive converter using the parameter mechanism.

Note:
The serial interface SS1 can **either** be used as RS485 **or** as RS232; this means, it is not permissible to **simultaneously** use the physical interfaces at terminal X132 and X133!

The baud rate is **9600 baud**.

RS232

Pin number according to the print on the supplied and coded T300 connector	Pin number, referrred to connector **X132**	Function
1	1	RxD
2	2	TxD
3	3	Ground
4	4	Ground
5	5	Ground

Table 2.3.a: X132

RS485

Pin number according to the print on the supplied and coded T300 connector	Pin number, referred to connector **X133**	Function
6	1	+RxD/+TxD
7	2	-RxD/-TxD
8	3	+RxD/+TxD
9	4	-RxD/-TxD
10	5	Ground

Table 2.3.b: X133

2.4 T300 Peer-to-peer interface (SS2, term. X134)

The serial interface X02 (connector X134) is assigned the peer-to-peer protocol with the appropriate configuring. It is used for fast transfer of setpoints/actual values between

- additional T300
- other converters with SCB 2
- SIMOVERT 6SE12/13
- SIMOREG 6RA24
- SIMOREG DC MASTER 6RA70

without using an interface module. This interface is a 4-wire cable according to RS485.

The peer interface is pre-set as follows:

Baud rate (H220):	38400 baud
Monitoring time (H209):	80ms
Telegram length, max. 5 words (sender H222 =receiver H223)	4 words

The receive status is displayed with the parameter d224. in case of communication fault (d224=0), d225 display the error code.

Please refere also to section 7.4.3, note 3

2.4.1 Peer-to-peer interface, connector X134

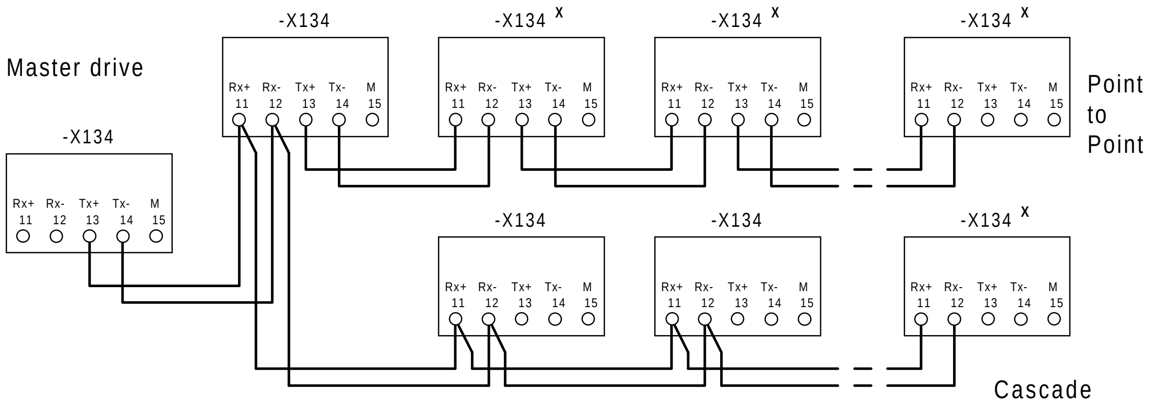
Pin number according to the print-out on the coded T300 connector provided	Pin number referred to connector X134	Function for RS485 4-wire operation
11	1	+RxD
12	2	-RxD
13	3	+TxD
14	4	-TxD
15	5	Ground

Table 2.4.1: X134

- The signals can flow through the drive in a series connection. With this connection type, each drive processes the data as required before passing them on to one other drive (classic setpoint cascade).

- In a parallel connection, a total of 31 drives can be connected in parallel to the transmit cable of one drive. All these drives receive their (identical) data set simultaneously.
The signal delay time (see table 2.4.2) occurs only once with the parallel connection.

- Any desired mixed combinations of series and parallel connections can be implemented.



x: For this T300 boards, the Bus terminating resistors must be switched-in, i.e. at bus terminating switch S1, coding switches S1.3 and S1.4 must be set to ON.

Transmission times (example):

Baudrate	**Telegram length in word**	**Telegram-transmission time in ms**
9600	1 2 5	5.7 8 16
19200	1 2 5	2.8 4 8
38400	1 2 5	1.43 2 4
115200	1 2 5	0.47 0.67 1.34

Tabelle 2.4.2: Transmission times Peer-to-Peer

2.4.2 Peer send data (actual values) in the 4ms sampling time:

Telegram word	Send data
Status word	Selectable: H216=0: Selected from the T300 fault/alarm word (H219) and the drive converter status word (H218) H216=1: The control word generated for the master drive (e. g. as a result of setpoint enable, acknowledge, external fault)
Select value 1	Select value 1 acc. to H176; so that the drive converter parameter values can also be transferred (display parameter d178)
Select value 2	Select value 2 acc. to H177; so that the drive converter parameter values can also be transferred (display parameter d179)
Select value 3	Select value 3 acc. to H170; so that the drive converter parameter values can also be transferred
Select value 4	Select value 4 acc. to H171; so that the drive converter parameter values can also be transferred

Table 2.4.2.a: Peer send data

2.4.2.1 Select status word T300

2.4.2.1.1 Select status word T300 with H216=0:

A bit, set in mask H219 transfers the appropriate bit of the T300 fault/alarm word to the interface.
A bit set in mask H218 transfers the appropriate bit of status word 1 from the basic drive to the interface.
The resulting status word (d261) is then formed from the T300 fault/alarm word, which can be masked using H219 and (logical OR) the basic drive status word 1, which can be masked using H218.
It should be observed that only different bits can be enabled using the masks H218 and H219.

Assignment T300 fault/alarm word, basic drive converter, status word 1:

Status word 1 from the basic drive bit / significance	T300 status word (fault/alarm) bit / significance
0: Ready to switch-on	F116, A097: Overspeed, positive (H190)
1: Ready	F117, A098: Overspeed, negative (H191)
2: Run	F118, A099: External fault from sources 1 to 3
3: Fault	F119, A100: Angular controller at its limit (H112)
4: OFF2	F120, A101: Telegram error T300-Peer
5: OFF3	F121, A102: Communications fault, T300 drive
6: Switch-on inhibit	F122, A103: Communications fault T300-CB/SCB
7: Alarm	F123, A104: Anti-stall protection (acc. to basic drive-ZUW1, bit8)
8: Setpoint/actual value difference deviation	F124, A105: n act > H180
9: Control requested	F125, A106: n act within H182 ± H183
10: f/n limit reached	F126, A107: n act < H181
11: Fault, undervoltage	F127, A108: Comparison frequency not reached(ZUW1, bit10)
12: Main contactor controlled	F128, A109: Control difference, angular controller > H200
13: Ramp-function generator active	F129, A110: n act sensing erroneous
14: Clockwise rotating field	F130, A111: Control difference, angular controller < H200
15: Kinetic buffering active	F131, A112: Angular difference outside H201<DY<H202

Table 2.4.2.b: Status word T300 with H216=0

2.4.2.1.2 Selecting the status word T300 with H216=1:

The control words, generated on the T300 from all of the set sources (d260) is transferred to the interface.

Assignment T300 control word:

T300 control word bit / significance
0: On (=1) 1: Off2 (=0) 2: Off3 (=0) 3: from CB/SCB Control word 1 bit 3 4: from CB/SCB Control word 1 bit 4 5: from CB/SCB Control word 1 bit 5 6: Setpoint enable (=1) 7: Acknowledgment (=1) 8: Inching1 (=1) 9: Inching2 (=1) 10...14: not used 15: Fault, ext. (=0 !)

Table 2.4.2.c: Status word T300 with H216=1

2.4.3 Peer receive data (setpoints) in the 4ms sampling time:

The received setpoints which are actually used by the standard software package must be set.

Telegram word	Used as:
1	Control word (e. g. On) (see d230)
2	Master setpoint (see H70)
3	Status word 2 (due to excitation sequence) (see d231)
4	Status word 1 (due to fault signal) (see d232)
5	not used

Table 2.4.3.a: Peer receive date

Assignment, control word 1 from Peer-to-Peer

Control word 1 bit	Significance	Select parameter	Effect / explanation
0	ON	H240	Unit on
1	/OFF2 (voltage off)	H241,H242	Transfer to the unit
2	/OFF3 (fast stop)	H243,H244	Transfer to the unit
3	Not used	-	
4	Not used	-	
5	Not used	-	
6	Enable setpoint	H245,H246	Input setpoint
7	Acknowledge fault	H247,H248	Transfer to the unit
8	Inching 1	H249	Local inching, forwards
9	Inching 2	H250	Local inching, backwards
10		-	
11	Synchronizing command	H251	Angular synchronization enabled
12	Not used	-	
13	Angular controller enable	H252	Angular controller enabled
14	Not used	-	
15	Not used	-	

Table 2.4.3.b: Control word 1 peer-to-peer

Assignment, status word 2 from Peer-to-Peer (display parameter d231)

Status word 2 bit	Significance	Select parameter	Effect / explanation
0	Restart on the fly active (AND „Run“ Status word 1 bit 2)	H245, H246	enable setpoint after restart on the fly
1...15	not used		

Table 2.4.3.c: Status word 2 Peer-to-Peer → technological module

Assignment, status word 1 from Peer-to-Peer (display parameter d232)

Status word 2 bit	Significance	Select parameter	Effect / explanation
0	not used	-	
1	Ready to start	H240	Equipment on
2	Run OR / AND Run AND Restart on the fly completed (Status word 2 bit 0)	H240, H245, H246	Equipment on Enable setpoint
3	External fault	H254,H255,H256	Generate external fault
4	OFF2	H241, H242	OFF2
5	OFF3	H243, H244	OFF3
6	Switch on inhibit	H240	Switch on inhibit
7...15	not used	-	

Table 2.4.3.d: Status word 1 Peer-to-Peer → technological module

3 Basic converter setting

The parameters must be set in the basic drive converter in the sequence specified here so that the standard ”angular synchronous control” software package can be used (refer to the parameter list of the drive converter).
The starting point is an ”initialized” drive converter which was initialized fault and error-free and is in the ”READY” status °009.
Generally, it is recommended that the factory setting is established.

P52= 1 (CU2,CU3)

P60= 2; P970=0 (CUVC,CUMC)

Note:
The parameterization for the SIMOVERT VC and MC drive converters with the CUVC and CUMC modules are described in the following Sections, as well as the parameterization of the SIMOVERT VC and SC drive converters with the predecessor modules CU2 and CU3.

3.1 Logging-on the boards

3.1.1 CU2,CU3

Parameter number	Value	Explanation
P051	3	Set the access stage to the required level
P052	4	Change-over into the “**hardware setting**” status
P090	2	Log-on T300 at slot 2 (to the far right in the electronics box)
P091	0: 1: 3:	No communications board available CB1 (for PROFIBUS DP) available SCB1 or SCB2 (peer-to-peer) available
P682	Refer to the parameter list	SCB protocol; can only be set if SCB1/2 is inserted
P052	0	End “hardware setting”

Table 3.1.1: Logging-on CU2,CU3

If logged-on boards are not available, incorrectly inserted or are faulty, the appropriate fault message is output (F070 for SCB1/2 or F080 for T300 or CB1).

3.1.2 CUVC,CUMC

The inserted modules (T300 and communication modules CPB, SCB1/2) are automatically identified by the basic drive. It is not necessary to log-on using a parameter.

Additional settings are required depending on the particular module (CBP bus address, SCB protocol...). Also refer to the basic drive description - Section „Module configuration“

If the modules are incorrectly inserted or are faulty, an appropriate fault message is output (F070 for SCB1/2 or F80 for T300 or CBP).

3.2 Operating mode

Only the settings which are absolutely necessary to run the angular synchronous control are described here. All of the other parameters can essentially have the ”factory setting”. In order to achieve optimum drive open- and closed-loop control, it will be necessary to change several parameters according to the usual setting instructions (refer to the User Manual SIMOVERT MASTERDRIVES).

3.2.1 CU2,CU3

Parameter number	**Value**	**Explanation**
P051	3	Set the access stage to the required level
P052	5	Change-over into the “**drive configuration**” status
P163	4	Closed-loop speed control
P208	1	The speed actual value is received from the pulse encoder; **Tracks A and B**, must be connected at the CU (the SE300 terminals 531-533 are not assigned!): SIMOVERT VC: Connector X103 pin 35 =ground pin 36 =track A pin 37 =track B pin 40 =+15V SIMOVERT SC: Pulses are generated from the encoder/resolver signals. Encoder connection via the special 26-pin sub-D connector X104 The encoder signals, available at the CU are transferred to the T300 speed sensing via the LBA backplane bus. The **zero pulse** can either be connected to the CU: SIMOVERT VC: Connector X103 pin38; (corresponds to pre-assignment H018) or to SE300, terminal 535.
P209	...	Pulse encoder pulse number
P052	0	End the “drive configuration”

Table 3.2.a: Operating mode CU2,CU3

3.2.2 CUVC,CUMC

Parameter number	Value	Explanation
P060	5	Change-over into the “**drive configuration**” status
P100	4	Closed-loop speed control (only for CUVC)
P130	11	The speed actual value is received from the pulse encoder; **Tracks A and B**, must be connected at the CUVC (the SE300 terminals 531-533 are not assigned!): CUVC: Connector X103 pin 23 =ground pin 24 =track A pin 25 =track B pin 28 =+15V CUMC: With SBP pulse encoder With SBR2 resolver (SBR2 required) With SBM encoder The encoder connection and the selection and parameterization of the encoder should be taken from the basic drive manual. The encoder signals, available at the CU are transferred to the T300 speed sensing via the LBA backplane bus. The **zero pulse** can either be connected to the CU: CUVC: Connector X103pin26; (corresponds to pre-assignment H018) or to SE300, terminal 535.
P151	...	Pulse encoder pulse number
P060	1	End the “drive configuration”

Table 3.2.b: Operating mode CUVC,CUMC

3.3 Motor data and speed controller

The motor data and a standard speed controller setting can be set with the following basic drive converter functions, both easily and drive-specific. If required, the determined parameter values can then be optimized.

CU2,CU3:

P052	=5	”Drive setting” functions are made selectable
	=8	Complete motor identification and speed controller setting executed Note: This program requires that the drive is **powered-up twice**! Alarms **A078, A080** refer to the power-up instants

CUVC,CUMC:

P060	=5	”Drive setting” functions are made selectable
P115	=3	Complete motor identification and speed controller setting executed Note: This program requires that the drive is **powered-up twice**! Alarms **A078, A080** refer to the power-up instants

If errors/faults occur: Refer to the basic drive converter User Manual!

3.4 Setpoint channel

Additional setpoint channel settings can be realized in the “ready” status (°009) and, if required a lower access stage (CU2,CU3,CUVC,CUMC):

Parameter number	Value	Explanation
P443	3002	Source, speed setpoint (“master setpoint”): Word 2 of the dual port RAM interface to the T300; the actual master setpoint source on the T300 is set there (H070). When relevant, it is also influenced by the ratio and inching setpoints.
P438	3005	Source, supplementary setpoint2: Word 5 of the T300 interface; angular controller output (if enabled)
P462	0	Ramp-up time Should be the max. actual ramp-up time of the master drive in order to achieve good control performance (speed and stability). As the angular controller output signal first becomes effective after the basic drive converter ramp-function generator, it should be observed, for high offset, that the angular controller is not enabled or the angular controller output remains limited.
P464	0	Ramp-down time It should be the max. actual ramp-down time of the master drive in order to achieve good control characteristics (speed and stability). Caution: The converter must have the appropriate braking capability (braking resistor, regenerative feedback unit).

Table 3.4.a: Setpoint channel

The T300 provides 3 additional quantities for **additional** drive settings and controller optimization features. They **may only be used on the CU**, i. e. set, if the associated functions are required.

Parameter number	**Value**	**Explanation**
P226 (CU2,CU3) P232 (CUVC,CUMC)	3006	Source, Kp adaptation for the speed controller; wort 6 of the dual port RAM interface to the T300;
P506 (CU2,CU3,CUVC) P262 (CUMC)	3008	Source, supplementary torque for inertia compensation word 8 of the dual port RAM interface to the T300;

Table 3.4.b: KP-Adaption

Note: KP adaption CUVC,CUMC

The following parameters should be permanently set on the T300:

H144=0%; H143=199,9%; H142=0 and H141=255,9.

The KP adaption is then set in the basic drive (P233,P234,P235,P236)

Procedure, refer to CUVC and CUMC block diagrams (Compendium), Sheet 360:

The effective KP can be read at parameter r237 of the basic drive.

3.5 Open-loop control

Several basic drive converter functions can also be controlled via the T300. If specific control word bits are taken from the T300, for the associated CU parameters P554 to P585, the source ”T300 dual port RAM” should be specified.

Additionally, the standard angular synchronous control software package provides several sources on the T300 for a control bit, which can be selected with the associated T300 parameters (H240 to H256).

Parameter number	Value CU2,CU3	Value CUVC,CUMC	Explanation	Source selection on T300 using T300 parameters:
P554	3001	3100	On command (main contactor)	H240
P555-557	3001	3101	Off2	H241, H242
P558-560	3001	3101	Off3	H243, H244
P564	3001	3106	Setpoint enable	H245, H246
P565-567	3001	3107	Fault acknowledgement	H247, H248
P568	3001	3108	Inching 1; refer below	H249
P569	3001	3109	Inching 2; refer below	H250
P575	3001	3115	Fault 1 external; refer to the explanation to H254	H254, H255, H256
P585	3004	3409	Speed controller enable	H253

Table 3.5: Open-loop control

Information regarding inching 1/2:

a) Inching commands via the T300 act in the form of a master setpoint change (according to H130, H131) when the drive is running, if P568 and P569 are **not** set **to 3001 (or 3108 and 3109)**. Thus, the **”slack take-up/slack-off”** functions are possible in operation.

b) If the inching control bits in the basic drive converter are used (**P568,P569=3001, or P568 =3108; P569=3109**), a different function is implemented: A drive which is powered-down **starts to rotate** with the line speed set in P448/P449 (jog function).

3.6 Actual value transfer from the CU to T300

The angular synchronous function package only requires the two basic drive converter status words 1 and 2 (r552, r553 for CU2,CU3; K32, K33 for CUVC,CUMC) and the drive converter control word (r550 for CU2,CU3; K30 for CUVC,CUMC) for open-loop control and monitoring.
For:

- T300/SE300 analog outputs
- T300 peer-to-peer,
- CB1/CBP or SCB1/2

If other basic drive converter parameter values (e. g. measured values) are output, either as analog signals or via interfaces, then they can be attached to the unassigned locations up to index 8.

These received words, which can be a max. of 5, are then subsequently selected with H176, H177, H170, H171(select values 1, 2, 3 and 4) on the T300.

3.6.1 CU2,CU3

Parameter number	Index (corresp. to the word No.)	Value (parameter No.)	Explanation
P694	1	968 (=552)	Status word 1 (used for setpoint enable, fault)
	2	0	Presently unassigned;(used for select value 1, 2, 3 or 4)
	3	0	Presently unassigned; (used for select value 1, 2, 3 or 4)
	4	553	Status word 2
	5	550	Control word1 (to disable the supplementary SW2 for OFF1)
	6	0	Presently unassigned; (used for select value 1 or 3)
	7	0	Presently unassigned; (used for select value 1, 2, 3 or 4)
	8	0	Presently unassigned; (used for select value 2 or 4)
	9	529	With P526.1=20xy or 60xy selected word from the USS-telegramm (refer to section 5.4)
	10	534	With P526.1=20xy or 60xy selected word from the USS-telegramm (refer to section 5.4)

Table 3.6.a: Actual value transfer CU2,CU3

3.6.2 CUVC,CUMC

Parameter number	Index (corresp. to the word No.)	Value (parameter No.)	Explanation
P734	1	32	Status word 1 (used for setpoint enable, fault)
	2	0	Presently unassigned; (used for select value 1, 2, 3 or 4)
	3	0	Presently unassigned; (used for select value 1, 2, 3 or 4)
	4	33	Status word 2
	5	30	Control word1 (to disable the supplementary SW2 for OFF1)
	6	0	Presently unassigned; (used for select value 1 or 3)
	7	0	Presently unassigned; (used for select value 1, 2, 3 or 4)
	8	0	Presently unassigned; (used for select value 2 or 4)
	9	2001... 2016 (SST1) or 6001... 6016 (SST2)	With P526.1=20xy or 60xy selected word from the USS-telegramm (refer to section 5.4)
	10	2001... 2016 (SST1) or 6001... 6016 (SST2)	With P526.1=20xy or 60xy selected word from the USS-telegramm (refer to section 5.4)

Table 3.6.b: Actual value transfer CUVC,CUMC

3.7 Data transfer CU ⇔ peer-to-peer (T300)

Receive data:

The 4 received words are used on the T300 and cannot (directly) be sent to the basic drive converter.

Send data:

The words 2 to 5 can be filled via the selection value parameters H176,177,170,171 from the free dual-port RAM locations (refer to Section 2.4).

Select values 1 to 4 (selected with H176,177,170,171) can be sent from the dual port RAM words (corresponding to P694 index (CU2,CU3); P734 index (CUVC,CUMC)) 2, 3, 6, 7 or 8 in telegram words 2 to 5.

The standard software package permanently assigns a status/control word which can be generated, to the 1st telegram word (refer to H216, Section 2.4).

3.8 Data transfer CU ⇔ communications board (CB,SCB)

The CU parameter values to be **sent** must first be transferred to free locations in the T300 dual port RAM using P964-index (CU2,CU3); P734-index (CUVC,CUMC) 2,3,6,7 and 8).
The standard software package assigns the 1st telegram word permanently with a status/control word which can be configured (refer to H217, Section 2.2).
Words 2 to 5 can be filled via the select value parameters H176,177,170,171 from the above mentioned free dual port RAM locations (refer to Section 2.2).

All of the data **received** from a communications board is processed on the T300. It is not directly transferred to the CU, but only dependent on the T300 parameterization.

Information regarding the use of the SCB1/2:
If an SCB1 or 2 is available as communications board, it must be set (initialized) via the basic drive converter parameters (refer to the drive converter parameter list and description of the boards):

- protocol
- baud rate
- telegram length (process data length);
  length set at the T300 send block (H226; FP-CONF.TAUT.LT")
  must be the same (or larger)!

The SCB telegram is monitored on the T300 (H210, H211). The monitoring, which can be set using the drive converter parameter P695 (CU2,CU3); P722 (CUVC,CUMC) for this configuration, only acts on the CU ⇔ T300 coupling!

3.9 Other information

Information regarding setpoint enable, synchronous start
It is recommended, to control the drive at power-up, that the setpoint enable is used, i. e. the setpoint is switched-in to the ramp-function generator input. The speed controller should be principally enabled (P585=1).
Master- and slave drive starting can be simply synchronized using the setpoint enable signal generated on the T300. In this case, the signal must be coupled-in via a suitable interface (peer-to-peer or binary signal) from the slave T300 to the master.

Both drives can be **synchronously started** even at different power-up instants (ON command) or as result of different excitation times (due to different motor outputs), as follows:

Bit0 of status word2 ("**restart-on-the-fly active**") of both drives is fed to T300.
From the master: Via a suitable interface (peer-to-peer or binary signal)
From the slave: In the 4th word of the actual value output to T300: **P694.4=553 (CU2,CU3), P734.4=33 (CUVC,CUMC)**
The T300 generates, in conjunction with an ON command, the setpoint enable, only if both motors are energized (bit0=0).

Information regarding the master setpoint
If ramp-up and ramp-down times are not set (=0), for an external master setpoint input, it must be ensured that the master setpoint does not manifest excessive steps (especially in the regenerative direction).

3.10 Free function blocks CUVC, CUMC

Free blocks can be used in SIMOVERT MASTERDRIVES CUVC and CUMC, to realise additional function (logic functions with logic blocks, calculation with numeric function blocs...).
To enable function blocks to carry out processing, a time slot (sampling time) must be assigned to each function block. Depending on the number and frequency of the blocks to be processed, the microprocessor system of the units has a varying degree of utilization.

The visualization parameter r829 has to be selected after enabling function blocks for displaying the free calculating time. The reserve of the microprocessor system in the basic unit should not be lower than 5 - 10%.
If this is not the case, please make shure all the enabled function blocs are really necessary, or if some function blocs may be assigned to different time slots.

4 Terminal assignment

Setpoints and control signals can be read-in and actual values and status signals output via binary and analog signals. The following connectors,

X131 (analog inputs/outputs, pulse encoder connections) and
X136 (binary inputs/outputs)

of the T300 board are connected to the SE300 interface module via a shielded, multi-conductor cable (signal ribbon cable, 40- or 34-core).

An SC58 cable should be used for the 40-pin connector X131, and an SC60 cable for the 34-pin connector X136.

The terminal assignments described in this document, are only valid when an SE300 interface module is used. The terminals, belonging to connector X5 are designated with 5xx, and those belonging to connector X6, with 6xx.

Caution:
Only the screened SC58 and SC60 **ribbon cables** may be used.
The described terminal assignment is only valid when the SE300 interface module is used.

4.1 Connector X6, Binary inputs

It should be observed that several terminals are assigned twice and three times. They control the actually selected function.

4.1.1 Signal level and SE300 terminal assignment

The binary inputs and outputs of the T300 board require or supply 24 V signals. In this case, the **24 V supply voltage** for the binary outputs must be **fed in from outside** (i. e. via the interface board).
An external power supply is not required when the binary inputs are used.

Input smoothing ≈ 700µs   Input current for a high signal, approx. 8 mA at 24V

	logical ”0”	**logical ”1”** (associated function is actived/enabled)
input voltage:	-1V to +6V or terminal ”open”	13V to 33V nominal voltage: 24V

Terminal strip X6: **Permanently wired control signals from the terminal**

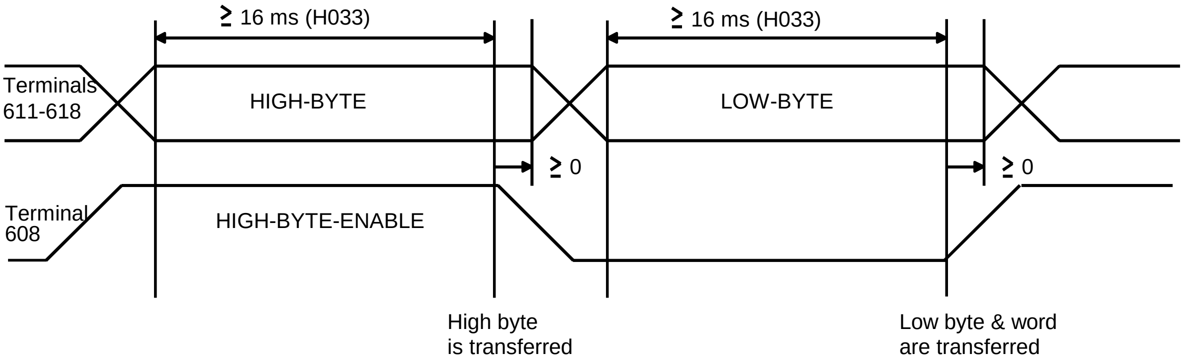
Terminals 601 to 608 (STRUC configured software: Partial connector X6A)
Terminals 611 to 618 (STRUC configured software: Partial connector X6B)

Terminal	Assignment: **for byte-serial input inhibited** (selection parameter)		Assignment for **byte-serial input enabled** (selection parameter)	
601	Angular controller enable (H252)		Angular controller enable (H252)	
602	On (main contactor) (H240) Additional ON delay (H021) and OFF delay (H022)		On (main contactor) (H240) Additional ON delay (H021) and OFF delay (H022)	
603	Speed controller enable (H253)	Reset position difference	Speed controller enable (H253)	Reset position difference
604	No off 3 (fast stop) (H243; H244)		No off 3 (fast stop) (H243; H244)	
605	Synchronizing (H251)		Synchronizing (H251)	
606	Inching 1 (H249)		Setpoint selection, together with term. 607: 00: Value invalid 01: Master speed setpoint 10: offset reference value 11: Ratio	
607	Inching 2 (H250)		Setpoint selection together with term. 606	
608	No off 2 (voltage disconnect) (H241; H242)	Reset position/offset	Select high byte: 1=high byte	
609	P24 external		P24 external	
610	Ground, external		Ground, external	
611	Thumbwheel switch input 2**0	Fault acknowledge (H247; H248)	Bit0 of the setpoint	
612	Thumbwheel switch input 2**1	Fault ext. (H254)	Bit1 of the setpoint	
613	Thumbwheel switch input 2**2	Fault ext. (H255)	Bit2 of the setpoint	
614	Thumbwheel switch input 2**3	Fault ext. (H256)	Bit3 of the setpoint	
615	Thumbwheel switch, data transfer		Bit4 of the setpoint	
616	Setpoint enable (H245; H246)		Bit5 of the setpoint	
617	Changeover, ratio (H40; H41; H42)		Bit6 of the setpoint	
618	Changeover, offset reference value (H60; H61)		Bit7 of the setpoint	

Table 4.1.1: Terminal assignment, binary inputs 601-618

4.1.2 Byte-serial data input

Data transfer mechanism: (Function description - refer to Section 5.2)



4.1.3 Thumbwheel switch

For detailed information about the terminal utilisation refer Sec.4.2.2

(Function description - refer to Section 5.3)

4.2 Connector X6, Binary outputs

4.2.1 Level and Assignments

All of the outputs are initially inhibited (high-ohmic condition), when the drive converter is powered-up. The output registers are pre-assigned with 0 in the initialization phase, and are then subsequently enabled. All outputs are inhibited when the drive converter is powered-down, or a processor crashes (e.g. due to a hardware fault).

logical ”0”: output switch open
logical ”1”: output switch closed
i.e. the terminal voltage is: power supply voltage (24V DC) -2.5V

max. output current 100 mA, short-circuit proof

<u>Terminal strip X6:</u> Binary outputs and status messages

Terminals 631 to 640 (STRUC configured software: Partial connector X6C)

Term.	Assignment	Explanation
	Thumbwheel switch:	
631	Thumbwheel switch output 10**0	
632	Thumbwheel switch output 10**1	
633	Thumbwheel switch output 10**2	
634	Thumbwheel switch output 10**3	
	Status messages:	Relevant parameters
635	Synchronism reached	H203
636	Angular controller at its limit	H112 (upper and lower limit); corresponds to F119, A100
637	Excitation in master and slave expired	logical AND of the binary values selected with H245 and H246 and of the ON command Could be used e.g. for setpoint enable so that both drives start in synchronism;
638	Angular difference > limit value	H201 H202; corresponds to F131, A112
639 640	P24, external M24, external	Terminals 609, 619 and 639 are connected via T300 Terminals 610, 630 and 640 are connected via T300

Table 4.2.1: Terminal assignment, 631-640

4.2.2 Thumbwheel switch

Connecting a BCD thumbwheel switch.

In this example a separate switch is used (Fig 4.2.2 on the left side) to provide the sign.

The same connecting is valid for the binary coding (16**0,...)

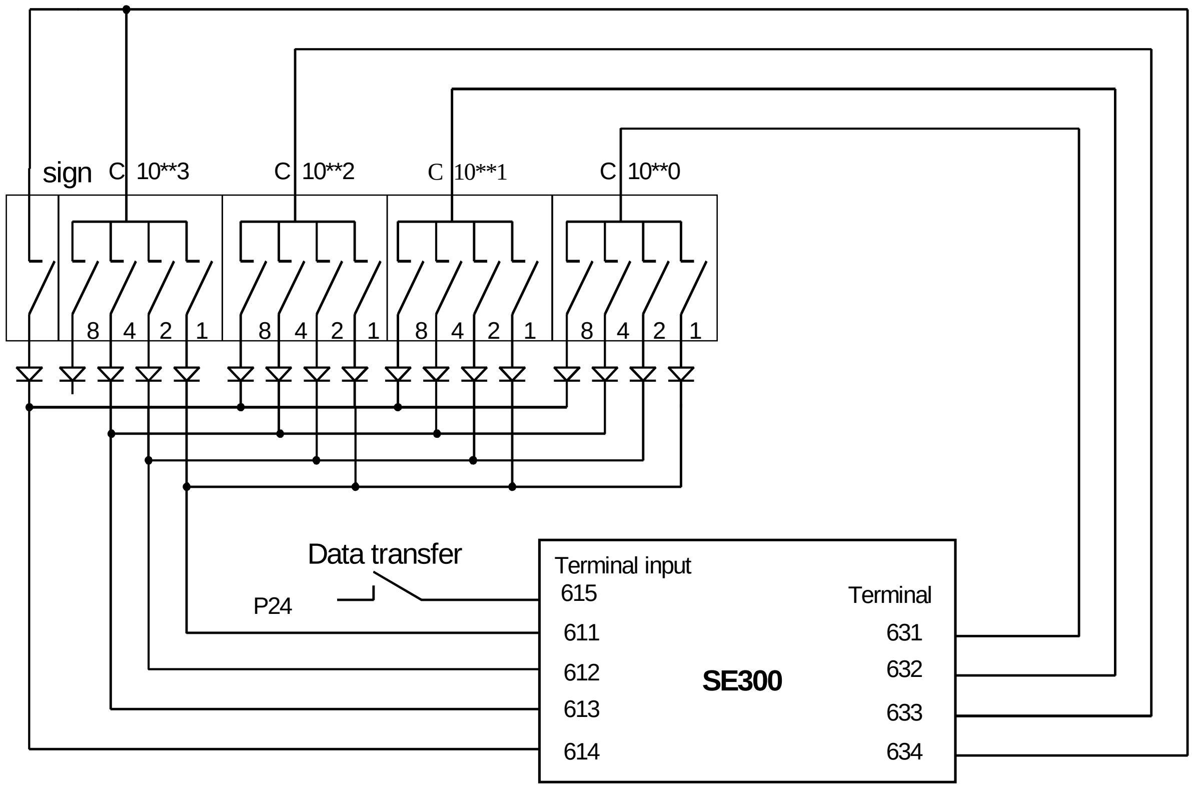


Fig.4.2.2: Connecting a BCD thumbwheel switch

4.3 Connector X5, Analog inputs and outputs

The analog inputs have a 1**2-bit resolution** over the input and output voltage range of **-10 V to +10 V (resolution = 4.88 mV)**. In this case, **5 V** corresponds to an internal value of **100 %**.

4.3.1 Analog inputs

Differential inputs (connect all reference potentials !),
Low-pass filter with 0.66 ms time constant Input resistor = 10 kΩ

Terminal strip X5: **Analog inputs 1 to 7**
(STRUC configured software: Partial connectors X5A to X5G)

Terminal / reference	Assignment, representation	Partial connect or	Effective for source selection	Adapted using parameter
501 / 502	Master speed setpoint 5 V = 100 % speed	X5A	H070 = 1	H071
503 / 504	offset ref. value 5 V = 16 384 pulse offset	X5B	H050 = 1	H052
505 / 506	Inertia compensation 5 V = 100 % torque	X5C	H080 = 1	H081
507 / 508	Gearshift ratio 5 V = 100 % i.e. 1:1	X5D	H048 = 4	H040, H043, H047

Table 4.3.1: Terminal assignment, analog inputs

4.3.2 Analog outputs

The output registers are set to 0 in the initialization phase, and then released. All outputs are inhibited when the converter is powered-down, or a processor crashes (e.g. due to a hardware fault).

Terminal strip X5: **Analog outputs 1 to 4**
(STRUC configured software: Partial connectors X5H to X5L)
Max. output current = 10 mA Representation: 5V = 100 % (e. g. 100% speed)

Terminal	Assignment	Partial connector, sampling time	Effective for source selection	Adapted with offset	gain
509 / 510	Selectable (=select value 1); can be monitored with d178; pre-assignment: Angular controller, control error (offset is taken into account)	X5H 4ms	H176 =7	H160	H161
519 / 520	Selectable (=select value 2); can be monitored with d179; pre-assignment: Speed actual value, slave	X5J 4ms	H177 =1	H162	H163
521 / 522	Selectable (=select value 3); Pre-assignment: Angular controller output	X5K 4ms	H170 =6	H172	H173
523 / 524	Selectable (=select value 4); Pre-assignment: Position difference-actual value	X5L 4ms	H171 =9	H174	H175

Table 4.3.2: Terminal assignment, analog outputs

4.4 Pulse encoders

4.4.1 Information regarding the pulse encoder types

Unipolar pulse encoders must be used with **two tracks displaced through 90 degrees**. The zero pulse must be connected-up if the synchronizing function is used.

The T300 board provides 15 V, max. 100 mA as encoder power supply. Generally, this can only be used to supply one pulse encoder. The second pulse encoder must, if required, be supplied from an external voltage source or from the basic converter.

Technical data:

- Input current 8mA typical
- Pulse level 0-30V
- Digital filter, max. frequency 500 kHz
- **max. pulse frequency** (per track) **400 kHz**

Recommended pulse encoder types:

Encoders with a 15 - 24 V supply voltage:
Low cost SIEMENS pulse encoder **1XP8001-1** (for 1LA5 motors, size 100K to 200L)
We have had good experience with HOG9D... and POG9D... encoders from Messrs. Hübner, Berlin

Shielding:

The pulse encoder cable and if required the synchronizing pulse cables must be carefully shielded. The cable screen should be connected to ground potential through the lowest possible impedence using cable clamps at both ends. This is especially important if these signals are received from proximity- or contact switching switches.

4.4.2 15 V power supply units for pulse encoders

a) Type CM62-PS-220 AC/ 15 DC/ 1
220 V AC to 15V DC, load capability 1A
Manufacturer, Phoenix

b) Type FMP 15S 500 ”with snap mounting”
110/220 V AC to 15V DC, load capabilities 0.5 A
Manufacturer, Block

4.4.3 Encoder pulse numbers

The following must be taken into account when selecting the encoder pulse number:

1.) **Max. pulse frequency per track = 400 kHz**

2.) The *pulse number ratio* (refer to Section: 5.13) should be approximately 1:1, where the best dynamic performance is achieved. A *pulse number ratio* of approximately 1:4 to 4:1 can generally designated as *approximately 1:1*.

3.) The master- and slave drive encoder pulse numbers should be identical; criteria 1) and 2) however have priority.

4.) The achievable accuracy and the value range, with which a selected ratio can be maintained, is defined by the pulse number ratio. **For unfavorable combination of master and slave** encoder pulse number, this can result in restrictions regarding the accuracy and value range (refer to Table 4.4.3).

PZ Master / PZ Slave	500	600	1000	1200	1500	1800	2000	2400	2500	4000	5000
500	X	**5.46**	X	6.82	**5.46**	4.55	X	3.41	X	X	X
600	X	X	X	X	X	X	X	X	X	2.45	X
1000	X	X	X	X	X	X	X	6.82	X	X	X
1200		X	X	X	X	X	X	X	X	X	X
1500	X	X	X	X	X	**5.46**	X	10.24	X	6.14	X
1800		X	X	X	X	X	X	X	11.79	7.37	5.89
2000	X	**5.46**	X	**5.46**	**5.46**	**1.82**	X	**5.46**	X	X	X
2400		X		X		**5.46**	X	X	X	X	X
2500	X	**5.46**	X	**5.46**	**5.46**		X	X	X	10.24	X
4000	X		X	**5.46**			X	**5.46**		X	X
5000	X	5.46	X	**5.46**	**5.46**		X	**5.46**	X	X	X
512		13.9	8.38	6.99	5.59	4.66	4.19	3.49	3.35	2.09	1.67
1024				13.98	11.18	9.32	8.38	6.99	6.71	4.19	3.30
2048								13.98	13.42	8.38	6.71
4096											13.42

PZ Master / PZ Slave	512	1024	2048	4096
500	16.0	8.0	4.0	2.0
600		9.6	4.8	2.4
1000		16.0	8.0	4.0
1200			9.6	4.8
1500			12.0	6.0
1800			14.4	7.2
2000			16.0	8.0
2400				9.6
2500				10.0
4000				16.0
5000				
512	X	X	X	X
1024	X	X	X	X
2046	X	X	X	X
4098	X	X	X	X

Explanation:

- X = Full value range and resolution
- (shaded) = Resolution restricted
- **5.46** = Value range restricted to 5.46
- 4.66 (shaded) = Value range and resolution restricted

PZ Master = Pulse number, master pulse encoder

PZ Slave = Pulse number, slave pulse encoder

Table 4.4.3: Possible combinations for different encoder pulse numbers

4.4.4 Pulse encoder inputs of the T300

The pulse encoder inputs 1 and 2 of the T300 boards have similar circuitry. The switching thresholds, for encoders without push-pull signal are optimized for pulse encoders with 15 V supply voltage. Pulse encoders with a 24 V supply voltage can be connected; it may be necessary to expect a somewhat lower maximum pulse frequency.

Terminal strip X5: Pulse encoder, slave drive
(STRUC configured software: Partial connector X5M)

The pulse encoder for the slave drive is connected to the basic drive, the pulse tracks are transferred to the T300 via the backplane bus. The pulse encoder signals do not have to be connected twice, parameterization using H18.

Term.	Assignment	Explanation
531 533	**Track A** **Track B**	This is not used in the pre-assignment (H018), as the pulse encoder inputs of the CU are used for the slave (refer to 4.4.6)
532 534	**Ground Track A** **Ground Track B**	Ground Ground
535	**Synchronizing pulse SYN** (e. g. zero pulse)	This is not used in the pre-assignment (H018), as the appropriate CU input is used for the slave. If required, it can be sourced from this terminal.
536	Ground SYN	Ground
537	Rough pulse	Connect to ground, if not available
538	GND external / ground	Ground, encoder power supply and ref. rough pulse
539	GND external / ground	”
540	P 15 - output	15 V encoder power supply **Imax= 100 mA** (max. 150 mA under short-cct conditions)

Table 4.4.4.a: Pulse encoder inputs, slave

Note for MASTER DRIVES SC (CU3):
Because of an interchanging of tracks A and B while transferring via the local bus adapter LBA to the T300, it might be better to fed the pulse encoder signals form **CU3 connector X102**, terminals 37 (track B), 38 (track A) and 39 (zero pulse) to the SE300 terminals 531, 533, 535. With this synchronizing might be adjusted easilier (refer Sec. 5.1.4).

Terminal strip X5: **Pulse encoder inputs of the master drive**
(STRUC configured software: Partial connector X5N)

Term.	Assignment	Explanation
541	Track A	
542	Reference, track A	Ground
543	Track B	
544	Reference, track B	Ground
545	Synchronizing signal SYN	External synchronizing signal or zero pulse
546	Reference SYN	Ground
547	Rough pulse	Connect to ground, if not available
548	GND external / ground	Ground, encoder power supply and ref. rough pulse
549	GND external / ground	Ground, encoder power supply and ref. rough pulse

Table 4.4.4.b: Pulse encoder inputs, master

4.4.5 Fine signal evaluation using the rough signal

The speed actual value sensing permits the synchronizing signal to be filtered (zero pulse corresponds to a fine signal) using a rough signal. If rough pulse evaluation is set at the IT1/IT2-connectors of the speed sensing block (H018,H019), a HW logic which is fed by fine and rough signal generates an ”evaluation signal” which is used for synchronizing and for calculating the offset (displacement).

Fig. 4.4.5.a: Typical position of the rough-, fine- and evaluation pulses

- a and b should be as short as possible (generally involves the mechanical design), so that noise/disturbances can be minimized. Further, the fine pulse should not extend beyond the rough pulse.
- a and b must be selected long enough so that possible contact bounce (BEROS, switches, etc.) has reliably decayed. (make an oscilloscope trace!)

Rough pulse type	**Explanation** (refer to Fig. 4.4.5.b as well as Section 6.3 for H018, H019)
0 H018/H019=x0xx	No rough pulse; only fine pulse (synchronizing pulse) is evaluated
1 H018/H019=x1xx	An evaluation signal is generated, as soon as the rough- and fine pulses have a high signal level, **independent of the sequence** in which they occur. *Note function of T300, MLFB 6SE7090-0XX84-0AH2:* *The evaluation signal is withdrawn, if **both the rough- and the fine pulse** have low signal levels!*
2 H018/H019=x2xx	An evaluation signal is generated if the **rough pulse** occurs **before the fine pulse**. It is not possible that they occur simultaneously! *Note function of T300, MLFB 6SE7090-0XX84-0AH2:* *The evaluation signal is always withdrawn with the falling edge of the **rough pulse**, even if the fine pulse becomes inactive before the rough pulse!*

Table 4.4.5.: Possible ways of setting the rough pulse evaluation

Depending on the position of the rough- and fine pulses and setting of the ”rough pulse type” at H018/H019, evaluation signals are generated, which have different lengths. These differences should be taken into account, if ***”direction of rotation-dependent evaluation*”** is set (H018/H019=1xxx), and the drive is **rotating counter-clockwise**, as, in this case, the falling edge of the evaluation signal is decisive for synchronizing!
This falling edge corresponds to edge a of figure while rotating counter-clockwise. For more information refer Section 5.1.4!

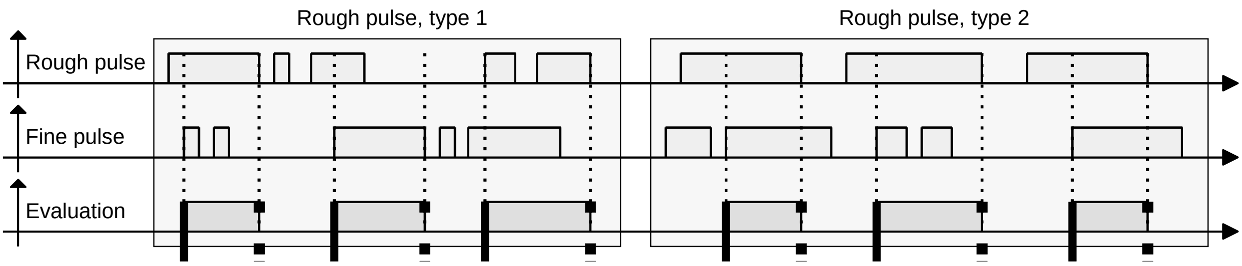


Fig. 4.4.5.b: Generating the evaluation signal for T300, MLFB 6SE7090-0XX84-0AH2

Restriction:
*When **reversing**, within a rough pulse, and after the fine signal has been travelled-over (i. e. in the range b), the fine signal is no longer identified when it is travelled-over in the reverse direction!*

4.4.6 Pulse tachometer connection at CU

The slave drive pulse encoder must be connected to the CU terminals, as the basic drive converter speed controller (CU) is used in the slave drive.

4.4.6.1 Pulse tachometer connection at CU2,CU3

CU2 connector X103 (bottom right) Pin number (referred to all connectors):	Pin number (referred to connector X103):	**Function**
35 (corresponding to connector, pin 1)	1	Ground
36	2	Track A
37	3	Track B
38	4	Zero pulse
40	6	+ 15V

Table 4.4.6.a: Pulse tachometer connection at CU2

CU3: The encoder signals are generated from the encoder/resolver signals.
The encoder connection thrue special 26 pol. Sub-D connector X104.
The encoder connection should be taken from the basic drive manual.

4.4.6.2 Pulse tachometer connection at CUVC,CUMC

CUVC connector X103 (bottom right) Pin number (referred to all connectors):	Pin number (referred to connector X103):	**Function**
23 (corresponding to connector, pin 1)	1	Ground
24	2	Track A
25	3	Track B
26	4	Zero pulse
28	6	+ 15V

Table 4.4.6.b: Pulse tachometer connection at CUVC

CUMC: With SBP pulse encoder
With SBR2 resolver (SBR2 required)
With SBM encoder
The encoder connection should be taken from the basic drive manual.

4.5 Service interface, connectors X132 and X133

Serial interface 1 (STRUC board connector X01) is configured as RS232 (V24) - X132 or RS485 - X133 start-up interface to connect TELEMASTER.
For more detailed service (for hardware/software problems, the so-called diagnostics/hexadecimal monitor can be started by depressing the **button** for approx. 5 seconds at power on.

Pin number (referred to connector X132):	Pin number (referred to the labels on the T300 connector):	**Connector X132** (RS232)
1	1	Receive data RxD
2	2	Transmit data TxD
3	3	Ground GND
4	4	Ground GND
5	5	Ground GND

Pin number (referred to connector X132):	Pin number (referred to the labels on the T300 connector):	**Connector X133** (RS485)
1	6	Receive / Transmit +RxD / +TxD
2	7	Receive / Transmit -RxD / -TxD
3	8	Receive / Transmit +RxD / +TxD
4	9	Receive / Transmit -RxD / -TxD
5	10	Ground GND

Table 4.5: Connector X132,X133

4.6 Peer-to-peer interface, connector X134

Serial interface 2 (STRUC module connector X02) is assigned the peer to peer protocol; it is available as RS485 at X134.

Pin number (referred to connector X134):	Pin number (referred to the labels on the T300 connector):	**Connector X134 4-wire RS485**
1	11	Receive data +RxD
2	12	Receive data -RxD
3	13	Transmit data +TxD
4	14	Transmit data -TxD
5	15	Ground GND

Table 4.6: Connector X134

5 Function description

For the standard angular synchronous control software package the closed-loop speed control is implemented in the drive converter itself, and the **closed-loop angular contro**l, on the **technology board**.

The standard software package can be run with or without interface boards (CB1/CBP, SCB1/2).
The control and setpoint input can be realized via the automation system (interface boards) or via analog and binary terminals. The sources for individual control word bits and for setpoints can be selected using parameters.

The standard software package functions are combined in several function packages (FP) as follows:

Function(s)	Implemented in the function package
Setpoints are received from the interface board or T300 peer-to-peer and actual values are sent to the interface board and T300 peer-to-peer Coupling monitoring	CONF
Closed-loop control - reading-in setpoints - actual value sensing - angular controller - offset calculation - synchronization	SYNCON
Open-loop control and monitoring - coupling to the basic drive converter - analog and binary outputs - control word processing - monitoring functions (control-related) - fault handling	CONTRL
Technological parameter handling Definition of the texts to the technological parameters, other parameters	PARAM
Central functions for the SIMADYN D monitor interface and T300 peer-to-peer	@TXD

The distribution of functions in the function packages is only of interest if block connectors can be read and changed using the SIMADYN D monitor (IBS/SERVICE-program).

5.1 Actual value sensing

Speed, position and *position difference* actual values are sensed by counting the pulses of the two pulse encoders connected to the master and slave. The encoder pulses are separated, per hardware, into up- and down pulses in order to be able to identify the pulse direction; the **pulses are quadrupled**. The ”**unit pulse**” always refers to - with the exception of the encoder pulse number per revolution - the **quadrupled pulse**; i.e. for an encoder with 1000 pulses per revolution, 4000 pulses are counted in one revolution. The pulses are counted using several hardware counters. Time is measured to determine the actual speed.

5.1.1 Speed actual value sensing

The mode of operation of the speed actual value sensing corresponds to a **continuous average value generation** of the speed actual value over one sampling interval (4 ms). The measuring time end is directly before the end of the sampling interval, so that a minimum dead time is achieved. The **speed actual value resolution** for the MS340 angular synchronous control is, as a result of the measuring technique:

Rated speed / 16384 (rated speed corresponding to H012/H013).

At low speeds (i.e. no encoder pulses received within a 4 ms sampling time), the measuring time is automatically increased up to 4 sampling times (16 ms). A speed actual value of 0 is output, if no encoder pulses are received within this time interval.

The speed actual value sensing is adjusted (calibrated) using parameters H010 to H013.

$$\text{Speed act. value in \%} \quad \frac{\text{Pulses (*4) per meas. interval}}{\text{Measuring interval}} * \underbrace{\frac{100\%}{\text{Enc. pulse No. (*4)} * \text{rated speed}}}_{\text{Normalization factor}}$$

The **speed/position sensing** can be parameterized using parameters H018 and H019:

- filter time constant of the digital filter for track signals (A, B, syn) for encoder type 0:
  encoder pulses shorter than the specified filter time, are suppressed
- pulse encoder type
  pulse encoders with 2 tracks shifted through 90° and if required, zero pulse and synchronizing signal or Sony pulse encoder (separate tracks for the forward and reverse track); also refer to Section 4.4 !
- rough pulse type:
  3 rough pulse types are possible (refer to the hardware description)
- direction-dependent synchronizing edge selection:
  no: Always synchronize to the positive synchronizing edge;
  i.e. different mechanical edges
  yes: for a positive direction of rotation (clockwise), synchronize to the positive synchronizing edge, and for a negative direction of rotation, synchronize to the negative synchronizing edge;
  but this is the same mechanical edge in both directions!
  Setting can only be selected for sensing 1 and 2 together

The following parameters should be set:

H No.	Significance	Explanation
H010	Encoder pulse No., SLAVE	No. of pulses (single) per revolution
H011	Encoder pulse No., MASTER	No. of pulses (single) per revolution
H012	Rated speed, SLAVE	Speed actual value, which is referred to 100%; i.e. the actual speed which is actually achieved for 100% setpoint
H013	Rated speed, MASTER	Speed actual value, which is referred to 100%
H018	Encoder type, SLAVE	Operating mode of the speed sensing (pulse source etc.)
H019	Encoder type, MASTER	Operating mode of the speed sensing (pulse source etc.)

Table 5.1.1.: Speed actual value sensing parameters

Note:

Parameters H010 to H013, H018 and H019 are initialization parameters; i.e., after these parameters are changed, **the converter must be powered down and up again** so that the changes are transferred.

SIMOVERT SC:
Because of an interchanging of tracks A,B while transfering them from CU3 via LBA to T300 the slave drive

a**) either has to be configured with negative rated speed** (H012)
(observe the selection of the active syncronizing edge; refer Sec. 5.1.4!)

b) or tracks A,B have to be rertrieved from CU3 connector X102 and fed to SE300 (ref Sec.4.4.4)!

Master rated speed (H013) and rated system frequency (or -speed):

P420: CU2,CU3

P352,P353: CUVC,CUMC

If the master setpoint for the slave is retrieved from the encoder pulses of the master (H070=3), the master rated speed (H013) and the rated system frequency (or -speed for SC,MC) **P420**; **P352**,**P353** must be parameterized so that they are correct and harmonized with one another!

Example *for SIMOVERT VC (2-pole induction motor):*
For a master actual frequency of 25Hz, which corresponds to half the rated frequency/speed, the (master)setpoint of the slave should also be 25Hz (also half the rated slave frequency);
H013 = 1500RPM (corresponding to 50Hz);
thus, the following is true: d015=50%;
This 50% (for ratio Ü=1.0) is transferred as setpoint to the basic board via the dual port RAM;
a setpoint of 25Hz is obtained with the rated slave-system frequency P420=50Hz; P352=50Hz.

Rated speeds of the master and slave are also required for the actual speed display (d014, d015) in addition to master setpoint generation. Thus, an incorrect setting is only effective here.
The sign (polarity) of the rated speed must be correctly parameterized, so that the position and position difference calculations are correct!

5.1.2 Position actual value sensing

The position actual values from the master and slave are required to determine the offset. For the position actual value sensing, the encoder pulse edges are counted and output at output YP1 (pulse number, slave) or YP2 (pulse No. master) of the SACT function block. The position actual values are sensed using a 32-bit counter. Thus, a maximum pulse number $\pm 2^{**31}$ = ± 2 147 483 648 quadrupled pulses are possible. For parameter display and enabling the synchronizing signals (also refer to Section 5.1.4), the 32-bit values are converted into 16-bit values. This conversion is set as standard, so that the least-significant 16 bits are selected (H104, H106 = 16); i.e., +/- 32768 pulses can be represented.

The actual position actual value is set to 0 (refer to Section 5.1.4), after the enable threshold (H105,H107) has expired, using a **synchronizing pulse** (e. g. zero pulse) at the appropriate input for

slave: CU : X103/terminal 38 (CU2); X103/terminal 26 (CUVC) (or to SE300/terminal 535) or
master: SE300/terminal 545

d No.	Significance	Explanation
d016	Pos. actual value, SLAVE	Display parameter, No. of pulses (*4) (16-bit value)
d017	Pos. actual value, MASTER	Display parameter, No. of pulses (*4) (16-bit value)

Table 5.1.2.: Parameters for position actual value sensing

Note:
In order that the position actual values do not overflow, a synchronizing pulse must be generated, at the latest after 2^{**31} quadrupled pulses, so that the position is reset. If this is not the case, a subsequent synchronizing operation could be erroneous.

5.1.3 Position difference sensing

For the position difference sensing, the difference between the master- and slave drive pulses, weighted with the pulse number ratio, are summed. The position difference actual value is defined as:

Position diffference = Number of slave pulses (*4), which the slave leads with respect to the master

$$\text{Position difference [pulses]} = \Sigma\,(\text{slave pulses} *4 - \frac{NM}{DN} * \text{master pulses}*4) \qquad - \text{correction value}$$

Thus, the **pulse number ratio** $ü_p$ is the quotient of NM and DN; i.e., the pulse number ratio between the slave and master drive. It is automatically calculated from the speed ratio and the encoder pulse numbers from the master- and slave drives. It can be displayed using parameters d045 (NM) and d046 (DN). The pulse number ratio $ü_p$, set by the ratio of NM to DN, is maintained, independent of rounding-off errors (e.g., for NM=2000 and DN=6000, the pulse number ratio = 1:3 = 0.33333333....).

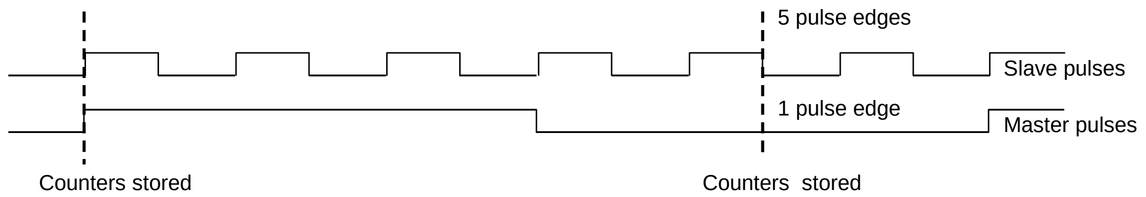
For synchronizing, a value (generally +/- H093), calculated from the offset determination, is added to the position difference, so that the angular controller is forced to correct the entered position difference. The correction value is zero without synchronization or when in the synchronized status.

A 32-bit counter is used to sense the position difference. The maximum position difference which can be sensed **+/- 2^{31} pulses** (quadrupled). For parameter display and the angular controller, the 32-bit value is converted into a 16-bit value; i.e. +/- 32768 pulses difference can be represented. For a higher difference, the 16-bit value is limited.

d No.	Significance	Explanation
d094	Pos. difference actual value	Display parameter, No. of pulses (*4) (16-bit value)

Table 5.1.3: Parameters for position difference actual value sensing

For the position difference actual value sensing, it is important that the counters from the master- and slave sensing are simultaneously stored. However, there is still, especially for a pulse number ratio $\neq 1$, an uncertainty zone of several pulses:



<u>Ratio = 1</u>

	5 edges	-	1edge	=	4 pulse edges
Actual position difference:	4.5 pulses	-	0.75 pulses	=	3.75 pulses

<u>Ratio = 6</u>

Calculated position difference	5 edges	-	6 * 1 edge	=	-1pulse edge	A difference of up 6 pulses is possible
Actual position difference:	4.5 pulses	-	6 * 0.75 pulse	=	0 pulse	

Fig. 5.1.3: Explanation of the uncertainty zone when calculating the position difference

The highest accuracy is achieved for a pulse number ratio of 1:1 (also refer to Section 4.4.3).

<u>Note:</u> For unfavorable combination encoder pulse number (H10,H11) and ratio, this can result in restrictions regarding the accuracy of the pulse number ratio.
With H277=1 pulse number ratio can be adjusted by H275 and H276. (only up to version 1.5)

5.1.4 Offset sensing & synchronization

The position difference actual value is only determined using the pulse difference, which has occurred since reset of the position difference (the source is selected using H052). This is not a criterium to ascertain the relative position of the drives to one another!

An **offset calculation** is always executed, if the **relative position between two drives** must be sensed and controlled, **regarding their synchronizing pulses** (e. g. zero pulses). The source for reset/enable is selected using H090.
Synchronizing involves determining and correcting the offset. The synchronizing pulses are made to coincide (a possible selected offset reference value is taken into account).
Synchronizing may be required repeatedly , for instance, if the (pulse number-) ratio cannot be precisely entered (e. g. π), or if it has to be assumed, that encoder pulses are lost.

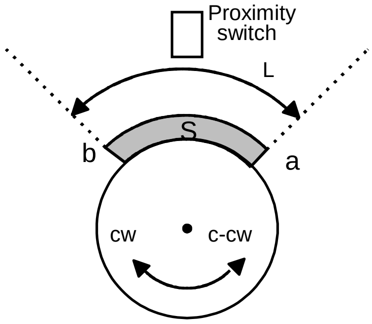
Synchronizing sequence:
If a synchronizing command is present (the source is selected using H251, e. g. terminal 605), and after at least one synchronizing pulse has occurred, for an offset actual value, which is <>0 or <> a selected offset reference value, then a "correction value", corresponding to H093, is added to the position difference actual value (SACT.YDP). Thus, the angular controller receives a control error, generated by the offset calculation, which it has to correct.
In order that this correction isn't too significant and so that overshoots are prevented, extremely low values should be set for this correction pulse number H093 (typically =1). In order to still correct an existing offset, which is greater than the value set in H093 (standard case), the correction pulse number is subtracted from the position difference actual value in each sampling time (4ms) until synchronism has been achieved.
If the angular controller is inactive, and starting from a position difference =0, the position difference actual value would have the same value as the offset actual value after n sampling cycles (n = offset/H093).

Once synchronizing has been started ("edge" of the synchronizing command) it is executed until synchronism is reached (the correction value becomes 0); it can not be interrupted.

The **offset is determined** using the position actual values from the master and slave, whereby the position actual values are set to 0 by the synchronizing pulses.

If ***no*** **"direction of rotation-dependent evaluation"** is set (**H018,H019 =0xxx**), then synchronizing is realized always at the rising edge of the synchronizing signal (or evaluation signal).
This is for example edge a of the cam in fig. 5.1.4 for a clockwise direction of rotation and edge b for a counter-clockwise direction of rotation.

For **"direction of rotation-dependent evaluation" (H018,H019 =1xxx**), synchronizing is realized in both directions of rotation at the same mechanical position (always edge a of the cam). It is always the rising edge of the synchronizing or evaluation signal for a clockwise direction of rotation and a falling edge for a counter-clockwise direction.



S=Switching cam, length L with edges a and b

cw: clockwise

c-cw: counter-clockwise

Fig. 5.1.4.: Offset determination and synchronizing for both directions of

Note for MASTER DRIVES SC:
If the slave encoder pulses are retrieved from the LBA, **tracks A and B are interchanged**. Although having clockwise rotation a counter-clockwise rotation direction is detected. That's why in both directions and with having "direction of rotation-dependent evaluation" synchronizing takes place at at edge b (fig. 5.1.4)! A negative rated speed value has no affect on the selection of the synchronizing edge! If this displacement error can not be tolerated, "**no direction of rotation-dependent evaluation**" in combination with direction of rotation-dependent offset reference value (ref. Sec. 5.6.2) has to be adjusted!

Offset actual value:

The offset actual value can be determined for the first time, when both synchronizing pulses occur (the synchronizing marks are "travelled over"). It can be determined in 2 ways:

H91 = 0 = **"continuous"** offset calculation:

As soon as the offset actual value has been determined once, i. e., both synchronizing marks have been travelled over once, an offset actual value is calculated each time **one** synchronizing mark is travelled over (this can be monitored using d094, d095). The number of synchronizing pulses travelled over is "counted", and is weighted with the **synchronizing pulse number**, i. e. the pulse number per revolution of the part to be synchronized (set H100 ... H103!). Thus, the actual offset can be determined, even if the associated synchronizing pulse of the other drive is still missing. If required, several revolutions of the machine component to be synchronized, are included in the offset actual value.
When synchronizing, **several synchronizing pulses which have been travelled over** ("revolutions") **are equalized**.
This mode should normally be selected (pre-assignment).

Note:
For rotary axis in the continuous offset calculation mode, erroneous offset calculation may occure if the axis is reversing. In this case the synchronizing pulses should be enabled only after certain position values master to slave. This means the „synchronizing enable threshold slave“ (H105) and the „synchronizing enable threshold master“ (H107) should be set on values corresponding to ¼ revolution.

H91 = 1 = offset determination within one synchronizing pulse period (”retrigger”):

When synchronizing, **correction is only realized within 1 synchronizing pulse which has been travelled over** (”1 revolution”).

The *”retrigger”* mode should be used,
1.) if it is sufficient, practical or even necessary for technological reasons, to only synchronize within 1 „revolution“, or

2.) if the synchronizing pulse number can only be determined with insufficient accuracy.
(in this case, both synchronizing pulses are required in order to determine the precise offset.)

3.) if positive and negative ratios and negative offset reference values might occur
(up to SW version 1.40, later on the synchronizing pulse number H100/H101 has to be set with positive values)

4.) if the synchronizing pulse are not cyclically, in general the case for linear axis.

To determine a new offset, both synchronizing marks must again be travelled over. The number of synchronizing marks travelled over is not ”counted”; the synchronizing pulse number should be set to 0. If an offset of several revolutions is to be obtained, then this is lost the next time the offset is determined.
In this mode, there is a danger, that the closed-loop angular control circuit could become unstable if the loop speed is set too fast and for low-frequency synchronizing pulses, because, it could occur, that when the two synchronizing pulses occur one after another, alternating positive and negative offset actual values could be determined, which the angular controller would attempt to correct (for example, from an offset of -370°, +10° would be obtained).

The **offset actual value** v_{act} is calculated according to the following formula:

$$\mathbf{v_{act}\ [pulses] = \phi_{slave}|_{t=Ts} - \ddot{u}_p{}^{*}\ \phi_{master}|_{t=Ts} + \Sigma S_{slave} * PR_{slave} - \ddot{u}_p{}^{*}\ \Sigma S_{master} * PR_{master}}$$

$\ddot{u}_p$ = NM/DN	=	Pulse number ratio (slave-/master)
$\phi_{slave/master}$	=	Position actual value, slave and master
$\Sigma S_{slave/master}$	=	No. of crossed-over synchronizing marks, slave and master
$PR_{slave/master}$	=	Synchronizing pulse No. = pulse number (*4) between two synchronizing marks, i.e per revolution of the machine components to be synchronized.
$t=T_s$	=	Sampling time instant, after a synchronizing signal has been received
$\Sigma S_{slave/master}$		is reset in the retrigger mode after each sensing

Information regarding synchronizing: Synchronizing could be erronous if these conditions are not maintained.
The time between two synchronizing operations may not exceed 2^{**31} quadrupled pulses
The time between two synchronizing operations must be > 16 ms.
The synchronizing signal must be inactive for T > 8 ms (i.e. low signal).

Examples:

a) Situation: Master- and slave drives, each with a pulse encoder mounted on the motor shaft, generate two pulse trains, shifted through 90° and a 0 pulse.

Task: The drives are to be synchronized, so that the zero pulses (synchronizing pulses) always occur simultaneously. This would look like the following when displayed on a suitable plotter or oscilloscope:

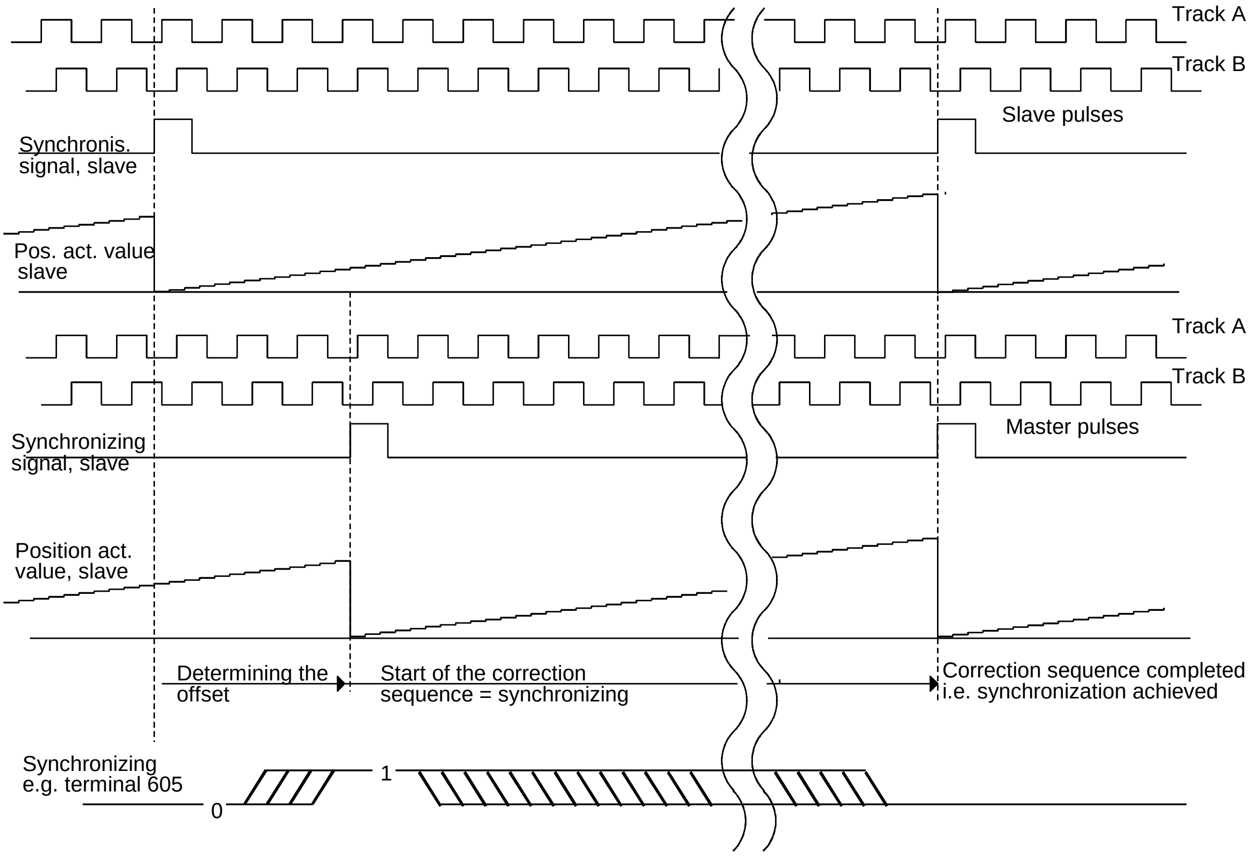
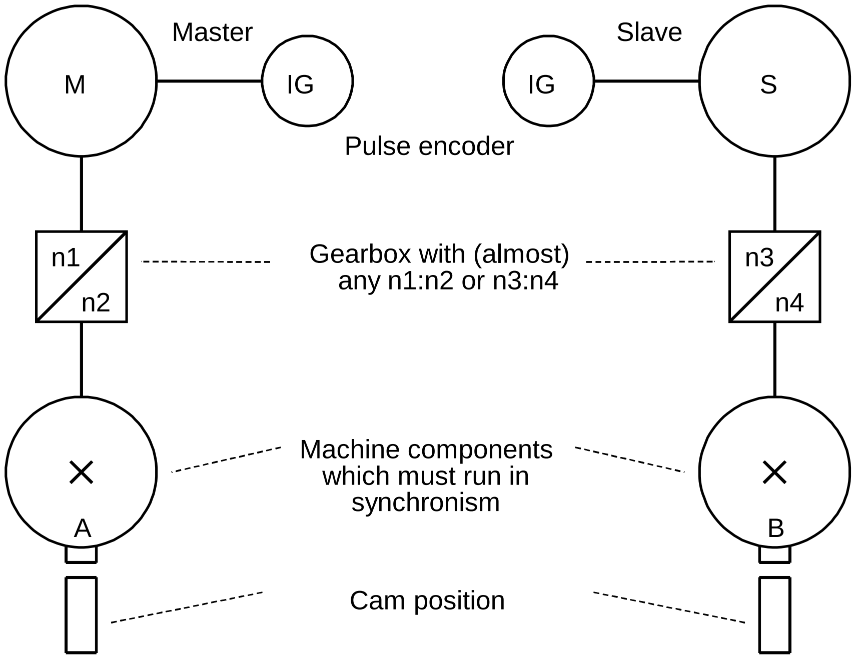


Fig. 5.1.4.a: Offset sensing and synchronization

b) Situation: Master- and slave drives, each with a pulse encoder mounted on the motor shaft, with two pulse trains, shifted through 90° and zero pulse

Task: The drives are to be synchronized, so that the synchronizing pulses - in this case cams - are always received simultaneously.



The following should be set:

- Setpoints:
  Relative speed ü = speed ratio = (n3:n4) / (n1:n2)
  Master speed = speed setpoint n1 of the master
- Parameters:
  Synchronizing pulse No., master H100/H101 = encoder pulse No. (*4) master * (n1:n2)
  Synchronizing pulse No., slave H102/H103 = encoder pulse No. (*4) slave * (n3:n4)

In this example, the closed-loop synchronous control must be parameterized so that components A and B run in angular synchronism. It is not necessary to establish synchronism between the pulse encoders (motor) of the master- and slave drives. Synchronism is realized by sensing the cam position.

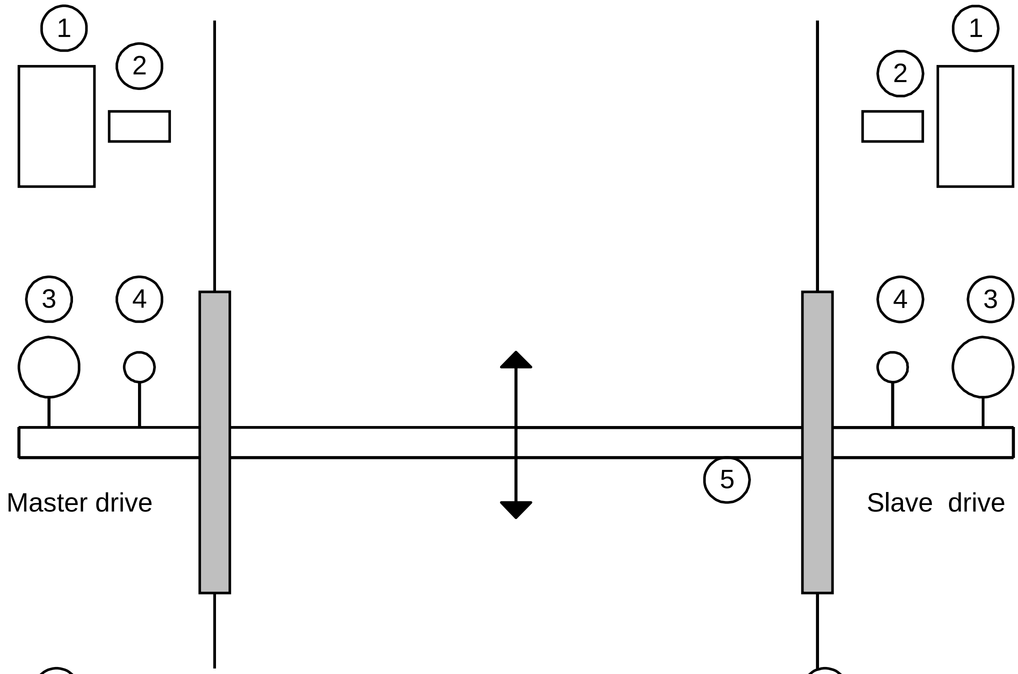
The speed ratio between components A and B may only be 1.1 (refer to example C).

c) Example as under b), however component A should rotate 3 x as fast as component B.

The following should be set:

- Setpoints:
  Relative speed ü = Speed ratio = (n3:n4) / ((n1:n2)***3**)
  Master speed = Seed setpoint n1 of the master
- Parameters:
  Synchronizing pulse No., master H100/H101 = encoder pulse number (*4) master * (n1:n2)
  Synchronizing pulse No., slave H102/H103 = encoder pulse No. (*4) slave * (n3:n4) / **3**

d) Synchronism and synchronization using a gantry crane as an example



1 Rough positioning signal, located on the crane track

2 Fine positioning signal mark

3 Rough position sensing signal, located on the traversing gear is fed to the synchronous control

4 Fine position sensing signal, located on the traversing gear is fed to the synchronous control

5 Crane gantry with master- and slave drives

6 Crane track

Purpose of the synchronization

Gantries are positioned transverse to the track. Synchronization is realized using permanent marks - rough- and fine positioning signals for both the master- and slave drives. A precise mechanical adjustment is not required due to the adjustment possibilities provided by the synchronous control. The pulse encoders are preferably mounted on the motor shafts.

The evaluation of the rough- and synchronizing pulse (fine signal) is described in Section 4.4.5.

5.2 Byte serial setpoint input

Bytewise setpoint input is the preferred technique for setpoint input via digital outputs of a master system, e.g. SIMATIC S5. The technique has the following advantages:

-The two setpoint bytes are output continuously. The software required in the master system is significantly simpler to generate as for hexadecimal or BCD setpoint input, as no request signals must be interrogated by the PT.

- Fast setpoint input with a minimum setpoint cycle time of approx. 40 ms is possible.

-Several PT boards can be controlled with a master system digital output board.

8 bits (i.e. 1 byte) of a 16-bit setpoint can be read-in in parallel via the binary inputs X6, terminals 611-618. The byte is identified as either low- or high byte as a result of the binary input signal level, terminal 608 (high byte enable). High- and low- bytes must be steady for the ”transfer time” which can be parameterized using parameter H033 (i.e. transfer time/4 ms consecutively), so that the value is transferred. The value read-in is assigned a specific setpoint via terminals 606 and 607.

The following parameters should be set:

No	Significance	Explanation
H030	Enable byte-serial setpoint input	1 = enable 01 = inhibit
H033	Transfer time for one byte	min. 8 ms max. 256 ms

Table 5.2.a: Parameter for byte-serial input

Terminal 606	Terminal 607	Selected setpoint	Explanation
0	0	None	
0	1	Speed master setpoint	min. -200 % max. 199.99 %
1	0	Displacement setpoint	min. -32768 max. 32767 pulses
1	1	Relative speed (ratio)	min. -16.384 max. 16.3835

Table 5.2.b: Explanation of the setpoint selection using binary inputs

Notes:
Byte-serial input and numerical thumbwheel input cannot be simultaneously used.
Inching is not effective for byte-serial input (H030=1).

5.3 Thumbwheel switch - setpoint input

The **thumbwheel switch setpoint** is generated from a **4-digit thumbwheel switch,** controlled via binary inputs and outputs, **BCD** or **binary** coded, and is transferred as ratio or as offset setpoint, when the transfer key is depressed.

The thumbwheel switch value which is read-in (without taking into account the positions after the decimal point), is referred to the value defined using parameter H031- normalization factor; i.e., using the normalization factor, it is defined which thumbwheel switch number should correspond to an offset setpoint of 16384 (100%), quadrupled pulses or a ratio of 8.1920 (100%):

$$\text{Switch output Ydec} = \frac{\text{Thumbwheel switch value} * 16384}{\text{Normalization factor H031}}$$

Refer to Figure 2 in the Appendix for the block diagram;
connecting-up diagram, refer to Section 4.2.2.

Each setpoint change is **automatically stored**, so that when the voltage is powered-up again, the last selected setpoint is available and is active.

The following parameters should be set:

No	Significance	Explanation	
H030	Enable thumbwheel switch input	2 = enable	≠ 2 = inhibit
H031	Normalization factor	16384 8192	for offset setpoint *) for ratio
H032	Thumbwheel switch coding	0 = binary	1 = BCD

Table 5.3.: Parameters for the thumbwheel switch setpoint input

*) When entering the offset setpoint, if a different value is to be set than the pulse number at the thumbwheel switch, then the value, which corresponds to 16384 quadrupled pulses should be entered as normalization factor.

Example:
Offset setpoint should be able to be set in degrees; 360 ° = 1 revolution of the machine part
Slave pulse encoder - (following) drive with 1000 pulses per revolution,
4-digit thumbwheel switch, 1 position after the decimal point Þ numerical value for 360.0 ° = 3600
Gearbox with 1:2 ⇒ 2*1000 pulses per machine revolution
Pulse quadrupling ⇒ 2*1000*4 = 8000 pulses per machine revolution
Normalization factor = 16384 pulses *3600/8000 pulses = 7372.8 = 7373

Notes:
Byte-serial input and thumbwheel switch input cannot be simultaneously used.
The resolution is reduced to 0.001 when the thumbwheel switch is used to set the ratio (for the setting value).

5.4 Setpoint inputs via the USS interface

Up to two 16-bit values, which are received via an USS interface of the basic drive converter (CU), can be fed to the T300 by using the **basic drive converter technology controller** (which is then no longer available for other applications).

They can then be used as setpoints on the T300 (refer to the following Section)
- master speed
- ratio (absolute value)
- percentage change in the absolute ratio
- inertia compensation
- offset

5.4.1 CU2,CU3

The basic drive converter technology controller should then, for example, be set as follows:

1. Using the setpoint channel:
   P526.01 = 20xy or 60xy xy: Word in the USS telegram
   P694.09 = 529 the 9th word in the dual port RAM is assigned

2. Using the actual value channel:
   P531.01 = 20xy or 60xy xy: Word in the USS telegram
   P694.10 = 534 the 10th word in the dual port RAM is assigned

5.4.2 CUVC,CUMC

The receive connectors of the USS interface can be directly transferred to the dual port RAM.

P734.09 = 20xy or 60xy xy: Selected word from the appropriate USS telegram (SST1, SST2) with which the 9th word is assigned in the dual port RAM.

P734.10 = 20xy or 60xy xy: Selected word from the appropriate USS telegram (SST1, SST2) with which the 10th word is assigned in the dual port RAM.

5.5 Closed-loop speed control

5.5.1 Ratio (absolute value)

The ratio ü between master and slave drive is defined as follows:

$$\text{Ratio ü: } = \frac{\text{Speed, SLAVE}}{\text{Speed, MASTER}}$$

Ratio ü is the ratio between the slave drive speed referred to the master drive speed.

Example:	Master drive speed:	n_M = 1710 RPM
	Ratio:	ü = 0.7
	-> Slave drive speed:	$n_S = n_M$ * ü = 1710 RPM * 0.7 = 1197 RPM

The ratio can be set in steps of 0.5 * 10^{-3} , this means:

Resolution of the ratio	= 0.0005
Ratio range	= -16.3840 to 16.3835
Internal ratio notation	= 1.0 = 2000 dec = 7D0 hex
Internal rated value (=16834 dec = 4000 hex)	= 8.1920

Notes:
A so-called ”**pulse number ratio**” is calculated from ratio ü and the encoder pulse number. For uneven encoder pulse numbers, under certain circumstances, the pulse number ratio regarding the value range and/or resolution may not be able to be maintained (refer to Table 4.4.3).
It should be noted, that the representable **value range** (a 2-byte quantity), for the technology board, is limited to +/- 1.99 * nominal value. This means, for example, that the maximum representable speed is 1.99 x rated speed as configured with **H012,H013** and **P420 (CU2,CU3) P352,P353 (CUVC,CUMC)**
Up to SW version V1.40 a negative ratio ü in combination with a negative offset setpoint value and H091=0 is allowed only if the synchronising pulse number MASTER (H100,H101) is configured negative (example refer Sec. 5.7)! From Version 1.5 the problem is solved.

The ratio can be entered from following sources (selected using H040):

H040	Ratio of	Explanation
0	Serial interface	Setpoint No. 6
1	Binary input, byte-serial	Inputs term. 601-605, 608 Selection for term.606=term.607=1
2	Binary input with thumbwheel switch	Inputs term. 611-615 Outputs term. 631 -634 normalization factor: H031=8192
3	Parameter H041 or Paramerter H042	for term.617=0 or for term.617=1
4	**Parameter H043**	**Pre-assignment**
5	Fixed value 1.0	
6	Word 9 of the basic drive converter (P694.9: CU2,CU3; P734.9: CUVC,CUMC)	E. g. value from the USS interface of the CU
7	Word10 of the basic drive converter (P694.10: CU2,CU3; P734.10: CUVC,CUMC)	E. g. value from the USS interface of the CU

Table 5.5.1: Possibilities of selecting the ratio

The ratio can also be entered via **analog input 4** (terminal 507, 508 (ground)). In this case, **H048 must be set to 4** (refer to Section 1.5.2) and the required setting range, specified using H043, e. g.:

H043 (examples)	**Ratio from the analog input** for a voltage from 0V to 10V:
0.1	0 ... 0.4
1.0	0 ... 4.0
2.0	0 ... 8.0

Making a change from an initial value:
Further, a fixed ratio value can be set using **H047**, to which the product of the sources, set with H040 and H048, is added.
Thus, the ratio, starting from a base value (H047) can be changed, e. g. using analog input (H048=4).
(Refer to Section 5.5.2 when selecting the analog input.)

5.5.2 Percentage change in the ratio

A ratio entered as absolute value can be changed in a range from 0 to +/-200% and in 0.0061% steps, in order to for example, easily set stretch- and shrink ratios.
The (absolute) ratio, set using H043, is multiplied with a (0...+/-200%) value, which is supplied from a source, set using H048. When this factor reaches 100%, the selected ratio is not changed.

H048	Percentage change of the ratio from:	Explanation
0	Serial interface	Setpoint No. 4
1	Binary input, byte-serial data entry	Inputs terminals 601-605, 608 Selected for terminal 606= terminal 607 =1
2	Binary input with thumbwheel switch	Inputs terminals 611-615 Outputs terminals 631-634 Setting the normalization: H031
3	Parameter H041 or parameter H042	If terminal 617=0, If terminal 617=1 Caution: In this case, the entered decimal number corresponds to a percentage value (100% instead of 1.0)
4	**Parameter H049**	**Pre-assignment =100%** (no change)
5	**Analog input** 4 (terminals 507/508)	5V corresponds to 100%, i. e. no change; 10V correspond to 200%, i. e. the selected ratio is doubled
6	Word 9 of the basic drive converter (P694.9: CU2,CU3; P734.9: CUVC,CUMC)	E. g. value from the USS interface of the CU
7	Word10 of the basic drive converter (P694.10: CU2,CU3; P734.10: CUVC,CUMC)	E. g. value from the USS interface of the CU

Table 5.5.2: Possibilities of selecting a percentage change in the ratio

5.5.3 Master speed setpoint and speed setpoint

The **master** speed setpoint is the setpoint at which the master drive should run. The ”speed setpoint” for the slave drive is calculated from the master speed setpoint after smoothing (H072) and after multiplying it with the ratio. This is then fed to the speed controller. The closed-loop angular control on the T300, as higher-level controller to the speed controller, must then only correct the signal.

The following sources are possible for the **master speed setpoint** (selected with H070):

H070	Master speed setpoint from	Explanation
0	Communications board, word2	CB1/CBP (PROFIBUS) or SCB1/2
1	Analog input 1	Terminal 501 / 502 adapted with H071
2	Binary input, byte-serial	Terminal 611 - 618 selected for term.606=0, term.607=1
3	**Speed actual value, MASTER drive**	**Pre-assignment** Master pulse encoder at SE300 terminals 541-547. *It should be noted, that H013 and P420 (CU2,CU3); P352,P353 (CUVC,CUMC) have to be configured correctly!*
4	Peer-to-peer protocol on T300, word2	Pre-set: 38400 baud, 4 words
5	Parameter H073	Pre-assignment =0%
6	9th word of basic drive (P694.9: CU2,CU3; P734.9: CUVC,CUMC)	e.g. USS interface of the basic drive (CU)
7	10th word of basic drive (P694.10: CU2,CU3; P734.10: CUVC,CUMC)	e.g. USS interface of the basic drive (CU)

Table 5.5.3: Possibilities of selecting the master speed setpoint

The setpoint smoothing (in ms) is set using parameter H072, which is especially recommended for the setting H070=3.

The actual setpoint smoothed can be displayed with d074 (value without ratio), or with d136 (value after the multiplkation with the ratio).

Notes:
If the angular controller (or synchronizing) are used, the slave master setpoint may only be changed with respect to the master, **using ratio ü**! This is because the speed, and therefore the angular differences can only be taken into account by the angular controller for appropriately set ratios which are known to the position sensing. An absolute angular difference, occurring at a specific ratio, no longer appears in the position difference value, so that the angular controller must not attempt to correct it.
H075 - Delay, master setpoint : If both a master setpoint as well as an off3 command from a SIMOVERT MASTER DRIVES drive converter is generated and sent, together in a telegram to the slave via a serial interface (e. g. T300 peer), then the master setpoint is immediately 0 if an off3 command is present. As the master setpoint is coupled to the basic drive converter faster than the off3 command, the basic drive converter immediately identifies that the setpoint has been changed to 0, which could lead to a DC link overvoltage fault! In order to prevent this, the master setpoint must be coupled to the basic drive converter in the same time sector as the off3 command (T2=16ms).

5.5.4 Inertia compensation

Using the "inertia compensation" function for fast master speed setpoint changes, the resulting control deviation of the angular synchronism is reduced. The inertia compensation acts as feed-forward signal for the speed controller. When required this should be set in the basic drive converter as supplementary torque setpoint: **P506=3008**

T300 offers the following sources for **inertia compensation** (selected using H080), which is then transferred to the basic drive converter:

H080	Inertia compensation from	Explanation
0	Communications board, word7	CB1 (PROFIBUS) or SCB1/2
1	Analog input 3	Terminal 505 / 506 Adapted using H081
2	**Differentiation, speed setpoint**	Pre-assignment Time constant with H082 Adapted using H083
3	0	No inertia compensation
4	0	No inertia compensation
5	0	No inertia compensation
6	9th word of basic drive (P694.9: CU2,CU3; P734.9: CUVC,CUMC)	e.g. USS interface of the basic drive (CU)
7	10th word of basic drive (P694.10: CU2,CU3; P734.9: CUVC,CUMC)	e.g. USS interface of the basic drive (CU)

Table 5.5.4: Possibilities of selecting the inertia compensation-setpoint

The parameters to be set to differentiate the speed setpoint have the following significance:

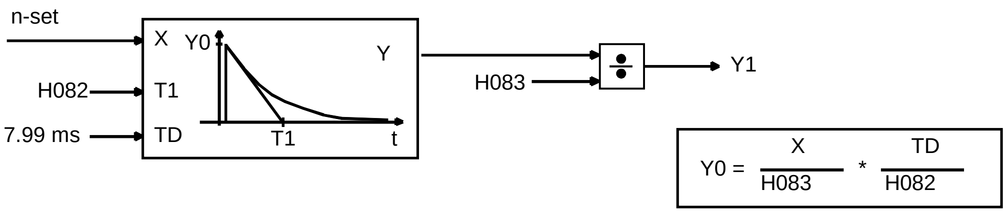


Fig. 5.5.4: Differentiation step

Setting:
Generally, T1 lies in the range between 100 and 500 ms. The magnitude of the output quantity of the differential element is set using H083. The values for parameter H083 are generally between 1% to 10%.

5.5.5 Inching

An inching setpoint (1 or 2) is **added to the master setpoint** on the T300, if the inching 1 or inching 2 command is entered. Thus, the slave speed can be changed with respect to the master speed very simply and briefly. Thus, slack take-up or slack-off with respect to the master can be easily implemented. However, **inching is not practical for operation in the angular control mode**, as the angular controller opposes the inching setpoint.

Inching setpoints 1 and 2 are set using parameters H130 and H131.
The source is selected using H249 (for inching1) and H250 (for inching2).

5.5.6 Speed controller, Kp adaption

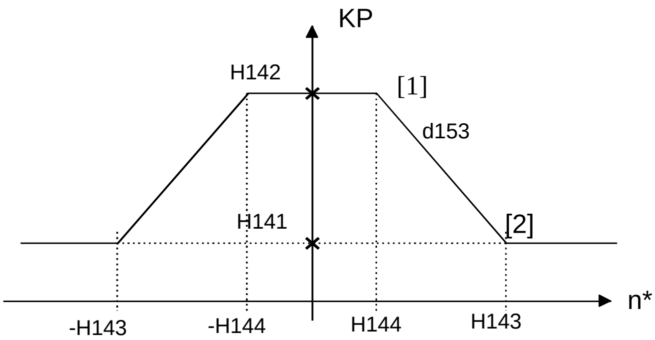
5.5.6.1 CU2,CU3

The basic drive converter speed controller is a PI controller. For very **low speeds** (n* < approx. 2% to 5%), it is recommended, to provide a **speed-setpoint dependent** adaption of the P gain, which can be implemented on the T300 with an adjustable polygon characteristic.

CU2: If adaption is required, **P226 must be set to 3006** in the basic drive converter.
CU3: Adaptation not possible.

The resulting Kp is the product of P225 and this value retrieved from T300.

The characteristic is linearly interpolated between the transition points (e. g. [1] and [2]):



H141 = KP (Connector B2 from PLI2)
H142 = KP_0 (Connector B1 from PLI2)
H143 = n_KP (Connector A2 from PLI2)
H144 = n_KP_0 (Connector A1 from PLI2)

if adaption is not required:
H143 = H144 = 0;
H141 is effective

Fig. 5.5.6: P gain adaption

No.	Significance	Explanation
H141	**KP**: P gain at **high** speeds n > n_KP	If adaption is required, parameters H142 to H144 must be set
H142	**KP_0**: P gain at low speeds	
H143	Speed n_KP, from P gain = KP	
H144	Speed, n_KP_0, up to P gain = KP_0	
d153	actual gain KP	display parameter

Table 5.5.6: Parameters for speed controller setting

The adaption values should be determined using the usual techniques or empirically:

a) Starting from the standard setting (no adaption), the lowest speed should be determined, where the already optimized drive still has the required control quality.
b) Then, for n_KP_0, the value n_KP_0 is approx. set to = n_KP/2.
c) Approach the speed, as entered under b), and then optimize with KP_0 closed-loop control.
d) The KP_0 and n_KP_0 values may still have to be varied.

5.5.6.2 CUVC,CUMC

The following parameters must be permanently set on the T300:

H144=0%; H143=199,9%; H142=0 and H141=255,9.

The KP adaptation is then set in the basic drive (P233,P234,P235,P236)

For the procedure, refer to the CUVC and CUMC block diagrams (Compendium), Sheet 360:

The values for the adaptation should be determined using the usual techniques or experimentally:

a) Starting from the standard setting (no adaptation), the lowest speed should be determined where the required control quality is still evident for an already optimized drive

b) Then, for n_KP_0, approximately the value n_KP_0 = n_KP/2 should be determined

c) Approach the speed, entered under b), and then optimize the control with KP_0.

d) The values for KP_0 and n_KP_0 must, under certain circumstances, still be varied.

The effective KP can be read at parameter r237, basic drive.

5.6 Angular control

Angular synchronous control is when a speed control is cascaded with a higher-level angular controller. The angular controller corrects the angular difference, which is obtained due to the different loading and control of speed fluctuations between the master- and slave drives, to zero or an offset reference value. The angular controller generates a supplementary speed setpoint at its output. The block circuit diagram of the angular control is illustrated in Fig. 4 of the Appendix.

5.6.1 Enable signals

1.) The angular controller is enabled via the source, which can be set using **H252** (e. g. terminal 601).
2.) **Parameter H052** is used to select when the position difference actual value sensing is reset and enabled. If the actual value sensing is not enabled, the position difference actual value is set to the setpoint (0 or the set offset reference value).
3.) For the setting H257 = 0, the angular controller output is no longer sent as supplementary setpoint value2 to the basic drive converter, if an OFF signal is present in the drive converter and the ramp-function generator is inactive (drive has ramped-down to frequency 0).
Thus, this prevents the drive rotating in spite of an off command and master setpoint =0 if the angular controller output is greater than the ”off-shutdown frequency” from the basic converter.
The supplementary setpoint is not disconnected for setting H257 = 1.

5.6.2 Offset and direction of rotation-dependent synchronization reference value

An offset of the relative angular position between the master- and slave drive can be set using the offset reference value. If synchronization is not realized, the offset reference value is referred to the angular position of the drives at the instant that the position difference actual value was last set (angular controller enabled). If synchronizing is realized, the offset reference value is referred to the synchronized angular position.

The offset reference value is defined as the number of encoder pulses (*4) from the slave, by which the slave drive should lead the master drive. The offset reference value should be a maximum of +/- 32768 encoder pulses (*4). The limits can be adjusted with H054, H055.

Examples: Encoder pulse number, slave = 1000 (encoder on the drive)
1) The slave drive should lead the master by 0.5 revolutions
⇒ Offset reference value = 0.5 * (1000 * 4) = 2000 pulses
2) Maximum offset reference value = 32768 / (1000 * 4) = 8.192 revolutions

The offset reference value is fed to the angular controller via a ramp-function generator. The ramp-up time is the time, in which the reference value changes by 16384 pulses (*4). The ramp-up time should be selected to be as high as possible (recommended: 5-10 seconds; generally not less than 1 second).

Notes:
In the mode, ***offset sensing = retrigger (H91=1)***, the maximum offset reference value may only be half of a revolution of the component to be synchronized*!*
Up to SW version V1.3 In the mode ***offset sensing = continuous (H91=0)*** a negative ratio in combination with a negative offset setpoint value is **not allowed** **Up to SW version V1.40** a negative ratio ü in combination with a negative offset setpoint value and H091=0 is allowed only if the synchronising pulse number MASTER (H100,H101) is configured as a negative value (example refer Sec. 5.7)! **From SW version V1.5** this problem is sloved
Note(from V1.6): If the value range of the offset setpoint (*/- 32768) is not sufficient (exceptional cases), then this can be increased using H270 (H270 as exponent to the power of two). In this case, it must be expected that the accuracy (resolution) is reduced

The following sources are possible for the **offset reference value** ds*:

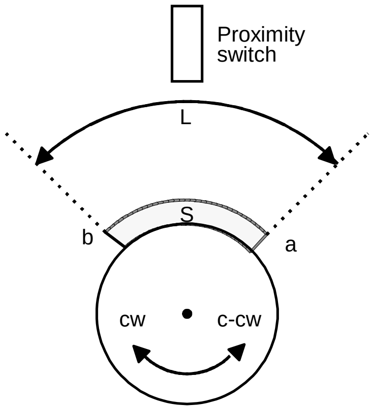
H050	Displacement reference value from	Explanation
0	Communications board, word5	Reference value No. 3
1	Analog input 2	Terminal 503 / 504 and H051
2	Binary input, byte-serial	Terminals 601 - 608 Selection for 606=1, 607=0
3	Binary input with thumbwheel switch	Inputs Terminals 611-615 Outputs Termnals 621-624 Normalization factor: H031 = 16384
4	Word 9 of the basic drive converter (P694.09: CU2,CU3) (P734.09: CUVC,CUMC)	E. g. value from the USS interface of the CU
5	**Parameter H066**	**Pre-assignment**
6	Parameter H060 for term. 618 = 0 Parameter H061 for term. 618 = 1	Not possible, (not permissible to select) for byte-serial input !
7	Word10 of the basic drive converter (P694.10: CU2,CU3) (P734.10: CUVC,CUMC)	E. g. value from the USS interface of the CU

Table 5.6.2.a: Possibilities of selecting the offset reference value

P-No.	Significance	Explanation
H051	Adaption, analog input	ds* [pulses] = H051 * 16 384 pulses * U [V] / 5 V
H053	Ramp-up time, offset reference value	
H054	Reference value limiting, positive	
H055	Reference value limiting, negative	
d056	Actual offset reference value	Display parameters
H060	Displacement reference value for terminal 618 = 0	Not for byte-serial input
H061	Displacement reference value for terminal 618 = 1	Not for byte-serial input
H062	- H065 Direction of rotation-	dependent offset reference value, refer below
H066	Fixed reference value	

Table 5.6.2.b: Parameters for the offset reference value

For **reversing** and wide synchronizing marks, synchronization is possible at different directions of rotation to **different "edges"** of the synchronizing signal.
Depending on the direction of rotation, a positive synchronizing edge appears at edge A as well as at B. However, the aim is that synchronization is always referred to one edge.



S = Switching cam, length L with edges a and b

For clockwise rotation, the system synchronizes to edge a, and for counter-clockwise rotation, to edge b.

L should be specified as pulse number (*4)

cw: clockwise
cw: counter clockwise

The speed actual value sensing of the T300 board can be parameterized, so that the synchronizing edge can always be selected, dependent on the direction of rotation. For example, for a positive direction of rotation, the positive edge is evaluated, and for a negative direction of rotation, the negative synchronizing edge. The "direction of rotation-dependent synchronization" selection can only be made together for the master- and slave drives. The setting is realized using parameter H018 and H019 (initialization parameters, explanation of the parameter setting, refer to Section 5.1.4).

For the case, that "direction of rotation-dependent synchronization" cannot be used, the length L of the switching cam must be stored in the software. This is realized using a direction of rotation-dependent offset reference value input, using parameters H062 to H065:

TP-No	Master speed	Slave speed	Value to be set	Offset (positive values)
H062	+	+	0	Slave lagging
H063	-	+	L_{slave}	Slave lagging
H064	+	-	$-ü_P*L_{master}$	Slave leading
H065	-	-	$L_{slave} - ü_P*L_{master}$	Slave leading

Table 5.6.2.d: Direction of rotation - dependent offset reference value

($ü_p$=pulse number ratio NM/DN refer to Sections 5.1.3 and 5.5.1)

5.6.3 Smoothing, position difference actual value

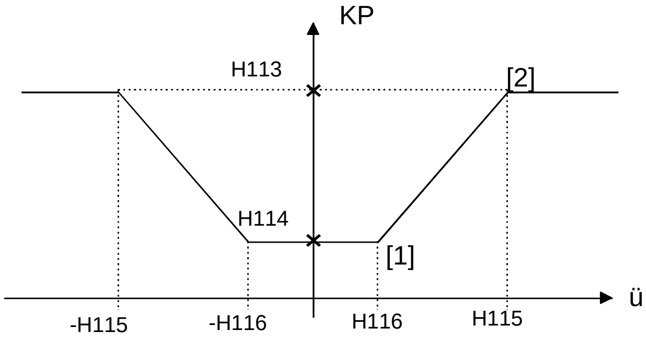
The position difference actual value (the 32 bit value converted to 16 bit), is smoothed using a PT1 element. The smoothing time is set using parameter H117.

5.6.4 Limit value monitor, position difference actual value

A limit value monitor for the smoothed position difference actual value can be set using parameters H201 and H202. When the limits are exceeded, this is signaled at binary output, terminal 638 and in status word, bit 11 (limiting effective = logical 1).

5.6.5 Angular controller

The angular controller has PI characteristics. However, generally it is only parameterized as P controller. If the ratio is to be changed in operation, by factors approximately >1.5 or < 0.75, P gain adaption should be used. This is implemented using a ratio-dependent setting of the P gain. There is a linear interpolation between the characteristic points [1] and [2]:



H113	=	KP	(connector B2 from PLI2)
H114	=	KP_0	(connector B1 from PLI2)
H115	=	ü_KP	(connector A2 from PLI2)
H116	=	ü_KP_0	(connector A1 from PLI2)

If adaption is not required:
H115 = H116 = 0;
H113 is effective

Fig. 5.6.5: P gain adaption

No	Significance	Explanation
H110	Angular controller as P controller (0 / 1 = no / yes)	(0 / 1 = PI / P controller)
H111	Integral action time TN	
H112	Positive and negative output limiting (as a % of the rated speed)	
H113	P gain KP or, if adaption is set P gain for high ratio ü > ü_KP	If adaption is required, parameters H114 to H116 should be set
H114	P gain KP_0 for low ratio	
H115	Ratio ü_KP, from P gain = KP	
H116	Ratio ü_KP_0, from P gain= KP_0	

Table 5.5.5.b: Parameters for angular controller setting

The adaption values should be determined using the standard techniques or experimentally:

a) Starting from the standard setting (no adaption), the highest ratio should be selected, this should then be entered for ü_Kp. and the control optimized using this value (Kp).

b) Then select the lowest ratio, enter this for ü_KP_0, and optimize the control for this value (KP_0).

Example: Ratio range: 0.2 to 4.0

H116	=	ü_KP_0	= 0.2
H114	=	KP_0	= 3
H115	=	ü_KP	= 4.0
H113	=	KP	= 5

5.7 Synchronization

Synchronizing has the task to **sense** and to **control** the **relative position** - the offset - between the drives. The position of the drives is sensed using a synchronizing pulse (zero pulse, proximity switch (BERO), contact,..).
The synchronizing corrects angular/position errors, which are not visible in the position difference (SACT.YDP), e. g. after the drives have been rotated when the drive converter is in a powered-down status.
A permanently available synchronizing command maintains synchronism when erroneous pulses occur or when the pulses fail completely.

Synchronizing, i. e. the correction of a possibly determined offset, is realized by activating a synchronizing command, whose source can be set using H251 (e. g. terminal 603).
For applications, which require no synchronizing, the synchronizing command must be inhibited.

Parameters **H052 and H090** are used to select, when the position actual value sensing and offset calculation are to be reset and enabled.

The synchronizing command can be parameterized for either signal level- or edge control, using H092. For signal level control, the offset is corrected for as long as the signal is active (logical 1); for edge control, correction is only once after a positive (0→1) edge. Offset correction is not suddenly realized, but is corrected by a pulse number, selected using parameter H093, in each sampling interval.

An **offset correction** of n 4 x pulses takes: 4ms(sampling time) *n / H093

No:	Significance	Explanation
H251	Source, ”angular synchronization”	
H091	Mode, offset actual value sensing	0 = cont. (refer to Section 5.1.4) 1 = retrigger
H092	Mode, synchronization request	0 = level controlled 1 = edge controlled
H093	Correction pulse number	Select lowest possible value (H093=1); Could be *greater* for faster syncronization for low-frequent sync-signals or if H091=1
d094	offset actual value (16 bit)	Display parameter
d095	offset act. value - pos. diff. act. val. (16 bit)	Display parameter
d096	offset actual value sensing, error ID: Bit 0 = overflow ΣS_{slave} Bit 1 = overflow ΣS_{master} Bit 2 = overflow ΣS_{slave} * (H103,H102) Bit 3 = overflow ΣS_{master} * (H101,H100) Bit 8 = overflow offset- - pos. diff. act. val.	Display parameter ΣS = sum of the synchronizing signals

Table 5.7.b: Parameter for offset sensing / synchronization

The number of pulse edges between 2 synchronizing marks must be entered to perfectly determine the offset actual value. This information is required to calculate the offset. A small deviation between the entered and actual pulse number does not negatively influence the calculation.

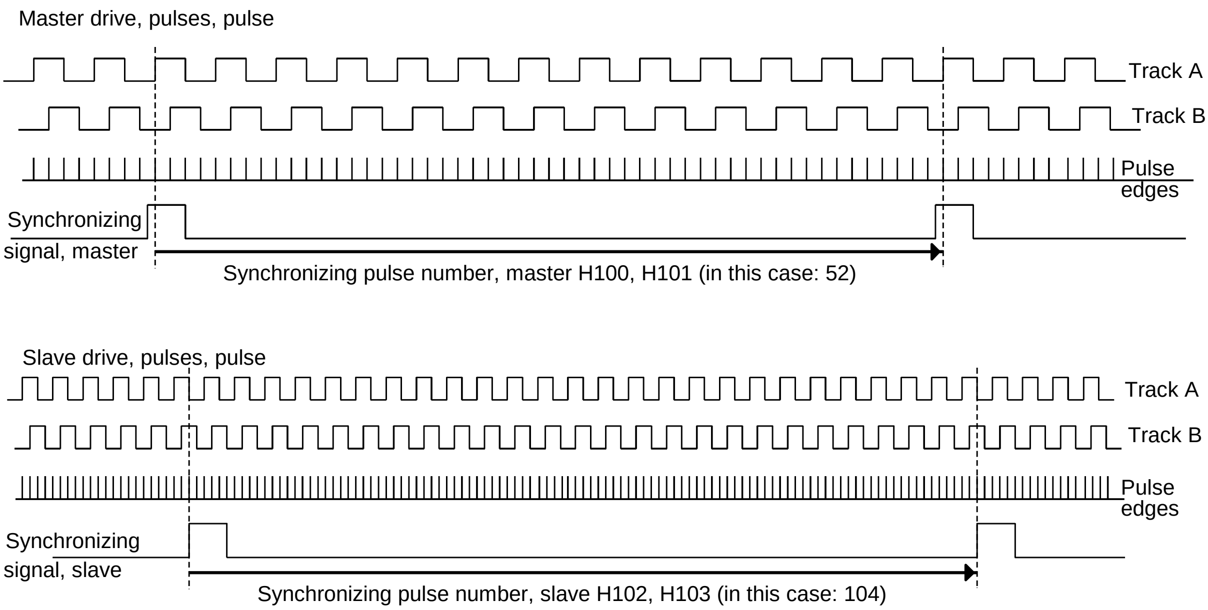


Fig. 5.7.a: Explanation of the synchronizing pulse number

This **synchronizing pulse number** is a 32-bit parameter, which is entered as low- and high word. If the pulse number (*4) is less than 32 767, only the low word must be entered (high word = 0). Proceed as follows, if it is greater than 32 767:

Divide the pulse number (*4) by 65 536   high word = integer number result (without rounding-off),
determine the rest: Rest = pulse number (*4) - high word *65 536
- Rest is less than 32 768:   Low word = rest
- Rest is greater than 32 767:   Low word = rest - 65 536 (is negative !)

No	Significance	Explanation
H100	Synchronzing pulse No., master low word	Pulse edges (pulse * 4) of the master drive which are received between 2 synchronizing marks
H101	Synchron. pulse No., master high word	
H102	Synchronizing pulse No., slave low word	Pulse edges (pulse * 4) of the slave drive, which are received between 2 synchronizing marks
H103	Synchronizing pulse No., slave high word	
d108	Synchronizing pulse No. master, **32bit**	for verify of H100-H103 input
d109	Synchronizing pulse No. slave, **32bit**	

Table 5.7.b: Parameters, synchronizing pulse number

Examples:

- Encoder pulse No., MASTER: 2000
- Encoder pulse No., SLAVE: 4000

Both encoders are mounted on the motors

a) Gearbox ratio: MASTER - motor : MASTER - drive axis = 1:1
Gearbox ratio: SLAVE - motor : SLAVE - drive axis = 1:1
Synchronizing pulse No. MASTER: 2 000*4 = 8 000 = H100 = (H101 = 0)
Synchronizing pulse No. SLAVE: 4 000*4 = 16 000 = H102 = (H103 = 0)

b) Gearbox ratio: MASTER - motor : MASTER - drive axis = 12.5:1
Gearbox ratio: SLAVE - motor : SLAVE - drive axis = 5:1

Synchronizing pulse No. MASTER: 2000*4*12.5 = 100 000
100 000 / 65 536 = 1.525.. = 1 = H101
100 000 - 1*65 536 = 34 464
34 464 is > 32 767:34 464 - 65 536 = -31 072 = H100

Synchronizing pulse No. SLAVE: 4000*4*5 = 80 000
80 000 / 65 536 = 1.22..= 1 = H103
80 000 - 1*65 536 = 14 464
14 464 is < 32 768:14 464 = H102

Adjusting a **negative synchronizing pulse No MASTER** (for SW-version V1.40, "B"):

H100/H101 has to be configured as a negative number, if a negative offset setpoint value has to be adjusted while having a negative ratio and H091=0.

A positive synchronizing pulse No is parameterized as a negative No as follows (check with d108):

$H100_{neg} = \mathbf{-}\ H100_{pos}$

$H101_{neg} = H101_{pos}\ \mathbf{-1}$

Examples (ref. above).:
synchronizing pulse No = - 40 000: H100 = 25536; H101 = -1
synchronizing pulse No = - 80 000: H100 = -14464; H101 = -2

5.7.1 Fail-save synchronization by means of enable threshold

The synchronization control is used to suppress bounce effects. In this case, disturbances/noise can only be suppressed to a certain degree.

A synchronization signal, caused by contact bounce or by noise can result in the following:

- inaccuracy (angular position)
- inversion of the control sense of the synchronization, as the rigid sequence of synchronizing pulses is interrupted (e.g.: master-, slave-, master drive). For a rotary motion, it means that the slave drive rotates, e.g. one revolution forwards or backwards.
- the slave drive operates without any control

Thus, the synchronizing signal cables should be carefully routed and screened (refer to Section 4.4).

The following diagrams describe the effects when bounce is present, and the counter-measures. Only one drive is illustrated.

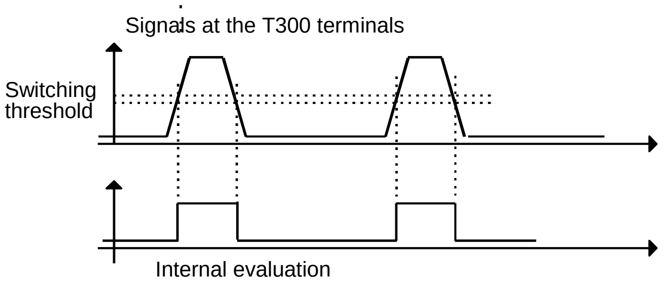
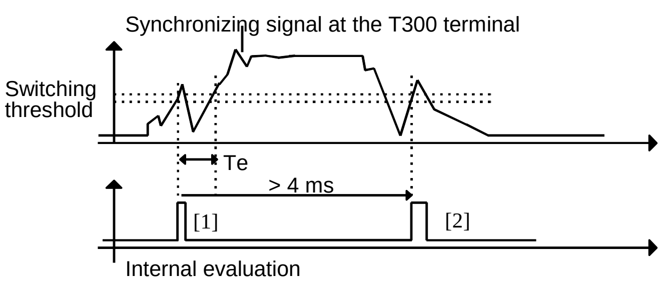


Fig. 5.7.c: Signal characteristic with steep pulse edges for example typical for zero pulses from pulse encoders

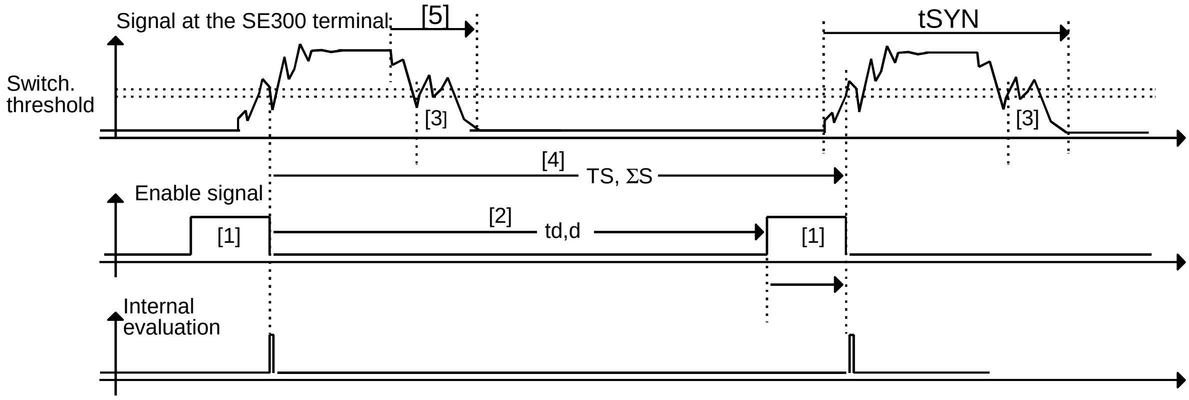


[1] At the first rising edge, the control system recognizes a synchronizing pulse. The effectiveness that the switching threshold has been exceeded again after Te (0 < Te < approx. 4 ms) is suppressed per hardware (after the first synchronizing signal, software must issue an enable signal).

[2] A new synchronizing pulse is simulated without any special measures. The software can again identify a synchronizing pulse after approx. 4 ms.

Fig. 5.7.d: Signal characteristics with an undefined voltage characteristic; typical for a proximity switch; Faults/noise occurring within 4ms (=sampling time) are automatically suppressed due to the processing in the sampling time!

Faults/noise and disturbances which occur (e.g. contact bounce) between 2 leading edges of the synchronizing pulses can be suppressed by entering an **enable threshold when a specific position actual value is reached**. The synchronizing pulses are only registered again after this **enable time td**, which can be separately set for the master- (H106, H107) and slave drive (H104, H105), has expired.



[1] Synchronization is enabled in this section (position actual value > limit value); the minimum duration may not fall below 12 ms, tmin = 12 ms

[2] Synchronizing pulse sensing is inhibited for time td (as the position actual value < limit value)

[3] Bounce is suppressed at this position

[4] TS = Time between two synchronizing operations (ΣS = number of pulses)

[5] Normally, bounce times are between 1 - 10 ms

Fig. 5.7.e: Effect of the enable control (only one drive shown)

Calculation of limit value of **enable time d** (H105, H107):
1.) For non-critical situations, the enable threshold can be set to approx. 95% of the synchronizing pulse number.
2.) If the synchronizing pulses are extremely noisy, or if there is a danger, that the above mentioned 12ms minimum enable duration cannot be maintained at high speeds and the highest possible enable threshold, then the enable threshold can be precisely calculated using the following formula:

$$\boxed{d = \Sigma S * \left(1 - \frac{12\text{ ms} + (0.05\text{ to }0.1) * TS}{TS} \right)}$$

d not negative !
d not < width of the synchronizing signal tSYN

ΣS = No. of pulse edges between 2 synchronizing pulses (Fig. 5.7.a)
TS = Time between two synchronizing pulses at maximum speed
tmin= 12 ms (configuring constant 3*4 ms)
Safety factor 0.05 .. 0.1

Limit value defines how many pulses must be counted (*4) after a successful synchronization (i.e. how high the position actual value must be) before the next synchronizing operation is enabled.
Limit value d - the **enable threshold** for the synchronizing signal - should be calculated for the master- and slave drives.

Information regarding synchronizing: Synchronizing could be erronous if these conditions are not maintained.
The time between two synchronizing operations may not exceed 2**^{31} quadrupled pulses
The time between two synchronizing operations must be > 16 ms.
The synchronizing signal must be inactive for T > 8 ms (i.e. low signal).

The **position actual values** are available as 32-bit values; they are converted into 16-bit values. If an enable threshold (refer below) ≥32768 pulses must be set, the position actual value conversion must be adapted with parameters H104 and H106. The precise conversion formula is:

$$\text{Pos. act. val. [16 bit]} = \frac{\text{Pos. act. val. [32 bit]}}{2^{**(16\text{-adaption})}} \quad \text{with adaption} = \text{H104 for slave drive and H106 for master drive}$$

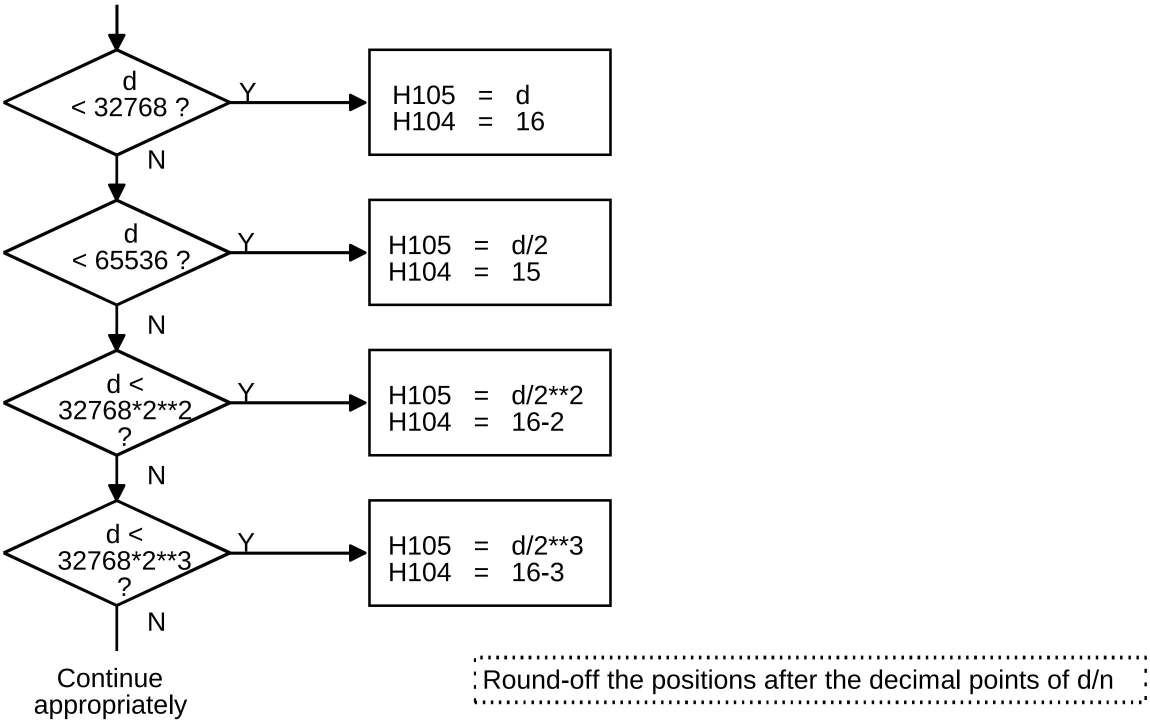


Fig. 5.7.f: Determining the enable threshold d for the slave drive
(proceed in an analog fashion for the master: H104 → H106, H105 → H107)

No	Significance	Explanation
H104	Adaption, position actual value slave	Value is an exponent to the power of 2 (2^{**X})
H105	Enable threshold of the synchronizing signal, slave	
H106	Adaption, position actual value, master	Value is an exponent to the power of 2 (2^{**X})
H107	Enable threshold of the synchronizing signal, master	

Table 5.7.g: Parameters for synchronization

If parameters H104 or H106 must be changed, it should be taken into account, that the 16-bit position actual values must be modified by a factor $2^{**(16\text{ -adaption})}$. This involves the following values: Analog actual value, enable threshold and display parameters d016 and d017.

Note:
The enable threshold must either - be greater than the synchronizing signal width or - be parameterized to 0. If enabling is realized while the synchronizing signal is active, the position actual value is reset; this can result in erroneous synchronization.

Example to enable timd td:

Given:
- the number of pulse encoder pulses between two synchronizing marks
  master drive = 21307 Slave drive = 6843
- time between 2 synchronizing marks at max. speed = 117 ms
  (always the same for master and slave)
- safety time = 0.1 * TS

Calculation, master drive:	Slave drive:
ΣS = 4 *pulse number	
4 * 21307 = 85228	4 * 6843 = 27372
$d = 85228 * (1 - \frac{12\ ms + 11.7\ ms}{117\ ms})$	$d = 27372 * (1 - \frac{12\ ms + 11.7\ ms}{117\ ms})$
d = 67964	d = 21827
H107 = 67964 / 4 = 16990	H105 = 21827
H106 = 14	H104 = 16

5.7.2 Increasing the noise immunity of the synchronizing pulse

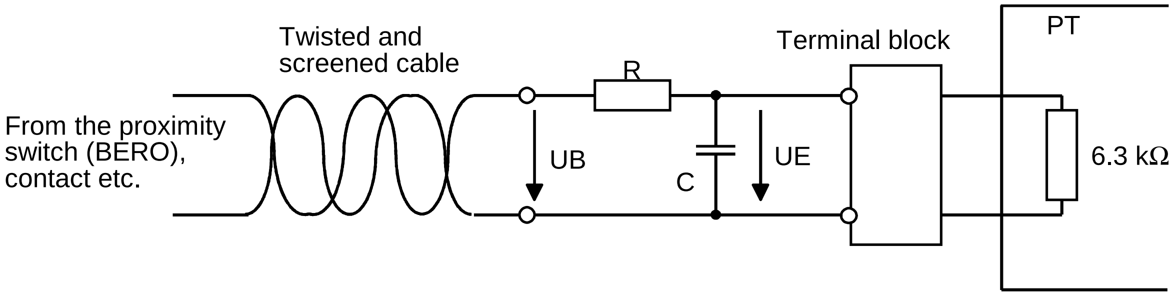
The *synchronizing control*, described in Section 5.7.1, is used to suppress contact bounce; disturbance/noise on the synchronizing pulse line cannot be suppressed with these measures. An RC-lowpass filter, with a smoothing time of 2 to 5 ms has proven itself to be effective in increasing the noise immunity.

Information regarding the RC element:
- the synchronizing signal must be sufficiently long with respect to the smoothing time.
- with different master- and slave drive speeds, low offset errors occur when the speeds vary.
- using an oscilloscope (smoothing time as described above), noise can be reliably identified after the RC element, as the synchronizing signal itself has a limiting frequency > 100 kHz, and noise in the 10 µs range is difficult to identify.
- the RC element can, for example, be mounted in a Phönix enclosure
  (Order No.: Enclosure EMG.50-89, cover: EMG50-H15).
- the capacitor used must have good HF characteristics.
  Recommended type: MKL, B32110, Siemens.

Dimensioning the RC element:

- Given: V_B, proximity switch output voltage, etc.
- Defined: V_E, PT input voltage
- $R = \left(\frac{V_B}{V_E} - 1 \right) * 6.3\ k\Omega$ (1) $C = \frac{T * (R + 6.3\ k\Omega)}{R * 6.3\ k\Omega}$ (2)

  When T is entered in ms and R is in kΩ (2), the result is in µF.



Example:

- Given: U_B = 23 V, T = 2 ms
- $R = \left(\frac{23\ V}{15\ V} - 1 \right) * 6.3\ k\Omega = 3.36\ k\Omega \approx 3.3\ k\Omega$
- $C = \frac{2\ ms * (3.3\ k\Omega + 6{,}3\ k\Omega)}{3.3\ k\Omega * 6.3\ k\Omega} = 0.9\ \mu F \approx 1\ \mu F$

5.7.3 Synchronism reached

The threshold for the synchronism reached signal (binary output, terminal 635) can be set using parameter H203.
Synchronism is achieved, if an offset actual value is determined, which is zero (or the direction of rotation-dependent offset reference value). Dynamic fluctuations of the angular difference, which are represented in the offset actual value, are taken into account in so much that the offset actual value is corrected by the angular difference actual value - conditioned offset actual value.

Thus, *synchronism reached* means: conditioned offset actual value = 0 ± H203

H100-H103 must be adjusted!

5.8 Open-loop control

The open-loop control of the angular synchronous software package and the basic drive converter can be set via T300 parameters (H216 - d261).
Control word bits, received from the T300, are used in the angular synchronous software package according to the actual parameterization. The control word bits used by the basic drive converter are transferred to the basic drive converter.
They must be appropriately set in the basic drive converter if they are actually used there (P554 to P590).

All binary control signals (controller enable signals, synchronizing command) can be simultaneously entered, independently of one another. Possibly required interlocking functions are made in the software (e. g. synchronization is only practical when the angular controller is enabled).

5.9 Faults, alarms, status displays

5.9.1 General information regarding faults and alarms

The standard software package permits an extremely flexible display and transfer of the internal statuses in the form of

- drive converter faults, F116 to F131,
- drive converter alarms, A097 to A112
- status bits, which are transferred via serial interfaces,
- status bits, which are signaled via SE300 terminals.

The type of output of the individual statuses is set via parameter (H212, H213, H218, H219), as well as the limit values, where a signal is to be initiated.

The basic drive converter is **fault-tripped**, if a bit is set in parameter d214, and with an appropriate enable with the H212 mask parameter (behaviour as for OFF2, i. e. the power is disconnected, the drive coasts down). The fault is stored on the basic drive converter.
As soon as the cause has been removed, i. e. the bit involved is 0, the fault can be **acknowledged** on the basic drive converter. Acknowledgement is not possible as long as a ”1” is transferred to the basic drive converter via the dual port RAM!
Alarms, are only displayed as numbers on the operator control panels. They do not influence the drive. They cannot be acknowledged, but instead they are automatically deleted once the cause has been removed and the appropriate bit becomes 0.

Bit	**Hex** value	**Fault** number	**Alarm** number	**Significance**
0	1	F116	A097	Overspeed, positive (H190)
1	2	F117	A098	Overspeed, negative (H191)
2	4	F118	A099	External fault from sources 1 to 3 (according to H254 to H256)
3	8	F119	A100	Angular controller at its limit (H112)
4	10	F120	A101	Telegram error, T300-peer (monitoring times: H208, H209)
5	20	F121	A102	Communications error, T300<->drive converter (no adjustable monitoring)
6	40	F122	A103	Communications error, T300<->CB1/CBP/SCB1,2 (monitoring times: H210, H211)
7	80	F123	A104	Anti-stall protection: Corresponds to the basic drive converter status bit 8 of status word 1 ”setpoint/actual value deviation”;
8	100	F124	A105	Slave speed actual value > H180
9	200	F125	A106	Slave speed actual value is within H182 ± H183
10	400	F126	A107	Slave speed actual value < H181
11	800	F127	A108	”Comparison frequency not reached” Corresponds to the basic drive converter status bit 10 of status word 1
12	1000	F128	A109	Control error, angular controller > H200
13	2000	F129	A110	”Speed actual value sensing erroneous” the correct pulse encoder connection should be checked and for cable interruption; master- or slave actual value deviate from the master setpoint by more than 10%. The monitoring only functions if the master setpoint is not taken from the master speed actual value and the ratio ist 1.
14	4000	F130	A111	Control error, angular controller < H200
15	8000	F131	A112	Angular difference outside H201<DY<H202 (measured in pulses *4)

5.9.2 Communications monitoring (F120, F122)

The communication blocks, which receive the telegrams from a communications board or the T300-peer-to-peer, check, in each sampling cycle, whether a valid (and error-free) telegram has been received, which is then signaled. These signals are counted using an integrator.
The integrator is reset if an error-free telegram has been received.
If the integrator limit value (corresponds to the selected monitoring time) is reached due to sufficiently long telegram failures, a status message is output, which, according to the fault mask (H212) can result in a fault trip.

In order to simplify the first start-up steps, and to eliminate irrelevant fault trips, the communications error (H212) is suppressed when the angular synchronous standard software package is supplied.

If a communications board or the T300-peer is used, the associated status bits to initiate a fault, must be re-enabled!

Initialization monitoring time:
After power-up, a time, which can be set with **H208** (T300-peer) or **H210** (communications board) is inserted, before the telegram is checked to ensure that it has been correctly received.

Cyclic monitoring time
As soon as the initialization delay time after power-up has expired, or valid telegrams have already been received, the cyclic monitoring time for the telegram error identification becomes effective. This is parameterized using parameter **H209, H211**. For this monitoring time, for CB1 (PROFIBUS), it may be necessary to take into account the number of nodes, as the reception of telegrams is a function of the node number and transmit cycle.

5.9.3 Binary status displays

Important status information is displayed via the following SE300 binary outputs:

Terminal	Significance	Relevant parameters
635	Synchronism reached	H203
636	Angular controller at its limit corresponds to F119 and A100	H112
637	Excitation in the master and slave expired; If the associated status bits are present and their selection/processing correspondingly set, the setpoint can be enabled, and both drives can accelerate in synchronism.	H245, H246
638	Angular difference greater than the limit value, corresponds to F131 or A112	H201, H202

Table 5.9.3: Status messages at the binary outputs

5.10 Diagnostics LED, alarms, faults

5.10.1 Diagnostics LED on the T300

The T300 has 3 LEDs:

Red LED
This flashes if the T300 software is being executed.
This LED must always flash, even if T300 for CU2, CU3 is still not logged-in in the unit.

No flashing, error cause	**Remedy**
T300 (or LED) defective	Replace T300
T300 not completely inserted, or inserted at the center slot if there is no communications module.	Always insert T300 into slot 2, i. e. **the far right-hand slot**
LBA defective	Replace LBA
MS340 memory module not inserted / not correctly inserted	Correctly insert the MS340 memory module
MS340 memory module not programmed or defective, or incorrect module, refer to the note below.	Replace the MS340 memory module

Yellow LED
This LED flashes if the T300 is communicating with the basic drive (CU). Cause of the error, if only the red LED is flashing, but not the yellow LED:

No flashing, error cause:	**Remedy**
T300 (if relevant, the dual port RAM) defective	Replace the T300
CUVC, CUMC: The basic drive does not recognize the T300 CU2, CU3: The basic drive does not recognize the T300	CUVC, CUMC: Replace T300 or CUVC, CUMC CU2, CU3: Log-on the T300, refer to Section 3.1 or replace T300 or CU2, CU3
Slots from T300 and the communications board are interchanged	Always insert the T300 into slot 2, i. e. the **far right-hand slot**

Green LED
This LED flashes if the T300 is communicating with the communications module (CBP/CB1, SCB1/SCB2) (CU2, CU3: Do not have to be logged-on in the basic drive (P91)!).
Does not flash, if a communications module is not available for axial winder operation.
Cause of the error, only if the red (and if relevant the yellow) LED flashes, but not the green LED:

No flashing, cause of the error:	**Remedy**
T300 defective	Replace the T300
Communications module has not been inserted or not at the correct slot	Insert the communications module, or ensure that it is correctly inserted, i. e. in the center!
Communications module has failed	Replace the communications module

Note:
The MS340 memory module is identified by its Order No. on the PC board, refer to Section 1.3 and on the "MS340 Vx.y" label on one of the components.

6 Parameters

6.1 Parameter handling

All of the parameters, which are implemented on the technology board, are called *technological parameters.* T300 parameters were located behind/above the basic drive parameters.
They can be reached by up- and down-key or by typing a leading ”1” as a fourth digit for direct addressing with an OP1.

The technology parameters are shown in the following form on the operator control panels, dependent on their ability to be changed

dyyy	monitoring parameters, i. e. they cannot be changed; they are output connectors
Hxxx	setting parameters which can be changed; these are input connectors with constants

The technological parameters can be read-out of and changed from several locations (simultaneously):

- PMU
- OP1 (the configured parameter names are displayed)
- CB1/CBP (PROFIBUS)
- SCB2 with USS protocol
- serial interfaces 1 and 2 of the CU

The **parameter name**, displayed on the OP1, is a maximum of 16 characters long, and can be toggled between German and English using the H000 initialization parameter (after a change, reset is required!).

For several parameter types, **rounding-off errors** must be expected due to internal conversions / calculations, from, or in the SIMADYN D connector notation with under certain circumstances, some restrictions in the display.
Further, more decimal places can sometimes be provided than can actually be set.

Note: Technology parameters are not ”achnowledgement” parameters! When parameters are set using the rise/lower arrow keys on the operator control panels, **every parameter value with a line above it is effective (temporarily)!** This must be especially observed when setting multiplexers and masks (V2 type).

If technology parameters are addressed via a serial interface, the upper most bit of the parameter number field must be set, so that a parameter number range from **1000 to 1999** is obtained.

With OP1, changes of V2-type paramerters (hex values) are possible with pord. state ”G”, SW release 1.1

Note: Bevor using SIMOVIS see Section 7.4

Connectors can be read and changed using the **SIMADYN D monitor** and the PC-based programs, SIMOVIS or IBS/SERVICE program (start-up/service program) via the T300 connector X132 (RS232) or X133 (RS485). All of these parameters can also be addressed via connectors using this program.
In order to change technology parameters, the following path name

1.function package name.block name.connector name

of the appropriate connector must be entered using the SIMADYN D monitor.

Information regarding the parameter listing:

- **counting, bits: 0 ...15**
- select values which are **highlighted**, show the pre-setting.

6.2 Data types and data formats

Parameters can only be changed within a specific parameter range. The value range depends on the parameter data type, and, for some parameters, is restricted to a smaller range (MIN/MAX limits). If there is no information to the contrary in the value range column in the parameter lists, then the value range is that defined by the data type:

Type	Designation	Explanation	Value range	Resolution
B1	Binary signal	Status word	Logical 0 or 1	
V2	Binary vector	Mask, CW, SW	0000 to 7FFF hex	1
N2	Normal signal	Percentage	-200 % to 199.99 %	0.006103 %
I2	Integer	Complete No.	-32768 to 32767	1
O2	Ordinal number	Natural No.	0 to 32767	1
E2	Extended signal	Decimal value	-256.0 to 255.99	0.0078125
R2	Time	Reciprocal	1* TA to 16384* TA	dep. on the value
T2	Time	Proportional	0* TA to 32767* TA	1 TA
D2	Time	Proportional	0* TA to 1.99* TA	0.00006103 TA

Table 6.2.a: Value range and resolution of the SIMADYN D data types (TA =sampling time)

The following value ranges, in the sampling times used, are obtained for the time-dependent data types R2, T2 and D2. Only values are accepted, which represent an **integer multiple of the associated sampling time**! Values which are entered which do not match are appropriately rounded-up or down.

	TA = T1 = 4 ms (closed-loop control)	TA = T2 = 16 ms (open-loop control)
R2:	4 ms to 65536 ms (= 1.1 min)	16 ms to 262144 ms (= 4.3 min)
T2:	0 ms to 131068 ms (= 2.2 min)	16 ms to 524272 ms (= 8.8 min)
D2:	0 ms to 8 ms	0 ms to 32 ms

Bit	Hexa-decimal value	Decimal value (I2,O2)	Percentage (N2)	Extended signal (E2)	Time- reciprocal sig. (R2 4 ms)	Time-proportional signal (T2 4 ms)
0	1	1	0.0061 %	0.0078125	65536.0 ms	4.0 ms
1	2	2	0.0122 %	0.015625	32768.0 ms	8.0 ms
2	4	4	0.0244 %	0.03125	16384.0 ms	16.0 ms
3	8	8	0.0488 %	0.0625	8192.0 ms	32.0 ms
4	10	16	0.0976 %	0.125	4096.0 ms	64.0 ms
5	20	32	0.1953 %	0.25	2048.0 ms	128.0 ms
6	40	64	0.3906 %	0.5	1024.0 ms	256.0 ms
7	80	128	0.7812 %	1.0	512.0 ms	512.0 ms
8	100	256	1.5625 %	2.0	256.0 ms	1024.0 ms
9	200	512	3.125 %	4.0	128.0 ms	2048.0 ms
10	400	1024	6.25 %	8.0	64.0 ms	4096.0 ms
11	800	2048	12.5 %	16.0	32.0 ms	8192.0 ms
12	1000	4096	25.0 %	32.0	16.0 ms	16384.0 ms
13	2000	8192	50.0 %	64.0	8.0 ms	32768.0 ms
14	4000	16384	100.0 %	128.0	4.0 ms	65636.0 ms
15	8000	-32768	-200.0 %	-256.0	-	-

Table 6.2.b: Conversion table for data types

Connector types generally correspond directly to the parameter types, for example, such as required to externally access parameters (serial interfaces (SIMOVIS), dual port RAM) and for the operator control panel displays (PMU, OP1). However, some types are converted on the T300 due to the resolution and the value range required: **Connector type N2, E2, D2, T2, R2 are converted to parameter type I4**

6.3 Parameter list

All of the parameters used in the standard angular synchronous control software package are listed on the following pages. The listing appears in the following general form:

Hxxx, dyyy Short parameter designation	Type Dim	Min....Max	Value
Explanation and if required parameter information ...... Initialization value BB n Section X.Y FP-FPNAME.FBNAME.K			

Table 6.3.a: List form for input parameters

Hxxx, dyyy Short parameter designation	Type Dim		A
Explanation and if required parameter information ...... BB n Section X.Y FP-FPNAME.FBNAME.K			

Table 6.3.b: List form for display parameters

Hxxx, dxxx	Parameter number xxx
Type	Parameter data type
Dim	Parameter dimensions, if applicable
Min	Smallest selectable parameter value, if this is not identical with the minimum value specified for the particular data type
Max	Highest selectable parameter value, if this is not identical with the maximum value specified for the particular data type For symmetrical limits, i.e. minimum value = negated maximum value, the min/max values can be also specified in the form ±max
Value	Parameter factory setting
A	Code for display parameters
Initialization value	**Comments specifying whether the parameter value is only to be evaluated once when the drive converter runs-up, i.e. when it is powered-up (initialization). The drive converter must be powered-down and up again so that such a parameter change becomes effective.**
BB n	Reference to the block diagram n (not every parameter has a block diagram)
Section X.Y	Reference to Section x.y of the documentation, in which additional information/explanations regarding the parameter can be found.

H000 Parameter name language	O2	0..1	0
0 = German 1 = English **Initialization value** BB: 3 Section: 6.1 FP-PARAM.PARAMS.LID			

d001 Software release	N2		A
Current software release BB: 3 Section - FP-PARAM.P001.Y			

d002 Software type (identification)	O2		A
Includes the number of the standard software package = **340** BB: 3 Section - FP-PARAM.P002.Y			

H003 write inhibit	B1	0..1	0
T300 parameters cannot be changed when value 1 is entered. Connector values can still be changed via the SIMADYN D monitor (e. g. using IBS/SERVICE program (start-up/service program))! This write inhibit can be cancelled by depressing the button on the T300 board. H003 must be again set after this! 0= can be read and changed 1= can only be read BB: 3 Section - FP-PARAM.H003.I			

d004 system error bits	V2		A
Diagnostics: As there is no 7-segment display on the T300, which allows software- and run time errors to be visualized, then they can be monitored by using bits set here. This is especially interesting for communication errors as well as computation time overflows. **Bit Significance** 0 Fatal system error 1 =0 2 =0 3 Task administrator, i. e. computation time overflow 4 Monitor error 5 Hardware fault 6 Communications error Is always present, if a communications board is not inserted (CB1/CBP, SCB1/2)! BB - Section - FP-PARAM.H003.Y			

d006 System error word 1 BB - Section - FP-PARAM.SYSERR.Y1	V2		A
d007 System error word 2 BB - Section - FP-PARAM.SYSERR.Y2	V2		A
d008 System error word 3 BB - Section - FP-PARAM.SYSERR.Y3	V2		A
d009 System error word 4 BB - Section - FP-PARAM.SYSERR.Y4	V2		A

H010 Encoder pulse number, slave (=speed sensing 1)	O2	1...32767	1024
Number of pulses (of a track) per incremental encoder revolution at the slave drive; **This is absolutely necessary that it is correctly set!** Otherwise, the position difference would be incorrectly calculated, so that neither synchronous operation nor synchronizing is possible! **Observe that the unit must be <u>powered-down/up</u>** **after H010/H011 has been set!** **Initialization value** BB: 12 Section: 5.1.1 FP-SYNCON.NAVPAR.X1			

H011 Encoder pulse number, master (=speed sensing 2)	O2	1...32767	1024
Number of pulses (of a track) per incremental encoder revolution at the master drive **Observe that the unit must be <u>powered-down/up</u>** **after H010/H011 has been set!** **Initialization value** BB 12 Section: 5.1.1 FP-SYNCON.NAVPAR.X2			

H012 Rated speed, slave	I2 RPM	Abs. val. >1	1500
Slave speed actual value (pulse encoder) in RPM, which is referred to 100% speed actual value. Polarity reversal of the value corresponds to interchanging the pulse encoder tracks. *Caution for **MasterDrives SC**:* *A <u>**negative rated speed**</u> must be set due to interchanging tracks A and B fed from the CU3 via LBA to T300! This has no affect on offset sensing (synchronizing edge selection)!* **Initialization value** BB 12 Section 2.1.1.1; 2.1.1.2; 5.1.1; 5.5.1 FP-SYNCON.NAVPAR.X3			

H013 Rated speed, master	I2 RPM	Abs. val. >1	1500
Master speed actual value (pulse encoder) in RPM, which is referred to 100% speed actual value. Polarity reversal of the value corresponds to interchanging the pulse encoder tracks. **The correct input is especially important when using the master transmitter/encoder signal as master setpoint for the slave.** *Caution for **MasterDrives SC**:* *Track A is connected to CU connector X102, terminal 38, track B at terminal 37 (!)!* *A negative rated speed is **not** parameterized!* **Initialization value** BB 12 Section 5.1.1; 5.5.1 FP-SYNCON.NAVPAR.X4			

d014 Speed actual value, slave	N2 %		A
Calculated speed actual value of the slave drive as a % of the rated speed (parameter H012) BB: 5; 12; 14;15 Section 5.1.1 FP-SYNCON.SACT.Y1			

d015 Speed actual value, master	N2 %		A
Calculated speed actual value of the master drive as a % of the rated speed (parameter H013) BB: 12; 15 Section: 5.1.1 FP-SYNCON.SACT.Y2			

<table>
<tr><td>d016 Position pulse number, slave</td><td>I2 pulses</td><td></td><td>A</td></tr>
<tr><td>Number of quadrupled pulses from the slave drive since the last synchronizing signal. For a negative rotation, the counter counts down. The display is limited at+/- 32768 pulses. The value can be adapted using parameter H104:
No. of pulses*4 / 2**(H104-16) (pre-setting, H104 = 16)
BB: 12 Section: 5.1.2; 5.7.1 FP-SDYNCON.PSL.Y</td><td></td><td></td><td></td></tr>
</table>

<table>
<tr><td>d017 Position pulse number, master</td><td>I2 pulses</td><td></td><td>A</td></tr>
<tr><td>Number of quadrupled pulses from the master drive since the last synchronizing signal. For a negative rotation, the counter counts down. The display is limited at +/- 32768 pulses. The value can be adapted using parameter H106:
No. of pulses*4 / 2**(H106-16) (pre-setting H106 = 16)
BB: 12 Section 5.1.2; 5.7.1 FP-SYNCON.PMAS.Y</td><td></td><td></td><td></td></tr>
</table>

<table>
<tr><td>H018 Operating mode, slave speed sensing 1</td><td>V2</td><td>2H0000..8000</td><td>2H0060</td></tr>
<tr><td>The digital filter, encoder type, rough signal type selection and direction of rotation dependency of the synchronizing signal (encoder zero pulse) and the encoder pulse source is set using this parameter:

- - X:last digit = digital filter time constant/limiting frequency
0 = 2.0 us = 500 kHz
1 = 0.0 us = no filter
2 = 0.5 us = 2 MHz
3 = 2.0 us = 500 kHz
4 = 8.0 us = 125 kHz
5 = 16. us = 62.5 kHz
- - X -: next to last digit = encoder type
0 = pulse encoder with 2 tracks displaced through 90°
1 = Sony pulse encoder (separate tracks for up and down pulses). The digital filter can only be disabled (value 1) or enabled (value ≠1) (8 MHz limiting frequency).
2 = zero pulse from the CU via the LBA backplane bus
4 = tracks A+B from the CU via the LBA backplane bus
6 = A+B+zero pulse from the CU via the LBA backplane bus
- X - -: second highest digit = rough pulse evaluation
0 = no rough pulse; zero pulse is always effective
1 rough pulse, type1: The zero pulse is identified as soon as both signals are present.
2 rough pulse, type2: The zero pulse is only identified if the rough signal is present before the zero pulse.
X - - -: highest digit = direction of rotation dependent synchronizing edge selection
0 = no direction of rotation dependency synchronization always at positive edge
1 = direction of rotation dependency synchronization in both rotation directions at same (mechanical) edge

The highest value digit must coincide with the highest value digit of H019. Values other than those specified may <u>not</u> be entered!

Example of a setting:
- - - 4: Digital filter time constant 125 kHz
- - 0 -: Pulse encoder with 2 tracks displaced through 90°
- 2 - -: Rough pulse, type 2
1 - - -: Direction of rotation-dependent synchronizing edge selection
1 2 0 4: = Parameter value</td><td></td><td></td><td></td></tr>
</table>

Pre-assignment: Pulses are received from the CU and LBA backplane bus **Initialization value** BB: 21 Section: 3.2.1; 3.2.2; 4.4.4; 4.4.5; 5.1.1; 5.1.4; 5.6.2 FP-SYNCON.SACT.IT1			

H019 Operating mode, master speed sensing 2	V2	2H0000..8000	2H0000
Parameter explanation, refer to H018. The highest value digit (=direction of rotation dependency) must coincide with the highest-value digit of H018. **Initialization value** BB: 12 Section 4.4.5; 5.1.1; 5.1.4; 5.6.2 FP-SYNCON.SACT.IT2			

H021 Delay time, "enable operation" (on)	T2 ms	0...8 min	0 ms
Delay time between ON from terminal 602 = 1 and enable operation at the converter. This is a integer multiple of 16ms. BB: 8 Section: 4.1.1 FP-CONTRL.CW015.T			

H022 Extension time, "enable operation" (off)	T2 ms	0...8 min	1000 ms
Delay time between the OFF from terminal 602=0 and operation inhibited at the drive converter. This is an integer multiple of 16ms. BB: 8 Section: 4.1.1 FP-CONTRLCW018.T			

H030 Function, binary inputs	O2	0...2	0
Selects the function of the binary inputs: 0 = none 1 = thumbwheel switch 2 = byte-serial data input BB: 7 Section: 5.2; 5.3 FP-SYNCON.BSREN.X1			

H031 Normalization factor, thumbwheel switch	O2	0...32767	0
Selects which number is to be represented from the thumbwheel switch (without taking into account positions after the decimal point) to 100% (=16384 dec) BB: 7 Section 5.3; 5.5.1; 5.6.2 FP-SYNCON.BNRNF.X			

H032 Coding, thumbwheel switch	B1	0/1	1
0 = binary coding 1 = BCD coding BB: 7 Section: 5.3 FP-SYNCON.BNR.BCD			

H033 Transfer time, BSR	T2 ms	4...256 ms	16 ms
The minimum time for which a byte must be continually available so that it is transferred for byte-serial data input BB: 7 Section 4.1.2; 5.3 FP-SYNCON.BSR.TC			

Ratio

Ü= (select value H040 * select value H048) + *H047*

H040 Source, ratio	O2	0...7	4
Selects the source from which the ratio is entered: 0 = word 6 of a CB1/CBP- or SCB1/2 telegram 1 = byte-serial data input 2 = thumbwheel switch 3 = can be toggled between H041 (T.617=0) and H042 (T.617=1) **4 = parameter H043** 5 = fixed value +1.0 6 = word 9 of the bas. drive convert. 7 = word10 of the bas.drive convert. BB: 7 Section 2.2.2.1; 4.1.1; 4.3.1; 5.5.1 FP-SYNCON.RREFSE.XCS			

H041 Ratio for terminal 617=0	N2	±16,384	1,0
Ratio for binary input, terminal 617 = 0 and H040=3 BB: 7 Section: 4.1.1 5.5.1 FP-SYNCON.RREFPN.X1			
H042 Ratio for terminal 617=1	N2	±16,384	2,0
Ratio for binary input, terminal 617 = 1 and H040=3 BB: 7 Section: 4.1.1; 5.5.1 FP-SYNCON.RREFPN.X2			
H043 Ratio, fixed value	N2	±16,384	1,0
Fixed ratio for H040=4 BB: 7 Section 4.3.1; 5.5.1; 5.5.2 FP-SYNCON.RREFSE.X4			

d044 Actual ratio	N2		A
Actual ratio BB: 7 Section: 5.5.1 FP-SYNCON.RREFSE.Y			

Pulse number ratio:

d045 Pulse number ratio, numerator	I2		A
Actual value of the pulse number ratio, numerator BB: 12 Section: 5.1.3 FP-SYNCON.PNRAT.NM			
d046 Pulse number ratio, denominator	O2		A
Actual value of the pulse number ratio, denominator BB: 12 Section: 5.1.3 FP-SYNCON.PNRAT.DN			

H047 ratio, supplementary fixed value	N2	±16.384	0.0
Additional summand for the fixed ratio; Ü = (select value H040 * select value H048) + *H047* BB: 7 Section 4.3.1; 5.5.1 FP-SYNCON.UE4PRO.X2			
H048 source, percentage ratio change	O2	0...7	4
The value supplied from the selected source changes the ratio, selected using H040, in the range from 0 to +/- 200%. Normalization: 0... +/-200% Ü= (select value H040 * *select value H048*) + H047 0 = word 6 of an CB1/CBP- or SCB1/2 telegram 1 = byte-serial data entry 2 = thumbwheel switch 3 = can be toggled between H041 (Ter.617=0) and H042 (Ter.617=1) **4 = parameter H049** 5 = analog input 4; terminal 507/508 6 = word 9 of the bas. drive convert. 7 = word10 of the bas. drive convert. BB: 7 Section: 4.3.1; 5.5.1; 5.5.2 FP-SYNCON.UE2PRO.XCS			
H049 ratio, percentage fixed value	N2	±200%	100%
Adjustable fixed value for 2nd factor to change the ratio (percentage change); BB: 7 Section: 5.5.1; 5.5.2 FP-SYNCON.UE2PRO.X4			

Offset processing:

Up to SW version V1.40 a negative ratio ü in combination with a negative offset setpoint value and H091=0 is allowed only if the synchronising pulse number MASTER (H100,H101) is configured as a negative value. From SW version V1.5, the problem is solved.

H050 Source, offset reference value	O2	0...7	5
Selects, from which location the offset setpoint is entered (in PULSE*4): 0 = word 5 of a CB1/CBP- or SCB1/2 telegram 1 = analog input 2, terminal 503 / 504 2 = byte-serial data input 3 = thumbwheel switch 4 = word 9 of the bas. drive convert. **5 = parameter H066** 6 = parameters H060 (term.618=0) or H061 (term.618=1) 7 = word10 of the bas. drive convert. BB: 7 Section 2.2.2.1; 4.3.1; 5.6.2 FP-SYNCON.DREFSE.XCS			

H051 Adaption, analog offset reference value	N2 %	± 199.9 %	100 %
Adapts the offset reference value, read-in via analog input, terminal 501 / 502 BB: 7 Section: 5.6.2 FP-SYNCON.DREFAA.X2			

H052 Source, "reset position difference"	O2	0... 7	6
Selects the signal, which resets the position difference of the speed- and position actual value sensing (to 0 or to the selected offset reference value d056). A position difference (can be monitored using d124) is obtained, if, for example, the slave drive rotates with respect to the master drive with the position actual value/position difference sensing enabled. The **angular controller corrects an existing position difference** (to 0 or the selected offset reference value). If the slave drive is powered-up with the angular controller active, without resetting the position difference, the slave drive rotates with an initial speed which corresponds to the angular controller limiting until the position difference becomes 0 (or the offset reference value). In this case, the selected and typically very low ramp-up time in the slave should be observed! 0 = angular controller enable (acc. to H252) 1 = speed controller enable (acc. to H253) 2 = 1 (for voltage on) 3 = operational on (acc. to H240) 4 = operational on and angular controller enable 5 = terminal 603 **6 = status bit "run" of the drive converter unit-status word1** 7 = status bit "run" of the basic drive converter-ZUW1 (stat w 1) BB: 11 Section 4.3.1; 5.1.4; 5.6.1 FP-CONTRL.CW210.XCS			

H053 Ramp-up time, offset reference value	R2 s	4 ms...64 s	9,36 s
Time, in which the offset reference value changes by 16384 quadrupled pulses. BB: 13 Section: 5.6.2 FP-SYNCON.DREFRTU.X			

H054 Maximum value, offset reference value	I2 pulses	±32767	+16384
Upper limit of the offset reference value (pulses *4) In the retrigger mode of the offset sensing (i.e.H091=1), the maximum offset reference value must not exceed ”half the pulse number (*4) per revolution of the component to be synchronized” ! BB: 13 Section: 5.6.2 FP-SYNCON.DREFRG.LU			
H055 Minimum value, offset reference value	I2 pulses	±32767	-16384
Lower limit of the offset reference value (pulses *4) In the retrigger mode of the offset sensing (i.e.H091=1), the minimum offset reference value must not fall below ”half the pulse number (*4) per revolution of the component to be synchronized” !! BB: 13 Section: 5.6.2 FP-SYNCON.DREFRG.LL			

d056 Actual offset reference value	I2 pulses		A
Actual offset reference value (pulses *4) (unlimited) BB: 7; 13 Section 5.6.2 FP-SYNCON.DREFSE.Y			

H060 Offset reference value for terminal 618=0	I2 pulses	±32767	0
Offset reference value (pulses*4) for binary input terminal 618=0 BB: 7 Section: 4.1.1; 5.6.2 FP-SYNCON.DREFPN.X1			
H061 Offset reference value for terminal 618=1	I2 pulses	±32767	0
Offset reference value (pulses*4) for binary input terminal 618=1 BB: 7 Section: 4.1.1; 5.6.2 FP-SYNCON.DREFPN.X2			

H062 Offset ref. Value n_Mas > 0 and n_SLV > 0	I2 pulses	±32767	0
Offset reference value (pulses *4) for positive speeds of both drives BB: 7 Section: 5.6.2 FP-SYNCON.DREFS.X10			
H063 Offset ref. Value n_Mas < 0 and n_SLV > 0	I2 pulses	±32767	0
Offset reference value (pulses *4) for negative master speed and positive slave speed BB: 7 Section: 5.6.2 FP-SYNCON.DREFS.X11			
H064 Offset ref. Value n_Mas > 0 and n_SLV > 0	I2 pulses	±32767	0
Offset reference value (pulses *4) for a positive master speed and negative slave speed BB: 7 Section: 5.6.2 FP-SYNCON.DREFS.X20			
H065 Offset ref. Value n_Mas < 0 and n_SLV < 0	I2 pulses	±32767	0
Offset reference value (pulses *4) when both drives have negative speeds BB: 7 Section: 5.6.2 FP-SYNCON.DREFS.X21			

H066 Fixed value, offset reference value	I2 pulses	±32767	0
Fixed offset reference value (pulses*4) for H050 = 5 BB: 7 Section: 5.6.2 FP-SYNCON.DREFSE.X5			

Master speed setpoint

H070 Source, master speed setpoint	O2	0... 7	3
Selects the source for the master speed setpoint 0 = word 2 of a CB1/CBP- or SCB1/2 telegram 1 = analog input 1 terminal 501 / 502 2 = byte-serial data input **3 = speed actual value, master** 4 = word 2 of the T300 peer-to-peer telegram 5 = 0% (for testing) 6 = word 9 of the bas. drive convert. 7 = word10 of the bas. drive convert. BB: 7 Section: 2.2.2.1; 2.4.3; 4.3.1; 5.5.3 FP-SYNCON.SREFSE.XCS			

H071 Adaption, analog master speed setpoint	N2 %	±199,9 %	100 %
Adaption factor for the master speed setpoint read-in via analog input 1, terminal 501 / 502 BB: 7 Section: 4.3.1 FP-SYNCON.SREFAA.X2			

H072 Smoothing, master speed setpoint	R2 ms	4 ms...64 s	9,99 ms
Smoothing time (PT1 element) for the master speed setpoint BB: 7 Section: 5.5.3 FP-SYNCON.SREFSM.T			

H073 Fixed value, master speed setpoint	N2 %	±199,9 %	100 %
Fixed reference value (for testing) BB: 7 Section: 5.5.3 FP-SYNCON.SREFSE.X5			

d074 Actual master speed setpoint, smoothed	N2		A
Actual value of the smoothed master speed setpoint (without ratio) BB: 7 Section: 5.5.3 FP-SYNCON.SREFSM.Y			

H075 Delay, master setpoint	B1	0...1	0
If both a master setpoint as well as an off3 command from a SIMOVERT MASTER DRIVES drive converter is generated and sent, together in a telegram to the slave via a serial interface (e. g. T300 peer), then the master setpoint is immediately 0 if an off3 command is present. As the master setpoint is coupled to the basic drive converter faster than the off3 command, the basic drive converter immediately identifies that the setpoint has been changed to 0, which could lead to a DC link overvoltage fault! In order to prevent this, the master setpoint must be coupled to the basic drive converter in the same time sector as the off3 command (T2=16ms). 0: No delay 1: 16ms delay, so that synchronization is to off3 BB: 14 Section - FP-CONTRL.LSW1.I			

Inertia compensation

H080 Source, inertia compensation	O2	0... 7	2
Selects the source for inertia compensation (feed-forward control value for the speed controller): 0 = word 7 of a CB1/CBP- or SCB1/2 telegram 1 = analog input 3 terminal 505 / 506 2 = speed setpoint differentiation 3-5= 0 6 = word 9 of the bas. drive convert. 7 = word10 of the bas. drive convert. BB: 14 Section 2.2.2.1; 4.3.1; 5.5.4 FP-SYNCON.AREFSE.XCS			

H081 Adaption, analog inertia compensation	N2 %	±199.9 %	100 %
Adaption factor for the inertia compensation value read-in via analog input X5, terminal 505 / 506 BB: 14 Section: 4.3.1; 5.5.4 FP-SYNCON.AREFAA.X2			

H082 Smoothing constant, inertia compensation dn/dt	R2 ms	4 ms...64 s	100 ms
Time constant of the differentiation (DT1 element) of the speed setpoint value to generate the inertia compensation high time values -> less influence BB: 14 Section: 5.5.4 FP-SYNCON.AREFSR.T1			
H083 Adaption, inertia compensation dn/dt	N2 %	±199.9 %	199.99 %
Adaption factor of the differentiation (DT1 element) of the speed setpoint to generate the inertia compensation value higher values -> less influence BB: 14 Section: 5.5.4 FP-SYNCON.AREFSA.X2			

d084 Actual value, inertia compensation	N2 %		A
Actual value of the inertia compensation BB: 4; 14 Section: 5.5 FP-SYNCON.AREFSE.Y			

Synchronization:

H090 Source ”reset/enable offset sensing/position act .val”	O2	0...7	6
Selects the source, which resets the position actual values and enables the offset calculation (also refer to H052): As long as the selected signal source is 0, the position actual values=0 (device SACT.YP1 or .YP2) and the offset actual values (d094, d095) retain their previous value. If enabling is realized (=1), the position actual values are updated, and also the offset actual values (d094, d095) after both synchronizing pulses have occurred. 0 = angular controller enable (according to H252) 1 = speed controller enable (according to H253) 2 = 1 (for power/voltage on) 3 = operation on (according to H240) 4 = operation on and angular controller enable 5 = terminal 608 **6 = status bit, ”operation/run” of the basic drive converter-status word1** 7 = status bit, ”operation/run” of the basic drive converter-ZUW1 BB: 11 Section: 5.1.4 FP-CONTRL.CW200.XCS			

H091 Synchronizing, RETRIGGER	B1	0/1	0
Selects whether synchronizing (offset sensing and offset equalization) is to be realized in the RETRIGGER mode or is to be continuous. **0 = continuous** The offset is sensed over **several revolutions** and equalized **(it is necessary to set parameters H100 to H103!)** 1 = retrigger The offset is only sensed over 1 revolution and equalized BB: 12 Section: 5.1.4; 5.5.1; 5.6.2; 5.7 FP-SYNCON.DISC.RTM			

H092 Synchronizing command edge-controlled	B1	0/1	0
Evaluates the ”synchronizing” control bit (i. e. offset compensation): 0 = level-controlled 1 = edge-controlled BB: 12 Section: 5.7 FP-SYNCON.DISC.ENM			

H093 Correction pulse number	I2 pulses	1...1000	1
Number of quadrupled pulses, which are fed to the angular controller to correct the offset, for offset correction per sampling time. Thus a position difference is generated, which the angular controller corrects. A low value (approx. 1) is recommended in order to achieve low-oscillation synchronization. To ensure fast synchronization for very low-frequency synchronizing pulses (e. g. using a high ratio, low speed), this value must be increased (e. g. to 10). BB: 12 Section: 5.1.4; 5.7 FP-SYNCON.DISC.CPN			

d094 offset actual value	I4 pulses		A
Offset actual value in **quadrupled <u>slave</u> pulses** since the offset calculation was enabled (according to H090), and after both synchronizing pulses occurred. It is only re-calculated, if one (H91=0; setting of H100...H103!) synchronizing pulse occurs, or two (H091=1) synchronizing pulses. It includes the possibly set offset- (d056) as well as the direction of rotation-dependent synchronizing offset-reference values (H062 - H065). When synchronized, it is 0, or it includes the offset reference value. This status is signaled, taking into account a tolerance bandwidth at **terminal 635**, set with H203. The actual angular difference between the synchronizing pulses is displayed using **d124**. BB: 12 Section 5.1.3; 5.1.4; 5.7 FP-SYNCON.DISC.DV			

d095 offset actual value - position difference actual value	I4 pulses		A
Offset actual value - position difference actual value in **quadrupled <u>slave</u> pulses**. This is **0 in the angular synchronous status** (independent of a possibly existing offset reference value)! Value during synchronizing: <>0; it becomes continuously smaller during synchronizing. Update as described for d094. The following is essentially valid: d095 = d094 - d124 BB: 12 Section: 5.1.4; 5.7 FP-SYNCON.DISC.DVD			

H096 Error identification, offset sensing	V2		A
Error identification from the offset sensing; the error identification is deleted when the position difference is reset; error is coded bitwise. Bit Hex Significance 0 1 = overflow, number of synchronizng signals 1 1 2 = overflow, number of synchronizing signals 2 2 4 = number of synchr. signals 1 * synchr. pulse No. 1 > 32 bit 3 8 = number of synchr. signals 2 * synchr. pulse No. 2 > 32 bit 8 100 = offset-pos. difference, cannot be represented with 32 bit BB: 12 Section: 5.7 FP-SYNCON.DISC.FC			

Synchronizing pulse number:
Number of **quadrupled** pulses per revolution of the component to be synchronized. Input is absolutely necessary, if synchronization is parameterized for *continuous (H091=0)*. Input is realized as low- and high word as the value is a 32-bit value. If the pulse number > 32767, then refer to the example in Section 5.7.

H100 Synchronizing pulse number, master low	I2 pulses	±32767	4096
Low word, master; pre-assigned for a 1024 pulse encoder *For SW-version 1.40 a negative synchronizing pulse number has to be parameterized, if there is a negative ratio in combination with a negative displacement (offset) and with H091=0! (also valid for H101)* BB: 12 Section: 5.1.4; 5.5.1; 5.6.2; 5.7; 5.7.2; 5.7.3 FP-SYNCON.SPZMAS.LW			
H101 Synchronizing pulse number, master high	O2 pulses	0...32767	0
High word, master BB: 12 Section: 5.1.4; 5.5.1; 5.6.2; 5.7; 5.7.2; 5.7.3 FP-SYNCON.SPZMAS.HW			
H102 Synchronizing pulse number, slave low	I2 pulses	±32767	4096
Low word, slave; pre-assigned for a 1024 pulse encoder BB: 12 Section: 5.1.4; 5.7; 5.7.1; 5.7.3 FP-SYNCON.SPZSLV.LW			
H103 Synchronizing pulse number, slave high	O2 pulses	0...32767	0
High word slave BB: 12 Section: 5.1.4; 5.7; 5.7.1; 5.7.3 FP-SYNCON.SPZSLV.HW			

H104 Adaption, position actual value slave (16 bit)	O2	16...32	16
The position actual value is a 32-bit value. It is converted into a 16-bit value for display and, if required, analog output. Conversion can be adapted using this parameter: 16-bit value =number of pulses *4 / 2**(16-H104) BB: 12 Section: 5.1.2; 5.7.1 FP-SYNCON.PSLAD.XD			

H105 Enable threshold, slave synchronization	O2 pulses	0...32767	100
The minimum number of quadrupled pulses, which must be received after an effective synchronizing signal before a new synchronizing signal may become effective. This can be used, for example, to **suppress synchronizing switch bounce**. **Caution:** The pulse number specified here must be greater than the number of pulses which are received during the active synchronizing signal time. This threshold value is also effective for the first synchronization (after the position actual value reset). BB: 12 Section: 5.1.4; 5.7.1 FP-SYNCON.SENSL.X2			

H106 Adaption, position actual value master (16 bit)	O2	16...32	16
The position actual value is a 32-bit value. It is converted into a 16-bit value for display, and if required analog output. The conversion can be adapted using this parameter: 16-bit value =number of pulses *4 /2**(16-H106) BB: 12 Section: 5.1.2; 5.7.1 FP-SYNCON.PMASAD.XD			

H107 synchronizing enable threshold, master	O2 pulses	0...32767	100
Function as for H105 BB: 12 Section: 5.1.4; 5.7.1 FP-SYNCON.SENMAS.X2			

d108 synchronizing pulse number, master	I4 pulses	+/- 2147483647	A
Double word (32bit) to check the value entered with H100,H101. BB: 12 Section: 5.7 FP-SYNCON.SPZMAS.Y			
d109 synchronizing pulse number, slave	O4 pulses	0... 2147483647	A
Double word (32bit) to check the value entered with H102,H103. BB: 12 Section: 5.7 FP-SYNCON.SPZSLV.Y			

Angular controller:

H110 Angular controller as P controller	B1	0/1	1
0 = controller operates as PI controller 1 = controller operates as P controller **Caution:** Changeover from 0 to 1 only with the controller inhibited, as otherwise the I component will not be deleted! BB: 13 Section: 5.6.5 FP-SYNCON.SYNCON.HI			

H111 Integral action time	R2 ms	4 ms...64 s	500ms
Integral action time of the angular controller (relevant for H110 = 0) BB: 13 Section: 5.6.5 FP-SYNCON.SYNCON.TN			

H112 Limit value, angular controller	N2 %	±199.9 %	10 %
Absolute output quantity of the angular controller BB: 13 Section 2.2.1.2.1; 4.2.1; 5.6.5; 5.9.1; 5.9.2 FP-SYNCON.SYNMAX.X			

Angular controller, Kp adaption for the ratio:
If P-gain adaption is not required, H115 should be set the same as H116 to 0; H113 is then the effective KP.

H113 P gain, angular controller Ü_KP	E2	±255.9	2.0
P gain without adaption or P gain for high ratio ü_KP BB: 13 Section: 5.6.5 FP-SYNCON.SYNCKP.B2			
H114 P gain, angular controller Ü_KP_0	E2	±255.9	2.0
P gain for low ratio ü_KP_0 BB: 13 Section: 5.6.5 FP-SYNCON.SYNCKP.B1			
H115 ü_KP	N2	±199.9 %	0.0
Limit value of the ratio up to linear interpolation starting from ü_KP_0. For ü > ü_KP, KP = ü_KP BB: 13 Section: 5.6.5 FP-SYNCON.SYNCKP.A2			
H116 ü_KP_0	N2	±199.9 %	0.0
Limit value of the ratio from where linear interpolation is effective up to ü_KP_0. For ü < ü_KP_0, KP = ü_KP_0 BB: 13 Section: 5.6.5 FP-SYNCON.SYNCKP.A1			

H117 Smoothing, position difference actual value	R2	4 ms...64 s	4.0 ms
Smoothing time (PT1 element) for the position difference actual value BB: 13 Section: 5.6.3 FP-SYNCON.PDIFS.T			

d120 Output, angular controller	N2 %		A
Angular controller output = supplementary speed setpoint BB: 13; 14 Section: 5.6 FP-SYNCON.SYNCON.Y			

d121 Angular controller, error signal	I2 pulses		A
Actual angular deviation (as slave pulse No.). A possible offset ref. value is taken into account: Angular controller, controller error = offset reference value - position difference actual value (the position difference actual value includes the offset reference value as "static component") BB: 13; 15 Section: 5.6 FP-SYNCON.SYNCON.YE			

d122 Angular controller, I component	N2 %		A
Integral component of the angular controller output BB: 13 Section: 5.6 FP-SYNCON.SYNCON.YI			

d123 Angular controller KP	E2		A
Effective P gain of the angular controller BB: 13 Section: 5.6 FP-SYNCON.SYNCKP.Y			

d124 Position difference actual value, smoothed	N2 pulses		A
Position difference actual value (16 bit), smoothed using H117, since the reset (according to H052); it is independent of the offset calculation or synchronizing pulses and therefore is not informative regarding the relative position (synchronism) (refer to d094)! A possibly set **offset reference value** can also be identified here! BB: 13 Section: 5.6 FP-SYNCON.PDIFS.Y			

Speed setpoints & limits

H130 Inching setpoint 1	N2 %	±199.9 %	2.5 %
Supplementary speed setpoint which is added to the main setpoint if control bit inching 1 is effective. BB: 14 Section: 3.5; 5.5.5 FP-CONTRL.TIP1.X2			

H131 Inching setpoint 2	N2 %	±199.9 %	-2.5 %
Supplementary speed setpoint which is added to the main setpoint if control bit inching 2 is effective. BB: 14 Section: 5.5.5 FP-CONTRL.TIP2.X2			

d136 Actual speed setpoint	N2 %		A
Actual speed setpoint after smoothing and multiplication by the ratio (without inching setpoint) Master speed setpoint * ratio BB: 7;14 Section: 5.5.3 FP-SYNCON.SREFR.Y			

Speed controller, Kp adaption

CU2,CU3
The P gain can be adapted at the speed setpoint. The adaption is realized on the T300 and is transferred to the basic drive converter. The basic drive converter speed controller uses this value when setting: P226=3006.
If adaption is not required: P226=1001 (then P225 is effective) or
H143 = H144 = 0; then H141 is effective.

CUVC,CUMC:
The following parameters are permanently set on the T300:
H144=0%; H143=199,9%; H142=0 and H141=255,9.
The KP adaptation is then set in the basic drive (P233,P234,P235,P236)
Procedure, refer to Block diagram CUVC and CUMC (Compendium), Sheet 360:

H141 P gain, speed controller	E2	±255.9	10.0
KP: P gain for high speed setpoint or H143=H144 BB: 14 Section: 3.4; 5.5.6.1; 5.5.6.2 FP-SYNCON.SCONKP.B2			
H142 P gain, speed controller	E2	±255.9	10.0
KP_0: P gain for a low speed setpoint BB: 14 Section: 3.4; 5.5.6.1; 5.5.6.2 FP-SYNCON.SCONKP.B1			

H143 n_KP	N2 %	±199.9 %	0.0 %
Speed setpoint limit, where linear interpolation is realized from n_KP_0. For n > n_KP, KP = n_KP BB: 14 Section: 3.4; 5.5.6.1; 5.5.6.2 FP-SYNCON.SCONKP.A2			
H144 n_KP_0	N2 %	±199.9 %	0.0 %
Speed setpoint limit, from where linear interpolation is realized from n_KP. For n < n_KP_0, KP = n_KP_0 BB: 14 Section: 3.4; 5.5.6.1; 5.5.6.2 FP-SYNCON.SCONKP.A1			

d153 Speed controller KP	E2		A
Effective speed controller P gain BB: 4; 14 Section: 5.5.6.2 FP-SYNCON.SCONKP.Y			

d154 Word 2 from the basic drive converter	N2 %		A
The (actual)value sent from the basic drive converter to T300. The value which is received is parameterized in the basic drive converter (P694.2:CU2,CU3 ; P734.2:CUVC,CUMC) Normalization depending on the parameter transferred (refer to the drive converter parameter list) BB: 4 Section: 2.1.2.1; 2.1.2.2 FP-CONTRL.RDEV.Y2			

d155 Word 4 (status word 2) from the basic drive converter	I2		A
(Actual)value sent from the basic drive converter to the T300. The value which is received is parameterized in the basic drive converter (P694.4:CU2,CU3 ; P734.4:CUVC,CUMC) Normalization depending on the parameter transferred (refer to the drive converter parameter list) BB: 4 Section: 2.1.2.1; 2.1.2.2 FP-CONTRL.RDEV.Y4			

d156 Word 3 from the basic drive converter	I2		A
(Actual)value sent from the basic drive converter to the T300. The value which is received is parameterized in the basic drive converter (P694.3:CU2,CU3 ; P734.3:CUVC,CUMC) Normalization depending on the parameter transferred (refer to the drive converter parameter list) BB: 4 Section: 2.1.2.1; 2.1.2.2 FP-CONTRL.RDEV.Y3			

Analog outputs 1 and 2:
The values to be output are selected using H176 and H177 (refer there)

H160 Analog output 1, offset	N2 %	±199,9 %	0 %
Offset, analog output 1, terminal 509 / 510 BB: 16 Section: 4.3.2 FP-CONTRL.AOUT1.OFF			

H161 Analog output 1, gain	E2	±255,9	25,0
Gain, analog output 1, terminal 509 / 510 Pre-assigned so that the angular deviation of approx. +-5% can be represented. BB: 16 Section: 4.3.2 FP-CONTRL.AOUT1.K			

H162 Analog output 2, offset	N2 %	±199,9 %	0 %
Offset , analog output 2, terminal 519 / 520 BB: 16 Section: 4.3.2 FP-CONTRL.AOUT2.OFF			

H163 Analog output 2, gain	E2	±255,9	1,0
Gain, analog output 2, terminal 519 / 520 BB: 16 Section: 4.3.2 FP-CONTRL.AOUT2.K			

Analog outputs 3 and 4:

H170 Source, analog output 3 and select value 3	O2	0...15	6
Source for analog output 3 (terminals 521 / 522) and the select value 3 which can be transferred via the communication boards (CB1 / CBP, SCB1/2): Sampling time: 4ms 0 = 50% (for testing) 1 = speed actual value, slave 2 = word 6 from the basic drive converter 3 = master speed setpoint, smoothed 4 = master speed actual value 5 = word 7 from the basic drive converter **6 = output, angular controller** 7 = control error, angular controller 8 = integral component, angular controller 9 = position difference-actual value (including offset reference value!) 10 = position actual value, slave 11 = position actual value, master 12 = inertia compensation 13 = word 2 from the basic drive converter 14 = word 3 from the basic drive converter 15 = word 5 from the basic drive converter BB: 17 Section 2.2.1.1; 2.4.2; 3.6; 3.7; 3.8; 4.3.2 FP-CONTRL.AOMUX3.XCS			

H171 Source, analog output 4 and select value 4	O2	0...15	9
Source for analog output 4 (terminals 523 / 524) and the select value 4 which can be transferred via the communication boards (CB1 / CBP, SCB1/2): (as for H170 with the exception of settings 1 and 2): Sampling time: 4ms 0 = 0% (for testing) 1 = speed actual value, slave 2 = word 8 from the basic drive converter 3 = master speed setpoint, smoothed 4 = master speed actual value 5 = word 7 from the basic drive converter 6 = output, angular controller 7 = control error, angular controller 8 = integral component, angular controller **9 = position difference-actual value** (incl. offset reference value!) 10 = position actual value, slave 11 = position actual value, master 12 = inertia compensation 13 = word 2 from the basic drive converter 14 =word 3 from the basic drive converter 15 = word 5 from the basic drive converter BB: 17 Section 2.2.1.1; 2.4.2; 3.6; 3.7; 3.8; 4.3.2 FP-CONTRL.AOMUX4.XCS			

H172 Analog output 3, offset	N2 %	±199,9 %	0 %
Offset, analog output 3, terminals 521 / 522 BB: 17 Section: 4.3.2 FP-CONTRL.AOUT3.OFF			

H173 Analog output 3, gain	E2	±255,9	1,0
Gain, analog output 3, terminals 521 / 522 BB: 17 Section: 4.3.2 FP-CONTRL.AOUT3.K			

H174 Analog output 4, offset	N2 %	±199,9 %	0 %
Offset, analog output 4, terminals 523 / 524 BB: 17 Section: 4.3.2 FP-CONTRL.AOUT4.OFF			

H175 Analog output 4, gain	E2	±255,9	1,0
Gain, analog output 4, terminals 523 / 524 BB: 17 Section: 4.3.2 FP-CONTRL.AOUT4.K			

To analog outputs 1 and 2:

H176 Source, analog output 1 and select value 1	O2	0...15	7
Source for analog output 1 and select value 1, which can be transferred via the communication boards (CB1 / CBP, SCB1/2). Raw output value (without gain and offset) can be monitored using d178. Assignment as for H170; Sampling time: 4ms 0 = 100% (for testing) 1 = speed actual value, slave 2 =word 6 from the basic drive converter 3 = master speed setpoint, smoothed 4 = master speed actual value 5 = word 7 from the basic drive converter 6 = output, angular controller **7 = control error, angular controller** 8 = integral component, angular controller 9 = position difference-actual value (including offset reference value!) 10 = position actual value, slave 11 = position actual value, master 12 = inertia compensation 13 = word 2 from the basic drive converter 14 = word 3 from the basic drive converter 15 = word 5 from the basic drive converter BB: 16 Section: 2.2.1.1; 2.4.2; 3.6; 3.7; 3.8; 4.3.2 FP-CONTRL.AOMUX1.XCS			

H177 Source, analog output 2 and select value 1	O2	0...15	1
Source for analog output 2 and select value 2 which can be transferred via the communication boards (CB1 / CBP, SCB1/2): Raw output value (without gain and offset) can be monitored using d179. Assignment as for H171; Sampling time: 4ms 0 = 0% (for testing) **1 = speed actual value, slave** 2 = word 8 from the basic drive converter 3 = master speed setpoint, smoothed 4 = master speed actual value 5 = word 7 from the basic drive converter 6 = output, angular controller 7 = control error, angular controller 8 = integral component, angular controller 9 = position difference-actual value (including offset reference value!) 10 = position actual value, slave 11 = position actual value, master 12 = inertia compensation 13 = word 2 from the basic drive converter 14 = word 3 from the basic drive converter 15 = word 5 from the basic drive converter BB: 16 Section: 2.2.1.1; 2.4.2; 3.6; 3.7; 3.8; 4.3.2 FP-CONTRL.AOMUX2.XCS			

d178 Raw value, analog output 1	I2		A
Raw output value (without gain and offset) of the multiplexer for analog output 1. BB: 5; 6; 16 Section: 2.2.1.1; 2.4.2; 4.3.2 FP-CONTRL.AOMUX1.Y			
d179 Raw value, analog output 2	I2		A
Raw output value (without gain and offset) of the multiplexer for analog output 2. BB: 5; 6; 16 Section: 2.2.1.1; 2.4.2; 4.3.2 FP-CONTRL.AOMUX2.Y			

Monitoring functions, which result in fault-, alarm- and status outputs
(bits from 0 to 15)

Speed limit values:

H180 n-act limit, positive	N2 %	±199,9 %	110 %
Upper speed actual value limit d214, bit 8 =1, if n-act > H180 BB: 15 Section: 2.2.1.2.1; 2.4.2.1.1; 5.9.1 FP-CONTRL.CON020.LU			
H181 n-act limit, negative	N2 %	±199,9 %	-110 %
Lower limit, speed actual value d214, bit 10 =1, if n-act < H181 BB: 15 Section: 2.2.1.2.1; 2.4.2.1.1; 5.9.1 FP-CONTRL.CON020.LL			
H182 n-act limit, center	N2 %	±199,9 %	0 %
Center limit, speed actual value d214, bit 9 =1, if H182-H183 < n-act < H182+H183 BB: 15 Section: 2.2.1.2.1; 2.4.2.1.1; 5.9.1 FP-CONTRL.CON030.M			
H183 n-act limit, center tolerance	N2 %	±199,9 %	1 %
Tolerance, center limit, speed actual value d214, bit 9 =1, if H182-H183 < n-act < H182+H183 BB: 15 Section: 2.2.1.2.1; 2.4.2.1.1; 5.9.1 FP-CONTRL.CON030.L			

H190 Overspeed-positive limit	N2 %	±199,9 %	120 %
Upper speed actual value limit as a % of the rated speed (H012) d214, bit 0 =1, if n-act > H190 BB: 15 Section: 2.2.1.2.1; 2.4.2.1.1; 5.9.1 FP-CONTRL.CON010.LU			
H191 Overspeed-negative limit	N2 %	±199,9 %	-120 %
Lower speed actual value limit as a % of the rated speed (H012) d214,bit 1 =1, if n-act < H191 BB: 15 Section: 2.2.1.2.1; 2.4.2.1.1; 5.9.1 FP-CONTRL.CON010.LL			

Limit values for angle/position:

H200 Signal threshold, error signal angular controller	N2 %	±199,9 %	4 %
Absolute value of the angular controller control error YE up to when the following messages are generated in the T300 status word (d214): d214, bit 12 =1, if |YE| > ± H200 to signal erroneous synchronism d214, bit 14 =1, if |YE| < ± H200 to signal correct synchronism BB: 15 Section 2.2.1.2.1; 2.4.2.1.1; 5.9.1 FP-CONTRL.CON070.L			

H201 Angular limit value, positive (binary output 638)	I2 pulses	±32767	10
Upper limit of the angular difference DY (number of pulses * 4), from which value the "angular difference outside tolerance" signal = 1, i. e. DY > H201; output at terminal 638 BB: 15 Section: 2.2.1.2.1; 2.4.2.1.1; 4.2.1; 5.6.4; 5.9.1; 5.9.2 FP-CONTRL.CON200.LU			
H202 Angular limit value, negative (binary output 638)	I2 pulses	±32767	-10
Lower limit of the angular difference DY (number of pulses * 4), from which value the "angular difference outside tolerance" signal = 1, i.e. DY < H202; output at terminal 638 BB: 15 Section: 2.2.1.2.1; 2.4.2.1.1; 4.2.1; 5.6.4; 5.9.1; 5.9.2 FP-CONTRL.CON200.LL			

H203 Response threshold "synchronism reached" term 635	I2 pulses	±32767	2
Absolute value of the conditioned offset actual value (pulse difference, **d094**), up to which value the binary output, **terminal 635** is logically set to 1 (SE300 LED lit). A possible offset is taken into account. BB: 12 Section: 4.2.1; 5.7.3; 5.9.2 FP-SYNCON.DV0030.L			

H208 Delay time, initialization T300-peer telegrams	T2 ms	0 ms...8 min	10000ms
Time which can expire after the drive converter has been powered-up until a valid telegram is received from the T300 peer interface. If a telegram has not been received after T>H208 has expired, fault F120 or alarm A101 is generated if not suppressed with H212, H213. This is an integer multiple of 16ms. BB: 6 Section: 5.9.1; 5.9.2 FP-CONF.T3INIT.X			
H209 Monitoring time, T300-peer telegrams	T2 ms	0 ms...8 min	80ms
Time, in which a valid telegram must again be received from the T300 peer interface. If a telegram has not been received after T>H209 has expired, fault F120 or alarm A101 is generated if not suppressed with H212, H213. This is an integer multiple of **4ms**. BB: 6 Section: 2.4; 5.9.1; 5.9.2 FP-CONF.T3ZYKL.X2			

H210 Delay time, initialization CB1/CBP/SCB telegrams	T2 ms	0 ms...8 min	20000ms
Time, which can expire after the drive converter has been powered-up until a valid telegram is received from the communication boards. If a telegram has not been received after T>H210 has expired, fault F122 or alarm A103 is generated if not suppressed with H212, H213. This is an integer multiple of 16 ms BB: 5 Section: 3.8; 5.9.1; 5.9.2 FP-CONF.TEINIT.X			
H211 Monitoring time, CB1/CBP/SCB telegrams	T2 ms	0 ms...8 min	80ms
Time, in which a valid telegram must again be received from the communications board. If a telegram has not been received after T>H211 has expired, fault F122 or alarm A103 is generated if not suppressed with d122, H213. This is an integer multiple of 16ms. BB: 5 Section: 3.8; 5.9.1; 5.9.2 FP-CONF.TEZYKL.X2			

Masking faults, alarms and status messages:

H212 Fault mask for T300 status word	V2	0...2HFFFF	2H00A7
Bitwise enabling of the T300 status bits of the d214, which should result in a fault. A bit set in this mask results in a drive converter fault (F116...F131), if the appropriate bit is set in the T300 status word. Example and pre-assignment: Status bits 0,1,2,5,7 should result in a fault trip: 00C7 hex **Pre-assignment is selected, so that start-up is as fast as possible. Thus, the interface monitoring functions (T300 peer and CB1/CBP/SCB) were suppressed; the monitoring functions must be re-enabled if these interfaces are to be used!** BB: 15 Section: 2.2; 2.4.2.1.1; 5.9.1; 5.9.1 FP-CONTRL.SW040.IS2			

H213 Alarm mask for T300 status word	V2	0 ... 2HFFFF	2HB000
Bitwise enabling of the T300 status bits of the d214, which should result in an alarm. A bit set in this mask results in a drive converter alarm (A097...A112), if the appropriate bit is set in the T300 status word. Example and pre-assignment: Status bits 12,14,15 should result in a fault trip: B000 hex The pre-assignment is selected, so that only a few alarms occur during start-up. Generally it is recommended that after start-up, all alarms are again enabled. Note: Alarms are only sent to the basic drive converter and displayed **when the on command is active**. BB: 15 Section: 2.2; 5.9.1 FP-CONTRL.SW030.IS2			

d214 T300 status word (fault/alarm)	V2		A
(Central) status word to monitor and signal open- and closed-loop control statuses. Basic drive converter faults and alarms are generated from this status word according to the fault- and alarm masks (H212, H213). Further, these bits can be sent, via an additional select mask (H219) as status word via interfaces (T300 peer and communication boards). Note:Alarms are only sent to the basic drive converter and displayed **when the on command is active**. Bit assignment: **Bit hex fault-/alarm Significance** 0 1 **F116**, A097 **Overspeed, positive (H190)** 1 2 **F117**, A098 **Overspeed, negative (H191)** 2 4 **F118**, A099 **External fault from sources 1 to 3** 3 8 F119, A100 Angular controller at its limit (H112) 4 10 F120, A101 Telegram error, T300 peer 5 20 **F121**, A102 **Communic err, T300<-> drive converter** 6 40 F122, A103 Communications error, T300<->CB/SCB 7 80 **F123**, A104 **Anti-stall protection (according to the basic drive converter-ZUW1, bit8)** 8 100 F124, A105 n-act > H180 9 200 F125, A106 n-act within H182 ± H183 10 400 F126, A107 n-act < H181 11 800 F127, A108 Comparison freq not reached,ZUW1, bit10) 12 1000 F128, **A109** **Control error, angular controller> H200** 13 2000 F129, **A110** **n-act sensing erroneous(SYNCON.N_SL)** 14 4000 F130, A111 Error difference, angular controller< H200 15 8000 F131, **A112** **Angular difference, outside tolerance H201<**DY**<H202** BB: 5; 6; 15 Section 5.9.1 FP-CONTRL.CON150.QS			

H216 Word1 - source selection for T300 peer	B1	0..1	1
The following control/status word bits are transferred in the 1st word of the peer telegram: 0: Drive converter- and T300 status bits, selected according to H218, H219 1: Control word generated on T300 (d260) BB: 6 Section: 2.4.2; 2.4.2.1.2; 3.7; 5.8 FP-CONF.SZWPTP.I			
H217 Word1 - source selection for com board	B1	0..1	1
The following control/status word bits are transferred in the 1st word of the communications board telegram: As for H216 BB: 5 Section 2.2.1.1; 2.2.1.2.1; 2.2.1.2.2 ; 3.8 FP-CONF.SZWAUT.I			

H218 Interface mask f. basic drive converter status word	O2	0 ... 2HFFFF	2H058C
Bitwise enabling of the drive converter status word 1 for transfer via serial interfaces (T300 peer and communication boards). If a bit is set in this mask, the appropriate bit of the status word 1 is transferred to the interface. The following bits are enabled in the **pre-assignment**: 2: Operation 3: Fault 7: Alarm 8: Setpoint/actual value deviation (=drive stalled) 10: Comparison frequency reached All of the other bits can be taken from the fault/alarm word with mask H219. It should be noted, that only different bits may be enabled using the H218 and H219 masks! BB: 5; 6 Section 2.2.1.1; 2.4.2; 2.4.2.1.1 FP-CONTRL.SW110.IS2			

H219 Interface mask for T300 status word	O2	0 ... 2HFFFF	2HFA73
Bitwise enabling of the T300 fault/alarm word for transfer via serial interfaces (T300 peer and communication boards). If a bit is set in this mask, the appropriate bit is transferred to the interface. It should be noted, that only different bits can be enabled using the H218 and H219 masks! All bits, which are masked (inhibited) with H218, are enabled in the pre-assignment. BB: 5; 6 Section 2.2.1.1; 2.2.1.2.1; 2.4.2; 2.4.2.1.1 FP-CONTRL.SW111.IS2			

Peer-to-peer on T300:
For detailed information refer to the T300 User Instructions.

H220 Baud rate T300 - peer	O2	0... 7	7
4: 2400 Bit/s 5: 4800 6: 9600 7: 19200 8: 38400 9: 57600 10: 76800 11:- 12: 115200 **Caution:** see also section 7.4.3 note 3 **Initialization value!** BB: 6 Section: 2.4 FP-@TXD.PEER.BDR			

H222 Transmit telegram length, T300-peer	O2	0 ... 5	5
A telegram is not sent for the **setting 0**. This can be practical for testing and at start-up, or to further reduce the computation time. **Initialization value!** BB: 6 Section: 2.4 FP-CONF.PTP3TX.LTW			
H223 Receive telegram length, T300 - peer	O2	1 ... 5	5
Initialization value! BB: 6 Section: 2.4 FP-CONF.PTP3RX.LTW			
d224 Receive status, T300-peer	B1		A
0: No reception in this 4ms sampling time. (LEM connector =1) 1: Correct reception BB: 6 Section: 2.4 FP-CONF.PTP3RX.QTS			
d225 Receive errror, T300-peer	O2		A
Error status, if a correct telegram was not received within a 4ms sampling time. Complete error codes, refer to /10/. Important error codes: 0: Error-free initalization and reception 32000: No telegram received within the sampling time 32001: Telegram length, transmitter greater than receiver 32002: Telegram length, receiver greater than sender 32003: Incorrect baud rate BB: 6 Section: 2.4 FP-CONF.PTP3RX.YTS			

Data transfer to the CB1/CBP, SCB1/2 communication boards:

H226 Transmit telegram length, ComBoard	O2	0..7	4
Initialization value! BB: 5 Section: 2.2.1.1; 3.8 FP-CONF.TAUT.LT			
H227 Receive telegram length, ComBoard	O2	0..7	4
Initialization value! BB: 5 Section: 2.2.1.1; 2.2.2.1 FP-CONF.RAUT.LT			
d228 Receive status, ComBoard	B1		A
0: No reception after 4ms*LEM connector 1: Reception o.k. BB: 5 Section: 2.2 FP-CONF.RAUT.QTS			
d229 Receive error, ComBoard	O2		A
0: Error-free initialization and reception <>0: Error code BB: 5 Section: 2.2 FP-CONF.RAUT.YTS			

Monitoring important receive telegram words

d230 Word 1, T300 - peer (STW)	V2		A
Word 1 of the received T300-peer telegram; The following bits can be used as control word bits on the T300: **Bit Function** 0 On 1 Off2 2 Off3 6 Setpoint enable 7 Acknowledgement 8 Inching1 9 Inching2 BB: 6 Section: 2.4.3 FP-CONF.PTP3RX.Y1			
d231 Word 3, T300 - peer (ZUW2)	V2		A
Word 3 of the received T300-peer telegram; The following bits can be used as control word bits on the T300: **Bit Function** 0 Excitation expired (=0) BB: 6 Section: 2.4.3 FP-CONF.PTP3RX.Y3			
d232 Word 4, T300-peer (ZUW1)	V2		A
Word 4 of the received T300 peer telegram; The following bits can be used as control word bits on the T300: **Bit Function** 2 Operation (for setpoint enable) 3 Fault (external) 4 Off2 5 Off3 BB: 6 Section: 2.4.3 FP-CONF.PTP3RX.Y4			

d235 Word 1, ComBoard telegram (STW)	V2		A
Word 1 of the received telegram: The bits such as d230 can be used as control word bits on T300. BB: 5 Section: 2.2.2.1 FP-CONF.RAUT.Y13			
d236 Word 3, ComBoard telegram (ZUW2)	V2		A
Word 3 of the received telegram; The following bits can be used as control word bits on T300: **Bit Function** 0 Excitation expired (=0) BB: 5 Section: 2.2.2.1 FP-CONF.RAUT.Y13			
d237 Word 4, ComBoard telegram (ZUW1)	V2		A
Word 4 of the received telegram; The following bits can be used as control word bits on T300: **Bit Function** 2 Operation (for setpoint enable) 3 Fault (external) 4 Off2 5 Off3 BB: 5 Section: 2.2.2.1 FP-CONF.RAUT.Y14			

Source selection for control word bits

H240 Source (run) on command	O2	0...15	3
The basic drive converter can also be powered-up with the selection possibilities 0...6. The setpoint is only enabled with this signal (according to H247, H246) and the display/output of alarms enabled. Further, the position- and offset sensing can be reset and enabled and the position difference sensing generated. **Value Source** 0 Terminal 602 1 Terminal 602, on edge delayed 2 Terminal 602, on- and off edge delayed **3 Status bit basic drive converter "run"-status word1** 4 T300 peer: Word1, bit0 (STW, ON bit) 5 ComBoard telegram: Word1, bit0 (dito) 6 T300 peer: Word1,bit0 AND word4,bit6 (ZUW1, power-up inhibit), so that only the slave is powered-up, if there is no off2/3! 7 ComBoard: Word1,bit0 AND word4,bit6 (ZUW1, power-up inhibit) 8 T300 peer: Word4,bit1 OR 2 (ZUW1, run or ready) 9 ComBoard: Word4,bit1 OR 2 (ZUW1, run or ready) 10...11 0 BB: 8 Section: 2.2.2.1; 2.4.3; 3.5; 4.1.1 FP-CONTRL.BEIN_1.XCS			

H241 Source1, off2 command	O2	0...7	5
This is not used in the angular synchronous control software package, but is only sent to the basic drive converter where it can be used. **Value Source** 0 Terminal 608 1 Word1, bit1 T300 peer 2 Word1, bit1 ComBoard telegram 3 Generated from ZUW1, bit4 "no off2" of the T300 peer 4 Generated from ZUW1, bit4 "no off2" of the ComBoard telegram **5 1 (no off2)** 6 1 (no off2) 7 1 (no off2) BB: 8 Section: 2.2.2.1; 2.4.3; 3.5; 4.1.1 FP-CONTRL.AUS2_1.XCS			
H242 Source2, off2 command	O2	0...7	5
Function and selection as for H241 BB: 8 Section 2.2.2.1; 2.4.3; 3.5; 4.1.1 FP-CONTRL.AUS2_2.XCS			
H243 Source1, off3 command	O2	0...7	0
This is not used in the angular synchronous control software package, but is only sent to the basic drive converter where it can be used. **Value Source** **0 Terminal 604** 1 Word1, bit2 T300 peer 2 Word1, bit2 ComBoard telegram 3 Generated from ZUW1, bit5 "no off3" of the T300 peer generated 4 Generated from ZUW1, bit5 "no off3" of the ComBoard telegram 5 1 (no off3) 6 1 (no off3) 7 1 (no off3) BB: 8 Section: 2.2.2.1; 2.4.3; 3.5; 4.1.1 FP-CONTRL.AUS3_9.XCS			
H244 Source2, off3 command	O2	0...7	5
Function and selection as for H243 BB: 8 Section: 2.2.2.1; 2.4.3; 3.5; 4.1.1 FP-CONTRL.AUS3_9.XCS			

H245 SourceM for setpoint enable	O2	0...7	7
The setpoint is enabled (for the basic drive converter and if required master drive) if the source, selected using this parameter and the source, set with H246, is ”1”. The setpoint enable is a pre-condition to enable the angular controller! **Value Source** 0 Terminal 616 1 Word1, bit6 T300 peer 2 Word1, bit6 ComBoard telegram 3 Generated from ZUW2, bit0 ”RESTART ON THE FLY” of the T300 peer 4 Generated from ZUW2, bit0 ”RESTART ON THE FLY” of the Com Board telegram 5 Generted from ZUW2, bit0 ”RESTART ON THE FLY” of the basic drive converter **6 Terminal 602 with on delay (H021)** 7 1 (setpoint enable) BB: 8 Section: 2.2.2.1; 2.4.3; 3.5; 4.1.1; 4.2.1; 5.9.2 FP-CONTRL.SWFR_1.XCS			
H246 SourceS for setpoint enable	O2	0...7	7
Function and selection as for H245! BB: 8 Section: 2.2.2.1; 2.4.3; 3.5; 4.1.1; 4.2.1; 5.9.2 FP-CONTRL.SWFR_2.XCS			

H247 Source1 for fault acknowledgement	O2	0...7	0
This is not used in the angular synchronous control software package, but is only sent to the basic drive converter where it can be used to acknowledge faults; The signal is edge-triggered and should be at ”0” in the quiescent state. **Value Source** **0 Terminal 611** 1 Word1, bit7 T300 peer 2 Word1, bit7 ComBoard telegram 3 0 ... 7 0 BB: 9 Section 2.2.2.1; 2.4.3; 3.5; 4.1.1 FP-CONTRL.QUIT_1.XCS			
H248 Source2 for fault acknowledgement	O2	0...7	7
Function and selection as for H247! BB: 9 Section 2.2.2.1; 2.4.3; 3.5; 4.1.1 FP-CONTRL.QUIT_2.XCS			

H249 Source for inching 1	O2	0...7	0
Value Source **0 Terminal 606** 1 Word1, bit8 T300 peer 2 Word1, bit8 ComBoard telegram 3 0 ... 7 0 BB: 10 Section 2.2.2.1; 2.4.3; 3.5; 4.1.1; 5.5.5 FP-CONTRL.TIP1_1.XCS			

H250 Source for inching 2	O2	0...7	0
Value Source **0 Terminal 607** 1 Word1, bit9 T300 peer 2 Word1, bit9 ComBoard telegram 3 0 ... 7 0 BB: 10 Section 2.2.2.1; 2.4.3; 3.5; 4.1.1; 5.5.5 FP-CONTRL.TIP2_1.XCS			
H251 Source, "angular synchronization"	O2	0...7	0
Using this command, the master- and slave drive are brought into the required angular position (i. e. 0 or the selected offset reference value) regarding the synchronizing marks, if the angular controller is also enabled (H252). **Value Source** **0 Terminal 605** 1 Control word (=word1) from the automation (CB, SCB1/2), **bit11** 2 Control word (=word1) from 300 peer, **bit11** 3 0 (= inhibited) ... 6 0 7 1 (= enabled) BB: 11 Section: 2.2.2.1; 2.4.3; 4.1.1; 5.1.4; 5.7 FP-CONTRL.SYNC_1.XCS			

H252 Source, "angular controller enable"	O2	0...7	0
Using this command, the (offset)angle between the master- and slave drive is corrected. a) When the synchronizing command (H251) is inhibited, the angle is maintained, which existed at the instant of the command "position difference reset" (H052). b) The angle is controlled to the selected offset reference value when a synchronizing command is present. The angular controller is only enabled if the speed controller is enabled (H253) and the setpoint (reference values) (H245 and H246)! **ValueSource** **0 terminal 601** 1 control word (=word1) from the automation (CB, SCB1/2), **bit13** 2 control word (=word1) from 300-peer, **bit13** 3 0 (= inhibited) ... 6 0 7 1 (= enabled) BB: 11 Section: 2.2.2.1; 2.4.3; 4.1.1; 5.6.1 FP-CONTRL.WIRE_1.XCS			
H253 Source, "speed controller enable"	O2	0...7	7
The speed controller on the basic drive converter is enabled using this command, if P585=3004. This enable signal via the T300 is however generally not required; the speed controller can always be enabled (P585=1)! **Value Source** 0 Terminal 603 1 0 (= inhibited) ... 6 0 **7 1 (= enabled)** BB: 10 Section: 4.1.1; 3.5 FP-CONTRL.NREG_1.XCS			

H254 Source1, for external T300 fault	O2	0...7	7
A fault trip (**F118**) or alarm (**A099**) can be forced using the signal sources specified here. Thus, it is easy to shutdown a slave drive, if the master drive signals a fault via a serial interface (in its status word1). Note: A fault is initiated for **”1” signal level** so that the status bit of the interfaces can be simply processed. All of the sources, selected with H254...H256 are OR ’d. **Information regarding the ”external” basic drive converter fault F035:** This signal can also be processed in the basic drive converter for the setting P575=3001(CU2,CU3); P575 =3115(CUVC,CUMC)! In this case, it should be noted, that a fault is initiated for a **”0” signal level** in the basic drive converter. This application can be practical, if, for example, a closed switch (terminal 612) is to initiate a fault condition. In this case, F118 must be masked, as it would occur if the switch was closed. **Value Source** 0 Terminal 612 (if not used as thumbwheel switch input!) 1 Word4, bit3 T300 peer 2 Word4, bit3 ComBoard telegram 3 0 (no fault) ... **7 0 (no fault)** BB: 9 Section 2.2.2.1; 2.4.3; 3.5; 4.1.1; 5.9.2 FP-CONTRL.STEX_1.XCS			

H255 Source2 for external fault	O2	0...7	7
As for H254, with the exception: **Value Source** 0 Terminal 613 (if not used as thumbwheel switch input!) 1 Word4, bit3 T300 peer 2 Word4, bit3 ComBoard telegram 3 0 (no fault) ... **7 0 (no fault)** BB: 9 Section 2.2.2.1; 2.4.3; 3.5; 4.1.1; 5.9.2 FP-CONTRL.STEX_2.XCS			
H256 Source3 for external fault	O2	0...7	7
As for H254, with the exception: **Value Source** 0 Terminal 614 (if not used as thumbwheel switch input!) 1 Word4, bit3 T300 peer 2 Word4, bit3 ComBoard telegram 3 0 (no fault) ... **7 0 (no fault)** BB: 9 Section 2.2.2.1; 2.4.3; 3.5; 4.1.1; 5.9.2 FP-CONTRL.STEX_3.XCS			

H257 Inhibit supplementary setpoint2 for off and RFG inactive	B1	0/1	1
For the 0 setting, the angular controller output is no longer sent as supplementary setpoint value2 to the basic drive converter, if an OFF signal is present in the drive converter and the ramp-function generator is inactive (drive has ramped-down to frequency 0). Thus, this prevents the drive rotating in spite of an off command and master setpoint =0 if the angular controller output is greater than the ”off-shutdown frequency” from the basic converter. The supplementary setpoint is not disconnected for setting 1. BB: 4 Section: 5.6.1 FP-CONTRL.ZUS2AB.I4			
d260 T300 control word	V2		A
Monitoring parameter of the control word, **generated on the T300** from all of the selected sources. This is transferred to the basic drive converter, and can be sent via serial interfaces. Assignment (active signal level in brackets): **Bit: Significance:** 0 On (=1) 1 Off2 (=0) 2 Off3 (=0) ... 6 Setpoint enable (=1) 7 Acknowledgement (=1) 8 Inching1 (=1) 9 Inching2 (=1) ... 15 External fault (=0 !) BB: 4; 5; 6 Section: 2.2.1.2.2; 2.4.2.1.2 FP-CONTRL.MA_STW.Y			

d261 Masked T300 status word + drive converter-ZUW	V2		A
Monitoring parameter of the resulting status word, which can be sent via the serial interfaces. It is generated from the T300-fault/alarm status word (d214) which can be masked using H219, and (logical OR), with the basic drive converter status word, which can be masked using H218. Bit assignment: Refer to d214 and the basic drive converter status word (Manual). BB: 5; 6 Section: 2.2.1.2.1; 2.4.2.1.1; 5.8 FP-CONTRL.SW120.QS			

H270 Value range expansion, setpoint offset	O2	32767	16
(From V1.6) If the value range of the offset setpoint (*/- 32768) is not sufficient (exceptional cases) then this can be increased using H270 (H270 as exponent to the power of two). In this case, it must be assumed that the accuracy (resolution) will be decreased. BB: 13 Section: 5.6.2 FP-SYNCON.PDIFAD.XD			

H275 Fine adjust pulse number ratio, numerator	I2	32767	1000
For unfavorable combination encoder pulse number (H10,H11) and ratio , this can result in restrictions regarding the accuracy of the pulse number ratio. With H277=1 pulse number ratio can be adjusted by H275 and H276. (ref. Section 4.4.3; 5.1.3, new in V1.50 (05.96)) ! BB: 12 Section: 5.6.1 FP-SYNCON.FEINNM.X2			
H276 Fine adjust pulse number ratio, denominator	I2	32767	1000
ref. H275 BB: 12 Section: 5.6.1 FP-SYNCON.FEINDN.X2			
H277 Enable fine adjust pulse number ratio	B1	0/1	0
ref. H275 BB: 12 Section: 5.6.1 FP-SYNCON.FEINPZ.I1			

H970 establish factory setting	02	165	0
If the value is set to **165**, the EEPROM (on MS340) is erased after an erase- or delay time of several seconds. This parameter must then be set to another value (e. g. 0)! After a **subsequent power-off/on**, the parameterization is set to that when the unit was shipped (”factory setting”). BB: 3 Section - FP-PARAM.ER10.Q			

7 Start-up

It is recommended that the sequence specified here is kept during start-up, so that if difficulties are encountered they can be more easily identified and resolved.

WARNING

Only commence with start-up, if there are adequate and effective measures to ensure that the system and drive can be safely electrically and mechanically operated.
Please ensure that all safety- and EMERGENCY OFF signals are connected and are effective, so that the drive can be shutdown at any time.

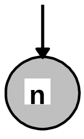
Start-up sequence:

- Start-up (commission) the basic drive converter according to the appropriate Instruction Manual
  - either without a technology board and if required interface board
  - or with an already installed technology board by cancelling the technology- and interface board using parameters P52, P90, P91, P52 (CU2,CU3).
  - document all of the parameters which were changed; e.g. in a list of changeable parameters
- Disconnect the drive converter from the power and wait until the DC link has discharged.
- Install the technology board:
  - plug-in the memory submodule (MS340) on the T300
  - insert the technology board at slot 2 in the electronics box, at the **outer right**
- Connect the SE300 terminal module to T300:
  - connect the T300 connectors X131 and X135 to SE300 via the SC58 and SC60 cables
- Connect-up the SE300 according to the terminal assignment (Section 4) and check
- Connect the power to the drive converter
- Set/check the basic drive converter parameters (according to Section 3)
- Parameterize the angular synchronous control of the technology board

All of the settings to parameterize the angular synchronous control are made via the technology parameters (also refer to Section 5 !).

An **oscilloscope** should be used to evaluate the control quality and if necessary, to check the pulse encoder signals. Further, it is easy to display an offset by tracing the synchronizing marks (zero pulses) in 2 channels.
A storage oscilloscope and a stroboscope are extremely helpful when setting the offset values.
Additional equipment (e. g. battery box) are required according to the system-specific requirements and situation.

Information regarding the representation in the following sequence diagrams:



Additional information under n) following the particular sequence diagram

7.1 Start-up speed control

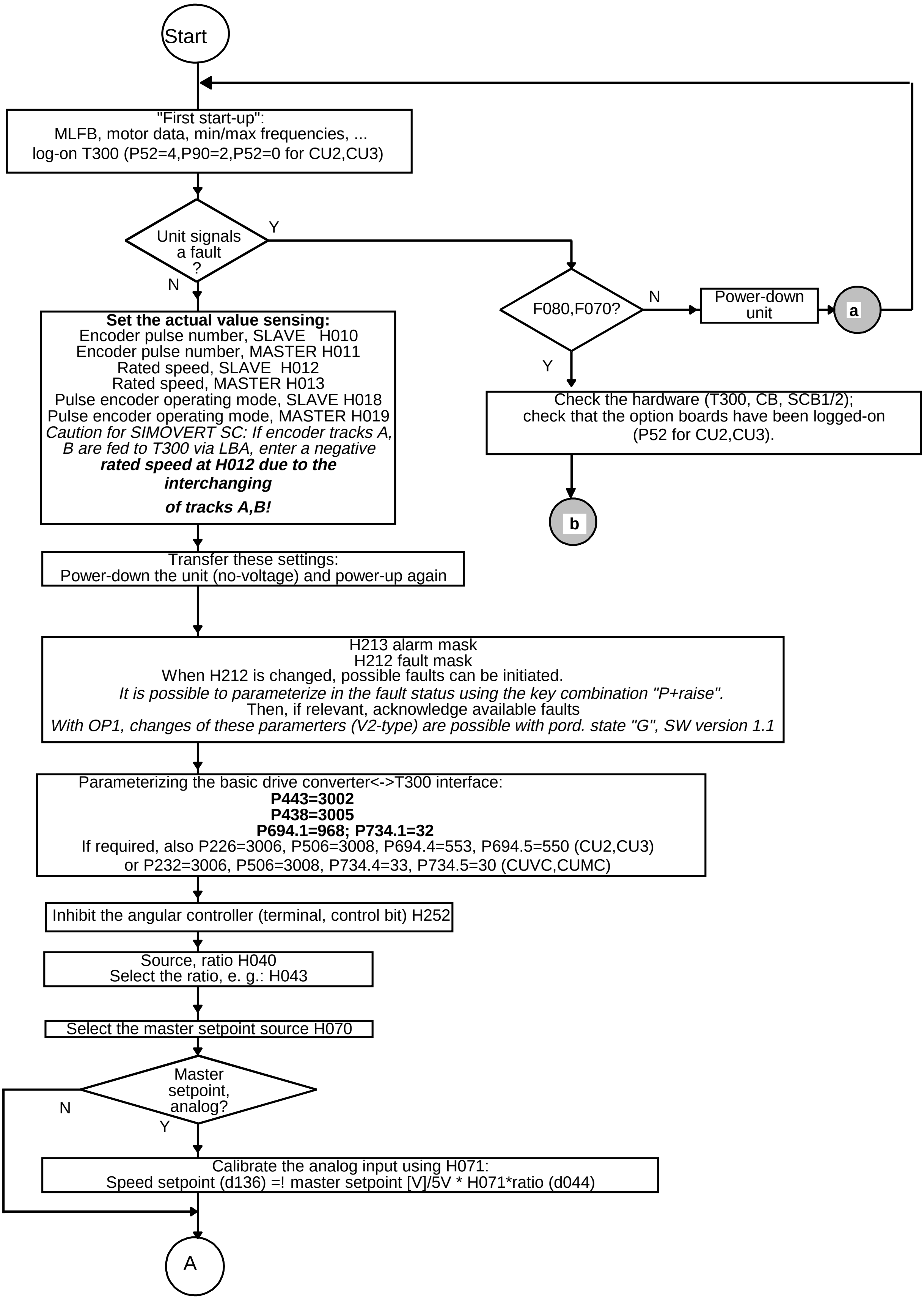


Fig. 7.1.a: Speed control start-up (Start-A): ***Speed actual value sensing, setpoint***

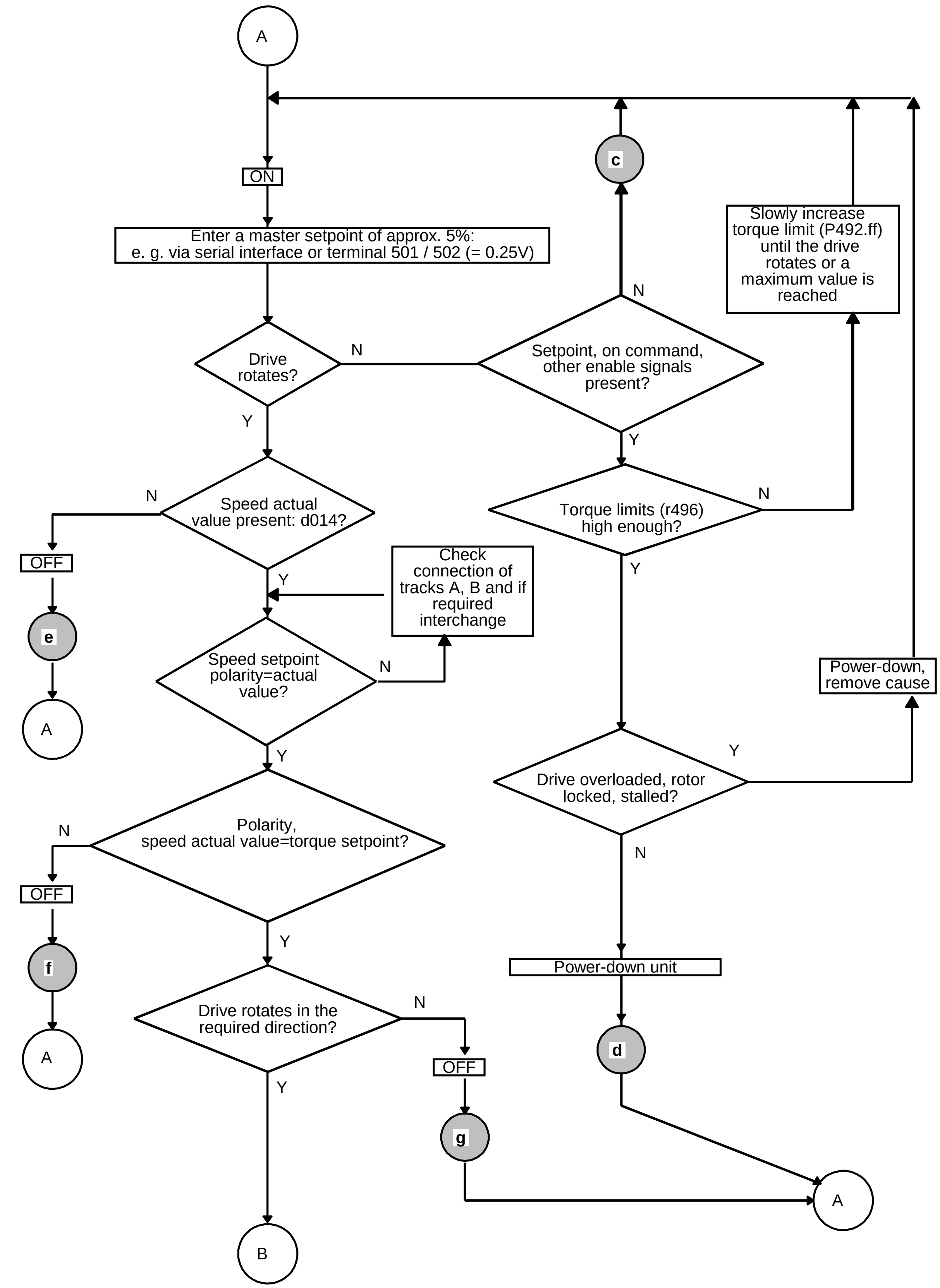
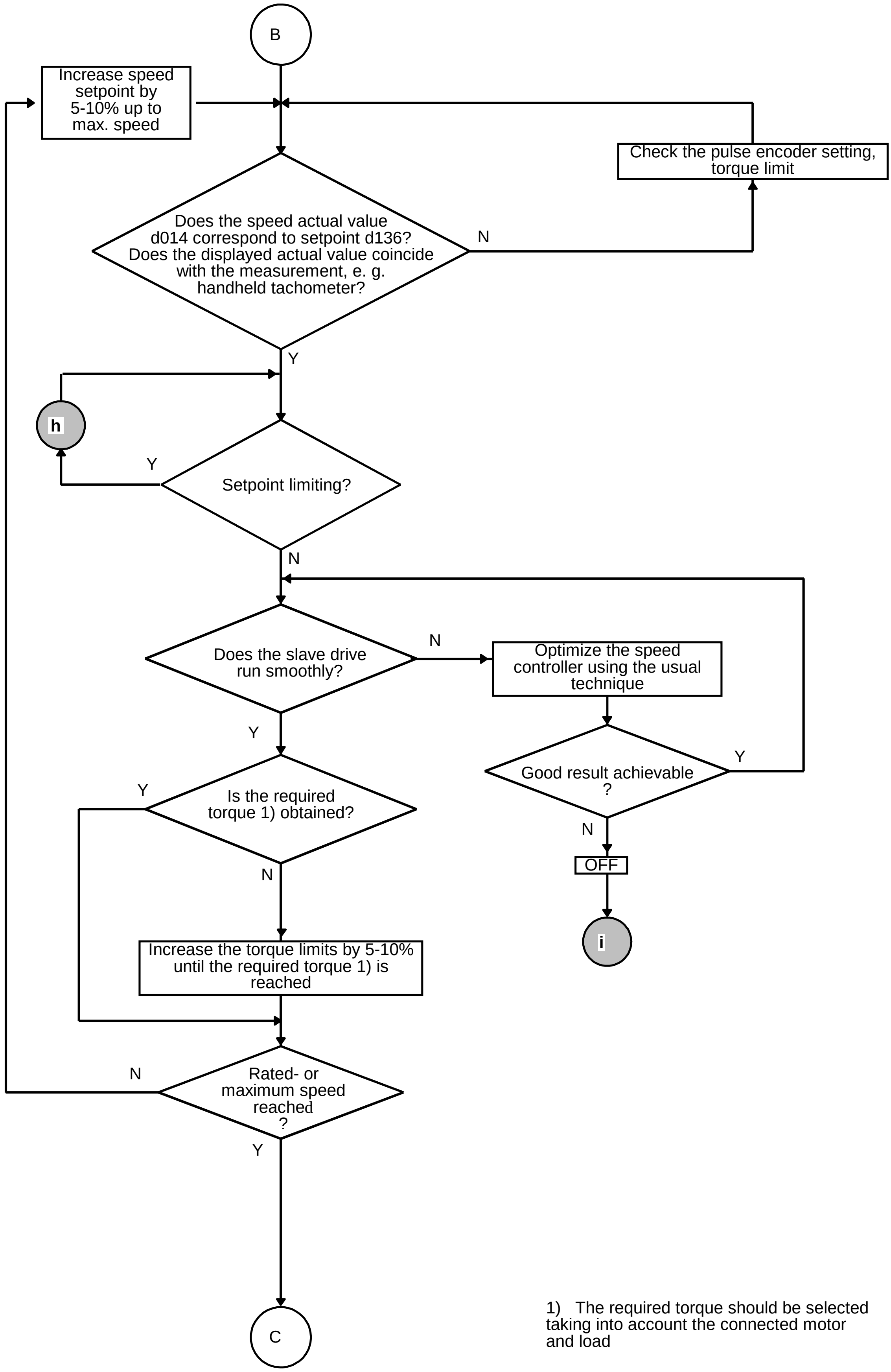


Fig. 7.1.b: Speed control start-up (A-B): ***Drive rotates, torque***



1) The required torque should be selected taking into account the connected motor and load

Fig. 7.1.c: Speed control start-up (B-C): ***Speed controller optimization, torque limit***

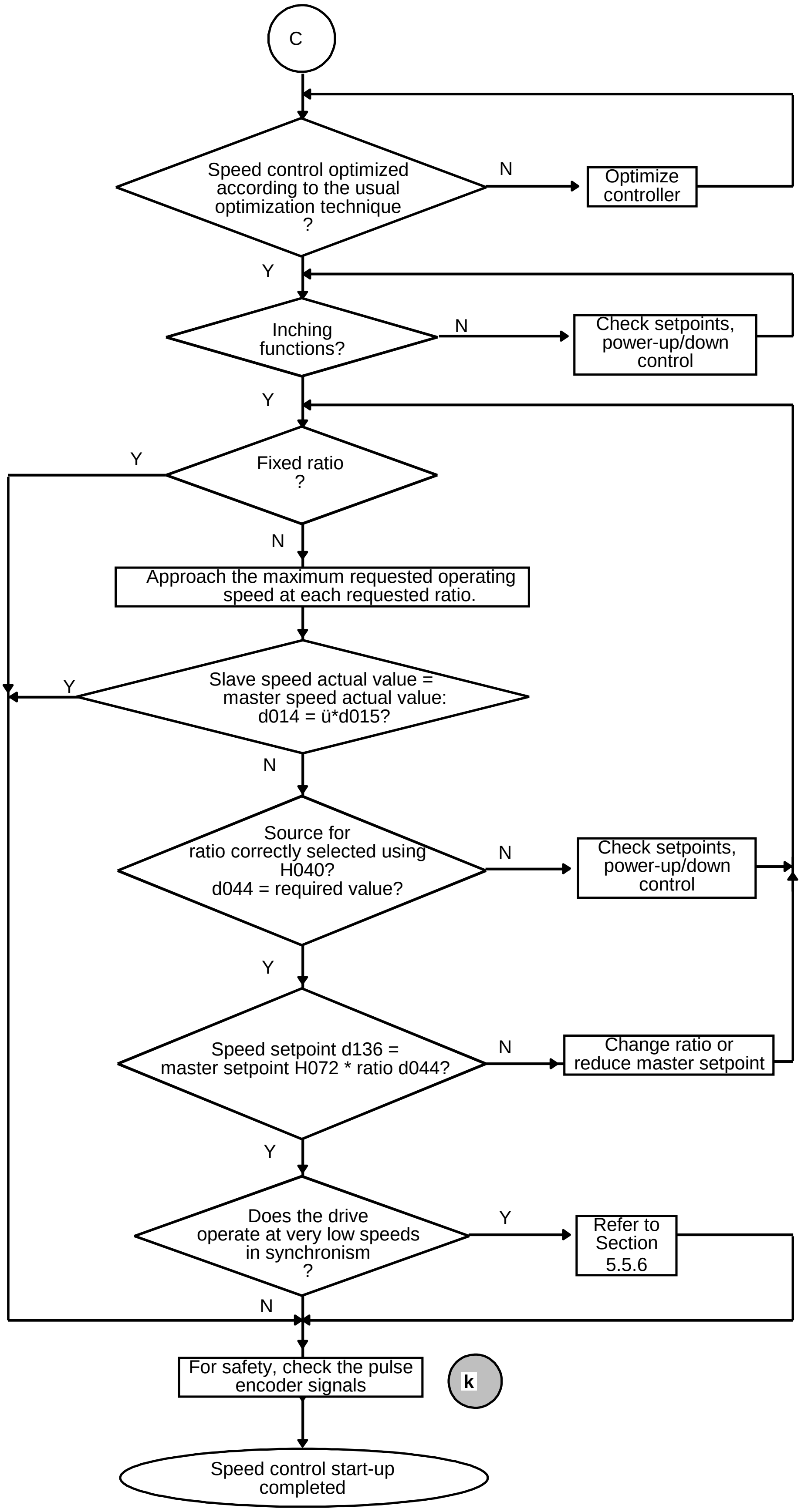


Fig. 7.1.d: Speed control start-up (C-end): ***Ratio***

The fault causes specified here can be used to troubleshoot the **speed control**; other causes are also possible.

a) Basic drive converter signals fault F080:
T300 correctly inserted, correct slot? T300 defective? MS340 memory module inserted?
CU2,CU3:If parameterized (P91=1), CB1 correctly inserted, correct slot? CB1 defective?
CUVC,CUMC: If used, is the CBP correctly inserted, in the correct slot? CBP defective?

b) Basic drive converter signals fault F070:
CU2,CU3:If parameterized (P91=3), correct SCB1/2 interface board type inserted for the selected protocol (P682)? correct slot? defective hardware? - if required replace board
CUVC,CUMC: If used, is the correct type of interface module SCB1/2, matching the selected protocol (P696) inserted? Correct slot? Hardware defective? If required replace the module

c) Drive does not rotate when an ON command is entered and a setpoint is present:
Check that all of the necessary control word enable signals are present (setpoint-, inverter-, ramp-function generator enable, clockwise/counter-clockwise phase sequence etc.).
Frequency limits OK?

d) The drive does not rotate although all of the enable signals are present:
Can the drive be open-loop V/f characteristic controlled (P163=1) or open- or closed-loop frequency controlled (P163=3)?
Establish the factory setting (P52=1); execute motor identification run (P52=7 or 8).

e) No speed actual value:
Wiring correct (ground connections)?
For the slave drive: Encoder cables to the CU (for VC: Connector X132) correctly connected?
For the master drive: T300-SE300 connecting cables OK?
Power supply voltage available at the pulse encoder?
Are all signals available with respect to ground and do they have the correct phase sequence (oscilloscope!)?
Yes: Defective technology board? ® Replace technology board
No: Check the pulse encoder and pulse encoder cable

f) The torque setpoint and speed actual value have different polarities:
Prerequisite: The machine is not driven:
If the converter and pulse encoder are correctly connected, for a positive torque setpoint, the machine must rotate in a clockwise direction (when viewing the drive side) and have a positive speed actual value.
Otherwise, tracks A and B of the pulse encoder (SLAVE) must be interchanged, or a negative value entered at H012 (rated SLAVE speed) (this is transferred by powering-down the unit and powering it up again!).
Note: Fluctuations can occur in the polarity (sign), for motors which are either running under no-load conditions or only with a low load

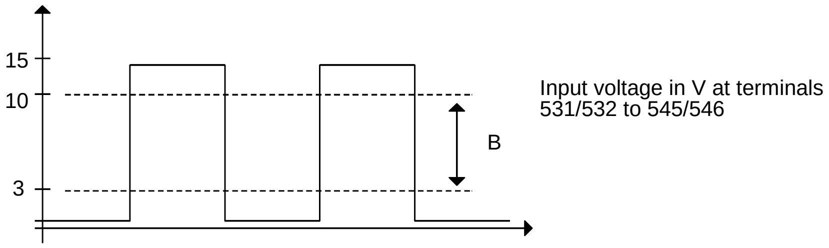
g) Drive does not rotate in the required direction:
Power-down the drive converter, change the phase sequence at the motor/converter, observe point f), reverse the speed actual value by
interchanging pulse encoder tracks A/B or
reverse the polarity at H012 (SLAVE rated speed)

h) Setpoint limiting is effective:
The product of the master setpoint (d074) and the ratio (d044) may not exceed or fall below the min/max frequency setpoint limits (P452, P453, P457).

i) Erroneous optimization:
Execute the motor identification and speed controller optimization runs (P52=8 or similar).
Is all of the equipment used OK?
Are all of the cables (especially the pulse encoder cable) carefully routed and shielded, especially for long encoder cables?
Does the subordinate closed-loop torque control operate perfectly (check parameterization, motor data, etc.)?
Is the load mechanically OK (no play, elasticities, etc.)?
Is the pulse encoder correctly mounted (mechanical mounting design)?

k) Check the **pulse encoder signals**:
To use the angular synchronous control, the pulse encoder signals must be noise-free. It is strongly recommended, that the following measurements are made using the oscilloscope (directly at terminals 531 to 546):

1) The phase shift between tracks A and B of an encoder must be at least **1µs** at all speeds.
2) Noise spikes (duration > 2.5 ms) must not occur close to the switching threshold of the pulse encoder input circuit, i. e. not in the range B:



3) If a sychronizing signal is used, it is recommended that the synchronizing signal is now oscilloscoped.

7.2 Start-up, closed-loop angular control

Before commissioning the angular control it is absolutely necessary that the speed control start-up was successfully completed. It is not permissible that the drive is overloaded. Synchronization must be inhibited (according to H251, e. g. terminal 605=0 and control word bit11=0).

Note:	The load must be completely coupled to the motor.
Caution:	The motor rotates backwards and forwards during optimization.

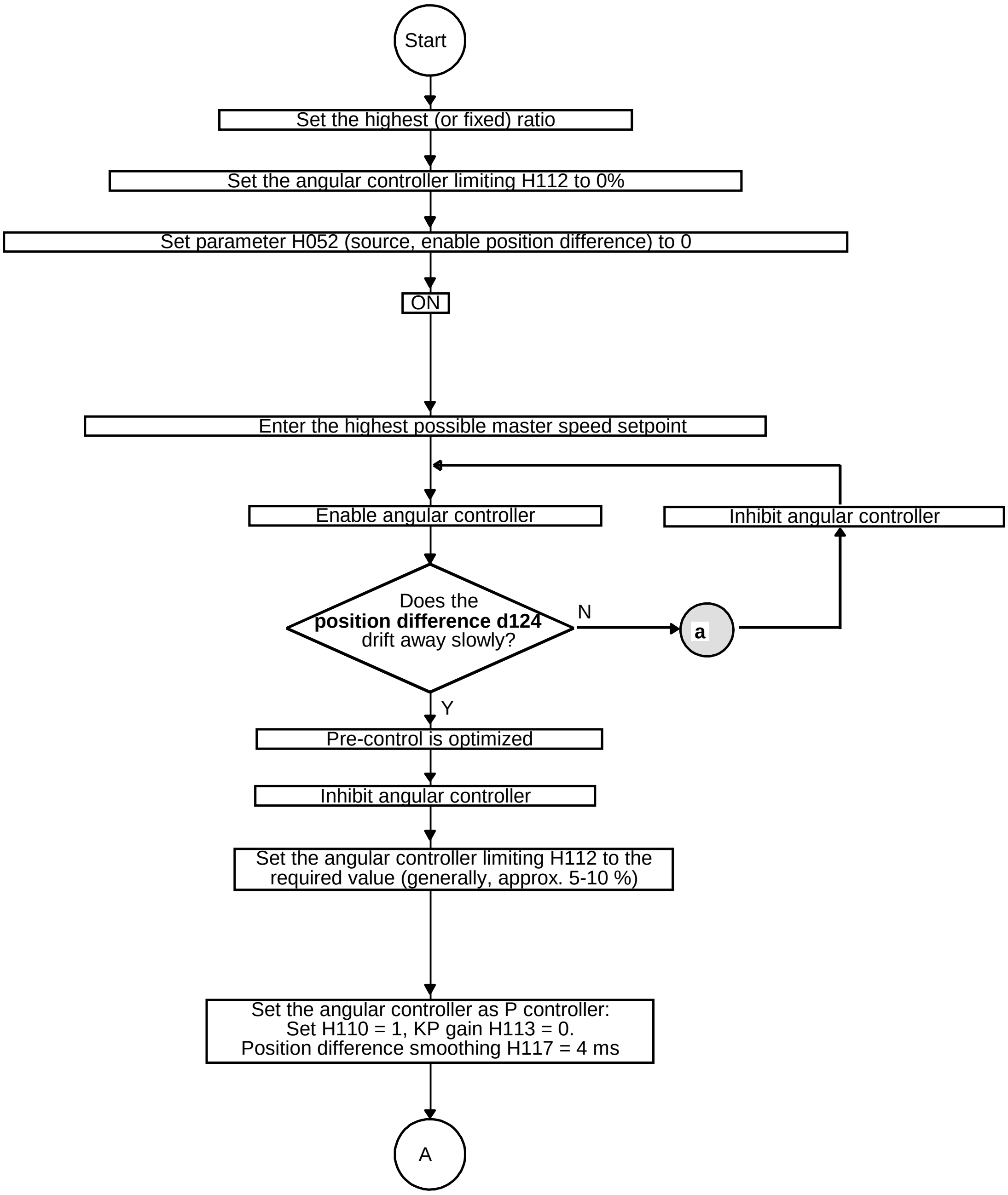


Fig. 7.2.a: *Angular control start-up (Start-A):* ***Basic setting***

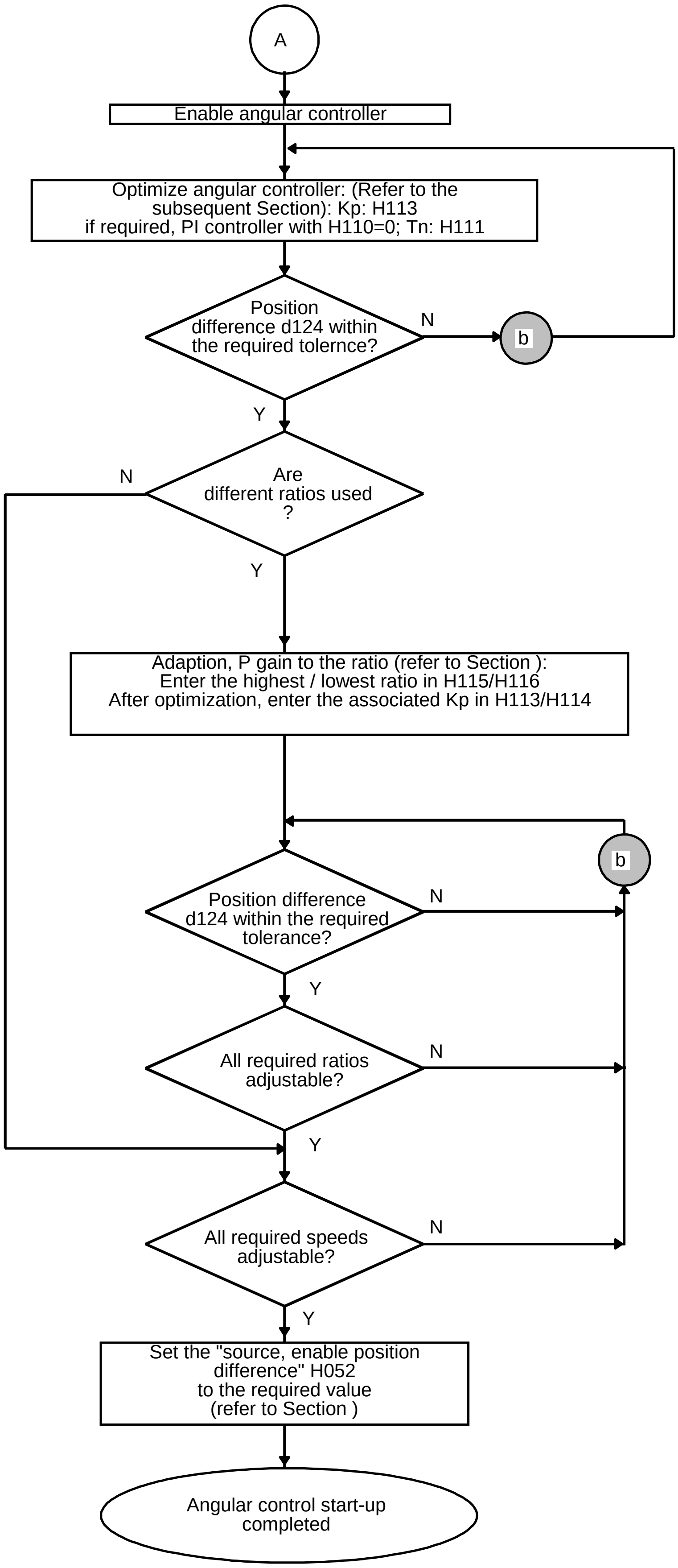


Fig. 7.2.b: Angular control start-up (A-End): ***Ratio***

The fault causes specified here can be used to troubleshoot the **angular control**; other causes are also possible.

a) After the actual value sensing has been enabled (angular controller), the position difference actual value quickly drifts away from 0:
The pre-control is correctly set, if the position difference actual value only drifts away from zero without the angular controller intervening. The prerequisites are that
- the master drive runs smoothly (speed controller optimization),
- the master setpoint corresponds to the master drive speed,
- the slave drive runs smoothly (speed controller optimization),
- the product of master setpoint * ratio (H072*d044) is less than 200 %,
- for analog master setpoint input, the adaption is correct (H071)

b) Position difference actual value is too high. Possible causes:
- speed controller goes to its limit?
Yes: Correctly select the torque limits, remove overload condition
- angular controller goes to its limit?
If yes: Ensure that
1.) frequency limiting > [speed setpoint (d136) + angular controller limiting (H112)] !
2.) product of the master setpoint * ratio (H072*d044) < 200% !

c) Check configured ratio and compare it with mechanical ratio.
If possible do this by watching the synchronizing pulses or/and of the material web or technology.
Does it move away from the desired position?

7.2.1 Instructions to optimize the angular controller

Procedure:

1. For low to average requirements regarding the control quality:
Set experience values:
A **KP between 2 and 6** provides, for many applications, adequate accuracy and dynamic performance.

2. For average to high requirements regarding the dynamic performance or
the experience values (refer to 1 above) do not provide satisfactory results:

- enter master setpoint 0
- **Increase the P gain in steps of 2 until the slave drive oscillates.** The oscillation can be determined, for example, by monitoring the speed actual value at analog output terminals 509 / 510. If the slave drive runs very smoothly for a P gain > 2, then it will be necessary to initiate motor oscillation. This can be realized, for example, by entering inching setpoint 1 (terminal 606, H130, approx. 1%).
- reduce the P gain H113 in steps of 0.5 to 1 until oscillation stops. Then multiply the value (just reached) by 0.5 to 0.7, and store in H113.

3. For **high requirements** regarding the control quality:

- for high requirements regarding the control quality, the **speed actual value** must be precisely traced, for example, via analog output 1 (terminals 509 / 510) using a fast plotter or a storage oscilloscope. In this case, the speed actual value is compensated using H160 and the analog output gain adapted using H161, so that the speed ripple can be easily monitored.

- at average slave drive speeds, excite oscillation using inching setpoint 1 (terminal 606, parameter H130 = approx. 1 %) and monitor the response. Vary the P gain until a favorable result is achieved.
- under certain circumstances, the optimization result can be improved by increasing the **position difference smoothing** (H117). However, generally the pre-set value of 4 ms should be used.

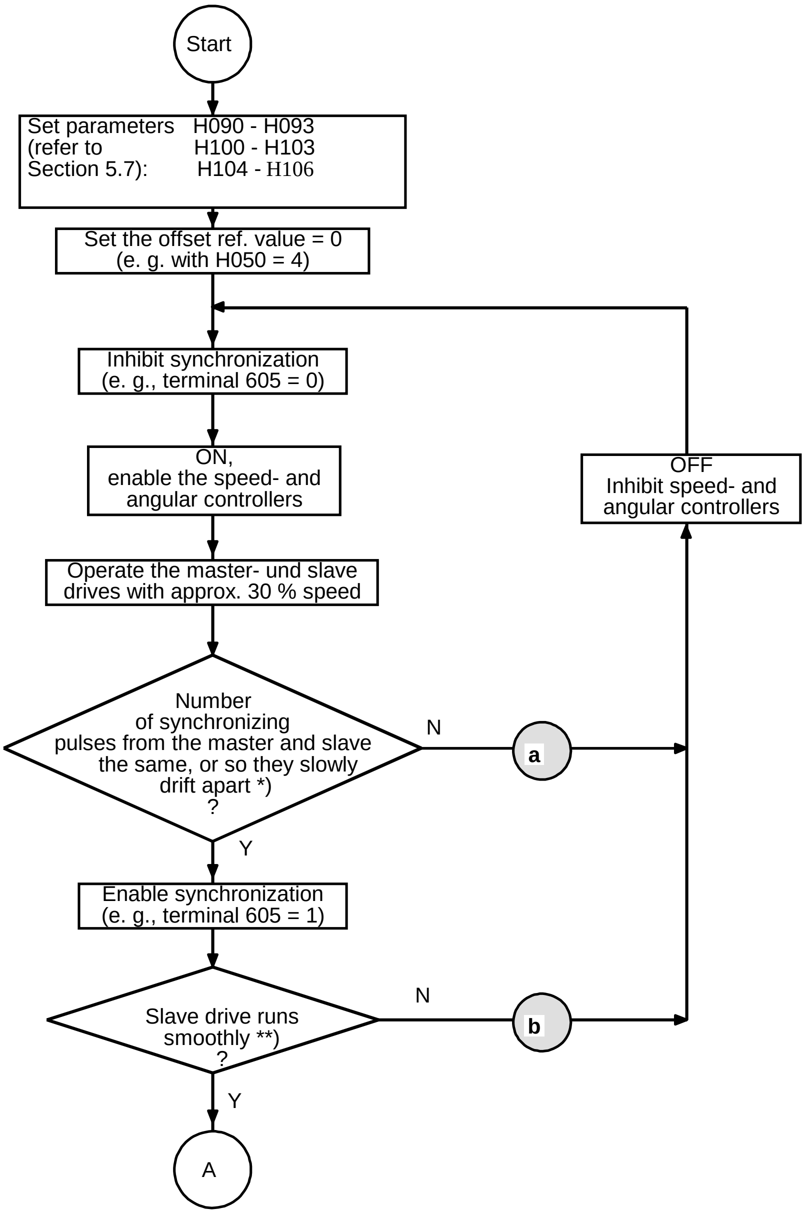
4. **Angular errors**

- The P controller results in an angular error, dependent on the P gain. If this error is noticeable, the angular controller must be parameterized as PI controller (H110 = 0). The integral action time must be set using parameter H111. The drive should be optimized and values varied towards lower Tn, starting with higher values (approx. 5 sec) of Tn.

7.3 Start-up - synchronization

Before synchronization can be commissioned the closed-loop speed and angular control must have been successfully commissioned. Synchronization must be inhibited if it is not required (using H251, e. g. terminal 605).

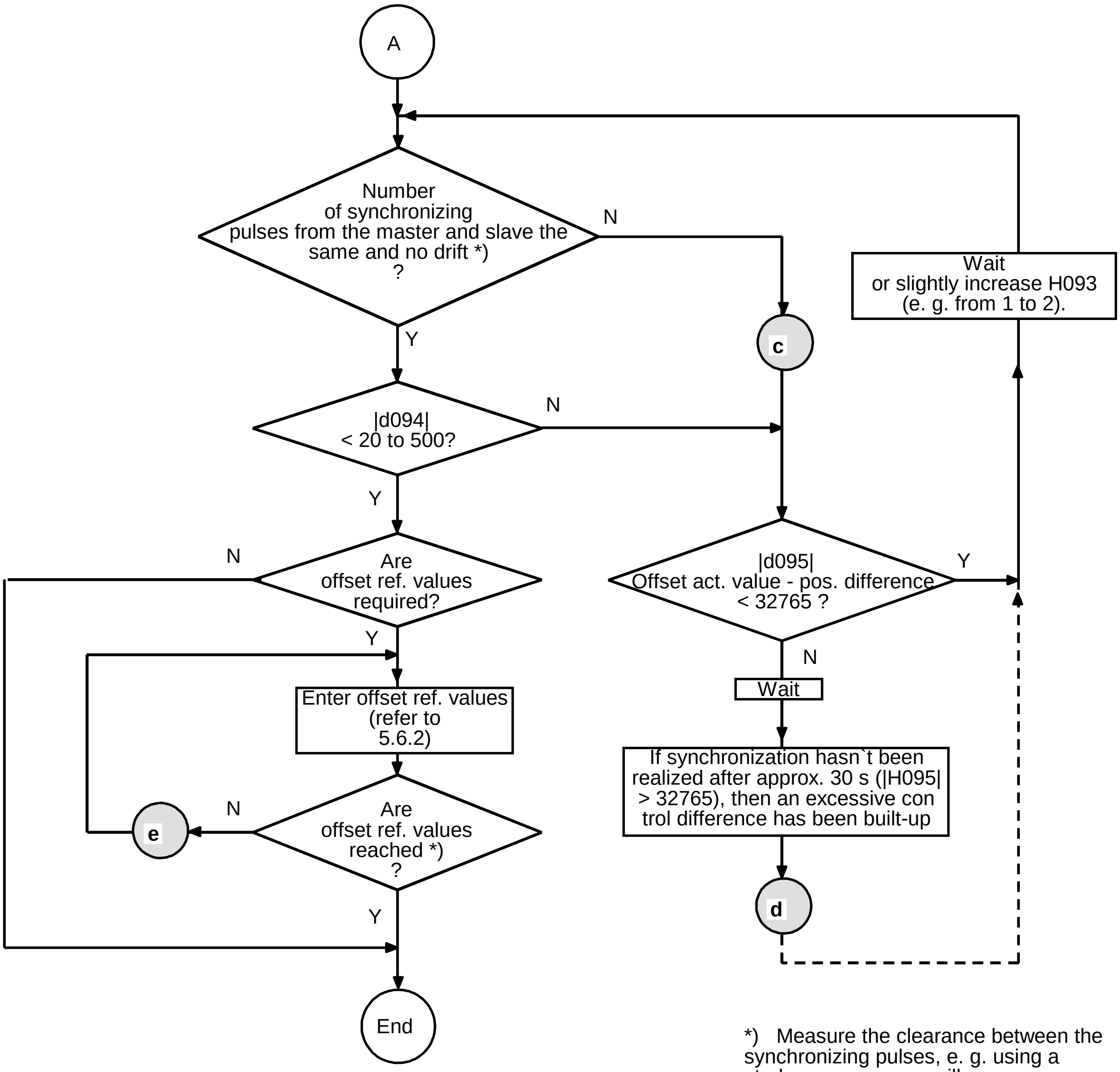
Caution:
Synchronization is only possible if the **synchronizing signals** are OK (e. g. zero pulses). The cable should be routed to ensure that it is immune to noise and it must be correctly shielded; the synchronizing signal pulse shape should be checked using an oscilloscope.



*) Check with an oscilloscope

**) Monitor the actual slave speed fluctuations < 2 % of the actual value! (e. g. analog output, terminal 509/510)

Fig. 7.3.a: Synchronization start-up (Start-A)



*) Measure the clearance between the synchronizing pulses, e. g. using a stroboscope or an oscilloscope

Fig. 7.3.b: *Synchronization start-up (A-End)*

The fault causes specified here can be used to troubleshoot the synchronization function; other causes are possible.

a) The number of synchronizing pulses from the master and slave in any time sector are not the same:
   - check the ratio (n_{set} slave r451 ≅ ü * n_{act} master d015)
   - check the synchronizing signals/signal transmitters

b) The slave drive does not run smoothly after synchronization has been enabled:
   - reduce H093 if possible (minimum = 1),
   - check the synchronizing signal characteristics
   - check the speed- and angular controller optimization; if required, re-optimize.
   - check the master drive; if required, re-optimize the master drive
   - investigate the mechanical configuration for play, torsion etc.

c) The number of synchronizing pulses from the master and slave for a particular time sector are not the same after synchronization has been enabled:
   - check the synchronizing signals/signal transmitters
   - check the parameterization (H050 to H069 and H090 to H109) -especially the synchronizing pulse numbers

d) Synchronization was not able to be realized (absolute offset actual value - position difference > 32765):
   - refer to c)
   - if d094 shows an increasing trend, then the correcting influence of the synchronization is probably too low:
   - slightly increase H093 (e. g. from 1 to 2); start again

d) Offset reference values are not reached:
   - check the parameterization (H050 to H069 and H090 to H109) (offset reference value limiting reached?)
   - check the mechanical design and if required modify

7.4 Parameterization with Simovis for Windows

Up to Simovis V5.1, the T300 parameterization can be done with SIMOVIS, like the base units thrue the PMU connection. Please refere to section 7.4.3.

7.4.1 Creating the data base for a technology type.

In order to parameterize every drive and technology type, SIMOVIS requires exact information about the number and characteristics of the available parameters, e.g. parameter numbers, value limits, etc.. This information is stored in data base files.

If a T300 with „unknown“ data base is connected (data base not available in SIMOVIS), the necessary technology data base may be created online.

In both cases it is assumed that the communication to the drives is intact.

Preconditions:

- For the learn process the technology type’s parameter set should be reset to the factory settings (refer to parameter H970).

If during the learn process the technology type’s parameter set was not reset to the factory settings, the functions refer to the status of the technology type when the data base was created and not to the factory settings.

Note: It is recommened, but not essential, that step as described above is carried out. During the learn procedure SIMOVIS also generates a file (by upreading), which is interpreted during offline mode to be the factory setting of a technology type. This file is used for example:

- when opening an offline file as the basis for the factory setting,
- when printing a parameter set, where only the changes compared with the factory setting are to be printed.

- The dialogue to create the data base of a technology type will only be displayed if the base unit, to which SIMOVIS is connected, has a slot for technology boards (MASTERDRIVES Compact units).

- If the technology board has to be registered to the base unit by parameterization (MASTERDRIVES with CU2 or CU3: parameters P90 or P91) the „learning“ process will only start if the technology board is registered.

<u>Proceed as follows:</u>

1. For MASTERDRIVES with CU2 or CU3 the technology board has to be registered

2. Reset the technology board to the factory setting.

In the nenu BUS CONFIGURATION:

3. Dependant on the Baud rate, increase the "number of request repeats" under the "extended" tab(refer to section 7.4.3.).

4. Select the drive by clicking on the lefthand mouse key, and establish the connection (clicking toolbar „connect. On/Off). The communication to the drives is intact if this toolbar changes to green colour.

5. Disconnect other drives (if available) to reduce the time required for the „learning process".

6. Disconnect all other communication systems (Profibus, Peer-to-Peer) for example by pulling off the connecting plug.

7. In the function bar, click on the button „Create data base" or
7. Select the menu Edit > Create („learn") data base.

8. In the „Create data base" dialogue (in the „technology type" folder), the bus address, type and SW version of the connected base unit can be checked. In the dropdown list box „Name technology type", select (or enter) the name of the technology type to be learned (default name: TECHN000). If a name is selected, which already exists, the data base will be overwritten by the new one.

   The technology type T300 to be learned does not make use of parameters 3000 ...3999, deactivate the checkbox „L/c parameters". The „learning" time will then be significantly reduced.

9. Click on the Start button to start creating the technology type data base

-The following „learn" process will take several minutes. Progress can be monitored in the displayed dialogue. Upon successful completion, the new technology type is available for all drives (which have a slot for technology boards) in the Add drive or Change drive dialogue. The drive should now be disconnected, and the new technology type selected in the „Change drive" dialogue.

<u>Data bases for further languages:</u> The standard software package „Angular synchronous control" supports two languages (german and english). A seperate data base for each additional language can be created. For each language selection (refere to H000) a new data base has to be created, each one must be assigned to a different technology type name, (e.g. MS340_G and MS340_E).

<u>Note:</u> Should errors be detected at the end of the learn procedure, then further information can be displayed by clicking on the „details" button. The cause of the errors (e.g. restricted parameter access) should be corrected and the learning process repeated.

7.4.2 T300 parameterization

After a technology data base has been created, the T300 can be parametrized with SIMOVIS.
(Please refer to the SIMOVIS help system if you require further information).

- Parameter list complete
  opens a parameter table (same structure as standard parameter table) with all of the parameters of the drive type, which is assigned to the actual drive window. (H and d parameter are displayed after the base unit parameter P and r)
  Double click somewhere in the appropriate line of the table to change the parameter value.

- Free parameterization:
  opens a parameter table, where parameters can be individually listed by entering parameter numbers (e.g. H010 or d016, resp. 1010 or 1016).
  Double click somewhere in the appropriate line of the table to change the parameter value.

- Download: The parameter set (Upread files, offline generated files) can be directly saved in the RAM or EEPROM memory of the drive.
  When downloading, the actual parameter values in the drive are overwritten by the parameter values in the parameter set.

7.4.3 Important notes

Note 1: Dependant on the Baud rate, increase the "number of request repeats" under the "extended" tab.

Empirical values:
38400 Baud: Number of request repeats = 200
19200 Baud: Number of request repeats = 100
9600 Baud: Number of request repeats = 50

Refer to: online help (BUSKON): Help topics > Editing projects
> Configuring the interface.

Note 2: Disconnect other drives (if available) to reduce the time required for the „learning process“.
Disconnect all other communication systems (Profibus, Peer-to-Peer) for example by pulling off the connecting plug.

Note 3: If more serial interfaces are used addition to SIMOVIS (e.g. Profibus and T300 Peer-to-Peer interface), the Peer-to-Peer baud rate should be set to values ≤ 19200 Bauds (H220 ≤ 7).
A simultaneous data transmission with several interfaces (and high baudrates) can, under these circumstances, cause a T300 overload.

8 STRUC G graphic diagram display

Several SIMADYN D - specific functions are described in this Section. They are essentially intended to assist in understanding the STRUC G diagrams in the Appendix.

8.1 Sheet structure

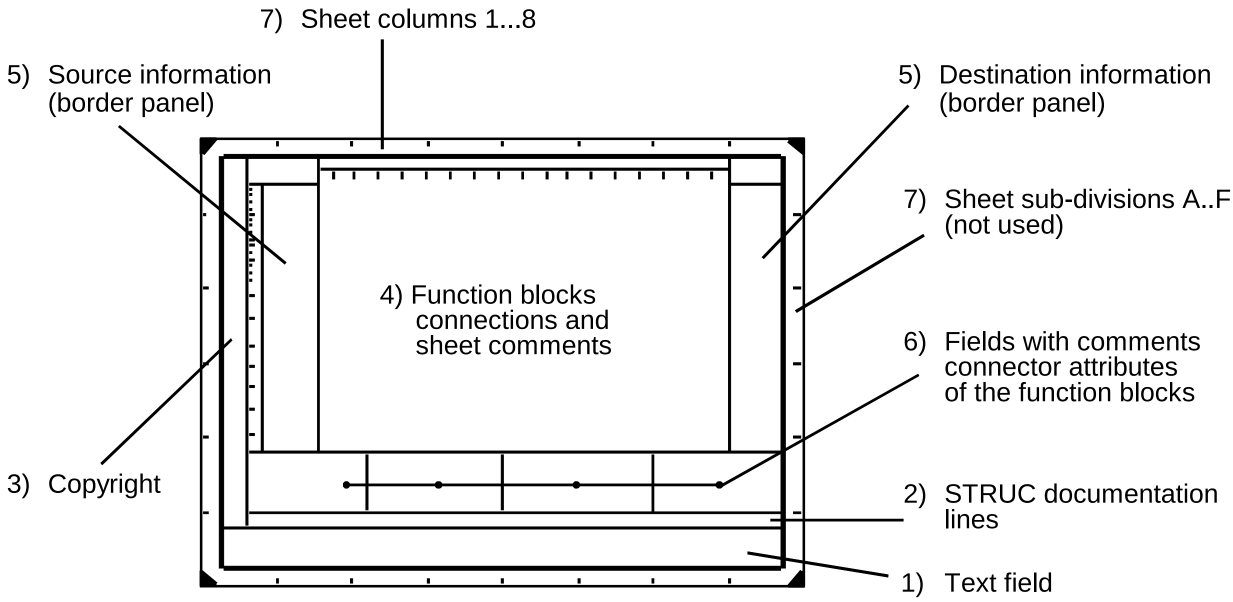


Fig. 8.1: Sheet structure for STRUC G

Explanation to Fig. 8.4:

1) Text field
The text field is laid out according to DIN 6771, Part 5.

2) **STRUC documentation line**
Information regarding the version, compiler times, libraries and STRUC configuring levels.

3) Field for **copyright** and additional documentation information.

4) Field for **function blocks, connections and sheet comments**
The individual function blocks with their connections, constants and signal designations as well as the sheet comments are located here.

5) **Source- and destination information**
Function package connections ($ quantities), are specified here with their source- and destination function packages and the associated system IDs. Hardware- and communication connections are also entered here.

6) Field for **comments and connector attributes of the function blocks**
The comments in the border strip signals, the function block comments (header line in STRUC), the connector attributes (MIN, MAX, SCAL, ...) and the connector comments are entered in this four-section field.

7) **Sheet columns**
The sheet is sub-divided along the x axis into sections 1 to 8. The displayed, but unused y axis runs from left to right, from A to F. The information is referred to the sheet columns.

8.2 Structure and display of a function block

There is a **graphic function symbol** for every function block which can be used to document the function block and the user-specific features. In addition to the input- and output signal connections, there are also signal values specified and various connector attributes, which are significant for the sequence and embedding the function block in the function package. The information is described in the Section, Connector supply.

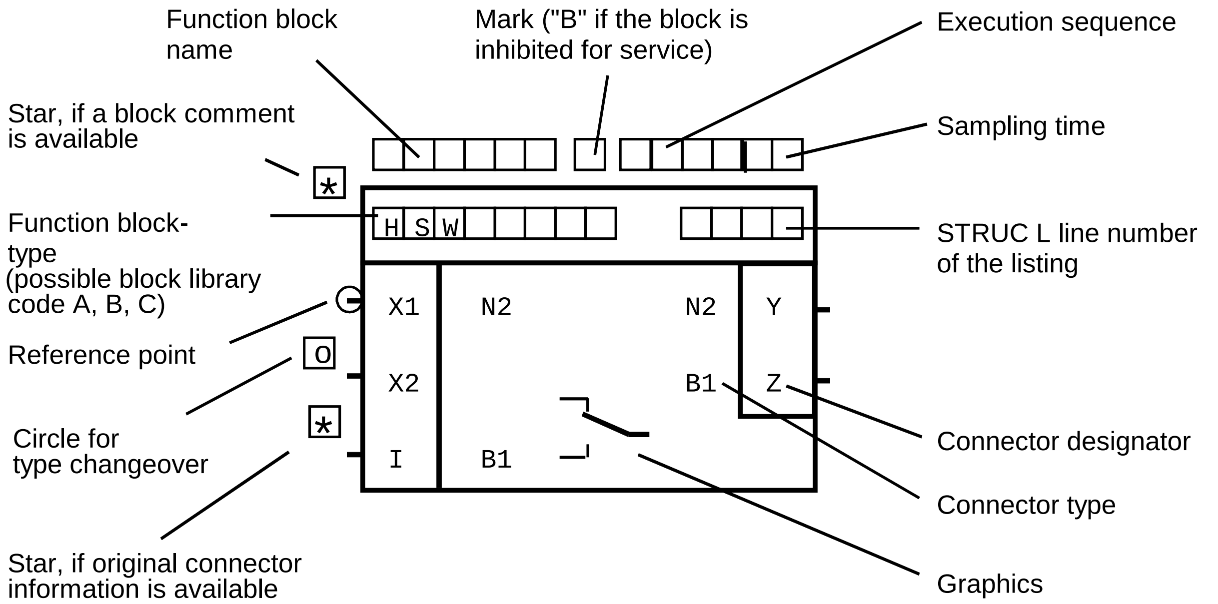


Fig. 8.2:Function block layout

8.3 Connector supply for the function blocks

The **connectors** are used to supply the function blocks with input information and output the results to other function blocks or peripheral boards.

The connectors are coded in the function blocks via the connector type and the connector designation.The connectors are supplied with signal connections, signal values (constants), signal designators, attributes (MIN, MAX, SCAL, Pn ≅ PAR = n, Mn ≅ MES=n, DATX, INIT, LOG0, LOG1) and comments. As not all of this information can be located in the graphics sections, some information is located in the comments field below the graphic field. A star at the connector indicates that this information is available.

8.4 Information in the function package

① **Local sheet connections,** as line, or letter (A..Z) within a sheet

② **Internal function package connections** to/from another sheet with source/target block, connector, sheet, column. If there is no space at the connector for target- or source information, or if several target infos are available, then the border strip is used.

③ **External function package connections,** with connection name, bus access, processor, function package, system id, sheet, column.

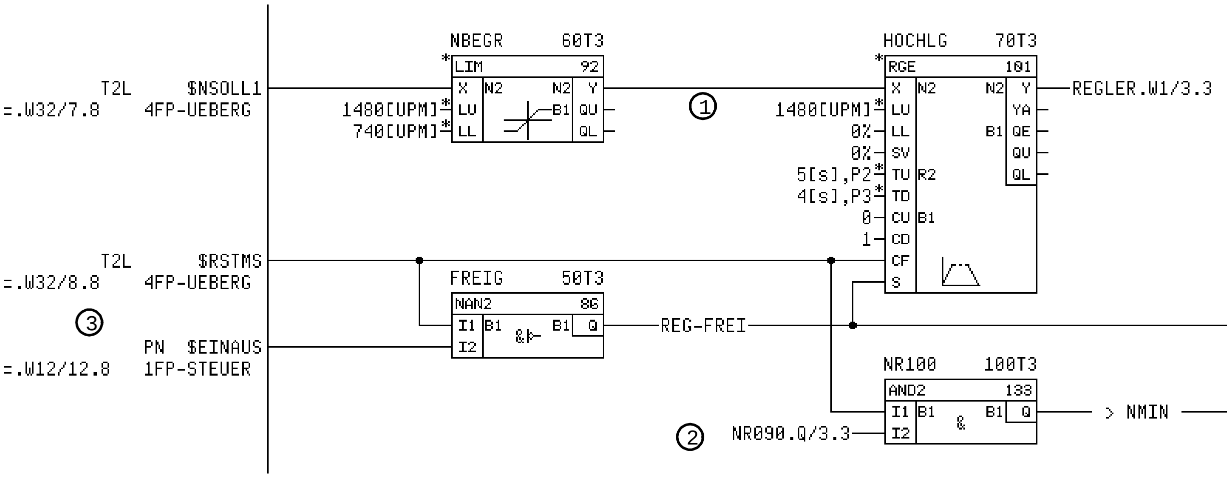


Fig. 8.4.1 Signal connection types

Function package connections **($ quantities)** provide signal transfer paths between technological function units in which the individual function packages are realized.

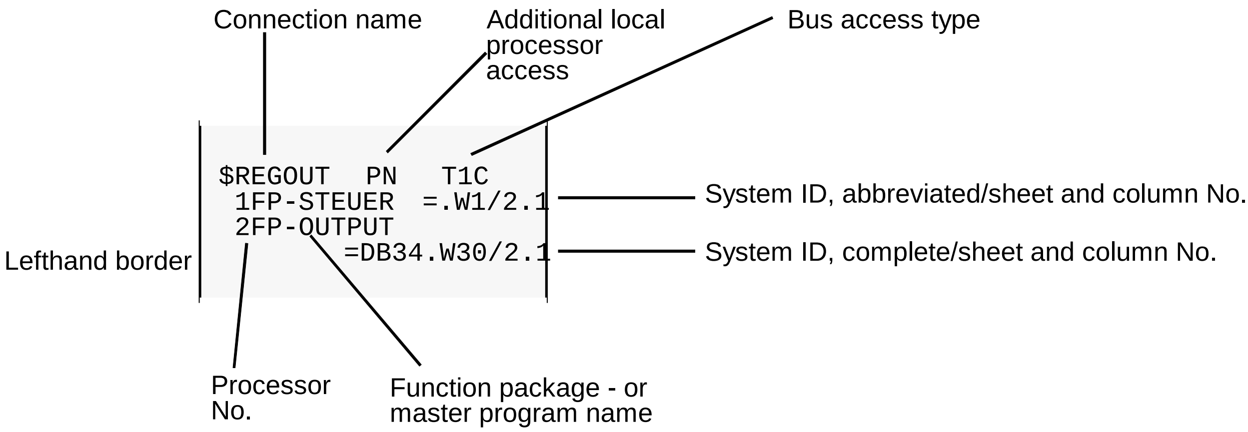


Fig. 8.4.2 Function package connection structure

9 Others

9.1 Terminology/abbreviations

AG	Automation unit
DUST	Data transfer control
FB	Function block
FP	Function package (function blocks configured to provide a complete function)
GG	Basic converter
MP	Master program (defines the hardware and software configuration)
n	Speed
n_act	Speed actual value
n_set	Speed setpoint
PG	Programming unit (e.g. PG685, PG730, PG750)
PKW	Parameter ID/value
PNU	Parameter number
PT	Technology board
T	Torque
TA	Sampling time
TP	Technological parameter
TP_xxx	Technological parameter, number xxx

9.2 Literature

/1/ User Manual User Manual *STRUC G/L/PT*

(Useful, e.g. when modifying the standard software package)

6DD1981-1AA2 German
6DD1981-1AB2 English

/2/ Recommendations for EMC-proof cabinet design with SIMOVERT MASTERDRIVES
Order No.: 6SE7087-6CX87-8CE0

(Refer also Kompendium CUVC,CUMC)

/3/ User Manual T300 (german/english)
Order No. 6SE7087-6CX84-0AH1

Is contained in T300 HW-package!

Ordering locations:

/1/

SIEMENS AG
PSWER
Postfach 3269
91050 Erlangen

/2/ /3/

SIEMENS AG
A&D DS A P1
Postfach 3269
91050 Erlangen

10 Changes

Version 1.1: 17.03.95 First Software

Version 1.2: 06.04.95
little changes concerning communications

Version 1.30: 14.12.95
- new T300 peer-to-peer software: **H220 with different settings!!!!!!!**
  (higher baud rate, no deadtime, lower computation time);
  transmitter and receiver in a 4ms sampling time;
- EEPROM can be erased
- parameter write inhibit can be cancelled using a button;
- system error bits are displayed instead of a 7-segment code;
- offset actual values as I4- instead of I2 parameter
- extremely high synchronous pulse numbers can be checked via I4 parameters
- several parameter names have been optimized
- every setpoint change entered via the thumbwheel switch is stored in the NOVRAM. At the new power-up, the last selected value is automatically used.
- control word bits 3-5 are transferred from the communications board (CB1) to the basic drive converter.

Version 1.40: 12.01.96
- setpoint inputs (up to 2x 16-bit values) are now also possible via the USS interface of the basic drive converter (involves H040, H048, H050, H070, H080)
- the selectability and changeability of the ratio has been expanded;
  H047, H048, H049 are new; (partially already in V1.30):
  - percentage change of a selected ratio
  - addition of a further fixed value
  - percentage change can be entered via an analog input
- the angular controller is enabled only when the setpoint is enabled
- the synchronizing command is only enabled when the angular controller is enabled
- EEPROM can be erased using H970
  (parameter number corresponding to ”factory setting”, basic drive converter)
- fixed value parameter H073 to enter a speed (master-)setpoint (for testing)
- analog outputs 3 and 4 (terminals 521/522, 523/524; corresponding to H170, H171) in 4 ms instead of 16 ms
- Pre-assignment H245/H246 „Source setpoint enable“ on fixed 1 (enabled)
- Pre-assignment H100,H102=4096
- High word synchronizing pulse number (H101): also negative values can be parametrized.

10 Changes

Version 1.50: 31.05.96
-Using **STRUC V4.2.3**:
- Korrection of Parameter handling (SIMOVIS)
- Peer-to-Peer-blocs now in FBSLIB
- having negative ratio a negative displacement is allowed
- parameters **H275,H276,H277** added

Version 1.60: 24.07.97
- Using **STRUC V4.2.4** with the appropriate new features:
- H270 new: The value range of the offset setpoint can be changed.

Version 1.70: 08.02.99
- Optimization initialization PKW-mechanism for Profibus.
- Problems by synchonizing with Linear axis with only one synchronizing signal where solved. Onwards V1.7, the library FBSLT1 with version 990204V420, or newer is required

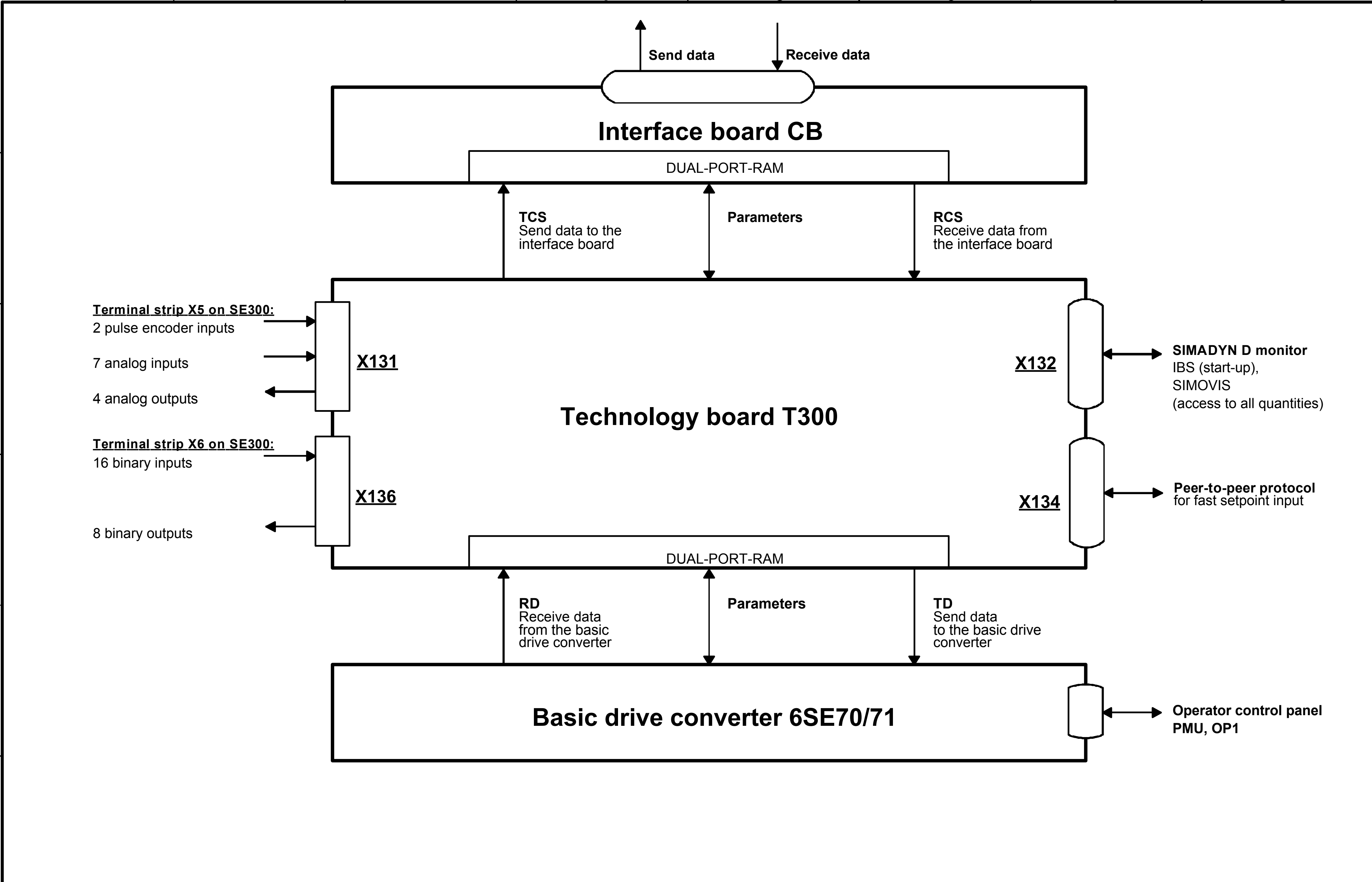
11 Appendix: Block diagrams, Short parameter list, STRUC G Diagrams

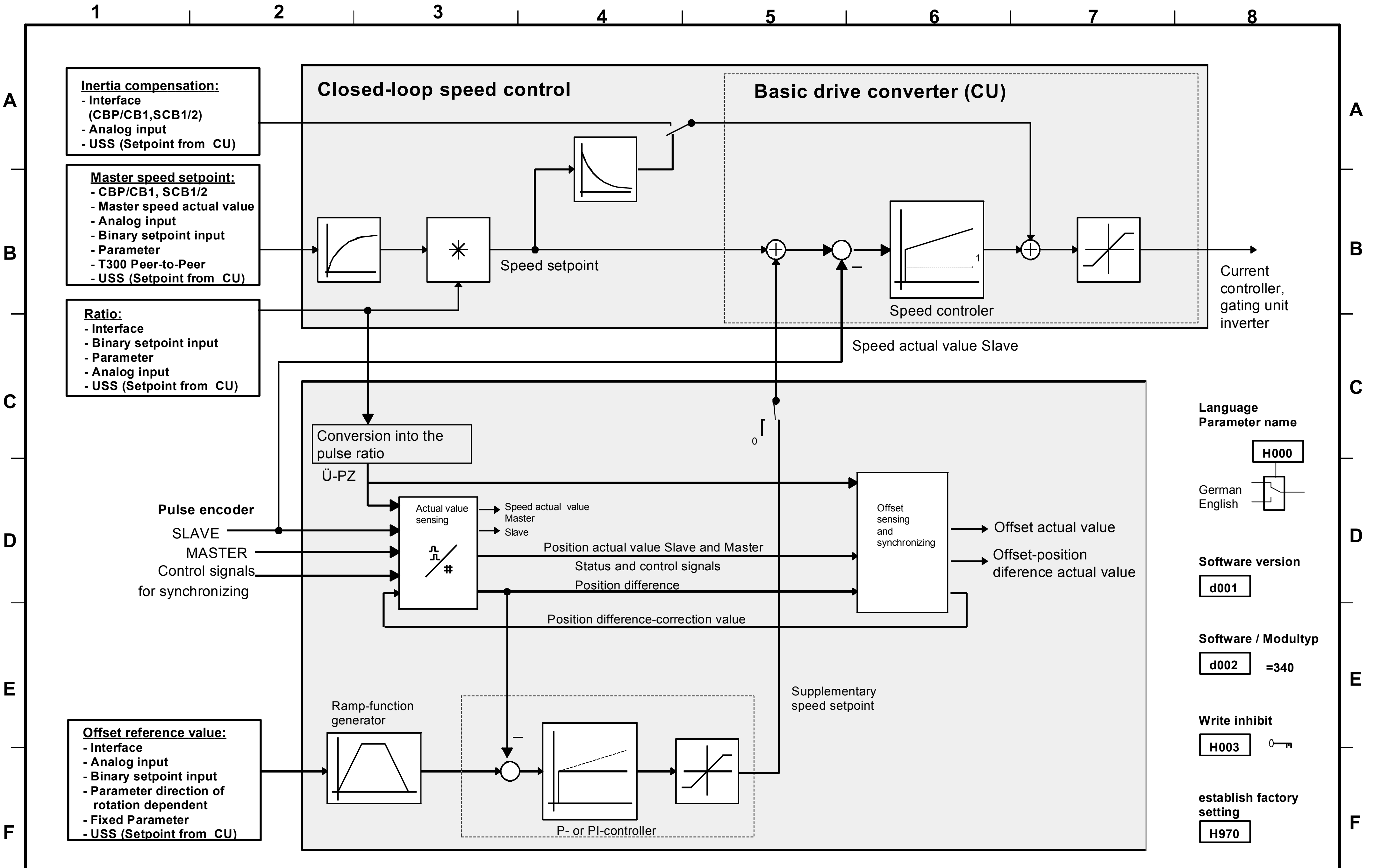
Block diagrams

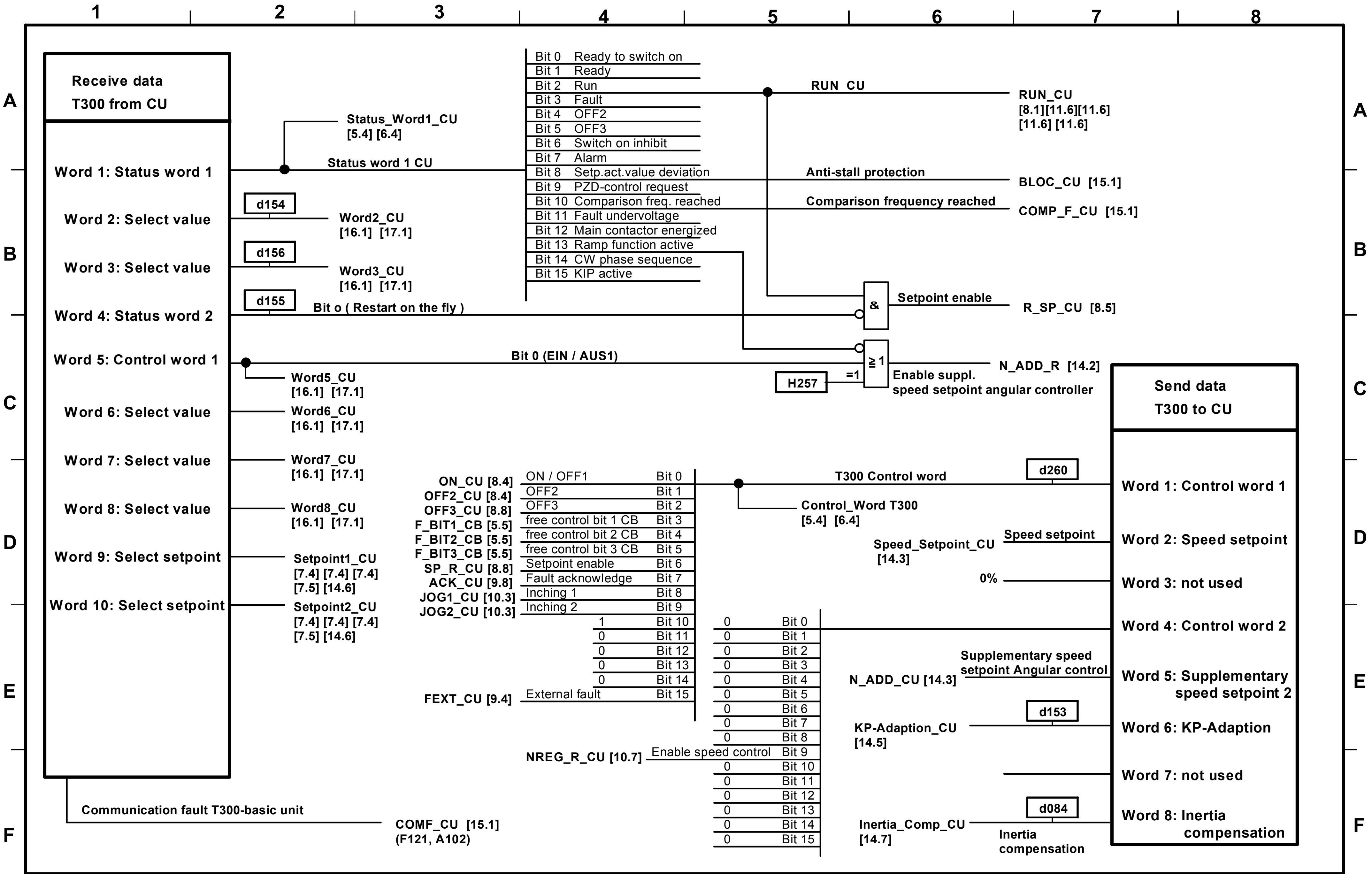
Short parameter list

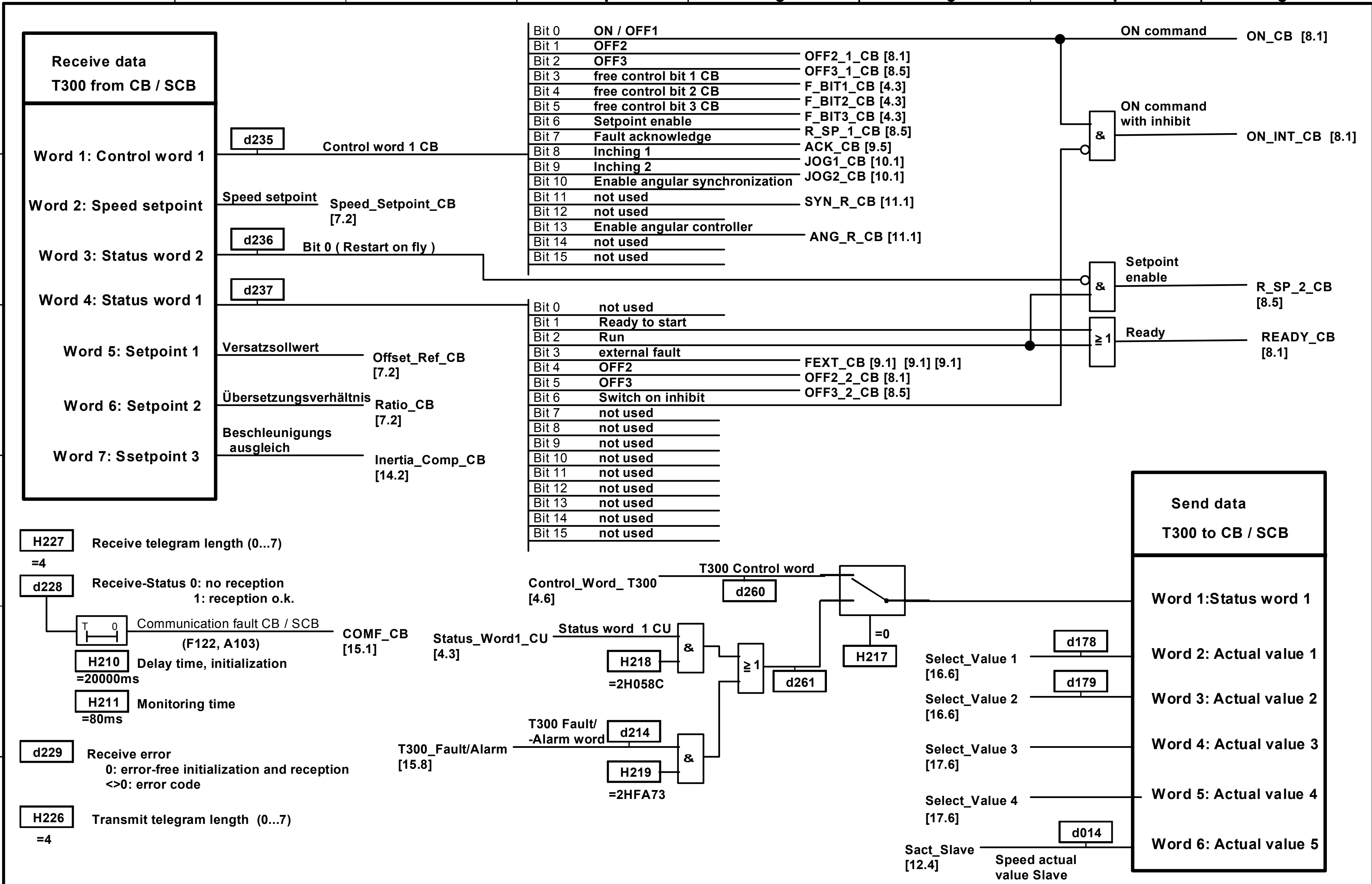
STRUC G function diagrams

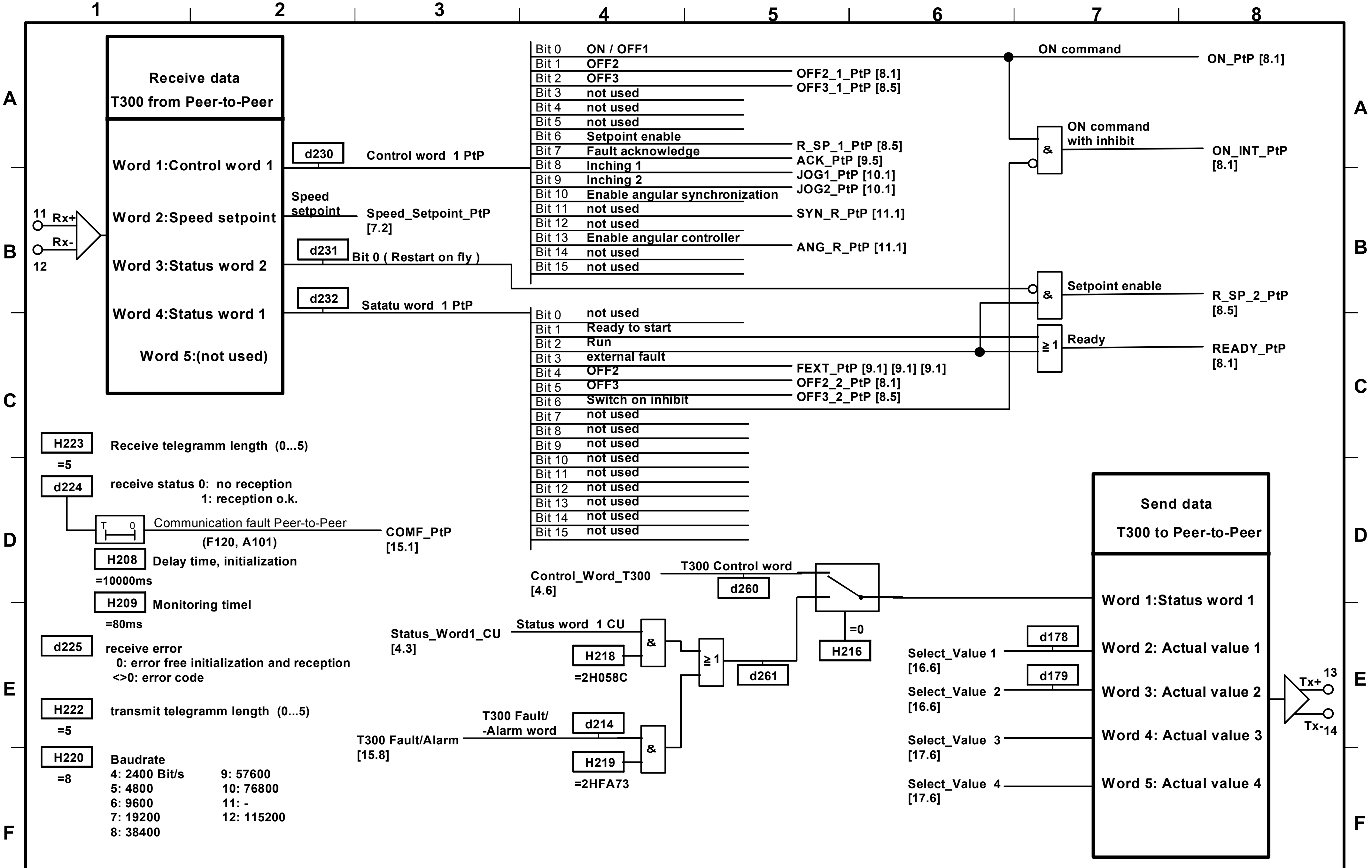
List of contents "Standard software package Angular Synchronous Control" for 6SE70/71

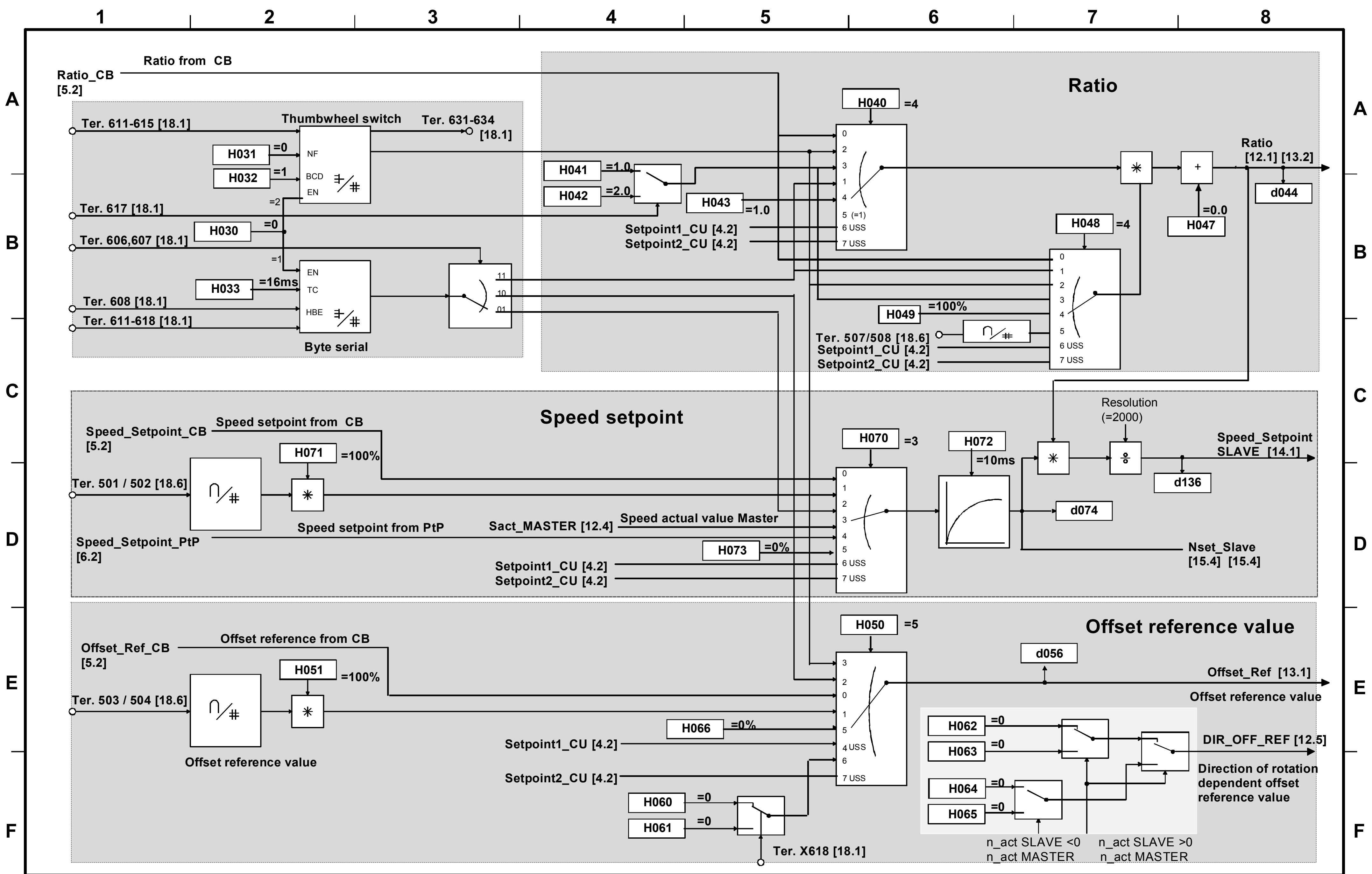

Send data
Receive data
Interface board CB
DUAL-PORT-RAM
TCS
Send data to the interface board
Parameters
RCS
Receive data from the interface board
Terminal strip X5 on SE300:
2 pulse encoder inputs
7 analog inputs
4 analog outputs
X131
Terminal strip X6 on SE300:
16 binary inputs
8 binary outputs
X136
Technology board T300
X132
SIMADYN D monitor
IBS (start-up),
SIMOVIS
(access to all quantities)
X134
Peer-to-peer protocol
for fast setpoint input
DUAL-PORT-RAM
RD
Receive data from the basic drive converter
Parameters
TD
Send data to the basic drive converter
Basic drive converter 6SE70/71
Operator control panel
PMU, OP1

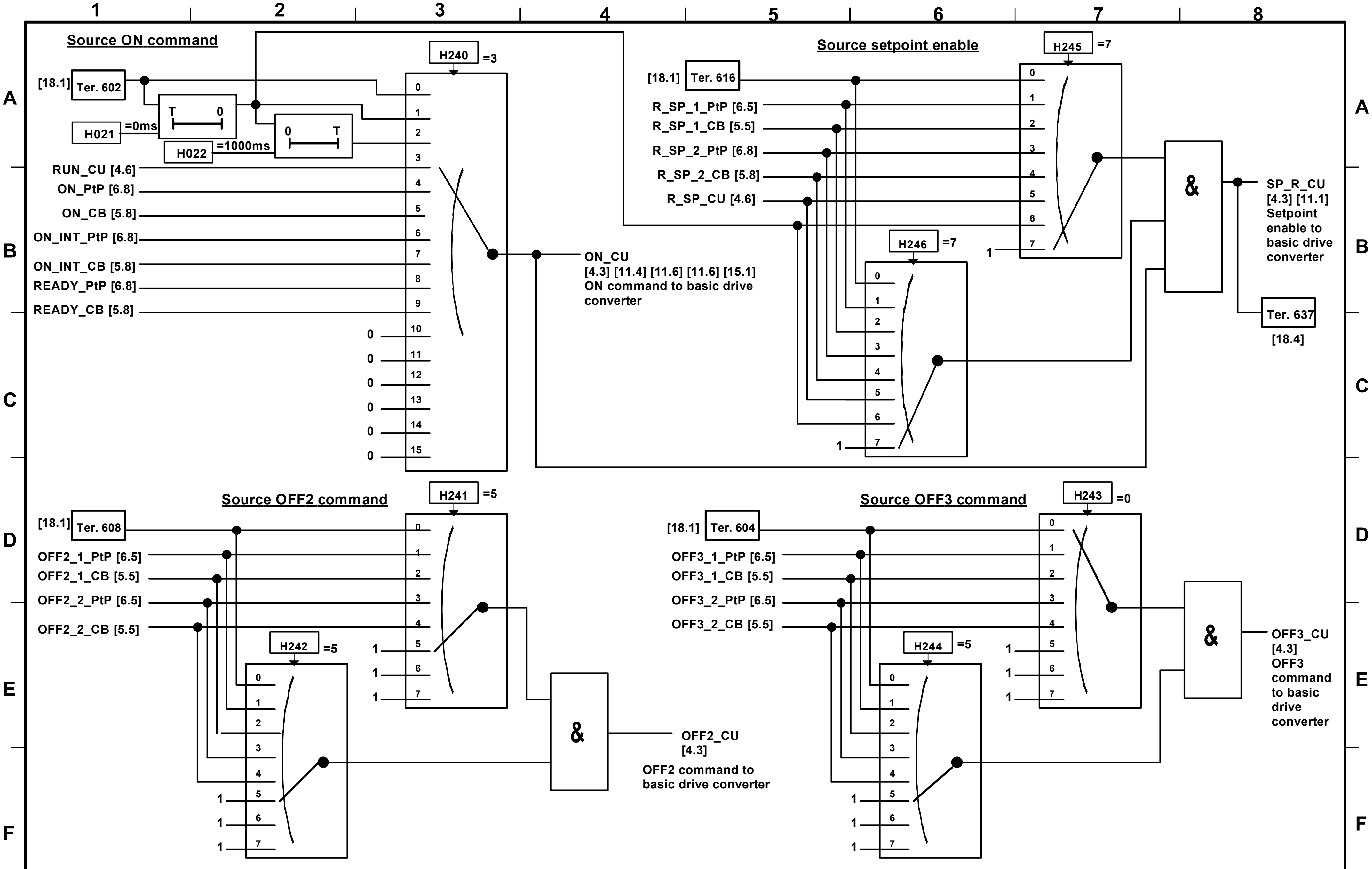

Inertia compensation:
- Interface
(CBP/CB1,SCB1/2)
- Analog input
- USS (Setpoint from CU)
Master speed setpoint:
- CBP/CB1, SCB1/2
- Master speed actual value
- Analog input
- Binary setpoint input
- Parameter
- T300 Peer-to-Peer
- USS (Setpoint from CU)
Ratio:
- Interface
- Binary setpoint input
- Parameter
- Analog input
- USS (Setpoint from CU)
Closed-loop speed control
Basic drive converter (CU)
Speed setpoint
Speed controler
Current controller, gating unit inverter
Speed actual value Slave
Conversion into the pulse ratio
Ü-PZ
Pulse encoder
SLAVE
MASTER
Control signals for synchronizing
Actual value sensing
Speed actual value
Master
Slave
Position actual value Slave and Master
Status and control signals
Position difference
Position difference-correction value
Offset sensing and synchronizing
Offset actual value
Offset-position diference actual value
Supplementary speed setpoint
Ramp-function generator
P- or PI-controller
Offset reference value:
- Interface
- Analog input
- Binary setpoint input
- Parameter direction of rotation dependent
- Fixed Parameter
- USS (Setpoint from CU)
Language
Parameter name
H000
German
English
Software version
d001
Software / Modultyp
d002
=340
Write inhibit
H003
establish factory setting
H970


1 2 3 4 5 6 7 8
A B C D E F
Receive data
T300 from CU
Word 1: Status word 1
Word 2: Select value
Word 3: Select value
Word 4: Status word 2
Word 5: Control word 1
Word 6: Select value
Word 7: Select value
Word 8: Select value
Word 9: Select setpoint
Word 10: Select setpoint
Status_Word1_CU
[5.4] [6.4]
Status word 1 CU
d154
Word2_CU
[16.1] [17.1]
d156
Word3_CU
[16.1] [17.1]
d155
Bit o (Restart on the fly)
Bit 0 (EIN / AUS1)
Word5_CU
[16.1] [17.1]
Word6_CU
[16.1] [17.1]
Word7_CU
[16.1] [17.1]
Word8_CU
[16.1] [17.1]
Setpoint1_CU
[7.4] [7.4] [7.4]
[7.5] [14.6]
Setpoint2_CU
[7.4] [7.4] [7.4]
[7.5] [14.6]
Bit 0 Ready to switch on
Bit 1 Ready
Bit 2 Run
Bit 3 Fault
Bit 4 OFF2
Bit 5 OFF3
Bit 6 Switch on inhibit
Bit 7 Alarm
Bit 8 Setp.act.value deviation
Bit 9 PZD-control request
Bit 10 Comparison freq. reached
Bit 11 Fault undervoltage
Bit 12 Main contactor energized
Bit 13 Ramp function active
Bit 14 CW phase sequence
Bit 15 KIP active
RUN CU
RUN_CU
[8.1][11.6][11.6]
[11.6] [11.6]
Anti-stall protection
BLOC_CU [15.1]
Comparison frequency reached
COMP_F_CU [15.1]
&
Setpoint enable
R_SP_CU [8.5]
≥ 1
=1
H257
N_ADD_R [14.2]
Enable suppl.
speed setpoint angular controller
Send data
T300 to CU
Word 1: Control word 1
Word 2: Speed setpoint
Word 3: not used
Word 4: Control word 2
Word 5: Supplementary
speed setpoint 2
Word 6: KP-Adaption
Word 7: not used
Word 8: Inertia
compensation
ON_CU [8.4]
OFF2_CU [8.4]
OFF3_CU [8.8]
F_BIT1_CB [5.5]
F_BIT2_CB [5.5]
F_BIT3_CB [5.5]
SP_R_CU [8.8]
ACK_CU [9.8]
JOG1_CU [10.3]
JOG2_CU [10.3]
FEXT_CU [9.4]
ON / OFF1 Bit 0
OFF2 Bit 1
OFF3 Bit 2
free control bit 1 CB Bit 3
free control bit 2 CB Bit 4
free control bit 3 CB Bit 5
Setpoint enable Bit 6
Fault acknowledge Bit 7
Inching 1 Bit 8
Inching 2 Bit 9
1 Bit 10
0 Bit 11
0 Bit 12
0 Bit 13
0 Bit 14
External fault Bit 15
T300 Control word
d260
Control_Word T300
[5.4] [6.4]
Speed setpoint
Speed_Setpoint_CU
[14.3]
0%
0 Bit 0
0 Bit 1
0 Bit 2
0 Bit 3
0 Bit 4
0 Bit 5
0 Bit 6
0 Bit 7
0 Bit 8
Enable speed control Bit 9
0 Bit 10
0 Bit 11
0 Bit 12
0 Bit 13
0 Bit 14
0 Bit 15
NREG_R_CU [10.7]
Supplementary speed
setpoint Angular control
N_ADD_CU [14.3]
d153
KP-Adaption_CU
[14.5]
d084
Inertia_Comp_CU
[14.7]
Inertia
compensation
Communication fault T300-basic unit
COMF_CU [15.1]
(F121, A102)

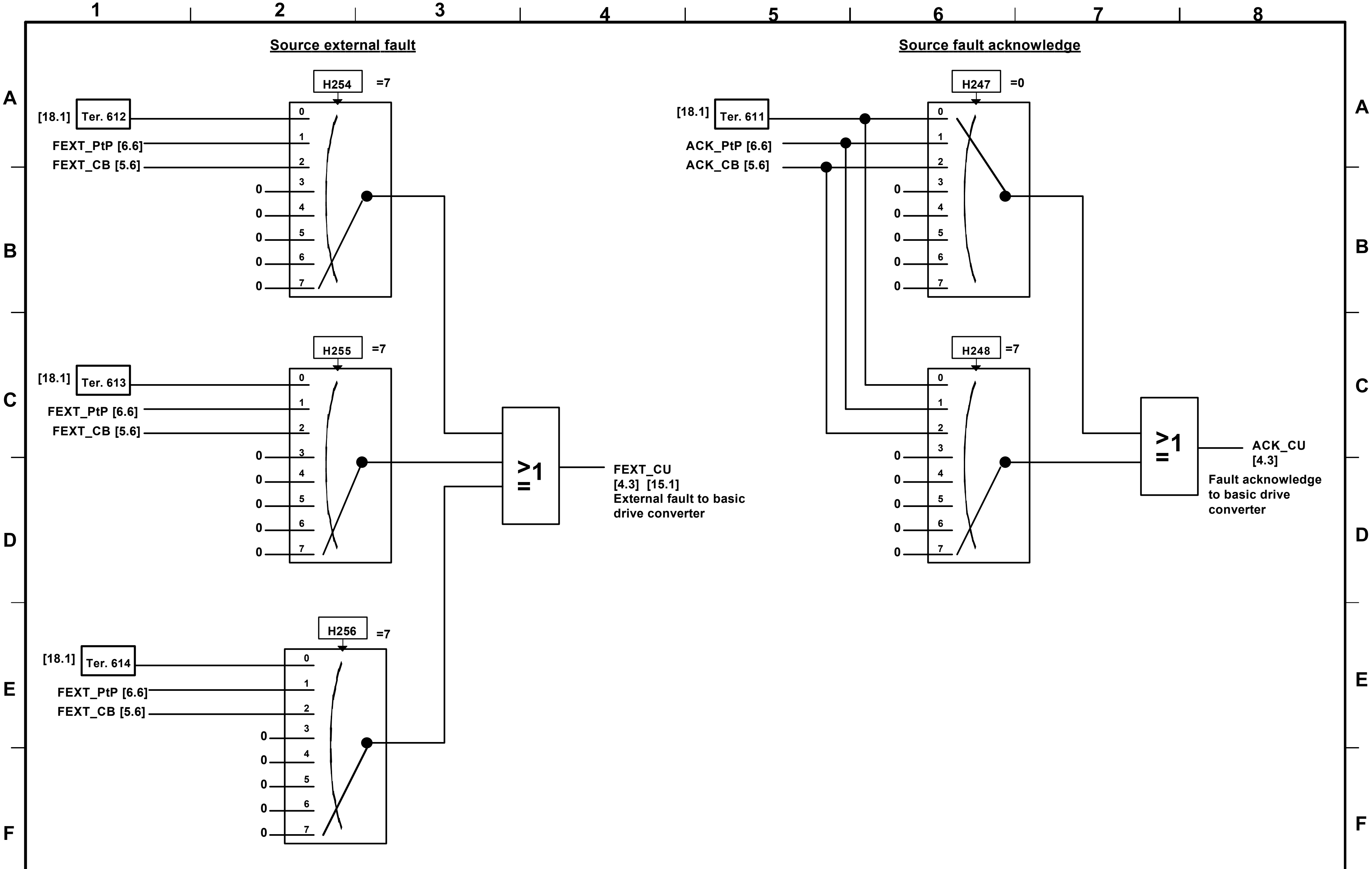

Receive data
T300 from CB / SCB
Word 1: Control word 1
Word 2: Speed setpoint
Word 3: Status word 2
Word 4: Status word 1
Word 5: Setpoint 1
Word 6: Setpoint 2
Word 7: Ssetpoint 3
d235
Control word 1 CB
Speed setpoint
Speed_Setpoint_CB [7.2]
d236
Bit 0 (Restart on fly)
d237
Versatzsollwert
Offset_Ref_CB [7.2]
Übersetzungsverhältnis
Ratio_CB [7.2]
Beschleunigungs ausgleich
Inertia_Comp_CB [14.2]
Bit 0 ON / OFF1
Bit 1 OFF2
Bit 2 OFF3
Bit 3 free control bit 1 CB
Bit 4 free control bit 2 CB
Bit 5 free control bit 3 CB
Bit 6 Setpoint enable
Bit 7 Fault acknowledge
Bit 8 Inching 1
Bit 9 Inching 2
Bit 10 Enable angular synchronization
Bit 11 not used
Bit 12 not used
Bit 13 Enable angular controller
Bit 14 not used
Bit 15 not used
OFF2_1_CB [8.1]
OFF3_1_CB [8.5]
F_BIT1_CB [4.3]
F_BIT2_CB [4.3]
F_BIT3_CB [4.3]
R_SP_1_CB [8.5]
ACK_CB [9.5]
JOG1_CB [10.1]
JOG2_CB [10.1]
SYN_R_CB [11.1]
ANG_R_CB [11.1]
ON command
ON_CB [8.1]
ON command with inhibit
ON_INT_CB [8.1]
&
Setpoint enable
R_SP_2_CB [8.5]
Ready
READY_CB [8.1]
≥ 1
Bit 0 not used
Bit 1 Ready to start
Bit 2 Run
Bit 3 external fault
Bit 4 OFF2
Bit 5 OFF3
Bit 6 Switch on inhibit
Bit 7 not used
Bit 8 not used
Bit 9 not used
Bit 10 not used
Bit 11 not used
Bit 12 not used
Bit 13 not used
Bit 14 not used
Bit 15 not used
FEXT_CB [9.1] [9.1] [9.1]
OFF2_2_CB [8.1]
OFF3_2_CB [8.5]
H227 Receive telegram length (0...7)
=4
d228 Receive-Status 0: no reception
1: reception o.k.
T 0
Communication fault CB / SCB
(F122, A103)
COMF_CB [15.1]
H210 Delay time, initialization
=20000ms
H211 Monitoring time
=80ms
d229 Receive error
0: error-free initialization and reception
<>0: error code
H226 Transmit telegram length (0...7)
=4
Control_Word_ T300 [4.6]
T300 Control word
d260
=0
H217
Status_Word1_CU [4.3]
Status word 1 CU
H218
=2H058C
d261
T300_Fault/Alarm [15.8]
T300 Fault/ -Alarm word
d214
H219
=2HFA73
Send data
T300 to CB / SCB
Word 1:Status word 1
Word 2: Actual value 1
Word 3: Actual value 2
Word 4: Actual value 3
Word 5: Actual value 4
Word 6: Actual value 5
d178
d179
d014
Select_Value 1 [16.6]
Select_Value 2 [16.6]
Select_Value 3 [17.6]
Select_Value 4 [17.6]
Sact_Slave [12.4]
Speed actual value Slave


Receive data
T300 from Peer-to-Peer
Word 1:Control word 1
Word 2:Speed setpoint
Word 3:Status word 2
Word 4:Status word 1
Word 5:(not used)
11 Rx+
Rx- 12
d230
Control word 1 PtP
Speed setpoint
Speed_Setpoint_PtP [7.2]
d231
Bit 0 (Restart on fly)
d232
Satatu word 1 PtP
Bit 0 ON / OFF1
Bit 1 OFF2
Bit 2 OFF3
Bit 3 not used
Bit 4 not used
Bit 5 not used
Bit 6 Setpoint enable
Bit 7 Fault acknowledge
Bit 8 Inching 1
Bit 9 Inching 2
Bit 10 Enable angular synchronization
Bit 11 not used
Bit 12 not used
Bit 13 Enable angular controller
Bit 14 not used
Bit 15 not used
ON command
ON_PtP [8.1]
OFF2_1_PtP [8.1]
OFF3_1_PtP [8.5]
ON command with inhibit
ON_INT_PtP [8.1]
R_SP_1_PtP [8.5]
ACK_PtP [9.5]
JOG1_PtP [10.1]
JOG2_PtP [10.1]
SYN_R_PtP [11.1]
ANG_R_PtP [11.1]
Setpoint enable
R_SP_2_PtP [8.5]
Ready
READY_PtP [8.1]
Bit 0 not used
Bit 1 Ready to start
Bit 2 Run
Bit 3 external fault
Bit 4 OFF2
Bit 5 OFF3
Bit 6 Switch on inhibit
Bit 7 not used
Bit 8 not used
Bit 9 not used
Bit 10 not used
Bit 11 not used
Bit 12 not used
Bit 13 not used
Bit 14 not used
Bit 15 not used
FEXT_PtP [9.1] [9.1] [9.1]
OFF2_2_PtP [8.1]
OFF3_2_PtP [8.5]
H223 Receive telegramm length (0...5)
=5
d224 receive status 0: no reception
1: reception o.k.
Communication fault Peer-to-Peer
(F120, A101)
COMF_PtP [15.1]
H208 Delay time, initialization
=10000ms
H209 Monitoring timel
=80ms
d225 receive error
0: error free initialization and reception
<>0: error code
H222 transmit telegramm length (0...5)
=5
H220 Baudrate
=8
4: 2400 Bit/s
5: 4800
6: 9600
7: 19200
8: 38400
9: 57600
10: 76800
11: -
12: 115200
Control_Word_T300 [4.6]
T300 Control word
d260
Status_Word1_CU [4.3]
Status word 1 CU
H218
=2H058C
d261
H216
=0
T300 Fault/Alarm [15.8]
T300 Fault/ -Alarm word
d214
H219
=2HFA73
Send data
T300 to Peer-to-Peer
Word 1:Status word 1
Word 2: Actual value 1
Word 3: Actual value 2
Word 4: Actual value 3
Word 5: Actual value 4
d178
d179
Select_Value 1 [16.6]
Select_Value 2 [16.6]
Select_Value 3 [17.6]
Select_Value 4 [17.6]
Tx+ 13
Tx- 14


Ratio
Ratio_CB [5.2]
Ratio from CB
Ter. 611-615 [18.1]
Thumbwheel switch
Ter. 631-634 [18.1]
H031 =0
NF
H032 =1
BCD
EN
=2
Ter. 617 [18.1]
H030 =0
Ter. 606,607 [18.1]
=1
EN
H033 =16ms
TC
Ter. 608 [18.1]
HBE
Ter. 611-618 [18.1]
Byte serial
11
10
01
H041 =1.0
H042 =2.0
H043 =1.0
Setpoint1_CU [4.2]
Setpoint2_CU [4.2]
H040 =4
0
2
3
1
4
5 (=1)
6 USS
7 USS
H048 =4
H049 =100%
Ter. 507/508 [18.6]
Setpoint1_CU [4.2]
Setpoint2_CU [4.2]
H047 =0.0
Ratio [12.1] [13.2]
d044
Speed setpoint
Speed_Setpoint_CB [5.2]
Speed setpoint from CB
H071 =100%
Ter. 501 / 502 [18.6]
Speed setpoint from PtP
Speed_Setpoint_PtP [6.2]
Sact_MASTER [12.4]
Speed actual value Master
H073 =0%
Setpoint1_CU [4.2]
Setpoint2_CU [4.2]
H070 =3
H072 =10ms
d074
Resolution (=2000)
Speed_Setpoint SLAVE [14.1]
d136
Nset_Slave [15.4] [15.4]
Offset reference value
Offset_Ref_CB [5.2]
Offset reference from CB
H051 =100%
Ter. 503 / 504 [18.6]
Offset reference value
H066 =0%
Setpoint1_CU [4.2]
Setpoint2_CU [4.2]
H060 =0
H061 =0
Ter. X618 [18.1]
H050 =5
d056
Offset_Ref [13.1]
Offset reference value
H062 =0
H063 =0
H064 =0
H065 =0
DIR_OFF_REF [12.5]
Direction of rotation dependent offset reference value
n_act SLAVE <0 n_act MASTER
n_act SLAVE >0 n_act MASTER

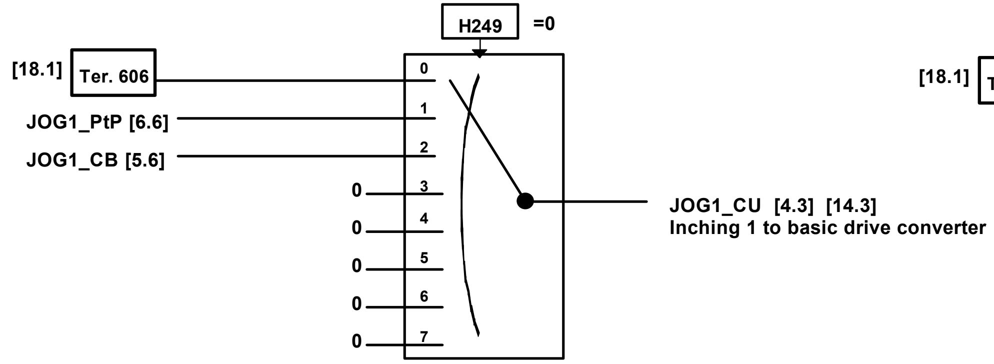


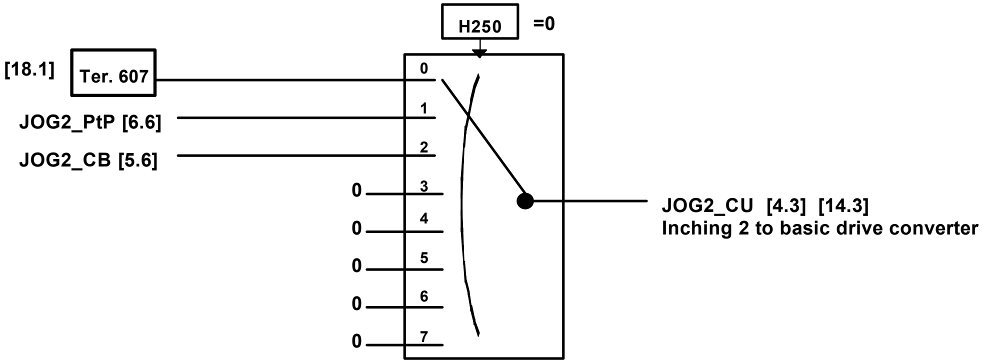
Source ON command
[18.1] Ter. 602
H021 =0ms
H022 =1000ms
H240 =3
RUN_CU [4.6]
ON_PtP [6.8]
ON_CB [5.8]
ON_INT_PtP [6.8]
ON_INT_CB [5.8]
READY_PtP [6.8]
READY_CB [5.8]
ON_CU
[4.3] [11.4] [11.6] [11.6] [15.1]
ON command to basic drive converter
Source setpoint enable
[18.1] Ter. 616
R_SP_1_PtP [6.5]
R_SP_1_CB [5.5]
R_SP_2_PtP [6.8]
R_SP_2_CB [5.8]
R_SP_CU [4.6]
H245 =7
H246 =7
&
SP_R_CU
[4.3] [11.1]
Setpoint enable to basic drive converter
Ter. 637
[18.4]
Source OFF2 command
[18.1] Ter. 608
OFF2_1_PtP [6.5]
OFF2_1_CB [5.5]
OFF2_2_PtP [6.5]
OFF2_2_CB [5.5]
H241 =5
H242 =5
&
OFF2_CU
[4.3]
OFF2 command to basic drive converter
Source OFF3 command
[18.1] Ter. 604
OFF3_1_PtP [6.5]
OFF3_1_CB [5.5]
OFF3_2_PtP [6.5]
OFF3_2_CB [5.5]
H243 =0
H244 =5
&
OFF3_CU
[4.3]
OFF3 command to basic drive converter



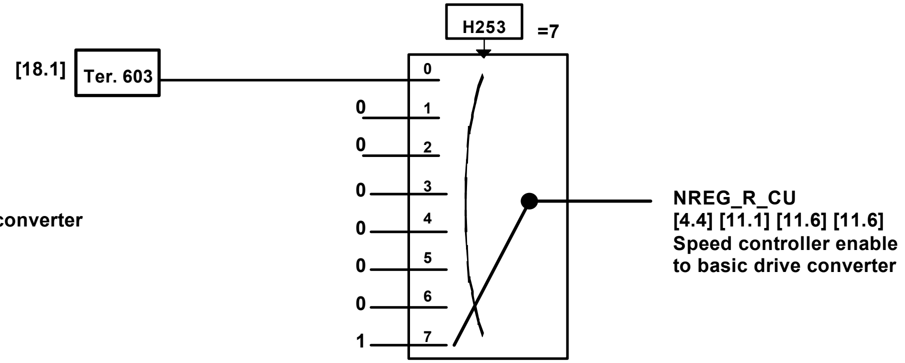
Source external fault
H254 =7
[18.1] Ter. 612
FEXT_PtP [6.6]
FEXT_CB [5.6]
H255 =7
[18.1] Ter. 613
FEXT_PtP [6.6]
FEXT_CB [5.6]
H256 =7
[18.1] Ter. 614
FEXT_PtP [6.6]
FEXT_CB [5.6]
≥1
FEXT_CU
[4.3] [15.1]
External fault to basic drive converter
Source fault acknowledge
H247 =0
[18.1] Ter. 611
ACK_PtP [6.6]
ACK_CB [5.6]
H248 =7
≥1
ACK_CU
[4.3]
Fault acknowledge to basic drive converter

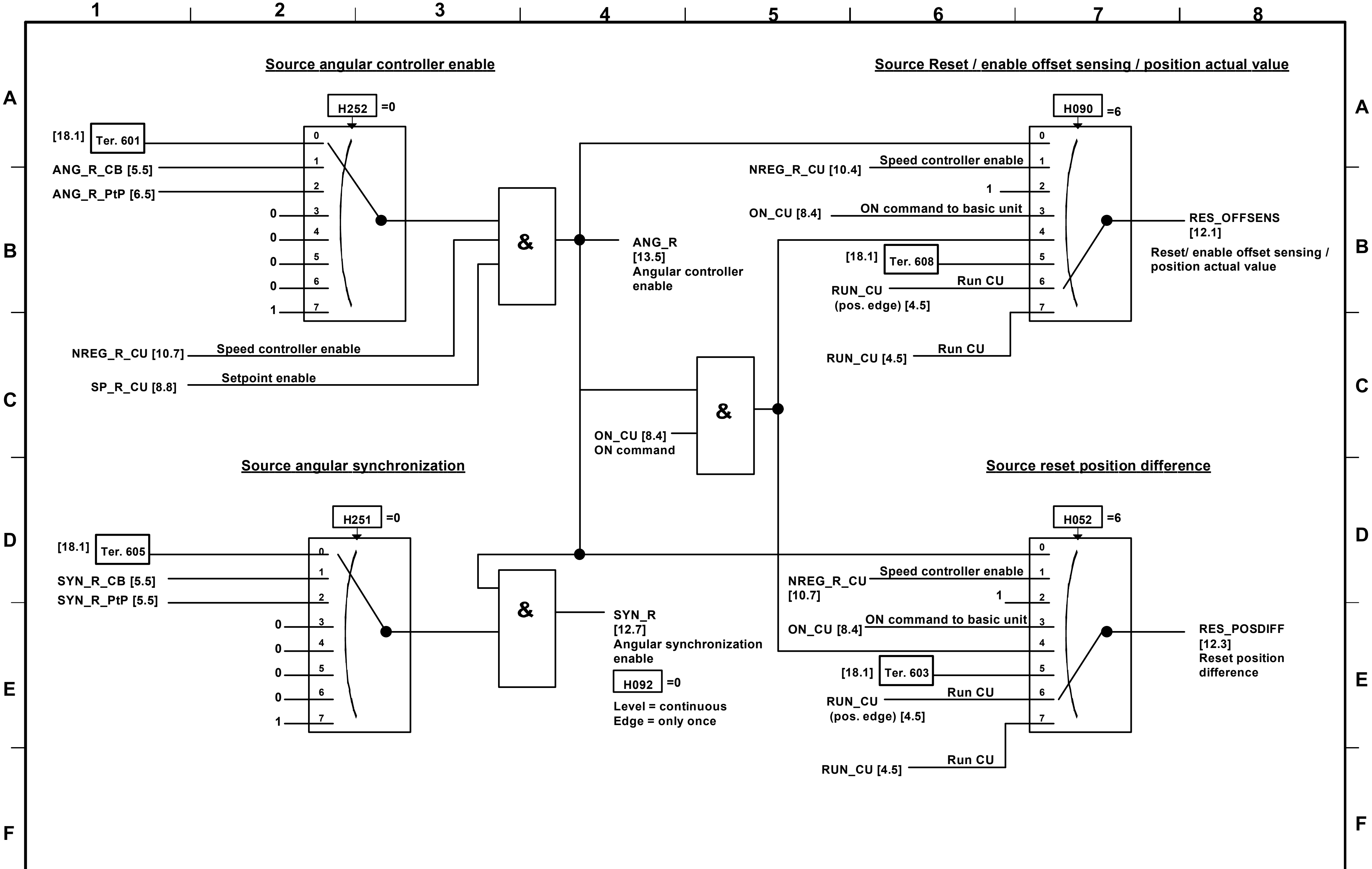
Source Inching 1 and Inching 2

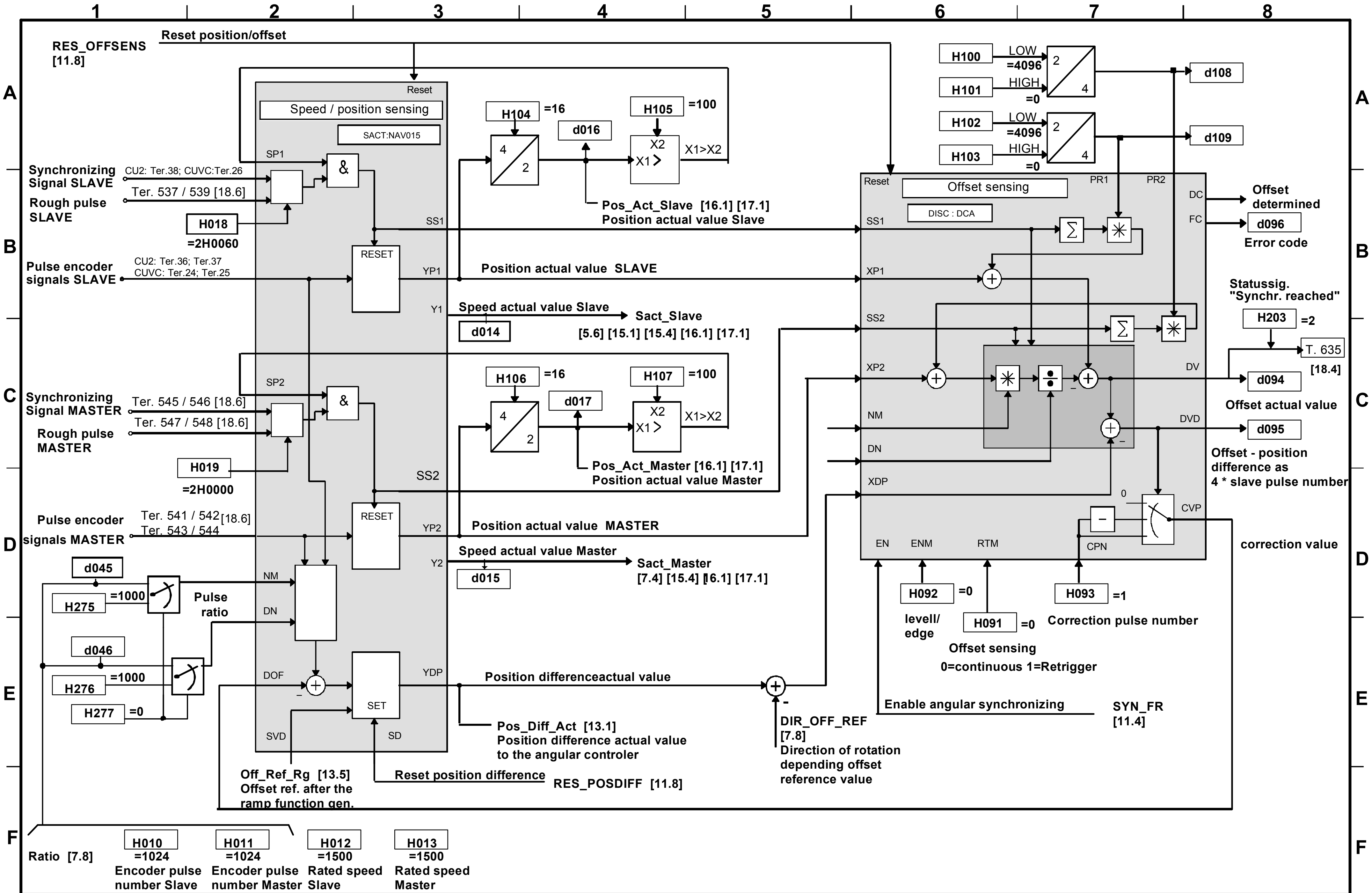




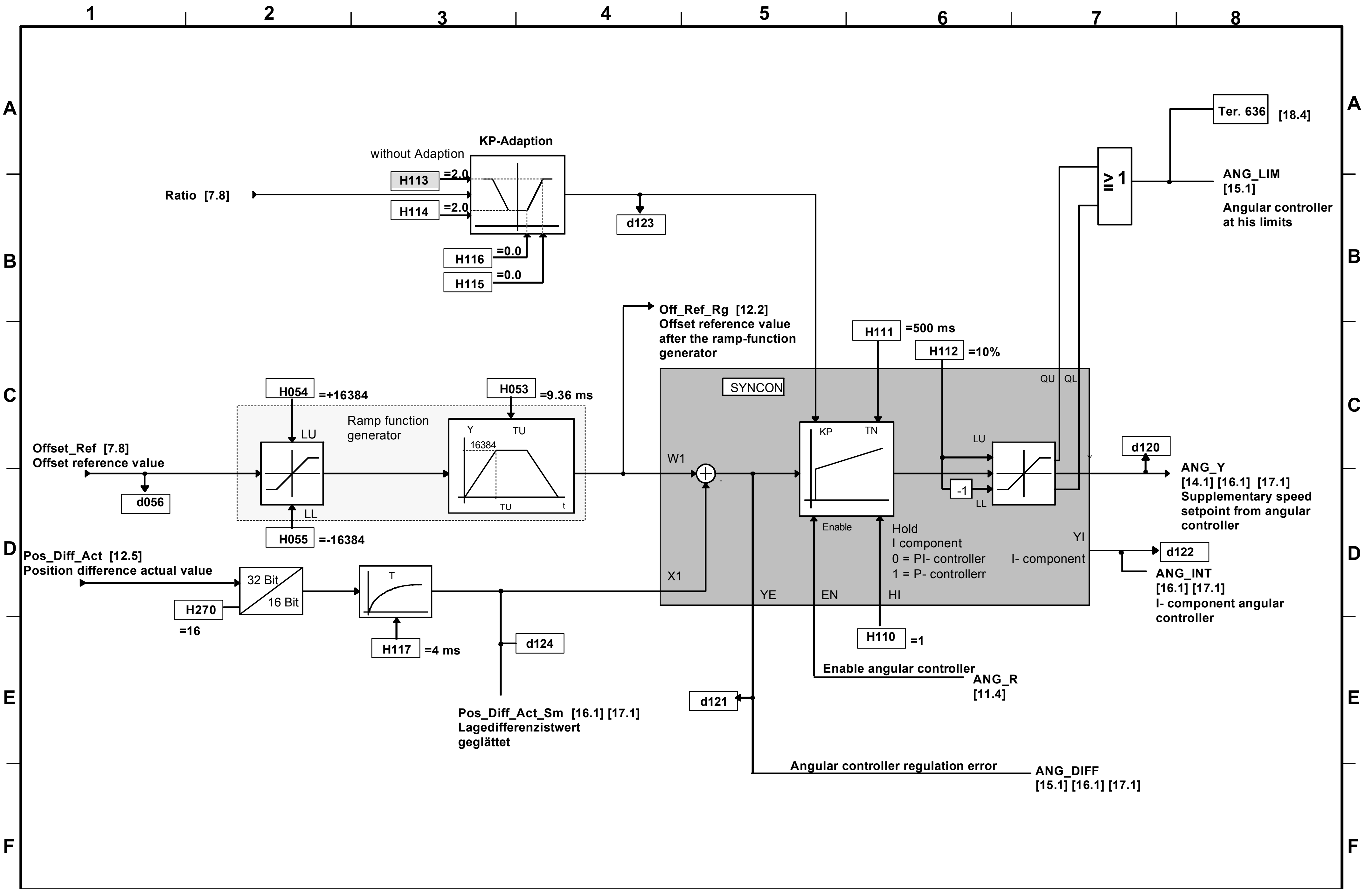
Source speed controller enable



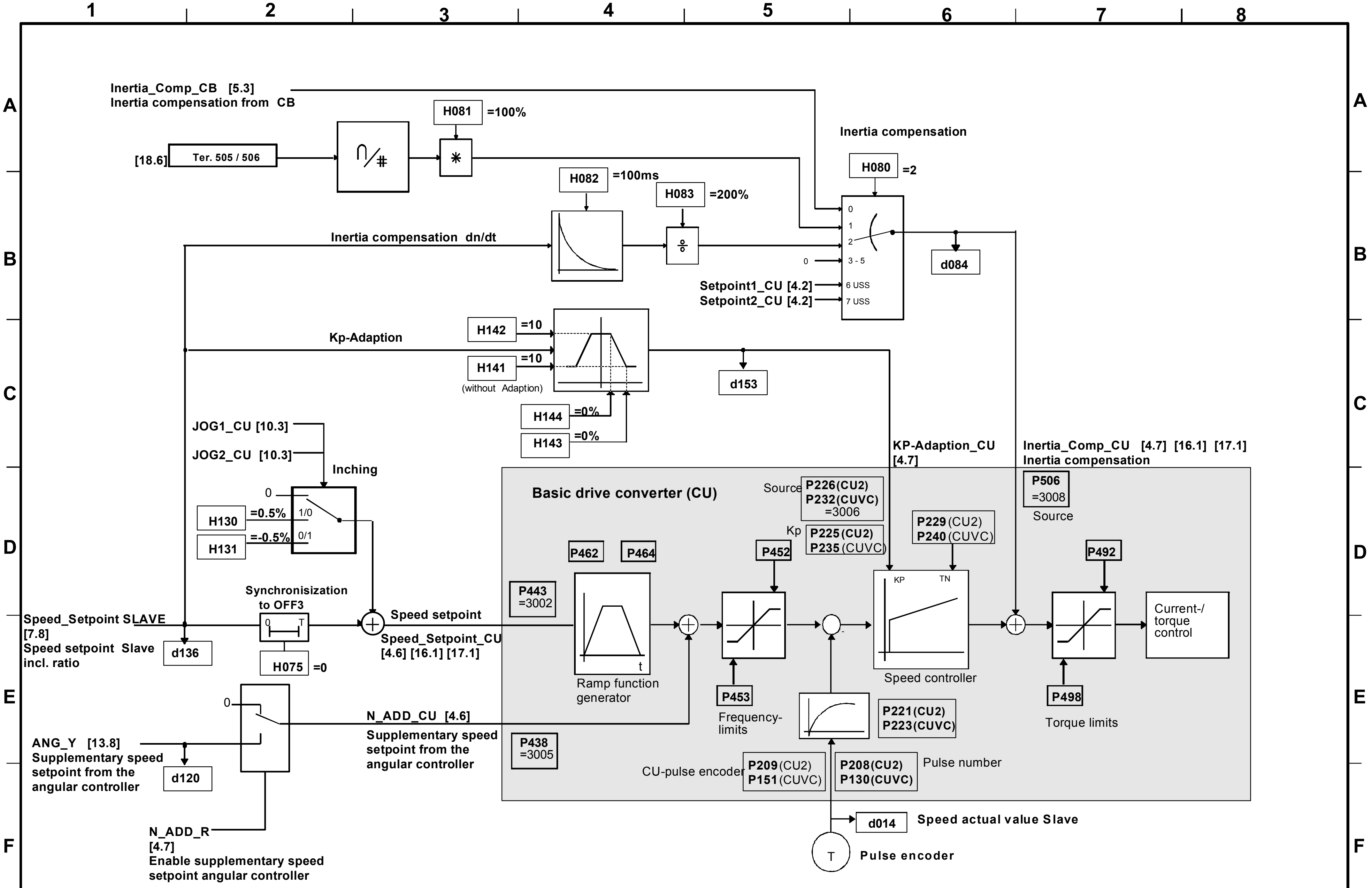

Source angular controller enable
H252 =0
[18.1] Ter. 601
ANG_R_CB [5.5]
ANG_R_PtP [6.5]
NREG_R_CU [10.7] Speed controller enable
SP_R_CU [8.8] Setpoint enable
&
ANG_R
[13.5]
Angular controller
enable
Source Reset / enable offset sensing / position actual value
H090 =6
NREG_R_CU [10.4] Speed controller enable
ON_CU [8.4] ON command to basic unit
[18.1] Ter. 608
RUN_CU
(pos. edge) [4.5] Run CU
RUN_CU [4.5] Run CU
RES_OFFSENS
[12.1]
Reset/ enable offset sensing /
position actual value
ON_CU [8.4]
ON command
Source angular synchronization
H251 =0
[18.1] Ter. 605
SYN_R_CB [5.5]
SYN_R_PtP [5.5]
SYN_R
[12.7]
Angular synchronization
enable
H092 =0
Level = continuous
Edge = only once
Source reset position difference
H052 =6
NREG_R_CU
[10.7] Speed controller enable
ON_CU [8.4] ON command to basic unit
[18.1] Ter. 603
RUN_CU
(pos. edge) [4.5] Run CU
RUN_CU [4.5] Run CU
RES_POSDIFF
[12.3]
Reset position
difference

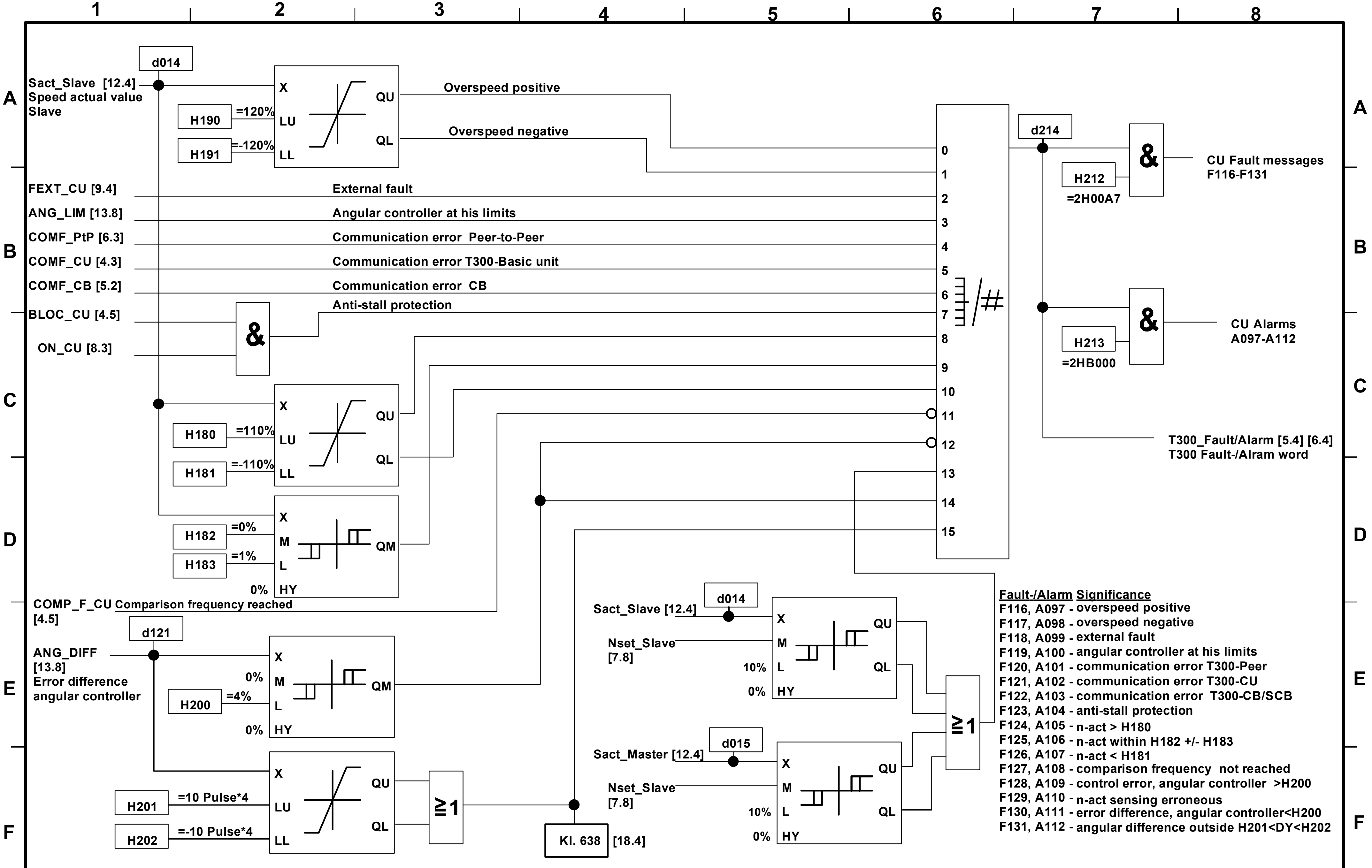


RES_OFFSENS [11.8]
Reset position/offset
Reset
Speed / position sensing
SACT:NAV015
SP1
Synchronizing Signal SLAVE
CU2: Ter.38; CUVC:Ter.26
Ter. 537 / 539 [18.6]
Rough pulse SLAVE
H018
=2H0060
SS1
RESET
Pulse encoder signals SLAVE
CU2: Ter.36; Ter.37
CUVC: Ter.24; Ter.25
YP1
Y1
H104 =16
d016
H105 =100
X2
X1
X1>X2
Pos_Act_Slave [16.1] [17.1]
Position actual value Slave
Position actual value SLAVE
Speed actual value Slave
d014
Sact_Slave
[5.6] [15.1] [15.4] [16.1] [17.1]
SP2
Synchronizing Signal MASTER
Ter. 545 / 546 [18.6]
Rough pulse MASTER
Ter. 547 / 548 [18.6]
H019
=2H0000
SS2
H106 =16
d017
H107 =100
Pos_Act_Master [16.1] [17.1]
Position actual value Master
Pulse encoder signals MASTER
Ter. 541 / 542 [18.6]
Ter. 543 / 544
YP2
Y2
Position actual value MASTER
Speed actual value Master
d015
Sact_Master
[7.4] [15.4] [16.1] [17.1]
d045
H275 =1000
Pulse ratio
NM
DN
d046
H276 =1000
H277 =0
DOF
SET
YDP
SVD
SD
Position differenceactual value
Pos_Diff_Act [13.1]
Position difference actual value to the angular controler
Off_Ref_Rg [13.5]
Offset ref. after the ramp function gen.
Reset position difference
RES_POSDIFF [11.8]
DIR_OFF_REF [7.8]
Direction of rotation depending offset reference value
H100
LOW =4096
H101
HIGH =0
d108
H102
LOW =4096
H103
HIGH =0
d109
Reset
Offset sensing
DISC : DCA
PR1
PR2
DC
Offset determined
FC
d096
Error code
SS1
XP1
SS2
XP2
NM
DN
XDP
DV
d094
Offset actual value
Statussig. "Synchr. reached"
H203 =2
T. 635
[18.4]
DVD
d095
Offset - position difference as 4 * slave pulse number
CVP
CPN
correction value
EN
ENM
RTM
H092 =0
levell/ edge
H091 =0
Offset sensing
0=continuous 1=Retrigger
H093 =1
Correction pulse number
Enable angular synchronizing
SYN_FR [11.4]
Ratio [7.8]
H010 =1024
Encoder pulse number Slave
H011 =1024
Encoder pulse number Master
H012 =1500
Rated speed Slave
H013 =1500
Rated speed Master

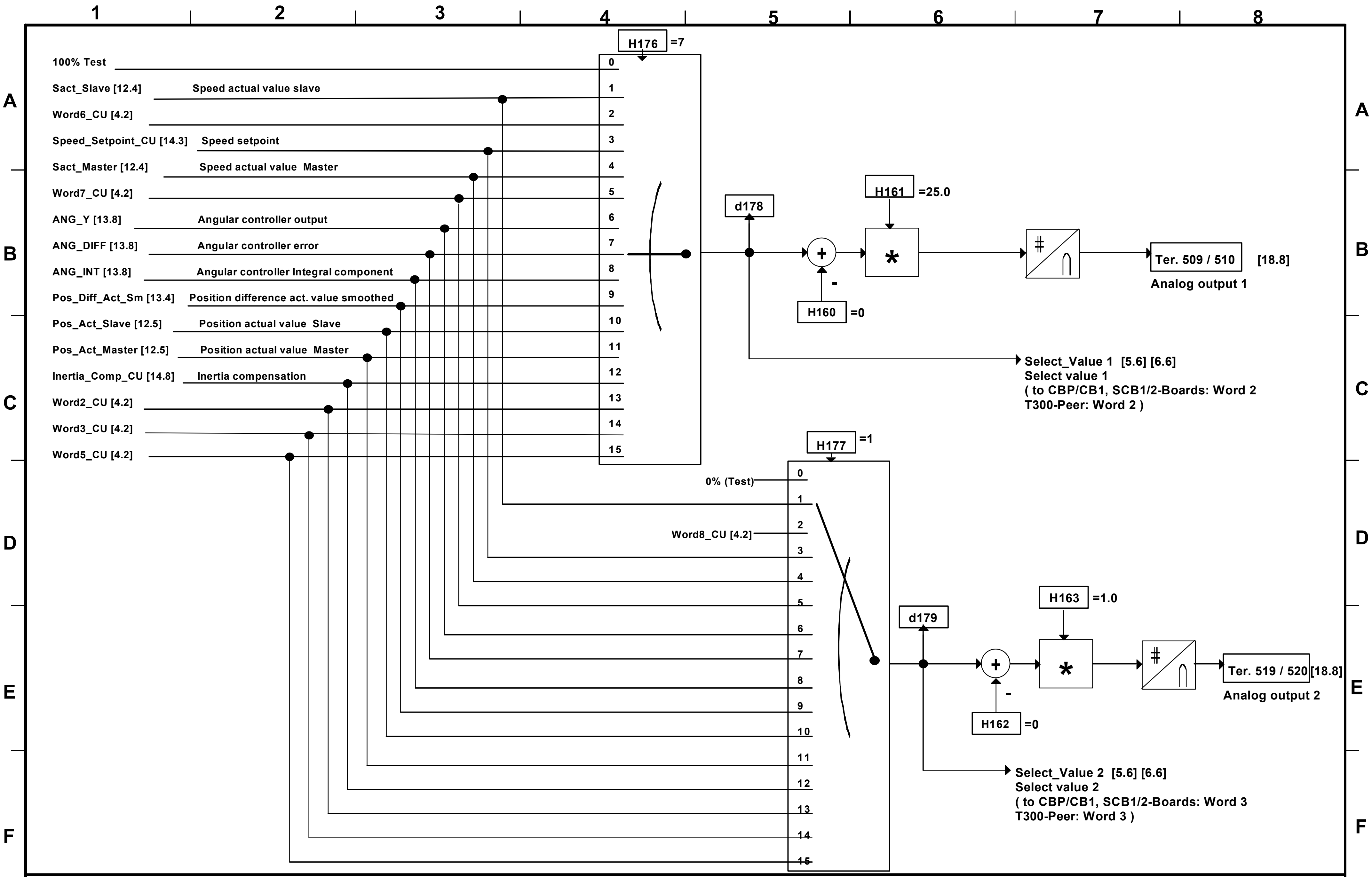


KP-Adaption
without Adaption
H113 =2.0
H114 =2.0
Ratio [7.8]
H116 =0.0
H115 =0.0
d123
Ter. 636 [18.4]
≥ 1
ANG_LIM
[15.1]
Angular controller
at his limits
Off_Ref_Rg [12.2]
Offset reference value
after the ramp-function
generator
H111 =500 ms
H112 =10%
SYNCON
QU QL
H054 =+16384
H053 =9.36 ms
Ramp function
generator
LU
Y TU
16384
TU t
Offset_Ref [7.8]
Offset reference value
d056
LL
H055 =-16384
W1
KP TN
LU
-1
LL
d120
ANG_Y
[14.1] [16.1] [17.1]
Supplementary speed
setpoint from angular
controller
Enable
Hold
I component
0 = PI- controller
1 = P- controllerr
YI
I- component
d122
ANG_INT
[16.1] [17.1]
I- component angular
controller
Pos_Diff_Act [12.5]
Position difference actual value
32 Bit
16 Bit
H270
=16
T
H117 =4 ms
d124
X1
YE EN HI
H110 =1
Enable angular controller
ANG_R
[11.4]
d121
Pos_Diff_Act_Sm [16.1] [17.1]
Lagedifferenzistwert
geglättet
Angular controller regulation error
ANG_DIFF
[15.1] [16.1] [17.1]

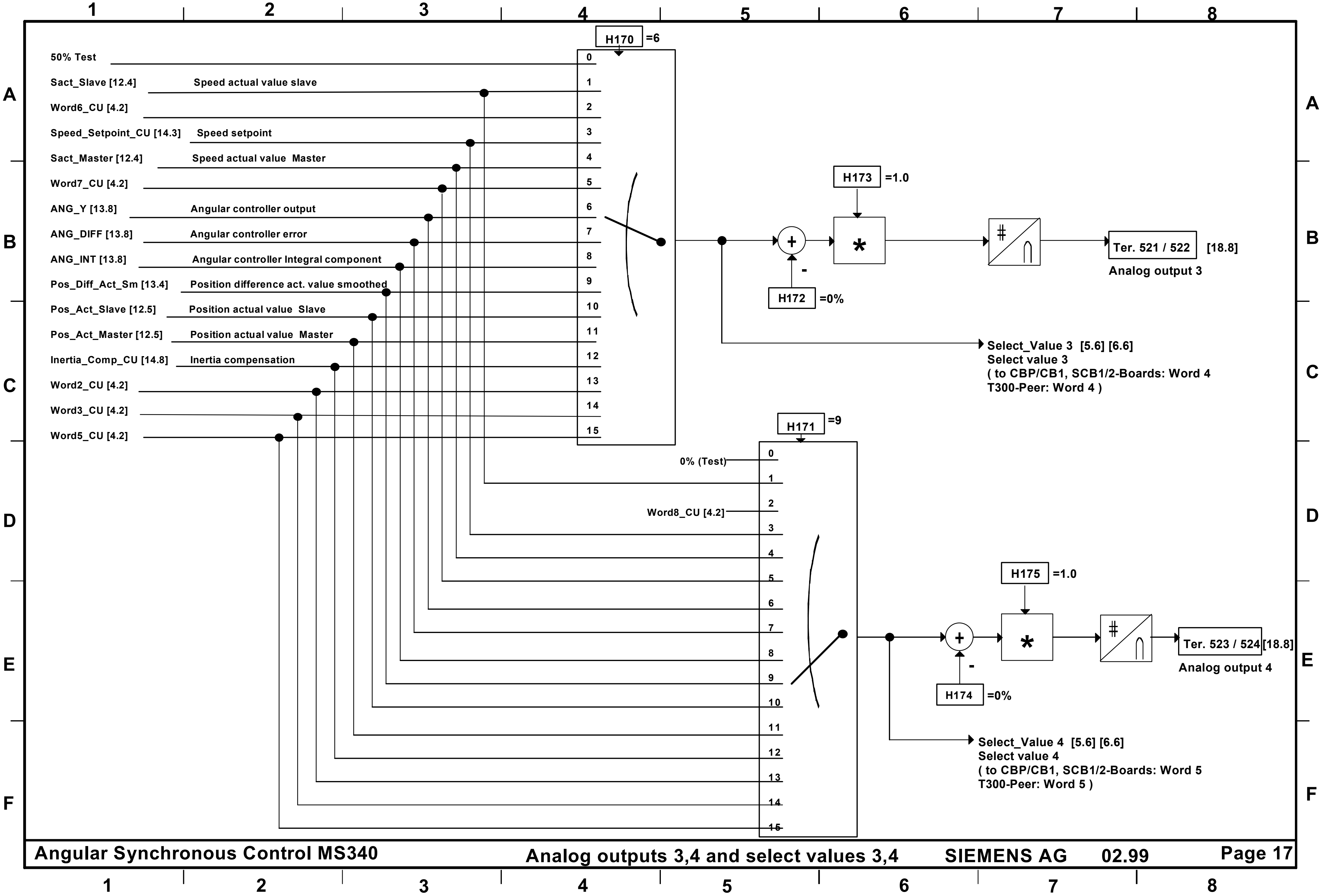

Inertia_Comp_CB [5.3]
Inertia compensation from CB
[18.6]
Ter. 505 / 506
H081
=100%
Inertia compensation
H080
=2
H082
=100ms
H083
=200%
Inertia compensation dn/dt
0
1
2
3 - 5
6 USS
7 USS
Setpoint1_CU [4.2]
Setpoint2_CU [4.2]
d084
Kp-Adaption
H142
=10
H141
=10
(without Adaption)
d153
H144
=0%
H143
=0%
JOG1_CU [10.3]
JOG2_CU [10.3]
Inching
0
1/0
0/1
H130
=0.5%
H131
=-0.5%
KP-Adaption_CU
[4.7]
Inertia_Comp_CU [4.7] [16.1] [17.1]
Inertia compensation
Basic drive converter (CU)
Source
P226(CU2)
P232(CUVC)
=3006
Kp
P225(CU2)
P235(CUVC)
P229(CU2)
P240(CUVC)
P506
=3008
Source
P462
P464
P452
P492
P443
=3002
Synchronisization
to OFF3
Speed setpoint
Speed_Setpoint SLAVE
[7.8]
Speed setpoint Slave
incl. ratio
d136
H075
=0
Speed_Setpoint_CU
[4.6] [16.1] [17.1]
t
Ramp function
generator
KP
TN
Speed controller
Current-/
torque
control
P453
Frequency-
limits
P498
Torque limits
P221(CU2)
P223(CUVC)
N_ADD_CU [4.6]
Supplementary speed
setpoint from the
angular controller
P438
=3005
ANG_Y [13.8]
Supplementary speed
setpoint from the
angular controller
d120
CU-pulse encoder
P209(CU2)
P151(CUVC)
P208(CU2)
P130(CUVC)
Pulse number
d014
Speed actual value Slave
T
Pulse encoder
N_ADD_R
[4.7]
Enable supplementary speed
setpoint angular controller



Fault-/Alarm	Significance
F116, A097 -	overspeed positive
F117, A098 -	overspeed negative
F118, A099 -	external fault
F119, A100 -	angular controller at his limits
F120, A101 -	communication error T300-Peer
F121, A102 -	communication error T300-CU
F122, A103 -	communication error T300-CB/SCB
F123, A104 -	anti-stall protection
F124, A105 -	n-act > H180
F125, A106 -	n-act within H182 +/- H183
F126, A107 -	n-act < H181
F127, A108 -	comparison frequency not reached
F128, A109 -	control error, angular controller >H200
F129, A110 -	n-act sensing erroneous
F130, A111 -	error difference, angular controller<H200
F131, A112 -	angular difference outside H201<DY<H202



H176 =7
100% Test
Sact_Slave [12.4] Speed actual value slave
Word6_CU [4.2]
Speed_Setpoint_CU [14.3] Speed setpoint
Sact_Master [12.4] Speed actual value Master
Word7_CU [4.2]
ANG_Y [13.8] Angular controller output
ANG_DIFF [13.8] Angular controller error
ANG_INT [13.8] Angular controller Integral component
Pos_Diff_Act_Sm [13.4] Position difference act. value smoothed
Pos_Act_Slave [12.5] Position actual value Slave
Pos_Act_Master [12.5] Position actual value Master
Inertia_Comp_CU [14.8] Inertia compensation
Word2_CU [4.2]
Word3_CU [4.2]
Word5_CU [4.2]
d178
H161 =25.0
H160 =0
Ter. 509 / 510 [18.8]
Analog output 1
Select_Value 1 [5.6] [6.6]
Select value 1
(to CBP/CB1, SCB1/2-Boards: Word 2
T300-Peer: Word 2)
H177 =1
0% (Test)
Word8_CU [4.2]
d179
H163 =1.0
H162 =0
Ter. 519 / 520 [18.8]
Analog output 2
Select_Value 2 [5.6] [6.6]
Select value 2
(to CBP/CB1, SCB1/2-Boards: Word 3
T300-Peer: Word 3)


H170 =6
50% Test
Sact_Slave [12.4] Speed actual value slave
Word6_CU [4.2]
Speed_Setpoint_CU [14.3] Speed setpoint
Sact_Master [12.4] Speed actual value Master
Word7_CU [4.2]
ANG_Y [13.8] Angular controller output
ANG_DIFF [13.8] Angular controller error
ANG_INT [13.8] Angular controller Integral component
Pos_Diff_Act_Sm [13.4] Position difference act. value smoothed
Pos_Act_Slave [12.5] Position actual value Slave
Pos_Act_Master [12.5] Position actual value Master
Inertia_Comp_CU [14.8] Inertia compensation
Word2_CU [4.2]
Word3_CU [4.2]
Word5_CU [4.2]
H173 =1.0
H172 =0%
Ter. 521 / 522 [18.8]
Analog output 3
Select_Value 3 [5.6] [6.6]
Select value 3
(to CBP/CB1, SCB1/2-Boards: Word 4
T300-Peer: Word 4)
H171 =9
0% (Test)
Word8_CU [4.2]
H175 =1.0
H174 =0%
Ter. 523 / 524 [18.8]
Analog output 4
Select_Value 4 [5.6] [6.6]
Select value 4
(to CBP/CB1, SCB1/2-Boards: Word 5
T300-Peer: Word 5)

Binary inputs

Ter.601	Enable angular control [11.1]
Ter.602	ON command [8.1]
Ter.603	Enable speed control [10.4] Reset position differenz [11.6]
Ter.604	OFF3 [8.5]
Ter.605	Enable angular synchronizing [11.1]
Ter.606	Inching 1 [10.1] Setpoint selection [7.1]
Ter.607	Inching 2 [10.1] Setpoint selection [7.1]
Ter.608	OFF2 [8.4] Reset/enable offset sensing/position act. value [11.8] High-Byte selection [7.1]
Ter.611	Fault acknowledge [9.5] Setpoint Bit0 [7.1] Thumbwheel switch input 2**0 [7.1]
Ter.612	External fault [9.1] Setpoint Bit1 [7.1] Thumbwheel switch input 2**1 [7.1]
Ter.613	External fault [9.1] Setpoint Bit2 [7.1] Thumbwheel switch input 2**2 [7.1]
Ter.614	External fault [9.1] Setpoint Bit3 [7.1] Thumbwheel switch input 2**3 [7.1]
Ter.615	Setpoint Bit4 [7.1] Data transfer [7.1]
Ter.616	Release setpoint [8.5] Setpoint Bit5 [7.1]
Ter.617	Changeover ratio [7.1] Setpoint Bit6 [7.1]
Ter.618	Changeover offset reference value [7.5] Setpoint Bit7 [7.1]

Binary outputs

Thumbwheel switch output 10**0 or 16**0 [7.3]	Ter.631
Thumbwheel switch output 10**1 or 16**1 [7.3]	Ter.632
Thumbwheel switch output 10**2 or 16**2 [7.3]	Ter.633
Thumbwheel switch output 10**3 or 16**3 [7.3]	Ter.634
Synchronism reached t [12.8]	Ter.635
Angular controller at his limits [13.8]	Ter.636
"Setpoint enable" present [8.8]	Ter.637
Angular difference outside limit H201< DY < H202 [15.4]	Ter.638

Ter.609	P24 external
Ter.610	M24 external
Ter.619	P24 external
Ter.630	M24 external
Ter.639	P24 external
Ter.640	M24 external

Analog inputs

Ter. 501 (+) / Ter. 502 (-)	Speed setpoint [7.1]
Ter. 503 (+) / Ter. 504 (-)	Offset reference value [7.1]
Ter. 505 (+) / Ter. 506 (-)	Inertia compensation [14.2]
Ter. 507 (+) / Ter. 508 (-)	Ratio [7.6]

Analog outputs

Select_Value 1 [16.7] Select value 1	Ter. 509 (+) / Ter. 510 (-)
Select_Value 2 [16.8] Select value 2	Ter. 519 (+) / Ter. 520 (-)
Select_Value 3 [17.7] Select value 3	Ter. 521 (+) / Ter. 522 (-)
Select_Value 4 [17.8] Select value 4	Ter. 523 (+) / Ter. 524 (-)

Pulse encoder inputs Slave

Ter. 531 (+) / Ter. 532 (-)	Track A
Ter. 533 (+) / Ter. 534 (-)	Track B
Ter. 535 (+) / Ter. 536 (-)	Synchronizing pulse SLAVE [12.1]
Ter. 537 (+) / Ter. 538 (-)	Rough pulse SLAVE [12.1]
Ter. 539 (+) / Ter. 540 (-)	P15 Power supply M15

Pulse encoder SLAVE
The pulse encoder is connected to the CU.
The pulse encoder signals are transmetted to the T300 via the LBA backplane bus.
It is not necessary to connect again the pulse encoder signals on the T300 terminals. (see H018)

Pulse encoder inputs Master

Terminals	Function
Ter. 541 (+) / Ter. 542 (-)	Track A
Ter. 543 (+) / Ter. 544 (-)	Track B
Ter. 545 (+) / Ter. 546 (-)	Synchronizing pulse MASTER [12.1]
Ter. 547 (+) / Ter. 548 (-)	Rough pulse MASTER [12.1]
Ter. 549 (-)	M15

Impulsgebersignale MASTER [12.1]

Parameter Nummer Parameter Number	Parameter Text Deutsch H000 = 0	Parameter Text English H000 = 1	Werkseinstellung Value preset	Neuer Wert Modified value
H000	Sprachauswahl	Language select	0	
d001	SW-VersionMS340	SW versionMS340		
d002	Stnd Softwaretyp	stnd softwaretyp		
H003	P-Schreib-Sperre	Par change lock	0	
d004	Systemfehlerbits	Systemerror bits		
d006	Systmfehl.1.Wort	Systemerror.1.word		
d007	Systmfehl.2.Wort	Systemerror.2.word		
d008	Systmfehl.3.Wort	Systemerror.3.word		
d009	Systmfehl.4.Wort	Systemerror.4.word		
H010	Geberpulsz SLAVE	Tachopulses SLAV	1024	
H011	Geberpulsz MASTE	Tachopulses MAST	1024	
H012	Nenndrehz SLAVE	Nom.Speed SLAVE	1500	
H013	Nenndrehz MASTER	Nom.Speed MASTER	1500	
d014	n-ist SLAVE	Act. Speed SLAVE		
d015	n-ist MASTER	Act. Speed MASTE		
d016	Lageistw SLAVE	Act. Pos. SLAVE		
d017	Lageistw MASTER	Act. Pos. MASTER		
H018	Impulsgeb.typ Sl	Tachotype SLAVE	2H0060	
H019	Impulsgeb.typ Ma	Tachotype MASTE	2H0000	
H021	T: EIN->BetrFrei	on Wait-Tme enab	0 ms	
H022	T: AUS->BetrSper	off Wait-Tme dis	1000 ms	
H030	Fktn binaere Ein	Fktn binary Inp.	0	
H031	Zahlensch Normf.	Nomfact BCD-Swit	0	
H032	Zahlensch BCD-Co	BCD-Coding	1	
H033	Uebern.zeit BSR	Timeconstant BSR	16 ms	
H040	Quelle Uebersver	Ratio-Source	4	
H041	Ueb bei Kl617=0	Ratio @tm.617=0	1.0	
H042	Ueb bei Kl617=1	Ratio @tm.617=1	2.0	
H043	Uebsetz Festwert	Ratio FixValue	1.0	
d044	akt Uebsetz-Verh	Ratio actual Val		
d045	Pulszahluebs NM	Ratio Pulses NM		

Parameter Nummer Parameter Number	Parameter Text Deutsch H000 = 0	Parameter Text English H000 = 1	Werkseinstellung Value preset	Neuer Wert Modified value
d046	Pulszahluebs DN	Ratio Pulses DN		
H047	Uebverh ZusatzSW	Ratio addit val	0.0	
H048	Q.ProportfaktUeb	S.proprtfac rat	4	
H049	Festwert UebProp	Fixval rat prop	100%	
H050	Quelle Versatzso	Displacem Source	5	
H051	Anp. Versatz ana	Displ. Adjus ana	100%	
H052	Q.LageDiff-Reset	Src PosiDiff Res	6	
H053	Hochlaufzt Versa	Displ. RG-Time	9.36 ms	
H054	Versatzsoll max	Displ. max Val	+16384	
H055	Versatzsoll min	Displ. min Val	-16384	
d056	akt Versatzsollw	Displ. act Val		
H060	Vers-SW Kl618=0	DisplVal t618=0	0	
H061	Vers-SW Kl618=1	DisplVal t618=1	0	
H062	Versatzs +/+	DisplVal +/+	0	
H063	Versatzs +/-	DisplVal +/-	0	
H064	Versatzs -/+	DisplVal -/+	0	
H065	Versatzs -/-	DisplVal -/-	0	
H066	Versatzsw Festw	DisplVal Fixedv	0	
H070	Quelle Leitssoll	Speedref Source	3	
H071	Anp. n-soll ana.	Adj. s-ref ana.	100%	
H072	Glaettung Leits.	s-ref Smoothtime	9.99 ms	
H073	Festwert Leitsw.	Fixval speedref	0%	
d074	akt Leit-SW glat	act s-ref filtrd		
H075	Leit-SW Verzoegg	s-ref with delay	0	
H080	Quelle Beschlaus	Source accelarat	2	
H081	Anp. Beschl. ana	accel. Adj. ana	100%	
H082	Beschlaus TD dn	accel. Tconst	100 ms	
H083	Beschlaus Anp dn	accel. Adj. Diff	199.99%	
d084	Beschlaus Istw.	accel. act. val.		
H090	Q.Lag/Vers-Freig	Src pos/dspl-res	6	
H091	Versatz Retrigg.	Dipl. retrigger	0	

Parameter Nummer Parameter Number	Parameter Text Deutsch H000 = 0	Parameter Text English H000 = 1	Werkseinstellung Value preset	Neuer Wert Modified value
H092	Synchr. Flanke	Synchr. Edge	0	
H093	KorrPulsz Synchr	Synchr. Corrpuls	1	
d094	Versatzistwert	Displ. Act. Val.		
d095	Vers. - Lagediff	Displ.-Pos.dif.		
d096	Versatzerf Fehle	Displ.calc. Errc		
H100	Synchr.PZ M-low	Synchr.PnoM-low	4096	
H101	Synchr.PZ M-high	Synchr.PnoM-high	0	
H102	Synchr.PZ S-low	Synchr.PnoS-low	4096	
H103	Synchr.PZ S-high	Synchr.PnoS-high	0	
H104	Anp. L-ist SLAVE	Adj. Pos. Slave	16	
H105	Synchrfrei SLAVE	Synchr EN Slave	100	
H106	Anp. L-ist MASTE	Adj. Pos. Master	16	
H107	Synchrfrei MASTE	Synchr EN Master	100	
d108	SyncrPulszahl-Ma	SyncrPulsnumb-Ma		
d109	SyncrPulszahl-Sl	SyncrPulsnumb-Sl		
H110	Wireg als P-Reg	SynCtr as P-Con	1	
H111	Wireg TN	SynCtr TN	500 ms	
H112	Wireg Begrenzung	SynCtr Limit	10%	
H113	Wireg KP	SynCtr KP	2.0	
H114	Wireg KP_0	SynCtr KP_0	2.0	
H115	Wireg ue_KP	SynCtr ue_KP	0.0	
H116	Wireg ue_KP_0	SynCtr ue_KP_0	0.0	
H117	Lagediff. Glaett	Pos.dif Smt-time	4.0 ms	
d120	Wireg Ausgang	SynCtr Output		
d121	Wireg Regeldiff	SynCtr Ctr-Dev		
d122	Wireg I-Anteil	SynCtr I-Part		
d123	Wireg KP-ist	SynCtr KP-act		
d124	Lagediffer.glatt	Pos.dif. smt		
H130	Tippsollwert 1	Stepvalue 1	0.5%	
H131	Tippsollwert 2	Stepvalue 2	-0.5%	
d136	n-soll(+Uebstzg)	spd-ref (+ratio)		

Parameter Nummer Parameter Number	Parameter Text Deutsch H000 = 0	Parameter Text English H000 = 1	Werkseinstellung Value preset	Neuer Wert Modified value
H141	Nreg KP	SCtr KP	10.0	
H142	Nreg KP_0	SCtr KP_0	10.0	
H143	Nreg n_KP	SCtr n_KP	0.0%	
H144	Nreg n_KP_0	SCtr n_KP_0	0.0%	
d153	Nreg KP ist	SCtr KP act		
d154	Grndgeraet Wort2	device rx-word2		
d155	Grndgeraet Wort4	device rx-word4		
d156	Grndgeraet Wort3	device rx-word3		
H160	Offset Anaausg.1	Offset AnaOutp 1	0%	
H161	KP Anaausg. 1	KP AnaOutp 1	25.0	
H162	Offset Anaausg.2	Offset AnaOutp 2	0%	
H163	KP Anaausg. 2	KP AnaOutp 2	1.0	
H170	Q.Wahlw3 Ana3/SS	src val3 Ana3/SI	6	
H171	Q.Wahlw4 Ana4/SS	src val4 Ana4/SI	9	
H172	Offset Anaausg.3	Offset AnaOutp 3	0%	
H173	KP Anaausg. 3	KP AnaOutp 3	1.0	
H174	Offset Anaausg.4	Offset AnaOutp 4	0%	
H175	KP Anaausg.4	KP AnaOutp 4	1.0	
H176	Q.Wahlw1 Ana1/SS	src val1 Ana1/SI	7	
H177	Q.Wahlw2 Ana2/SS	src val2 Ana2/SI	1	
d178	Rohwert Anaausg1	actval AnaOutp 1		
d179	Rohwert Anaausg2	actval AnaOutp 2		
H180	Grenzw n-ist pos	LimInd s-act pos	110%	
H181	Grenzw n-ist neg	LimInd s-act neg	-110%	
H182	Grenzw n-ist Mit	LimInd s-act mid	0%	
H183	Grenzw n-ist Tol	LimInd s-act trs	1%	
H190	Ueberdrehz. pos	Overspeed pos	120%	
H191	Ueberdrehz. neg	Overspeed neg	-120%	
H200	Grenzw Regeldiff	LimInd SCtrDevia	4%	
H201	Grenzw Wink pos	LimInd Ang. pos	10	
H202	Grenzw Wink neg	LimInd Ang. neg	-10	

Parameter Nummer Parameter Number	Parameter Text Deutsch H000 = 0	Parameter Text English H000 = 1	Werkseinstellung Value preset	Neuer Wert Modified value
H203	Grenzw f Syn err	LimInd sync o.k	2	
H208	PeerUebwch-Start	Peer monit-start	10000 ms	
H209	PeerUeberwachung	Peertlg-time-off	80 ms	
H210	CB1/SCB Uebw-Ini	CB1/SCB moni-ini	20000 ms	
H211	CB1/SCB Uebw-Zyk	CB1/SCB moni-cyl	80 ms	
H212	Stoermaske d214	ERROR-Mask @d214	2H00A7	
H213	Warnmaske d214	Warn-Mask @ d214	2HB000	
d214	T300-Statuswort	T300 statusword		
H216	Qu W1 Tx TB-Peer	src w1Tx TB-Peer	1	
H217	Qu W1 Tx ComBord	src w1Tx ComBord	1	
H218	Ausblendm GGZUW1	mask dev-statwrd	2H058C	
H219	Ausblendm St/WnW	mask TB-statwrd	2HFA73	
H220	Baudrate TB-Peer	Baudrate TB-Peer	8	
H222	TxLgeTlg TB-Peer	TxLgeTlg TB-Peer	5	
H223	RxLgeTlg TB-Peer	RxLgeTlg TB-Peer	5	
d224	RxStatus TB-Peer	RxStatus TB-Peer		
d225	RxFehler TB-Peer	RxFehler TB-Peer		
H226	TxLgeTlg ComBord	TxLgeTlg ComBord	4	
H227	RxLgeTlg ComBord	RxLgeTlg ComBord	4	
d228	RxStatus ComBord	RxStatus ComBord		
d229	RxFehler ComBord	RxFehler ComBord		
d230	W1 (STW) TB-Peer	W1 (STW) TB-Peer		
d231	W3(ZUW2) TB-Peer	W3(ZUW2) TB-Peer		
d232	W4(ZUW1) TB-Peer	W4(ZUW1) TB-Peer		
d235	W1 (STW) ComBord	W1 (STW) ComBord		
d236	W3(ZUW2) ComBord	W3(ZUW2) ComBord		
d237	W4(ZUW1) ComBord	W4(ZUW1) ComBord		
H240	Quelle (Betr)Ein	source ON	3	
H241	Quelle1 Aus2	source1 OFF2	5	
H242	Quelle2 Aus2	source2 OFF2	5	
H243	Quelle1 Aus3	source1 OFF3	0	

Parameter Nummer Parameter Number	Parameter Text Deutsch H000 = 0	Parameter Text English H000 = 1	Werkseinstellung Value preset	Neuer Wert Modified value
H244	Quelle2 Aus3	source2 OFF3	5	
H245	QuelleM SW-Freig	sourceM sv-enabl	7	
H246	QuelleS SW-Freig	sourceS sv-enabl	7	
H247	Quelle1 St-Quitg	source1 sv-enabl	0	
H248	Quelle2 St-Quitg	source2 sv-enabl	7	
H249	Quelle Tippen 1	source jog 1	0	
H250	Quelle Tippen 2	source jog 2	0	
H251	Quelle Wi-Syncrn	source syncronsm	0	
H252	Quelle WiReglFrg	source angle-reg	0	
H253	Quelle n-ReglFrg	source v-reg-ena	7	
H254	Quelle1 ext.Strg	source1 ext.flt	7	
H255	Quelle2 ext.Strg	source2 ext.flt	7	
H256	Quelle3 ext.Strg	source3 ext.flt	7	
H257	Zus-SW2 Abschalt	add-SetP2 disabl	1	
d260	T300-Steuerwort	T300 controlword		
d261	T300-STW+GG-ZUW1	T3-ctl+dev-statw		
H270	Wertberversa-SW	Scal disp-refval	16	
H275	Fein-Pulszahl NM	fine ratiopulsNM	1000	
H276	Fein-Puslzahl DN	fine ratiopulsDN	1000	
H277	Auswahl Fein-PZ.	selc fine ratiop	0	
H970	Werkseinstellung	factory setting	0	

Die STRUC G Pläne sind aus der Betriebsanleitung „Winkelgleichlaufregelung MS340“
zu entnehmen.
Bestell-Nr: 6SE7080-0CX84-4AH1

STRUC G function diagrams - refere to the manual „Angular Synchronous Control MS340“.
Order-No: 6SE7087-6CX84-4AH1

The following editions have been published so far:

Edition	Internal Item Number
05.96	477 407.4084.76
10.98	477 407.4184.76
03.99	477 407.4184.76

Version 03.99 consists of the following chapters:

Chapter		Changes	Pages	Version date
0	Warning information and product limitation		2	10.98
1	Overview	reviewed edition	16	03.99
2	Interfaces	reviewed edition	16	03.99
3	Basic converter setting	Page: 7, 8, 10	10	03.99
4	Terminal asignment	reviewed edition	14	03.99
5	Function description	Page: 5, 7, 8, 15, 17, 20, 21, 23, 28, 29, 31, 32 ,33	36	03.99
6	Parameters	reviewed edition	40	03.99
7	Start-up	Page: 1, 15 - 18	14	03.99
8	SIMADYN D functions		4	10.98
9	Others		2	10.98
10	Changes	Page: 1, 2	2	03.99
11	Appendix:	Page: 1	2	03.99
	- Block diagrams	reviewed edition	18	03.99
	- Parameter list	new edition	6	03.99
	- STUC G diagrams	FP-CONF page 2 FP-PARAM page 2	60	03.99

Group: Automation and Drives (A&D)
Division: Variable-Speed Drive Systems
Postfach 3269, D-91050 Erlangen

Siemens Aktiengesellschaft Subject to change Order Number: 6SE7087-6CX84-4AH1

SIEMENS

Standard Software Package

MS360 SECTIONAL DRIVE

for the T300 technology board

in SIMOVERT MASTER DRIVES 6SE70/71

Software release 1.4

Manual

Edition **04.99**

Order-No. 6SE7087-6CX84-6AH1

This Instruction Manual is available in the following languages:

Sprache **Language**	German		
Bestell-Nr. Order No.	6SE7080-0CX84-6AH1		

English

0 Warning information and product limitation

WARNING

Hazardous voltages are present in this electrical equipment during operation.
Non-observance of the safety instructions can result in severe personal injury or property damage.

Only qualified personnel should work on or around this equipment after becoming thoroughly familiar with all warnings, safety notices and maintenance procedures contained herin.

The successful and safe operation of this equipment is dependent on proper transportation, storage, installation and assembly, and on careful operation and maintenance.

Pay particular attention to the warnings in the SIMOVERT Instruction Manuals.

Definitions

- **QUALIFIED PERSONNEL**

A "qualified person" as used in this Manual and in the warnings on the products themselves is one who is familiar with the installation, assembly, commissioning and operation of the equipment and the hazards involved. In addition, he/she has the following qualifications:

1. Is trained and authorized to energize, de-energize, ground and tag circuits and equipment in accordance with established safety practices.
2. Is trained in the proper care and use of protective equipment in accordance with established safety practices.
3. Is trained in rendering first aid.

- **DANGER**

"Danger" as used in this Manual and in the warnings on the products themselves means that death, grievous injury or extensive damage to property will occur if the appropriate precautions are not taken.

- **WARNING**

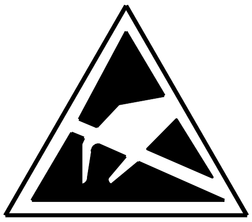
"Warning" as used in this Manual and in the warnings on the products themselves means that death, grievous injury or extensive damage to property may occur if the appropriate precautions are not taken.

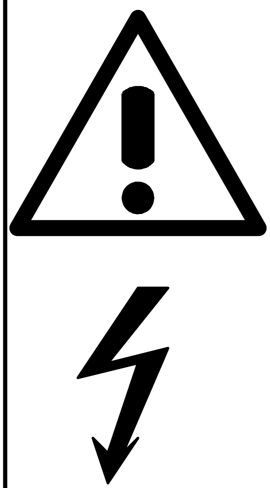
- **CAUTION**

"Caution" as used in this Manual and in the warnings on the products themselves means that minor personal injury or damage to property may occur if the appropriate precautions are not taken.

- **NOTE**

"Note" as used in this Manual highlights an important item of information about the product or a section of the instructions which requires careful attention.

	**CAUTION** The boards contain components which can be destroyed by electrostatic discharge. Before touching an electronic board, the human body must be electrically discharged. This can be simply done by touching a conductive, grounded object immediately beforehand (e.g. a bare metal cabinet component, protective conductor contact).

	**WARNING** Hazardous voltages are present in this electrical equipment during operation. Non-observance of the safety instructions can result in severe personal injury or property damage. Only qualified personnel should work on or around this equipment after becoming thoroughly familiar with all warnings, safety notices and maintenance procedures contained herein. The successful and safe operation of this equipment is dependent on proper transportation, storage, installation and assembly, and on careful operation and maintenance. The warning information supplied with the SIMOVERT Instruction Manuals must be observed.

NOTE
This Instruction Manual does not purport to cover all details or variations in equipment, not to provide for every possibly contingency to be met in connection with the installation, operation or maintenance. Should further information be desired or should particular problems arise, which are not covered sufficiently for the purchasers purposes, please contact your local Siemens office.. The contents of this Manual shall neither become part of nor modify an prior or existing agreement, commitment or relationship. The sales contract contains the entire obligation of Siemens. The warranty contained in the contract between the parties is the sole warranty of Siemens. Any statements contained here do not create new warranties nor modify the existing warranty.

1 Overview

1.1 General information

There are various supplementary boards for the digital 6SE70 MASTER DRIVE AC drive converters. Communications boards (CB1/CBP, SCB1, SCB2) permit the drive to be interfaced to an automation system or coupled to other drives. The drive functional scope can be expanded using technology boards (T100 and T300).

The T300 technology board is a freely-configurable processor board with peripheral devices (analog and binary inputs and outputs, pulse encoder inputs, serial interfaces, dual port RAM to the converter etc.) It is programmed using a programming language (STRUC L) in either list form, or using a graphics operator interface (STRUC G).

Pre-configured software modules (programmed EPROM memory modules) are available for frequently required applications. No additional costs are involved for configuring, testing or documentation. The modules can be parameterized via the converter operator control panel or using a service program and a PC. The standard software can be adapted, or expanded for special applications.
The standard software package is available on floppy disks.

1.2 Validity

This User Manual is valid for the standard "***sectional drive***" ***MS360*** software package, **Release 1.40**. Differences to the previous versions are listed in Section 9 "Changes".

With the exception of the expanded functionality, described in the "Changes" section, this software release is compatible to the previous releases. This is the reason that this Manual can be used for the start-up of previous versions.

The MS360 standard software package can only run on the T300 technology board.

The functions explained here for SIMADYN D and the T300 technology board only refer to the standard **MS360** "***sectional drive***" software package and they do not represent a general statement for SIMADYN D or the technology module. For instance, "fastest cycle time 5 ms" only means that no faster cycle time may be used in the MS360 standard software package.

This standard software package is enabled for the following SIMOVERT MASTERDRIVES (6SE70, 6SE71) drive converters described in the next section.

1.2.1 Hardware/Software requirement

MASTERDRIVES basic units

MASTERDRIVES basic units (new Series, introduced from 1998)
The T300 has been approved for operation in the following MASTER DRIVES basic units:

- ❑ SIMOVERT VC with electronic board CUVC: Software release ≥ 3.11
- ❑ SIMOVERT MC with electronic board CUMC: Software release ≥ 1.2.

The T300 can only be used with Compact-, Chassis- and Cubicle-type units. The use with "Compact Plus" type units is not possible.

MASTERDRIVES basic units (older series, introduced from 1995)
The T300 has been approved for operation in the following MASTER DRIVES basic units:

- ❑ SIMOVERT VC with electronic board CU2: Software release ≥ 1.2
- ❑ SIMOVERT SC with electronic board CU3: Software release ≥ 1.1

CAUTION:	When a t300 board is installed in a SIMOVERT SC unit, the pulse frequency of the converter must not be increased above the factory setting value of P761 = 5kHz to avoid overloading the convertre processor.

Communication boards

The standard software packages can run with and without communication board (CB1/CBP or SCB1/2). In this case the parameter H270 and H248 (Alarm-/ Fault mask) has to be set (refer to section 2)

The T300 can be combined with the following communications boards

- ❑ PROFIBUS-DP interface CBP , Software release ≥ 1.0

  Only one fieldbus communication board can be used. It must be mounted in mounting location 3 (middle location). Communication boards which are designed as Mini-Slot-Boards (e.g. CBP, CBC) must additionally be mounted in Slot "G" of an ADB Adaption Bord before inserted in mounting location 3. The T300 can not communicate with a communication board mounted on he CU (in slot A or C).

- ❑ PROFIBUS interface module CB1, software release ≥ 1.3

- ❑ SCB2 Board software release ≥ 1.3
  The SCB2 has an opto-isolated serial interface which is capable of operating with either a USS protocol or a peer-to-peer protocol.

- ❑ SCB1 board
  The SCB1 is equipped with a fibre-optic interface for peer-to-peer communication or terminal extension modules SCI1 and/or SCI2.

- ❑ SLB SIMOLINK interface board for CUVC or CUMC.
  If a Peer-to-Peer communication in not possible (for example for „Compact Plus“ type units) the SLB board can be installed instead of the T300 Peer-to-Peer interface.

CAUTION: - An optinal SLB SIMOLINK Interface Board must be mounted in a slot on the CUVC or CUMC base electronics board, most preferably in Slot A.

The combination T300 and SLB SIMOLINK Interface mounted in location 3 is not possible!

The SLB borad communicates directly with the base unit. Signal interconnections to the T300 board must be softwired via Binectors-/ Connectors.

- Example for softwiring via Binectors-/ Connectors, refere to section 3.1.17

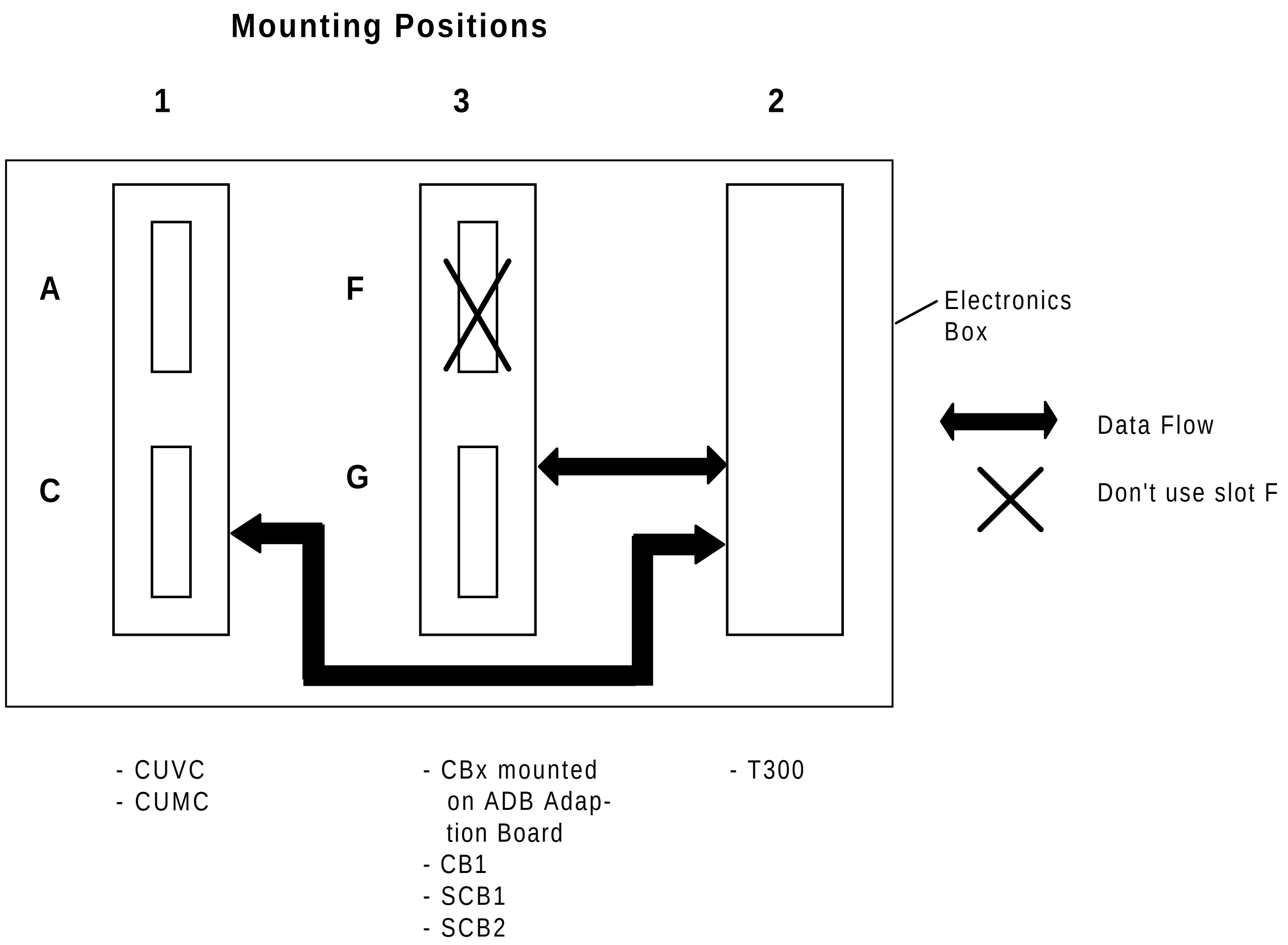
- A T300 board with Hardware release ≥ B, or newer, is needed for use with an SLB SIMOLINK interface board. The correct hardware release code can be detected on the component side of the T300 in the neighbourhood of the lower backplane connector.

Note: MASTERDRIVES basic drive parameter and T300 Parameter can be read and write thrue all the serial Interfaces (with the exception of Peer-to-Peer interface and SIMOLINK interface board).

Allowed mounting combinations / Mounting positions

Please adhere to the following rules for mounting the T300 and other supplementary boards into the electronics box.

Please note: Only the following combinations and mounting positions are allowed.



– The T300 must be mounted in mounting location 2 (rightmost mounting location)

– Only one fieldbus communication board can be used. It must be mounted in mounting location 3 (middle location). Communication boards which are designed as Mini-Slot-Boards (e.g. CBP) must additionally be mounted in Slot "G" of an ADB Adaption Bord before inserted in mounting location 3. The T300 can not communicate with a communication board mounted on the CU (in slot A or C).

– The Communication Board communicates directly with the T300 board.

– An optinal SLB SIMOLINK Interface Board must be mounted in a slot on the CUVC or CUMC base electronics board, most preferably in Slot A..

  The combination T300 and SLB SIMOLINK Interface mounted in location 3 is not possible!

CAUTION:	A T300 board with Hardware release ≥ B, or newer, is needed for use with an SLB SIMOLINK interface board. The correct hardware release code can be detected on the component side of the T300 in the neighbourhood of the lower backplane connector.

T300 parameter settings

The following devices can be used to set the parameters of the T300 board:

- ❑ Standard parameterizing unit (PMU) for basic converters
- ❑ A PC or programmer with the SIMOVIS service program (refer also to section 6.4)
- ❑ Optional OP1S plaintext operator device
- ❑ Optional OP1 plaintext operator device version 1.1 or higher

1.3 T300 technology module

The T300 technology module is a processor module, which can be freely configured using STRUC. It is compatible to SIMADYN D, and it has been especially designed for use with SIMOVERT MASTERDRIVES drive converters. The function of the modules is defined using the function block-oriented STRUC L / STRUC G configuring language. The configured software which is generated is programmed in a program memory sub-module, which is inserted on the processor module. An EEPROM is provided on the program memory sub-module to save parameter changes (EEPROM = electrically write- and deletable memory). Communications with the basic drive is realized through a parallel interface, which is implemented as DUAL PORT RAM (DPR).

Processor / clock frequency	80C186 / 20 MHz		
RAM memory	128 Kbytes		
Communications with unit	Parallel bus, 2 kbyte dual port RAM		
Program memory sub-module	MS300 with 512 kbyte EPROM and 2 kbyte EEPROM		
Binary inputs	16	non-floating	24 V
Binary outputs	8	non-floating	24 V
Analog inputs	7	11 bits + sign	± 10 V (differential inputs)
Analog outputs	4	11 bits + sign	± 10 V, 10 mA
Serial interfaces	2	1* RS232 and RS485 (2 wire) 1* RS485 (2- or 4 wire)	
Pulse encoder inputs	2	2* track A,B, zero, fmax = 400 kHz	

Table 1.3.1: Overview of the T300 technology module. For details refer to the Instruction Manual and connecting diagram T300, refer to Fig. 1.3.

The following components are required to operate the angular synchronous operation module:

Product description	Comment	Order No.
T300 technology module including SC58 and SC60 connecting cables, SE300 terminal block and Instruction Manual for the module in German/English		6SE7090-0XX87-4AH0
Local bus adapter LBA for the MASTERDRIVES electronics box	is required to install a T300 and possibly a Com board	6SE7090-0XX84-4AH0
ADB carrier module to accept the CBP	is required to install a Com board	6SE7090-0XX84-0KA0
MS360 Sectional drive on the memory module, without manual		6SE7098-6XX84-0AH0
MS360 Mehrmotorenantrieb or **Sectional drive MS360**	German or English	6SE7080-0CX84-6AH1 or 6SE7087-6CX84-6AH1

The individual components are also available as spare parts:

T300 technology module	6SE7090-0XX84-0AH2
T300 Instruction Manual, German/English	6SE7087-6CX84-0AH1
SC58 connecting cables	6DD3461-0AB0
SC60 connecting cables	6DD3461-0AE0
SE300 terminal block	6SE7090-0XX84-3EH0

Further, if the standard software package is to be modified, the following is also available:

- STRUC L PT to implement your own functions, in list form. This can run on a PC under WINDOWS.
- STRUC G PT to implement your own functions in a graphic form. This can run on a PC under SCO-UNIX.
- Prommer for memory modules with connection via a parallel PC interface.
- STRUC Service Program for the symbolic monitor.
- STRUC configuring software for the angular synchronous control on floppy disk.

Refer to Section 1.4.2 and Catalog DA65.10 for more precise information.

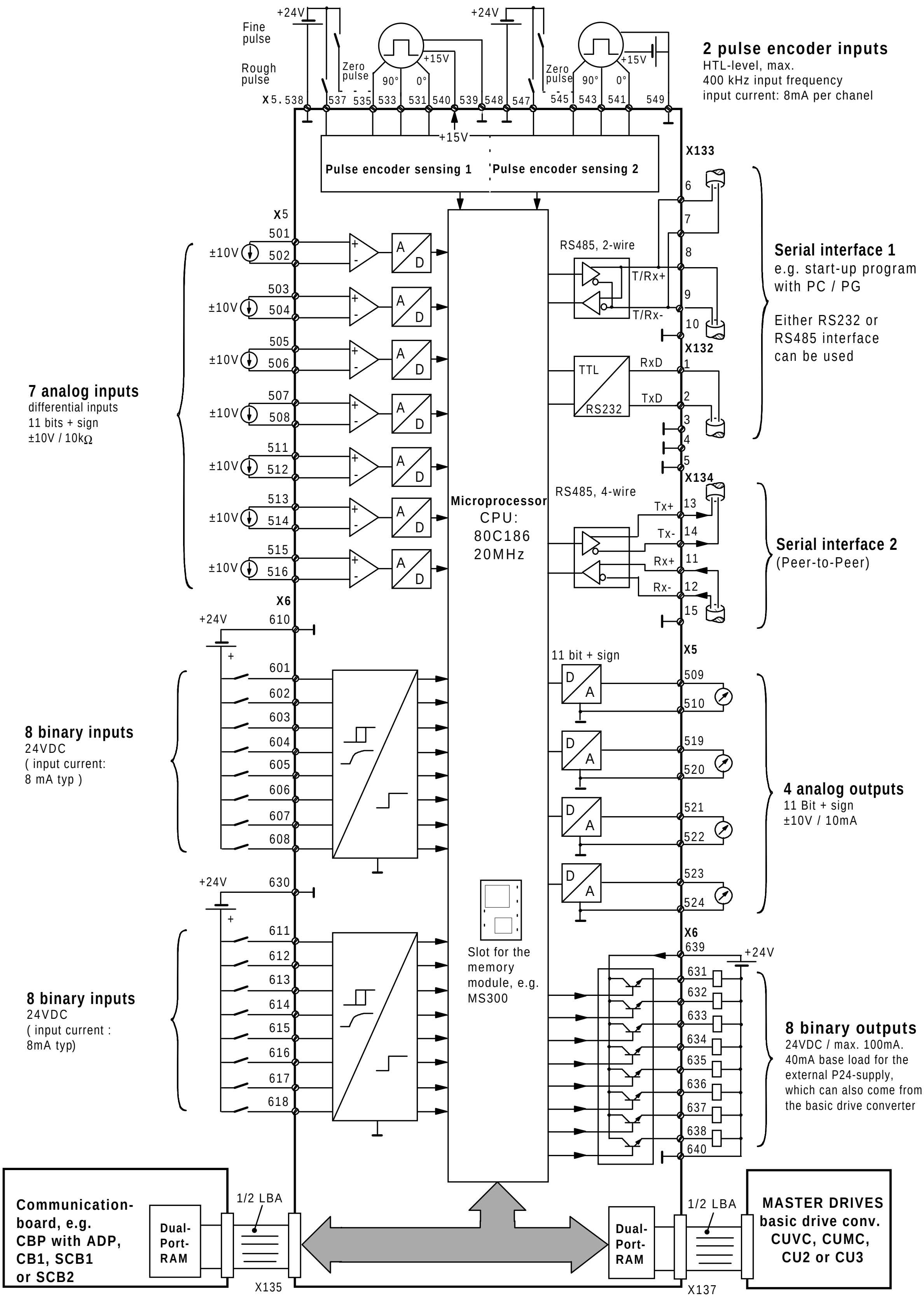
1.3.1 Standard software package on floppy disk

The source codes of the MS360 standard software package are available as STRUC files on floppy disk (designation, MD360). When required, the angular synchronous control function can be adapted to specific requirements using conventional SIMADYN D resources.

Components to adapt the standard software package with STRUC:

Designation	Explanation	MLFB / Order No.
MD360	MS360 angular synchronous control on a $3^1/_2$ inch floppy disk (without documentation)	6SW1798-6XX84-0AH0
MS300	EPROM for T300 **-empty-**	6SE7098-0XX84-0AH0
PP1X	Parallel Programmer (PC-) external	6DD1672-0AD0
UP3	Programming adapter for MS47/MS300	6DD3462-0AB0
STRUC	A STRUC version 4.2.4 or higher is required	Refer to Catalog DA99
	If required, start-up program (SIMOVIS, IBS/SERVICE-program)	Refer to Catalog DA99

Table 1.3.21: Components to adapt the standard software package using STRUC



terminal series X5, X6:connect at terminal bloc SE300.
terminal series X132, X133, X134: connect at T300.

Fig. 1.3

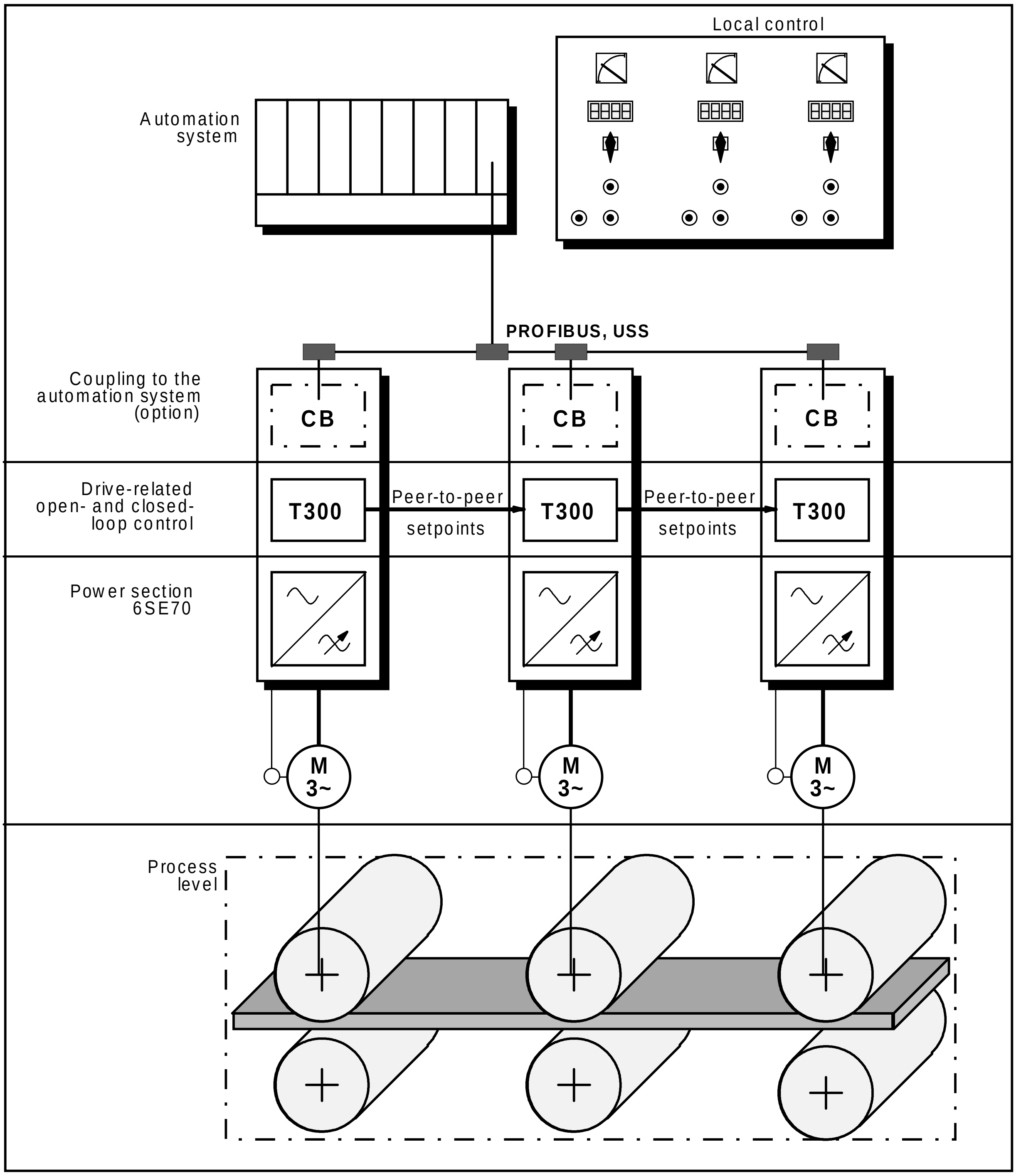
1.4 Applications

This standard software package (module) has been developed for machines which consist of several drives and drive groups. This is true for all machines with a continuous material web (paper- and pulp machines, textile fiber lines, foil machines, coating machines etc.). Either an automation system can be included or just a stand-alone solution.

Existing systems can be retrofitted cost-effectively using the module, as all of the required functionality is available and it must only be adapted to the particular application. In most of the applications, automation is not required.

The module also includes all of the partial functions required for a sectional drive. However, the functionality is not embedded in a rigid structure, and can be adapted by the user for his particular requirements. This module design offers a high level of flexibility. This is supported by freely-available blocks which can be used for special functions.

The following drawing shows a typical configuration:



The converters equipped with technology board, have the required functional scope to create a multi-motor drive group with setpoint generation and transfer. As the control is integrated in the module,

generally, automation is not required. It can be optionally used for complex control tasks or operator control and visualization.

1.5 Functional scope

The individual functions included on the board are as follows:

- **Open-loop drive control**

  Power-on/off, multi-motor group, standard stop, fast stop, electrical off, 7 local modes, 2 x inching, fault evaluation, brake control (open-loop).

- **Technology controller**

  Power-on/off, actual value generation, automatic/manual offset adjustment, setpoint ramp-function generator, supplementary setpoint, technology controller (PID), kp adaption, speed influence, pre-control, torque influence.

- **Setpoint conditioning**

  Machine ramp-function generator, speed ratios, supplementary setpoint, compensation, diameter/gearbox correction, local setpoints, take-up/slack-off, bias, technology controller influence, setpoint cascade.

- **Torque setpoint generation**

  Friction characteristic, accelerating torque computation, supplementary torque, technology controller influence, braking characteristic, load proportion calculation.

- **2 freely-available motorized potentiometers/ramp-function generators**

- **Free functions**

  Adders, multipliers, subtractors, dividers, changeover switch functions, limiters, filters, absolute value generators, square-route extraction functions, minimum evaluators, maximum evaluators, sinusoidal functions, flashing frequency, EXOR logic gates.

- **2 speed inputs**

  2x length measurement, 2x diameter correction

- **Inputs/outputs**

  7x analog input, 4x analog output, 16x binary input, 8x binary output, communications to the basic drive converter (16 words) and to the communications board (10 words) via the backplane bus, peer-to-peer coupling (5 words) to configure a fast setpoint cascade.

1.6 Fault messages (F035)

The technology board generates internal fault signals. These fault signals are combined to form a fault word. The fault word is deposited in connector K141, and can be read-out of parameter d022.

If the multi-motor module identifies a fault condition, a group fault signal is transferred to the basic drive converter.
This technology board group fault signal generates fault message **F035** in the converter (= external fault 1).

If fault message **F035** occurs, then a fault has been generated by the technology board.
The fault cause can be determined using parameter **d022**.
The individual bit positions have the following significance:

d022	**STATUS_FLT_WRD** Fault word, drive 15 14 | 13 12 | 11 10 | 9 8 7 6 | 5 4 | 3 2 | 1 0 Bit 0: Communications error CB Bit 1: Communications error CU Bit 2: Error, converter checkback signal Bit 3: Error from the open-loop group control Bit 4: Communications error, peer-to-peer Bit 5: External fault Bit 6: Overspeed, positive Bit 7: Overspeed, negative Bit 8: Anti-stall protection Bits 9 to 15: Unassigned

1.7 Diagnostic LEDs

Three diagnostic LEDs are provided on the board:

Red LED
The red LED flashes if the technology board software is being executed. One of the following faults/errors may be present if the red LED does not flash in spite of the fact that the converter is powered-up:

Fault cause	**Remedy**
Defective technology board/LED	Replace the board
Board incorrectly or not completely inserted	Insert the board in the correct slot and screw into place
Defective LBA	Replace the LBA
Memory module incorrectly inserted or missing	Correctly insert the memory module
Memory module failed or not programmed, refer to the information below.	Replace the memory module

Yellow LED
The yellow LED flashes if the technology board is communicating with the basic drive converter (CU).
If the red LED is flashing, but the yellow LED not, then one of the following faults/errors may be present:

Fault cause	**Remedy**
Defective technology board (DPR) / LED	Replace the board
CUVC, CUMC: The basic drive has not identified the T300.	CUVC, CUMC: Replace T300 or CUVC, CUMC
CU2, CU3: T300 not logged-in in the basic drive, or not recognized.	CU2, CU3: Log-on T300, refer to Section 6, or replace T300 or CU2, CU3
Board incorrectly or not completely inserted	Insert the board into the correct slot and screw into place

Green LED
The green LED flashes if the technology board is communicating with the communications board (CB).
If the red LED flashes, but the green LED not, then one of the following faults/errors may be present:

Fault cause	**Remedy**
Technology module / LED or communications module failed	Replace the board
CUVC, CUMC: The basic drive has not identified the CBP.	CUVC, CUMC: Replace T300 or CBP
CU2, CU3: T300 not logged-in in the basic drive, or not recognized.	CU2, CU3: Log-on T300, log-on CB1 refer to Section 6, or replace T300 or CB1
Board incorrectly or not completely inserted	Insert the board into the correct slot and screw into place

Notes:
The red LED must always flash if the technology board is O.K.
CU2,CU3: The yellow and green LEDs first start to flash, if the hardware setting (P052=4) has been completed.

Setting up without communications board:
The yellow and red LEDs must flash.

Setting up with communications board:
The yellow, red and green LEDs must flash.

The MS360 memory module is identified by its Order No. on the PC board, refer to Section 1.3 and on the "MS360 Vx.y" label on one of the components.

1.8 Sampling times

The modules uses 5 different *sampling times*, which are coded with T1 to T5. Only this code is used in the text. The assignment is as follows:

Time level	Sampling time
T1	5.0 [ms]
T2	20.0 [ms]
T3	40.0 [ms]
T4	160.0 [ms]
T5	640.0 [ms]

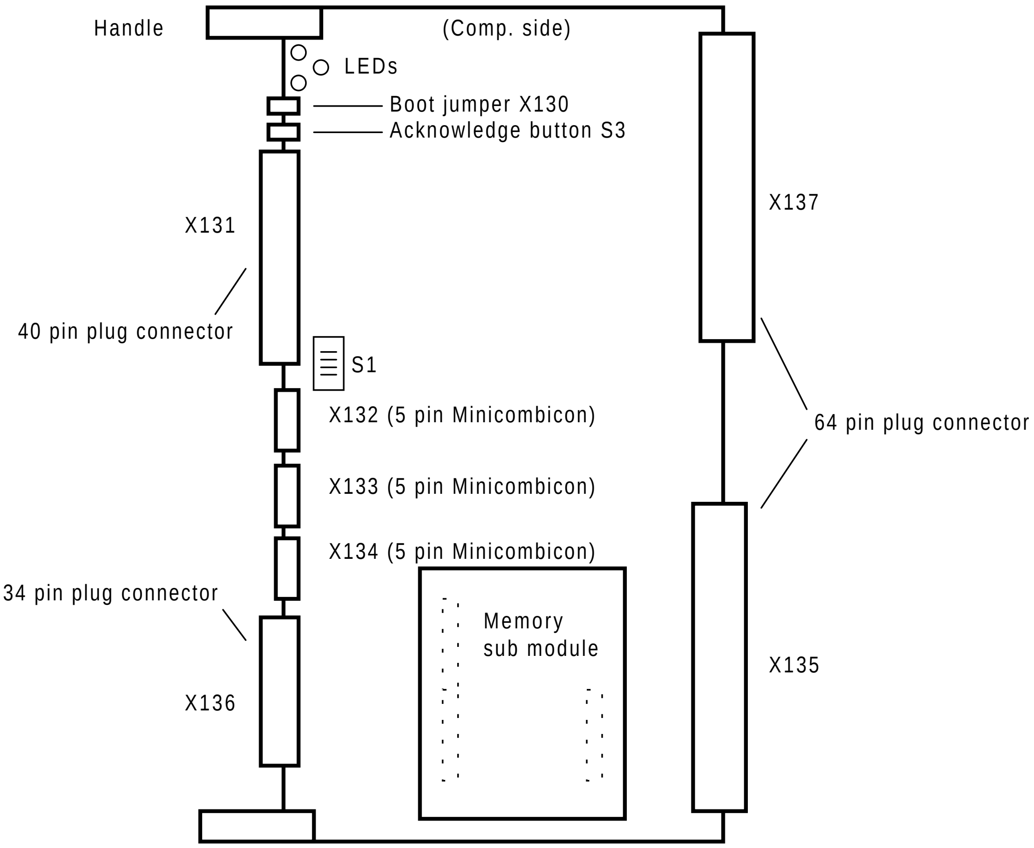
The sampling time specifies, in which time interval the particular function is sampled, i.e. is computed or calculated. The inputs and outputs of the function are updated at the start and end of the sampling time (because the sampling times are cyclically repeated, this is one and the same). However, put in a simplified fashion, the complete sequence from input, computation and output are simultaneously realized during this short instant and in the meantime nothing else happens. Thus, the term sampling.

2 T300 technology board

The T300 technology board is a configurable microprocessor board which was developed to implement drive-related technological open- and closed-loop control tasks. It includes a program and parameter memory as well as interfaces to the process.

2.1 Hardware

The board is a microprocessor board with an 80C186-CPU, clocked at 20MHz. It also includes a 128kbyte RAM for the user program, 1k word dual port RAM for CU communications and various interfaces. A special real-time operating system, in conjunction with the processor performance of the CPU, permits extremely fast closed-loop control functions with short response times but is simultaneously stable and reliable.



X131 : Analog inputs and outputs, speed inputs
X132 : RS232 (downloading, diagnostics monitor)
X133 : RS485
X134 : RS485 (peer-to- peer)
X136 : Binary inputs/outputs
X135 : Dual port RAM interface to the COM board (e.g. CB)
X137 : Dual port RAM interface to the BASE board (e.g. CU)

The converter must be equipped with a local bus adapter (LBA) so that the board can be used. This is snapped-into the electronics box, and provides the mechanical guides for the supplementary boards, and also the electrical connection to the converter using a bus PC board. The board is supplied and communications to the converter established in this fashion. Further, the pulses from the pulse encoder connected at the CU are available there and can be evaluated on the T300.

In addition to a T300, a communications board, abbreviated CB1/CBP (COM BOARD), can also be inserted in the 6SE70/71 electronics box. Basic drive converter- and T300 signals can be accessed via the CB using fast bus communications, e.g. PROFIBUS.

The connection to the peripherals is established using the SE300 terminal module, which is connected to the T300 via two 2 m shielded round cables which cannot be interchanged. The processor board, cables and terminal module are supplied as complete package, but are also individually available as spare parts.

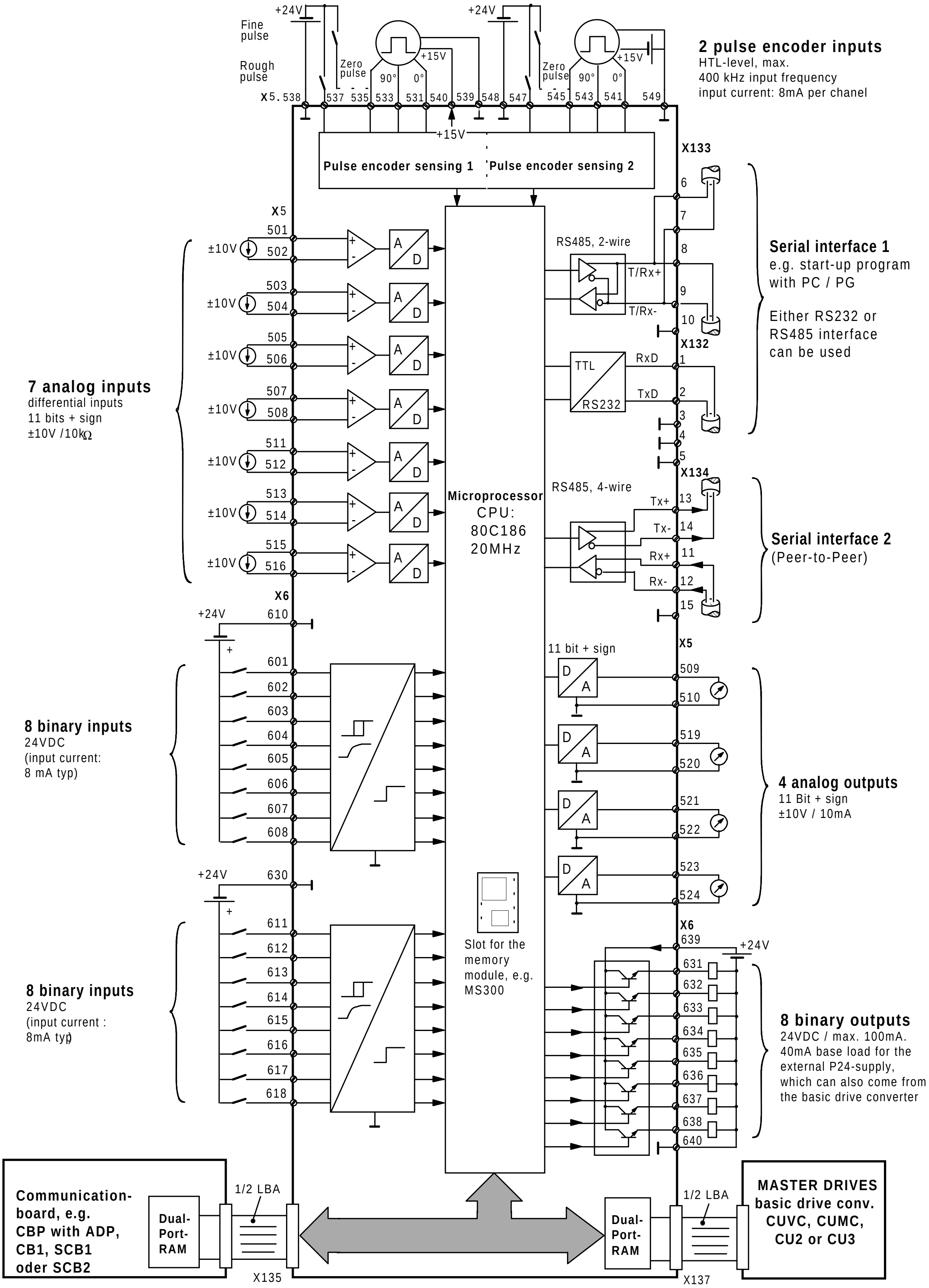
LEDs are provided on the terminal module which permit a fast status display of binary inputs and outputs. Binary signals, analog signals and tachometer pulses are fed-in and out via screw terminals. No other terminals are required (e.g. terminals on a mounting rail in the cabinet).

T300 has two serial SS1 and SS2 communication interfaces. SS1 is configured for diagnostics and start-up; SS2 is used for the peer-to-peer coupling. The cables are connected at plug-in terminal blocks.

Three diagnostic LEDs are provided on the T300 itself. When they flash they indicate perfect operation, and are assigned to the T300 itself (red LED), communications to the CU (yellow LED) and communications to the CB (green LED). A system fault signal can be reset using an acknowledge button.

Several watchdogs are available to monitor the correct functioning. Monitoring functions for the hardware (ready signal delay for hardware access, double address coding errors, access to non-existent addresses) and the software (cyclic operation, interrupt control of the interfaces, timers and inputs) are provided.

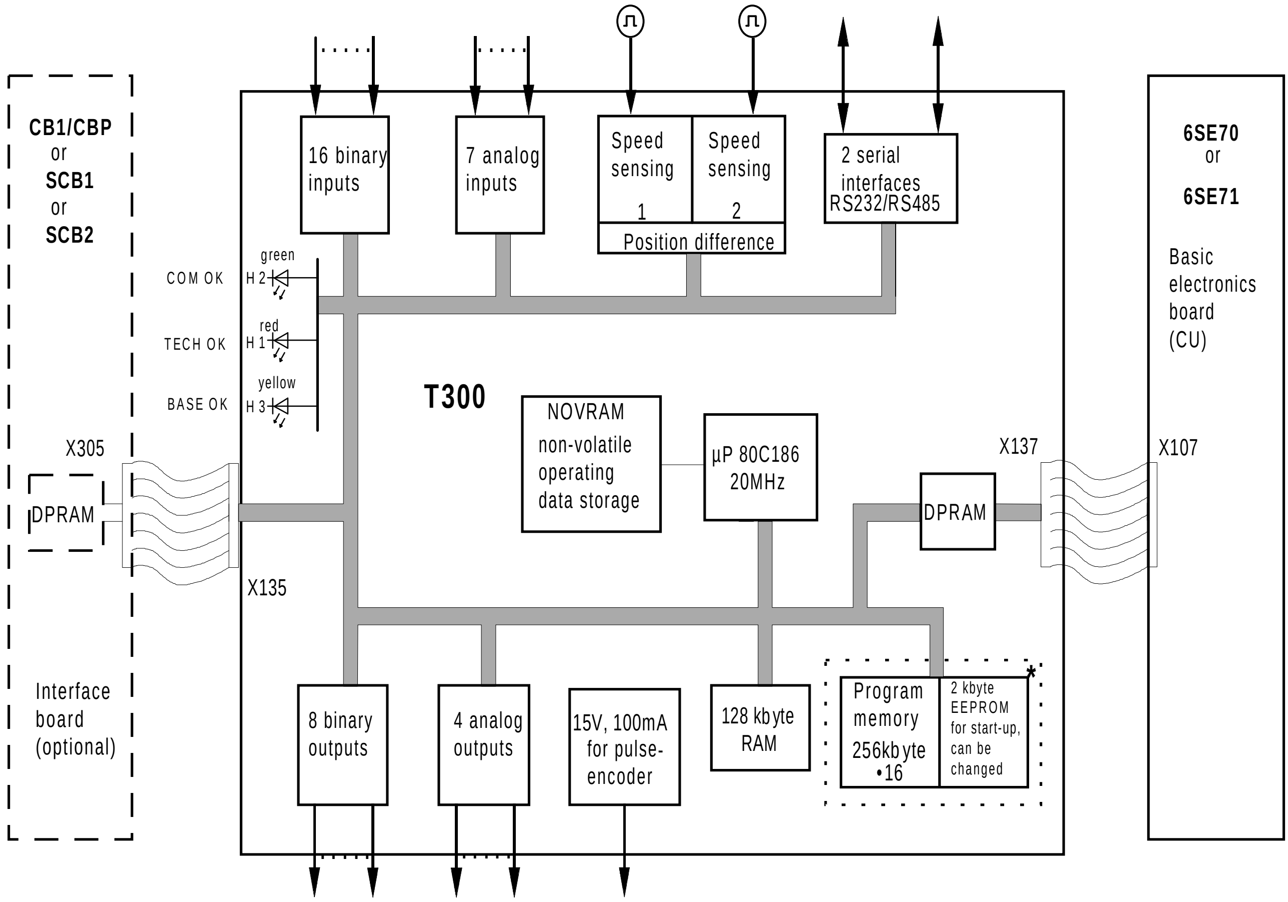
An NMI (Non Maskable Interrupt) is generated if a fault/error is identified. The processor attempts to remove the cause and to return to cyclic operation. If this is not successful, the board is switched into a completely inactive state. This means that the processor is stopped and the drive is shutdown with a fault condition.



terminal series X5, X6:connect at terminal bloc SE300.
terminal series X132, X133, X134: connect at T300.

2.2 Interfaces and input/output terminals

The following diagram shows a schematic of the internal T300 functions as well as the external connections:

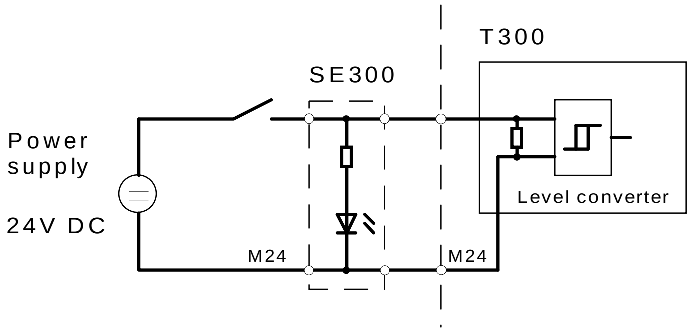


* Insertable memory module

The assignments for the connector and the technical input and output data are described in the following sections. However, only the information specified in the current T300 Manual is binding.

2.2.1 Binary input terminals

Binary signals have a 24 V DC level with reference to M24 (terminals 610, 630 or 640 on SE300).

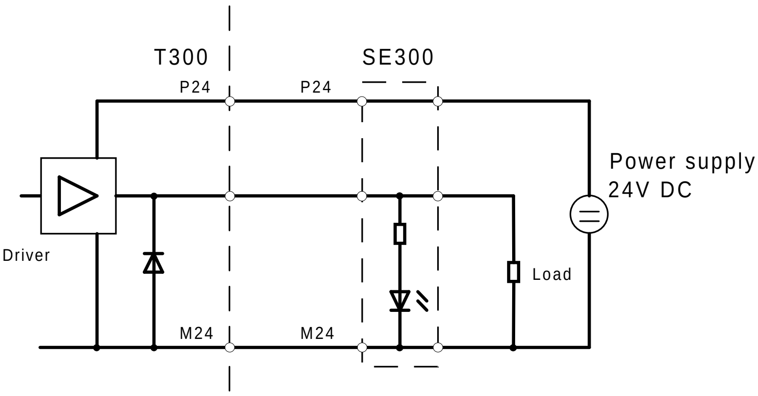


An input which is not connected has a logical zero signal level. Signals below +6 V are also interpretted as low. Voltages between 13 V and 33 V represent a high signal level. The input current at 24 V is typically approx. 5 mA; the delay time, approx. 1 ms.

Binary input	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Terminal at SE300 -X6	601	602	603	604	605	606	607	608	611	612	613	614	615	616	617	618
Pin at T300 -X136	1	2	3	4	5	6	7	8	11	12	13	14	15	16	17	18

2.2.2 Binary output terminals

The binary outputs are also 24 V DC signals referred to M24 (terminals 610, 630 or 640 at SE300). They are supplied from the P24 terminals (609, 619 or 639).



Each of the 8 outputs (terminals 631 to 638) can drive between 0.2 mA and 100 mA, which is sufficient to control small indicating lamps or coupling relays. A free-wheeling diode is available on the T300, however, for inductive loads, it is recommended that a free-wheeling diode is directly connected at the load. Further, the outputs have an electronic short-circuit protection to ground and P24. The total output loading may not exceed 400 mA; the operating voltage range is between +20V and +30V. The switching delay is approx. 300µs.

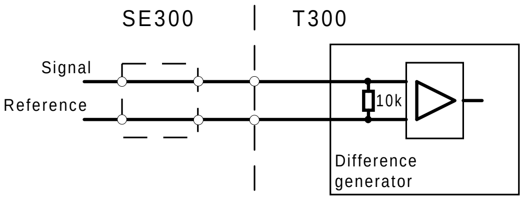
Binary output	1	2	3	4	5	6	7	8
Terminal at T300 -X136	21	22	23	24	25	26	27	28
Pin at SE300 -X6	631	632	633	634	635	636	637	638

The outputs are low when the processor is being reset.

Note:
The binary inputs and outputs are internally connected with electronics ground. There is no electrical isolation.
The input or output stages or even the complete board could be damaged if the permissible signal level is exceeded!

2.2.3 Analog input terminals

The analog input stages are differential inputs for common-mode rejection. Thus, the reference level is not connected with the internal ground and must be individually connected. It should be ensured, that the voltages at the terminals for signal and reference do not exceed +/-20V!



The inputs have a filter with a 1.5 kHz transition frequency and a typical 10kΩ input resistance. The resolution is 12 bits (corresponding to 4.9 mV) over the complete input voltage range of +/- 10 V for a linearity of ≤1LSB. The absolute accuracy is +/- 3LSB.

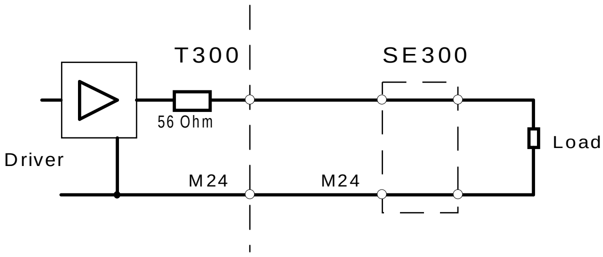
7 analog inputs are available.

Analog input	1	2	3	4	5	6	7
Terminal at SE300 -X5 SIGNAL	501	503	505	507	511	513	515
Terminal at SE300 -X5 REF.	502	504	506	508	512	514	516
Pin at T300 -X131 SIGNAL	1	3	5	7	11	13	15
Pin at T300 -X131 REF.	2	4	6	8	12	14	16

Note:
If the lines/cables are noisy, it is recommended that an RC hardware filter is connected at the analog input terminals (also refer to the T300 Instruction Manual). The noise is then no longer digitized.
If problems occur with the analog inputs it should be checked as to whether the reference terminal is connected for each analog input.

2.2.4 Analog output terminals

The analog outputs are drivers with a +/- 10 mA maximum current and an internal resistance of 56Ω, which can control display instruments or coupling elements. They have a 12-bit resolution (corresponding to 4.9 mV) over the complete +/- 10 V range, with a linearity of ≤1LSB and are short-circuit proof to ground. They have common reference potentials, which are connected with the electronics ground.



The terminal assignment is as follows:

Analog output	1	2	3	4
Pin at T300 -X131 SIGNAL	9	17	19	20
Terminal at SE300 -X5 SIGNAL	509	519	521	523
Terminal at SE300 -X5 REF.	510	520	522	524

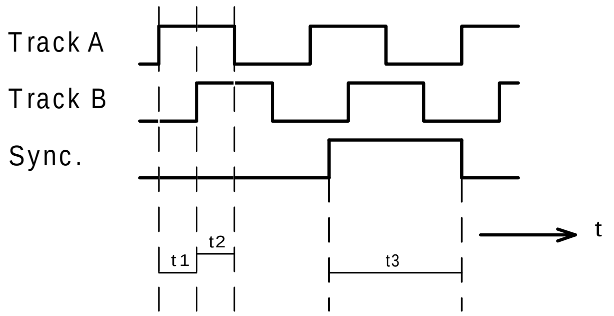
The analog outputs are undefined after power-up while the system runs-up. The output voltage levels are maintained for a reset or if the board develops a fault.

2.2.5 Pulse encoder terminals

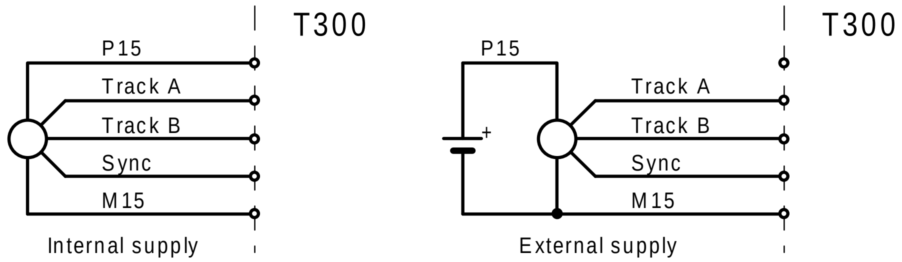
The technology board has evaluation electronics for two pulse encoders. Terminals for track A and track B as well as the zero track (synchronizing pulse) are available for every encoder. These are unipolar inputs, which are not suitable for push-pull operation.

Tachometer input	1	2
Terminal at SE300 -X5 TRACK A	531	541
Terminal at SE300 -X5 REF.	532	542
Terminal at SE300 -X5 TRACK B	533	543
Terminal at SE300 -X5 REF.	534	544
Terminal at SE300 -X5 SYNC	535	545
Terminal at SE300 -X5 REF.	536	546

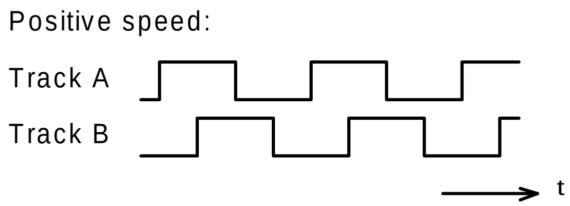
The displacement between track A and B must be 90°, a +/- 20° deviation is tolerated. The maximum input frequency is 400 kHz. In this case, the pulses or pulse intervals (T1 to T3) must be at least 1 µs long:

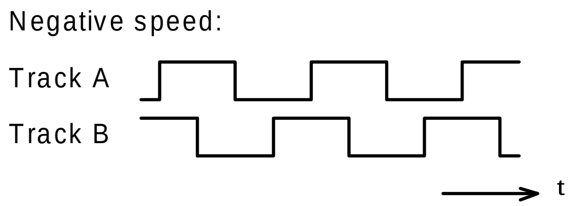


The nominal tachometer signal level is 15 V. Signal levels are permissible between 0 V and 30 V, whereby voltages below 5 V are interpretted as low signals, and signals above 8 V, as high signals. The maximum input current per track is approx. 5 mA. Pulse encoder types with supply voltages from 15 V to 24 V can be used. A 15 V supply voltage is available at terminals 540 (P15) and 539 (ground) of the SE300. The maximum current is 100 mA, which is generally sufficient for a pulse encoder. The grounds must be connected when supplied via an external power supply unit.



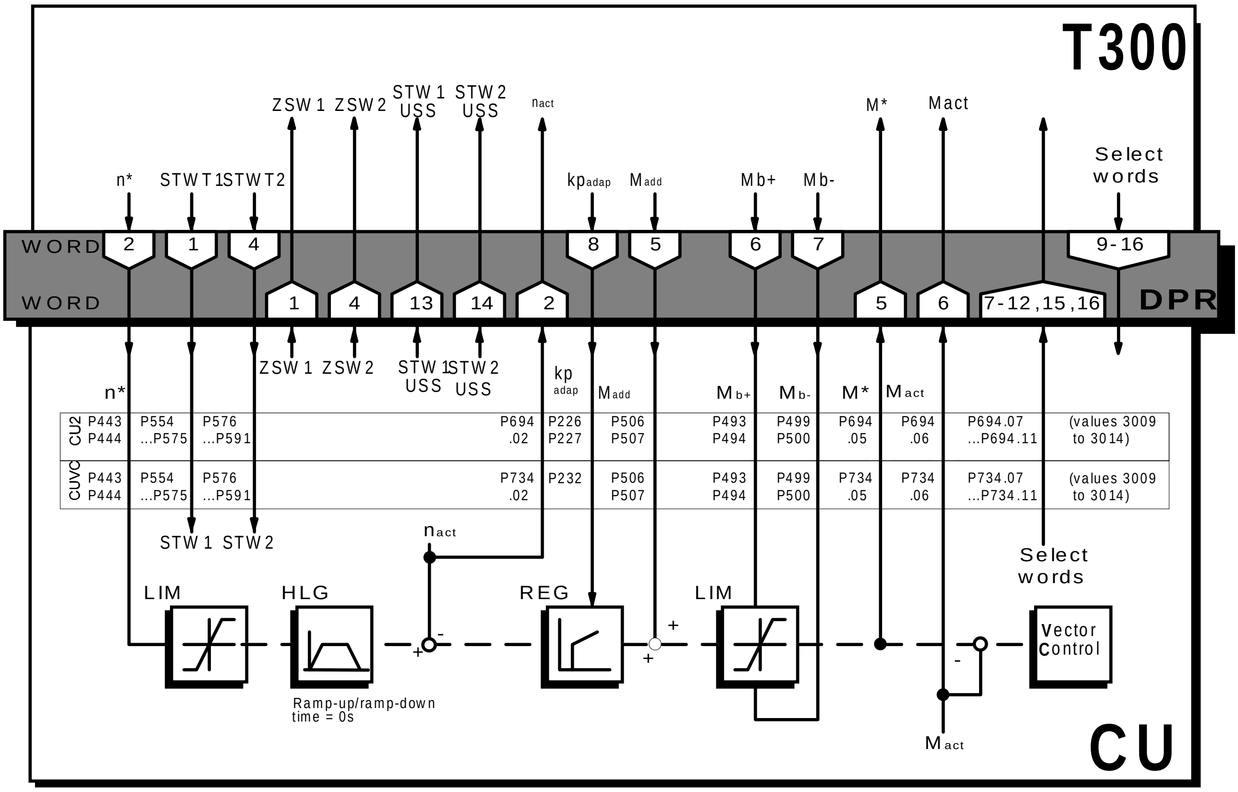
The speed actual value is positive, if the rising edge of track B coincides with a high signal at track A and negative for a low signal level.





2.2.6 Interface to the basic drive converter (CU)

Communications to/from the converter are realized via a dual port RAM on the T300. It permits simultaneous access to data being transferred to/from the T300 and CU.



16 words are transferred from the T300 to the CU and the same number in the reverse direction. The connection is physically established throught the plug connectors (-X1137) on the rear side when the T300 is inserted.
As can be seen in the diagram, the technology board expects specific parameterization for the signal transfer to the basic drive converter. Thus, the basic drive converter signals must be connected-through to the T300 according to Section 6.2.10.

Note:

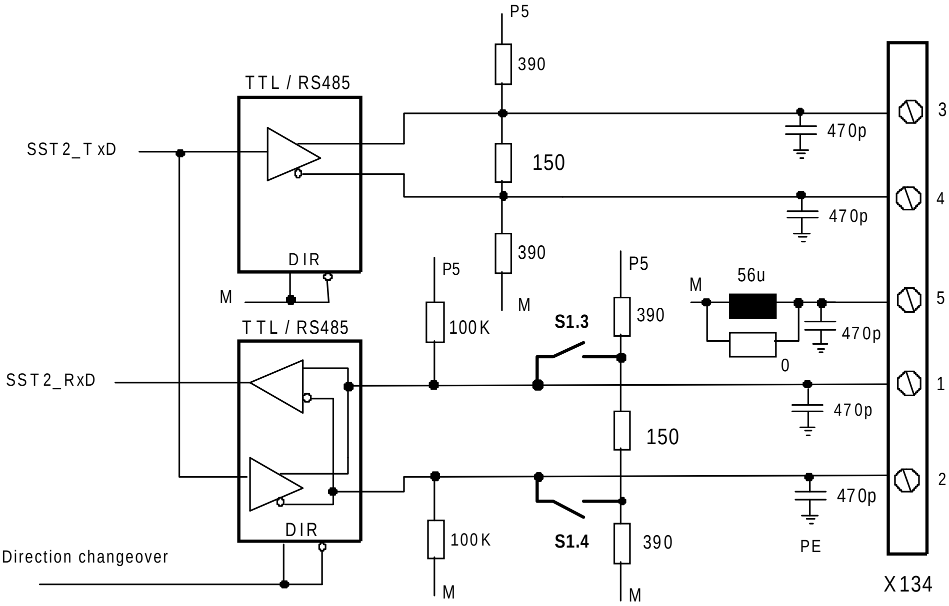
STW1, STW2 = Control words 1 and 2 of the basic drive converter
ZSW1, ZSW2 = Status words 1 and 2 of the basic drive converter

As can be seen from the block diagram, the closed-loop speed control remains active in the basic drive converter, even when the T300 is used. The proportional gain factor can be set via T300.

2.2.7 Peer-to-peer interface (SS2)

The serial interface (-X134) is a piece of hardware according to the RS-485 standard up to 115200 baud. It can be operated in either a two- or four-wire mode, which is defined in the particular protocol (for peer-to-peer communications of the multi--motor module, this is the four wire mode).

Plesae refere also to note 3, Section 6.4.3



Bus terminating resistors can be activated using DIP switch S1, which must be activated at the last receiver. They are active, if switches S1.3 and S1.4 are set to ON.

The following rules must be observed when configuring a bus system:

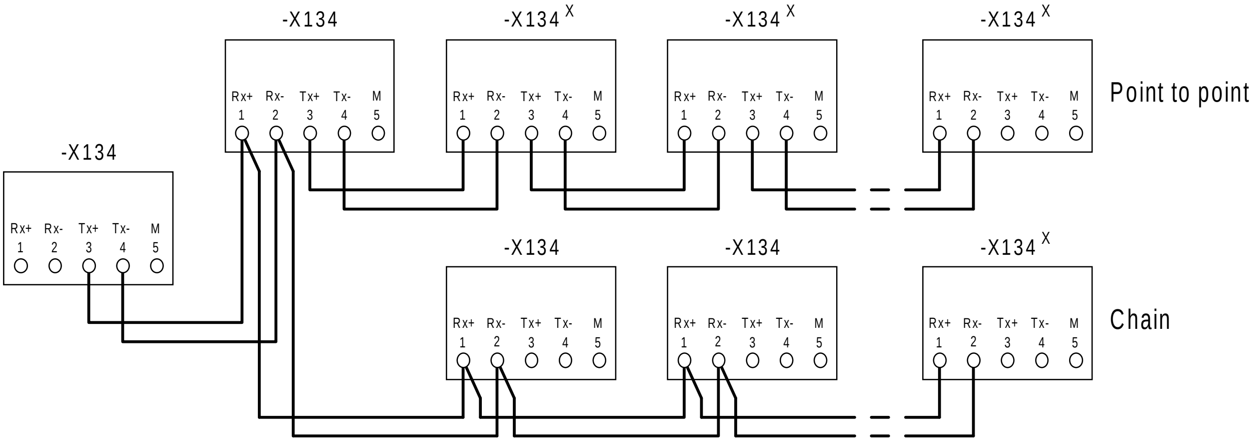
Rule 1: Connections must be directly routed from T300 to T300 using shielded cables (1 pair) without any intermediate terminal locations. The shield must be connected at both ends through a low-impedance connection at the SIMOVERT housing or cabinet potential (using a cable clamp).

Rule 2: Only one conductor may be connected at the transmit terminals (+Tx/-Tx).

Rule 3: At the receiver terminals (+Rx/-Rx), either one conductor can be connected (in this case, the terminating resistors must be switched-in), or two conductors (in this case, it is not permissible that the terminating resistors are active).
The first case, involves a point-to-point connection; a cascade is realized in the latter (point-to-multi-point).

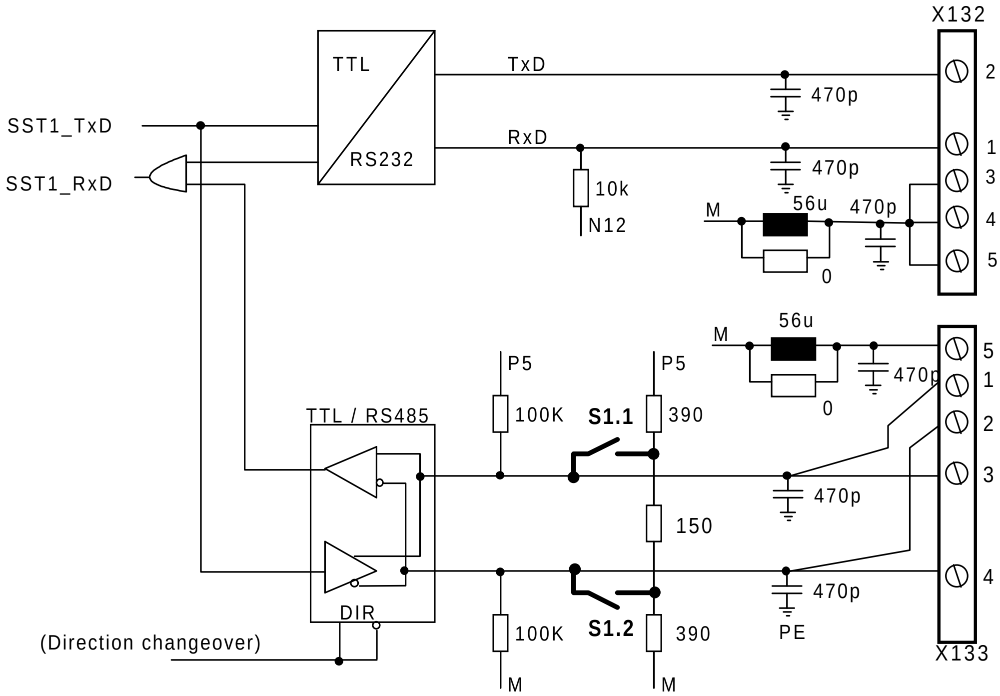
Rule 4: A cascade (chain) may only include up to 31 receivers.

Connection assignment and a possible configuration is shown in the following diagram. Bus termination is required at the connectors marked with x.



2.2.8 Serial service interface (SS1)

The serial interface is either RS-232 (-X132) or hardware according to the RS-485 standard (two wire) up to 38400 baud (-X133). However, it is not possible to use both connectors simultaneously.



Bus terminating resistors at -X133 can be activated using DIP switch S1, if switch S1.1 and S1.2 are set too ON. They must also be available at the last receiver.

RS232

Pin number (referred to connector X132):	Pin number (referred to the labels on the T300 connector):	**Connector X132** (RS232)
1	1	Receive data RxD
2	2	Transmit data TxD
3	3	Ground GND
4	4	Ground GND
5	5	Ground GND

Table 2.2.8.a: Connector X132

RS485

Pin number (referred to connector X132):	Pin number (referred to the labels on the T300 connector):	**Connector X133** (RS485)
1	6	Receive / Transmit +RxD / +TxD
2	7	Receive / Transmit -RxD / -TxD
3	8	Receive / Transmit +RxD / +TxD
4	9	Receive / Transmit -RxD / -TxD
5	10	Ground GND

Table 2.2.8.b: Connector X133

The cable assignment PC - X132

PC (9-pin SUB-D)			T300 (Minicombicon 5)
RxD	2	2	TxD
TxD	3	1	RxD
M	5	3	M

2.2.9 Interface to the CB communications board

Communications to/from the communications board is realized via a dual port RAM on the COM board. It permits simultaneous access to the data to be transferred between T300 and the COM-BOARD.

Presently the following can be used as COM-BOARD

- **CB1/CBP** for PROFIBUS DP (SINEC L2 DP),
- **SCB1** Fiber-optic cable for the USS protocol and terminal expansion via SCI1 and SCI2
- **SCB2** for the USS protocol via RS485.

10 words are transferred from the T300 to the COM-BOARD and the same number in the reverse direction. The connection is physically established by the plug connector (-X135) on the rear side when the COM-BOARD is inserted.

3 Function description

The function description consists of a text part as well as the graphic documentation in the form of function diagrams. The function diagrams are neutral block diagrams, and permit configuring and start-up without any supportive text description. The latter is considered to be detailled information to the diagrams.

The description is sub-divided into functional sections such as inputs/outputs, open-loop control, technological closed-loop control, speed setpoint generation, torque setpoint generation and free functions.
The function diagrams are structured as follows:

Function diagrams	Contents
A	Signal input/output, signal conditioning
B	Open-loop drive control
C	Closed-loop technology controller
D	Setpoint conditioning
E	Supplementary torque/torque limit generation
F	Supplementary functions

***Note**:*
In order to understand the function diagrams, it is necessary to be knowledgable about the connector principle. This procedure permits unified documentation and the highest degree of flexibility. Its principle of operation is explained at the beginning of Section 5.

3.1 Inputs/outputs (function diagrams, A.)

All steps and measures are considered as inputs, which are used as inputs for the multi-motor module. These are communications from the basic drive converter, another technological module with peer-to-peer connection or an automation system via COM-BOARD, e.g. SINEC-L2, and beyond this, also the hardware inputs for binary and analog signals as well as for pulse encoders.
Outputs are essentially functions, which send signals to a particular partner. These also include the above mentioned communications as well as binary- and analog outputs.
The freely-definable status word, the limit value monitors as well as the motorized potentiometers are discussed here.

3.1.1 Inputs/outputs from/to CU (function diagrams A1, A2)

Data (16 words) received from the basic drive converter, are deposited in connectors K040 to K055, where they can be selected through the multiplexers. The appropriate parameters are specified as actual value source in parameter P694 (CU2,CU3), P734 (CUVC,CUMC) of the basic drive converter. In this case, the index stands for the position in the telegram or for the connector, in which the value can be found, according to the following table:

Index P694.xx P734.xx	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
Telegram position	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Connector Kxxx	040	041	042	043	044	045	046	047	048	049	050	051	052	053	054	055

Vice versa, when selecting the value to be sent to the CU, a connector is selected for every telegram position and then entered into the appropriate parameter. Further, the most important values for transfer to CU are located in the display parameters.

Parameters Hxxx	888	889	890	891	892	893	894	895	896	897	898	899	900	901	902	903
Display in dxxx	092	093	-	094	095	096	097	-	-	-	-	-	-	-	-	-
Telegram position	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Entry 30xx	-	02	-	-	05	06	07	08	09	10	11	12	13	14	15	16

Note:
The communications status is represented in the *status word INPUT*. When using a PC with SERVICE program, this can be used to check the function of communications to the CU by interrogating the $F_CUR (receive) and $F_CUT (transmit) signals. These are a logical 1 if communications are functioning correctly.

CU communications is processed in the shorted sampling time (T1).

The assignment of the *control-* and *status words* is shown on Page A2 of the function diagrams. The bits to control the *setpoint channel-* and *motor data sets* and for *fixed setpoint selection* can be freely-connected, and are supplied with H234, 236, 238, 240, 242 and 244 (source) and H235, 237, 239, 241, 243 and 245 (mask). Further, the control signal can be selected for *fault acknowledgement,* using H216 and H217.

3.1.2 Inputs/outputs from/to CB (function diagrams, A3)

Data (10 words) received via a communications board (CB) is deposited in connectors K020 to K029. The assignment of the values to the connectors corresponds to their sequence in the telegram:

Telegram position	1	2	3	4	5	6	7	8	9	10
Connector Kxxx	020	021	022	023	024	025	026	027	028	029

The transmit quantities are also assigned according to their sequence:

Parameters Hxxx	904	905	906	907	908	909	910	911	912	913
Telegram position	1	2	3	4	5	6	7	8	9	10

Note:
Communications status is represented in the *status word INPUT*. When using a PC with SERVICE program, the function of the communications to CB can be checked by interrogating the $F_CBR (receive) and $F_CBT (transmit) signals. These are a logical 1 if communications are functioning correctly.

The CB communications is processed in the shortest sampling time (T1).

Please refere also to note 3, Section 6.4.3

3.1.3 Inputs/outputs from/to the peer (function diagrams, A3)

Data (max. 10 words), received from another multi-motor module or another drive are deposited in connectors K030 to K039, where they can be selected through multiplexers. The assignment of the values to the connectors corresponds to their sequence in the telegram:

Telegram position	1	2	3	4	5	6	7	8	9	10
Connector Kxxx	030	031	032	033	034	035	036	037	038	039

The transmit quantities (5 words) are also assigned according to their sequence, and displayed in the display parameters, the remaining words are zero. Further, there are *adaption factors* for the first 4 words:

Parameters Hxxx	879	881	883	885	887
Adaption factor Hxxx	880	882	884	886	-
Display dxxx	087	088	089	090	091
Telegram position	1	2	3	4	5

Further, the following parameters can be set for peer-to-peer communications:

H197: Baud rate
H198: Number of receive words
H199: Number of transmit words

Note:
- The communications status is represented in *status word INPUT*. When a PC with a service program is used, the peer communications function can be checked by interrogating the $F_PPR (receive) and $F_PPT (transmit) signals. These are logical 1 if communications are functioning correctly.

The peer communications is executed in the shortest sampling time (T1).

Please refere also to note 3, Section 6.4.3

- When using Compact or Compact Plus units, under certain circumstances, the peer to peer link must be replaced by SIMOLINK. One of the basic CUVC or CUMC modules is required if SIMOLINK is to be used. An example of how SIMOLINK can be connected with the multi-motor module via the basic drive, is shown in Section 3.1.17, replacing peer to peer by SIMOLINK.

3.1.4 Binary inputs (function diagrams, A4

The statuses of input terminals 1 to 8 or 11 to 18 of T300 (corresponds to terminals 601 to 608 and 611 to 618 of the SE300) are read-in as word-quantity. It is possible to *invert* the individual binary signals from the terminals via H102, before these are deposited in K069. Status input signal display is possible via D010.

Binary input	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Terminal at SE300 -X6	601	602	603	604	605	606	607	608	611	612	613	614	615	616	617	618
Weighting for inv. in H102	0001	0002	0004	0008	0010	0020	0040	0080	0100	0200	0400	0800	1000	2000	4000	8000

Binary inputs 9 to 16 are additionally directly linked with the *byte-serial read-in function.* The bit inversion is ineffective for these.

The circuit configuration and internal structure of the binary inputs is described in Section 2.2.1

3.1.5 Binary outputs (function diagrams, A4)

There are 8 binary outputs which are assigned via parameters H833, 835, 837, 839, 841, 843, 845 and 847 (source) and H834, 836, 838, 840, 842, 844, 846 and 848 (mask). All binary outputs can also be inverted using the appropriate masking with H849.

Binary output	1	2	3	4	5	6	7	8
Weighting for inv. in H849	0001	0002	0004	0008	0010	0020	0040	0080
Terminal at SE300 -X6	631	632	633	634	635	636	637	638

The circuit configuration and the internal structure of the binary outputs is described in Section 2.2.2.

The binary inputs and outputs are processed in T3. The outputs are low when the processor is being reset.

Note:
The binary inputs and outputs are connected with the internal electronics ground. There is no electrical isolation! If the permissible signal level is exceeded, in addition to the input- or output stages, the complete board could be damaged!

3.1.6 Analog inputs (function diagrams, A5)

There are 7 analog inputs in various sampling times, i.e. with different speeds.
This permits a selection to be made depending on the process requirements. Further, every analog input can be adapted using a *correction factor* and *offset*. The thus obtained signal is fed through a first order *software filter* (PT1), whose time constant can be parameterized. The values are fed to display parameters.

Analog input	1	2	3	4	5	6	7
Terminal at SE300 -X5 signal	501	503	505	507	511	513	515
Terminal at SE300 -X5 REF.	502	504	506	508	512	514	516
Adaption Hxxx	121	124	127	130	133	136	139
Offset Hxxx	122	125	128	131	134	137	140
Filter time Hxxx	123	126	129	132	135	138	141
Display dxxx	003	004	005	006	007	008	009
Connector Kxxx	060	061	062	063	064	065	066
Sampling time	T1	T1	T3	T3	T3	T4	T4

The circuit configuration and the internal structure of the analog inputs is described in Section 2.2.3.

Note:
If there is noise on the cables, it is more favorable to connect an *RC hardware filter* to the analog input terminals than provide filtering per software (also refer to the T300 Instruction Manual).
Then, the noise is not even digitized.
Fluctuations, resulting from sampling can be removed using a software filter

3.1.7 Analog outputs (function diagrams, A5)

Using a parameter, it is defined as to whether a signal is output *with sign* or as *absolute value,* and with which *smoothing*, *offset* and *gain*. The assignment is as follows:

Analog output	1	2	3	4
Source Hxxx	850	855	860	865
Abs. value Hxxx	851	856	861	866
Filter time Hxxx	852	857	862	867
Offset Hxxx	853	858	863	868
Adaption Hxxx	854	859	864	869
Terminal at SE300 -X5 SIGNAL	509	519	521	523
Terminal at SE300 -X5 REF.	510	520	522	524
Sampling time	T1	T1	T3	T3

The analog outputs are undefined after power-up while the systems run-up. The output voltages are retained at r*eset* or if the board develops a fault.
Generally, for inputs and outputs, the assignment ±100% corresponds to ±5V and ±200% corresponds to ±10V.

The circuit configuration and the internal structure of the analog outputs is described in Section 2.2.4.

3.1.8 Pulse encoder inputs (function diagrams, A6)

The technology board has evaluation electronics for two incremental pulse encoders. Terminals for track A and track B as well as the zero track (synchronizing pulse) are available for each encoder.

Pulse encoder input	1	2
Terminal at SE300 -X5 TRACK A	531	541
Terminal at SE300 -X5 REF.	532	542
Terminal at SE300 -X5 TRACK B	533	543
Terminal at SE300 -X5 REF.	534	544
Terminal at SE300 -X5 SYNC	535	545
Terminal at SE300 -X5 REF.	536	546

Both pulse encoder inputs are separately parameterized. The pulse encoder pulse number, encoder speed at which 100% speed actual value is to be determined (rated speed) as well as the time constant for actual value smoothing is required.

Tachometer input	1	2
Pulse number per revolution	H142	H144
Rated speed	H143	H145
Filter time, speed actual value	H154	H155
Display, speed actual value	d013	d014
Connector	K067	K068
Sampling time	T3	T3

Both pulse encoder sensing inputs have a length count function. These operate by summing the **quadrupled** pulses. This means, that each time the encoder rotates, four times the pulse number (as count pulses) are entered and the length actual value increased. The counter is a 32-bit counter and can be *held* using binary control commands (the length actual value is then no longer changed), or *reset* (the length actual value is reset to zero).

A range selector function allows a 16-bit measuring range to be freely defined in the 32-bit counter value. The value to be specified is oriented to the highest pulse number to be measured. The length actual value is 100% if the specified number of pulses have been received:

H160/ H163	Pulse No. for 100% length actual value	H160/ H163	Pulse No. for 100% length actual value
0	1 073 741 824	16	16 384
1	536 870 912	17	8192
2	268 435 456	18	4096
3	13 421 778	19	2048
4	67 108 864	20	1024
5	33 554 432	21	512
6	16 777 216	22	256
7	8 388 608	23	128
8	4 194 304	24	64
9	2 097 152	25	32
10	1 048 576	26	16
11	524 288	27	8
12	262 144	28	4
13	131 072	29	2
14	65 536	30	1
15	32 768		

For specific geometric data (roll diameter, gearbox), a certain number of counted pulses corresponds to a specific length.

The number of pulses which are counted is obtained from:

$$\boxed{Pulses = 4 \cdot pulsenumber \cdot gearboxratio \cdot \frac{rated\_length}{\pi \cdot rolldiameter}}$$

Example:
10000 m is to be measured. The pulse encoder pulse number is **1024.** The gearbox ratio is **1:7.5.** The roll diameter is **400mm.**

1st step: Determining the pulse number at the maximum length

$$Pulses = 4 \cdot pulsenumber \cdot gearboxratio \cdot \frac{rated\_length}{\pi \cdot rolldiameter}$$

$$Pulses = 4 \cdot 1024 \cdot 7.5 \cdot \frac{10000m}{\pi \cdot 0.4m} = 244461993$$

2st step: The normalization for the next highest pulse number is determined from the table

In this case, 100% = 268 435 456 ⇒ **H160=2**

3rd step: Determining the normalization of the length measurement

$$Pulses = \frac{rated\_length}{\pi \cdot rolldiameter}$$

$$No\min allength = \frac{pulses \cdot \pi \cdot rolldiameter}{4 \cdot pulsenumber \cdot gearboxratio} = 10980.66m = 100\%$$

Diameter correction allows the length actual value to be adapted using any factor, and therefore a finer grading. Further, this can also be used to implement a *diameter*- or *gearbox correction,* which may be necessary if the roll diameters change (due to wear) or for changeover gearboxes.

The actual length is compared with a selectable length reference value. The binary statuses, *length less than the limit value* and *length greater than the limit value* can be separately accessed, for both measurements, in the status word.

Further, the *synchronizing signal detected* binary signal is also available there. It is set to a high signal level for one sampling interval, if the pulse input detected the zero mark of the particular pulse encoder. This signal can be used internally.

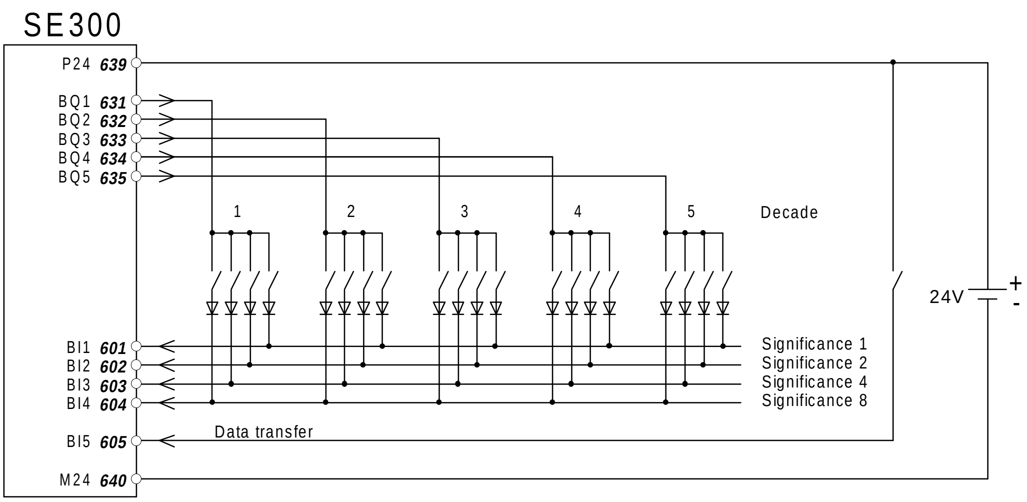
Length measurement	1	2
Source RESET command Hxxx	146	151
Mask, RESET command Hxxx	147	152
Source STOP command Hxxx	148	153
Mask STOP command Hxxx	149	154
Length meas. range Hxxx	160	163
Source, diam. correction Hxxx	161	164
Display, length act. value dxxx	016	017
Source, length limit value Hxxx	162	165
Connector Kxxx	074	075
Sampling time	T3	T3

3.1.9 Input from a thumbwheel switch (function diagrams, A7)

Using binary inputs and outputs, a circuit can be implemented, which can be used to read-in values from *decade switches*. These can be used as main setpoint, ratio, technological setpoint etc. 5 inputs and for every decade, 1 output, are required.

The module cyclically activates the control lines for the individual decades and reads-in the switch positions via diodes, in a de-coupled fashion.

Connection example:



The control bits for the maximum 5 decades are located in K077, bits 0 to 4. From there, they must be connected to binary outputs. The same is also true for the weighting factors (bit 0=1, bit 1=2, bit 2=4 and bit 3=8), an individual input must be reserved for each of them; these must be assigned using parameters H111, 113, 115 and 117 for the source (the value in this case must be 069 = status word of the binary inputs) and using H112, 114, 116 and 118 for the mask (which binary input).

The data are first read-in, if the *data transfer signal* is available. Also here, it probably involves a signal from one of the binary inputs, so that 069 must again be entered as source in H119. The appropriate binary input is selected using the mask in H120.

The following parameterization must be made for the example shown above:

Parameter number	Description	Value
H111	Source, bit 0 from the decade switch	69
H112	Mask, bit 0 from the decade switch	0001h
H113	Source, bit 1 from the decade switch	69
H114	Mask, bit 1 from the decade switch	0002h
H115	Source, bit 2 from the decade switch	69
H116	Mask, bit 2 from the decade switch	0004h
H117	Source, bit 3 from the decade switch	69
H118	Mask, bit 3 from the decade switch	0008h
H119	Source bit, data transfer, decade switch	69
H120	Mask bit, data transfer, decade switch	0010h

Using H107, the module must be signaled as to how many decades are to be read-in. The information at H108 defines that switch position in the BCD format, which is to represent 100%. The following table makes this clear using examples:

Value in H107	Switch statuses	H108	Value range
1	0...9	5	0...180% +/-20%
2	0...99	50	0...198% +/-2%
3	0...999	500	0...199.8% +/-0.2%
4	0...9999	5000	0...199.98% +/-0.02%
5	0...65536 1)	32768	0...199.9939% +/-0.0061%

1) Note: From 32767 the output value is limited to the highest possible value!

The coding can be changed-over to *binary* using H109 (value 0). The signal which is read-in is then interpretted as hexadecimal number.

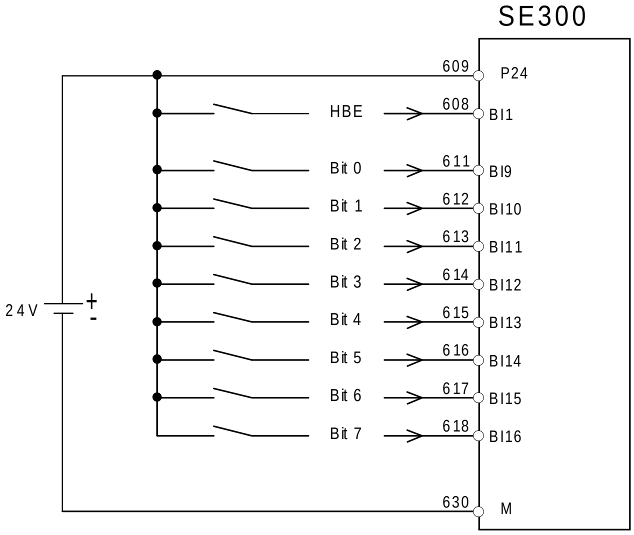
If negative values are also to be entered, the most significant bit of the higest decade represents the *sign bit* (high, if negative).

The value which is read-in is indicated in d012 and can be used at any location as connector K071. Processing is realized in T4. Peripheral access is required for each decade, which means that for n decades, a new value is available at the earliest after n sampling cycles.

3.1.10 Byte-serial input (function diagrams, A7)

Byte-serial input of process data permits a quasi-parallel coupling to an automation system if a serial connection via a bus is not justified due to a single value. The word to be transferred is split-up into two bytes. These are alternately switched to a group of 8 binary inputs. Using a control bit (HBE *high byte enable*), the module is signaled, that it involves the most significant byte.

Connecting example:



In order to limit the amount of parameterization, binary inputs 9 to 16 (terminals 611 to 618 on SE300) are permanently assigned this function. The controlling bit can be freely assigned to another binary input using H104 (source) and H105 (mask).

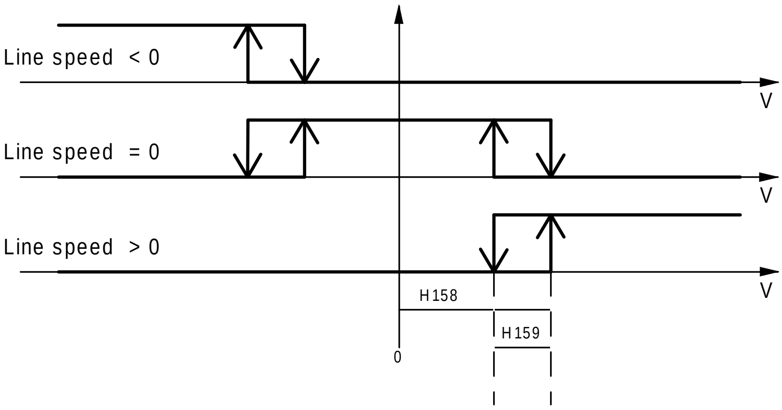
The time for which the byte to be read-in must be available unchanged so that it is accepted as valid, is defined in parameter H106. The pre-setting is the same as sampling time (T4). Each byte is now read twice consecutively and when the values coincide, is accepted. (it is immediately read-in for a 0 ms entry, however, there is no possibility to check the value).

The value which is read-in remains stored, until it is overwritten by a new value. It can be read in display parameter d011, and can be used as K070.

3.1.11 Generating the line speed actual value (function diagrams, A8)

A connector is defined as source for the *speed actual value* using select parameter H156. This can be one of the pulse encoder actual values of the T300 as well as a signal from an analog input or the actual value from the drive converter via the dual port RAM. This is multiplied by a *diameter/gearbox correction factor,* which can be selected using H157.

Thus, a line *speed actual value* is obtained, which can be observed at d015 and is available at K076. A window discriminator monitors the value and supplies the binary information, *speed < 0*, *speed = 0* and *speed > 0*. They are available at the *INPUT status word* at positions bit 2, bit 3 and bit 4.



Limit (H158) and *hysteresis* (H159) determine when the drive is shutdown after *standard stop* or *fast stop*. Further, this limit defines the instant when the holding brake closes. If the limit value is too high, the holding brakes are applied too early and the machine does not stop smoothly.

3.1.12 Generation, status word INPUT (function diagrams, A8)

The *INPUT status word* includes a wide range of status signals from the input- and output function area. They are shown in the table; the text describes the active status of the particular binary signal:

Bit	Description
0	Synchr. signal identified, pulse encoder 1
1	Synchr. signal identified, pulse encoder 2
2	Speed < 0
3	Speed = 0
4	Speed > 0
5	Length act. val., pulse encod. 1 > lim. val.
6	Length act. val., pulse encod. 1 < lim. val.
7	Length act. val., pulse encod. 2 > lim. val.
8	Length act. val., pulse encod. 2 < lim. val.
9	System error, T300
10	Communications, send to CU o.k.
11	Communications, send to CB o.k.
12	Communications, send to peer o.k.
13	Communications, receive from CU o.k.
14	Communications, receive from CB o.k.
15	Communications, receive from peer o.k.

The word is located in K072 and d018. It is updated in T4.

The *system error bit* (bit 9) is retrieved by OR'ing the system error word bits, selected using H103. The system error word includes the following system errors:

Bit	Description	Enabled in H103 with
0	Fatal system error	0001
3	Task administration error	0008
4	Monitor error	0010
5	Hardware monitoring responded	0020
6	Communications error	0040
10	User error	0400

If system errors occur, refer to the documentation for the digital SIMADYN D control system.

For hardware faults, all of the plug-in cables to the T300 should be withdrawn. If the fault/error re-occurs after the drive converter is powered-down and up again, then replace the T300; this is also the case if fatal system errors occur. Task administration errors (sampling time overruns) should only, if at all, occur sporadically. They can then be acknowledged using the button at the top of the T300 front panel. Monitor errors refer to the serial interface to a PC (symbolic monitor), and can be ignored, if not processed using the SERVICE program. User errors cannot ooccur as these haven't been programmed.

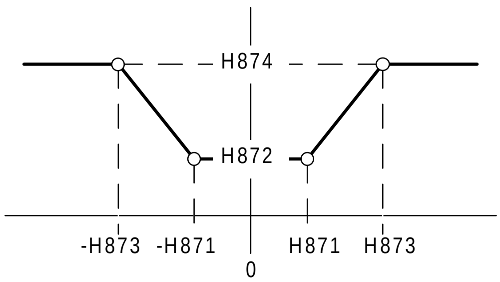
The pre-setting for the enable in H103 is 0429h, whereby communications- and monitor errors are suppressed, i.e. they cannot lead to a fault trip.

3.1.13 Gain adaption, speed controller (function diagrams, A8)

A characteristic with two points allows the proportional gain of the speed controller in the basic drive converter to be adapted as a function of any quantity. This is helpfull if no constant control parameters can be found due to the complexity of the control loop. Frequently, a function can be found where the gain is dependent on a control loop quantity and the problem can be reduced to an *adaption* for a linear control loop.

The adaption is supplied with a selectable value, which is defined using H870. This is the input quantity for a characteristic, which, dependent on its absolute value, defines the factor with which the speed controller proportional gain is multiplied by in the converter.

Both points are defined using H871 and 872 and/or H873 and 874. A linear interpolation is made between the points, and outside, the respective abscissa values remain constant.



H871 and 873 must be positive. Values between 0 and +19.999 are permitted as correction factors. The actual correction factor is represented in d086 and in K162. Processing is realized in T1.

CUVC,CUMC: The following values are set on the T300, if the KP adaption is required;

H871, H872 = 0, H873 = 199,99% and H874 = 19,99%.

The KP adaption is then realized in the basic drive.

- refer also to CUVC,CUMC compendium, funktionblock 360

3.1.14 Generating a freely-definable status word (function diagrams, A9)

A free 16-bit word can be configured from any status signal. Every bit position can be assigned a particular binary status signal of the module. This allows the user to configure individual, status words, which can then be sent to an automation system or partner drive.

It may occur, that several bits (OR'ed) should be used for a control function. If these come from one and the same source, then this can be simply realized by specifying a mask, in which these bits are set. However, if bits from various sources are to be used, this can be realized by first gathering the relevant signals in a free status word and then evaluating them as described.

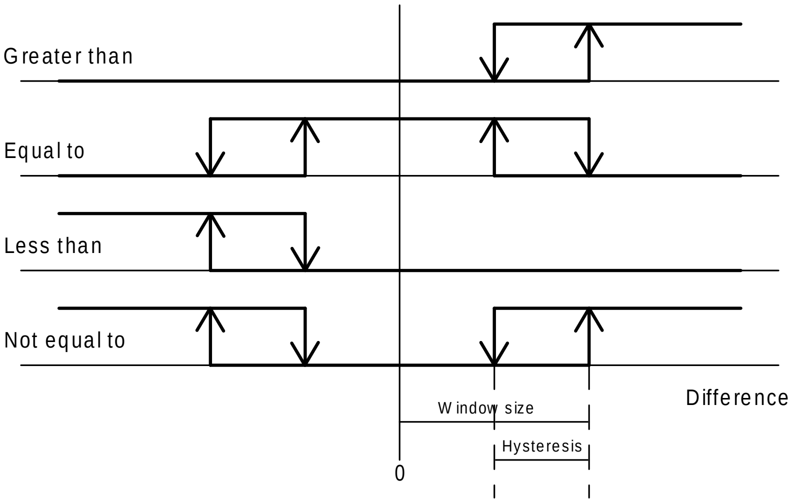
The source- and mask parameters are assigned to the bit positions as follows:

Bit position	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Source Hxxx	801	803	805	807	809	811	813	815	817	819	821	823	825	827	829	831
Mask Hxxx	802	804	806	808	810	812	814	816	818	820	822	824	826	828	830	832

The free status word is located in K161 and d080 and is processed in T3.

3.1.15 Limit value monitors (function diagrams, A9)

The *limit value monitors* are used to compare process quantities with one another or with fixed threshold values. Each of the four limit value monitors has, for this purpose, independent select parameters for the two input quantities, *signal* and *limit value*. Further, one of the quantities can be filtered using a *PT1* filter. The limit value monitors are window comparitors,which require *window size* and *hysteresis* information. The switching characteristic is shown in the following schematic.



The binary information from the limit value monitors, *greater than, equal to, less than* and *not equal to* are combined in the *status word limit value monitors* (d098 and K160):

Bit	Description
0	Signal, greater than lim. val., comparator 1
1	Signal, equal to limit value, comparator 1
2	Signal, less than lim. val., comparator 1
3	Signal, not equal to lim. val., comparator 1
4	Signal, greater than lim. val., comparator 2
5	Signal, equal to limit value, comparator 2
6	Signal, less than lim. val., comparator 2
7	Signal, not equal to lim. val., comparator 2
8	Signal, greater than lim. val., comparator 3
9	Signal, equal to limit value, comparator 3
10	Signal, less than lim. val., comparator 3
11	Signal, not equal to lim. val., comparator 3
12	Signal, greater than lim. val., comparator 4
13	Signal, equal to limit value, comparator 4
14	Signal, less than lim. val., comparator 4
15	Signal, not equal to lim. val., comparator 4

The status word is processed in T3. However, as limit value monitors 3 and 4 are sampled in T5 it should be noted, that their status signals are updated slower.

3.1.16 Motorized potentiometer (function diagrams, A10)

Two *motorized potentiometers* are included in the multi-motor module, which may be used as *ramp-function generator*. For the ramp-function generator function, they have a *setpoint input* and a *tracking control input*, which ensures that the ramp-function generator tracks this setpoint with a defined gradient.

For motorized potentiometer operation, there are commands for *increase setpoint* and *decrease setpoint*, to *set* the motorized potentiometer to a connectable *setting value*, as well as a fast setting which changes-over the ramp time for commands which are present for a longer period of time. Further, the motorized potentiometer/ramp-function generator can be limited and scaled as required. The actual output value is deposited in the NOVRAM where it is available, even after voltage failure.

3.1.17 Replacing peer to peer by SIMOLINK

In a multi-motor drive group with Compact Plus units, peer to peer communications is not possible, whereby it is possible to replace the peer to peer functionality using SIMOLINK on the CUVC and CUMC modules.

Using the transfer of the speed- and ratio setpoint via SIMOLINK and the operating setpoint and output of the technology controller, we will briefly see how the basic drive and T300 are to be parameterized. The SIMOLINK interface is inserted in slot A (upper slot). The example is the same for CUVC and CUMC. It is assumed, that SIMOLINK was already commissioned in accordance with the basic drive Instruction Manual (Compendium).

Setpoints sent from SIMOLINK to the T300 via the basic drive:

- Receive SIMOLINK at the basic drive:
  The speed setpoint n-set is available at connector K7001
  The ratio setpoint is available at connector K7002.
- Transfer to T300, refer to function diagram, Sheet A1:
  P734.7=7001: n-set is available at select value 1 from CU.
  P734.8=7002: The ratio setpoint is available at select value 2 from CU.
- Connect the setpoints on the T300, refer to function diagram, Sheet D1:
  H500 = 46, select speed- (main) setpoint
  H506 = 47, select the ratio setpoint.

(Actual) values from the T300 to SIMOLINK via the basic drive:

- Select the values on the T300, refer to function diagram, Sheet D1, Sheet C2 as well as Sheet A1:
  The operating setpoint [D1] is available at send word 9 to CU [A1]: H896 = 107
  The technology controller [C2] output is available at send word 10 to the CU [A1]: H897 = 138.
- Receiving the values on the basic drive:
  The operating setpoint is available at K3009.
  The technology controller output is available at K3010.
- Connect on SIMOLINK, words 1 and 2:
  P751.01=3009
  P751.02=3010.

CAUTION:	A T300 board with Hardware release ≥ B, or newer, is needed for use with an SLB SIMOLINK interface board. The correct hardware release code can be detected on the component side of the T300 in the neighbourhood of the lower backplane connector.

3.2 Open-loop control (function diagrams, B.)

This part of the functional scope includes the binary signal handling. It powers the converter up and -down, controls brakes and setpoints, monitors the drive, signals faults/errors and processes the interlocking controls and checkback signals for multi-motor groups.

3.2.1 Powering-up the drive (function diagrams, B1)

The *power-up command* is selected with H200 (source) and H201 (mask). The drive is immediately powered-up, if there is no power-down signal (*fast stop, electrical off, standard stop* or *drive fault*) and operation is parameterized without the *start sequence* (H252=1).

3.2.2 Function, starting sequence (function diagrams, B1)

For large machines, it is not permissible that the drives are immediately powered-up. The responsible regulatory bodies specify that a warning device is first actuated. The warning device comprises three phases:

1. An accoustic signal is issued after the on button has been depressed for the **signal time**.
2. The signal time is followed by the **delay time,** where personnel, in the vicinity of the machine, have the opportunity to leave the hazardous area.
3. In the **ready time,** a drive can be started by again depressing the on button.

The following table indicates the times specified by the Papiermacher-Berufsgenossenschaft (Regulatory body for safety in paper- and paper finishing plants) (1).

	Signal time	Delay time	Ready time
Paper machines, coating machines and similar large machines which can be spread over several levels making it difficult to have a complete overview	5s	15s	30s
Slitter/winders, cross-cutters, calanders	3s	5s	30s

Information without guarantee

(1) Source: Explanations with diagrams for the accident prevention regulations “Paper manufacturing and finishing machines" (VBG 7r) from the 1st October, 1985

The “start sequence” function allows an alarm starting device to be implemented together with a central control (open-loop).
The start sequence is first initiated using parameter H252=0.

If a start command is now output, the control (open-loop) issues a *start request*. This is bit 0 in the *control status word* (K145 and d020). This start request must be transferred to the central control via a binary output, or the communications. The central control accepts the start request of the individual drives as group signal. If there is no reason to prevent power-up, the central control outputs the start alarm (generally a horn or siren). After a delay time, all drives are enabled.
The *start enable signal* is read-into the drive control via terminal or communications. The start enable signal source is defined in H230/H231. If a start command is re-output within the ready time, the drive is actually powered-up.
The start enable signal and start command (power-up pulse) are located in the *control status word* (bits 1 and 2).

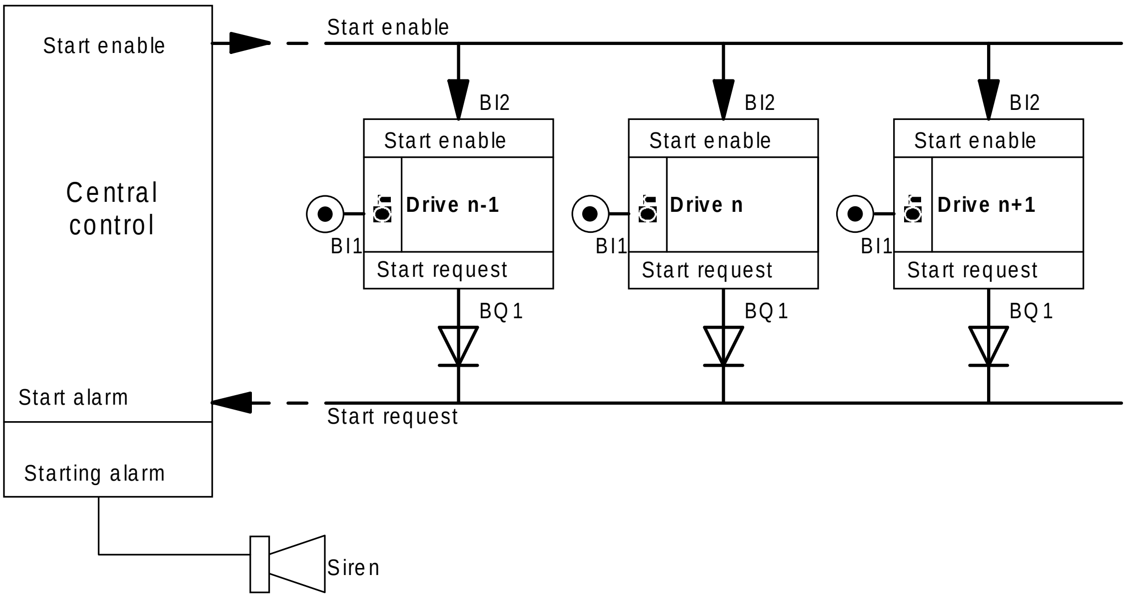
Example
A start warning device is to be subsequently implemented, whereby the start command is entered via binary input 1, and the start enable, via binary input 2. The start request is to be implemented via binary output 1 with the central control.

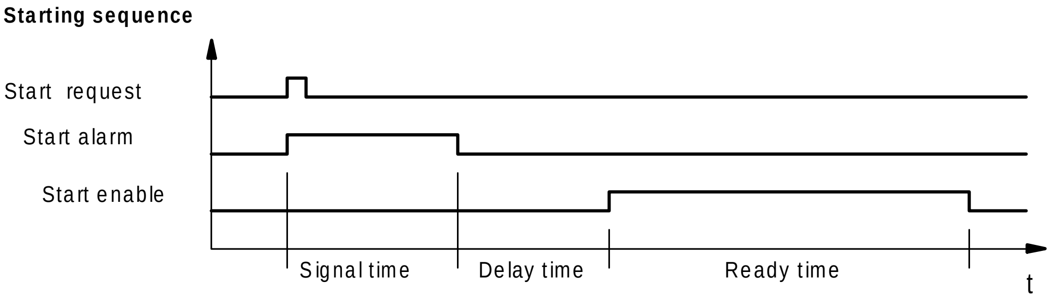
The drives should be parameterized as follows:
H252=0 Enable starting sequence

H200=69 Start command source is K069 (binary inputs)
H201=0001 Start command at binary input 1

H230=69 H069 is the source for the start enable (binary inputs)
H231=0002 Start enable at binary input 2

H833=146 K146 is the source for binary output 1 (control status word)
H834=0001 Bit 0 is output (start request)





3.2.3 Enabling local operation (function diagrams, B1)

The *no local operation* signal is selected using H218 (source) and H219 (mask). It allows the local operating modes to be inhibited, which could come, for example, from a key-actuated switch, or as control bit from the automation via the bus. Zero is pre-assigned, i.e., the local operating modes are enabled.

3.2.4 Inching 1 / inching 2 (function diagrams, B1)

Two binary signals are provided for drive *inching,* each of which has its own setpoint. *Inching 1* (H220

source, H221 mask, H538 setpoint) and *inching 2* (H222 source, H223 mask, H539 setpoint) power-up the drive which receives its setpoint as long as the inching command is active. In order to prevent multiple power-up/down (main contactor wear), the drive is not immediately powered-down when the inching command becomes inactive, but only after a time, which can be set in H253.
Further, H256 can be used to define, as to whether the drive should brake along the ramp-function generator ramp for local setpoints, when the inching key is released, or should only coast-down with controller inhibit.

3.2.5 No regenerative feedback (function diagrams, B1)

The *no regenerative feedback* parameter H250 is not a general inhibit for regenerative feedback, but only defines the characteristics at fast stop. If the parameter value is 1, the drive is immediately powered-down with the fast stop command; otherwise, it brakes down to standstill along the braking characteristic.

Note:
The converter is able to limit the active regenerative feedback power, which ensures that, even without a braking unit or regenerative inverter, that the maximum DC link voltage is not exceeded when the motor is regenerating (generator operation). This assumes that the pre-control (feed-forward control) is correctly set (maximum active regenerative power P233).

If 6SE70 converters are operated as individual drive converters, parameter H250 can be generally set and remain at 0.

For a common DC link bus it may be desirable that the drives do not brake, thus preventing overvoltage conditions on the DC link. In this case, parameter H250 is set to 1.

3.2.6 Standard stop/fast stop/electrical off (function diagrams, B2)

The *standard stop* function (H202 source and H203 mask) brakes the drive down to standstill using the *triggerable ramp-function generator.* In addition to the ramp, at low speeds, the brake torque is reduced, in order to prevent the drive going through zero speed and reversing in the oppositve direction (overshoot).

Electrical off (H204 source and H206 mask) cause the drive to be immediately powered-down. The drives then coast down and immediately go into a no-torque condition.

Note:
Electrical off does not mean that the drive is also isolated from the line supply. If this is required, then a main contactor must be used. Drives, which are connected to a common DC link, are still under voltage (live) even after *electrical off*.

For *fast stop* (H206 source and H207 mask), the setpoint is immediately switched to zero, and the drive is braked along the torque limit according to the *braking characteristic*.

3.2.7 Braking control (function diagrams, B2)

H254 must be set to 1 [B1.6] if the drive has standstill- or holding brakes. Thus, an additional part of the control becomes active, which coordinates the control of the brakes and the internal control (drive on/off, setpoint enable etc.).

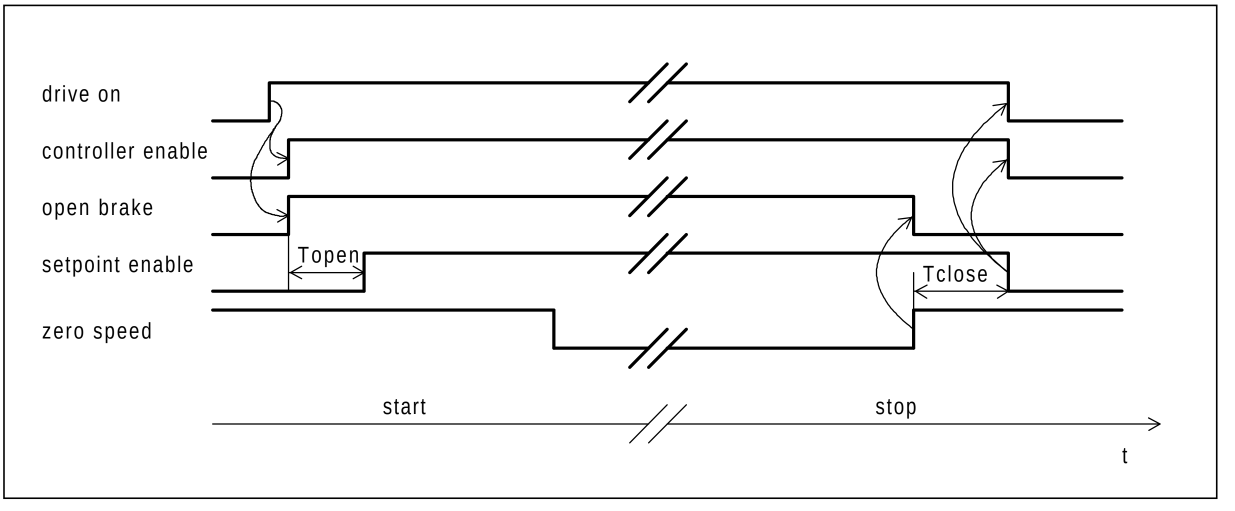
The time between the *open brake* command and the brake actually being released so that the drive can rotate, is defined as the *opening time,* and must be entered in H271. It comprises the delays of possibly connected intermediate control elements, control valves, and the brake itself (note, it is generally not favorable to connect intermediate logic, as only the drive can actually control the brakes. From experience, any additional logic conditions lead to problems).

The command to open the brake is output after *controller enable*. The *setpoint is enabled* after the opening time has expired.

The time between the *close brake* command and the instant when the brake actually becomes effective, is known as the *closing time* and this time is entered in H272. Generally, it is longer than the opening time.

The command to close the brake is output with *zero speed,* and after the closing time has expired, the drive is powered-down.

The following sequence is the standard sequence for starting and stopping.



The *braking control mode* is defined in H255. A total of 4 settings are defined:

Mode	Close brake at electrical off:	Close brake when a fault condition occurs:
1	at zero speed	at zero speed
2	immediately	at zero speed
3	at zero speed	immediately
4	immediately	immediately

Thus, the brake can be defined to be either a pure standstill brake or as holding brake with emergency function.

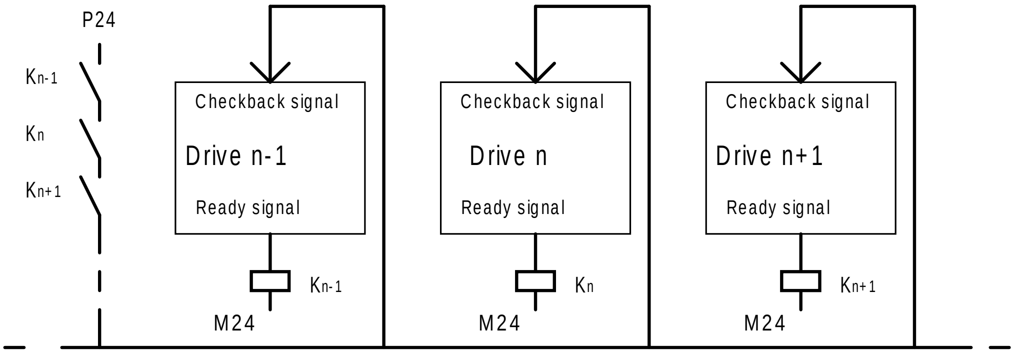
3.2.8 Setpoint/inverter enable (function diagrams, B3)

The inverter is only enabled, if the drive is powered-up, and in addition, an *inverter enable* signal is present (H208 source and H209 mask). This can be permanently set to 1, if it is not required (pre-setting).

The same is true for the *setpoint enable* control signal (source H214 and mask 215). If this bit is low, then the setpoint in the converter is set to zero, the triggerable ramp-function generator is set to the actual value and if required, the central ramp-function generator is set to zero.

3.2.9 Group control (open-loop) (function diagrams, B2)

If a *group* is defined (H251 set to 1), then a checkback signal must be defined via H232 (source) and H233 (mask). This signal only enables the setpoint, if all of the group drives are powered-up, and are ready to accept torque. An AND logic function is required.

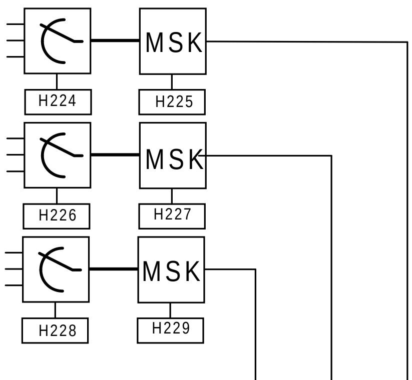


The checkback signal only becomes high, if all of the drives signal *ready*. The internal *inverter enable* signal can be used (bit 9, control status word K145).

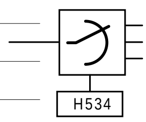
Parameter H256 defines whether the drive should brake when inching. If the inching command becomes ineffective, the setpoint ramps down to zero along the *setpoint ramp-function generator ramp*. If H256 is set to 1, the drive coasts-down, because the speed controller is immediately inhibited with the inching command. Otherwise, the speed controller remains active down to zero speed.

3.2.10 Operating mode selection (function diagrams, B4)

Seven *local operating modes* are available for local operation or individual drive operation. The setpoints are specified at H531 to H539. Three *operating mode bits*, are used to make the selection, which are defined using parameters H224/225 (bit 0), H226/227 (bit 1) and H228/229 (bit 2).



Local oper. modes	Bit 2	Bit 1	Bit 0	Setpoint
-	0	0	0	Operating setpoint
Local 1	0	0	1	H531
Local 2	0	1	0	H532
Local 3	0	1	1	H533
Local 4	1	0	0	
Local 5	1	0	1	H535
Local 6	1	1	0	H536
Local 7	1	1	1	H537



Preferably, binary-coded selector switches are provided to select the operating modes. Generally, far fewer statuses are required. In this case, *local 1* (operating mode, bit 0), *local 2* (operating mode bit 1) and *local 4* (operating mode bit 2), which can be selected via an individual bit, can serve as preferred local operating modes.
The *operating mode word* (K142) is then used to select the appropriate setpoints of the local operating modes and the inching function.

Operating mode code	Setpoint
0	No local setpoint selected (operating setpoint)
1	Local fixed setpoint 1
2	Local fixed setpoint 2
3	Local fixed setpoint 3
4	Local setpoint 4
5	Local fixed setpoint 5
6	Local fixed setpoint 6
7	Local fixed setpoint 7
8	Inching setpoint 1
9	Inching setpoint 2

3.2.11 Generating the fault word (function diagrams, B5

All of the signals are combined in the *error word,* which can lead to the drives being shutdown with a fault message. All of the error causes (with the exception of the overspeed fault) are provided with a *time delay* and can be suppressed using a mask (H270).

Bit in error word (d022)	Designation	Time delay	Enable signal in H270
0	Fault, CB communications	H257	0001h
1	Fault, CU communications	H258	0002h
2	Fault, converter checkb. signal	H259	0004h
3	Fault, checkb. signal, group	H264	0008h
4	Fault, peer communications	H263	0010h
5	External fault	H262	0020h
6	Overspeed, positive	-	0040h
7	Overspeed, negative	-	0080h
8	Anti-stall protection	H269	0100h

The *external fault* can be parameterized using H260 (source) and H261 (mask) and is only effective, if the drive is powered-up.
The *overspeed threshold* is specified in H265, and acts the same for both directions of rotation.
Anti-stall protection responds, if the speed setpoint lies above limit value H267, the torque actual value is greater than H268, and the speed actual value H266 has still not been exceeded.

The fault word can be monitored in d022 and can be transferred as K141. Bits 9 to 15 in the word which are not used are then zero.

3.2.12 Generating the status word (function diagrams, B6)

Important control signals are located in the *status word,* for example, *start request*, *braking*, *zero speed, drive on, local operation, fault* and *release brake*. The control status word lies in d020 and K146.

3.2.13 Generating the alarm word (function diagrams, B6)

Contrary to the fault word, the *alarm word* contains the instantaneous monitoring signals. They are available for direct evaluation. With the exception of the overspeed signals, which are not required in the alarm word, the assignment is the same as the error word. In addition, an *external alarm 2*, is located in bit 15, which can be selected using H246/247.

Bit in alarm word (d023)	Designation	Enable signal in H248
0	Fault, CB communications	0001h
1	Fault, CU communications	0002h
2	Fault, converter checkback	0004h
3	Fault, checkback group	0008h
4	Fault, peer communications	0010h
5	External fault	0020h
8	Anti-stall protection	0100h
15	No external alarm 2	8000h

The status of all of the alarms is indicated in display parameter d023. The alarm word is deposited in K145 after *filtering* with H248. A signal is sent to the converter (bit 13, control word 2) if at least one bit is set in the alarm word.

3.3 Technological control (function diagrams, C.)

The technological controller offers all of the functions for the tension- and position controller as well as for other technological control loops.

3.3.1 Switching the technological control on/off (function diagrams, C1)

The technological control can be switched on/off using a key function or a direct control signal.

Two binary signals are available for switch-on/off (H404/405 and H406/407 for on, H408/409 and H410/411 for off). These are OR'd and are high-active.
A direct on/off signal can be entered via H453. The high signal switches the technological control on and a low signal off.

3.3.2 Generating the technological setpoint (function diagrams, C1))

The *technological setpoint* source is selected using H400 and adapted using H401. A fixed *supplementary setpoint* can be injected using H422, which can be used for example, as a minimum tension signal or similar. The thus generated setpoint is fed via a *ramp-function generator*. The *ramp-up-* (H425) and *ramp-down time* (H426) can be parameterized just like the *upper-* (H423) and *lower limit* (H424). The final technological setpoint is deposited in d034 and k130.

3.3.3 Generating the technological actual value (function diagrams, C1)

The *actual value* is read-in via H402. *Adaption* is possible using H403. If H431 is set to 1, a fixed value is added, which allows *offset compensation* to be realized.

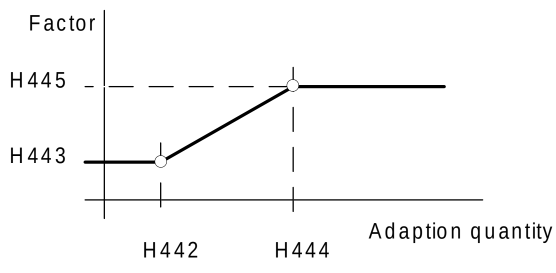
Automatic offset adjustment is activated when H431 is set to zero. This is activated using a control command, which is selected via H428/429. The smoothed actual value is available at a changeover switch if the actual value is zero (if there is no material web for tension measurements). If the control signal becomes active, this value is stored in a memory and subtracted from the actual value, i.e. the offset is adjusted. The offset can be accessed at K132.

3.3.4 Technological controller (function diagrams, C2)

The *technological controller* is a PID controller. It has two parameter sets and can be selected using a control signal (H412/413):

	Parameter set 1	Parameter set 2	Display in
Control signal	0	1	K136.1
Actual value smoothing	H414	H415	d030
Proportional gain	H416	H417	d031
Integral action time	H418	H419	d032
Derivative action time	H420	H421	d033

The proportional gain is adapted via a characteristic. The characteristic provides a factor (d037) with which the actual gain is multiplied. Thus, the controller gain is dynamically adapted and can result in significant improvements for non-linear control loops:



The *adaption quantity* (selected using H441) is a suitable process quantity, which is either sourced from an analog input or from the automation, or is already in the drive. Often, the setpoint-actual value difference (K133) can be used for this purpose.

The controller *operating modes* can be selected. The derivative action time (D component) is enabled, if H432 is set to 1. The controller operates as a pure I controller if H435 is set to 1. The integral- and differential components are available in K134 and K135 respectively.

The technological controller is provided with switchable *limits* (H436/437 for the upper limit, H438/439 for the lower limit), which can be selected with the *technological controller on* status. The complete controller is enabled with the on-command, or continuously with H440=1. Thus, the following operating mode is possible, which often occurs for machines which have closed-loop tension control:

The controller is parameterized with H440=1, which means that it is always active, independent of the power-on status. The technological controller corrects the drive speed. The controller limits are set, so that the controller cannot accelerate the drives when it is disabled, which means that the upper limit H436 is zero. Thus, the drive speed remains constant while the material web is being threaded. However, if the operator has set this limit too high, the tension would increase significantly. If the negative limit is open (H438=-100%), the controller can intervene by reducing the tension by reducing the speed (slack-off). Thus, the operator is supported.

If the control is now switched-in, the limits are completely removed (H437=100% and H439=-100%). The controller can now operate over the complete range.

The controller output can be observed at display parameter d036. Its output is additionally fed through a *de-coupling filter* (PT1), whose time constant can be set using H447.

The technological controller is provided with a *characteristic droop* which allows a type of P controller to be made from the integral controller. It then manifests steady-state control deviations like a P controller, but has dynamic control characteristics similar to a PI controller.

A *speed influence* for the technological controller is generated via multiplier H450. Depending on the particular material, various factors may be required. As a general rule of thumb, twice the stretch value should be entered at full tension. This provides the controller with sufficient reserve for dynamic operations. The speed correction value is available at d039 or K138 for further use but is already connected as supplementary setpoint. Thus, H450 must be set to zero if the speed influence is not required.

If the particular drive group is located in front of the master drive in the machine line-up, the control sense must be changed. The tension can only be increased by reducing the line speed and vice versa. Thus, factor H450 is entered with a negative polarity.

Using an additional factor (H448) a *pre-control value* (d038) is derived from the direct technological setpoint, and this is used to derive, together with the smoothed controller output, a *torque setpoint*, via a second factor (H449). This is also available at a connector (K137) and is already connected to a summing point in the torque generation function. Thus, H427 must be set to zero, if the torque influence is not required.

The filter of the controller setpoint with H427 is used to de-couple the pre-control and controller and is important. It must be the sum of the time constants of the complete technological control loop (closed-loop speed control + closed-loop torque control + smoothing, technological actual value). It prevents overshoot for fast setpoint changes. On the other hand, without pre-control (H448=0%), the time constant must be kept to the lowest possible value.

3.3.5 Generating the status word, technological control (function diagrams, C3)

The *technological status word* combines several important status signals from the closed-loop technological control. It is deposited in K136.

Range violation of the automatic offset adjustment is signaled in the status word. This range is defined by the width, entered in H446, around zero.

Bit in the status word	Designation
0	Closed-loop technological control switched-in
1	Controller parameter set 2 active
2	Setpoint ramp-function generator output equals the input
3	Setpoint at the upper limit
4	Setpoint at the lower limit
5	Controller at the upper limit
6	Controller at the lower limit
7	Offset greater than the positive limit value
8	Offset greater than the negative limit value

Bits 9 to 15 which are not used are permanently assigned zero.

3.4 Generating the line speed setpoint (function diagrams, D.)

The line speed (web speed) and speed setpoint are generated in this module section.

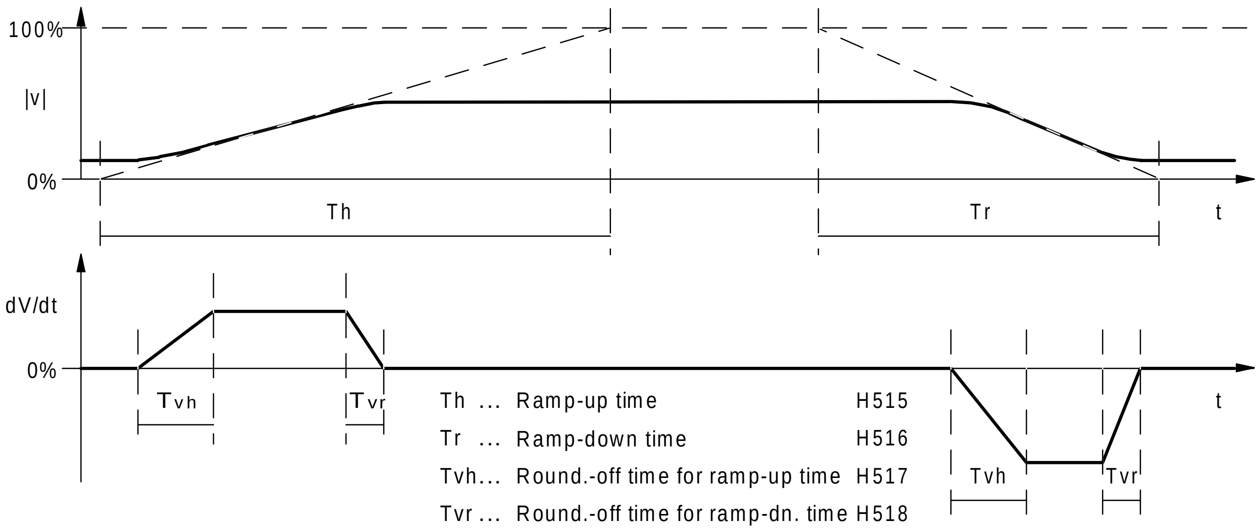
3.4.1 Main setpoint selection (function diagrams, D1)

The *main setpoint* is selected using H500. *Adaption* can be realized using H501 and a *shift*, using H502. It is available at d045 and K100 for further processing. It serves, both as input quantity for the *machine ramp-function generator* as well as direct setpoint for groups, which receive their setpoint from the machine master drive.

H513 is used to make the setting. If the parameter value is 1, the setpoint is taken from the machine ramp-function generator, otherwise, directly from the main setpoint source. The selected setpoint is available at K106.

3.4.2 Central ramp-function generator (function diagrams, D1)

The central ramp-function generator specifies the speed ramp for the complete machine, and is only parameterized for the machine master drive The central ramp-function generator is the source for the setpoint cascade and the machine acceleration. The setpoints are transferred to the individual converters via the peer-to-peer coupling.
The *central ramp-function generator* has independent *ramp-up-* (H515) and *ramp-down times* (H516), as well as *initial-* (H517) and *final rounding-off functions* (H518). These are defined as follows:



From experience, 10% of the ramp-up time is entered for the rounding-off time.

The *acceleration signal* (K105) is normalized via H521. The minimum ramp-up time (or ramp-down time) of the machine (accelerating-decelerating time) are entered there. Thus, for a 100% acceleration signal, the ramp-time (accelerating time) is a minimum. The accelerating value is valid for the complete machine. Inertia compensation is separately executed in each individual drive.

Note:
If each of the individual drives has inertia compensation, the acceleration signal normalization may no longer be changed. This is also not necessary, as even if the acceleration time is reduced, a correct acceleration signal is generated as the signal range is only limited at 200%.
Specifically: The acceleration time can be reduced by about half after calibration.
If this is not sufficient, inertia compensation must be re-executed, or the determined values must be converted for the new normalization.

The ramp-function generator can be held (*acceleration interrupted*) via a signal, defined with H212 (source) and H213 (mask). The ramp-function generator ramps to that value which the output had at the instant that the hold signal was activated. Ramp-up or ramp-down is continued if the hold signal is de-activated.

The ramp-function generator can be *enabled* using a binary signal which can be selected with H210/211. A zero appears at the ramp-function generator output if the bit is inactive.

Further, the machine ramp-function generator has two operating modes. If the drive is powered-down, it may be necessary to enter a setpoint for all of the other drives of the complete machine (e.g. a paper machine). H514 should then be set to 0. If the machine ramp-function generator must also generate a zero with the drive powered-down, as machine operation is no longer possible without this drive, then H514 is set to 1.

The machine ramp-function generator output is available at K104 or d046.

3.4.3 Speed ratios (function diagrams, D1)

A ratio factor is applied to the speed setpoint here. This is a factor with which the speed setpoint is multiplied. Thus, web stretching can be compensated, which is relevant for paper, fibers and plastic foils.

The ratio is selected from the connector list via H506, and adapted using H507 (gain) and H508 (offset). It is located in d047 and K102.

For ratios greater than 200%, the internal arithmetic calculations go to a limit. Thus, for such cases, the recipricol of the ratio can be entered which is then used for the division operation. H522 is set to 1 to realize this.

The corrected speed setpoint can be seen in d048.

3.4.4 Slack take-up/slack-off (function diagrams, D1)

When threading the web it is helpful, if a low speed supplementary setpoint is temporarily injected for the drive. This allows a web sag to be removed (supplementary setpoint positive: *Slack take-up*) or allows tension to be decreased (supplementary setpoint negative: *Slack-off*). The polarities are inverted for drives located in front of the machine master drive.

There are control signals and setpoints having the same names for this purpose. The appropriate parameters are as listed below:

	Source	Mask	Setpoint
Slack take-up	H524	H525	H526
Slack-off	H527	H528	H529

H523 can be used to define whether the setpoints are to be used for slack take-up or slack-off, as a function of the speed. However, generally it is simpler to use constant supplementary setpoints, as sag take-up is always executed at the same rate, independent of the actual machine line speed.

H530 then defines whether and how significantly the supplementary setpoints should be smoothed, before they become effective in the main setpoint channel. This makes the drive response somewhat softer.

The so-called *operating setpoint* can then be found in d049 and in K107.

3.4.5 Supplementary setpoint selection (function diagrams, D2)

The *speed influence* of the technological controller as well as a *supplementary setpoint* are added to the operating setpoint. The supplementary setpoint can be selected using H503, adapted using H504 and shifted using H505. It is pre-assigned 0 for the factory setting. It is located in d050 and K101.

The result of the summation of the operating setpoint, technological controller and supplementary setpoint is available in d051 and K108.

3.4.6 Local setpoints (function diagrams, B4 and D2)

The *local setpoints* are selected according to the selection made in the control. Setpoint 4 can also be variable, if, for example, it is supplied from an analog input. Thus, it can be used to implement a positioning- or a manouvering function.

All of the local operating modes are fed through their own *ramp-function generator*, so that setpoint changes are smoothed. The *ramp-up* and *ramp-down times* are defined in H540/541 and are pre-assigned 10 seconds. The actual effective local setpoint can be taken from d052.

The changeover between a local and the operating setpoint is realized in the drive control. The signals from the operating mode selector switch (operating mode bits), the *no local operation* signal to inhibit the local function function as well as the *fast stop* and *standard stop* are taken into account.

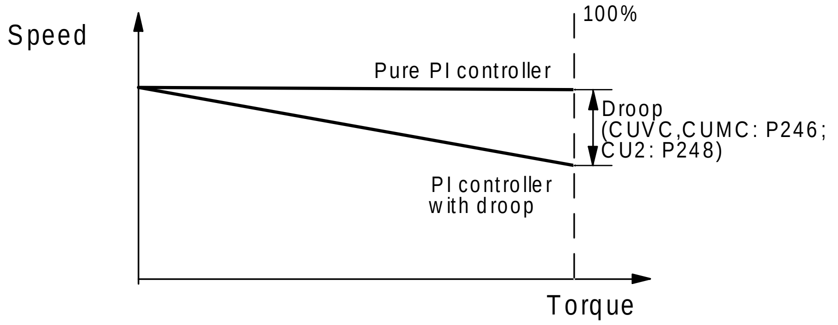
Note:
Local operating modes only result in a setpoint changeover, however, they do not power-up the drive. If a local setpoint is selected while a drive is running, the speed setpoint is ramped to the local setpoint via the triggerable ramp-function generator. If the operating mode word becomes zero (no local operating mode selected), the drive ramps-down to the available operating setpoint along the ramp of the triggerable ramp-function generator.

3.4.7 Triggerable ramp-function generator (function diagrams, D2)

The *triggerable ramp-function generator* controls the drive smoothly from the actual setpoint to the new setpoint when an operating mode is changed. However, in standard operation, it is ineffective, and transfers setpoints directly to the controller. It is defined via the *ramp-up time* (H542) and *ramp-down time* (H543). Its output signal can be monitored at d053.

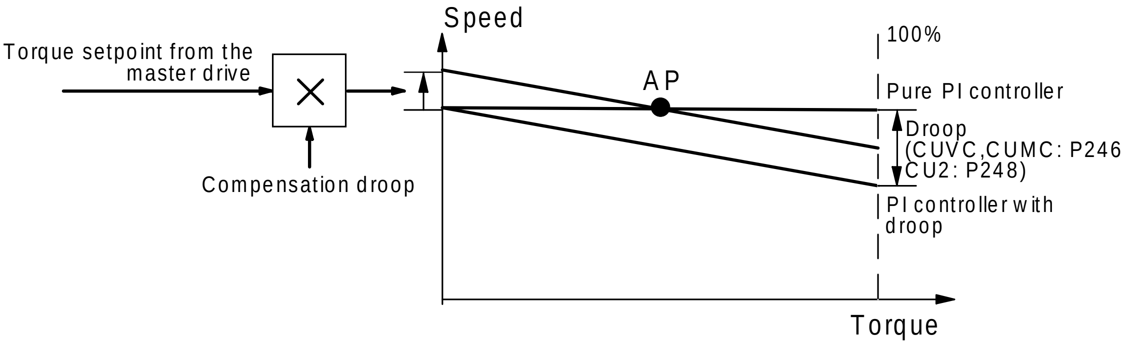
3.4.8 Droop compensation (function diagrams, D2)

If a droop factor is parameterized for a drive in the basic drive converter (CUVC,CUMC:P246; CU2:P248), the speed is influenced dependent on the torque:
This is shown in the following diagram.



The *droop compensation* allows the droop characteristic, set in the basic drive converter, to be shifted as far as its operating point is concerned. Thus, the slave drive can also participate in driving the load.
A supplementary speed is added to the speed setpoint from the triggerable ramp-function generator. This is the product of the master drive torque setpoint and the factor for the droop compensation (H510). The droop (CUVC,CUMC:P246; CU2:P248) set in the slave drive is entered in H510.

Thus, the following characteristic is obtained:



This means that the drive speed is flexible around its operating point, and therefore does not exert any disturbing influence on the master drive. The load level for the slave drive is however specified by the master drive.

The *droop on* control command for the droop function is selected via H511 (source) and H512 (mask). Generally, this signal is received from a limit switch or similar, which signals the drive, that the load distribution conditions are available. If the signal is a 1, the droop function in the converter is enabled, and the compensation simultaneously activated.

3.4.9 Setpoint smoothing (function diagrams, D2)

The speed setpoint is fed through a *filter block* (PT1). In a drive group consisting of many drives this is practical, as following errors can thus be eliminated which could occur while accelerating due to different speed actual value smoothing functions. If the smoothing of the speed channel is entered as reference smoothing (H547), then all of the groups run in synchronism and with the same web lengths. The smoothed setpoint can be monitored at d056.

3.4.10 Speed setpoint generation (function diagrams, D2)

A *speed setpoint* (K111) is generated from the line speed setpoint by multiplying it by a diameter/gearbox factor. The factor is the same as was already used when generating the internal speed actual value. It is defined in H157.

3.4.11 Bias (function diagrams, D2)

A supplementary setpoint, which acts directly and instantaneousy on the speed controller, is required for the *bias and limiting* load distribution version. It forces the speed controller to one of the limits, which is controlled.

The *bias setpoint* is entered into H546. It is added to the speed setpoint using the *load distribution on* signal. The bias setpoint can be monitored at d055 and k110. The result, the speed setpoint at the controller in the converter, is available at d057 and K112. From here, it is sent to the basic drive converter.

3.5 Torque setpoint generation (function diagrams, E.)

This part of the standard software package generates the torque setpoints and limits and ensures that operating mode changeovers are smooth.

3.5.1 Friction characteristic (function diagrams, E1)

The *friction compensation* controls the speed-dependent torque loss of the drive. The friction compensation only has a low influence on the drive dynamic performance.
However, it becomes interesting if the torque, which is transferred from the drive to the material or slave drives, shall be precisely defined.
This is, for example, the case with:

- indirect closed-loop web tension control (i.e. without web tension actual value)
- for drives which are mechanically coupled with one another

In this case, it is possible to increase the steady-state characteristics using friction compensation.

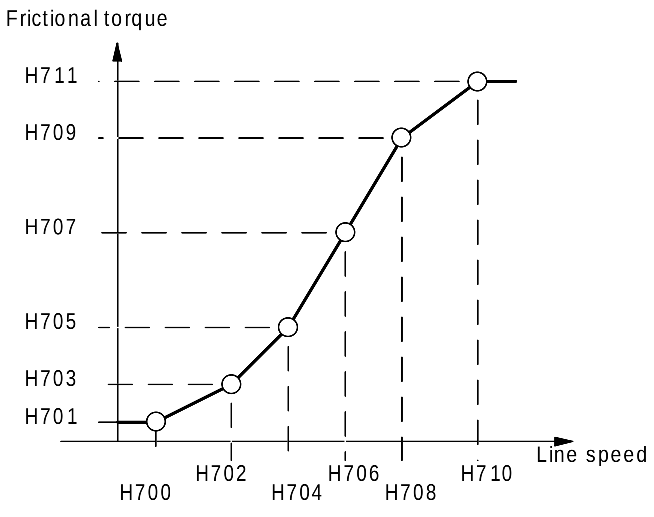
For drives, which have a high level of friction, inertia compensation is only practical, if the friction characteristic is known.

Note:
The friction characteristic is very dependent on temperature and aging. Thus, the characteristics should be measured (plotted) under operating conditions.

The friction characteristics are very dependent on the drive version. There are no generally valid equations for frictional torque. Although it generally consists of fixed components and a speed-proportional component, it can also have a square-law characteristic (air resistance) or, for example, for oil-filled bearings, very complex functions.

For this reason, a six-point characteristic is available. The abscissa and ordinate values can be freely parameterized, whereby practically all occuring situations can be handled.

Parameters H700, 702, 704, 706, 708 and 710 are speed points, H701, 703, 705, 707, 709 and 711 the associated friction torques. The characteristic is linearly interpolated between the points, and outside the range, defined by the points, the characteristic is horizontal. Negative values are also permitted in all of the parameters so that reversing drives can be handled.



The calculated frictional torque is available as connector 154 and can be monitored at d065.

The friction characteristic is determined as follows:
The drive is operated at various speeds in the speed-controlled range (e.g. 0%, 20%, 40%, etc.), and the steady-state torque determined after stabilization (a curve can then be generated, which can be stored in the characteristic). The 6 points can be placed so that the pre-control represents the actual characteristic with sufficient accuracy.

It is also possible to immediately switch the frictional torque as supplementary torque (H892 to 154), and to adjust the speed controller output (r245) to zero at the set speed points, by changing the particular friction value.

For reversing drives, the friction torque must also be determined in the negative direction of rotation, and also entered as negative value into the characteristic.

From experience, the frictional torques lie below 5% of the rated motor torque.

3.5.2 Inertia compensation (function diagrams, E1)

The pre-control of the *accelerating torque* relieves the controller for speed changes. Normally the speed controller must first establish torque for acceleration, due to a setpoint-actual value difference, it is now calculated and pre-controlled (feed-forward control). In this case, the controller must only inject very low correcting torques, if the pre-control torque is not exactly correct.

The accelerating torque is generated by multiplying the accelerating setpoint (can be selected using H712) by the moment of inertia (selected using H717). Adjustment can be realized using H718.

If there is no accelerating setpoint, then it can be calculated by differentiating the speed. In this case, H714 is set to 1. Thus, the signal, searched for using H712, becomes the speed signal which is then differentiated. H713 defines at which ramp-up time (= time to change by 100%) of the speed signal, the acceleration is 100%.

In order that the mathematical relationship between speed and acceleration remains correct, also when using the speed setpoint smoothing (H547), the accelerating torque can also be smoothed with H730. In this case, the torque time constant should be as high as the speed time constant.

The accelerating torque is represented at d068 and K150.

3.5.3 Supplementary torque selection (function diagrams, E1)

A *supplementary torque* can be added to the torque setpoint. Thus, the drive torque can be influenced by technological pre-controls or interventions of external.

The connector is selected with H715 and H716 determines the factor which is used to weight the supplementary torque.
The sum of the frictional torque, accelerating torque, technological controller torque and supplementary torque results in the *torque setpoint*, which is available at d069 and K151 for further processing. For pure closed-loop speed controlled drives, it is switched to the controller in the drive converter as additive supplementary setpoint. This is also the pre-setting for the sender to the CU.

3.5.4 Torque generation for slaves (function diagrams, E2)

The load distribution versions are explained in detail in Section 3.7. The implementation of the *torque limits* in the software is now discussed.

For *load distribution with bias and limiting*, the load component (can be selected with H719) is read-in from the master. It is then corrected with a *torque ratio*. The factor (defined by H720) generally comes from a potentiometer, with which the operator can set the load distribution. It can also be a function of a process quantity.

The slave component is contained in d070 and K155, and can either be immediately effective as torque limiting (the same electrical torques), or it can be previously provided with the friction- and accelerating torque (the same output torques). In this case, H721 must be set to 0 or 1.

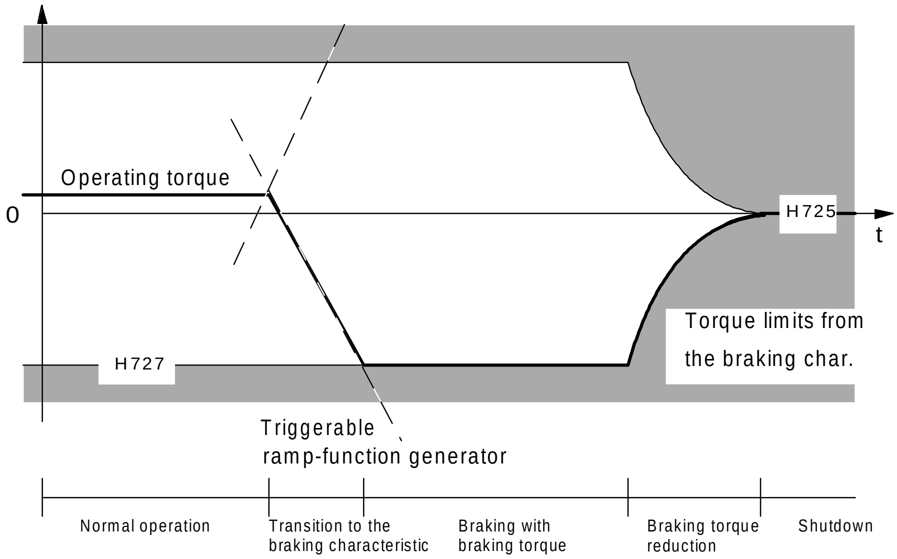
If load distribution is inactive, the torque limits are opened. They are in this case defined with H722 (positive limit) or H723 (negative limit). These values are valid for the non-controlled limit when the load distribution is active.

The actual limit which is controlled depends on the *torque setpoint polarity*. Generally, for positive bias, it is the positive torque limit. If the setpoint goes negative (e.g. if the drive reduces the line speed), the bias is inverted, and the negative torque limit controlled.

3.5.5 Braking characteristic (function diagrams, E2)

If the *fast stop* function becomes active, the speed setpoint is switched to zero. Thus, the speed controller jumps to one of the limits. These are now symmetrically entered, according to the braking characteristic as a function of the drive speed. The drive brakes until the torques limits are reduced at a low speed. Thus, the speed rate of change is always lower the closer the speed approaches zero, and the braking torque has an approximately square-law characteristic.

This allows soft braking characteristics to be achieved and prevents the drive from overshooting at standstill.
The sequence (*standard operation, fast stop* with transition to *braking torque by the ramp-function generator, braking, braking torque reduction* and *shutdown*) are illustrated in the following diagram:



The *maximum braking torque* is defined using H727. The braking torque is linearly reduced to the value entered in H725, starting from a speed, defined by H726 (e.g. 5%) (it is recommended that zero is entered here). The drive should come to a standstill without overshoot, with the drive factory settings. H724 can be increased if this is not correct. Further, the width of the window for the *zero speed signal* (H158) can be increased so that the drive shuts down faster.

The braking torque can be read at d072, which would be effective for braking the drive at a specific speed.

3.5.6 Triggerable torque ramp-function generator (function diagrams, E2)

The *triggerable ramp-function generator* ensures that torque changes are soft. Thus, jolts are eliminated if there is play in gearboxes and couplings; torsional vibrations are not excited.

It is set to the torque actual value when the load distribution is switched in and out and when switching into the *fast stop status* and is then transferred to the new value with a defined gradient. After this, it is no longer effective as long as the setpoints are transferred unchanged.

There are two different ramps for torque changes. The time, parameterized with H728 is valid for 100% torque change for *load distribution*, and the time set in H729, corresponding for *fast stop*. The drive should estabalish the braking current without causing gearbox jolts. It may be necessary to increase the time if there is considerable gearbox play. The effective time can be monitored in d073.

The torque limits, generated by the ramp-function generator, can be retrieved at connectors K152 (positive torque limit) and K153 (negative torque limit). They are directly transferred to the converter per factory setting.

3.6 Freely available functions (function diagrams, F.)

The *freely-available functions* are not technologically pre-assigned. They can be used, when required at any location. There are wide range of arithmetic and control-related functions available. They are intended to supplement the existing sub-functions of the multi-motor module.

3.6.1 Fixed setpoints (function diagrams, F1)

In order to assign *fixed values* to technological setpoints, there are a number of connectors which are each assigned a parameter. They form a group starting at K000 to K019 and a further group from K200 to K216. The first three connectors are permanently assigned 0% (or 0000h), 100% (4000h) and FFFFh, and cannot be parameterized. All others are pre-assigned 0%. The last two fixed setpoints are defined as V2 quantities, i.e. hexadecimal values can be specified there (e.g. as masks for bit inversion, etc.)

3.6.2 Monitoring parameters (function diagrams, F1)

There are 4 free *select display parameters* in addition to the permanently assigned display parameters. These are provided with multiplexers which permit the connector to be selected from the connector list and displayed.

Monitoring parameter	Select parameter
d081	H875
d082	H876
d083	H877
d084	H878

3.6.3 Freely-available functions in T3 (function diagrams, F2)

The functions in T3 are:

1 inverter, 1 adder, 1 subtracter, 1 multiplier, 1 divider, 1 limiter, 1 changeover switch, 1 filter and 1 position difference counter.

<u>Adders</u>: The output is limited to +199.9939% and -200.0000%.

<u>Subtractors</u>: The output is limited to +199.9939% and -200.0000%.

<u>Multipliers</u>: The following rule is valid 100%x100%=100%. Examples: 100%x50%=50%, 50%x50%=25% etc.

<u>Dividers</u>: The following rule is valid 100%:100%=100%. Examples: 80%:50%=160%, 10%:10%=100% etc.

<u>Changeover switch</u>: The output assumes the value of the first input if the control signal is low. Otherwise, the value of the second input appears at the changeover switch output.

<u>Filters</u>: The filter time is multiple of the sampling time and proportional to the input quantity. For 0.0061% (1 bit) it is 1xTa, for 0.0122% (2 bits) 2xTa, etc.

<u>Position difference counter</u>: This generates the position difference between the position actual values of the two pulse evaluations: Difference=length-[length 2x(H686/H687)]. A ratio can be adjusted with H686 (numerator) and H687 (denominator). 100% difference then corresponds to 16384 counted pulses, which, for pulse quadrupling, is 4096 pulses at the pulse encoder.

3.6.4 Freely-available functions in T4 (function diagrams, F2 - F4)

The functions in T4 are:

2 inverters, 2 adders, 2 subtractors, 2 multipliers, 2 dividers, 2 limiters, 2 changeover switches, 2 filters, 1 absolute value generator, 1 square root extracter, 1 maximum evaluater, 1 minimum evaluater, 1 sinusoidal function, 4 word - EXOR logic gates, 1 flashing frequency generator, 1 flashing word.

Adders: The output is limited to +199.9939% and -200.0000%.

Subtractors: The output is limited to +199.9939% and -200.0000%.

Multipliers: The following rule is valid 100%x100%=100%. Examples: 100%x50%=50%, 50%x50%=25% etc.

Dividers: The following rule is valid 100%:100%=100%. Examples: 80%:50%=160%, 10%:10%=100% etc.

Changeover switches: The output assumes the value of the first input if the control signal is low. Otherwise, the value of the second input appears at the converter output.

Filters: The filter time is multiple of the sampling time and proportional to the input quantity. For 0.0061% (1 bit) it is 1xTa, for 0.0122% (2 bits) 2xTa, etc.

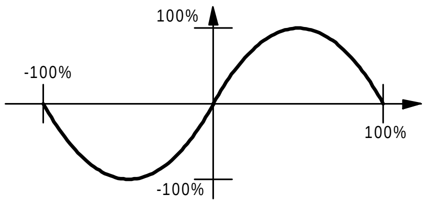
Absolute value generators: The output value is the absolute input value. For a negative input value, a bit is set, which is also included in the status word.

Square root extracters: The square-root function generates a 0 at the output for a negative input value. The bit in the status word is then set.

Maximum evaluaters: The evaluater supplies the highest (i.e. the most positive) of the two input quantities.

Minimum evaluaters: The evaluater provides the lowest (i.e. the most negative) of the two input quantities.

Sinusoidal function: The sinusoidal function covers a range from -100% to 100%. The amplitude is 100%.



EXOR logic operation: The input words are bitwise logically combined.

Flashing frequency: The flashing frequency generates a flashing flag in bit 0 and in the opposite cycle, a flashing flag in bit 1 of the connector. The interval is approximately 1 second.

Flashing word: The flashing word generates flashing bits in the connector at the positions at which the input word has active bits. The interval can be parameterized.

3.6.5 Status word, freely-available functions (function diagrams, F5)

Several important binary statuses are assigned to a status word (K299).

3.6.6 Free function blocks CUVC, CUMC

Free blocks can be used in SIMOVERT MASTERDRIVES CUVC and CUMC, to realise additional function (logic functions with logic blocks, calculation with numeric function blocs...).

To enable function blocks to carry out processing, a time slot (sampling time) must be assigned to each function block. Depending on the number and frequency of the blocks to be processed, the microprocessor system of the units has a varying degree of utilization.

The visualization parameter r829 has to be selected after enabling function blocks for displaying the free calculating time. The reserve of the microprocessor system in the basic unit should not be lower

than 5 - 10%.

If this is not the case, please make shure all the enabled function blocs are really necessary, or if

some function blocs may be assigned to different time slots.

3.7 Load distribution

Load distribution is required if drives are mechanically coupled. The function is intended to distribute the overall mechanical load to the individual drives in defined proportions.

3.7.1 General information

The *load distribution* function allows two or several drives, coupled either mechanically or through the material web (e.g. S rolls) to be operated in parallel. In this case, one drive is defined as master, which has the closed-loop speed control function for the complete drive group. The other drives (*slaves*) track the controlling drive (speed), and the load is distributed among them with an adjustable ratio.

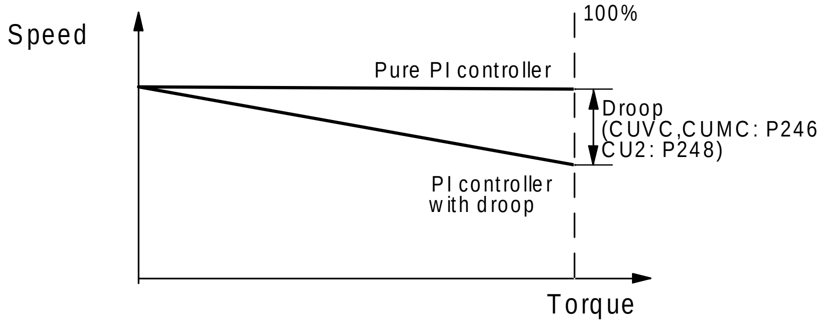
In the following text, a two-drive group is assumed (one master and one slave), however, the function is basically the same as if several slaves were involved.

There are various techniques in order to achieve torque distribution. The simplest way is to transfer the master torque setpoint to the slave. However, this is only possible if it can be assumed, that the mechanical coupling between the drives can never be disconnectedd. However, in actual applications this only occurs seldomly. The mechanical connections are almost always related to pressure (presses, calanders), or if another connecting element is present (felt, wire, material web, etc), so that it can be assumed that at some stage this connection will be broken in an uncontrolled fashion.

Thus, a safe drive status must also be provided for this case; the main priority is that the drive musn't be allowed to accelerate uncontrolled. This is achieved by maintaining the closed-loop speed control of the controlled drive. The load component is set by manipulating the speed setpoint (*droop and compensation*) or the current limiting (*bias and limiting*). This technique will now be explained.

3.7.2 Droop and compensation

The basic concept behind this technique is two speed-controlled drives operating in parallel. If controllers, with integral component, are used in both drives, then the smallest error in the actual value adjustment is summed and the controllers drift in opposite directions to the particular torque limit. In order to prevent this, only the master drive has an integral component. The controlled (*slave*) drive has a P controller. Instead of this, it is also possible to feed back part of the integral component as supplementary actual value (*droop*). With this measure, the load characteristic of the slave drive is shifted from the horizontal. For droop, the factor in the feedback arm is that speed change, which occurs for a 100% load change:

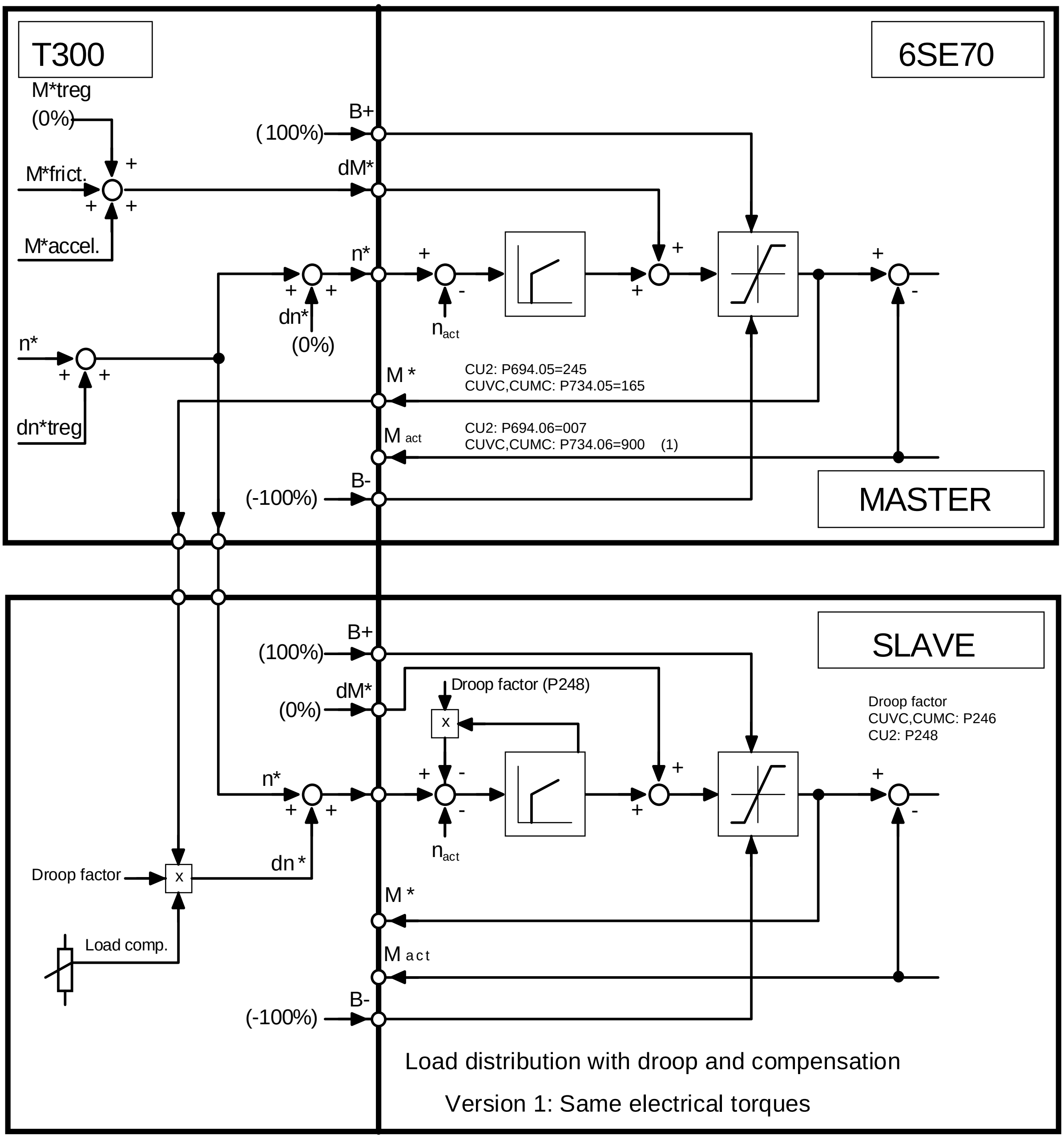


If such a drive is operated with a PI controlled drive, then the latter would generate the required torque, however, the slave nothing, as its setpoint-actual value difference is always zero and also its controller output (=load component).

Thus, a supplementary speed setpoint is injected into the slave, which corresponds to the product of the master load component and the droop factor. Thus, an artificial setpoint-actual value difference is generated (i.e. the load characteristic with droop is shifted upwards), until the slave controller has the same load component as the master.

3.7.2.1 Droop and compensation with the same electrical torques

This diagram illustrates what has been described. The lefthand section of the diagram represents the T300 level, and the righthand section of the diagram, the basic drive converters. The master drive is shown in the upper section and the slave in the lower section.

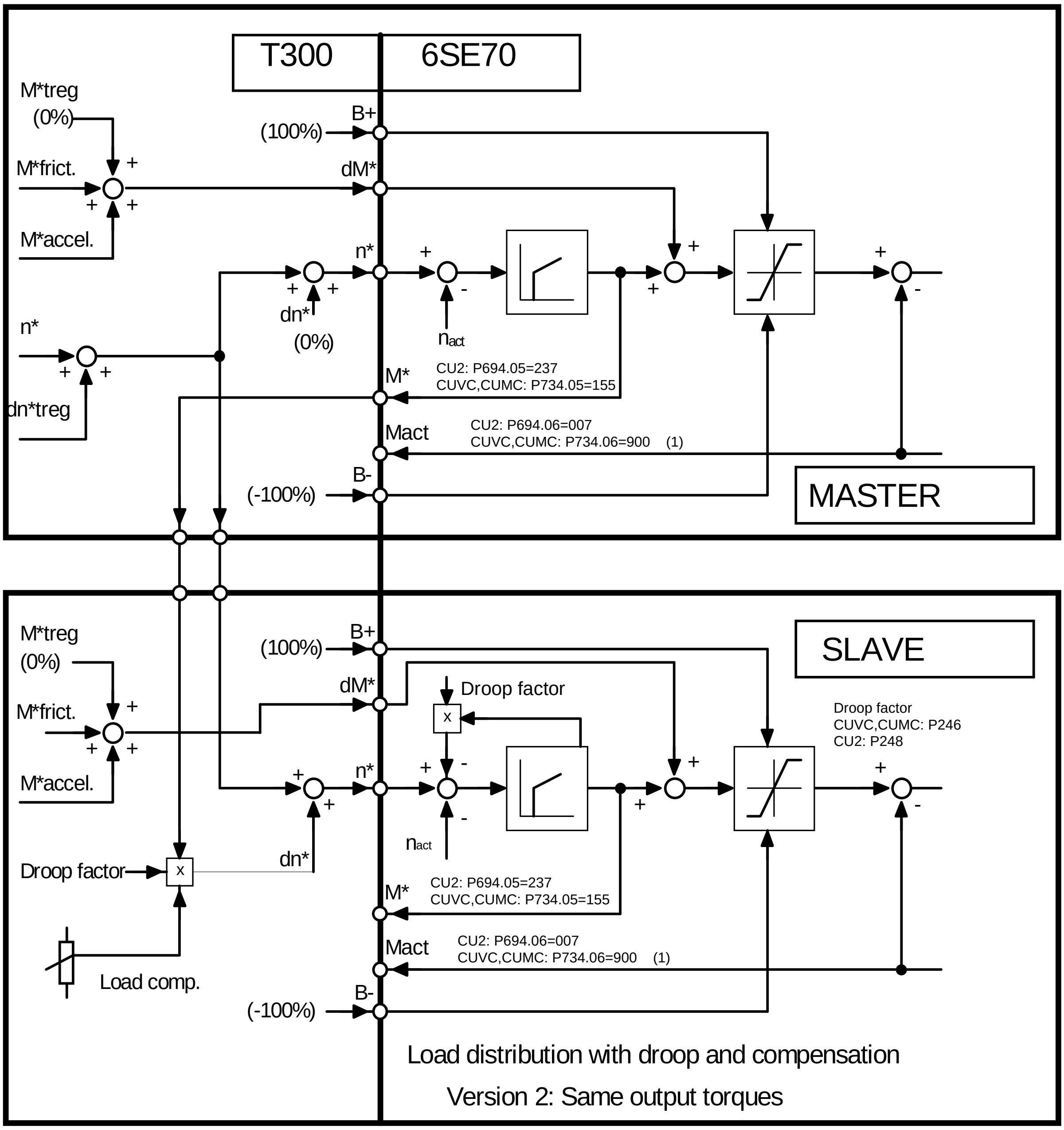


It can be seen how the speed setpoint is output in parallel to both drives. The master torque setpoint is transferred to the slave via the coupling (analog, or peer-to-peer), where it is multiplied by the droop factor. Further, a potentiometer is shown, which can adjust the load distribution between the master and slave. The correction value is added to the speed setpoint. The advantage of this solution is the possibility to simply check the function. The load distribution functions, if both currents are identical (potentiometer in the center position). A disadvantage is that the mechanical characteristics of both drives must be the same. Otherwise, different mechanical torques will be output from the rolls.

(1) For CUMC, instead of the torque actual value, the actual value of the torque-generating current ISQ (act), K184 should be used.
CUMC: P734.06 = 184

3.7.2.2 Droop and compensation with the same output torques

For many applicaitons it is necessary to ensure that no differential torques occur between the various rolls, especially those in contact with the material web. Thus, the drive losses must be individually compensated. Friction and acceleration are separately pre-controlled in every drive. Thus, only the controller part may be used from the master drive (correction torque).



Thus, instead of the total torque, the basic drive converter controller output is signaled back. The pre-control torques are each effective, whereby perfect technological load distribution can be implemented for drives which differ significantly.
The disadvantage of this version, is that there is no simple means to check for possibly unequal torque actual values. This is often difficult for the operator to understand. Further, the losses of both drives must be known or measured (friction characteristic). For losses, for example, churning loss, this isn't always quite so simple.

(1) For CUMC, instead of the torque actual value, the actual value of the torque-generating current ISQ (act), K184 should be used.
CUMC: P734.06 = 184

3.7.3 Bias and limiting

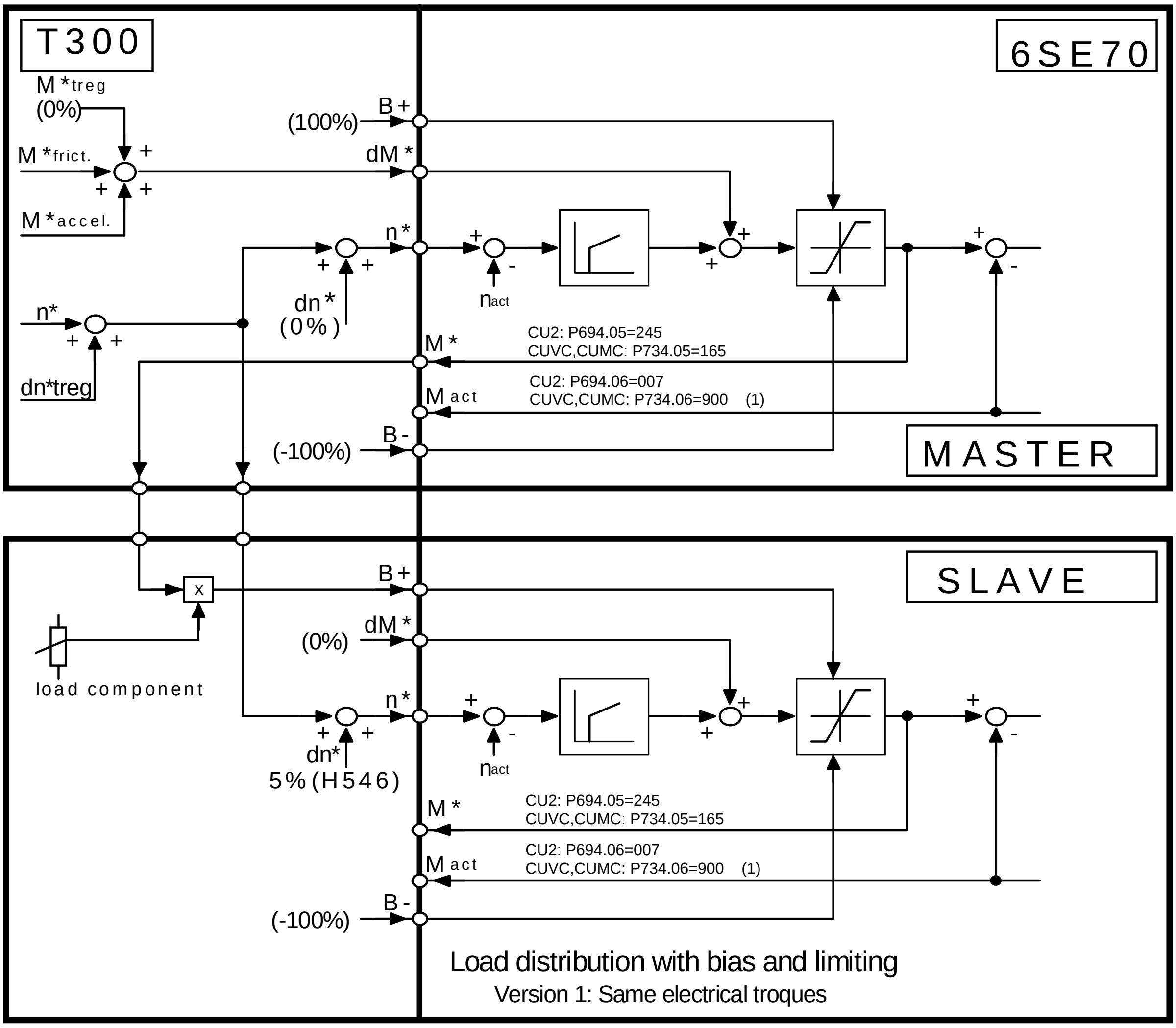
The technique goes back to the original concept to switch the torque setpoint directly to the slave. If both drives are mechanically coupled (only then can a load distribution function), then there is only one common speed and only one controller is required. This torque setpoint is valid for the master and slave.

Thus, it is only necessary to transfer the torque setpoint to the slave. In this case, one of the torque limits is used, as the slave speed controller can remain active; it is operated at the controlled limit by just using a bias setpoint.

The bias setpoint is selected so that speed increase is low when the connection is interrupted, on the other hand, the controller remains reliably at the limit even for dynamic load fluctuations. Generally, just a few percent of the setpoint are required.

3.7.3.1 Bias and limiting with the same electrical torques

Just like droop and compensation, the master torque setpoint can be used as setpoint for the slave for bias and limiting. In this case, the same electrical torques are obtained for both.

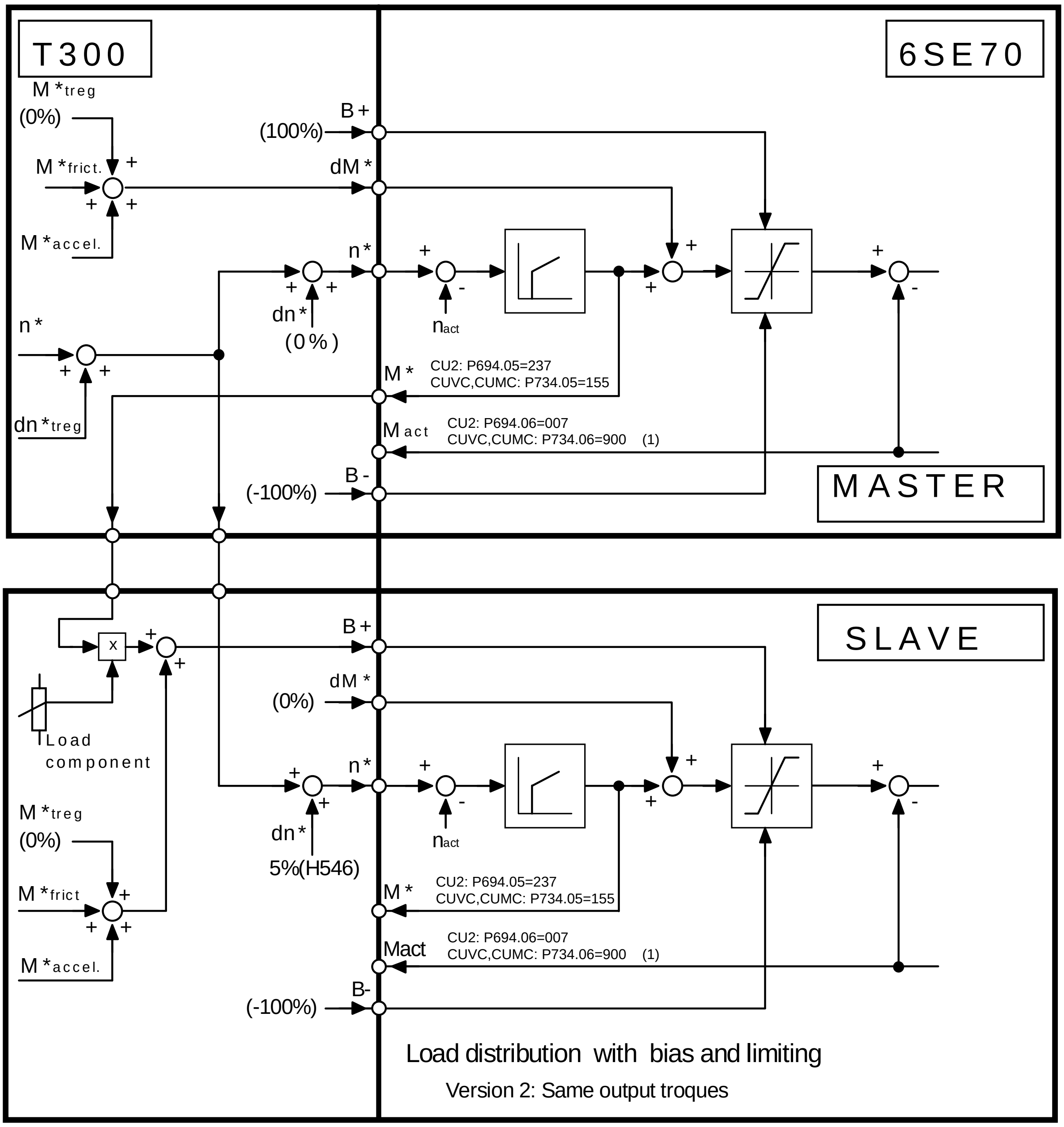


The advantage here is, that in addition to being able to simply check that the torque actual values are the same, only one controller is active, so that only one controller has to be optimized. Further, the speed actual value adjustment is completely uncritical as long as the bias error is not reached. This is an advantage which mustn't be underestimated for rolls, which are subject to wear (size presses, calanders, etc.).

(1) For CUMC, instead of the torque actual value, the actual value of the torque-generating current ISQ (act), K184 should be used.
CUMC: P734.06 = 184

3.7.3.2 Bias and limiting with the same output torques

In ths case, the torques acting on the material web should be the same. Analog to droop and compensation, only the controller output is fedback. This is effective at the slave together with the pre-controlled torque. The pre-control torques are separately determined and switched-in for the master and slave.



Load distribution with bias and limiting
Version 2: Same output troques

This solution offers the correct load equalization from the technological perspective as well as the advantage, that only one speed controller is active.

(1) For CUMC, instead of the torque actual value, the actual value of the torque-generating current ISQ (act), K184 should be used.
CUMC: P734.06 = 184

3.8 Function diagrams

The function diagrams A-F are now illustrated.

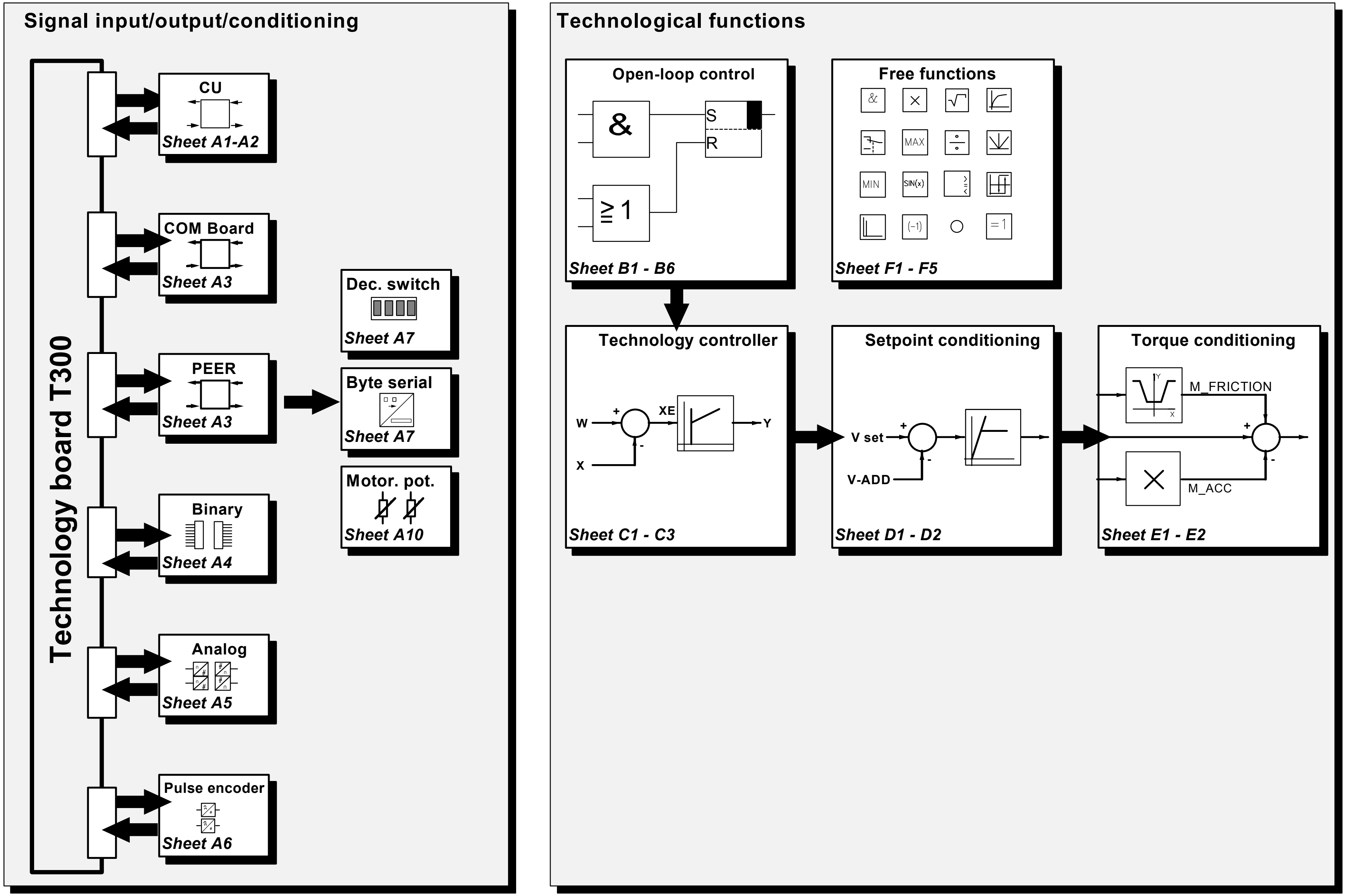
Status.	Change	Date	Name	Date: 1.8.94 Person: Reh / Michaelis Chk. Std.	Standard software package Sectional drive

SIEMENS

List of contents

=
+

FP_TOC



Status	Change	Date	Name						
				Date	1.8.94	Standard software package	SIEMENS	Function overview	=
				Person	Reh / Michaelis	Sectional drive			+
				Chk.				OVERVIEW	Sheet 1+
				Std.					Sh.

Line types:

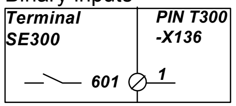
Depending on the signal type, various line types are assigned in the diagrams	Example:
Signals, which represent a bit quantity, are represented as thin line.	
Signals, which represent a word quantity, are represented as thick lines	
Signals, which represent a control signal, are represented as thick line with arrow.	

Cross references

Cross references are provided with pages and column information	Example: Cross reference to Page 10, column 8 [10.8]

Cross references to the hardware

Cross references to the board inputs and outputs are made by specifying the terminal on SE300 terminal block and the connector and pins on the technology board	Example: Binary inputs



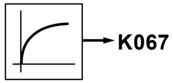
Binary signals

The binary signal description is always made for the 1 state.	Example No fast stop For signal status = 1, there is no fast stop

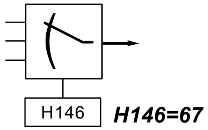
Many signals are defined to be freely connected-up as connectorst (also refer to Section5)

Example

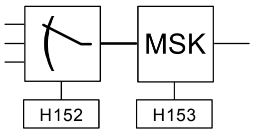
Connector
Connector, in which the signal is deposited, is located at the function block.



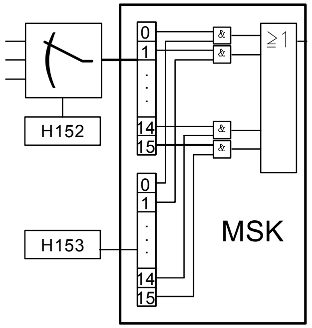
Selecting a connector
If the connector is to be connected, then the , connector number is entered into the multiplexor parameter.
Example:
Connector K067 should be switched-through to the multiplexor output.



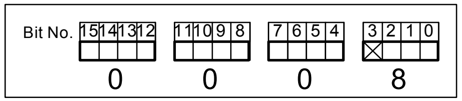
Selecting bits from a connector
A connector always consists of 16 bits. If one or several bits are to be selected from a connector, a masking block is used.
The following circuit has the function shown adjacently.



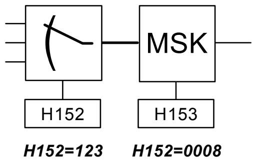
Also refer to Section5.1.2



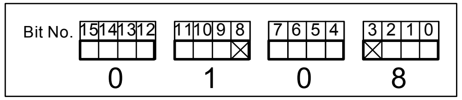
Selecting a bit from a connector
If, for the connector, a word quantity is involved, from which a bit should be selected, then, in addition to the multiplexor on the masking block, the bit to be selected should also be specified.
Example:
Bit No. 3 of connector 123 is to be switched-through to the output. Thus, 123 must be specified at the multiplexer. The mask, to select bit 3 is obtained as follows:



Selecting bit No. 3
in connector K123

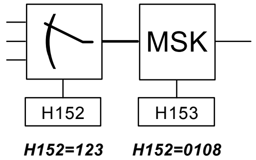


Selecting several bits from a connector
It is also possible to simultaneously select several bits from a connector.
Example:
Bit No. 3 and Bit 8 of connector 1232 should be switched-through to the output.
The mask to make the selection is obtained as follows:

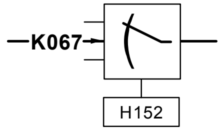


The masking block output is set to 1, if connector, bit 3 or bit 8 is set.

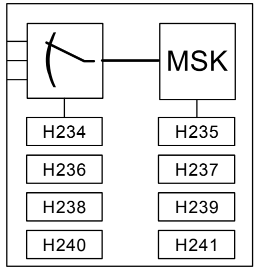
Selecting bit No. 3 and
bit No. 8 in connector K123

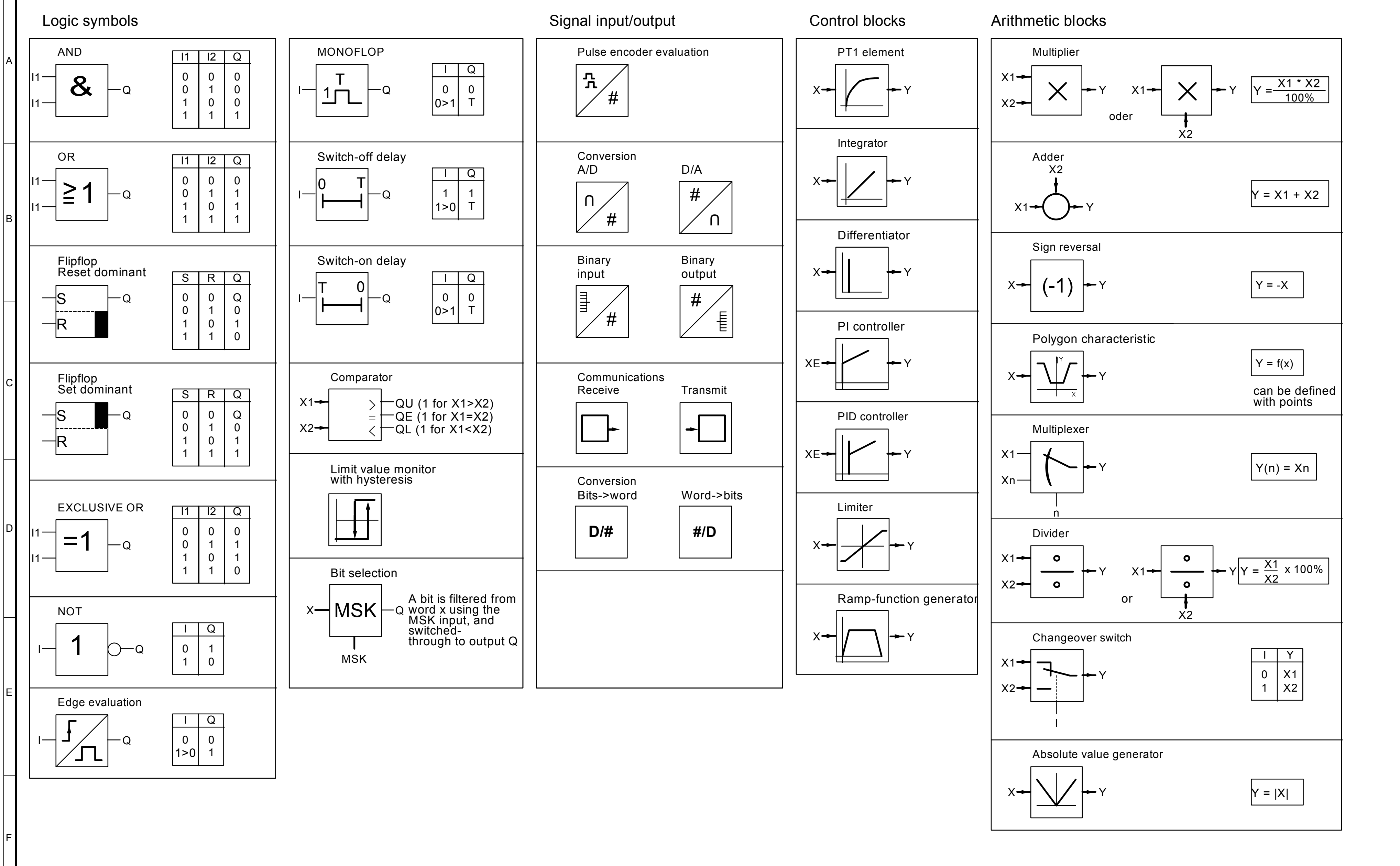


Pre-assigning multiplexors
Most most multiplexers are pre-assigned 0 (=fixed setpoint 0%, 0H0000). If the multiplexers have another factory setting, then the source connector is specified.



If several lsimilar multiplexers are used, for example, when generating status words, then they are displayed together.





AND

I1	I2	Q
0	0	0
0	1	0
1	0	0
1	1	1

OR

I1	I2	Q
0	0	0
0	1	1
1	0	1
1	1	1

Flipflop Reset dominant

S	R	Q
0	0	Q
0	1	0
1	0	1
1	1	0

Flipflop Set dominant

S	R	Q
0	0	Q
0	1	0
1	0	1
1	1	1

EXCLUSIVE OR

I1	I2	Q
0	0	0
0	1	1
1	0	1
1	1	0

NOT

I	Q
0	1
1	0

Edge evaluation

I	Q
0	0
1>0	1

MONOFLOP

I	Q
0	0
0>1	T

Switch-off delay

I	Q
1	1
1>0	T

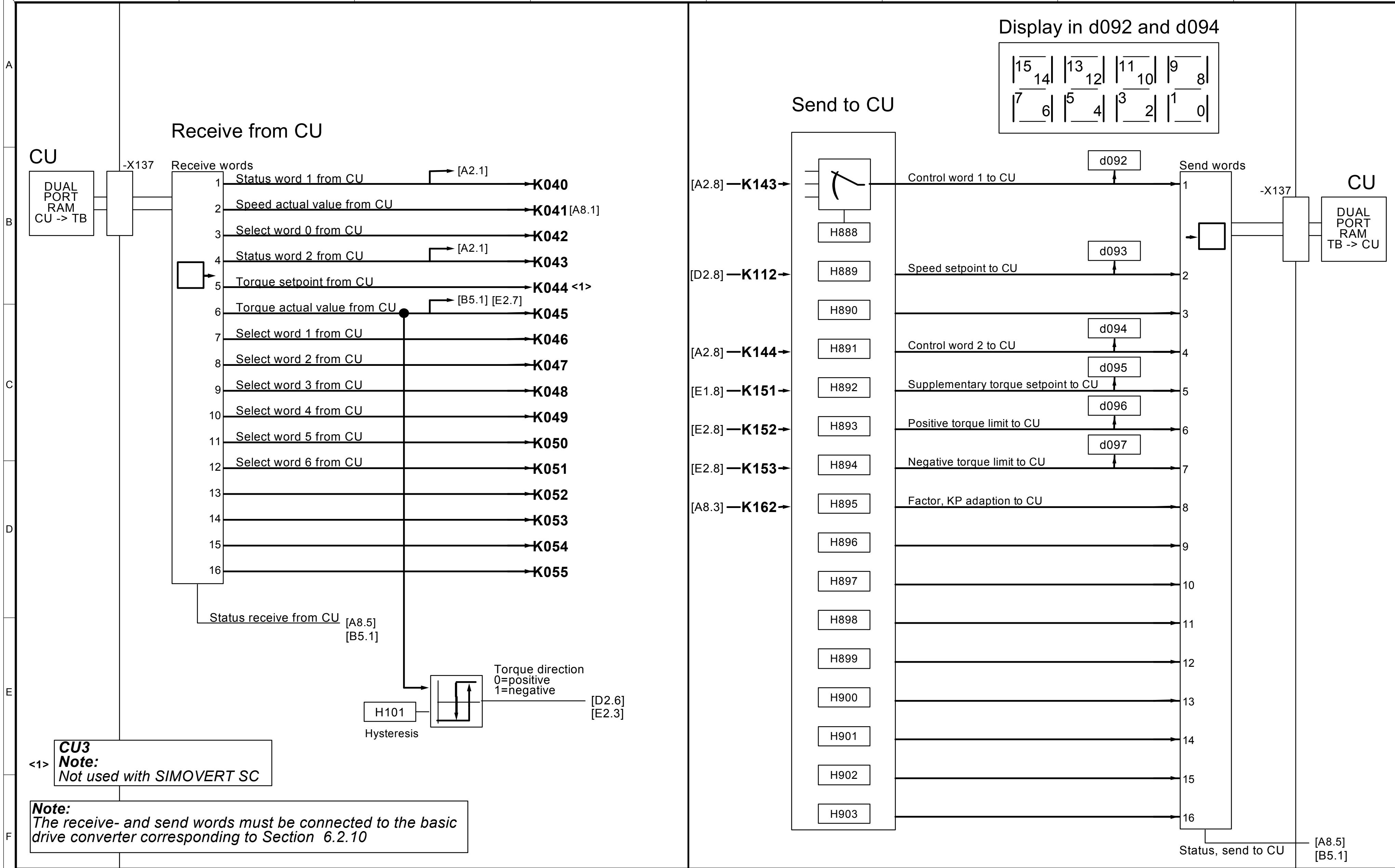
Switch-on delay

I	Q
0	0
0>1	T

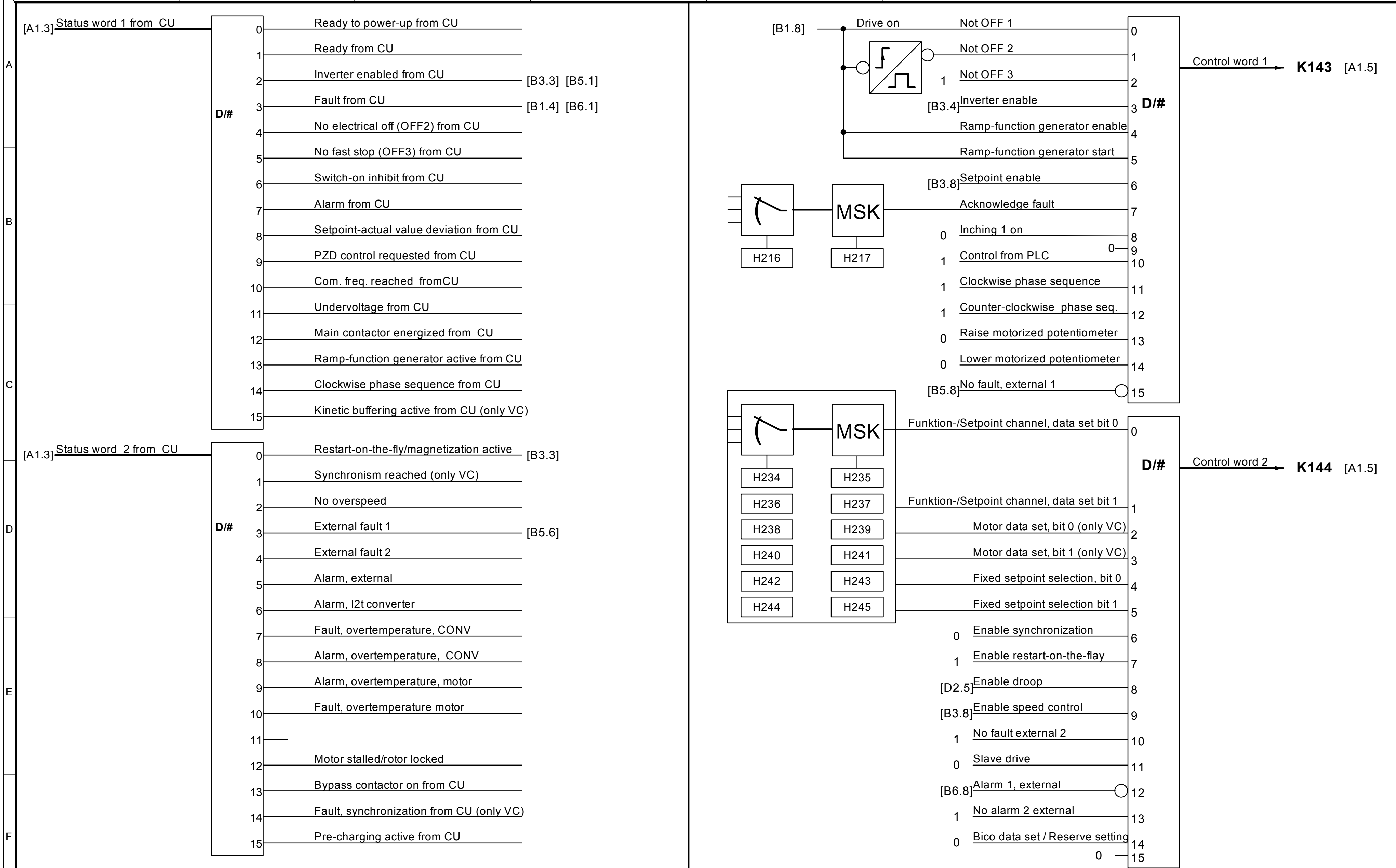
Changeover switch

I	Y
0	X1
1	X2

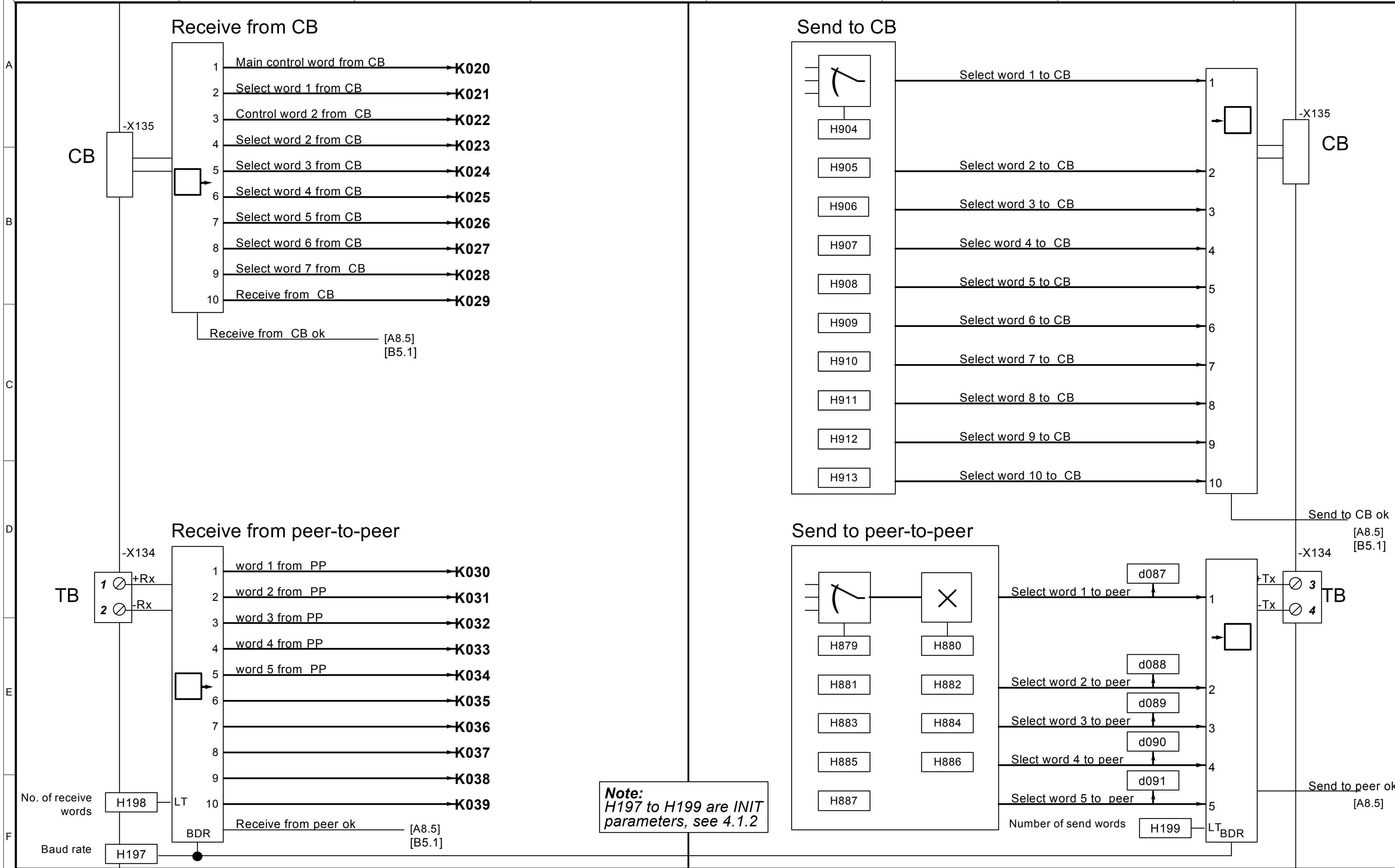
Status	Change	Date	Name	Date 1.8.94 / Person Reh / Michaelis / Chk. / Std.	Standard software package Sectional drive	SIEMENS	Function symbols used	FP_DEF	= + Sheet 4- Sh.



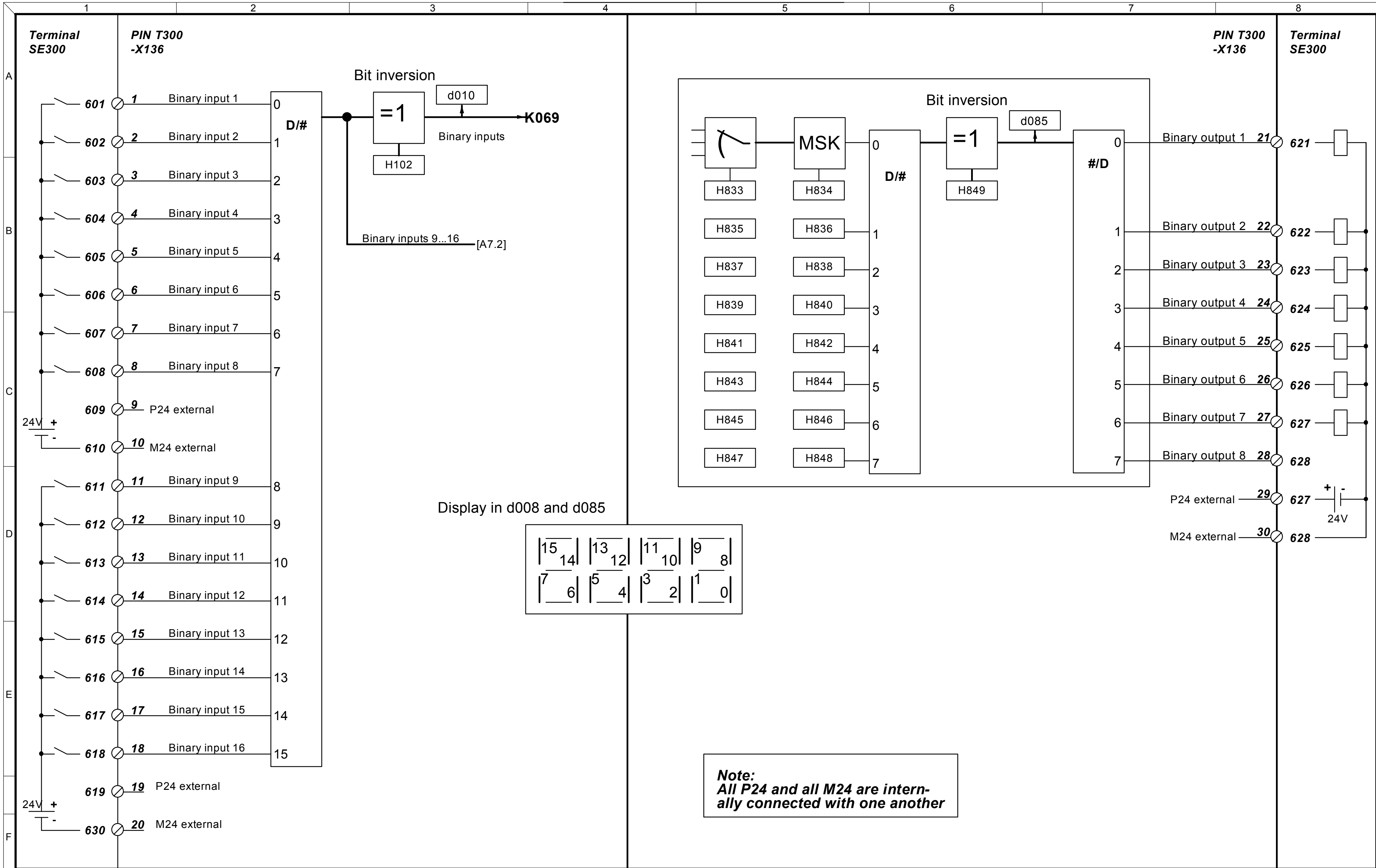
Status	Änderung	Date	Name	Date 19.8.96 / Person Reh / Michaelis / Chk / Std.	Standard software package Sectional drive	SIEMENS	Communications with the basic drive converter (CU) Receive/send telegram	FP_A1_6	Function diagram A1	Sheet A1+ Bl.



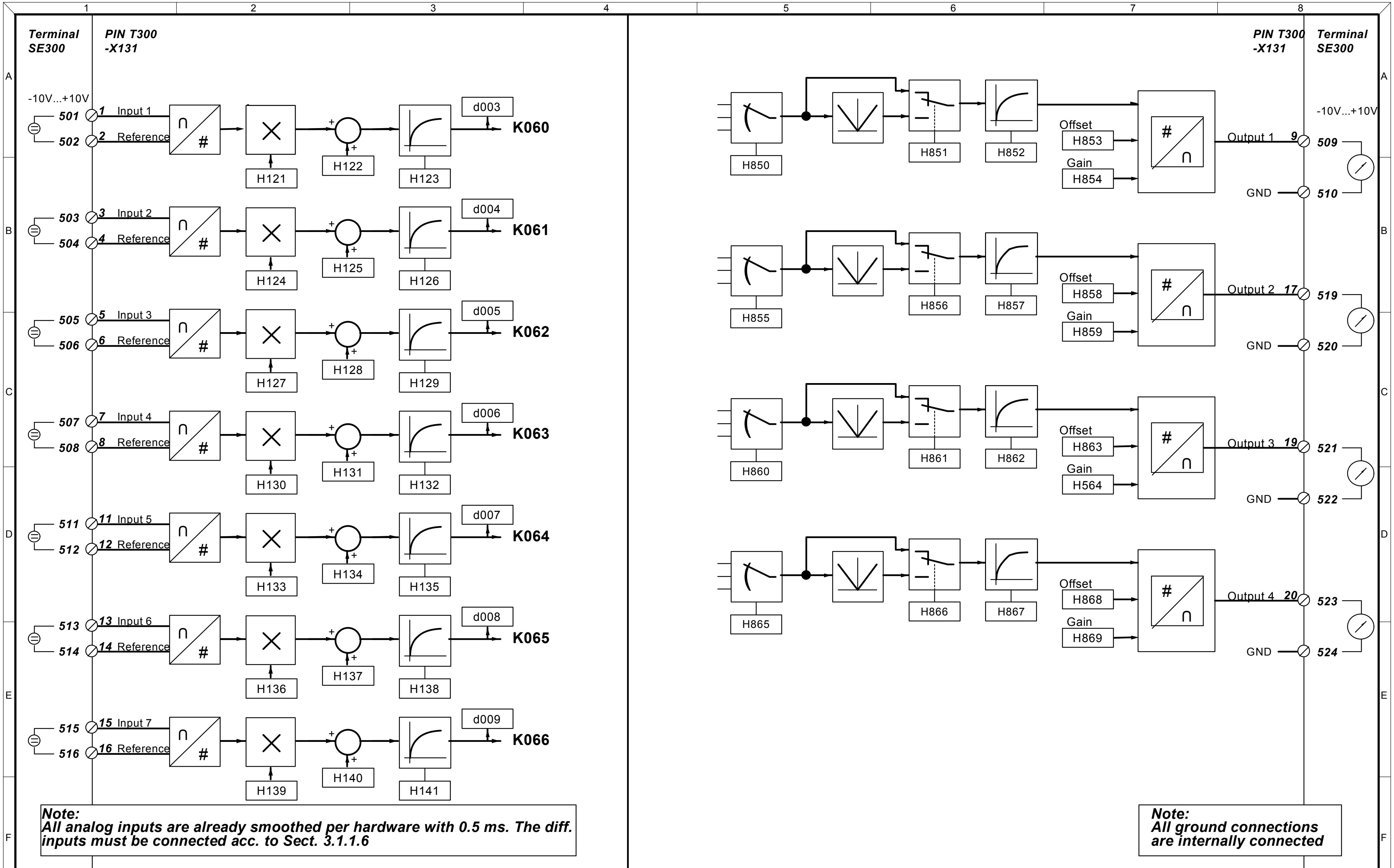
Status	Change	Date	Name	Date / Person / Chk. / Std.	1.12.94 / Reh / Michaelis	Standard software package Sectional drive	SIEMENS	Status words from the basic conv. Control words to the basic conv.	FP_A1_6	Function diagram A2	= / + / Sheet A2+ Sh.



				Date	19.8.96	Standard software package	SIEMENS	Comm. with the COM-BOARD	=
				Person	Reh / Michaelis			Peer-to-peer coupling	+
				Chk.		Sectional drive		FP_A1_6	**Function diagram A3**
Zustand	Änderung	Date	Name	Std.					Sheet A3+ Sh.

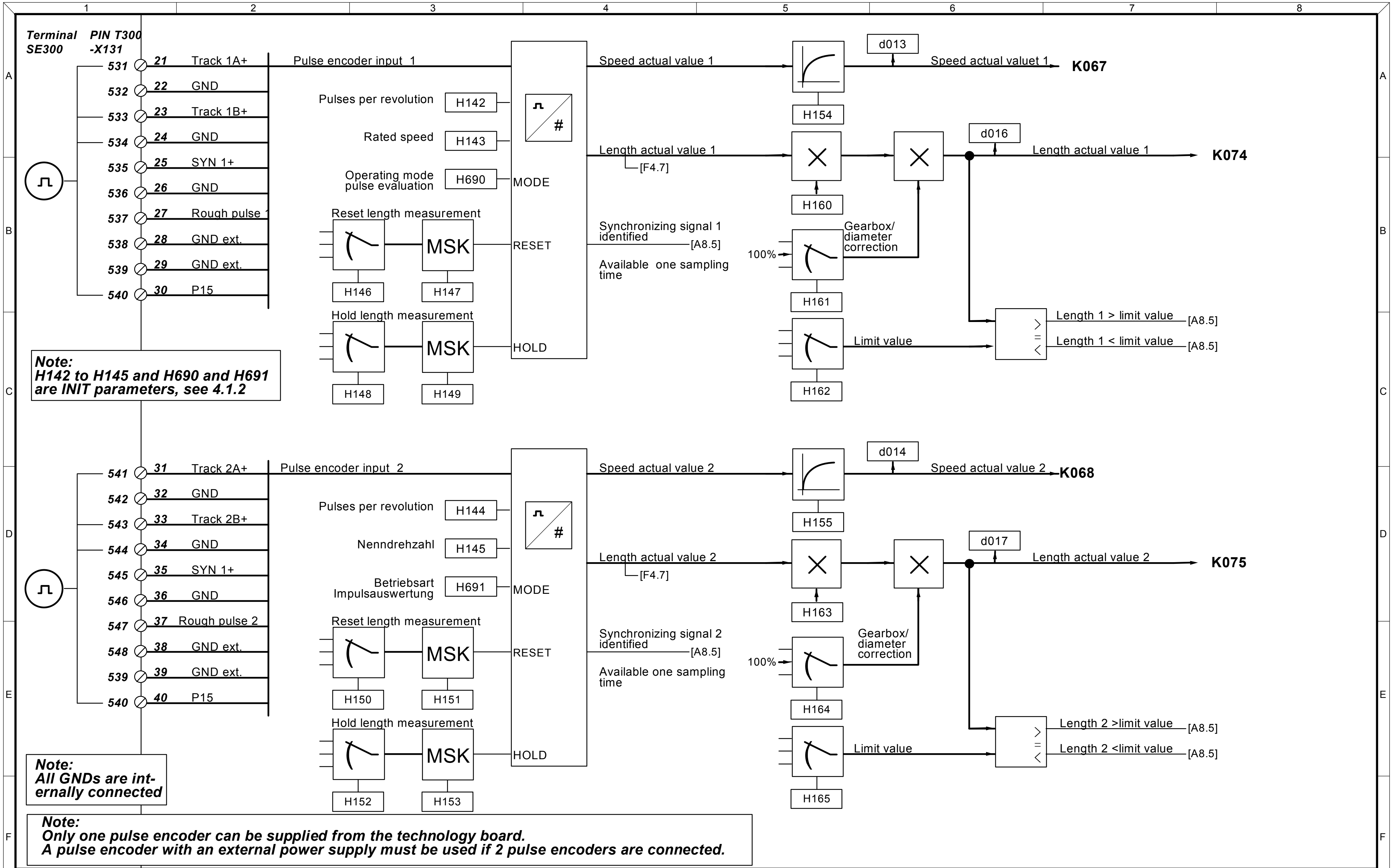


Status.	Change	Date	Name	Date / Person / Chk. / Std.	1.12.94 / Reh / Michaelis	Standard software package Sectional drive	SIEMENS	Binary inputs Binary outputs	FP_A1_6	Function diagram A4	Sheet A4+ Sh.

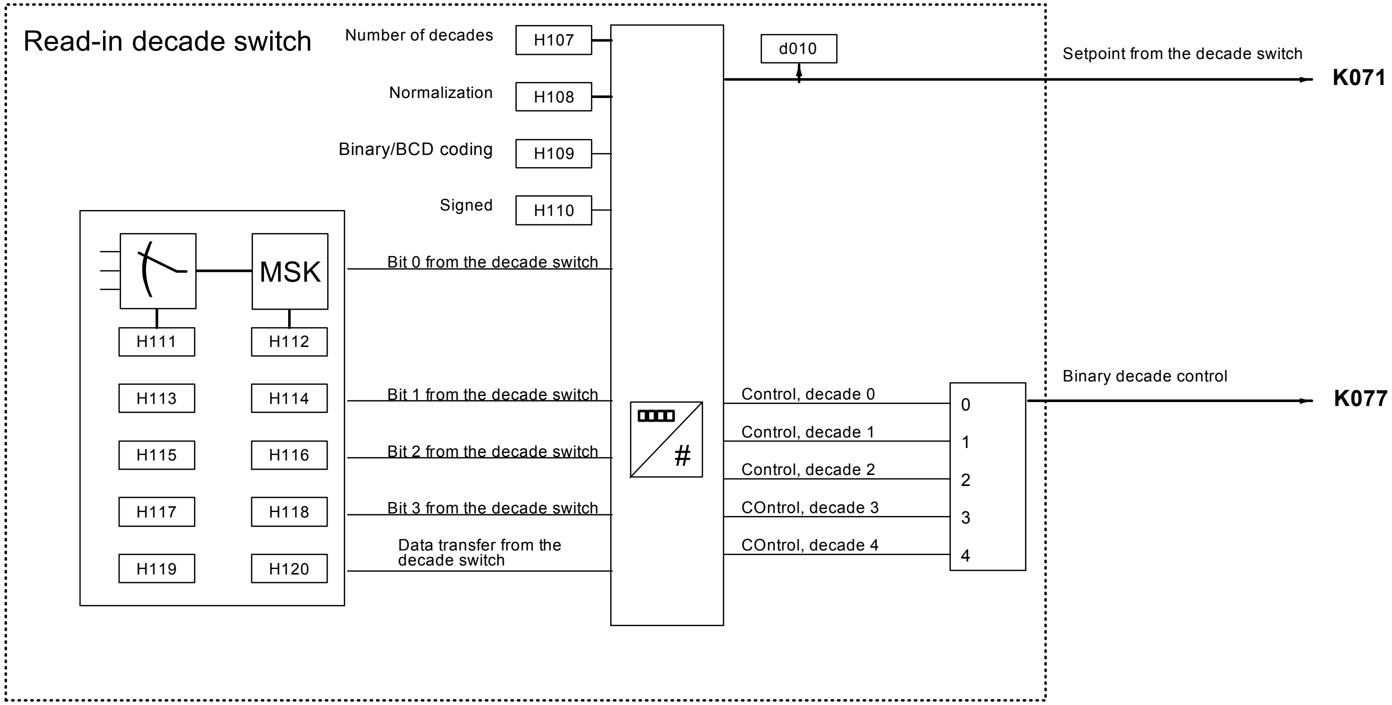


				Date	1.12.94	Standard software package	SIEMENS	Analog inputs
				Person	Reh / Michaelis	Sectional drive		Analog outputs
				Chk.				
Status	Change	Date	Name	Std.				

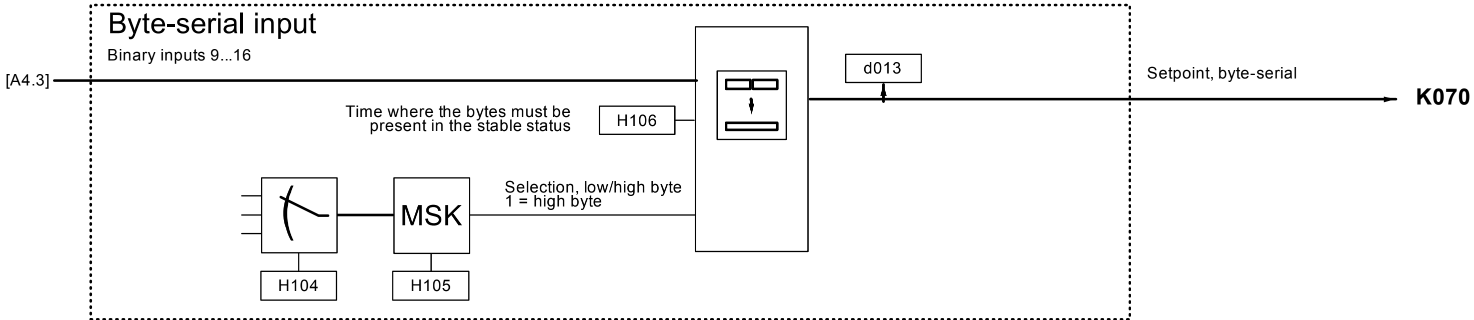
FP_A1_6 | Function diagram A5 | = | + | Sheet A5+ | Sh.



			Date	19.8.96	Standard software package	SIEMENS	Pulse encoder inputs	=
			Person	Reh / Michaelis	Sectional drive		Length measurement	+
			Chk.				FP_A1_6	Function diagram A6
Status.	Change	Date	Name Std.					Sheet A6+ Sh.



Note:
H107 is a INIT-parameter see 4.1.2

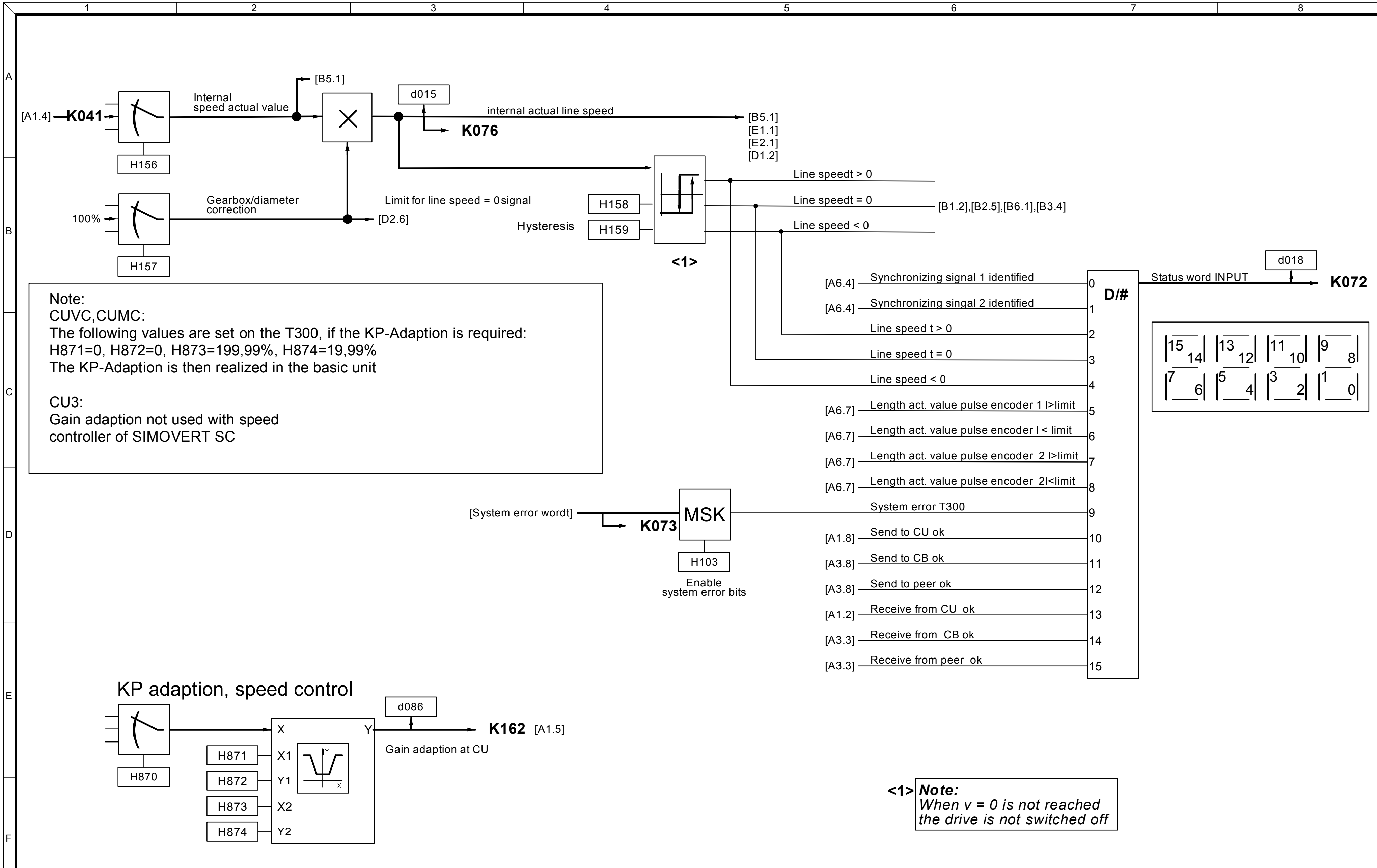


			Date	19.8.96	Standard software package Sectional drive
			Person	Reh / Michaelis	
			Chk.		
Zustand. Änderung		Date	Name Std.		

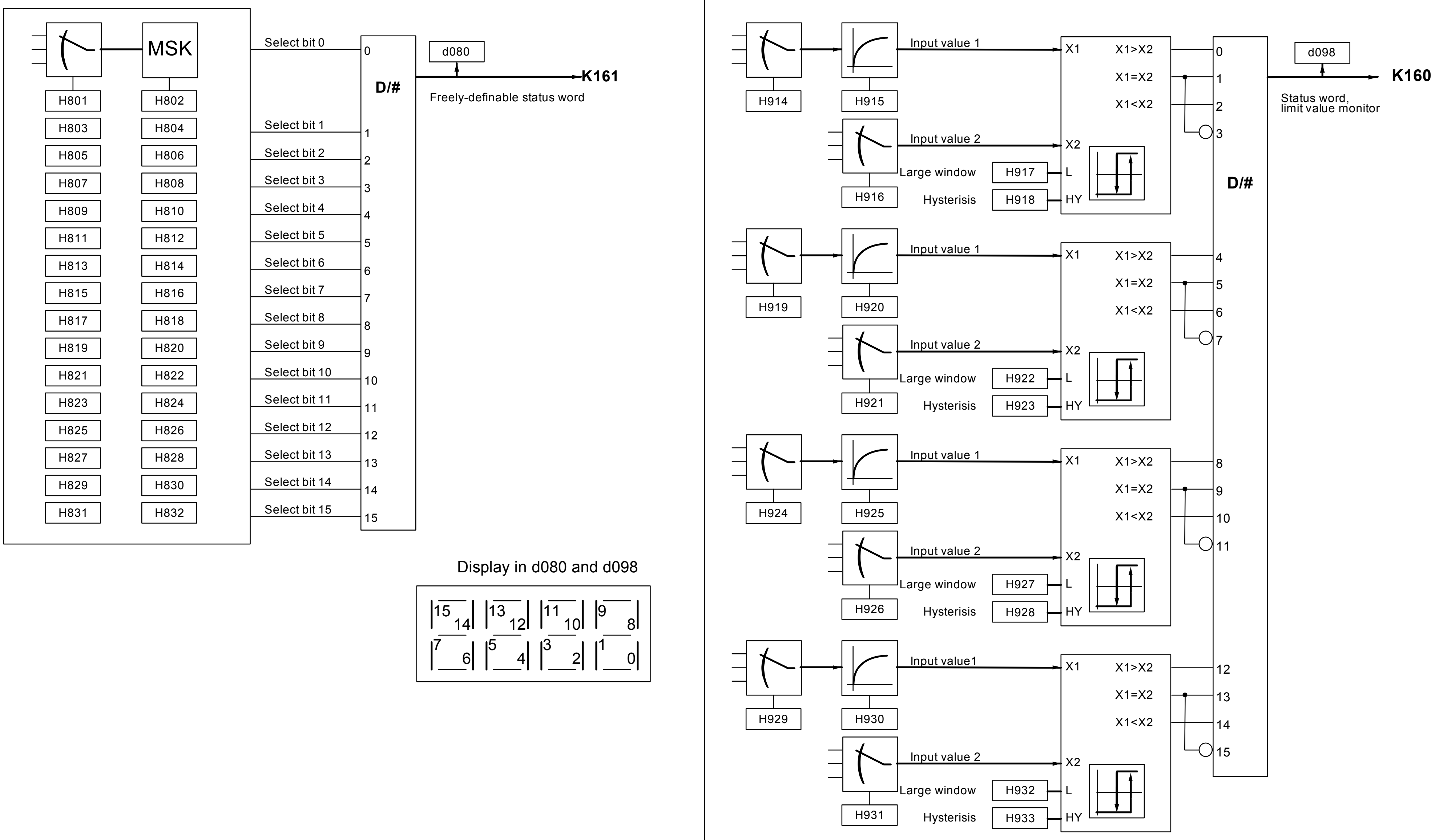
SIEMENS

Setpoint input via decade switches
Byte-serial input

FP_A7_10 | **Function diagram A7** | Sheet A7+ | Sh.

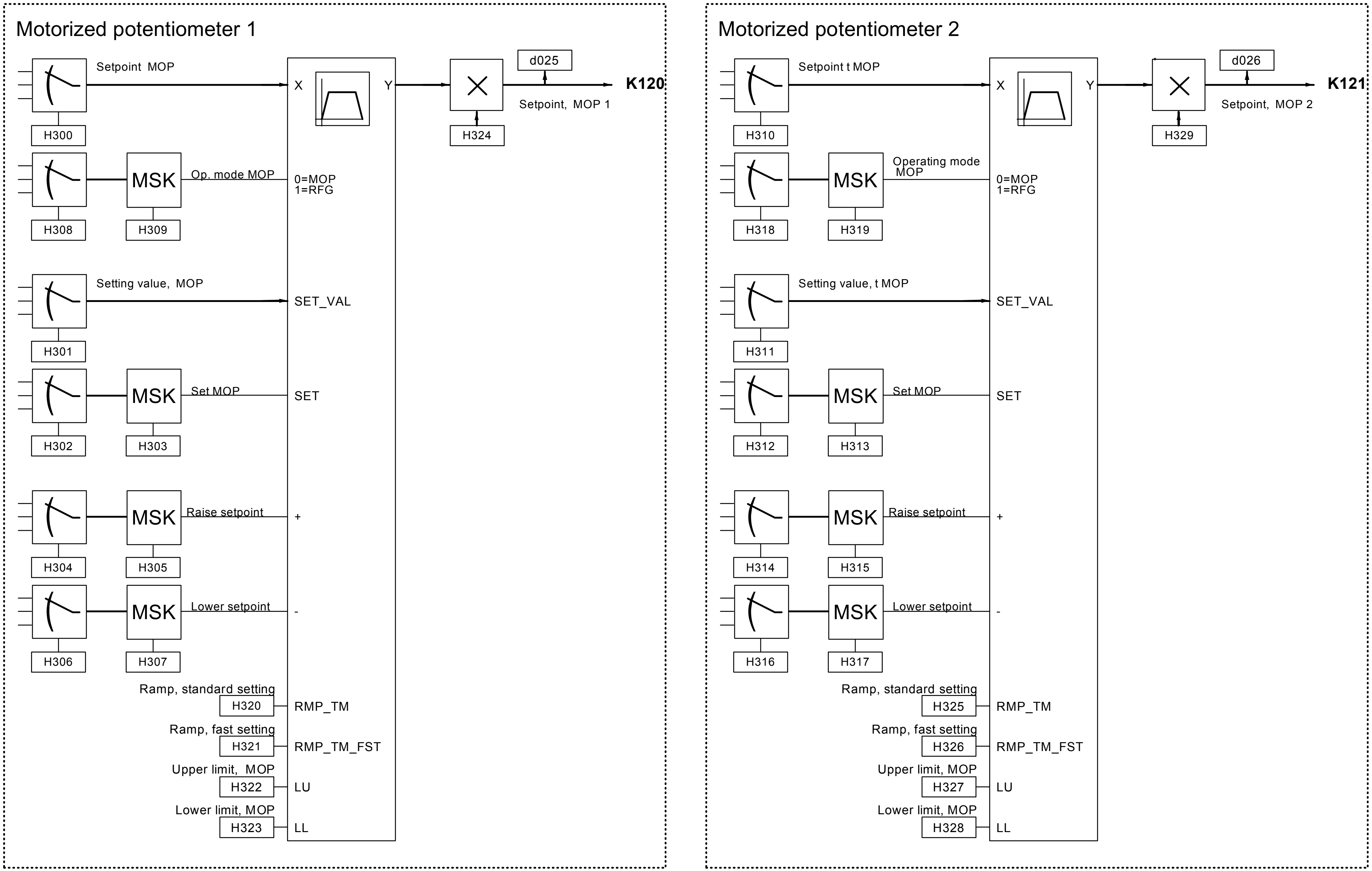


			Date	19.8.96	Standard software package	SIEMENS	Line speed actual value	=
			Person	Reh / Michaelis	Sectional drive		Status word input/output	+
			Chk.				KP adaption, speed control	FP_A7_10 — Function diagram A8 — Blatt A8+
Status. Change	Date	Name	Std.					Bl.



Note:
The switching characteristics is described in Sec. 3.1.1.5

				Date	1.8.94	Standard software package	SIEMENS	Freely-definable status word		=
				Person	Reh / Michaelis	Sectional drive		Freely-connectable lim. val. monit.		+
				Chk.				Status word, limit value monitor	FP_A7_10	Function diagram A9
Status	Change	Date	Name	Std.						Sheet A9+ Sh.



Zustand	Änderung	Date	Name	Date	1.8.94	Standard software package
				Person	Reh / Michaelis	Sectional drive
				Chk.		
				Std.		

SIEMENS

Motorized potentiometers 1 and 2

FP_A7_10 **Function diagram A10** Sheet A10- Sh.

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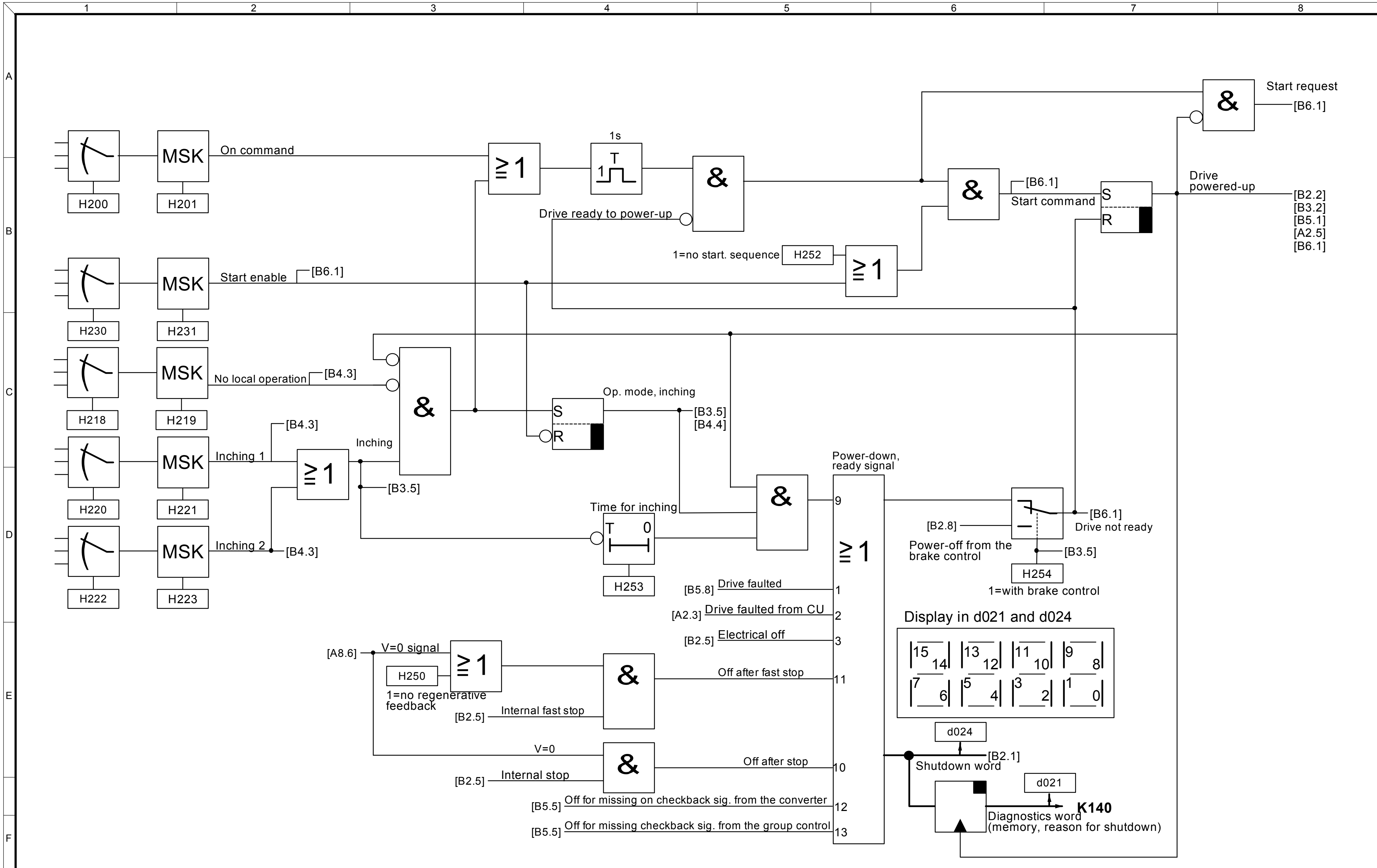
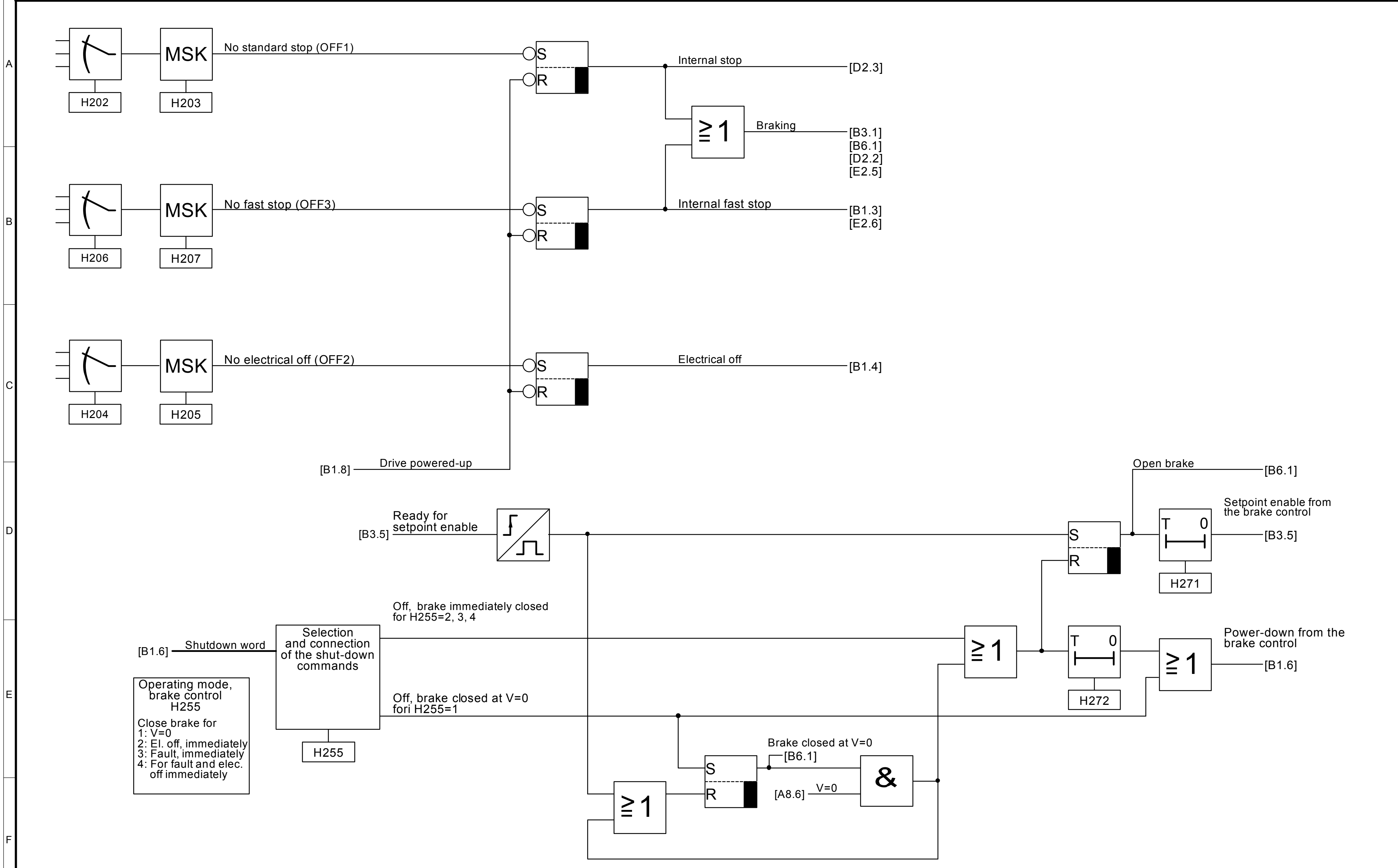
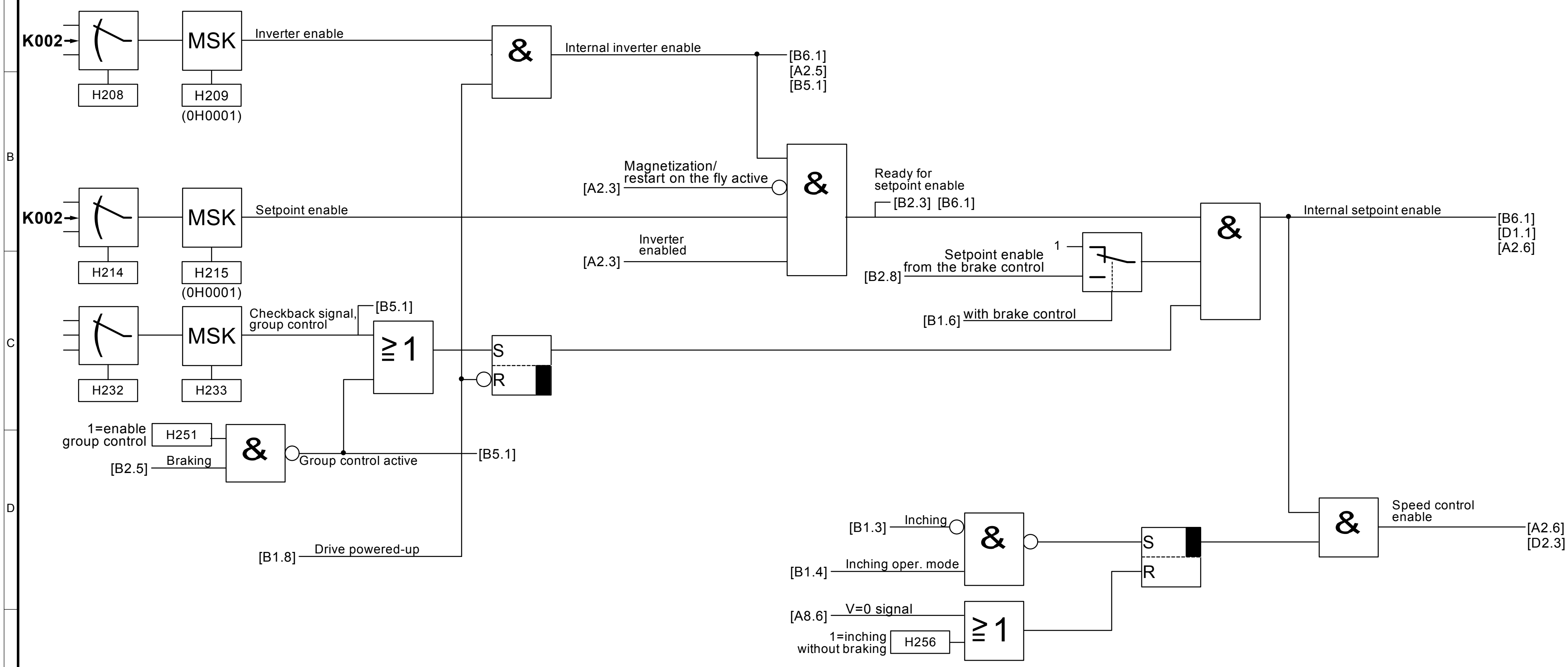


			Datum	1.8.94	Standard software package	SIEMENS	Drive power-up,	=
			Person	Reh / Michaelis	Sectional drive		power-down	+
			Chk.				FP_B1_6	Function diagram B1	Sheet B1+
Zustand	Änderung	Date	Name	Std.				Sh.



				Date	1.8.94	Standard software package Sectional drive	SIEMENS	Stop, electrical off/fast stop Brake control
				Person	Reh / Michaelis			
				Chk.				FP_B1_6
Status	Change	Date	Name	Std.				**Function diagramB2**

=
+
Sheet B2+
Sh.



				Date	1.8.94
				Person	Reh / Michaelis
				Chk.	
Zustand.	Änderung	Date	Name	Std.	

Standard software package
Sectional drive

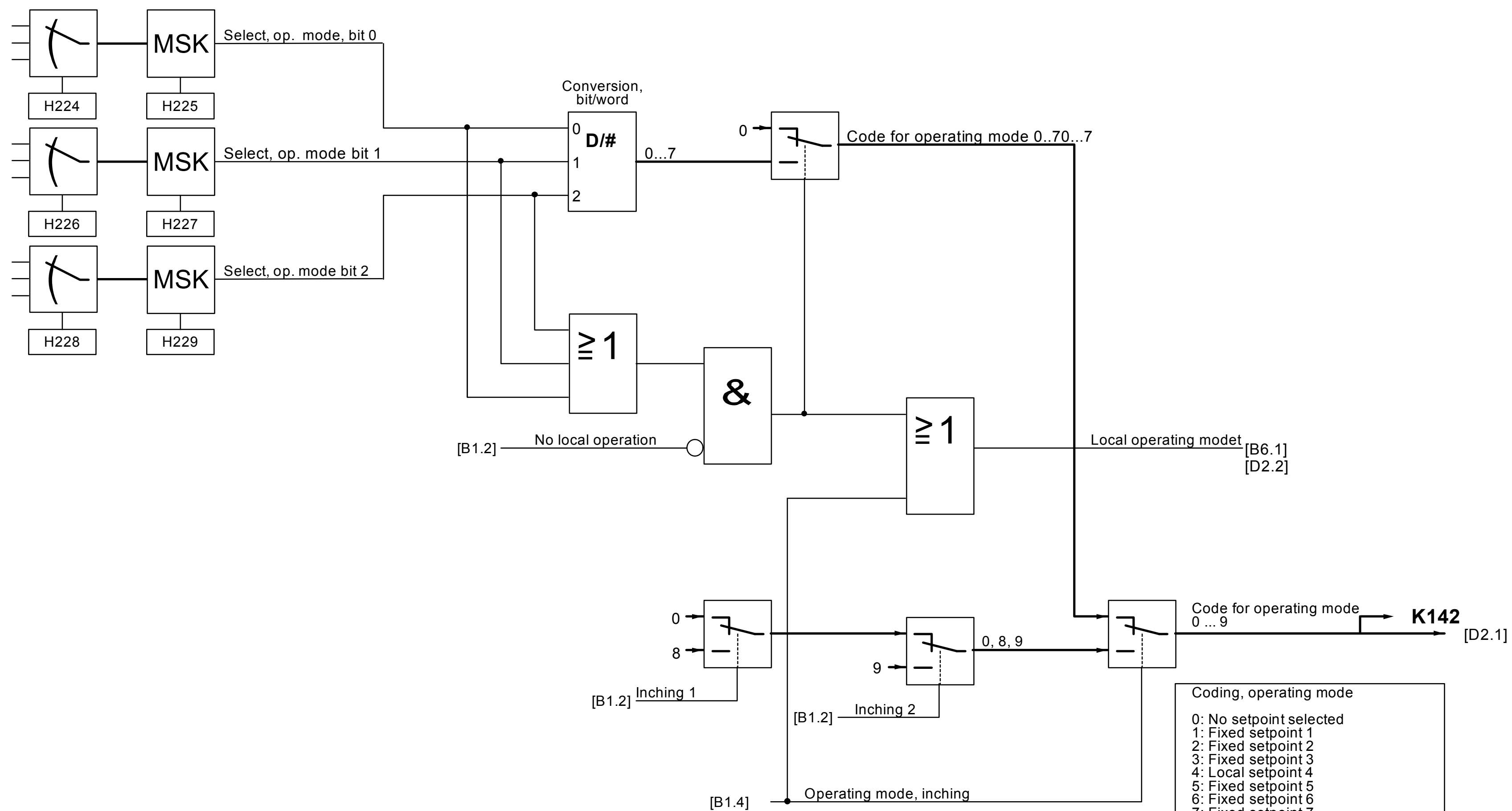
SIEMENS

Inverter enable
Setpoint enable
Speed control enable

FP_B1_6

Function diagram B3

=
+
Sheet B3+
Sh.

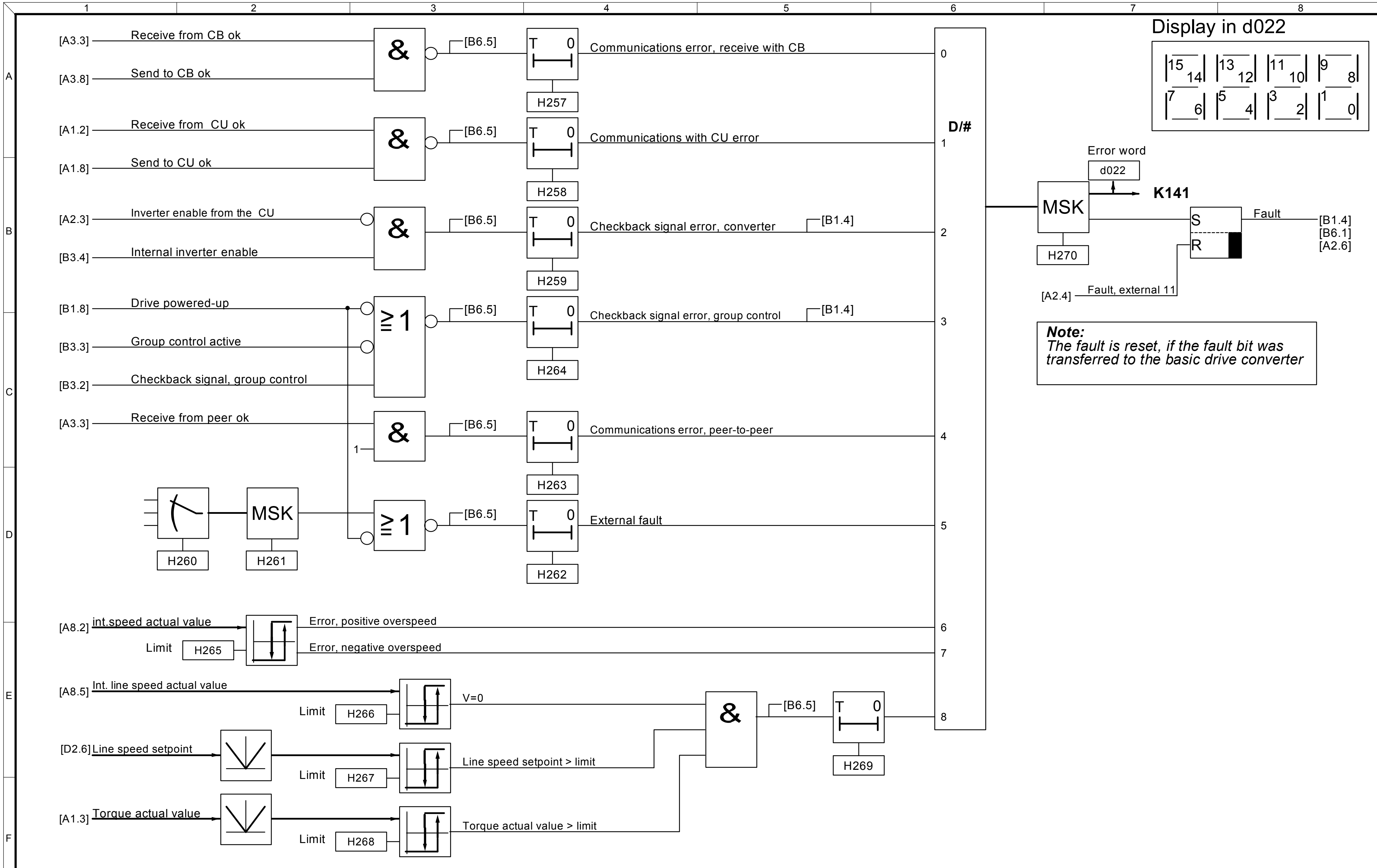


Coding, operating mode

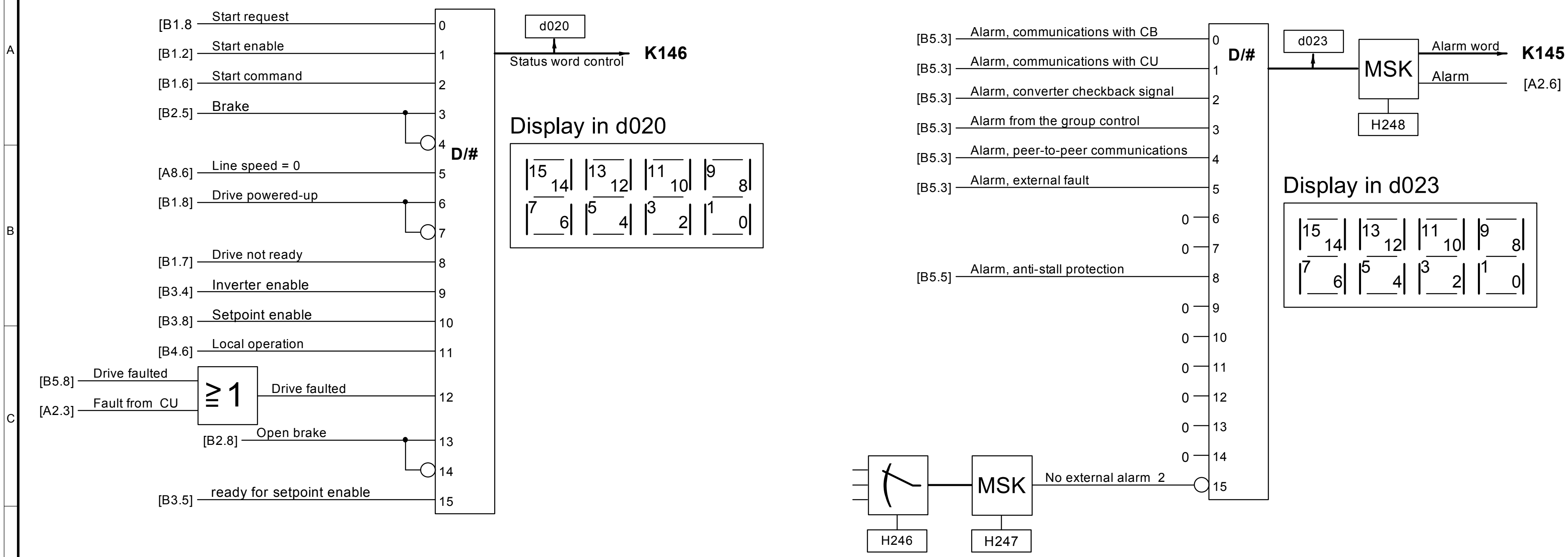
0: No setpoint selected
1: Fixed setpoint 1
2: Fixed setpoint 2
3: Fixed setpoint 3
4: Local setpoint 4
5: Fixed setpoint 5
6: Fixed setpoint 6
7: Fixed setpoint 7
8: Setpoint, inching 1
9: Setpoint, inching 2

Note:
Local setpoint selection is coded in a word from 0 to 9. The local setpoints are parameterized in diagram D2.

Datum	1.8.94	Standard software package Sectional drive	SIEMENS	Local setpoint selection	=
Person	Reh / Michaelis				+
Chk.				FP_B1_6	**Function diagram B4**
Status. Change Date Name Std.					Sheet B4+ . Sh.



Status.	Change	Date	Name						
				Date	1.8.94	Standard software package	SIEMENS	Error word generation	=
				Person	Reh / Michaelis	Sectional drive			+
				Chk.				FP_B1_6	Function diagram B5
				Std.					Sheet B5+ Sh..



				Date	1.8.94	Standard software package
				Person	Reh / Michaelis	Sectional drive
				Chk.		
Status.	Change	Date	Name	Std.		

SIEMENS

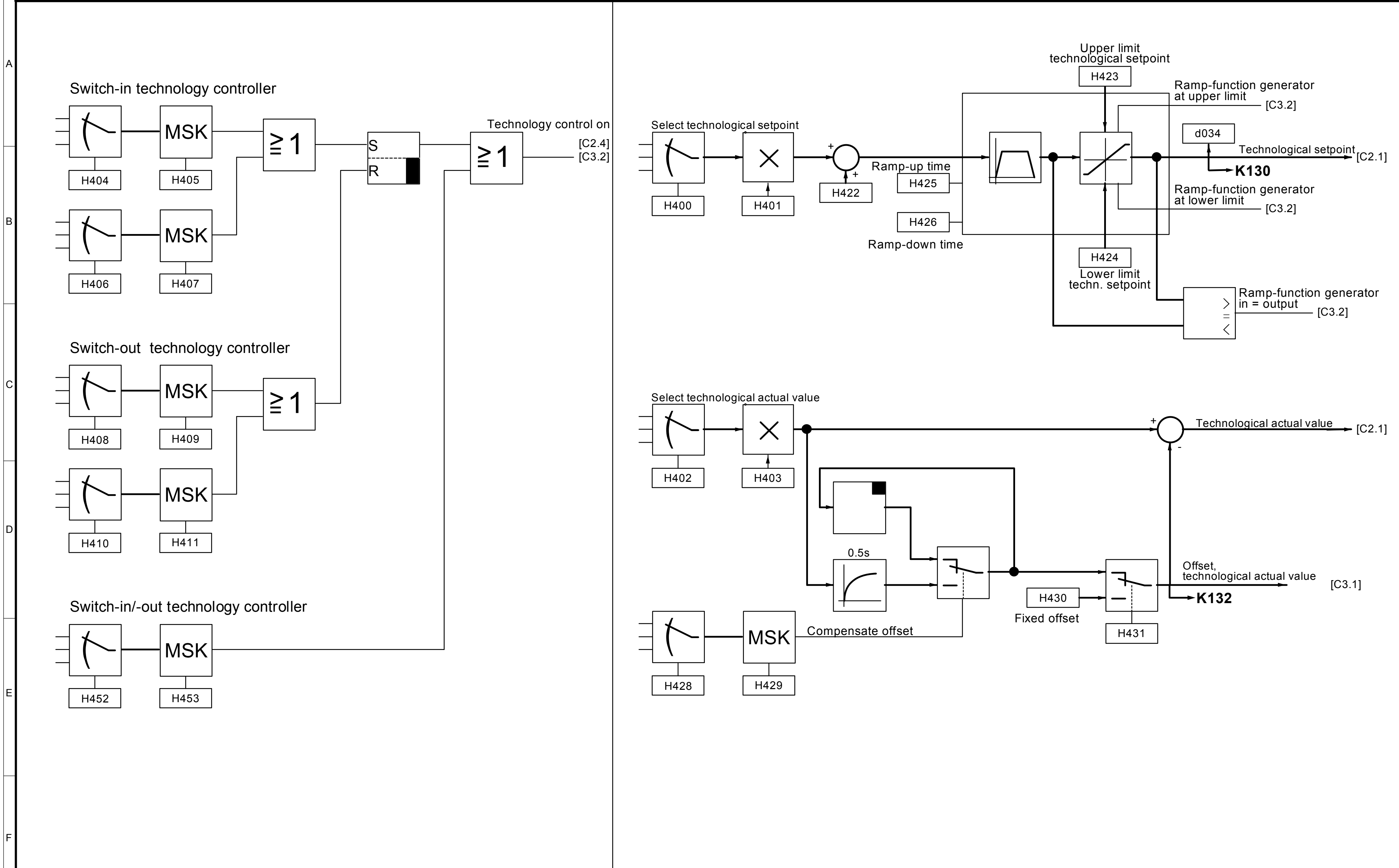
Status word, control
Alarm word

=
+

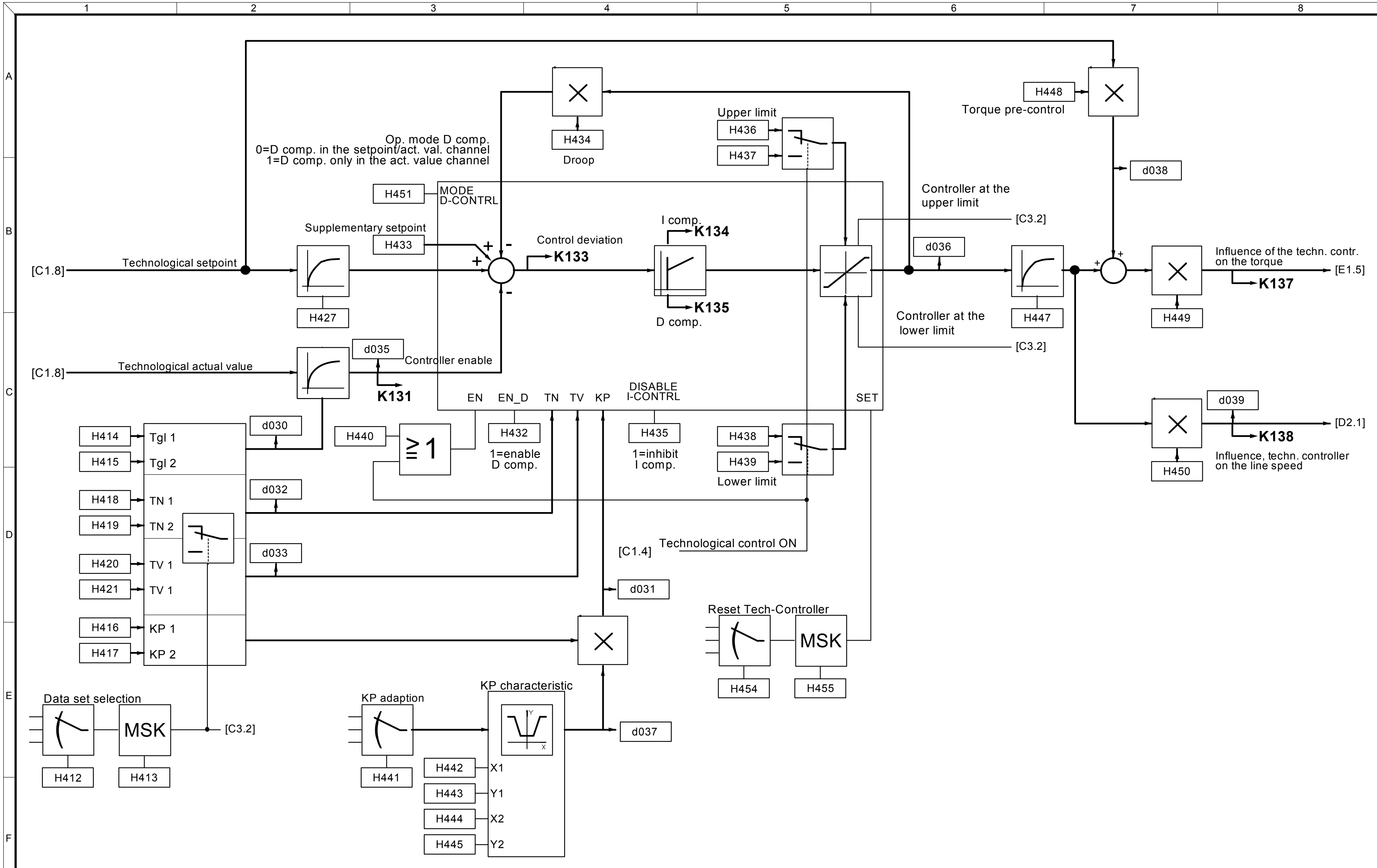
FP_B1_6

Function diagram B6

Sheet B6-
Sh.

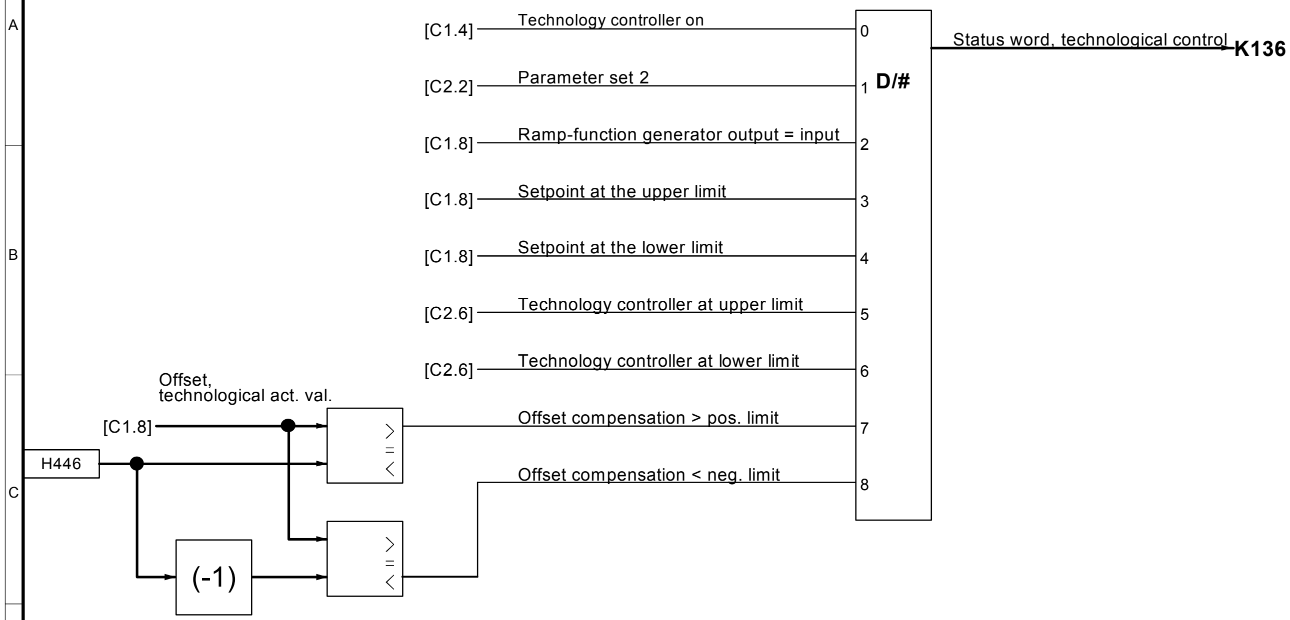


Switch-in technology controller
MSK
H404
H405
≧1
MSK
H406
H407
S
R
Technology control on
[C2.4]
[C3.2]
≧1
Switch-out technology controller
MSK
H408
H409
≧1
MSK
H410
H411
Switch-in/-out technology controller
MSK
H452
H453
Select technological setpoint
H400
H401
H422
Ramp-up time
H425
H426
Ramp-down time
Upper limit
technological setpoint
H423
Ramp-function generator
at upper limit
[C3.2]
d034
Technological setpoint
[C2.1]
K130
Ramp-function generator
at lower limit
[C3.2]
H424
Lower limit
techn. setpoint
Ramp-function generator
in = output
[C3.2]
Select technological actual value
H402
H403
Technological actual value
[C2.1]
0.5s
MSK
Compensate offset
H428
H429
H430
Fixed offset
H431
Offset,
technological actual value
[C3.1]
K132

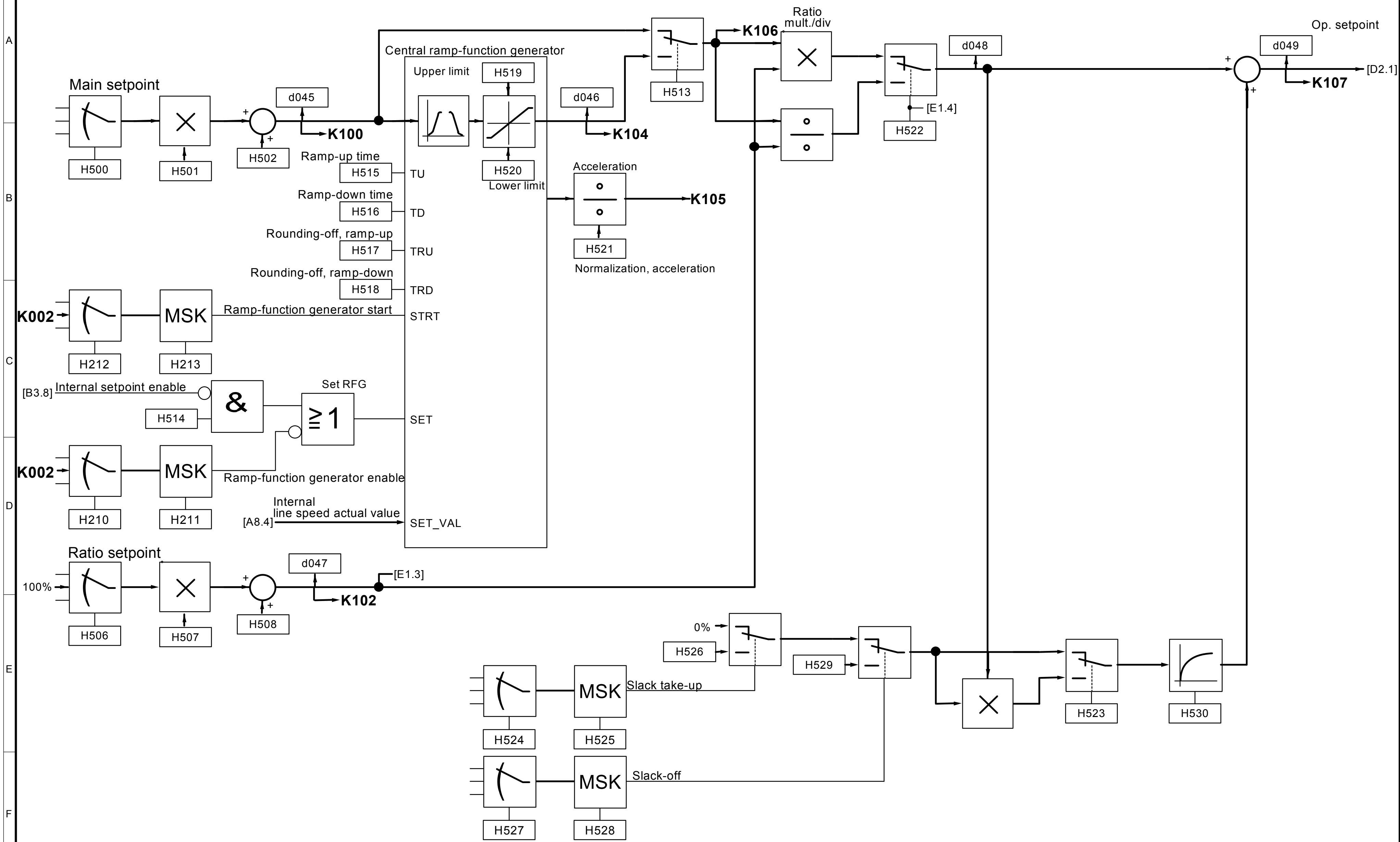


Date	1.8.94	Standard software package	SIEMENS	Technological controller	=
Person	Reh / Michaelis	Sectional drive			+
Chk.				FP_C1_3	**Function diagram C2** Sheet C2+ Sh
Std.					

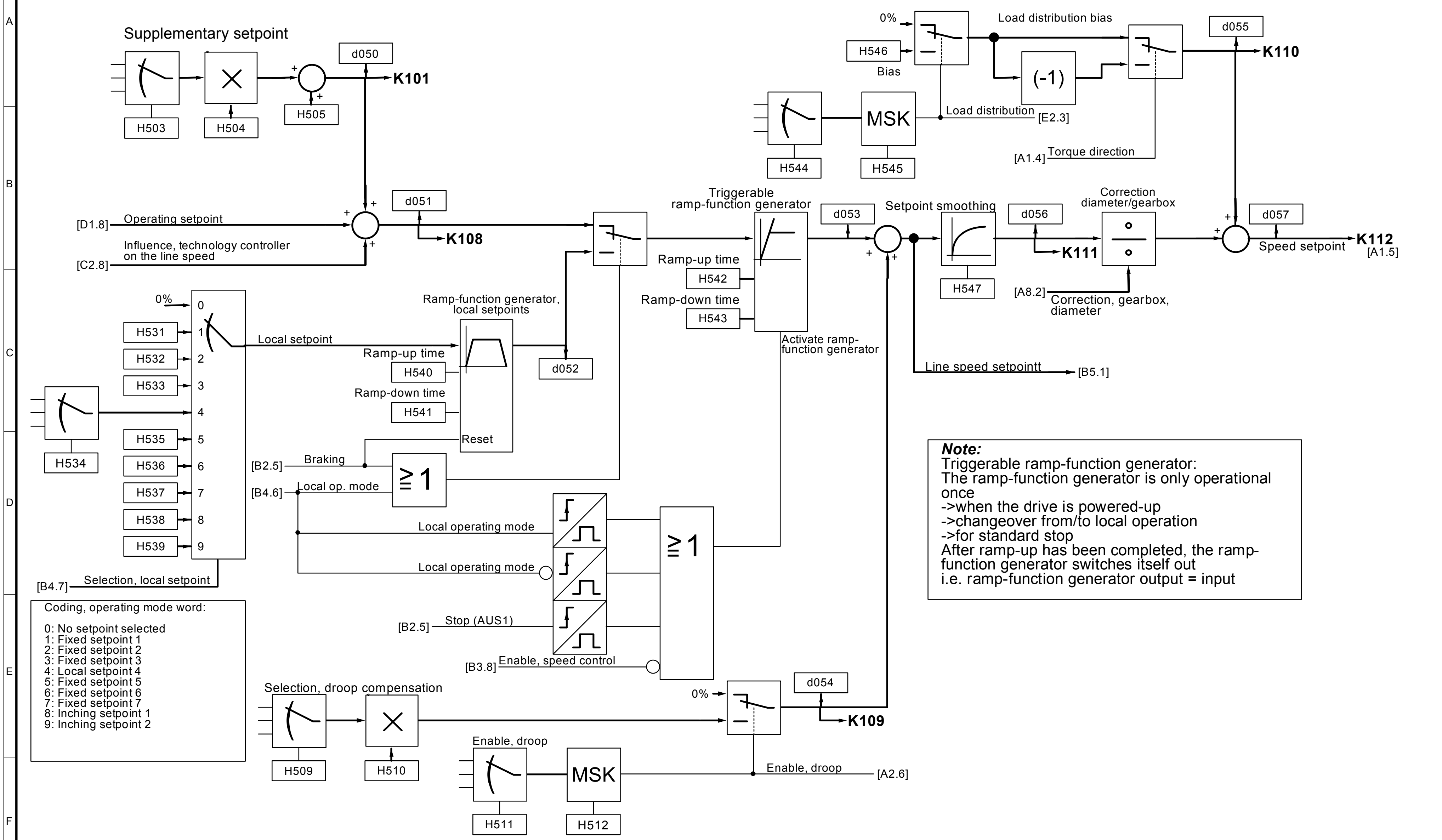
Status. | Change | Date | Name



				Date	1.8.94	Standard software package	SIEMENS	Statusword, technological control		=
				Person	Reh / Michaelis	Sectional drive				+
				Chk.					FP_C1_3	Function diagram C3	Sheet C3-
Status.	Change	Date	Name	Std.						Sh.

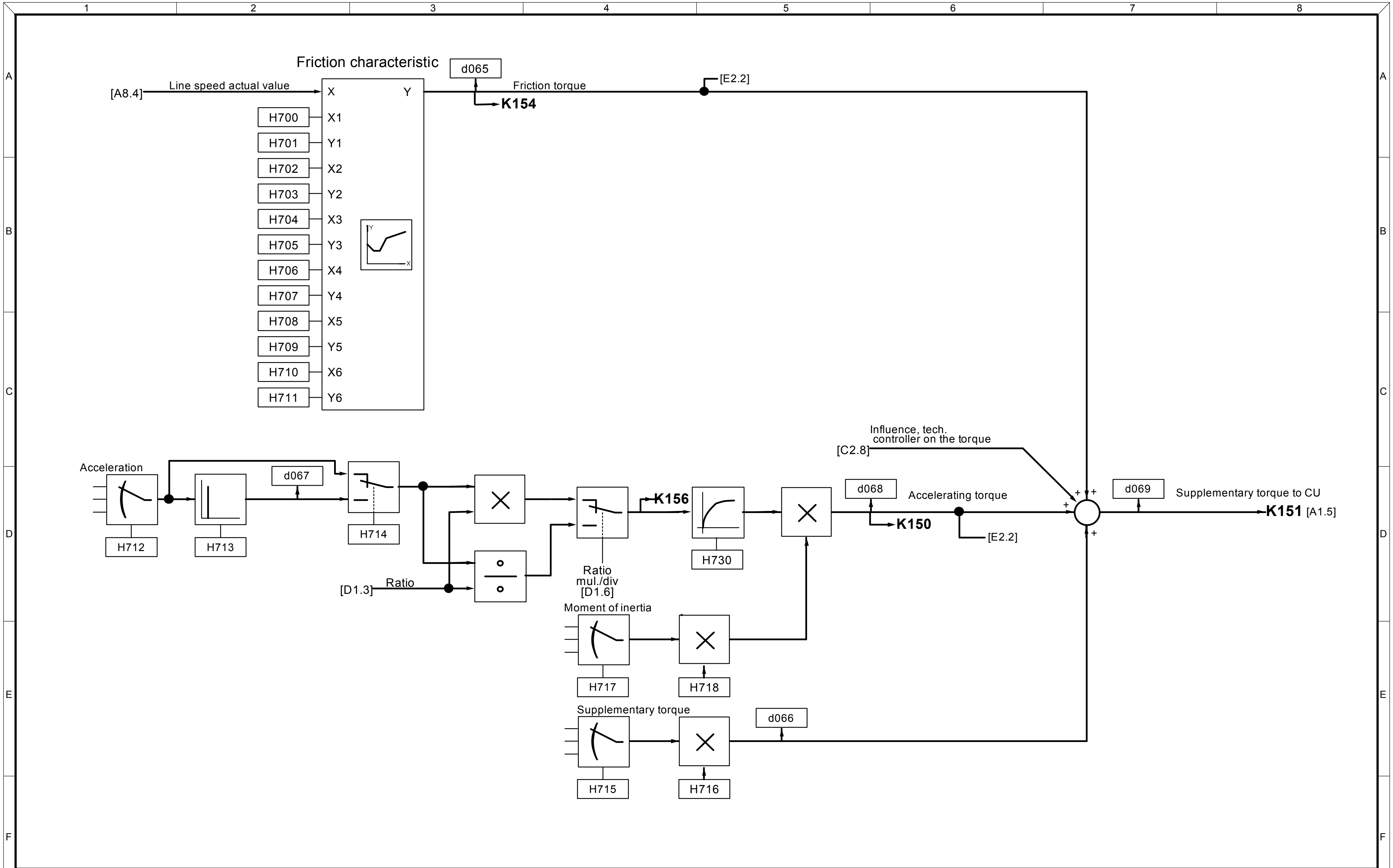


			Date	1.8.94	Standard software package Sectional drive	SIEMENS	Central ramp-function generator Ratio/slack take-up/slack-off
			Person	Reh / Michaelis			
			Chk.				FP_D1_2 **Function diagram D1** Sheet D1+ Sh.
Status.	Change	Date	Name	Std.			

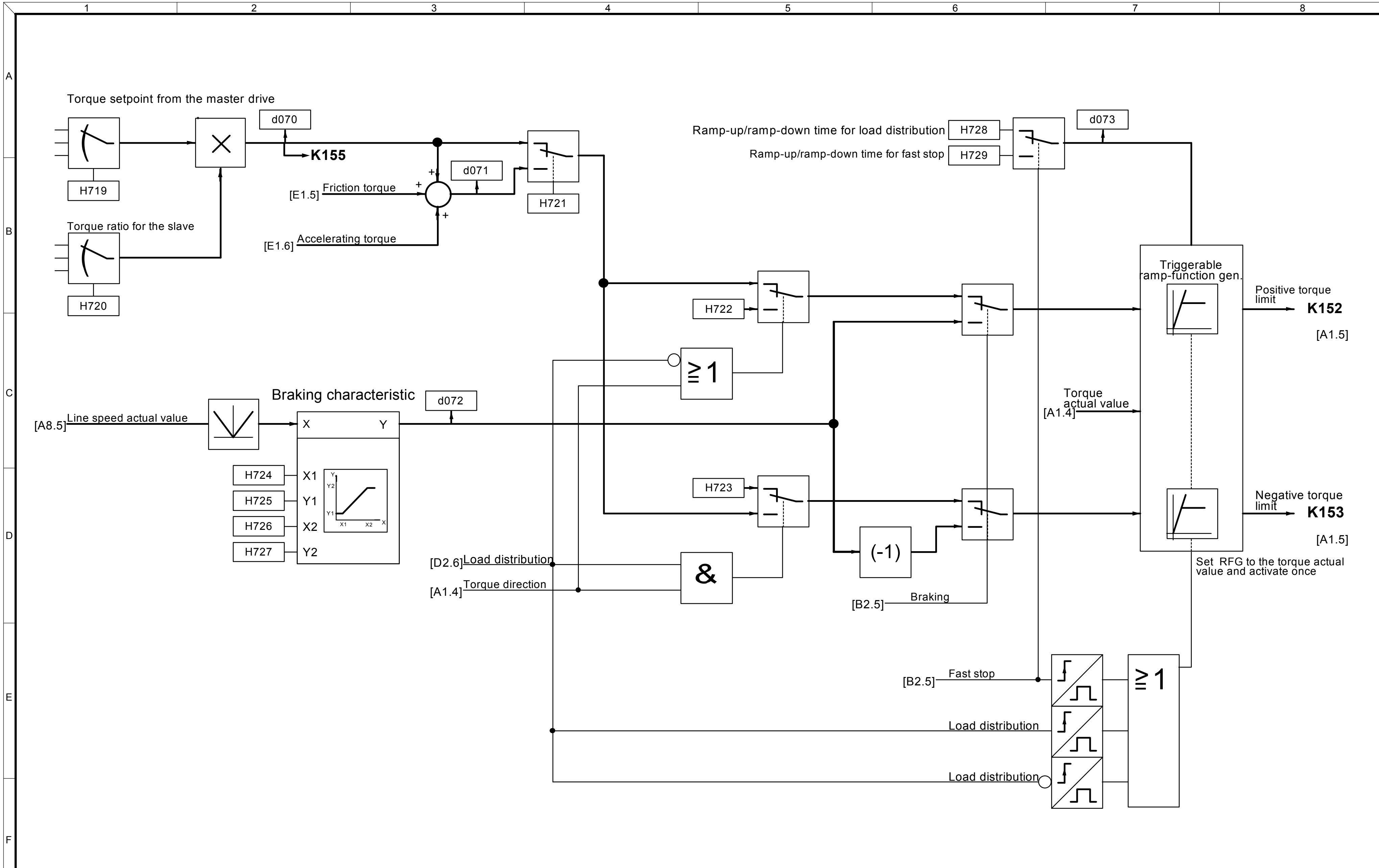


Note:
Triggerable ramp-function generator:
The ramp-function generator is only operational once
->when the drive is powered-up
->changeover from/to local operation
->for standard stop
After ramp-up has been completed, the ramp-function generator switches itself out
i.e. ramp-function generator output = input

Status.	Change	Date	Name	Date: 1.8.94 Person: Reh / Michaelis Chk. Std.	Standard software package Sectional drive
SIEMENS	Local fixed setpoints Triggerable ramp-function generator	FP_D1_2	**Function diagram D2**	Sheet D2+ Sh.	



Date	1.8.94	Standard software package Sectional drive	SIEMENS	Friction characteristic Inertia compensation Supplementary torque	= +
Person	Reh / Michaelis				FP_E1_2
Chk.					**Function diagram E1**
Zustand. Änderung Date Name Std.					Sheet E1+ Sh.



Date	19.8.96	Standard software package	SIEMENS	Load distribution	=
Person	Reh / Michaelis	Sectional drive		Braking characteristic	+
Chk.				FP_E1_2	Function diagram E2
Zustand. Änderung Date Name	Std.				Sheet E2- Sh.

Fixed setpoint 0
0%, 0H0000 → **K000**

Fixed setpoint 1
100% → **K001**

Fixed setpoint 2
0HFFFF → **K002**

Fixed setpoint 3
H166 → **K003**

Fixed setpoint 4
H167 → **K004**

Fixed setpoint 5
H168 → **K005**

Fixed setpoint 6
H169 → **K006**

Fixed setpoint 7
H170 → **K007**

Fixed setpoint 8
H171 → **K008**

Fixed setpoint 9
H172 → **K009**

Fixed setpoint 10
H173 → **K010**

Fixed setpoint 11
H174 → **K011**

Fixed setpoint 12
H175 → **K012**

Fixed setpoint 13
H176 → **K013**

Fixed setpoint 14
H177 → **K014**

Fixed setpoint 15
H178 → **K015**

Fixed setpoint 16
H179 → **K016**

Fixed setpoint 17
H180 → **K017**

Fixed setpoint 18
H181 → **K018**

Festsollwert 19
H182 → **K019**

Fixed setpoint 20
H183 → **K200**

Fixed setopint 21
H184 → **K201**

Fixed s etpoint 22
H185 → **K202**

Fixed setpoint 23
H186 → **K203**

Fixed setpoint 24
H187 → **K204**

Fixed setpoint 25
H188 → **K205**

Fixed setoint 26
H189 → **K206**

Fixed setpoint 27
H190 → **K207**

Fixed setpoint 28
H191 → **K208**

Fixed setpoint 29
H192 → **K209**

Fixed setpoint 30
H193 → **K210**

Fixed setpoint 31
H194 → **K211**

Fixed setpoint 32
H195 → **K212**

Fixed setpoint 33
H196 → **K213**

Monitoring parameter 1
H875 → d081

Monitoring parameter 2
H876 → d082

Monitoring parameter 3
H877 → d083

Monitoring parameter 4 (Hex)
H878 → d084

15 14 | 13 12 | 11 10 | 9 8
7 6 | 5 4 | 3 2 | 1 0

Hardware code
HW? → d000

Software code
SW? → d001

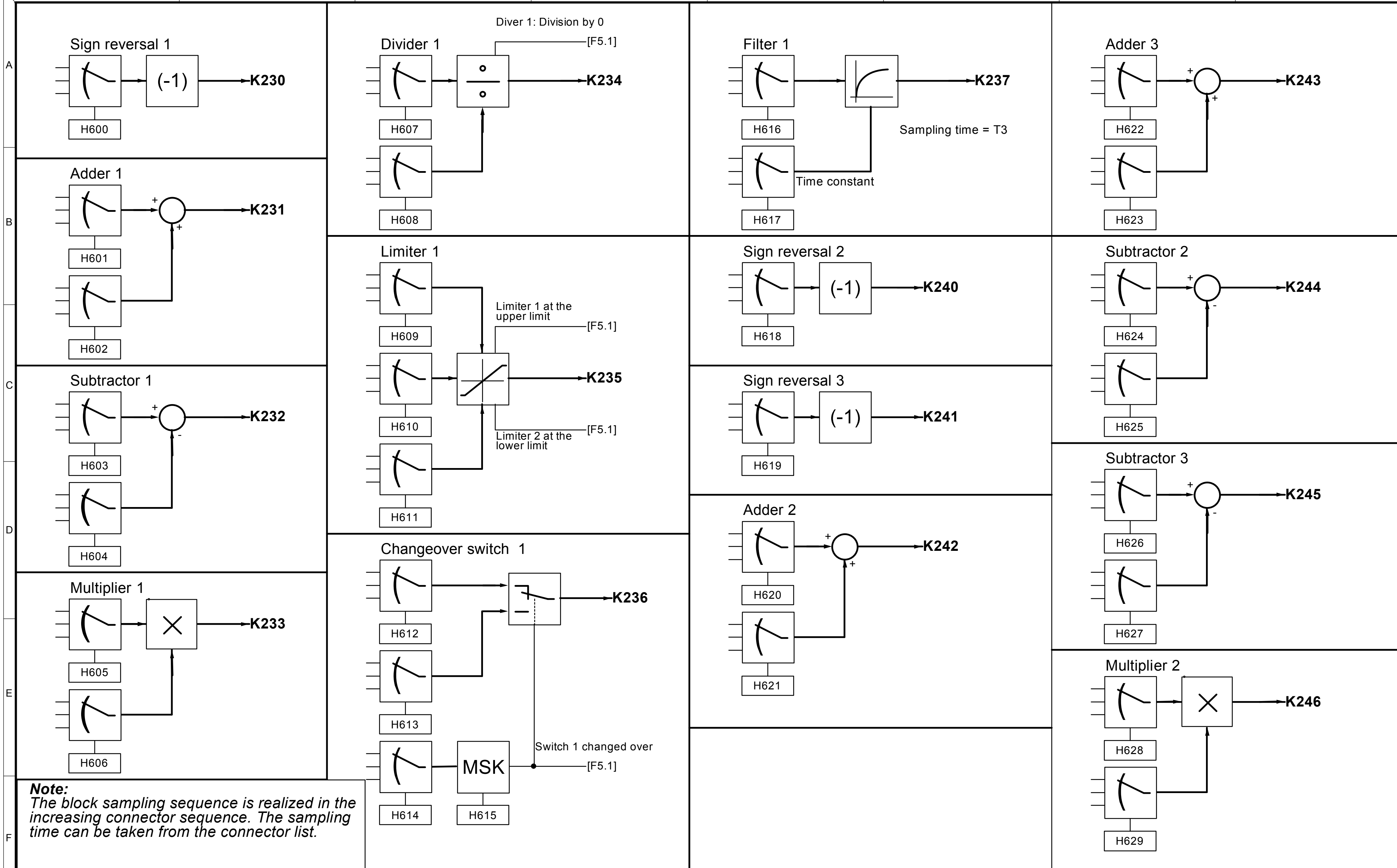
Version code,software
V?? → d003

Drive Number
H998 →

Establish factory setting
H999 →

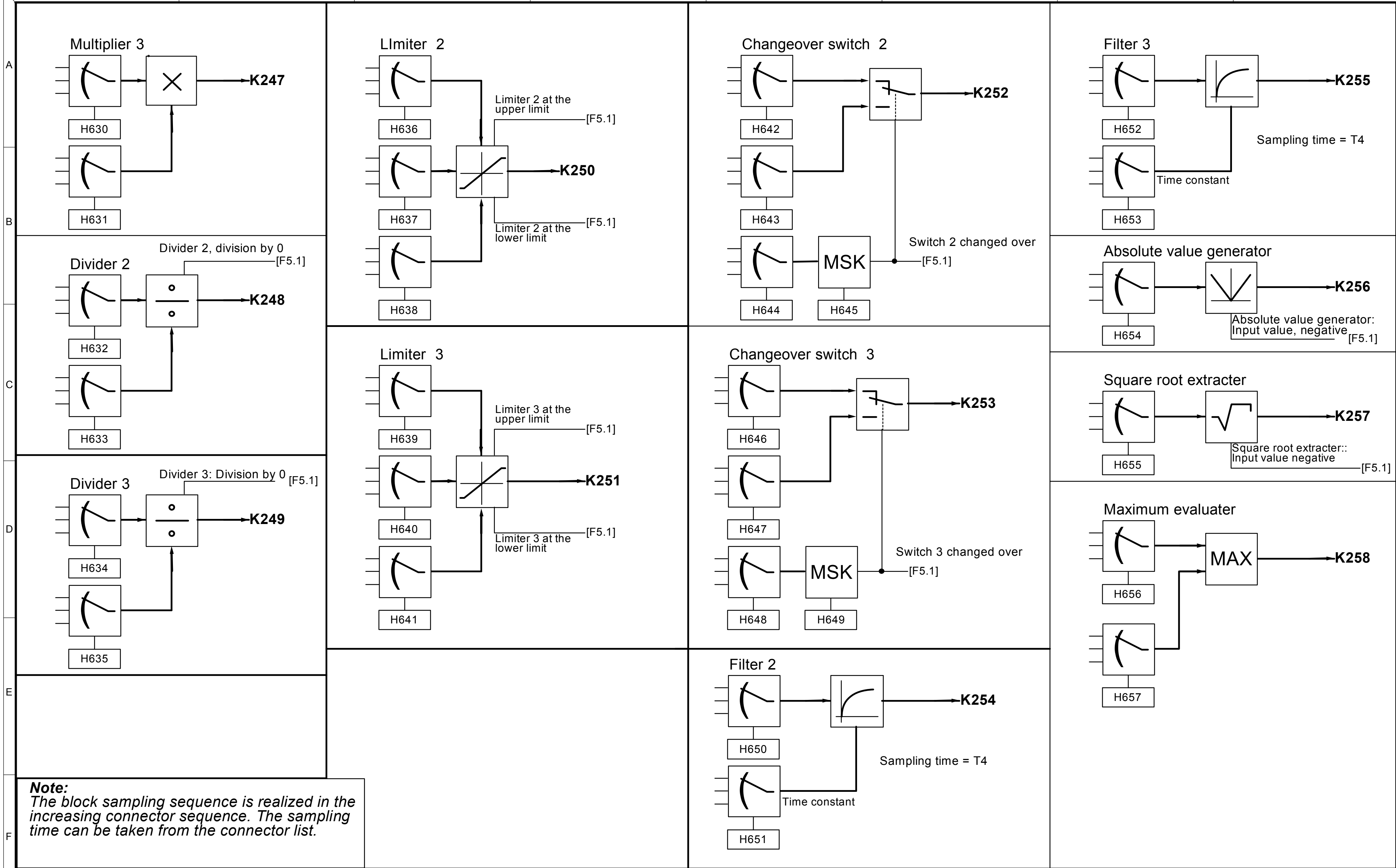
Note to setting of filter time constants:
Filter1:
Fixed setpoint xy[%]=(required time constant[ms]x100%)/(16384x40ms)
Filter 2 and 3:
Fixed setpoint xy[%]=(required time constant[ms]x100%)/(16384x160ms)

			Date	19.8.96	Standard software package	SIEMENS	Fixed setpoints	=
			Person	Reh / Michaelis	Sectional drive		Monitoring parameters	+
			Chk.					FP_F1_5
Status.	Change	Date	Name Std.					**Function diagram F1** Sheet F1+ Sh.



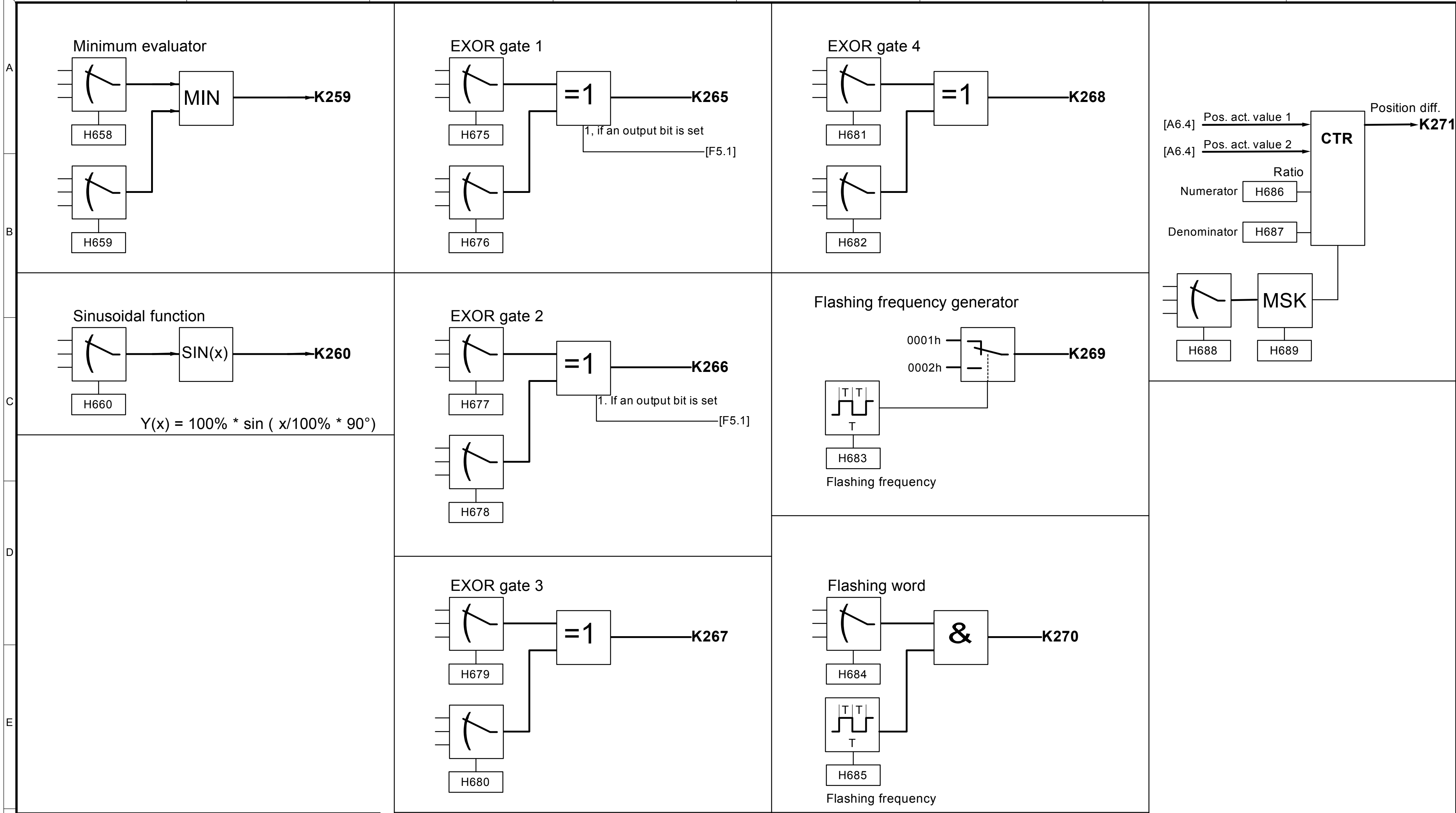
Note:
The block sampling sequence is realized in the increasing connector sequence. The sampling time can be taken from the connector list.

Status	Change	Date	Name	Date 19.8.96 Person Reh / Michaelis Chk. Std.	Standard software package Sectional drive
SIEMENS	Free functions I	FP_F1_5	Function diagram F2	= +	Sheet F2 Sh.



Note:
The block sampling sequence is realized in the increasing connector sequence. The sampling time can be taken from the connector list.

				Date	19.8.96	Standard software package	SIEMENS	Free functions II	=
				Person	Reh / Michaelis	Sectional drive			+
				Chk.					
Status	Change	Date	Name	Std.				FP_F1_5	Function diagram F3	Sheet F3 Sh



Note:
The block sampling sequence is realized in the increasing connector sequence. The sampling time can be taken from the connector list.

Status.	Change	Date	Name	Date 1.8.94 / Person Reh / Michaelis / Chk. / Std.	Standard software package Sectional drive	SIEMENS	Free functions III	FP_F1_5	Function diagram F4	Sheet F4 / Sh.

Source	Signal	D/# bit
[F2.3]	Divider 1 : Division by 0	0
[F2.3]	Limiter 1 at the upper limit	1
[F2.3]	Limiter 1 at the lower limit	2
[F2.4]	Switch 1 changed over	3
[F3.1]	Divider 2: Division by 0	4
[F3.1]	Divider 3: Division by 0	5
[F3.3]	Limiter 2 at the upper limit	6
[F3.3]	Limiter 2 at the lower limit	7
[F3.3]	Limiter 3 at the upper limit	8
[F3.3]	Limiter 3 at the lower limit	9
[F3.6]	Switch 2 changed over	10
[F3.6]	Switch 3 changed over	11
[F3.8]	Input absolue value generator, negative	12
[F3.8]	Input square root extractor, negative	13
[F4.4]	OR logic op. of output XOR 1	14
[F4.4]	OR logic op. of output XOR 2	15

D/# → Status word, free functions → **K299**

4 Parameter list

4.1 General information

The technological functions are set using parameters. These can be displaying parameters which are identified with d..., or parameters which can be changed, designated by H... .

4.1.1 List of display parameters

All of the process quantities, which are suitable to monitor the module behavior, are listed under display parameters. These are only for monitoring purposes, and cannot be connected-back into the process. The more detailed list of connectors is provided for tasks such as these.

In the *display parameter* column, the list includes the parameter abbreviations as well as the decimal- and hexadecimal value with which they are addressed via the dual port RAM. A 14-digit abbreviated designation follows in the *value/description* column, which also shows the plain text display on the OP1 operator control panel. These start, for display parameters, with **STATUS_** in order to simply differentiate them from adjustable parameters. A further parameter designation is provided in the column which can be used to locate this in the short list and the detailed signal description.

The c*ross reference_sampling time* column lists the STRUC G path of the particular display parameters, thus allowing it to be found in the STRUC function diagrams. The sampling time and numerical representation are also specified.

4.1.2 List of setting parameters

The parameter list describes the H parameters as well as their functions. The short designation of the parameters as well as the decimal- and hexadecimal value, with which this is addressed via the dual port RAM, is included in the *parameter number* column. An 11-digit short designation, follows in the *Description* column, which is also displayed in the plain text display of the OP1 operator control panel, a parameter designation which can be used to locate this in the short list, a detailed description as well as cross-reference in the STRUC G diagrams with information regarding the sampling time and connector type. Appropriate information (INIT) is entered for the initialization quantities; for these parameters, a switching off and on is required so that the change becomes effective.

The value range and the step size are specified in the *Range_step* column. Generally, the steps are connector-typical, and the range can also be restricted as a result of the technological function. If an attempt is made to enter higher values, they are rejected. No steps are specified for non-proportional connector types (R2), as this is dependent on the value (refer below).

The original setting is listed in the *factory setting* column. This is the pre-setting to which the module is reset using the *delete parameter changes* function. This setting is non-specific, i.e., it is not provided for a specific configuration, and is generally selected, so that the appropriate function of the parameter is inactive, or its influence is non-critical.

The *Section* column includes the section number, where the parameter is explained in the text summary. Further, the cross-reference to the function diagram page is specified in square brackets, where this parameter is shown.

NOTE
INIT parameters are read in only after the unit is switched off and on. This should be done once after entering all INIT parameters. The INIT parameters are identified in the parameterlist, column description, by the adding of (INIT) to the PKW type. Example: H107: ... PKW type O2 (INIT).

4.2 Parameter normalization

Generally, parameters are normalized via the interfaces, just like they appear on the converter operator control panel display (PMU).
In this case, the decimal point is eliminated.

The value range, as well as the position of the decimal point can be determined in the *Value range* column of the parameter list.

The smallest possible increment can be taken from the *Steps* column. In this case, it should be observed, that the value can be entered via the interface for certain parameter types with a lower step range, However, the system can only implement the specified step, i.e. it is rounded-off.

Parameters can either have 1-, 16- or 32-bit formats. There are various parameter types depending on their application.

An overview of the available parameter types in shown in the following table.

Parameter type	**Significance**
Boolean	Binary value
O2	Unsigned, 16-bit value
I2	Signed, 16-bit value
I4	Signed, 32-bit value
V2	16-bit word (binary vector)

Example:
21.9% must be entered for parameter H531. The parameter type is I4.

Required value for H531	Parameter value range	**Value to be entered via the interface**
21.9%	-200.000 ... 199.993	**21*900*** as decimal number

The value range information indicates that the parameter has three places after the decimal point which means that 2 zeros must be attached.
Leading zeros need not be specified.

Parameter number	Description	Range, steps	Werksein-stellung	Section [Plan]
d000 1000d 03e8	**STATUS_HW_ID** Hardware identifier Code for the technology board used e.g. T300 = 133 INPUT.HW ID.X_T5 SIMADYN:O2 PKW-TYP:I4	0...16384 1		[F1.8]
d001 1001d 03E9h	**STATUS_SW_ID** Software identifier Software code e.g. multi-motor module = 60.00 INPUT.SW ID.X_T5 SIMADYN D:O2, PKW-TYP:I4	0...16384 1		[F1.8]
d002 1002d 03EAh	**STATUS_SW_VER** Software release INPUT.SWVER.X_T5 SIMADYN D:N2, SCAL=5100.0 PKW-TYP:I4	0.0...1638.4 0.1		6.3.4.5 [F1.8]
d003 1003d 03EBh	**STATUS_ANA_IN1** Signal from analog input 1 Analog signal which is read-in after adaption and smoothing. INPUT.AI40.Y_T1 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%		3.1.6 [A5.3]
d004 1004d 03ECh	**STATUS_ANA_IN2** Signal from analog input 2 Analog signal which is read-in after adaption and smoothing. INPUT.AI80.Y_T1 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%		3.1.6 [A5.3]
d005 1005d 03EDh	**STATUS_ANA_IN3** Signal from analog input 3 Analog signal which is read-in after adaption and smoothing. INPUT.AI120.Y_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%		3.1.6 [A5.3]
d006 1006d 03EEh	**STATUS_ANA_IN4** Signal from analog input 4 Analog signal which is read-in after adaption and smoothing. INPUT.AI160.Y.X_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%		3.1.6 [A5.3]
d007 1007d 03EFh	**STATUS_ANA_IN5** Signal from analog input 5 Analog signal which is read-in after adaption and smoothing. INPUT.AI200.Y_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%		3.1.6 [A5.3]
d008 1008d 03F0h	**STATUS_ANA_IN6** Signal from analog input 6 Analog signal which is read-in after adaption and smoothing. INPUT.AI240.Y_T4 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%		3.1.6 [A5.3]
d009 1009d 03F1h	**STATUS_ANA_IN7** Signal from analog input 7 Analog signal which is read-in after adaption and smoothing. INPUT.AI280.Y_T4 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%		3.1.6 [A5.3]

Parameter number	Description	Range, steps	Werksein-stellung	Section [Plan]

d010 1010d 03F2h	**STATUS_BIN_INP** Status, binary inputs 15 14 | 13 12 | 11 10 | 9 8 7 6 | 5 4 | 3 2 | 1 0 Bit 0: Binary input 1 Bit 1: Binary input 2 Bit 2: Binary input 3 Bit 3: Binary input 4 Bit 4: Binary input 5 Bit 5: Binary input 6 Bit 6: Binary input 7 Bit 7: Binary input 8 Bit 8: Binary input 9 Bit 9: Binary input 10 Bit 10: Binary input 11 Bit 11: Binary input 12 Bit 12: Binary input 13 Bit 13: Binary input 14 Bit 14: Binary input 15 Bit 15: Binary input 16 INPUT.BI40.QS_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	3.1.4 [A4.3]
d011 1011d 03F3h	**STATUS_SER_INP** Setpoint from byte-serial input The value which is read-in is stored until a new value becomes available INPUT.SR40.Y_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	3.1.10 [A7.5]
d012 1012d 03F4h	**STATUS_TWS_INP** Setpoint from the decade switch A new setpoint is only read-in, if this was requested with the data transfer binary command. INPUT.SR50.Y_T4 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	3.1.9 [A7.5]
d013 1013d 03F5h	**STATUS_DIG_TC1** Speed actual value from pulse encoder 1 The calculated speed actual value is 100% if the digital pulse encoder rotates at the specified speed. INPUT.TA12.Y_T1 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	3.1.8 [A6.6]
d014 1014d 03F6h	**STATUS_DIG_TC2** Speed actual value from pulse encoder 2 The calculated speed actual value is 100% if the digital pulse encoder rotates at the specified speed. INPUT.TA14.Y_T1 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	3.1.8 [A6.6]
d015 1015d 03F7h	**STATUS_SPD_ACT** Speed actual value Speed actual value corrected by the diameter/gearbox factor. INPUT.TA120.Y2_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	3.1.11 [A8.3]
d016 1016d 03F8h	**STATUS_LEN_TC1** Length actual value from pulse encoder 1 Number of counted tachometer pulses which are corrected by a diameter/gearbox factor and which represent a length. INPUT.TA24.Y2_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	3.1.8 [A6.6]

Parameter number	Description	Range, steps	Werksein-stellung	Section [Plan]

d017 1017d 03F9h	**STATUS_LEN_TC2** Length actual value from pulse encoder 2 Number of counted tachometer pulses which are corrected by a diameter/gearbox factor and which represent a length INPUT.TA44.Y2_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	3.1.8 [A6.6]
d018 1018d 03FA	**STATUS_INP_FCT** Status word, input functions 15 14 | 13 12 | 11 10 | 9 8 7 6 | 5 4 | 3 2 | 1 0 Bit 0: Tachometer 1, synchronizing signal identified Bit 1: Tachometer 2, synchronizing signal identified Bit 2: Line speed actual value greater than zero Bit 3: Line speed actual value equal to zero Bit 4: Line speed actual value less than zero Bit 5: Length actual value 1 less than the setpoint Bit 6: Length actual value 1 greater than the setpoint Bit 7: Length actual value 2 less than the setpoint Bit 8: Length actual value 2 greater than the setpoint Bit 9: System fault, SIMADYN D Bit 10: Transmit to CU o.k. Bit 11: Transmit to CB o.k. Bit 12: Transmit to peer o.k. Bit 13: Receive from CU o.k. Bit 14: Receive from CU o.k. Bit 15: Receive from peer-to-peer o.k. INPUT.STAT10.QS_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	3.1.12 [A8.8]
d019	(unbenutzt)		
d020 1020d 03FCh	**STATUS_CTL_FCT** Status word, open-loop control 15 14 | 13 12 | 11 10 | 9 8 7 6 | 5 4 | 3 2 | 1 0 Bit 0: Start enable request Bit 1: Start enable Bit 2: Power-up command Bit 3: Fast stop Bit 4: No fast stop Bit 5: Speed is zero Bit 6: Drive is powered-up Bit 7: Drive is powered-down Bit 8: Drive ready Bit 9: Inverter enable Bit 10: Setpoint enable Bit 11: Local operation Bit 12: Fault Bit 13: Close holding brakes Bit 14: Open holding brakes Bit 15: Controller enable for the group control CONTRL.ST3900.QS_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	3.2.2 3.2.12 [B6.3]

Parameter number	Description	Range, steps	Werksein-stellung	Section [Plan]
d021 1021d 03FDh	**STATUS_DGN_WRD** Diagnostic word, drive 15 14 | 13 12 | 11 10 | 9 8 7 6 | 5 4 | 3 2 | 1 0 Bit 0: Drive fault Bit 1: Fault from CU Bit 2: Electrical off Bits 3 to 7: Unused Bit 8: Off after inching Bit 9: Off after stop command Bit 10: Off after fast stop Bit 11: No on checkback signal from the basic drive converter Bit 12 to bit 15: Unused CONTRL.C3840.Y_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h		[B1.6]
d022 1022d 03FEh	**STATUS_FLT_WRD** Fault word, drive 15 14 | 13 12 | 11 10 | 9 8 7 6 | 5 4 | 3 2 | 1 0 Bit 0: Communications error, CB Bit 1: Communications error, CU Bit 2: Fault, converter checkback signal Bit 3: Fault from the group control Bit 4: Communications error, peer-to-peer Bit 5: External fault Bit 6: Overspeed, positive Bit 7: Overspeed, negative Bit 8: Anti-stall protection Bits 9 to 15: 0 CONTRL.F4960.Y_T4 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h		1.6 3.2.11 [B5.7]
d023 1023d 03FFh	**STATUS_WRN_WRD** Alarm word, drive 15 14 | 13 12 | 11 10 | 9 8 7 6 | 5 4 | 3 2 | 1 0 Bit 0: Alarm from the CB communications Bit 1: Alarm from the CU communications Bit 2: Alarm, converter checkback signal Bit 3: Alarm from the group control Bit 4: Alarm from the peer-to-peer communications Bit 5: Alarm, external fault Bit 6, 7: 0 Bit 8: Alarm, anti-stall protection Bits 9 to 14: 0 Bit 15: External alarm CONTRL.ST3350.QS_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h		3.2.13 [B6.7]

Parameter number	Description	Range, steps	Werksein-stellung	Section [Plan]
d024 1024d 0400h	**STATUS_OFF_WRD** Shutdown conditions, drive 15 14 | 13 12 | 11 10 | 9 8 7 6 | 5 4 | 3 2 | 1 0 Bit 0: Fault, drive Bit 1: Fault from the CU Bit 2: Electrical off Bit 3 to bit 7: Unused Bit 8: Off after inching Bit 9: Off after stop command Bit 10: Off after fast stop Bit 11: No on checkback signal from the basic drive converter Bit 12 to bit 15: Unused CONTRL.BR20.QS_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h		[B1.6]
d025 1025d 0401h	**STATUS_OUT_MP1** Output, motorized potentiometer 1 Setpoint from the motorized potentiometer. MOTPOT.M320.Y2_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%		[A10.4]
d026 1026d 0402h	**STATUS_OUT_MP2** Output, motorized potentiometer 2 Setpoint from the motorized potentiometer. MOTPOT.M520.Y2_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%		[A10.8]
d027 to 029	(unused)			
d030 1030d 0406h	**STATUS_FTS_TEC** Selected smoothing, technological actual value The smoothing time constant for the technological actual value filter selected by the parameter changeover. TREG.P20.Y_T5 SIMADYN D:R2 PKW-TYP:O4	20[ms]...327 680[ms]		3.3.4 6.3.4.4 [C2.2]
d031 1031d 0407h	**STATUS_GNS_TEC** Effective gain, technological controller Technology controller gain selected by the parameter changeover. TREG.P30.Y_T5 SIMADYN D:E2 PKW-TYP:I4	-256...255.9921875 0.0078125		3.3.4 6.3.4.4 [C2.2]
d032 1032d 0408h	**STATUS_TRS_TEC** Selected integral action time, technological controller Integral action time for the technological controller selected by the parameter changeover. TREG.P40.Y_T5 SIMADYN D:R2 PKW-TYP:O4	20[ms]...327 680[ms]		3.3.4 6.3.4.4 [C2.2]
d033 1033d 0409h	**STATUS_DTS_TEC** Selected derivative action time, technological controller The derivative action time for the technological controller selected by the parameter changeover. TREG.P50.Y_T5 SIMADYN D:R2 PKW-TYP:O4	20[ms]...327 680[ms]		3.3.4 6.3.4.4 [C2.2]
d034 1034d 040Ah	**STATUS_REF_TEC** Technological setpoint after the ramp-function generator Technological setpoint received from the setpoint ramp-function generator. TREG.T450.Y_T2 SIMADYN D:N2 PKW-TYP:	-200.000%...199.993% 0.006%		3.3.2 [C1.7]

Parameter number	Description	Range, steps	Werksein-stellung	Section [Plan]
d035 1035d 040Bh	**STATUS_ACT_TEC** Technological actual value after smoothing Offset-compensated and smoothed technological actual value. TREG.T310.Y_T2 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%		[C2.3]
d036 1036d 040Ch	**STATUS_REG_TEC** Output, technological controller Technological controller output signal (proportional- + integral component). TREG.T650.Y_T2 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%		3.3.4 [C2.6]
d037 1037d 040Dh	**STATUS_KPA_TEC** Factor kp adaption Process quantity-dependent value which must be multiplied by the gain selected by the parameter changeover before it becomes effective as controller gain. TREG.T653.Y_T2 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%		[C2.4]
d038 1038d 040Eh	**STATUS_TPC_TEC** Technological pre-control Technological setpoint, multiplied by an adaption factor which is then added to the controller output. Used as pre-control torque for closed-loop tension controls. TREG.T725.Y2_T2 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%		3.3.4 [C2.7]
d039 1039d 040Fh	**STATUS_VEL_TEC** Technological line speed influence Influence of the technological controller on the line speed setpoint for speed correction controls. TREG.T745.Y2_T2 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%		[C2.8]
d040 to 044	(Unused)			
d045 1045d 0415h	**STATUS_REF_VEL** Main setpoint Selected and adapted value which serves as line speed setpoint for the drive (machine setpoint or setpoint from the previous group). SETPNT.S1020.Y_T1 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%		3.4.1 [D1.2]
d046 1046d 0416h	**STATUS_MAC_RGE** Output, machine ramp-function generator Line speed setpoint from the machine ramp-function generator. SETPNT.S3100.Y_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%		3.4.2 6.3.3.3 [D1.4]
d047 1047d 0417h	**STATUS_SRT_VEL** Ratio setpoint Factor, with which the line speed setpoint is multiplied for the drive (or also divided) in order to compensate for plastic length changes (stretching or shrinking). SETPNT.S3020.Y_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%		3.4.3 6.3.3.4 [D1.2]
d048 1048d 0418h	**STATUS_RFS_VEL** Main setpoint with ratio Line speed setpoint corrected by a ratio. SETPNT.S1210.Y_T1 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%		3.4.3 6.3.3.4 [D1.6]

Parameter number	Description	Range, steps	Werksein-stellung	Section [Plan]

d049 1049d 0419h	**STATUS_RFP_VEL** Main setpoint with ratio and slack take-up/slack-off Line speed setpoint corrected by a ratio with active supplementary signals to reduce sag (slack take-up) or for excessive web tension (slack-off). SETPNT.S1220.Y_T1 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	3.4.4 [D1.8]
d050 1050d 041Ah	**STATUS_RFA_VEL** Supplementary setpoint Additive supplementary signal to the corrected drive line speed setpoint. SETPNT.S1070.Y_T1 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	3.4.5 [D2.2]
d051 1051d 041Bh	**STATUS_RFT_VEL** Total setpoint with supplementary signal and technological controller Total line speed setpoint of the drive after the influences of the supplementary setpoint and technological controller have been added. SETPNT.S1230.Y_T1 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	3.4.5 [D2.3]
d052 1052d 041Ch	**STATUS_LOC_REF** Local setpoint Effective setpoint of the local modes. SETPNT.S3310.Y_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	3.4.6 [D2.4]
d053 1053d 041Dh	**STATUS_RFL_VEL** Line speed setpoint after the triggerable ramp-function generator Line speed setpoint for the drive, which is generated from the internal ramp-function generator. SETPNT.S1400.Y_T1 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	3.4.7 [D2.5]
d054 1054d 041Eh	**STATUS_CMP_VEL** Compensation setpoint Supplementary line speed setpoint for load equalization with droop. SETPNT.S3070.Y_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	[D2.5]
d055 1055d 041Fh	SETPNT.S3530.Y_T3 **STATUS_BIS_VEL** Bias setpoint Direct speed setpoint for the bias during load equalization. SETPNT.S3530.Y_T3 SIMADYN:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	3.4.11 [D2.7]
d056 1056d 0420h	**STATUS_RFF_VEL** Total setpoint with compensation, smoothed Line speed setpoint for the drive, which is corrected with the diameter(/gearbox factor). SETPNT.S1505.Y_T1 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	3.4.9 [D2.6]
d057 1057d 0421h	**STATUS_REF_RPM** Speed setpoint, smoothed with bias Speed setpoint, which is sent to the drive. SETPNT.S1520.Y_T1 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	3.4.11 [D2.7]
d058 to 064	(Unused)		

Parameter number	Description	Range, steps	Werksein-stellung	Section [Plan]
d065 1065d 0429h	**STATUS_FRC_TRQ** Frictional torque Speed-dependent frictional torque to compensate for constant losses. TORQ.T400.Y_T4 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%		3.5.1 6.3.3.12 [E1.3]
d066 1066d 042Ah	**STATUS_ADD_TRQ** Supplementary torque Additive supplementary torque to the drive torque setpoint. TORQ.T12.Y2_T1 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%		[E1.3]
d067 1067d 042Bh	**STATUS_CLC_ACC** Differentiation result Value, which is obtained by differentiating the speed signal which can then be used as acceleration setpoint. TORQ.T24.Y_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%		6.3.3.13 [E1.5]
d068 1068d 042Ch	**STATUS_ACC_TRQ** Accelerating torque Product of the acceleration setpoint and moment of inertia. TORQ.T50.Y2_T1 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%		3.5.2 [E1.5]
d069 1069d 042Dh	**STATUS_TOT_TRQ** Summed torque Torque setpoint from the friction-, acceleration-, supplementary torque and technological controller influence. TORQ.T60.Y_T1 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%		3.5.3 [E1.57
d070 1070d 042Eh	**STATUS_SLV_TRQ** Torque setpoint, slave Product of the torque setpoint of the master drive and load component of the slave. TORQ.T1000.Y2_T1 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%		3.5.4 [E2.2]
d071 1071d 042Fh	**STATUS_SLT_TRQ** Torque setpoint, slave with friction and acceleration Torque setpoint from the friction-, acceleration- and load distribution torque for use as torque limit for load distribution operation. TORQ.T1010.Y_T1 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%		[E2.3]
d072 1072d 0430h	**STATUS_BRK_TRQ** Braking characteristic Actual braking torque from the characteristic. TORQ.T120.Y_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%		3.5.5 6.3.3.14 [E2.3]
d073 1073d 0431h	**STATUS_RMP_TRQ** Effective changeover time for the torque ramp-function generator Actual changeover time of the triggerable torque ramp-function generator when braking and for load distribution. TORQ.T85.Y_T3 SIMADYN D:R2 PKW-TYP:O4	40[ms]...655 360[ms]		3.5.6 [E2.7]
d074 to 079	(Unused)			

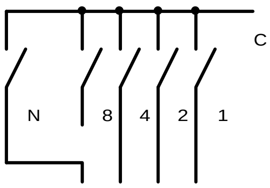
Parameter number	Description	Range, steps	Werksein-stellung	Section [Plan]
d080 1080d 0438h	**STATUS_SST_WRD** Selectable status word 15 14 | 13 12 | 11 10 | 9 8 7 6 | 5 4 | 3 2 | 1 0 The individual status word bits can be assigned by the user as required. OUTPUT.ST3180.QS_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h		3.1.14 [A9.3]
d081 1081d 0439h	**STATUS_DSP_PA1** Monitoring parameter 1 Parameter to monitor a process quantity, which can be selected using H875. OUTPUT.S5000.Y_T5 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%		3.6.2 [F1.6]
d082 1082d 043Ah	**STATUS_DSP_PA2** Monitoring parameter 2 Parameter to monitor a process quantity, which can be selected using H876. OUTPUT.S5010.Y_T5 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%		3.6.2 [F1.6]
d083 1083d 043Bh	**STATUS_DSP_PA3** Monitoring parameter 3 Parameter to monitor a process quantity, which can be selected using H877. OUTPUT.S5020.Y_T5 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%		3.6.2 [F1.6]
d084 1084d 043Ch	**STATUS_DSP_PA4** Monitoring parameter 4 (Hex) 15 14 | 13 12 | 11 10 | 9 8 7 6 | 5 4 | 3 2 | 1 0 Parameter to monitor a process quantity, which can be selected using H878. OUTPUT.S5030.Y_T5 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h		3.6.2 [F1.6]
d085 1085d 043Dh	**STATUS_BIN_OUT** Status, binary outputs 15 14 | 13 12 | 11 10 | 9 8 7 6 | 5 4 | 3 2 | 1 0 Bit statuses for output at the binary outputs. Bit 0: Binary output 1 Bit 1: Binary output 2 Bit 2: Binary output 3 Bit 3: Binary output 4 Bit 4: Binary output 5 Bit 5: Binary output 6 Bit 6: Binary output 7 Bit 7: Binary output 8 Bits 8 to 15: 0 OUTPUT.BQ3110.QS_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h		[A4.6]
d086 1086d 043Eh	**STATUS_KPA_NRG** Factor, kp adaption speed controller CU Factor to adapt the proportional gain of the speed controller in the basic drive converter. The effective gain is obtained by multiplying the value set in the basic drive converter by an adaption factor. OUTPUT.KP1010.Y_T1 SIMADYN D:N2 PKW-TYP:I4 (10 = 100%)	-200.000%...199.993% 0.006%		3.1.13 [A8.3]

Parameter number	Description	Range, steps	Werksein-stellung	Section [Plan]
d087 1087d 043Fh	**STATUS_P2P_WD1** Word 1 to peer-to-peer Value, which is at position 1 of the peer-to-peer telegram is sent to the following drive. OUTPUT.PP1010.Y2_T1 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%		3.1.3 [A3.7]
d088 1088d 0440h	**STATUS_P2P_WD2** Word 2 to peer-to-peer Value, at position 2 of the peer-to-peer telegram is sent to the following drive. OUTPUT.PP1110.Y2_T1 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%		3.1.3 [A3.7]
d089 1089d 0441h	**STATUS_P2P_WD3** Word 3 to peer-to-peer Value, at position 3 of the peer-to-peer telegram is sent to the following drive. OUTPUT.PP1210.Y2_T1 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%		3.1.3 [A3.7]
d090 1090d 0442h	**STATUS_P2P_WD4** Word 4 to peer-to-peer Value, at position 4 of the peer-to-peer telegram is sent to the following drive. OUTPUT.PP1310.Y2_T1 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%		3.1.3 [A3.7]
d091 1091d 0443h	**STATUS_P2P_WD5** Word 5 to peer-to-peer Value at position 5 of the peer-to-peer telegram is sent to the following drive. OUTPUT.PP1400.Y_T1 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%		3.1.3 [A3.7]
d092 1092d 0444h	**STATUS_TCU_WD1** Word 1 at CU Value at position 1 of the dual port RAM telegram which is sent to the basic drive converter. Bits 0 to 6: Drive on Bit 7: Acknowledge fault Bits 8 and 9: 0 Bits 10 to 12: 1 Bits 13 and 14: 0 Bit 15: 1 OUTPUT.SD1000.Y_T1 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h		3.1.1 [A1.7]
d093 1093d 0445h	**STATUS_TCU_WD2** Word 2 at CU Value at position 2 of the dual port RAM telegram which is sent to the basic drive converter. OUTPUT.SD1010.Y_T1 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%		3.1.1 [A1.7]

Parameter number	Description	Range, steps	Werksein-stellung	Section [Plan]

d094 1094d 0446h	**STATUS_TCU_WD4** Word 4 at CU 15 14 | 13 12 | 11 10 | 9 8 7 6 | 5 4 | 3 2 | 1 0 Value at position 4 of the dual port RAM telegram which is sent to the basic drive converter. Bit 0: Setpoint channel data set, bit 0 Bit 1: Setpoint channel data set, bit 1 Bit 2: Motor data set, bit 0 Bit 3: Motor data set, bit 1 Bit 4: Fixed setpoint selection, bit 0 Bit 5: Fixed setpoint selection, bit 1 Bit 6: 0 Bit 7: 1 Bit 8: Droop enabled Bit 9: Controller enable Bit 10: 1 Bit 11: 0 Bits 12 and 13: 1 Bits 14 and 15: 0 OUTPUT.SD1030.Y_T1 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	3.1.1 [A1.7]
d095 1095d 0447h	**STATUS_TCU_WD5** Word 5 at CU Value at position 5 of the dual port RAM telegram which is sent to the basic drive converter. OUTPUT.SD1040.Y_T1 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	3.1.1 [A1.7]
d096 1096d 0448h	**STATUS_TCU_WD6** Word 6 at CU Value, at position 6 of the dual port RAM telegram which is sent to the basic drive converter. OUTPUT.SD1050.Y_T1 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	3.1.1 [A1.7]
d097 1097d 0449h	**STATUS_TCU_WD7** Word 7 at CU Value, at position 7 of the dual port RAM telegram which is sent to the basic drive converter. OUTPUT.SD1060.Y_T1 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	3.1.1 [A1.7]
d098 1098d 044Ah	**STATUS_LVM_WRD** Status word, limit value monitor 15 14 | 13 12 | 11 10 | 9 8 7 6 | 5 4 | 3 2 | 1 0 The status word includes the status information of all 4 free limit value monitors. Bit 0: Limit value monitor 1, higher than limit value Bit 1: Limit value monitor 1, same as limit value Bit 2: Limit value monitor 1, lower than limit value Bit 3: Limit value monitor 1, unequal to limit value Bit 4: Limit value monitor 2, higher than limit value Bit 5: Limit value monitor 2, same as limit value Bit 6: Limit value monitor 2, lower than limit value Bit 7: Limit value monitor 2, unequal to limit value Bit 8: Limit value monitor 3, higher than limit value Bit 9: Limit value monitor 3, same as limit value Bit 10: Limit value monitor 3, lower than limit value Bit 11: Limit value monitor 3, unequal to limit value Bit 12: Limit value monitor 4, higher than limit value Bit 13: Limit value monitor 4, same as limit value Bit 14: Limit value monitor 4, lower than limit value Bit 15: Limit value monitor 4, unequal to limit value OUTPUT.GW900.QS_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	3.1.15 [A9.8]
d099	Unused		

Parameter number	Description	Range, steps	Werksein-stellung	Section [Plan]
H101 1101d 044Dh	**LIM_POL_TRQ** Hysteresis, torque polarity change Defines the changeover point for the bias polarity reversal. Refers to the actual motor torque from CU. INPUT.PL10.HY_T2 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	2%	[A1.3]
H102 1102d 044Eh	**MSK_INV_BIN** Mask, binary input inversion Allows 16 binary inputs to be inverted bitwise. Bit 0: Inversion, binary input 1 to Bit 15: Inversion, binary input 15 INPUT.BI40.IS2_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.1.4 [A4.3]
H103 1103d 044Fh	**MSK_ENA_SYS** Mask, system error bit enable Bit 0: Fatal system error Bit 1,2: (unused) Bit 3: Task administration error Bit 4: Monitor error Bit 5: Hardware fault Bit 6: Communications error Bits 7 to 9: (unused) Bit 10: User error Bit 11 to 14: (unused) INPUT.SYF2.IS2_T5 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0429h	3.1.12 [A8.4]
H104 1104d 0450h	**SRC_HBE_SER** Source bit high byte enable byte serial Connector number of the supplying value. INPUT.SR15.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.10 [A7.3]
H105 1105d 0451h	**MSK_HBE_SER** Mask bit high byte enable byte serial Mask to select the controlling bits. Signals the block which is being read-in that the most significant byte of the word is ready for transfer. INPUT.SR15.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.1.10 [A7.3]
H106 1106d 0452h	**ACC_TIM_SER** Acceptance time, byte serial This is the time where a particular byte must remain unchanged in order to be accepted. INPUT.SR20.TC_T3 SIMADYN D:T2 PKW-TYP:O4	0[ms]...655 360[ms] 40[ms]	40[ms]	3.1.10 [A7.4]
H107 1107d 0453h	**NUM_DEC_TWS** Number of decades, decade switch Number decades of the setpoint decade switch. INPUT.SR50.STZ_T4 SIMADYN D:O2 PKW-TYP:O2 (INIT)	2...5 1	4	3.1.9 [A7.4]
H108 1108d 0454h	**REF_FAC_TWS** Normalization factor, decade switch Number, read-in from the decade switch, which should correspond to 100% setpoint. INPUT.SR50.NF_T4 SIMADYN D:O2 PKW-TYP:O2	0...65536 1	100	3.1.9 [A7.4]

Parameter number	Description	Range, steps	Werksein-stellung	Section [Plan]
H109 1109d 0455h	**BCD_TPE_TWS** Coding, BCD decade switch Select, binary-coded-decimal. Setting range of the individual positions: 0...9 : BCD coding: H109=1 0...F : HEX coding: H109=0 INPUT.SR50.BCD_T4 SIMADYN D:B1 PKW-TYP:BOOLEAN	0...1 1	1	3.1.9 [A7.4]
H110 1110d 0456h	**NEG_SGN_TWS** Signed, decade switch When entering positive and negative values, the most significant position only has a -7...+7 range. The sign is attached instead of the most significant bit of this decade:  The contact is closed if the value is to be negative. INPUT.SR50.VZ_T4 SIMADYN D:B1 PKW-TYP:BOOLEAN	0...1 1	0	3.1.9 [A7.4]
H111 1111d 0457h	**SRC_BT0_TWS** Source, bit 0 from the decade switch Connector number of the supplying value. INPUT.SR491.NC_T4 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.9 [A7.3]
H112 1112d 0458h	**MSK_BT0_TWS** Mask, bit 0 from the decade switch Mask to select the controlling bits. Input which is used to read-in 1 of the decades via control lines decoupled through diodes. INPUT.SR491.MSK_T4 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.1.9 [A7.3]
H113 1113d 0459h	**SRC_BT1_TWS** Source, bit 1 from the decade bit Connector number of the supplying value. INPUT.SR492.NC_T4 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.9 [A7.3]
H114 1114d 045Ah	**MSK_BT1_TWS** Mask, bit 1 from the decade switch Mask to select the controlling bits. Input which is used to read-in 1 of the decades via control lines decoupled through diodes. INPUT.SR492.MSK_T4 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.1.9 [A7.3]
H115 1115d 045Bh	**SRC_BT2_TWS** Source, bit 2 from the decade switch Connector number of the supplying value. INPUT.SR493.NC_T4 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.9 [A7.3]
H116 1116d 045Ch	**MSK_BT2_TWS** Mask, bit 2 from the decade switch Mask to select the controlling bits. Input which is used to read-in 4 of the decades via control lines decoupled through diodes. INPUT.SR493.MSK_T4 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.1.9 [A7.3]

Parameter number	Description	Range, steps	Werksein-stellung	Section [Plan]
H117 1117d 045Dh	**SRC_BT3_TWS** Source, bit 3 from the decade switch Connector number of the supplying value. INPUT.SR494.NC_T4 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.9 [A7.3]
H118 1118d 045Eh	**MSK_BT3_TWS** Mask, bit 3 from the decade switch Mask to select the controlling bits. Input which is used to read-in 8 of the decades via control lines decoupled through diodes. INPUT.SR494.MSK_T4 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.1.9 [A7.3]
H119 1119d 045Fh	**SRC_DAK_TWS** Source bit, data transfer from the decade switch Connector number of the supplying value. INPUT.SR495.NC_T4 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.9 [A7.3]
H120 1120d 0460h	**MSK_DAK_TWS** Mask bit, data transfer from the decade switch Mask to select the controlling bit. Input which is used to enter the value, selected by the decade switch. INPUT.SR495.MSK_T4 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.1.9 [A7.3]
H121 1121d 0461h	**MUL_ANA_IN1** Gain, analog input 1 Value with which the signal, received from the analog input is multiplied (100% at 5V). The following is valid: 100%x100%=100% INPUT.AI20.X2_T1 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	50%	3.1.6 [A5.2]
H122 1122d 0462h	**OFF_ANA_IN1** Offset, analog input 1 Value, which is added to the corrected signal. INPUT.AI30.X2_T1 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.1.6 [A5.2]
H123 1123d 0463h	**FLT_ANA_IN1** Smoothing, analog input 1 Time constant to smooth the analog signal. INPUT.AI40.T_T1 SIMADYN D:R2 PKW-TYP:O4	5[ms]...81 920[ms]	5[ms]	3.1.6 [A5.3]
H124 1124d 0464h	**MUL_ANA_IN2** Gain, analog input 2 Value with which the signal, received from the analog input is multiplied (100% at 5V). The following is valid: 100%x100%=100% INPUT.AI60.X2_T1 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	50%	3.1.6 [A5.2]
H125 1125d 0465h	**OFF_ANA_IN2** Offset, analog input 2 Value, which is added to the corrected signal. INPUT.AI70.X2_T1 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.1.6 [A5.2]
H126 1126d 0466h	**FLT_ANA_IN2** Smoothing, analog input 2 Time constant to smooth the analog signal. INPUT.AI80.T_T1 SIMADYN D:R2 PKW-TYP:O4	5[ms]...81 920[ms]	5[ms]	3.1.6 [A5.3]

Parameter number	Description	Range, steps	Werksein-stellung	Section [Plan]
H127 1128d 0467h	**MUL_ANA_IN3** Gain, analog input 3 Value with which the signal, received from the analog input is multiplied (100% at 5V). The following is valid: 100%x100%=100% INPUT.AI100.X2_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	50%	3.1.6 [A5.2]
H128 1128d 0468h	**OFF_ANA_IN3** Offset, analog input 3 Value, which is added to the corrected signal. INPUT.AI110.X2_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.1.6 [A5.2]
H129 1129d 0469h	**FLT_ANA_IN3** Smoothing, analog input 3 Time constant to smooth the analog signal. INPUT.AI120.T_T3 SIMADYN D:R2 PKW-TYP:O4	40[ms]...655 360[ms]	40[ms]	3.1.6 [A5.3]
H130 1130d 046Ah	**MUL_ANA_IN4** Gain, analog input 4 Value with which the signal, received from the analog input is multiplied (100% at 5V). The following is valid: 100%x100%=100% INPUT.AI140.X2_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	50%	3.1.6 [A5.2]
H131 1131d 046Bh	**OFF_ANA_IN4** Offset, analog input 4 Value, which is added to the corrected signal. INPUT.AI150.X2_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.1.6 [A5.2]
H132 1132d 046Ch	**FLT_ANA_IN4** Smoothing, analog input 4 Time constant to smooth the analog signal. INPUT.AI160.T_T3 SIMADYN D:R2 PKW-TYP:O4	40[ms]...655 360[ms]	40[ms]	3.1.6 [A5.3]
H133 1133d 046Dh	**MUL_ANA_IN5** Gain, analog input 5 Value with which the signal, received from the analog input is multiplied (100% at 5V). The following is valid: 100%x100%=100% INPUT.AI180.X2_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	50%	3.1.6 [A5.2]
H134 1134d 046Eh	**OFF_ANA_IN5** Offset, analog input 5 Value, which is added to the corrected signal. INPUT.AI190.X2_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.1.6 [A5.2]
H135 1135d 046Fh	**FLT_ANA_IN5** Smoothing, analog input 5 Time constant to smooth the analog signal. INPUT.AI200.T_T3 SIMADYN D:R2 PKW-TYP:O4	40[ms]...655 360[ms]	40[ms]	3.1.6 [A5.3]
H136 1136d 0470h	**MUL_ANA_IN6** Gain, analog input 6 Value with which the signal, received from the analog input is multiplied (100% at 5V). The following is valid: 100%x100%=100% INPUT.AI220.X2_T4 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	50%	3.1.6 [A5.2]

Parameter number	Description	Range, steps	Werksein-stellung	Section [Plan]
H137 1137d 0471h	**OFF_ANA_IN6** Offset, analog input 6 Value, which is added to the corrected signal. INPUT.AI230.X2_T4 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.1.6 [A5.2]
H138 1138d 0472h	**FLT_ANA_IN6** Smoothing, analog input 6 Time constant to smooth the analog signal. INPUT.AI240.T_T4 SIMADYN D:R2 PKW-TYP:O4	160[ms]..2 621 440[ms]	160[ms]	3.1.6 [A5.3]
H139 1139d 0473h	**MUL_ANA_IN7** Gain, analog input 7 Value with which the signal, received from the analog input is multiplied (100% at 5V). The following is valid: 100%x100%=100% INPUT.AI260.X2_T4 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	50%	3.1.6 [A5.2]
H140 1140d 0474h	**OFF_ANA_IN7** Offset, analog input 7 Value, which is added to the corrected signal. INPUT.AI270.X2_T4 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.1.6 [A5.2]
H141 1141d 0475h	**FLT_ANA_IN7** Smoothing, analog input 7 Time constant to smooth the analog signal. INPUT.AI280.T_T4 SIMADYN D:R2 PKW-TYP:O4	160[ms]..2 621 440[ms]	160[ms]	3.1.6 [A5.3]
H142 1142d 0476h	**PPR_DIG_TC1** Pulse number, pulse encoder 1 Number of pulses per revolution of the digital pulse encoder at the tachometer input. INPUT.TA10.PR1_T1 SIMADYN D:O2 PKW-TYP:O2 (INIT)	0...32767 1	500	3.1.8 [A6.3]
H143 1143d 0477h	**RPM_DIG_TC1** Rated speed, pulse encoder 1 Motor shaft speed in [RPM], at which the pulse evaluation must supply 100% actual value. INPUT.TA10.RS1_T1 SIMADYN D:I2 PKW-TYP:I2 (INIT)	-32768...32767 1	500	3.1.8 [A6.3]
H144 1144d 0478h	**PPR_DIG_TC2** Pulse number, pulse encoder 2 Number of pulses per revolution of the digital pulse encoder at the tachometer input. INPUT.TA10.PR2_T1 SIMADYN D:O2 PKW-TYP:O2 (INIT)	0...32767 1	500	3.1.8 [A6.3]
H145 1145d 0479h	**RPM_DIG_TC2** Rated speed, pulse encoder 2 Motor shaft speed in [RPM], at which the pulse evaluation must supply 100% actual value. INPUT.TA10.RS2_T1 SIMADYN D:I2 PKW-TYP:I2 (INIT)	-32768...32767 1	500	3.1.8 [A6.3]
H146 1146d 047Ah	**SRC_LEN_RS1** Source bit, reset length counter 1 Connector number of the supplying value. INPUT.TA1.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.8 [A6.3]

Parameter number	Description	Range, steps	Werksein-stellung	Section [Plan]
H147 1147d 047Bh	**MSK_LEN_RS1** Mask bit, reset length counter 1 Mask to select the controlling bits. In this case, the length counter is set to zero. INPUT.TA1.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.1.8 [A6.3]
H148 1148d 047Ch	**SRC_LEN_RS2** Source bit, reset length counter 2 Connector number of the supplying value. INPUT.TA2.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.8 [A6.3]
H149 1149d 047Dh	**MSK_LEN_RS2** Mask bit, reset length counter 2 Mask to select the controlling bits. In this case, the length counter is set to zero. INPUT.TA2.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.1.8 [A6.3]
H150 1150d 047Eh	**SRC_LEN_ST1** Source bit, hold length counter 1 Connector number of the supplying value. INPUT.TA3.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.8 [A6.3]
H151 1151d 047Fh	**MSK_LEN_ST1** Mask bit, hold length counter 1 Mask to select the controlling bits. It holds the length counter to the actual counter status. INPUT.TA3.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.1.8 [A6.3]
H152 1152d 0480h	**SRC_LEN_ST2** Source bit, hold length counter 2 Connector number of the supplying value. INPUT.TA4.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.8 [A6.3]
H153 1153d 0481h	**MSK_LEN_ST2** Mask bit, hold length counter 2 Mask to select the controlling bits. It holds the length counter at the actual counter status. INPUT.TA4.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.1.8 [A6.3]
H154 1154d 0482h	**FLT_SPD_AC1** Smoothing, tachometer actual value 1 Time constant of the 1st order filter with which the tachometer input speed actual value is filtered. INPUT.TA12.T_T1 SIMADYN D:R2 PKW-TYP:O4	40[ms]...655 360[ms]	40[ms]	3.1.8 [A6.5]
H155 1155d 0483h	**FLT_SPD_AC2** Smoothing, tachometer actual value 2 Time constant of the 1st order filter with which the tachometer input speed actual value is filtered. INPUT.TA14.T_T1 SIMADYN D:R2 PKW-TYP:O4	40[ms]...655 360[ms]	40[ms]	3.1.8 [A6.5]
H156 1156d 0484h	**SRC_RPM_ACT** Source, speed actual value for V-act., internal Connector number of the supplying value. INPUT.TA100.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	41	3.1.11 6.3.3.1 [A8.1]
H157 1157d 0485h	**SRC_DIA_COR** Source, diameter/gearbox correction Connector number of the supplying value. INPUT.TA110.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	1	3.1.11 3.4.10 6.3.3.10 [A8.1]

Parameter number	Description	Range, steps	Werksein-stellung	Section [Plan]
H158 1158d 0486h	**LIM_SPD_ZRO** Window width, zero line speed signal Min. drive speed so that the zero line speed signal becomes inactive. INPUT.TA130.L_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0.5%	3.1.11 3.5.5 6.3.3.13 [A8.4]
H159 1159d 0487h	**HYS_SPD_ZRO** Hysteresis, zero speed signal Speed, by which the speed must fall below the threshold so that the zero speed signal becomes active again and the drive is switched off after OFF command. INPUT.TA130.HY_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0.1%	3.1.11 [A8.4]
H160 1160d 0488h	**RNG_LEN_CT1** Range selection, length measurement 1 For specific geometrical data (roll diameter, gearbox), a certain number of pulses, which is obtained by internal quadrupling and counting, correspond to a certain distance. The following is valid: $d \times \Pi = 4 \times i \times p$ d...Roll diameter, p...Tachometer pulse number, i...Gearbox factor n_{MOT}/n_{roll}) The counted length actual value is 100%, if the specified number of pulses have been counted (after quadrupling): 0 ... 16384x65536 1 ... 8192x65536 2 ... 4096x65536 3 ... 2048x65536 4 ... 1024x65536 5 ... 512x65536 6 ... 256x65536 7 ... 128x65536 8 ... 64x65536 9 ... 32x65536 10 ... 16x65536 11 ... 8x65536 12 ... 4x65536 13 ... 2x65536 14 ... 65536 15 ... 32768 16 ... 16384 17 ... 8192 18 ... 4096 19 ... 2048 20 ... 1024 21 ... 512 22 ... 256 23 ... 128 24 ... 64 25 ... 32 26 ... 16 27 ... 8 28 ... 4 29 ... 2 30 ... 1 INPUT.TA20.XD_T3 SIMADYN D:O2 PKW-TYP:O2	0...30 1	0	3.1.8 [A6.5]
H161 1161d 0489h	**SRC_DIA_CR1** Source, correction factor length meas. 1 Connector number of the supplying value. For measuring rolls where the diameter changes, a correction factor can be entered for length measurement. INPUT.TA22.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	1	3.1.8 [A6.5]

Parameter number	Description	Range, steps	Werksein-stellung	Section [Plan]
H162 1162d 048Ah	**SRC_LEN_RF1** Source, length setpoint 1 Connector number of the supplying value. The setpoint normalization is defined by that of the actual value (refer to H160). INPUT.TA28.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.8 [A6.5]
H163 1163d 048Bh	**RNG_LEN_CT2** Range selection, length measurement 2 (refer to parameter H160). INPUT.TA40.XD_T3 SIMADYN D:O2 PKW-TYP:O2	0...30 1	0	3.1.8 [A6.5]
H164 1164d 048Ch	**SRC_DIA_CR2** Source, correction factor length meas. 2 Connector number of the supplying value. For measuring rolls where the diameter changes, a correction factor can be entered for length measurement. INPUT.TA42.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	1	3.1.8 [A6.5]
H165 1165d 048Dh	**SRC_LEN_RF2** Source, length setpoint 2 Connector number of the supplying value. The setpoint normalization is defined by that of the actual value (refer to H163). INPUT.TA48.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.8 [A6.5]
H166 1166d 048Eh	**REF_FIX_003** Fixed setpoint 3 (connector 003) Fixed setpoint which can be defined by the user. INPUT.FP5030.X_T5 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.6.1 [F1.1]
H167 1167d 048Fh	**REF_FIX_004** Fixed setpoint 4 (connector 004) Fixed setpoint which can be defined by the user. INPUT.FP5040.X_T5 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.6.1 [F1.1]
H168 1168d 0490h	**REF_FIX_005** Fixed setpoint 5 (connector 005) Fixed setpoint which can be defined by the user. INPUT.FP5050.X_T5 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.6.1 [F1.1]
H169 1169d 0491h	**REF_FIX_006** Fixed setpoint 6 (connector 006) Fixed setpoint which can be defined by the user. INPUT.FP5060.X_T5 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.6.1 [F1.1]
H170 1170d 0492h	**REF_FIX_007** Fixed setpoint 7 (connector 007) Fixed setpoint which can be defined by the user. INPUT.FP5070.X_T5 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.6.1 [F1.1]
H171 1171d 0493h	**REF_FIX_008** Fixed setpoint 8 (connector 008) Fixed setpoint which can be defined by the user. INPUT.FP5080.X_T5 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.6.1 [F1.1]
H172 1172d 0494h	**REF_FIX_009** Fixed setpoint 9 (connector 009) Fixed setpoint which can be defined by the user. INPUT.FP5090.X_T5 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.6.1 [F1.1]

Parameter number	Description	Range, steps	Werksein-stellung	Section [Plan]
H173 1173d 0495h	**REF_FIX_010** Fixed setpoint 10 (connector 010) Fixed setpoint which can be defined by the user. INPUT.FP5100.X_T5 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.6.1 [F1.1]
H174 1174d 0496h	**REF_FIX_011** Fixed setpoint 11 (connector 011) Fixed setpoint which can be defined by the user. INPUT.FP5110.X_T5 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.6.1 [F1.1]
H175 1175d 0497h	**REF_FIX_012** Fixed setpoint 12 (connector 012) Fixed setpoint which can be defined by the user. INPUT.FP5120.X_T5 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.6.1 [F1.1]
H176 1176d 0498h	**REF_FIX_013** Fixed setpoint 13 (connector 013) Fixed setpoint which can be defined by the user. INPUT.FP5130.X_T5 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.6.1 [F1.1]
H177 1177d 0499h	**REF_FIX_014** Fixed setpoint 14 (connector 014) Fixed setpoint which can be defined by the user. INPUT.FP5140.X_T5 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.6.1 [F1.1]
H178 1178d 049Ah	**REF_FIX_015** Fixed setpoint 15 (connector 015) Fixed setpoint which can be defined by the user. INPUT.FP5150.X_T5 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.6.1 [F1.1]
H179 1179d 049Bh	**REF_FIX_016** Fixed setpoint 16 (connector 016) Fixed setpoint which can be defined by the user. INPUT.FP5160.X_T5 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.6.1 [F1.3]
H180 1180d 049Ch	**REF_FIX_017** Fixed setpoint 17 (connector 017) Fixed setpoint which can be defined by the user. INPUT.FP5170.X_T5 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.6.1 [F1.3]
H181 1181d 049Dh	**REF_FIX_018** Fixed setpoint 18 (connector 018) Fixed setpoint which can be defined by the user. INPUT.FP5180.X_T5 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.6.1 [F1.3]
H182 1182d 049Eh	**REF_FIX_019** Fixed setpoint 19 (connector 019) Fixed setpoint which can be defined by the user. INPUT.FP5190.X_T5 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.6.1 [F1.3]
H182 1183d 049Fh	**REF_FIX_020** Fixed setpoint 20 (connector 200) Fixed setpoint which can be defined by the user. INPUT.FP5200.X_T5 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.6.1 [F1.3]
H184 1184d 04A0h	**REF_FIX_021** Fixed setpoint 21 (connector 201) Fixed setpoint which can be defined by the user. INPUT.FP5201.X_T5 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.6.1 [F1.3]

Parameter number	Description	Range, steps	Werksein-stellung	Section [Plan]
H185 1185d 04A1h	**REF_FIX_022** Fixed setpoint 22 (connector 202) Fixed setpoint which can be defined by the user. INPUT.FP5202.X_T5 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.6.1 [F1.3]
H186 1186d 04A2h	**REF_FIX_023** Fixed setpoint 23 (connector 203) Fixed setpoint which can be defined by the user. INPUT.FP5203.X_T5 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.6.1 [F1.3]
H187 1187d 04A3h	**REF_FIX_024** Fixed setpoint 24 (connector 204) Fixed setpoint which can be defined by the user. INPUT.FP5204.X_T5 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.6.1 [F1.3]
H188 1188d 04A4h	**REF_FIX_025** Fixed setpoint 25 (connector 205) Fixed setpoint which can be defined by the user. INPUT.FP5205.X_T5 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.6.1 [F1.3]
H189 1189d 04A5h	**REF_FIX_026** Fixed setpoint 26 (connector 206) Fixed setpoint which can be defined by the user. INPUT.FP5206.X_T5 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.6.1 [F1.3]
H190 1190d 04A6h	**REF_FIX_027** Fixed setpoint 27 (connector 207) Fixed setpoint which can be defined by the user. INPUT.FP5207.X_T5 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.6.1 [F1.3]
H191 1191d 04A7h	**REF_FIX_028** Fixed setpoint 28 (connector 208) Fixed setpoint which can be defined by the user. INPUT.FP5208.X_T5 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.6.1 [F1.3]
H192 1192d 04A8h	**REF_FIX_029** Fixed setpoint 29 (connector 209) Fixed setpoint which can be defined by the user. INPUT.FP5209.X_T5 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.6.1 [F1.3]
H193 1193d 04A9h	**REF_FIX_030** Fixed setpoint 30 (connector 210) Fixed setpoint which can be defined by the user. INPUT.FP5210.X_T5 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.6.1 [F1.3]
H194 1194d 04AAh	**REF_FIX_031** Fixed setpoint 31 (connector 211) Fixed setpoint which can be defined by the user. INPUT.FP5211.X_T5 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.6.1 [F1.5]
H195 1195d 04ABh	**REF_FIX_032** Fixed setpoint 32 (connector 212) Fixed setpoint which can be defined by the user. INPUT.FP5212.X_T5 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.6.1 [F1.5]
H196 1196d 04ACh	**REF_FIX_033** Fixed setpoint 33 (connector 213) Fixed setpoint which can be defined by the user. INPUT.FP5213.X_T5 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.6.1 [F1.5]

Parameter number	Description	Range, steps	Werksein-stellung	Section [Plan]
H197 1197d 04ADh	**BD_RATE_P2P** Baud rate for a peer-to-peer coupling The following baud rates can be set: Value 0: 300 baud Value 1: 600 baud Value 2: 1200 baud Value 3: 2400 baud Value 4: 4800 baud Value 5: 9600 baud Value 6: 19200 baud Value 7: 38400 baud **Please refere also to note 3, Section 6.4.3** @CMT1.PEER.BDR_T4 SIMADYN D:O2 PKW-TYP:O2 (INIT)	0...7 1	7	3.1.3 [F1.5]
H198 1198d 04AEh	**LEN_RXD_P2P** Number of receive words, peer-to-peer Adapting the telegram length for a peer-to-peer coupling in the receive direction INPUT.RXPP.LT_T1 SIMADYN D:O2 PKW-TYP:O2 (INIT)	0...32 1	5	3.1.3 [A3.1]
H199 1199d 04AFh	**LEN_TXD_P2P** Number of transmit words, peer-to-peer Adapting the telegram length for a peer-to-peer coupling in the transmit direction OUTPUT.PP100.LT_T1 SIMADYN D:O2 PKW-TYP:O2 (INIT)	0...32 1	5	3.1.3 [F1.5]
H200 1200d 04B0h	**SRC_DRV_ONC** Source on Connector number of the supplying value. CONTRL.P3000.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.2.1 3.2.2 6.3.2.1 [B1.1]
H201 1201d 04B1h	**MSK_DRV_ONC** Mask on Mask to select the controlling bits. It issues the start request and powers-up the drive. CONTRL.P3000.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.2.1 3.2.2 6.3.2.1 [B1.1]
H202 1202d 04B2h	**SRC_DRV_NNS** Source, no standard stop Connector number of the supplying value. CONTRL.P3010.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.2.6 6.3.2.2 [B2.1]
H203 1203d 04B3h	**MSK_DRV_NNS** Mask, no standard stop Mask to select the controlling bits. A zero signal causes the drive to decelerate down to standstill along the internal ramp, followed by electrical shutdown. CONTRL.P3010.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.2.6 6.3.2.2 [B2.1]
H204 1204d 04B4h	**SRC_DRV_NCS** Source, no electrical off Connector number of the supplying value. CONTRL.P3020.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.2.6 6.3.2.2 [B2.1]

Parameter number	Description	Range, steps	Werksein-stellung	Section [Plan]
H205 1205d 04B5h	**MSK_DRV_NCS** Mask, no electrical off Mask to select the controlling bits. A zero signal inhibits the controller and instantaneously shuts down the drive electrically. CONTRL.P3020.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.2.6 6.3.2.4 [B2.1]
H206 1206d 04B6h	**SRC_DRV_NFS** Source, no fast stop Connector number of the supplying value. CONTRL.P3030.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.2.6 6.3.2.3 [B2.1]
H207 1207d 04B7h	**MSK_DRV_NFS** Mask, no fast stop Mask to select the controlling bits. A zero signal switches the speed setpoint to zero and controls the torque limit down to standstill. The drive is then shutdown. CONTRL.P3030.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.2.6 6.3.2.3 [B2.1]
H208 1208d 04B8h	**SRC_DRV_IVE** Source, inverter enable Connector number of the supplying value. CONTRL.P3040.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	2	3.2.8 6.3.2.5 [B3.1]
H209 1209d 04B9h	**MSK_DRV_IVE** Mask, inverter enable Mask to select the controlling bits. This permits the inverter to be enabled after the drive has been powered-up. CONTRL.P3040.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0001h	3.2.8 6.3.2.5 [B3.1]
H210 1210d 04BAh	**SRC_DRV_RGE** Source, ramp-function generator enable Connector number of the supplying value. CONTRL.P3050.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	2	3.4.2 [D1.1]
H211 1211d 04BBh	**MSK_DRV_RGE** Mask, ramp-function generator enable Mask to select the controlling bits. It enables the machine ramp-function generator. The ramp-function generator is set to zero if the signal is inactive. CONTRL.P3050.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0001h	3.4.2 [D1.1]
H212 1212d 04BCh	**SRC_DRV_RGS** Source, ramp-function generator start Connector number of the supplying value. CONTRL.P3060.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	2	3.4.2 [D1.1]
H213 1213d 04BDh	**MSK_DRV_RGS** Mask, ramp-function generator start Mask to select the controlling bits. The machine ramp-function generator is held (acceleration is interrupted) if the signal is inactive. CONTRL.P3060.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0001h	3.4.2 [D1.1]

Parameter number	Description	Range, steps	Werksein-stellung	Section [Plan]
H214 1214d 04BEh	**SRC_DRV_SPE** Source, setpoint enable Connector number of the supplying value. CONTRL.P3070.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	2	3.2.8 6.3.2.6 [B3.1]
H215 1215d 04BFh	**MSK_DRV_SPE** Mask, setpoint enable Mask to select the controlling bits. Permits the setpoint to be enabled after the drive has been powered-up. CONTRL.P3070.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0001h	3.2.8 6.3.2.6 [B3.1]
H216 1216d 04C0h	**SRC_DRV_FCK** Source, fault acknowledgement Connector number of the supplying value. CONTRL.P3080.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.1 [A2.5]
H217 1217d 04C1h	**MSK_DRV_FCK** Mask, fault acknowledgement Mask to select the controlling bits. Resets the converter frault displays. CONTRL.P3080.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.1.1 [A2.5]
H218 1218d 04C2h	**SRC_DRV_NLC** Source, no local operation Connector number of the supplying value. CONTRL.P3090.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.2.3 6.3.2.7 [B1.1]
H219 1219d 04C3h	**MSK_DRV_NLC** Mask, no local operation Mask to select the controlling bits. This signal inhibits the local operating modes. CONTRL.P3090.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.2.3 6.3.2.7 [B1.1]
H220 1220d 04C4h	**SRC_DRV_JG1** Source, inching 1 Connector number of the supplying value. CONTRL.P3100.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.2.4 6.3.2.8 [B1.1]
H221 1221d 04C5h	**MSK_DRV_JG1** Mask, inching 1 Mask to select the controlling bits. Controls inching function 1 CONTRL.P3100.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.2.4 6.3.2.8 [B1.1]
H222 1222d 04C6h	**SRC_DRV_JG2** Source, inching 2 Connector number of the supplying value. CONTRL.P3110.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.2.4 6.3.2.8 [B1.1]

Parameter number	Description	Range, steps	Werksein-stellung	Section [Plan]
H223 1223d 04C7h	**MSK_DRV_JG2** Mask, inching 2 Mask to select the controlling bits. Controls inching function 2. CONTRL.P3110.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.2.4 6.3.2.8 [B1.1]
H224 1224d 04C8h	**SRC_DRV_LB0** Source, operating mode bit 0 Connector number of the supplying value. CONTRL.P3120.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.2.10 6.3.2.10 [B4.1]
H225 1225d 04C9h	**MSK_DRV_LB0** Mask, operating mode bit 0 Mask to select the controlling bits. Defines the operating mode word with which the local setpoints are selected. CONTRL.P3120.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.2.10 6.3.2.10 [B4.1]
H226 1226d 04CAh	**SRC_DRV_LB1** Source, operating mode bit 1 Connector number of the supplying value. CONTRL.P3130.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.2.10 6.3.2.10 [B4.1]
H227 1227d 04CBh	**MSK_DRV_LB1** Mask, operating mode bit 1 Mask to select the controlling bits. Defines the operating mode word with which the local setpoints are selected. CONTRL.P3130.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.2.10 6.3.2.10 [B4.1]
H228 1228d 04CCh	**SRC_DRV_LB2** Source, operating mode bit 2 Connector number of the supplying value. CONTRL.P3140.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.2.10 6.3.2.10 [B4.1]
H229 1229d 04CDh	**MSK_DRV_LB2** Mask, operating mode bit 2 Mask to select the controlling bits. Defines the operating mode word with which the local setpoints are selected. CONTRL.P3140.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.2.10 6.3.2.10 [B4.1]
H230 1230d 04CEh	**SRC_DRV_STE** Source, start enable Connector number of the supplying value. CONTRL.P3150.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.2.2 6.3.2.1 [B1.1]
H231 1231d 04CFh	**MSK_DRV_STE** Mask, start enable Mask to select the controlling bits. It allows the drive to be powered-up, if operation with a start sequence (H252) is parameterized. CONTRL.P3150.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.2.2 6.3.2.1 [B1.1]

Parameter number	Description	Range, steps	Werksein-stellung	Section [Plan]
H232 1232d 04D0h	**SRC_DRV_ILF** Source, checkback signal, group control Connector number of the supplying value. CONTRL.P3160.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.2.9 6.3.2.9 [B3.1]
H233 1233d 04D1h	**MSK_DRV_ILF** Mask, checkback signal, group control Mask to select the controlling bits. Signals readiness (“powered-up”) for slave drives of a multi-motor group for setpoint enable and group monitoring, if group (multi-motor) operation is selected with H251. CONTRL.P3160.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	6.3.2.9 [B3.1]
H234 1234d 04D2h	**SRC_DRV_SB0** Source, setpoint channel data set, bit 0 Connector number of the supplying value. CONTRL.P5170.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.1 [A2.5]
H235 1235d 04D3h	**MSK_DRV_SB0** Mask, setpoint channel data set, bit 0 Mask to select the controlling bits. Controls the selection of specified standard configurations in the converter. CONTRL.P5170.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.1.1 [A2.5]
H236 1236d 04D4h	**SRC_DRV_SB1** Source, setpoint channel data set, bit 1 Connector number of the supplying value. CONTRL.P5180.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.1 [A2.5]
H237 1237d 04D5h	**SRC_DRV_SB1** Mask, setpoint channel data set, bit 1 Mask to select the controlling bits. Controls the selection of specified standard configurations in the converter. CONTRL.P5180.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.1.1 [A2.5]
H238 1238d 04D6h	**SRC_DRV_MB0** Source, motor data set, bit 0 Connector number of the supplying value. CONTRL.P5190.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.1 [A2.5]
H239 1239d 04D7h	**MSK_DRV_MB0** Mask, motor data set, bit 0 Mask to select the controlling bits. Selects specified motor data in the converter. CONTRL.P5190.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.1.1 [A2.5]
H240 1240d 04D8h	**SRC_DRV_MB1** Source, motor data set, bit 1 Connector number of the supplying value. CONTRL.P5200.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.1 [A2.5]

Parameter number	Description	Range, steps	Werksein-stellung	Section [Plan]
H241 1241d 04D9h	**MSK_DRV_MB1** Mask, motor data set, bit 1 Mask to select the controlling bits. The specified motor data in the converter are selected. CONTRL.P5200.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.1.1 [A2.5]
H242 1242d 04DAh	**SRC_DRV_FB0** Source, fixed setpoint selection, bit 0 Connector number of the supplying value. CONTRL.P5210.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.1 [A2.5]
H243 1243d 04DBh	**MSK_DRV_FB0** Mask, fixed setpoint selection, bit 0 Mask to select the controlling bits. The specified setpoints in the converter are selected. CONTRL.P5210.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.1.1 [A2.5]
H244 1244d 04DCh	**SRC_DRV_FB1** Source, fixed setpoint selection, bit 1 Connector number of the supplying value. CONTRL.P5220.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.1 [A2.5]
H245 1245d 04DDh	**MSK_DRV_FB1** Mask, fixed setpoint selection, bit 1 Mask to select the controlling bits. The specified setpoints in the converter are selected. CONTRL.P5220.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.1.1 [A2.5]
H246 1246d 04DEh	**SRC_DRV_XW2** Source, no external alarm 2 Connector number of the supplying value. CONTRL.ST3300.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	2	3.2.13 6.3.2.12 [B6.5]
H247 1247d 04DFh	**MSK_DRV_XW2** Mask, no external alarm 2 Mask to select the controlling bits. Activates external alarm. CONTRL.ST3300.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0001h	3.2.13 6.3.2.12 [B6.5]
H248 1248d 04E0h	**MSK_DRV_WWD** Mask, bit selection alarm word Mask to select the active alarms in the alarm word. Bit 0: Alarm, communications CB Bit 1: Alarm, communications CU Bit 2: Alarm, converter checkback signal Bit 3: Alarm, from the group control Bit 4: Alarm, peer communications Bit 5: Alarm, from an external fault Bits 6 and 7: (unused) Bit 8: Alarm, from the anti-.stall protection Bit 9 to 14: (unused) Bit 15: External alarm 2 CONTRL.ST3350.IS2_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.2.13 [B6.7]
H249	(Unused)			

Parameter number	Description	Range, steps	Werksein-stellung	Section [Plan]
H250 1250d 04E2h	**PAR_DRV_1QD** No regenerative feedback Defines single-quadrant operation of the drive, i.e. for fast stop, drive is immediately electrically shutdown without braking. CONTRL.P5000.I_T5 SIMADYN D:B1 PKW-TYP:BOOLEAN	0...1 1	0	3.2.5 [B1.3]
H251 1251d 04E3h	**PAR_DRV_ILE** Enable, group control Activates the interrogation of checkback signals for the operation of several drives in a group. CONTRL.P5010.I_T5 SIMADYN D:B1 PKW-TYP:BOOLEAN	0...1 1	0	3.2.9 6.3.2.1 6.3.2.9 [B3.1]
H252 1252d 04E4h	**PAR_DRV_NSS** No starting sequence Suppresses interrogation of the power-up enable from a central control to power-up the drive. CONTRL.P5020.I_T5 SIMADYN D:B1 PKW-TYP:BOOLEAN	0...1 1	1	3.2.1 3.2.2 [B1.5]
H253 1253d 04E5h	**TIM_OFF_JOG** Time, shutdown after inching Time after the inching command has become inactive until the drive is electrically shutdown. This prevents the main contactor from being switched-in/-out a multiple number of times when inching. CONTRL.C3210.T_T3 SIMADYN D:T2 PKW-TYP:O4	0[ms]...655 360[ms] 40[ms]	30 000[ms]	3.2.4 [B1.4]
H254 1254d 04E6h	**PAR_MBR_ENA** Enable operation with holding brakes Enables the holding brake control. For operation without holding brakes (zero), a zero should also be entered for the braking times (H271 and H272). CONTRL.P5030.I_T5 SIMADYN D:B1 PKW-TYP:BOOLEAN	0...1 1	0	3.2.7 [B1.6]
H255 1255d 04E7h	**PAR_MBR_MOD** Operating mode of the holding brakes Defines the mode of operation of the holding brakes for drive faults and the electrical off function: 1: For drive faults and electrical off, the drive is immediately shutdown, however, the holding brakes only close when the drive has come to a standstill. 2: For drive faults and electrical off, the drive is immediately shutdown. For a fault, the holding brakes close immediately, however, for electrical off, they only close when the drive has come to a standstill. 3: For drive faults and electrical off, the drive is immediately shutdown. For electrical off, the holding brakes close immediately, however, for faults, only when the drive has come to a standstill. 4: For drive faults and electrical off, the drive is immediately shutdown and the holding brakes immediately closed. CONTRL.P5039.X_T5 SIMADYN D:O2 PKW-TYP:O2	1...4 1	1	3.2.7 [B2.1]

Parameter number	Description	Range, steps	Werksein-stellung	Section [Plan]
H256 1256d 04E8h	**JOG_BRK_NNE** Inching without braking If the inching command becomes inactive, the drive coasts down in a no-torque condition to standstill if the parameter value is 1. Otherwise, the controller actively brakes the drive down to standstill along the internal ramp. CONTRL.C3990.I2_T3 SIMADYN D:B1 PKW-TYP:BOOLEAN	0...1 1	0	3.2.4 3.2.9 6.3.2.8 [B3.5]
H257 1257d 04E9h	**FLT_TMO_CCB** Tolerance time, CB - communications error Duration of a communications error which was identified from/to CB before the drive is shutdown with fault. CONTRL.F4110.T_T4 SIMADYN D:T2 PKW-TYP:O4	0[ms]...2 621 440[ms] 160[ms]	100[ms]	3.2.11 [B5.4]
H258 1258d 04EAh	**FLT_TMO_CCU** Tolerance time, CU - communications error Duration of a communications error which was identified from/to CU before the drive is shutdown with fault. CONTRL.F4160.T_T4 SIMADYN D:T2 PKW-TYP:O4	0[ms]...2 621 440[ms] 160[ms]	100[ms]	3.2.11 [B5.4]
H259 1259d 04EBh	**FLT_TMO_IFB** Tolerance time, converter checkback signal fault Time, for which the converter ready signal may not be present after power-up or during operation. The drive is shutdown with a fault signal if this time is exceeded. CONTRL.F4210.T_T4 SIMADYN D:T2 PKW-TYP:O4	0[ms]...2 621 440[ms] 160[ms]	1000[ms]	3.2.11 [B5.4]
H260 1260d 04ECh	**SRC_FLT_EXT** Source, no external fault Connector number of the supplying value. CONTRL.F4215.NC_T4 SIMADYN D:O2 PKW-TYP:O2	0...511 1	2	3.2.11 6.3.2.11 [B5.2]
H261 1261d 04EDh	**MSK_FLT_EXT** Mask, no external fault Mask to select the controlling bits. If the logical status goes to zero, the drive is shutdown with ‘external fault’ after a time which is defined using H262. CONTRL.F4215.MSK_T4 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0001h	3.2.11 6.3.2.11 [B5.2]
H262 1262d 04EEh	**FLT_TMO_EXT** Tolerance time, external faults Time, after a signal has become inactive, until this is identified as an external fault and the drive is shutdown. CONTRL.F4217.T_T4 SIMADYN D:T2 PKW-TYP:O4	0[ms]...2 621 440[ms] 160[ms]	1000[ms]	3.2.11 6.3.2.11 [B5.4]
H263 1263d 04EFh	**FLT_TMO_CPP** Tolerance time, peer communications error Duration of an identified peer-communications error until the drive is shutdown with fault. CONTRL.F4310.T_T4 SIMADYN D:T2 PKW-TYP:O4	0[ms]...2 621 440[ms] 160[ms]	100[ms]	3.2.11 [B5.4]

Parameter number	Description	Range, steps	Werksein-stellung	Section [Plan]
H264 1264d 04F0h	**FLT_TMO_GRP** Tolerance time, motor group fault Time, for which a checkback signal for a drive in a drive group may not be available after power-up or during operation. If this time is exceeded, the drive is shutdown with fault. CONTRL.F4260.T_T4 SIMADYN D:T2 PKW-TYP:O4	0[ms]...2 621 440[ms] 160[ms]	2000[ms]	3.2.11 [B5.4]
H265 1265d 04F1h	**FLT_LIM_OVS** Threshold, overspeed fault Threshold, where a fault is identified if the absolute speed actual value exceeds it. CONTRL.F4220.L_T4 SIMADYN D:N2 PKW-TYP:I4	0%...199% 0.006%	120%	3.2.11 [B5.2]
H266 1266d 04F2h	**FLT_BLK_LVA** Threshold, speed actual value for anti-stall protection Threshold, which the drive speed actual value may not exceed so that the anti-stall protection can respond. CONTRL.F4225.M_T4 SIMADYN D:N2 PKW-TYP:I4	0%...199% 0.006%	0.5%	3.2.11 [B5.3]
H267 1267d 04F3h	**FLT_BLK_LVR** Threshold, speed setpoint for anti-stall protection Threshold, which the drive speed setpoint must exceed so that the anti-stall protection can respond. CONTRL.F4230.M_T4 SIMADYN D:N2 PKW-TYP:I4	0%...199% 0.006%	1%	3.2.11 [B5.3]
H268 1268d 04F4h	**FLT_BLK_LMA** Threshold, torque actual value for anti-stall protection Threshold, which the drive torque actual value must exceed, so that the anti-stall protection can respond. CONTRL.F4235.M_T4 SIMADYN D:N2 PKW-TYP:I4	0%...199.993% 0.006%	80%	3.2.11 [B5.3]
H269 1269d 04F5h	**FLT_TMO_BLK** Tolerance time, anti-stall protection fault Duration, after the stall conditions have been fulfilled up until the anti-stall protection responds and the drive is shutdown with fault. CONTRL.F4245.T_T4 SIMADYN D:T2 PKW-TYP:O4	0[ms]...2 621 440[ms] 160[ms]	1000[ms]	3.2.11 [B5.5]
H270 1270d 04F6h	**FLT_MSK_ENA** Mask, fault enable Bitwise enabling of individual monitoring functions. At zero, these are inhibited, and neither result in a display nor shutdown. Bit 0: Enable monitoring, communications with CB Bit 1: Enable monitoring, communications with CU Bit 2: Enable monitoring, converter checkback signal Bit 3: Enable monitoring, motor group Bit 4: Enable monitoring, peer communications Bit 5: Enable, external fault Bit 6: Enable overspeed protection, positive Bit 7: Enable overspeed protection, negative Bit 8: Enable, anti-stall protection Bits 9 to 15: (unused) CONTRL.F4920.X1_T4 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	FFFFh	3.2.11 [B5.7]

Parameter number	Description	Range, steps	Werksein-stellung	Section [Plan]
H271 1271d 04F7h	**TIM_MBR_OPN** Time, open holding brake Duration between controller enable (command, open holding brake) and setpoint enable (holding brake is open - released). CONTRL.BR110.T_T3 SIMADYN D:T2 PKW-TYP:O4	0[ms]...655 360[ms] 40[ms]	0[ms]	3.2.7 [B2.7]
H272 1272d 04F8h	**TIM_MBR_CLS** Time, close holding brake Duration between standstill (command, close holding brake) and the drive shutting down (holding brake is closed). CONTRL.BR120.T_T3 SIMADYN D:T2 PKW-TYP:O4	0[ms]...655 360[ms] 40[ms]	0[ms]	3.2.7 [B2.7]
H273-299	(unused)			
H300 1300d 0514h	**SRC_INP_MP1** Source, motorized potentiometer 1, input Connector number of the supplying value. Input value, if the motorized potentiometer is used as ramp-function generator with the “track” function. MOTPOT.M10.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.16 [A10.1]
H301 1301d 0515h	**SRC_SVA_MP1** Source, motorized potentiometer 1, setting value Connector number of the supplying value. Value, to which the motorized potentiometer is instantaneously set if the ‘set’ command is active. MOTPOT.M20.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.16 [A10.1]
H302 1302d 0516h	**SRC_SET_MP1** Source bit, set MOP, motorized potentiometer 1 Connector number of the supplying value. MOTPOT.M30.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.16 [A10.1]
H303 1303d 0517h	**MSK_SET_MP1** Mask bit, set MOP motorized potentiometer 1 Mask to select the controlling bits. Instantaneously sets the motorized potentiometer to the setting value. ‘Setting’ has priority over ‘tracking’, ‘raise’ and ‘lower’. MOTPOT.M30.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.1.16 [A10.2]
H304 1304d 0518h	**SRC_INC_MP1** Source bit, raise motorized potentiometer 1 Connector number of the supplying value. MOTPOT.M40.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.16 [A10.1]
H305 1305d 0519h	**MSK_INC_MP1** Mask bit, raise motorized potentiometer 1 Mask to select the controlling bits. Increases the motorized potentiometer output signal. This has priority over ‘lower’. MOTPOT.M40.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.1.16 [A10.2]
H306 1306d 051Ah	**SRC_DEC_MP1** Source bit, lower motorized potentiometer 1 Connector number of the supplying value. MOTPOT.M50.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.16 [A10.1]

Parameter number	Description	Range, steps	Werksein-stellung	Section [Plan]
H307 1307d 051Bh	**MSK_DEC_MP1** Mask bit, lower motorized potentiometer 1 Mask to select the controlling bits. Reduces the motorized potentiometer output signal. MOTPOT.M50.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.1.16 [A10.2]
H308 1308d 051Ch	**SRC_FOW_MP1** Source bit, motorized potentiometer 1, tracking Connector number of the supplying value. MOTPOT.M60.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.16 [A10.1]
H309 1309d 051Dh	**MSK_FOW_MP1** Mask bit, motorized potentiometer 1, tracking Mask to select the controlling bits. The motorized potentiometer then tracks the input signal, taking into account the ramp times. This has priority over ‘raise’ and ‘lower’. MOTPOT.M60.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.1.16 [A10.2]
H310 1310d 051Eh	**SRC_INP_MP2** Source, motorized potentiometer input 2 Connector number of the supplying value. Input value, if the motorized potentiometer is used as ramp-function generator with the “track” function. MOTPOT.M15.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.16 [A10.5]
H311 1311d 051Fh	**SRC_SVA_MP2** Source, motorized potentiometer 2, setting value Connector number of the supplying value. Value, to which the motorized potentiometer is instantaneously set if the ‘set’ command is active. MOTPOT.M25.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.16 [A10.5]
H312 1312d 0520h	**SRC_SET_MP2** Source bit, set motorized potentiometer 2 Connector number of the supplying value. MOTPOT.M35.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.16 [A10.5]
H313 1313d 0521h	**MSK_SET_MP2** Mask bit, set motorized potentiometer 2 Mask to select the controlling bits. Instantaneously sets the motorized potentiometer to the setting value. ‘Setting’ has priority over ‘tracking’, ‘raise’ and ‘lower’. MOTPOT.M35.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.1.16 [A10.5]
H314 1314d 0522h	**SRC_INC_MP2** Source bit, raise motorized potentiometer 2 Connector number of the supplying value. MOTPOT.M45.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.16 [A10.5]
H315 1315d 0523h	**MSK_INC_MP2** Mask bit, raise motorized potentiometer 2 Mask to select the controlling bits. Increases the motorized potentiometer output signal. This has priority over ‘lower’. MOTPOT.M45.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.1.16 [A10.5]

Parameter number	Description	Range, steps	Werksein-stellung	Section [Plan]
H316 1316d 0524h	**SRC_DEC_MP2** Source bit, lower motorized potentiometer 2 Connector number of the supplying value. MOTPOT.M55.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.16 [A10.5]
H317 1317d 0525h	**MSK_DEC_MP2** Mask bit, lower motorized potentiometer 2 Mask to select the controlling bits. The motorized potentiometer output signal is decreased. MOTPOT.M55.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.1.16 [A10.5]
H318 1318d 0526h	**SRC_FOW_MP2** Source bit, motorized potentiometer 2 tracking Connector number of the supplying value. MOTPOT.M65.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.16 [A10.5]
H319 1319d 0527h	**MSK_FOW_MP2** Mask bit, motorized potentiometer 2 tracking Mask to select the controlling bits. The motorized potentiometer tracks the input signal taking into account the ramp times. This has priority over ‘raise’ and ‘lower’. MOTPOT.M65.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.1.16 [A10.5]
H320 1320d 0528h	**RPT_SLW_MP1** Slow ramp time, motorized potentiometer 1 Time, which the motorized potentiometer or the ramp-function generator requires, in order to execute a change for the range set in H324. MOTPOT.M230.X1_T3 SIMADYN D:R2 PKW-TYP:O4	40[ms]...655 360[ms]	60 000[ms]	3.1.16 [A10.2]
H321 1321d 0529h	**RPT_FST_MP1** Fast ramp time, motorized potentimeter 1 Time, which the motorized potentiometer or ramp-function generator requires in order to execute a change by the range set in H324. If one of the commands, ‘raise’ or ‘lower’ is continuously present for longer than 3 seconds, this time is used instead of H320. MOTPOT.M230.X2_T3 SIMADYN D:R2 PKW-TYP:O4	40[ms]...655 360[ms]	25 000[ms]	3.1.16 [A10.2]
H322 1322d 052Ah	**LIM_UPP_MP1** Upper limit, motorized potentiometer 1 Maximum positive value of the output signal. Corresponds to 100% of the value set in H324. MOTPOT.M300.LU_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	120%	3.1.16 [A10.2]
H323 1323d 052Bh	**LIM_LOW_MP1** Lower limit, motorized potentiometer 1 Maximum negative value of the output signal. 100% corresponds to the value set in H324. MOTPOT.M300.LL_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	-120%	3.1.16 [A10.2]

Parameter number	Description	Range, steps	Werksein-stellung	Section [Plan]
H324 1324d 052Ch	**MUL_IMP_MP1** Influence factor, motorized potentiometer 1 Motorized potentiometer setpoint range if the limiting is 100%. The following is valid: 100%x100%=100% MOTPOT.M320.X2_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.1.16 [A10.3]
H325 1325d 052Dh	**RPT_SLW_MP2** Slow ramp time, motorized potentiometer 2 Time, which the motorized potentiometer or the ramp-function generator requires, in order to execute a change for the range set in H329. MOTPOT.M430.X1_T3 SIMADYN D:R2 PKW-TYP:O4	40[ms]...655 360[ms]	60 000[ms]	3.1.16 [A10.6]
H326 1326d 052Eh	**RPT_FST_MP2** Fast ramp time, motorized potentiometer 2 Time, which the motorized potentiometer or ramp-function generator requires in order to execute a change by the range set in H329. If one of the commands, ‘raise’ or ‘lower’ is continuously available for longer than 3 seconds, this time is used instead of H325. MOTPOT.M430.X2_T3 SIMADYN D:R2 PKW-TYP:O4	40[ms]...655 360[ms]	25 000[ms]	3.1.16 [A10.6]
H327 1327d 052Fh	**LIM_UPP_MP2** Upper limit, motorized potentiometer 2 Maximum positive value of the output signal. Corresponds to 100% of the value set in H329. MOTPOT.M500.LU_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	120%	3.1.16 [A10.6]
H328 1328d 0530h	**LIM_LOW_MP2** Lower limit, motorized potentiometer 2 Maximum negative value of the output signal. 100% corresponds to the value set in H329. MOTPOT.M500.LL_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	-120%	3.1.16 [A10.6]
H329 1329d 0531h	**MUL_IMP_MP2** Influence factor, motorized potentiometer 1 Motorized potentiometer setpoint range, if the limiting is 100%. The following is valid: 100%x100%=100% MOTPOT.M520.X2_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.1.16 [A10.7]
H330-399	(Unused)			
H400 1400d 0578h	**SRC_REF_TEC** Source, technological setpoint Connector number of the supplying value. The signal, which is fed via the setpoint ramp-function generator and used as technological setpoint. TREG.T100.NC_T2 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.3.2 6.3.4.3 [C1.4]
H401 1401d 0579h	**MUL_REF_TEC** Adaption factor, technological setpoint Factor to adapt the range of the technological setpoint. The following is valid: 100%x100%=100% TREG.T110.X2_T2 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	100%	3.3.2 6.3.4.3 [C1.5]

Parameter number	Description	Range, steps	Werksein-stellung	Section [Plan]
H402 1402d 057Ah	**SRC_ACT_TEC** Source, technological actual value Connector number of the supplying value. Signal, which is smoothed after offset compensation and is used as technological actual value. TREG.T120.NC_T2 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.3.3 6.3.4.2 [C1.4]
H403 1403d 057Bh	**MUL_ACT_TEC** Adaption factor, technological actual value Factor to adapt the range of the technological actual value. The following is valid: 100%x100%=100% TREG.T130.X2_T2 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	100%	3.3.3 6.3.4.2 [C1.5]
H404 1404d 057Ch	**SRC_ON1_TEC** Source bit, enable 1 technological controller Connector number of the supplying value. TREG.T140.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.3.1 6.3.4.1 [C1.1]
H405 1405d 057Dh	**MSK_ON1_TEC** Mask bit, enable 1 technological controller Mask to select the controlling bits. Enables the technological controller. TREG.T140.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.3.1 6.3.4.1 [C1.1]
H406 1406d 057Eh	**SRC_ON2_TEC** Source bit, enable 2 technological controller Connector number of the supplying value. TREG.T150.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.3.1 6.3.4.1 [C1.1]
H407 1407d 057Fh	**MSK_ON2_TEC** Mask bit, enable 2 technological controller Mask to select the controlling bits. Enables the technological controller. TREG.T150.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.3.1 6.3.4.1 [C1.1]
H408 1408d 0580h	**SRC_OF1_TEC** Source bit, disable 1 technological controller Connector number of the supplying value. TREG.T160.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.3.1 6.3.4.1 [C1.1]
H409 1409d 0581h	**MSK_OF1_TEC** Mask bit, disable 1 technological controller Mask to select the controlling bits. Disables the technological controller. TREG.T160.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.3.1 6.3.4.1 [C1.1]
H410 1410d 0582h	**SRC_OF2_TEC** Source bit, disable 2 technological controller Connector number of the supplying value. TREG.T170.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.3.1 6.3.4.1 [C1.1]
H411 1411d 0583h	**MSK_OF2_TEC** Mask bit, disable 2 technological controller Mask to select the controlling bits. Disables the technological controller. TREG.T170.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.3.1 6.3.4.1 [C1.1]

Parameter number	Description	Range, steps	Werksein-stellung	Section [Plan]
H412 1412d 0584h	**SRC_PSS_TEC** Source, parameter changeover tech.controller Connector number of the supplying value. <table><tr><th>Parameter \ Status</th><th>0</th><th>1</th></tr><tr><td>Speed act. value smoothing</td><td>H414</td><td>H415</td></tr><tr><td>Controller gain</td><td>H416</td><td>H417</td></tr><tr><td>Integral action time</td><td>H418</td><td>H419</td></tr><tr><td>Derivation action time</td><td>H420</td><td>H421</td></tr></table>TREG.P10.NC_T5 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.3.4 6.3.4.4 [C2.1]
H413 1413d 0585h	**MSK_PSS_TEC** Mask, parameter changeover tech. controller Mask to select the controlling bits. Selects one of the two parameter sets for the technological controller. TREG.P10.MSK_T5 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.3.4 6.3.4.4 [C2.1]
H414 1414d 0586h	**FT1_ACT_TEC** Smoothing P1, technological actual value The actual value smoothing which is effective at parameter set changeover, status 0. TREG.P20.X1_T5 SIMADYN D:R2 PKW-TYP:O4	20[ms]...327 680[ms]	100[ms]	3.3.4 6.3.4.4 [C2.1]
H415 1415d 0587h	**FT2_ACT_TEC** Smoothing P2, technological actual value The actual value smoothing which is effective at parameter set changeover, status 1. TREG.P20.X2_T5 SIMADYN D:R2 PKW-TYP:O4	20[ms]...327 680[ms]	100[ms]	3.3.4 6.3.4.4 [C2.1]
H416 1416d 0588h	**KP1_REG_TEC** Gain P1, technological controller Proportional gain of the technological controller, effective at parameter set changeover, status 0. TREG.P30.X1_T5 SIMADYN D:N2 PKW-TYP:I4	-256...255.9921875 0.0078125	1	3.3.4 6.3.4.4 [C2.1]
H417 1417d 0589h	**KP2_REG_TEC** Gain P2, technological controller Proportional gain of the technological controller, effective at parameter set changeover, status 1. TREG.P30.X2_T5 SIMADYN D:N2 PKW-TYP:I4	-256...255.9921875 0.0078125	1	3.3.4 6.3.4.4 [C2.1]
H418 1418d 058Ah	**TN1_REG_TEC** Integral action time P1, technological controller Integral action time of the technological controller at parameter set changeover, status 0. TREG.P40.X1_T5 SIMADYN D:R2 PKW-TYP:O4	20[ms]...327 680[ms]	1 000[ms]	3.3.4 6.3.4.4 [C2.1]
H419 1419d 058Bh	**TN2_REG_TEC** Integral action time P2, technological controller Integral action time of the technological controller at parameter set changeover, status 1. TREG.P40.X2_T5 SIMADYN D:R2 PKW-TYP:O4	20[ms]...327 680[ms]	1 000[ms]	3.3.4 6.3.4.4 [C2.1]

Parameter number	Description	Range, steps	Werksein-stellung	Section [Plan]
H420 1420d 058Ch	**TV1_REG_TEC** Derivative action time P1, technological controller Derivative action time of the technological controller which becomes effective at parameter set changeover, status 0. TREG.P50.X1_T5 SIMADYN D:D2 PKW-TYP:O4	20[ms]...327 680[ms]	10[ms]	3.3.4 6.3.4.4 [C2.1]
H421 1421d 058Dh	**TV2_REG_TEC** Derivative action time P2, technological controller Derivative action time of the technological controller which becomes effective at parameter set changeover, status 1. TREG.P50.X2_T5 SIMADYN D:R2 PKW-TYP:O4	20[ms]...327 680[ms]	10[ms]	3.3.4 6.3.4.4 [C2.1]
H422 1422d 058Eh	**SRC_OFR_TEC** Source, supplementary setpoint in front of technological RFG Connector number of the supplying value. TREG.T400.NC_T2 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.3.2 6.3.4.3 [C1.4]
H423 1423d 058Fh	**LUP_REF_TEC** Upper limit, technological setpoint Highest positive value at the setpoint ramp-function generator output. TREG.T450.LU_T2 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	100%	3.3.2 [C1.7]
H424 1424d 0590h	**LLO_REF_TEC** Lower limit, technological setpoint Highest negative value at the setpoint ramp-function generator output. TREG.T450.LL_T2 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	10%	3.3.2 [C1.7]
H425 1425d 0591h	**RUP_REF_TEC** Ramp-up time, technological setpoint Time, which the ramp-function generator requires to increase the technological setpoint by 100%. TREG.T450.TU_T2 SIMADYN D:R2 PKW-TYP:O4	20[ms]...327 680[ms]	10 000[ms]	3.3.2 [C1.6]
H426 1426d 0592h	**RDN_REF_TEC** Ramp-down time, technological setpoint Time which the ramp-function generator requires to decrease the technological setpoint by 100%. TREG.T450.TD_T2 SIMADYN D:R2 PKW-TYP:O4	20[ms]...327 680[ms]	10 000[ms]	3.3.2 [C1.6]
H427 1427d 0593h	**FLT_REF_TEC** Smoothing, technological setpoint Setpoint delay for the controller to dynamically de-couple from the pre-control. This should correspond to the sum of all of the time constants of the actual value smoothing and control loop. TREG.T451.T_T2 SIMADYN D:R2 PKW-TYP:O4	20[ms]...327 680[ms]	100[ms]	3.3.2 [C2.2]
H428 1428d 0594h	**SRC_OFA_TEC** Source, offset adjustment, technological actual value Connector number of the supplying value. TREG.T296.NC_T4 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.3.3 6.3.4.2 [C1.4]

Parameter number	Description	Range, steps	Werksein-stellung	Section [Plan]
H429 1429d 0595h	**MSK_OFA_TEC** Mask, offset adjustment technological actual value Mask to select the controlling bits. If the status is a 1, the actual value, smoothed with 500 ms, is saved as offset and is subtracted from the actual value. TREG.T296.MSK_T4 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.3.3 6.3.4.2 [C1.5]
H430 1430d 0596h	**FIX_OFF_TEC** Fixed offset, technological Offset for a manual adjustment. In this case, the actual value without material is read and entered here. TREG.T298.X2_T4 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	6.3.4.2 [C1.6]
H431 1431d 0597h	**MAN_OFF_TEC** Offset adjustment, technological actual value, manual If the bit is 1, the fixed value H429 is subtracted from the actual value, otherwise the saved offset from automatic. TREG.T298.I_T4 SIMADYN D:B1 PKW-TYP:BOOLEAN	0...1 1	0	3.3.3 6.3.4.2 [C1.7]
H432 1432d 0598h	**DTM_ACT_TEC** Derivative action active, technological controller This specifies whether the technological controller has PI- or PID characteristics. TREG.T555.I_T2 SIMADYN D:B1 PKW-TYP:BOOLEAN	0...1 1	0	3.3.4 [C2.3]
H433 1433d 0599h	**ADD_RFD_TEC** Supplementary technological setpoint Fixed technological setpoint which is added before the controller. This allows a setpoint step to be entered for drive optimization. TREG.T650.W2_T2 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	[C2.3]
H434 1434d 059Ah	**MUL_DRP_TEC** Technological droop factor Defines a P characteristic in steady-state operation. A component of the integral component of the PI controller is fed back as actual value. A soft characteristic is thus obtained. The factor specifies at which setpoint-actual value difference the controller integral component reaches 100% (and thus approximately, also the controller output). TREG.T660.X2_T2 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.3.4 [C2.4]
H435 1435d 059Bh	**I_REG_TEC** Inhibit I component, technological controller The I component of the technological controller becomes active for value 0, and inhibited for 1. ***Note:*** If the changeover is realized with the technological controller enabled, then the last output value is “frozen”. The I component is only set to 0 when the controller is inhibited. TREG.T650.HI_T2 SIMADYN D:B1 PKW-TYP:BOOLEAN	0...1 1	0	3.3.4 [C2.4]

Parameter number	Description	Range, steps	Werksein-stellung	Section [Plan]
H436 1436d 059Ch	**LUP_ROF_TEC** Upper limit technological controller off Effective upper limit for the controller for 'technological controller off'. TREG.T500.X1_T2 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	100%	3.3.4 6.3.4.5 [C2.5]
H437 1437d 059Dh	**LUP_RON_TEC** Upper limit, technological controller on Effective upper limit for the controller for 'technological controller on' TREG.T500.X2_T2 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	100%	3.3.4 6.3.4.5 [C2.5]
H438 1438d 059Eh	**LLO_ROF_TEC** Lower limit, technological controller off Effective lower limit for the controller for 'technological controller off' TREG.T510.X1_T2 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	-100%	3.3.4 6.3.4.5 [C2.5]
H439 1439d 059Fh	**LLO_RON_TEC** Lower limit, technological controller on Effective lower limit for the controller for 'technological controller on' TREG.T510.X2_T2 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	-100%	3.3.4 6.3.4.5 [C2.5]
H440 1440d 05A0h	**PON_REG_TEC** Technological controller continuously on The controller continuously operates in this setting; for the "technological controller on/off commands, only the limits are changed-over. This is helpful for speed correction controls. When threading, the controller must not increase tension (upper limit zero), however, it should prevent possible excessive tension which could occur due to incorrectly set line speed setpoints. TREG.T645.I1_T3 SIMADYN D:B1 PKW-TYP:BOOLEAN	0...1 1	0	3.3.4 [C2.3]
H441 1441d 05A1h	**SRC_KPA_TEC** Source, quantity for Kp adaption, technological controller Connector number of the supplying value. The proportional gain can be changed as a function of a technological quantity according to a definable function (adapted). TREG.R653.NC_T2 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.3.4 [C2.3]
H442 1442d 05A2h	**STV_KPA_TEC** Start of Kp adaption, technological controller Process quantity value for the first point on the adaption characteristic. TREG.T653.A1_T2 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.3.4 [C2.3]
H443 1443d 05A3h	**STF_KPA_TEC** Factor, start of Kp adaption, technological controller Factor for the first point on the adaption characteristic. TREG.T653.B1_T2 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	100%	3.3.4 [C2.3]
H444 1444d 05A4h	**EDV_KPA_TEC** End of kp adaption, technological controller Process quantity value for the last point on the adaption characteristic. TREG.T653.A2_T2 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	100%	3.3.4 [C2.3]

Parameter number	Description	Range, steps	Werksein-stellung	Section [Plan]
H445 1445d 05A5h	**EDF_KPA_TEC** Factor, end of kp adaption technological controller Factor of the last point on the adaption characteristic. TREG.T653.B2_T2 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	100%	3.3.4 [C2.3]
H446 1446d 05A6h	**LIM_OMN_TEC** Limit, offset monitoring, technological controller Monitors the stored offset of the automatic offset compensation. If the limit value is violated (positive or negative), the appropriate signals are set in the technological controller status word. TREG.T970.X_T5 SIMADYN D:N2 PKW-TYP:I4	0%...199.993% 0.006%	30%	3.3.5 [C3.1]
H447 1447d 05A7h	**FLT_REG_TEC** Smoothing, technological controller output Time constant of the 1st order filter, with which the controller output is smoothed. TREG.T720.T_T2 SIMADYN D:R2 PKW-TYP:O4	20[ms]...327 680[ms]	20[ms]	3.3.4 [C2.6]
H448 1448d 05A8h	**MUL_TPC_TEC** Factor, technological controller pre-control Influences the technological setpoint at the controller output. This allows pre-control to be implemented (note: only if the setpoint ramp-up time is high with respect to the controller response time. TREG.T725.X2_T2 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.3.4 [C2.7]
H449 1449d 05A9h	**MUL_TRQ_TEC** Torque influence, technological controller Specifies which torque setpoint change is associated with a 100% technological controller output signal. The following is valid: 100%x100%=100% TREG.T740.X2_T2 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.3.4 [C2.7]
H450 1450d 05AAh	**MUL_VEL_TEC** Line speed influence, technological controller Specifies which speed setpoint change is associated with 100% technological controller output signal. The following is valid: 100%x100%=100% TREG.T745.X2 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.3.4 [C2.7]
H451 1451d 05ABh	**MOD_D_TEC** Operating mode, technological controller D component The differential component is effective for value 0 in the setpoint- and actual value channel (PID controller), 1, only in the technological controller actual value channel. TREG.T520.I_T2 SIMADYN D:B1 PKW-TYP:BOOLEAN	0...1 1	0%	3.3.4 [C2.3]
H452 1452d 05ACh	**SRC_ONOFF_TEC** Source bit on/off, technological controller Connector number of the supplying value. TREG.T180.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.3.1 [C1.1]
H453 1453d 05ADh	**MSK_ONOFF_TEC** Mask bit on/off, technological controller Mask to select the controlling bits. Disables the technological controller. TREG.T180.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.3.1 [C1.1]

Parameter number	Description	Range, steps	Werksein-stellung	Section [Plan]
H454 1454d 05AEh	**SRC_RES_TEC** Source technological controller reset Connector number of the supplying value. TREG.T301.NC_T4 SIMADYN D:O2 PKW-TYP:O2	0...511 1	146	3.3.1 [C1.1]
H455 1455d 05AFh	**MSK_RES_TEC** Mask technological controller reset Mask to select the controlling bits. Resets the technological controller e.g for swich-off. TREG.T301.MSK_T4 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0080h	3.3.1 [C1.1]
H456-499	(Unused)			
H500 1500d 05DCh	**SRC_REF_VEL** Source, main setpoint Connector number of the supplying value. Setpoint source for the drive. SETPNT.S1000.NC_T1 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.3.17 3.4.1 6.3.3.2 6.3.3.3 [D1.1]
H501 1501d 05DDh	**MUL_REF_VEL** Gain, main setpoint Factor, with which the main speed setpoint is multiplied. The following is valid: 100%x100%=100% ***Note:*** This value must be 100% for setpoint cascades. SETPNT.S1010.X2_T1 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	100%	3.4.1 6.3.3.2 [D1.2]
H502 1502d 05DEh	**OFF_REF_VEL** Offset, main setpoint Fixed supplementary setpoint to the main setpoint. Note, this value must be 0% for setpoint cascades. SETPNT.S1020.X2_T1 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.4.1 6.3.3.2 [D1.2]
H503 1503d 05DFh	**SRC_RFA_VEL** Source, supplementary setpoint Connector number of the supplying value. Variable supplementary line speed setpoint to the main setpoint after the ramp-function generator. SETPNT.S1050.NC_T1 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.4.5 6.3.3.6 [D2.1]
H504 1504d 05E0h	**MUL_RFA_VEL** Gain, supplementary setpoint Factor, with which the supplementary speed setpoint is multiplied. The following is valid: 100%x100%=100% SETPNT.S1060.X2_T1 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	100%	3.4.5 6.3.3.6 [D2.2]
H505 1505d 05E1h	**OFF_RFA_VEL** Offset, supplementary setpoint. Fixed supplementary setpoint to the supplementary setpoint. SETPNT.S1070.X2_T1 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.4.5 6.3.3.6 [D2.2]
H506 1506d 05E2h	**SRC_SRT_VEL** Source, ratio setpoint Connector number of the supplying value. Factor, with which the setpoint is multiplied, or divided, in order to compensate length changes (stretching). SETPNT.S3000.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	1	3.1.17 3.4.3 6.3.3.4 [D1.1]

Parameter number	Description	Range, steps	Werksein-stellung	Section [Plan]
H507 1507d 05E3h	**MUL_SRT_VEL** Gain, ratio setpoint Factor, with which the ratio setpoint is multiplied. The following is valid: 100%x100%=100% SETPNT.S3010.X2_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	100%	3.4.3 6.3.3.4 [D1.2]
H508 1508d 05E4h	**OFF_SRT_VEL** Offset, ratio setpoint Fixed supplementary setpoint to the ratio setpoint. SETPNT.S3020.X2_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	100%	3.4.3 6.3.3.4 [D1.2]
H509 1509d 05E5h	**SRC_CMP_VEL** Source, compensation setpoint Connector number of the supplying value. Additive supplementary speed setpoint, which is switched-in with the “droop on” command and which ensuress load equalization. SETPNT.S3050.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	6.3.3.9 [D2.2]
H510 1510d 05E6h	**MUL_CMP_VEL** Gain, compensation setpoint Factor, with which the compensation setpoint is multiplied. The following is valid: 100%x100%=100% SETPNT.S3060.X2_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.4.8 6.3.3.9 [D2.3]
H511 1511d 05E7h	**SRC_DRP_ONC** Source, switch-in droop Connector number of the supplying value. SETPNT.S3065.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.4.8 6.3.3.9 [D2.3]
H512 1512d 05E8h	**MSK_DRP_ONC** Mask, switch-in droop Mask to select the controlling bits. It switches the speed controller characteristics from PI to PI+ droop and enables the compensation setpoint. SETPNT.S3065.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.4.8 6.3.3.9 [D2.4]
H513 1513d 05E9h	**BPS_MAC_RGE** No bypass, central ramp-function generator The main setpoint is fed through the machine ramp-function generator. This is only required for single drives or for the machine master drive. If the bit is 0, the setpoint with the influence quantities is directly transferred to the controller. SETPNT.S1090.I_T1 SIMADYN D:B1 PKW-TYP:BOOLEAN	0...1 1	0	3.4.1 6.3.3.3 [D1.4]
H514 1514d 05EAh	**RST_MAC_RGE** Set central RFG for drive off If the ramp-function generator is only for a single drive (individual drive), the setpoint needn’t be present if the drive is powered-down (off). If the bit is active, the ramp-function generator is set to the actual value with the drive powered-down (off). SETPNT.S3080.I1_T3 SIMADYN D:B1 PKW-TYP:BOOLEAN	0...1 1	0	3.4.2 6.3.3.3 [D1.1]

Parameter number	Description	Range, steps	Werksein-stellung	Section [Plan]
H515 1515d 05EBh	**TUP_MAC_RGE** Ramp-up time, central ramp-function generator Time, which the ramp-function generator requires to increase the machine setpoint by 100%. SETPNT.S3100.TU_T3 SIMADYN D:R2 PKW-TYP:O4	40[ms]...655 360[ms]	60 000[ms]	3.4.2 6.3.3.3 [D1.3]
H516 1516d 05ECh	**TDN_MAC_RGE** Ramp-down time, central ramp-function generator Time, which the ramp-function generator requires to reduce the machine setpoint by 100%. SETPNT.S3100.TD_T3 SIMADYN D:R2 PKW-TYP:O4	40[ms]...655 360[ms]	60 000[ms]	3.4.2 6.3.3.3 [D1.3]
H517 1517d 05EDh	**TRU_MAC_RGE** Initial rounding-off, central RFG Time, which the ramp-function generator requires to establish and reduce the accelerating torque, if the absolute speed setpoint is increased. SETPNT.S3100.TRU_T3 SIMADYN D:R2 PKW-TYP:O4	40[ms]...655 360[ms]	6 000[ms]	3.4.2 6.3.3.3 [D1.3]
H518 1518d 05EEh	**TRD_MAC_RGE** Final rounding-off, central RFG Time, which the ramp-function generator requires to establish and decrease the accelerating torque, if the absolute speed setpoint is reduced. SETPNT.S3100.TRD_T3 SIMADYN D:R2 PKW-TYP:O4	40[ms]...655 360[ms]	6 000[ms]	3.4.2 6.3.3.3 [D1.3]
H519 1519d 05EFh	**LUP_MAC_RGE** Upper limit, central RFG Maximum positive value of the ramp-function generator output. It should be at least 10% greater than the highest positive setpoint in operation. SETPNT.S3100.LU_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	150%	6.3.3.3 [D1.3]
H520 1520d 05F0h	**LLO_MAC_RGE** Lower limit, central ramp-function generator Maximum negative value of the ramp-function generator output. It should be at least 10% greater than the highest negative setpoint in operation. SETPNT.S3100.LL_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	-150%	6.3.3.3 [D1.3]
H521 1521d 05F1h	**TAC_MAC_RGE** Normalization time, acceleration The minimum ramp-up or ramp-down time of the central ramp-function generator should be entered for normalization. Thus, a 100% acceleration signal is obtained at the minimum ramp-up time. ***Note:*** This may no longer be changed after inertia compensation has been set, even if the ramp-up and ramp-down times are subsequently changed. SETPNT.S3110.X2_T3 SIMADYN D:R2 PKW-TYP:O4	40[ms]...655360[ms]	60000[ms]	3.4.2 6.3.3.3 [D1.4]

Parameter number	Description	Range, steps	Werksein-stellung	Section [Plan]
H522 1522d 05F2h	**SRT_DIV_SEL** Ratio value as divisor Specifies as to whether the ratio setpoint should be effective as factor or as divisor (range, -2 ... 1.999939, step size 0.000061). SETPNT.S3200.I_T3 SIMADYN D:B1 PKW-TYP:BOOLEAN	0...1 1	0	3.4.3 6.3.3.4 [D1.6]
H523 1523d 05F3h	**STU_PYO_REL** Relative slack take-up/slack-off Specifies whether the injected setpoints for slack take-up and slack-off should be proportionally increased with the speed or not. SETPNT.S3210.I_T3 SIMADYN D:B1 PKW-TYP:BOOLEAN	0...1 1	0	3.4.4 6.3.3.5 [D1.7]
H524 1524d 05F4h	**SRC_BIT_STU** Source bit, slack take-up Connector number of the supplying value. SETPNT.S3215.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.4.4 6.3.3.5 [D1.3]
H525 1525d 05F5h	**MSK_BIT_STU** Mask bit, slack take-up Mask to select the controlling bits. Increases the speed in order to take-up material slack and to reduce a possible sag. SETPNT.S3215.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.4.4 6.3.3.5 [D1.4]
H526 1526d 05F6h	**STU_REF_VEL** Setpoint, slack take-up Supplementary setpoint to reduce the material quantity in front of the drive. SETPNT.S3220.X2_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	2%	3.4.4 6.3.3.5 [D1.4]
H527 1527d 05F7h	**SRC_BIT_PYO** Source bit, slack-off Connector number of the supplying value. SETPNT.S3225.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.4.4 6.3.3.5 [D1.3]
H528 1528d 05F8h	**MSK_BIT_PYO** Mask bit, slack-off Mask to select the controlling bits. Reduces the speed in order to output material and decrease excessive web tension. SETPNT.S3225.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.4.4 6.3.3.5 [D1.4]
H529 1529d 05F9h	**PYO_REF_VEL** Setpoint, slack-off Supplementary setpoint to increase the material quantity in front of the drive. SETPNT.S3230.X2_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	-2%	3.4.4 6.3.3.5 [D1.5]
H530 1530d 05FAh	**FLT_STU_PYO** Slack take-up/slack-off smoothing Time constant with which the setpoints for slack take-up and slack-off are smoothed. SETPNT.S3250.T_T3 SIMADYN D:R2 PKW-TYP:O4	40[ms]...655 360[ms]	1 000[ms]	3.4.4 6.3.3.5 [D1.7]

Parameter number	Description	Range, steps	Werksein-stellung	Section [Plan]
H531 1531d 05FBh	**RF1_LOC_REF** Local setpoint 1 Local setpoint, which becomes active for status 0001h of the operating mode word. SETPNT.S3300.X1_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.2.10 6.3.2.10 6.3.3.7 [D2.1]
H532 1532d 05FCh	**RF2_LOC_REF** Local setpoint 2 Local setpoint, which becomes active for status 0002h of the operating mode word. SETPNT.S3300.X2_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.2.10 6.3.2.10 6.3.3.7 [D2.1]
H533 1533d 05FDh	**RF3_LOC_REF** Local setpoint 3 Local setpoint, which becomes active for status 0003h of the operating mode word. SETPNT.S3300.X3_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.2.10 6.3.2.10 6.3.3.7 [D2.1]
H534 1534d 05FEh	**SRC_RF4_LOC** Source, local setpoint 4 Connector number of the supplying value. Becomes active as local setoint with status 0004h of the operting mode. SETPNT.S3290.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.2.10 6.3.2.10 [D2.1]
H535 1535d 05FFh	**RF5_LOC_REF** Local setpoint 5 Local setpoint, which becomes active for status 0005h of the operating mode word. SETPNT.S3300.X5_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.2.10 6.3.2.10 6.3.3.7 [D2.1]
H536 1536d 0600h	**RF6_LOC_REF** Local setpoint 6 Local setpoint, which becomes active for status 0006h of the operating mode word. SETPNT.S3300.X6_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.2.10 6.3.2.10 6.3.3.7 [D2.1]
H537 1537d 0601h	**RF7_LOC_REF** Local setpoint 7 Local setpoint, which becomes active for status 0007h of the operating mode word. SETPNT.S3300.X7_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.2.10 6.3.2.10 6.3.3.7 [D2.1]
H538 1538d 0602h	**JG1_LOC_REF** Inching setpoint 1 Local setpoint, which becomes active for status 0008h of the operating mode word. SETPNT.S3300.X8_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.2.4 6.3.2.8 6.3.2.10 6.3.3.7 [D2.1]
H539 1539d 0603h	**JG2_LOC_REF** Inching setpoint 2 Local setpoint, which becomes active for status 0009h of the operating mode word. SETPNT.S3300.X9_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.2.4 6.3.2.8 6.3.2.10 6.3.3.7 [D2.1]

Parameter number	Description	Range, steps	Werksein-stellung	Section [Plan]
H540 1540d 0604h	**TUP_LOC_RGE** Ramp-up time, local ramp-function generator Time, which the ramp-function generator requires to increase the local setpoint by 100% if the local operating mode is changed. SETPNT.S3310.TU_T3 SIMADYN D:R2 PKW-TYP:O4	40[ms]...655 360[ms]	10 000[ms]	3.4.6 6.3.3.7 6.3.3.8 [D2.3]
H541 1541d 0605h	**TDN_LOC_RGE** Ramp-down time, local ramp-function generator Time, which the ramp-function generator requires to decrease the local setpoint by 100% if the local operating mode is changed. SETPNT.S3310.TD_T3 SIMADYN D:R2 PKW-TYP:O4	40[ms]...655 360[ms]	10 000[ms]	3.4.6 6.3.3.7 6.3.3.8 [D2.3]
H542 1542d 0606h	**TUP_RUI_RGE** Ramp-up time, triggerable RFG Time which the ramp-function generator requires to increase the speed setpoint by 100% in the direction of more positive values, if a local operating mode is changed, or back to operation, or the drive is powered-up with a setpoint present or for a standard stop. SETPNT.S3450.TI_T3 SIMADYN D:R2 PKW-TYP:O4	40[ms]...655 360[ms]	60 000[ms]	3.4.7 [D2.4]
H543 1543d 0607h	**TDN_RUI_RGE** Ramp-down time, triggerable RFG Time which the ramp-function generator requires to increase the speed setpoint by 100% in the direction of negative values if a local operating mode is selected or back to operation, or the drive is powered-up with a setpoint present or for a standard stop. SETPNT.S3460.TI_T3 SIMADYN D:R2 PKW-TYP:O4	40[ms]...655 360[ms]	60 000[ms]	3.4.7 [D2.4]
H544 1544d 0608h	**SRC_ONC_BIS** Source bit, bias on Connector number of the supplying value. SETPNT.S3500.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	6.3.3.11 [D2.5]
H545 1545d 0609h	**MSK_ONC_BIS** Mask bit, bias on Mask to select the controlling bits. Activates a fixed, non-smoothed supplementary setpoint to the speed setpoint. This is required for load equalization via torque limits in order to keep the controller at the limits. SETPNT.S3500.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	6.3.3.11 [D2.5]
H546 1546d 060Ah	**REF_VEL_BIS** Setpoint, bias Additive supplementary setpoint to the speed setpoint. SETPNT.S3510.X2_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	5%	3.4.11 6.3.3.11 [D2.5]
H547 1547d 060Bh	**FLT_REF_VEL** Smoothing, line speed setpoint Time constant, of the line speed setpoint smoothing before it is converted into a speed and sent to the converter. SETPNT.S1505.T_T1 SIMADYN D:R2 PKW-TYP:O4	5[ms]...81 920[ms]	5[ms]	3.4.9 3.5.2 [D2.6]
H548-599	(Unused)			

Parameter number	Description	Range, steps	Werksein-stellung	Section [Plan]
H600 1600d 0640h	**SRC_INP_IV1** Source, input free inverter 1 Connector number of the supplying value. AUXIL.R3010.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.6.3 [F2.1]
H601 1601d 0641h	**SRC_IN1_AD1** Source, summand 1, free adder 1 Connector number of the supplying value. AUXIL.R3020.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.6.3 [F2.1]
H602 1602d 0642h	**SRC_IN2_AD1** Source, summand 2 free adder 1 Connector number of the supplying value. AUXIL.R3030.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.6.3 [F2.1]
H603 1603d 0643h	**SRC_IN1_SU1** Source, minuend, free subtractor 1 Connector number of the supplying value. AUXIL.R3040.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.6.3 [F2.1]
H604 1604d 0644h	**SRC_IN2_SU1** Source, subtrahend free subtractor 1 Connector number of the supplying value. AUXIL.R3050.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.6.3 [F2.1]
H605 1605d 0645h	**SRC_IN1_MU1** Source, factor 1, free multiplier 1 Connector number of the supplying value. AUXIL.R3060.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.6.3 [F2.1]
H606 1606d 0646h	**SRC_IN2_MU1** Source, factor 2, free multiplier 1 Connector number of the supplying value. AUXIL.R3070.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.6.3 [F2.1]
H607 1607d 0647h	**SRC_IN1_DV1** Source, dividend free divider 1 Connector number of the supplying value. AUXIL.R3080.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.6.3 [F2.3]
H608 1608d 0648h	**SRC_IN2_DV1** Source, divisor, free divider 1 Connector number of the supplying value. AUXIL.R3090.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.6.3 [F2.3]
H609 1609d 0649h	**SRC_INP_LM1** Source, input free limiter 1 Connector number of the supplying value. AUXIL.R3100.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.6.3 [F2.3]
H610 1610d 064Ah	**SRC_LUP_LM1** Source, upper limit free limiter 1 Connector number of the supplying value. AUXIL.R3110.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.6.3 [F2.3]
H611 1611d 064Bh	**SRC_LLO_LM1** Source, lower limit free limiter 1 Connector number of the supplying value. AUXIL.R3120.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.6.3 [F2.3]

Parameter number	Description	Range, steps	Werksein-stellung	Section [Plan]
H612 1612d 064Ch	**SRC_IN1_SW1** Source 1, free changeover switch 1 Connector number of the supplying value. AUXIL.R3130.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.6.3 [F2.3]
H613 1613d 064Dh	**SRC_IN2_SW1** Source 2, free changeover switch 1 Connector number of the supplying value. AUXIL.R3140.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.6.3 [F2.3]
H614 1614d 064Eh	**SRC_BIN_SW1** Source, control bit free changeover switch 1 Connector number of the supplying value. AUXIL.R3150.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.6.3 [F2.3]
H615 1615d 064Fh	**MSK_BIN_SW1** Mask, control bit free changeover switch 1 Mask to select the controlling bits. AUXIL.R3150.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	v [F2.3]
H616 1616d 0650h	**SRC_INP_FT1** Source, input free filter 1 Connector number of the supplying value. AUXIL.R3160.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.6.3 [F2.5]
H617 1617d 0651h	**SRC_TCN_FT1** Source, time constant free filter 1 Connector number of the supplying value. A value of 0.006% (0001h) corresponds to the sampling time (in this case 40 [ms]). AUXIL.R3170.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.6.3 [F2.5]
H618 1618d 0652h	**SRC_INP_SI2** Source, input free inverter 2 Connector number of the supplying value. AUXIL.R4010.NC_T4 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.6.4 [F2.5]
H619 1619d 0653h	**SRC_INP_SI3** Source, input free inverter 3 Connector number of the supplying value. AUXIL.R4015.NC_T4 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.6.4 [F2.5]
H620 1620d 0654h	**SRC_IN1_AD2** Source, summand 1 free adder 2 Connector number of the supplying value. AUXIL.R4020.NC_T4 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.6.4 [F2.5]
H621 1621d 0655h	**SRC_IN2_AD2** Source, summand 2 free adder 2 Connector number of the supplying value. AUXIL.R4030.NC_T4 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.6.4 [F2.5]
H622 1622d 0656h	**SRC_IN1_AD3** Source, summand 1 free adder 3 Connector number of the supplying value. AUXIL.R4025.NC_T4 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.6.4 [F2.7]

Parameter number	Description	Range, steps	Werksein-stellung	Section [Plan]
H623 1623d 0657h	**SRC_IN2_AD3** Source, summand 2 free adder 3 Connector number of the supplying value. AUXIL.R4035.NC_T4 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.6.4 [F2.7]
H624 1624d 0658h	**SRC_IN1_SU2** Source, minuend 3 subtractor 2 Connector number of the supplying value. AUXIL.R4040.NC_T4 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.6.4 [F2.7]
H625 1625d 0659h	**SRC_IN2_SU2** Source, subtrahend free subtractor 2 Connector number of the supplying value. AUXIL.R4050.NC_T4 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.6.4 [F2.7]
H626 1626d 065Ah	**SRC_IN1_SU3** Source, minuend free subtractor 3 Connector number of the supplying value. AUXIL.R4045.NC_T4 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.6.4 [F2.7]
H627 1627d 065Bh	**SRC_IN2_SU3** Source, subtrahend free subtractor 3 Connector number of the supplying value. AUXIL.R4055.NC_T4 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.6.4 [F2.7]
H628 1628d 065Ch	**SRC_IN1_MU2** Source, factor 1 free multiplier 2 Connector number of the supplying value. AUXIL.R4060.NC_T4 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.6.4 [F2.7]
H629 1629d 065Dh	**SRC_IN2_MU2** Source, factor 2 free multiplier 2 Connector number of the supplying value. AUXIL.R4070.NC_T4 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.6.4 [F2.7]
H630 1630d 065Eh	**SRC_IN1_MU3** Source, factor 1 free multiplier 3 Connector number of the supplying value. AUXIL.R4065.NC_T4 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.6.4 [F3.1]
H631 1631d 065Fh	**SRC_IN2_MU3** Source, factor 2 free multiplier 3 Connector number of the supplying value. AUXIL.R4075.NC_T4 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.6.4 [F3.1]
H632 1632d 0660h	**SRC_IN1_DV2** Source, dividend, free divider 2 Connector number of the supplying value. AUXIL.R4080.NC_T4 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.6.4 [F3.1]
H633 1633d 0661h	**SRC_IN2_DV2** Source, divisor, free divider 2 Connector number of the supplying value. AUXIL.R4090.NC_T4 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.6.4 [F3.1]
H634 1634d 0662h	**SRC_IN1_DV3** Source, dividend free divider 3 Connector number of the supplying value. AUXIL.R4085.NC_T4 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.6.4 [F3.1]

Parameter number	Description	Range, steps	Werksein-stellung	Section [Plan]
H635 1635d 0663h	**SRC_IN2_DV3** Source, divisor free divider 3 Connector number of the supplying value. AUXIL.R4095.NC_T4 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.6.4 [F3.1]
H636 1636d 0664h	**SRC_INP_LM2** Source, input free limiter 2 Connector number of the supplying value. AUXIL.R4100.NC_T4 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.6.4 [F3.3]
H637 1637d 0665h	**SRC_LUP_LM2** Source, upper limit free limiter 2 Connector number of the supplying value. AUXIL.R4110.NC_T4 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.6.4 [F3.3]
H638 1638d 0666h	**SRC_LLO_LM2** Source, lower limit free limiter 2 Connector number of the supplying value. AUXIL.R4120.NC_T4 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.6.4 [F3.3]
H639 1639d 0667h	**SRC_INP_LM3** Source, input free limiter 3 Connector number of the supplying value. AUXIL.R4105.NC_T4 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.6.4 [F3.3]
H640 1640d 0668h	**SRC_LUP_LM3** Source, upper limit free limiter 3 Connector number of the supplying value. AUXIL.R4115.NC_T4 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.6.4 [F3.3]
H641 1641d 0669h	**SRC_LLO_LM3** Source, lower limit free limiter 3 Connector number of the supplying value. AUXIL.R4125.NC_T4 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.6.4 [F3.3]
H642 1642d 066Ah	**SRC_IN1_SW2** Source 1, free changeover switch 2 Connector number of the supplying value. AUXIL.R4130.NC_T4 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.6.4 [F3.5]
H643 1643d 066Bh	**SRC_IN2_SW2** Source 2, free changeover switch 2 Connector number of the supplying value. AUXIL.R4140.NC_T4 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.6.4 [F3.5]
H644 1644d 066Ch	**SRC_BIN_SW2** Source, control bit free changeover switch 2 Connector number of the supplying value. AUXIL.R4150.NC_T4 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.6.4 [F3.5]
H645 1645d 066Dh	**MSK_BIN_SW2** Mask, control bit free changeover switch 2 Mask to select the controlling bits. AUXIL.R4150.MSK_T4 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.6.4 [F3.5]
H646 1646d 066Eh	**SRC_IN1_SW3** Source 1, free changeover switch 3 Connector number of the supplying value. AUXIL.R4135.NC_T4 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.6.4 [F3.5]

Parameter number	Description	Range, steps	Werksein-stellung	Section [Plan]
H647 1647d 066Fh	**SRC_IN1_SW3** Source 2, free changeover switch 3 Connector number of the supplying value. AUXIL.R4145.NC_T4 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.6.4 [F3.5]
H648 1648d 0670h	**SRC_BIN_SW3** Source, control bit free changeover switch 3 Connector number of the supplying value. AUXIL.R4155.NC_T4 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.6.4 [F3.5]
H649 1649d 0671h	**MSK_BIN_SW3** Mask, control bit free changeover switch 3 Mask to select the controlling bits. AUXIL.R4155.MSK_T4 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.6.4 [F3.5]
H650 1650d 0672h	**SRC_INP_FT2** Source, input free filter 2 Connector number of the supplying value. AUXIL.R4160.NC_T4 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.6.4 [F3.5]
H651 1651d 0673h	**SRC_TCN_FT2** Source, time constant free filter 2 Connector number of the supplying value. A value of 0.006% (0001h) corresponds to the sampling time (in this case, 160 [ms]). AUXIL.R4170.NC_T4 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.6.4 [F3.5]
H652 1652d 0674h	**SRC_INP_FT3** Source, input free filter 3 Connector number of the supplying value. AUXIL.R4165.NC_T4 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.6.4 [F3.7]
H653 1653d 0675h	**SRC_TCN_FT3** Source, time constant free filter 3 Connector number of the supplying value. A value of 0.006% (0001h) corresponds to the sampling time (in this case, 160 [ms]). AUXIL.R4175.NC_T4 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.6.4 [F3.7]
H654 1654d 0676h	**SRC_INP_AV1** Source, input absolute value generator Connector number of the supplying value. AUXIL.R4180.NC_T4 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.6.4 [F3.7]
H655 1655d 0677h	**SRC_INP_RD1** Source, input square-root extractor Connector number of the supplying value. AUXIL.R4190.NC_T4 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.6.4 [F3.7]
H656 1656d 0678h	**SRC_IN1_MAX** Source, input 1 maximum evaluator Connector number of the supplying value. AUXIL.R4200.NC_T4 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.6.4 [F3.7]
H657 1657d 0679h	**SRC_IN2_MAX** Source, input 2 maximum evaluator Connector number of the supplying value. AUXIL.R4210.NC_T4 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.6.4 [F3.7]

Parameter number	Description	Range, steps	Werksein-stellung	Section [Plan]
H658 1658d 067Ah	**SRC_IN1_MIN** Source, input 1 minimum evaluator Connector number of the supplying value. AUXIL.R4220.NC_T4 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.6.4 [F4.1]
H659 1659d 067Bh	**SRC_IN2_MIN** Source, input 2 minimum evaluator Connector number of the supplying value. AUXIL.R4230.NC_T4 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.6.4 [F4.1]
H660 1660d 067Ch	**SRC_INP_SIN** Source, input sinusoidal function Connector number of the supplying value. AUXIL.R4240.NC_T4 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.6.4 [F4.1]
H661-674	(Unused)			
H675 1675d 068Bh	**SRC_IN1_XR1** Source, input 1 word EXOR gate 1 Connector number of the supplying value. AUXIL.R4250.NC_T4 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.6.4 [F4.3]
H676 1676d 068Ch	**SRC_IN2_XR1** Source, input 2 word EXOR gate 1 Connector number of the supplying value. AUXIL.R4260.NC_T4 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.6.4 [F4.3]
H677 1677d 068Dh	**SRC_IN1_XR2** Source, input 1 word EXOR gate 2 Connector number of the supplying value. AUXIL.R4270.NC_T4 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.6.4 [F4.3]
H678 1678d 068Eh	**SRC_IN2_XR2** Source, input 2 word EXOR gate 2 Connector number of the supplying value. AUXIL.R4280.NC_T4 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.6.4 [F4.3]
H679 1679d 068Fh	**SRC_IN1_XR3** Source, input 1 word EXOR gate 3 Connector number of the supplying value. AUXIL.R4290.NC_T4 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.6.4 [F4.3]
H680 1680d 0690h	**SRC_IN2_XR3** Source, input 2 word EXOR gate 3 Connector number of the supplying value. AUXIL.R4300.NC_T4 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.6.4 [F4.3]
H681 1681d 0691h	**SRC_IN1_XR4** Source, input 1 word EXOR gate 4 Connector number of the supplying value. AUXIL.R4310.NC_T4 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.6.4 [F4.5]
H682 1682d 0692h	**SRC_IN2_XR4** Source, input 2 word EXOR gate 4 Connector number of the supplying value. AUXIL.R4320.NC_T4 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.6.4 [F4.5]

Parameter number	Description	Range, steps	Werksein-stellung	Section [Plan]
H683 1683d 0693h	**CLK_IVL_TIM** Pulse duration, flashing frequency Duration of the pulse as well as the interval of the flashing clock. AUXIL.BL10.T_T4 SIMADYN D:T2 PKW-TYP:O4	0[ms]...2 621 440[ms] 160[ms]	1 000[ms]	3.6.4 [F4.5]
H684 1684d 0694h	**SRC_CLK_WRD** Source, flashing requency word Duration of the pulse as well as the interval of the flashing clock. Those bits which are active in the selected input word, flash. AUXIL.BL40.NC_T4 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.6.4 [F4.5]
H685 1685d 0695h	**CLW_IVL_TIM** Pulse duration, flashing requency word Duration of the pulses as well as the interval of the flashing clock, those bits are controlled, which have a logical one in the selected word. AUXIL.BL50.T_T4 SIMADYN D:T2 PKW-TYP:O4	0[ms]...2 621 440[ms] 160[ms]	1 000[ms]	3.6.4 [F4.6]
H686 1686d 0696h	**NOM_KOR_PDF** Numerator, position difference correction Numerator of the quotient, with which the position actual value of pulse encoder 2 is multiplied before the difference to position actual value 1 is generated. This allows different gearbox factors and diameters to be compensated. INPUT.TA10.NM_T1 SIMADYN D:I2 PKW-TYP:I2	-32768...32767 1	1	3.6.4 [F4.7]
H687 1687d 0697h	**DEN_KOR_PDF** Denominator, position difference correction Denominator of the quotient, with which the position actual value of pulse encoder 2 is multiplied before the difference to position actual value 1 is generated. This allows different gearbox factors and diameters to be compensated. INPUT.TA10.DN_T1 SIMADYN D:I2 PKW-TYP:I2	-32768...32767 1	1	3.6.4 [F4.7]
H688 1688d 0698h	**SRC_RES_PDF** Source, reset position difference Connector number of the supplying value. INPUT.TA5.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.6.4 [F4.7]
H689 1689d 0699h	**MSK_RES_PDF** Mask, reset position difference Mask to select the controlling bits. Resets the calculated position difference. INPUT.TA5.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.6.4 [F4.7]

Parameter number	Description	Range, steps	Werksein-stellung	Section [Plan]
H690 1690d 069Ah	**DEF_DIG_TC1** Definition, pulse evaluation 1 Defines the pulse evaluation mode and the source of the pulses. Bits 0 to 3: Digital filter for the tracks and zero pulse Values 0 and 3: 500kHz Value 1: No filter Value 2: 2MHz Value 4: 126kHz Value 5: 62.5kHz Bits 4 to 7: Pulse encoder type Value 0: Encoder with 2 tracks displaced through 90° Value 1: Encoder with up and down tracks Value 2: Zero pulse via the bus from the CU Value 4: Tracks A+B via the bus from CU Value 6: Tracks and zero pulse via the bus from CU Bits 8 to 11: Rough pulse selection Value 0: No rough pulse evaluation Value 1: Rough pulse type 1 Value 2: Rough pulse type 2 Bits 12 to 15: Evaluation, zero pulse Value 0: Not direction of rotation-dependent Value 1: Direction of rotation-dependent Other values are not defined. INPUT.TA10.IT1_T1 SIMADYN D:V2 PKW-TYP:V2 (INIT)	0000h...FFFFh 0001h	0000h	[A6.3]
H691 1691d 069Bh	**DEF_DIG_TC2** Definition, pulse evaluation 2 Defines the pulse evaluation mode. Bits 0 to 3: Digital filter for the tracks and zero pulse Values 0 and 3: 500kHz Value 1: No filter Value 2: 2MHz Value 4: 126kHz Value 5: 62.5kHz Bits 4 to 7: Pulse encoder type Value 0: Encoder with 2 tracks displaced through 90° Value 1: Encoder with tracks for up and down Bits 8 to 11: Rough pulse selection Value 0: No rough pulse evaluation Value 1: Rough pulse type 1 Value 2: Rough pulse type 2 Bits 12 to 15: Evaluation, zero pulse Value 0: Not direction of rotation-dependent Value 1: Direction of rotation-dependent INPUT.TA5.IT2_T1 SIMADYN D:V2 PKW-TYP:V2 (INIT)	0000h...FFFFh 0001h	0000h	[A6.3]
H692-699	(Unused)			
H700 1700d 06A4h	**FRC_DGM_VL1** Friction characteristic, line speed 1 Line speed for point 1 of the characteristic. The associated torque setpoint is also valid for all line speeds which are more negative. TORQ.T400.A1_T4 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.5.1 6.3.3.12 [E1.2]

Parameter number	Description	Range, steps	Werksein-stellung	Section [Plan]
H701 1701d 06A5h	**FRC_DGM_TQ1** Friction characteristic, torque 1 Friction torque for point 1 of the characteristic. Line speed-dependent supplementary torque to compensate fraction losses. TORQ.T400.B1 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.5.1 6.3.3.12 [E1.2]
H702 1702d 06A6h	**FRC_DGM_VL2** Friction characteristic, line speed 2 Line speed for point 2 of the characteristic. TORQ.T400.A2_T4 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	20%	3.5.1 6.3.3.12 [E1.2]
H703 1703d 06A7h	**FRC_DGM_TQ2** Friction characteristic, torque 2 Friction torque for point 2 of the characteristic. Line speed-dependent supplementary torque to compensate for friction losses. TORQ.T400.B2_T4 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.5.1 6.3.3.12 [E1.2]
H704 1704d 06A8h	**FRC_DGM_VL3** Friction characteristic, line speed 3 Line speed for point 3 of the characteristic. TORQ.T400.A3_T4 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	40%	3.5.1 6.3.3.12 [E1.2]
H705 1705d 06A9h	**FRC_DGM_TQ3** Friction characteristic, torque 3 Friction torque for point 3 of the characteristic. Line speed-dependent supplementary torque to compensate for the friction losses. TORQ.T400.B3_T4 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.5.1 6.3.3.12 [E1.2]
H706 1706d 06AAh	**FRC_DGM_VL4** Friction characteristic, line speed 4 Line speed for point 4 of the characteristic. TORQ.T400.A4_T4 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	60%	3.5.1 6.3.3.12 [E1.2]
H707 1707d 06ABh	**FRC_DGM_TQ4** Friction characteristic, torque 4 Frictional torque for point 4 of the characteristic. Line speed-dependent supplementary torque to compensate the friction losses. TORQ.T400.B4_T4 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.5.1 6.3.3.12 [E1.2]
H708 1708d 06ACh	**FRC_DGM_VL5** Friction characteristic, line speed 5 Line speed for point 5 of the characteristic. TORQ.T400.A5_T4 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	80%	3.5.1 6.3.3.12 [E1.2]
H709 1709d 06ADh	**FRC_DGM_TQ5** Friction characteristic, torque 5 Friction torque for point 5 of the characteristic. Line speed-dependent supplementary torque to compensate the friction losses. TORQ.T400.B5_T4 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.5.1 6.3.3.12 [E1.2]
H710 1710d 06AEh	**FRC_DGM_VL6** Friction characteristic, line speed 6 Line speed for point 6 of the characteristic. The associated torque setpoint is also valid for all line speeds which are more positive. TORQ.T400.A6_T4 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	100%	3.5.1 6.3.3.12 [E1.2]

Parameter number	Description	Range, steps	Werksein-stellung	Section [Plan]
H711 1711d 06AFh	**FRC_DGM_TQ6** Friction characteristic, torque 6 Friction torque for point 6 of the characteristic. Line speed-dependent supplementary torque to compensate the friction losses. TORQ.T400.B6_T4 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.5.1 6.3.3.12 [E1.2]
H712 1712d 06B0h	**SRC_ACC_REF** Source, acceleration Connector number of the supplying value. When an accelerating signal is used from the line speed differentiation, the connector number of a line speed signal must be specified here. TORQ.T20.NC_T1 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.5.2 6.3.3.13 [E1.1]
H713 1713d 06B1h	**TIM_ACC_REF** Reference time, acceleration Time for ramp-up or ramp-down (acceleration or deceleration), where the accelerating signal should be 100%. Only relevant for line speed differentation. TORQ.T24.X2_T3 SIMADYN D:R2 PKW-TYP:O4	40[ms]...655 360[ms]	100[ms]	3.5.2 6.3.3.13 [E1.2]
H714 1714d 06B2h	**CLC_ACC_REF** Acceleration from differentiation Defines that a line speed signal was selected, and the acceleration was retrieved by differentiating. TORQ.T26.I_T1 SIMADYN D:B1 PKW-TYP:BOOLEAN	0...1 1	0	3.5.2 [E1.3]
H715 1715d 06B3h	**SRC_TRQ_ADD** Source, supplementary torque Connector number of the supplying value. This added to the friction, acceleration and technological controller torque. TORQ.T10.NC_T1 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.5.3 6.3.3.13 [E1.4]
H716 1716d 06B4h	**MUL_TRQ_ADD** Adaption factor, supplementary torque Value, with which the supplementary torque is multiplied. The following is valid: 100%x100%=100% TORQ.T12.X2_T1 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	100%	3.5.3 [E1.4]
H717 1717d 06B5h	**SRC_INE_REF** Source, moment of inertia Connector number of the supplying value. Defines the magnitude of the accelerating torque when accelerating. TORQ.T30.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.5.2 6.3.3.13 [E1.4]
H718 1718d 06B6h	**MUL_INE_REF** Adaption factor, moment of inertia Accelerating torque can be adjusted. The following is valid: 100%x100%=100% TORQ.T40.X1_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	100%	3.5.2 6.3.3.13 [E1.4]
H719 1719d 06B7h	**SRC_MSR_REF** Source, torque setpoint from the master Connector number of the supplying value. Transfers the master drive load component and controls the slave torque setpoint via the torque ratio. TORQ.T980.NC_T1 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.5.4 [E2.1]

Parameter number	Description	Range, steps	Werksein-stellung	Section [Plan]
H720 1720d 06B8h	**SRC_TRQ_RTO** Source, torque ratio Connector number of the supplying value. Defines the slave load component, referred to the master. TORQ.T130.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.5.4 [E2.1]
H721 1721d 06B9h	**TRQ_REF_FRA** Torque setpoint with friction/acceleration The slave load torque is used as torque setpoint in status zero, otherwise, the friction- and accelerating torque are added. TORQ.T1020.I_T1 SIMADYN D:B1 PKW-TYP:BOOLEAN	0...1 1	0	3.5.4 [E2.4]
H722 1722d 06BAh	**TRQ_MAX_POS** Maximum torque, positive Value of the positive torque limit for the drive, if this is not variable (for load distribution or fast stop). TORQ.T1110.X2_T1 SIMADYN D:N2 PKW-TYP:I4	0%...199% 0.006%	100%	3.5.4 [E2.5]
H723 1723d 06BBh	**TRQ_MAX_NEG** Maximum torque, negative Value of the negative torque limit for the drive, if this is not variable (for load distribution or fast stop). TORQ.T1120.X1_T1 SIMADYN D:N2 PKW-TYP:I4	-199%...0% 0.006%	-100%	3.5.4 [E2.5]
H724 1724d 06BCh	**BRK_DGM_VL1** Braking characteristic, line speed 1 Line speed which ends at the reduction of the braking torque and which remains constant at the associated setpoint below this. This value must be less than that in H75. TORQ.T120.A1_T3 SIMADYN D:N2 PKW-TYP:I4	0%...199.993% 0.006%	0%	3.5.5 6.3.3.13 [E2.2]
H725 1725d 06BDh	**BRK_DGM_TQ1** Braking characteristic, torque 1 Reduced braking torque, if the line speed is less than or equal to point H723. The characteristic is linearly interpolated between both points. TORQ.T120.B1_T3 SIMADYN D:N2 PKW-TYP:I4	0%...199.993% 0.006%	0%	3.5.5 6.3.3.13 [E2.2]
H726 1726d 06BEh	**BRK_DGM_VL2** Braking characteristic, speed 2 Line speed, where the braking torque is reduced (start) and above this remains constant at the maximum value. This value must be greater than that in H723. TORQ.T120.A2_T3 SIMADYN D:N2 PKW-TYP:I4	0%...199.993% 0.006%	5%	3.5.5 6.3.3.14 [E2.2]
H727 1727d 06BFh	**BRK_DGM_TQ2** Braking characteristic, torque 2 Maximum braking torque, if the line speed is greater than or equal to point H725. The characteristic is linearly interpolated between both points. TORQ.T120.B2_T3 SIMADYN D:N2 PKW-TYP:I4	0%...199.993% 0.006%	100%	3.5.5 [E2.2]
H728 1728d 06C0h	**LSH_TRQ_RMP** Change time, load distribution torque RFG Time for the torque setpoint to be changed by 100% by the triggerable torque ramp-function generator, if fast stop is not present. This defines the torque reduction when load distribution is switched-in. TORQ.T85.X1_T3 SIMADYN D:R2 PKW-TYP:O4	40[ms]...655 360[ms]	3 000[ms]	3.5.6 6.3.3.11 [E2.6]

Parameter number	Description	Range, steps	Werksein-stellung	Section [Plan]
H729 1729d 06C1h	**BRK_TRQ_RMP** Change time, braking torque RFG Time for the torque setpoint to be changed by 100% by the triggerable torque ramp-function generator, if fast stop is present. This defines the torque increase when changing-over to braking torque. TORQ.T85.X2_T3 SIMADYN D:R2 PKW-TYP:O4	40[ms]...655 360[ms]	1 000[ms]	3.5.6 6.3.2.3 [E2.6]
H730 1730d 06C2h	**FLT_TRQ_ACC** Smoothing, accelerating torque The accelerating torque smoothing time should be selected as high as the line speed setpoint smoothing. TORQ.T29.T_T1 SIMADYN D:R2 PKW-TYP:O4	5[ms]...81 920[ms]	5[ms]	3.5.2 [E1.4]
H731-800	(Unused)			
H801 1801d 0709h	**SRC_BT0_SSW** Source, bit 0 free status word Connector number of the supplying value. OUTPUT.ST3000.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.14 [A9.1]
H802 1802d 070Ah	**MSK_BT0_SSW** Mask, bit 0 free status word Mask to select the controlling bits. OUTPUT.ST3000.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.1.14 [A9.2]
H803 1803d 070Bh	**SRC_BT1_SSW** Source, bit 1 free status word Connector number of the supplying value. OUTPUT.ST3010.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.14 [A9.1]
H804 1804d 070Ch	**MSK_BT1_SSW** Mask, bit 1 free status word Mask to select the controlling bits. OUTPUT.ST3010.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.1.14 [A9.2]
H805 1805d 070Dh	**SRC_BT2_SSW** Source, bit 2 free status word Connector number of the supplying value. OUTPUT.ST3020.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.14 [A9.1]
H806 1806d 070Eh	**MSK_BT2_SSW** Mask, bit 2 free status word Mask to select the controlling bits. OUTPUT.ST3020.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.1.14 [A9.2]
H807 1807d 070Fh	**SRC_BT3_SSW** Source, bit 3 free status word Connector number of the supplying value. OUTPUT.ST3030.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.14 [A9.1]

Parameter number	Description	Range, steps	Werksein-stellung	Section [Plan]
H808 1808d 0710h	**MSK_BT3_SSW** Mask, bit 3 free status word Mask to select the controlling bits. OUTPUT.ST3030.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.1.14 [A9.2]
H809 1809d 0711h	**SRC_BT4_SSW** Source, bit 4 free status word Connector number of the supplying value. OUTPUT.ST3040.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.14 [A9.1]
H810 1810d 0712h	**MSK_BT4_SSW** Mask, bit 4 free status word Mask to select the controlling bits. OUTPUT.ST3040.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.1.14 [A9.2]
H811 1811d 0713h	**SRC_BT5_SSW** Source, bit 5 free status word Connector number of the supplying value. OUTPUT.ST3050.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.14 [A9.1]
H812 1812d 0714h	**MSK_BT5_SSW** Mask, bit 5 free status word Mask to select the controlling bits. OUTPUT.ST3050.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.1.14 [A9.2]
H813 1813d 0715h	**SRC_BT6_SSW** Source, bit 6 free status word Connector number of the supplying value. OUTPUT.ST3060.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.14 [A9.1]
H814 1814d 0716h	**MSK_BT6_SSW** Mask, bit 6 free status word Mask to select the controlling bits. OUTPUT.ST3060.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.1.14 [A9.2]
H815 1815d 0717h	**SRC_BT7_SSW** Source, bit 7 free status word Connector number of the supplying value. OUTPUT.ST3070.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.14 [A9.1]
H816 1816d 0718h	**MSK_BT7_SSW** Mask, bit 7 free status word Mask to select the controlling bits. OUTPUT.ST3070.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.1.14 [A9.2]
H817 1817d 0719h	**SRC_BT8_SSW** Source, bit 8 free status word Connector number of the supplying value. OUTPUT.ST3080.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.14 [A9.1]

Parameter number	Description	Range, steps	Werksein-stellung	Section [Plan]
H818 1818d 071Ah	**MSK_BT8_SSW** Mask, bit 8 free status word Mask to select the controlling bits. OUTPUT.ST3080.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.1.14 [A9.2]
H819 1819d 071Bh	**SRC_BT9_SSW** Source, bit 9 free status word Connector number of the supplying value. OUTPUT.ST3090.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.14 [A9.1]
H820 1820d 071Ch	**MSK_BT9_SSW** Mask, bit 9 free status word Mask to select the controlling bits. OUTPUT.ST3090.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.1.14 [A9.2]
H821 1821d 071Dh	**SRC_BTA_SSW** Source, bit 10 free status word Connector number of the supplying value. OUTPUT.ST3100.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.14 [A9.1]
H822 1822d 071Eh	**MSK_BTA_SSW** Mask, bit 10 free status word Mask to select the controlling bits. OUTPUT.ST3100.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.1.14 [A9.2]
H823 1823d 071Fh	**SRC_BTB_SSW** Source, bit 11 free status word Connector number of the supplying value. OUTPUT.ST3110.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.14 [A9.1]
H824 1824d 0720h	**MSK_BTB_SSW** Mask, bit 11 free status word Mask to select the controlling bits. OUTPUT.ST3110.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.1.14 [A9.2]
H825 1825d 0721h	**SRC_BTC_SSW** Source, bit 12 free status word Connector number of the supplying value. OUTPUT.ST3120.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.14 [A9.1]
H826 1826d 0722h	**MSK_BTC_SSW** Mask, bit 12 free status word Mask to select the controlling bits. OUTPUT.ST3120.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.1.14 [A9.2]
H827 1827d 0723h	**SRC_BTD_SSW** Source, bit 13 free status word Connector number of the supplying value. OUTPUT.ST3130.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.14 [A9.1]

Parameter number	Description	Range, steps	Werksein-stellung	Section [Plan]
H828 1828d 0724h	**MSK_BTD_SSW** Mask, bit 13 free status word Mask to select the controlling bits. OUTPUT.ST3130.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.1.14 [A9.2]
H829 1829d 0725h	**SRC_BTE_SSW** Source, bit 14 free status word Connector number of the supplying value. OUTPUT.ST3140.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.14 [A9.1]
H830 1830d 0726h	**MSK_BTE_SSW** Mask, bit 14 free status word Mask to select the controlling bits. OUTPUT.ST3140.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.1.14 [A9.2]
H831 1831d 0727h	**SRC_BTF_SSW** Source, bit 15 free status word Connector number of the supplying value. OUTPUT.ST3150.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.14 [A9.1]
H832 1832d 0728h	**MSK_BTF_SSW** Mask, bit 15 free status word Mask to select the controlling bits. OUTPUT.ST3150.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.1.14 [A9.2]
H833 1833d 0729h	**SRC_BT0_BNO** Source, bit 0, binary outputs (output 1) Connector number of the supplying value. OUTPUT.BQ3000.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.5 3.2.2 [A4.5]
H834 1834d 072Ah	**MSK_BT0_BNO** Mask, bit 0, binary outputs (output 1) Mask to select the controlling bits. Supplies the binary output. OUTPUT.BQ3000.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.1.5 3.2.2 [A4.5]
H835 1835d 072Bh	**SRC_BT1_BNO** Source, bit 1, binary outputs (output 2) Connector number of the supplying value. OUTPUT.BQ3010.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.5 [A4.5]
H836 1836d 072Ch	**MSK_BT1_BNO** Mask, bit 1, binary outputs (output 2) Mask to select the controlling bits. Supplies the binary output. OUTPUT.BQ3010.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.1.5 [A4.5]
H837 1837d 072Dh	**SRC_BT2_BNO** Source, bit 2, binary outputs (output 3) Connector number of the supplying value. OUTPUT.BQ3020.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.5 [A4.5]

Parameter number	Description	Range, steps	Werksein-stellung	Section [Plan]
H838 1838d 072Eh	**MSK_BT1_BNO** Mask, bit 2, binary outputs (output 3) Mask to select the controlling bits. Supplies the binary output. OUTPUT.BQ3020.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.1.5 [A4.5]
H839 1839d 072Fh	**SRC_BT3_BNO** Source, bit 3, binary outputs (output 4) Connector number of the supplying value. OUTPUT.BQ3030.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.5 [A4.5]
H840 1840d 0730h	**MSK_BT3_BNO** Mask, bit 3, binary outputs (output 4) Mask to select the controlling bits. Supplies the binary output. OUTPUT.BQ3030.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.1.5 [A4.5]
H841 1841d 0731h	**SRC_BT4_BNO** Source, bit 4, binary outputs (output 5) Connector number of the supplying value. OUTPUT.BQ3040.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.5 [A4.5]
H842 1842d 0732h	**MSK_BT4_BNO** Mask, bit 4, binary outputs (output 5) Mask to select the controlling bits. Supplies the binary output. OUTPUT.BQ3040.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.1.5 [A4.5]
H843 1843d 0733h	**SRC_BT5_BNO** Source, bit 5, binary outputs (output 6) Connector number of the supplying value. OUTPUT.BQ3050.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.5 [A4.5]
H844 1844d 0734h	**MSK_BT5_BNO** Mask, bit 5, binary outputs (output 6) Mask to select the controlling bits. Supplies the binary output. OUTPUT.BQ3050.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.1.5 [A4.5]
H845 1845d 0735h	**SRC_BT6_BNO** Source, bit 6, binary outputs (output 7) Connector number of the supplying value. OUTPUT.BQ3060.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.5 [A4.5]
H846 1846d 0736h	**MSK_BT6_BNO** Mask, bit 6, binary outputs (output 7) Mask to select the controlling bits. Supplies the binary output. OUTPUT.BQ3060.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.1.5 [A4.5]

Parameter number	Description	Range, steps	Werksein-stellung	Section [Plan]
H847 1847d 0737h	**SRC_BT7_BNO** Source, bit 7, binary outputs (output 8) Connector number of the supplying value. OUTPUT.BQ3070.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.5 [A4.5]
H848 1848d 0738h	**MSK_BT7_BNO** Mask, bit 7, binary outputs (output 8) Mask to select the controlling bits. Supplies the binary output. OUTPUT.BQ3070.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.1.5 [A4.5]
H849 1849d 0739h	**MSK_INV_BNO** Mask, inverting binary outputs Allows the 8 binary outputs to be inverted bitwise. Bit 0: Inversion, binary input 1 to Bit 7: Inversion, binary input 8 Bits 8 to 15: (unused) OUTPUT.BQ3110.IS2_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	3.1.5 [A4.6]
H850 1850d 073Ah	**SRC_ANA_OP1** Source, analog output 1 Connector number of the supplying value. OUTPUT.AQ1000.NC_T1 SIMADYN D:O2 PKW-TYP:O2	0...511 1	41	3.1.7 [A5.5]
H851 1851d 073Bh	**SLA_ANA_OP1** Select, absolute value analog output 1 Selects the absolute value of the supplying value for output. OUTPUT.AQ1020.I_T1 SIMADYN D:B1 PKW-TYP:BOOLEAN	0...1 1	0	3.1.7 [A5.6]
H852 1852d 073Ch	**FLT_ANA_OP1** Smoothing, analog output 1 Defines the time constant of the 1st order filter with which the signal, to be output, is smoothed. OUTPUT.AQ1050.T_T1 SIMADYN D:R2 PKW-TYP:O4	5[ms]...81 920[ms]	5[ms]	3.1.7 [A5.6]
H853 1853d 073Dh	**OFF_ANA_OP1** Offset, analog output 1 Is subtracted from the signal to be output. OUTPUT.AQ1060.OFF_T1 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.1.7 [A5.7]
H854 1854d 073Eh	**MUL_ANA_OP1** Gain, analog output 1 The conditioned signal is multiplied by this factor. The following is valid: 100%x1=100% and the assignment 100%=5V. OUTPUT.AQ1060.K_T1 SIMADYN D:E2 PKW-TYP:I4	-256...255.9921875 0.0078125	2	3.1.7 [A5.7]
H855 1855d 073Fh	**SRC_ANA_OP2** Source, analog output 2 Connector number of the supplying value. OUTPUT.AQ1100.NC_T1 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.7 [A5.5]

Parameter number	Description	Range, steps	Werksein-stellung	Section [Plan]
H856 1856d 0740h	**SLA_ANA_OP2** Select, absolute value analog output 2 Selects the absolute value of the supplying value for output. OUTPUT.AQ1120.I_T1 SIMADYN D:B1 PKW-TYP:BOOLEAN	0...1 1	0	3.1.7 [A5.6]
H857 1857d 0741h	**FLT_ANA_OP2** Smoothing, analog output 2 Defines the time constant of the 1st order filter, with which the signal, to be output, is smooothed. OUTPUT.AQ1150.T_T1 SIMADYN D:R2 PKW-TYP:O4	5[ms]...81 920[ms]	5[ms]	3.1.7 [A5.6]
H858 1858d 0742h	**OFF_ANA_OP2** Offset, analog output 2 Is subtracted from the signal to be output. OUTPUT.AQ1160.OFF_T1 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.1.7 [A5.7]
H859 1859d 0743h	**MUL_ANA_OP2** Gain, analog output 2 The conditioned signal is multiplied by this factor. The following is valid: 100%x1=100% and the assignment 100%=5V. OUTPUT.AQ1160.K_T1 SIMADYN D:E2 PKW-TYP:I4	-256...255.9921875 0.0078125	2	3.1.7 [A5.7]
H860 1860d 0744h	**SRC_ANA_OP3** Source, analog output 3 Connector number of the supplying value. OUTPUT.AQ3000.NC_T1 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.7 [A5.5]
H861 1861d 0745h	**SLA_ANA_OP3** Selection, absolute value analog output 3 Selects the absolute value of the supplying value for output. OUTPUT.AQ3020.I_T1 SIMADYN D:B1 PKW-TYP:BOOLEAN	0...1 1	0	3.1.7 [A5.6]
H862 1862d 0746h	**FLT_ANA_OP3** Smoothing, analog output 3 Defines the time constant of the 1st order filter with which the signal to be output is smoothed. OUTPUT.AQ3050.T_T1 SIMADYN D:R2 PKW-TYP:O4	40[ms]...655 360[ms]	40[ms]	3.1.7 [A5.6]
H863 1863d 0747h	**OFF_ANA_OP3** Offset, analog output 3 Is subtracted from the signal to be output. OUTPUT.AQ3060.OFF_T1 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.1.7 [A5.7]
H864 1864d 0748h	**MUL_ANA_OP3** Gain, analog output 3 The conditioned signal is multiplied by this factor. The following is valid: 100%x1=100% and the assignment 100%=5V. OUTPUT.AQ3060.K_T1 SIMADYN D:E2 PKW-TYP:I4	-256...255.9921875 0.0078125	2	3.1.7 [A5.7]

Parameter number	Description	Range, steps	Werksein-stellung	Section [Plan]
H865 1865d 0749h	**SRC_ANA_OP4** Source, analog output 4 Connector number of the supplying value. OUTPUT.AQ3100.NC_T1 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.7 [A5.5]
H866 1866d 074Ah	**SLA_ANA_OP4** Selection, absolute value analog output 4 Selects the absolute value of the supplying value for output. OUTPUT.AQ3120.I_T1 SIMADYN D:B1 PKW-TYP:BOOLEAN	0...1 1	0	3.1.7 [A5.6]
H867 1867d 074Bh	**FLT_ANA_OP4** Smoothing, analog output 4 Defines the time constant of the 1st order filter with which the signal to be output is smoothed. OUTPUT.AQ3150.T_T1 SIMADYN D:R2 PKW-TYP:O4	40[ms]...655 360[ms]	40[ms]	3.1.7 [A5.6]
H868 1868d 074Ch	**OFF_ANA_OP4** Offset, analog output 4 Is subtracted from the signal to be output. OUTPUT.AQ3160.OFF_T1 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.1.7 [A5.7]
H869 1869d 074Dh	**MUL_ANA_OP4** Gain, analog output 4 The conditioned signal is multiplied by this factor. The following is valid: 100%x1=100% and the assignment 100%=5V. OUTPUT.AQ3160.K_T1 SIMADYN D:E2 PKW-TYP:I4	-256...255.9921875 0.0078125	2	3.1.7 [A5.7]
H870 1870d 074Eh	**SRC_KPA_NRG** Source, kp adaption speed controller Connector number of the supplying value. It defines the process quantity, which specifies the speed controller adaption. OUTPUT.KP1000.NC_T1 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.13 [A8.1]
H871 1871d 074Fh	**STV_KPA_NRG** Start of kp adaption, speed controller Value of the process quantity, from which value the proportional gain factor changes. This value must be less than that in H873. OUTPUT.KP1010.A1_T1 SIMADYN D:N2 PKW-TYP:I4	0%...199.993% 0.006%	0%	3.1.13 [A8.2]
H872 1872d 0750h	**STF_KPA_NRG** Factor, start of kp adaption, speed controller Value, with which the speed controller proportional gain is multiplied as long as the process quantity is less than or equal to point H871. The characteristic is linearly interpolated between the two points. OUTPUT.KP1010.B1_T1 SIMADYN D:N2 PKW-TYP:I4	-20.00...19.99939 0.00061	1	3.1.13 [A8.2]

Parameter number	Description	Range, steps	Werksein-stellung	Section [Plan]
H873 1873d 0751h	**EDV_KPA_NRG** End of kp adaption, speed controller Value of the process quantity from which value the factor for the proportional gain had reached the changed value. This value must be greater than that in H871. OUTPUT.KP1010.A2_T1 SIMADYN D:N2 PKW-TYP:I4	0%...199.993% 0.006%	100%	3.1.13 [A8.2]
H874 1874d 0752h	**EDV_KPA_NRG** Factor, end of kp adaption, speed controller Value, with which the speed controller proportional gain is multiplied if the process quantity is greater or equal to point H873. The characteristic is linearly interpolated betwen the two points. OUTPUT.KP1010.B2_T1 SIMADYN D:N2 PKW-TYP:I4	-20.00...19.99939 0.00061	1	3.1.13 [A8.2]
H875 1875d 0753h	**SRC_DSP_PA1** Source, monitoring parameter 1 Connector number of the supplying value. Defines the quantity to be displayed in monitoring parameter d081. OUTPUT.S5000.NC_T5 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.6.2 [F1.7]
H876 1876d 0754h	**SRC_DSP_PA2** Source, monitoring parameter 2 Connector number of the supplying value. Defines the quantity to be displayed in monitoring parameter d082. OUTPUT.S5010.NC_T5 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.6.2 [F1.7]
H877 1877d 0755h	**SRC_DSP_PA3** Source, monitoring parameter 3 Connector number of the supplying value. Defines the quantity to be displayed in monitoring parameter d083. OUTPUT.S5020.NC_T5 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.6.2 [F1.7]
H878 1878d 0756h	**SRC_DSP_PA4** Source, monitoring parameter 4 (Hex) Connector number of the supplying value. Defines the quantity to be displayed in monitoring parameter d084. OUTPUT.S5030.NC_T5 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.6.2 [F1.7]
H879 1879d 0757h	**SRC_WD1_P2P** Source, word 1 to peer-to-peer Connector number of the supplying value. OUTPUT.PP1000.NC_T1 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.3 [A3.5]
H880 1880d 0758h	**MUL_WD1_P2P** Factor for word 1 to peer-to-peer Value, with which the signal is multiplied before sending. The following is valid: 100%x100%=100% OUTPUT.PP1010.X2_T1 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.1.3 [A3.6]
H881 1881d 0759h	**SRC_WD2_P2P** Source, word 2 to peer-to-peer Connector number of the supplying value. OUTPUT.PP1100.NC_T1 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.3 [A3.5]

Parameter number	Description	Range, steps	Werksein-stellung	Section [Plan]
H882 1882d 075Ah	**MUL_WD2_P2P** Factor for word 2 to peer-to-peer Value, with which the signal is multiplied before sending. The following is valid: 100%x100%=100% OUTPUT.PP1110.X2_T1 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.1.3 [A3.6]
H883 1883d 075Bh	**SRC_WD3_P2P** Source, word 3 to peer-to-peer Connector number of the supplying value. OUTPUT.PP1200.NC_T1 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.3 [A3.5]
H884 1884d 075Ch	**MUL_WD3_P2P** Factor for word 3 to peer-to-peer Value, with which the signal is multiplied before sending. The following is valid: 100%x100%=100% OUTPUT.PP1210.X2_T1 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.1.3 [A3.6]
H885 1885d 075Dh	**SRC_WD4_P2P** Source, word 4 to peer-to-peer Connector number of the supplying value. OUTPUT.PP1300.NC_T1 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.3 [A3.5]
H886 1886d 075Eh	**MUL_WD4_P2P** Factor for word 4 to peer-to-peer Value, with which the signal is multiplied before sending. The following is valid: 100%x100%=100% OUTPUT.PP1310.X2_T1 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.1.3 [A3.6]
H887 1887d 075Fh	**SRC_WD5_P2P** Source, word 5 to peer-to-peer Connector number of the supplying value. OUTPUT.PP1400.NC_T1 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.3 [A3.5]
H888 1888d 0760h	**SRC_WD1_TCU** Source, word 1 to CU Connector number of the supplying value. OUTPUT.SD1000.NC_T1 SIMADYN D:O2 PKW-TYP:O2	0...511 1	143	3.1.1 [A1.5]
H889 1889d 0761h	**SRC_WD2_TCU** Source, word 2 to CU Connector number of the supplying value. OUTPUT.SD1010.NC_T1 SIMADYN D:O2 PKW-TYP:O2	0...511 1	112	3.1.1 [A1.5]
H890 1890d 0762h	**SRC_WD3_TCU** Source, word 3 to CU Connector number of the supplying value. OUTPUT.SD1020.NC_T1 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.1 [A1.5]
H891 1891d 0763h	**SRC_WD4_TCU** Source, word 4 to CU Connector number of the supplying value. OUTPUT.SD1030.NC_T1 SIMADYN D:O2 PKW-TYP:O2	0...511 1	144	3.1.1 [A1.5]

Parameter number	Description	Range, steps	Werksein-stellung	Section [Plan]
H892 1892d 0764h	**SRC_WD5_TCU** Source, word 5 to CU Connector number of the supplying value. OUTPUT.SD1040.NC_T1 SIMADYN D:O2 PKW-TYP:O2	0...511 1	151	3.1.1 3.5.1 6.3.3.12 6.3.3.13 [A1.5]
H893 1893d 0765h	**SRC_WD6_TCU** Source, word 6 to CU Connector number of the supplying value. OUTPUT.SD1050.NC_T1 SIMADYN D:O2 PKW-TYP:O2	0...511 1	152	3.1.1 [A1.5]
H894 1894d 0766h	**SRC_WD7_TCU** Source, word 7 to CU Connector number of the supplying value. OUTPUT.SD1060.NC_T1 SIMADYN D:O2 PKW-TYP:O2	0...511 1	153	3.1.1 [A1.5]
H895 1895d 0767h	**SRC_WD8_TCU** Source, word 8 to CU Connector number of the supplying value. OUTPUT.SD1070.NC_T1 SIMADYN D:O2 PKW-TYP:O2	0...511 1	162	3.1.1 [A1.5]
H896 1896d 0768h	**SRC_WD9_TCU** Source, word 9 to CU Connector number of the supplying value. OUTPUT.SD1080.NC_T1 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.1 [A1.5]
H897 1897d 0769h	**SRC_WDA_TCU** Source, word 10 to CU Connector number of the supplying value. OUTPUT.SD1090.NC_T1 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.1 [A1.5]
H898 1898d 076Ah	**SRC_WDB_TCU** Source, word 11 to CU Connector number of the supplying value. OUTPUT.SD1100.NC_T1 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.1 [A1.5]
H899 1899d 076Bh	**SRC_WDC_TCU** Source, word 12 to CU Connector number of the supplying value. OUTPUT.SD1110.NC_T1 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.1 [A1.5]
H900 1900d 076Ch	**SRC_WDD_TCU** Source, word 13 to CU Connector number of the supplying value. OUTPUT.SD1120.NC_T1 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.1 [A1.5]
H901 1901d 076Dh	**SRC_WDE_TCU** Source, word 14 to CU Connector number of the supplying value. OUTPUT.SD1130.NC_T1 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.1 [A1.5]

Parameter number	Description	Range, steps	Werksein-stellung	Section [Plan]
H902 1902d 076Eh	**SRC_WDF_TCU** Source, word 15 to CU Connector number of the supplying value. OUTPUT.SD1140.NC_T1 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.1 [A1.5]
H903 1903d 076Fh	**SRC_WDG_TCU** Source, word 16 to CU Connector number of the supplying value. OUTPUT.SD1150.NC_T1 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.1 [A1.5]
H904 1904d 0770h	**SRC_WD1_TCB** Source, word 1 to CB Connector number of the supplying value. OUTPUT.SD2000.NC_T1 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.2 [A3.5]
H905 1905d 0771h	**SRC_WD2_TCB** Source, word 2 to CB Connector number of the supplying value. OUTPUT.SD2010.NC_T1 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.2 [A3.5]
H906 1906d 0772h	**SRC_WD3_TCB** Source, word 3 to CB Connector number of the supplying value. OUTPUT.SD2020.NC_T1 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.2 [A3.5]
H907 1907d 0773h	**SRC_WD4_TCB** Source, word 4 to CB Connector number of the supplying value. OUTPUT.SD2030.NC_T1 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.2 [A3.5]
H908 1908d 0774h	**SRC_WD5_TCB** Source, word 5 to CB Connector number of the supplying value. OUTPUT.SD2040.NC_T1 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.2 [A3.5]
H909 1909d 0775h	**SRC_WD6_TCB** Source, word 6 to CB Connector number of the supplying value. OUTPUT.SD2050.NC_T1 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.2 [A3.5]
H910 1910d 0776h	**SRC_WD7_TCB** Source, word 7 to CB Connector number of the supplying value. OUTPUT.SD2060.NC_T1 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.2 [A3.5]
H911 1911d 0777h	**SRC_WD8_TCB** Source, word 8 to CB Connector number of the supplying value. OUTPUT.SD2070.NC_T1 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.2 [A3.5]

Parameter number	Description	Range, steps	Werksein-stellung	Section [Plan]
H912 1912d 0778h	**SRC_WD8_TCB** Source, word 9 to CB Connector number of the supplying value. OUTPUT.SD2080.NC_T1 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.2 [A3.5]
H913 1913d 0779h	**SRC_WDA_TCB** Source, word 10 to CB Connector number of the supplying value. OUTPUT.SD2090.NC_T1 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.2 [A3.5]
H914 1914d 077Ah	**SRC_IN1_LV1** Source, value 1 limit value monitor 1 Connector number of the supplying value. It can be filtered and compared with a limit value. OUTPUT.GW100.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.15 [A9.5]
H915 1915d 077Bh	**FLT_IN1_LV1** Smoothing, value 1 limit value monitor 1 Time constant with which the signal to be monitored is smoothed. OUTPUT.GW110.T_T3 SIMADYN D:R2 PKW-TYP:O4	40[ms]...655 360[ms]	40[ms]	3.1.15 [A9.5]
H916 1916d 077Ch	**SRC_IN2_LV1** Source, value 2 limit value monitor 1 Connector number of the supplying value. Comparison value for the signal to be monitored. OUTPUT.GW120.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.15 [A9.5]
H917 1917d 077Dh	**LIM_CMP_LV1** Window size, limit value monitor 1 Defines the threshold, i.e. the maximum deviation between the signal (value 1) and limit value (value 2), which still results in “equal”. OUTPUT.GW130.L_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.1.15 [A9.6]
H918 1918d 077Eh	**HYS_CMP_LV1** Hysteresis, limit value monitor 1 Defines how far the deviation between the signal (value 1) and the limit value (value 2) must fall below the threshold so that “equal” is again identified. OUTPUT.GW130.HY_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.1.15 [A9.6]
H919 1919d 077Fh	**SRC_IN1_LV2** Source, value 1 limit value monitor 2 Connector number of the supplying value. It can be filtered and compared with a limit value. OUTPUT.GW200.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.15 [A9.5]
H920 1920d 0780h	**FLT_IN1_LV2** Smoothing, value 1 limit value monitor 2 Time constant with which the signal to be monitored is smoothed. OUTPUT.GW210.T_T3 SIMADYN D:R2 PKW-TYP:O4	40[ms]...655 360[ms]	40[ms]	3.1.15 [A9.5]

Parameter number	Description	Range, steps	Werksein-stellung	Section [Plan]
H921 1921d 0781h	**SRC_IN2_LV2** Source, value 2 limit value monitor 2 Connector number of the supplying value. Comparison value for the signal to be monitored. OUTPUT.GW220.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.15 [A9.5]
H922 1922d 0782h	**LIM_CMP_LV2** Window size, limit value monitor 2 Defines the threshold, i.e. the maximum deviation between the signal (value 1) and limit value (value 2), which still results in “equal”. OUTPUT.GW230.L_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.1.15 [A9.6]
H923 1923d 0783h	**HYS_CMP_LV2** Hysteresis, limit value monitor 2 Defines how far the deviation between the signal (value 1) and the limit value (value 2) must fall below the threshold so that “equal” is again identified. OUTPUT.GW230.HY_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.1.15 [A9.6]
H924 1924d 0784h	**SRC_IN1_LV3** Source, value 1 limit value monitor 3 Connector number of the supplying value. It can be filtered and compared with a limit value. OUTPUT.GW300.NC_T5 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.15 [A9.5]
H925 1925d 0785h	**FLT_IN1_LV3** Smoothing, value 1 limit value monitor 3 Time constant with which the signal to be monitored is smoothed. OUTPUT.GW310.T_T5 SIMADYN D:R2 PKW-TYP:O4	320[ms]..5 242 880[ms]	320[ms]	3.1.15 [A9.5]
H926 1926d 0786h	**SRC_IN2_LV3** Source, value 2 limit value monitor 3 Connector number of the supplying value. Comparison value for the signal to be monitored. OUTPUT.GW320.NC_T5 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.15 [A9.5]
H927 1927d 0787h	**LIM_CMP_LV3** Window size, limit value monitor 3 Defines the threshold, i.e. the maximum deviation between the signal (value 1) and limit value (value 2), which still results in ‘equal’. OUTPUT.GW330.L_T5 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.1.15 [A9.6]
H928 1928d 0788h	**HYS_CMP_LV3** Hysteresis, limit value monitor 3 Defines how far the deviation between the signal (value 1) and the limit value (value 2) must fall below the threshold so that ‘equal’ is again identified. OUTPUT.GW330.HY_T5 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.1.15 [A9.6]

Parameter number	Description	Range, steps	Werksein-stellung	Section [Plan]
H929 1929d 0789h	**SRC_IN1_LV4** Source, value 1 limit value monitor 4 Connector number of the supplying value. It can be filtered and compared with a limit value. OUTPUT.GW400.NC_T5 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.15 [A9.5]
H930 1930d 078Ah	**FLT_IN1_LV4** Smoothing, value 1 limit value monitor 4 Time constant with which the signal to be monitored is smoothed. OUTPUT.GW410.T_T5 SIMADYN D:R2 PKW-TYP:O4	320[ms]..5 242 880[ms]	320[ms]	3.1.15 [A9.5]
H931 1931d 078Bh	**SRC_IN2_LV4** Source, value 2 limit value monitor 4 Connector number of the supplying value. Comparison value for the signal to be monitored. OUTPUT.GW420.NC_T5 SIMADYN D:O2 PKW-TYP:O2	0...511 1	0	3.1.15 [A9.5]
H932 1932d 078Ch	**LIM_CMP_LV4** Window size, limit value monitor 4 Defines the threshold, i.e. the maximum deviation between the signal (value 1) and limit value (value 2), which results in ‘equal’. OUTPUT.GW430.L_T5 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.1.15 [A9.6]
H933 1933d 078Dh	**HYS_CMP_LV4** Hysteresis, limit value monitor 4 Defines how far the deviation between the signal (value 1) and the limit value (value 2) must fall below the threshold so that ‘equal’ is again identified. OUTPUT.GW430.HY_T5 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	3.1.15 [A9.6]
H934-997	**(Unused)**			
H998 1998d 07CEh	**Drive Number** Identification of the drive Delivers a number affter it has been parameterized. OUTPUT.DRNR.X_T5 SIMADYN D:O2 PKW-TYP:O2	0...32767 1	0	[F1.7]

Parameter number	Description	Range, steps	Werksein- stellung	Section [Plan]
H999 1999d 07CFh	**DEFAULTING** Establish factor setting Permits the EPROMs to be erased and thus the factory setting established. 165 has to be entered. Procedure: Set H999 = 165. Switch off and on. Only thereafter is the factory setting present again. Recommodation: Thereafter set H999 = 0. Note: It is seen that when the EEPROM is full (more as approx. 250 different parameters stored) no new parameter can be written. The factory setting can only be reached by setting H999 = 165 in the RAM memory. Erasing either via PROFIBUS or SIMOVIS. Not possible with the PMU. When using SIMOVIS the yellow R-symbol in the main menu must be selected. After entering H999 = 165 as above. Further with SIMOVIS by clicking the red E^2 symbol to select EEPROM storing again. OUTPUT.ER10.X1_T5 SIMADYN D:O2 PKW-TYP:O2	0...32767 1	0	6.3.4.6 [F1.7]

Parameter number	Description	Range, steps	Werksein-stellung	Section [Plan]

5 Connectors

5.1 The connector principle

In order to achieve the highest possible module flexibility, the control signals are not permanently connected with one another, but can be configured for the various applications.

Thus, these signals are collected in a connector list, where they can then be “connected-up” in the closed-loop control.

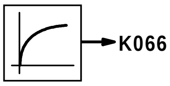
The connector list includes the following signals:

- Fixed setpoints
- Receive words from the basic drive converter, COM-BOARD, peer-to-peer
- Binary inputs, analog inputs, pulse encoder
- Status words from the control, closed-loop control and setpoint conditioning
- Signals from the closed-loop control, open-loop control and setpoint conditioning
- Signals from the freely-connectable functions

A connector always consists of a 16-bit word. A bit from the 16-bit word must be selected if bit quantities are used.

5.1.1 Word quantities

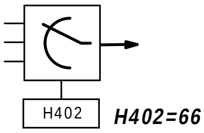
A connector is illustrated as follows in the function diagrams:



The output signal of the PT1 element is stored at connector K066

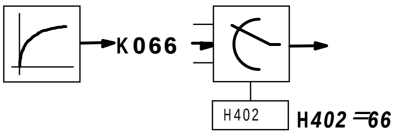
If this connector is to be used, then the connector number must be entered when selecting the signal.

Example:



K066 is entered in H402 as source

One can then think of this connection as follows:

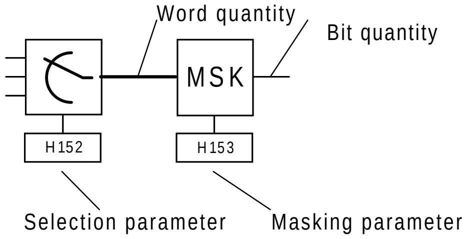


For setpoints and actual values, the normalization is 4000h = 100%, if not otherwise specified.

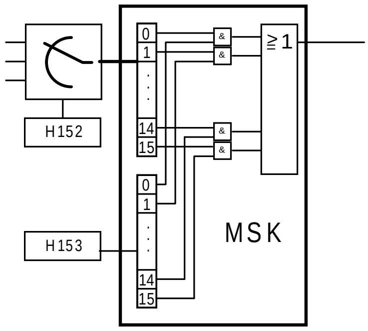
5.1.2 Bit quantities

For bit quantities, in addition to specifying the connector, a bit has to be selected. Thus, there is an additional parameter, the “masked” bit.

Example:



The MSK block function can be shown as follows:



This means that every connector bit is AND’ed with the corresponding bit of the masking, and the results of all of the AND logic operations are OR’d.

Thus, the bit must have a logical 1 in the mask, which is then to be selected as bit quantity. It is the simplest to represent the word in the binary notation. A one is entered under the bit with a logical 1 which is to control the binary function, all others have logical 0. If it is now converted into the hexadecimal notation, then the required mask is obtained.

Example:
Masking bit 7 from the control word:

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Input quantity									X							
Weighting	8	4	2	1	8	4	2	1	8	4	2	1	8	4	2	1
Mask	0	0	0	0	0	0	0	0	**1**	0	0	0	0	0	0	0
Hex		0				0				8				0		

Note:
By masking several bits, several bits can be simultaneously switch-through to the output.

5.1.3 Selection table for the masking

The subsequent table is used to simplify determining masks for switching bits through.

Mask	The bit switched through to the output
0000h	**No** bit is switched-through
0001h	Bit **0** of the input value
0002h	Bit **1** of the input value
0004h	Bit **2** of the input value
0008h	Bit **3** of the input value
0010h	Bit **4** of the input value
0020h	Bit **5** of the input value
0040h	Bit **6** of the input value
0080h	Bit **7** of the input value
0100h	Bit **8** of the input value
0200h	Bit **9** of the input value
0400h	Bit **10** of the input value
0800h	Bit **11** of the input value
1000h	Bit **12** of the input value
2000h	Bit **13** of the input value
4000h	Bit **14** of the input value
8000h	Bit **15** of the input value

Example 1:

0400h	Bit **10** of the input value

Example 2:

0402h	Bits **10** and **1** of the input value

5.1.4 Sampling times

The sampling time is an important criteria for digital systems. This is specified in the *cross reference_sampling time* column. The sampling time is shown after the path code for use with the symbolic monitor, separated by an underline. *T1*, *T2*, *T3*, *T4* and *T5* represent the 5 different technological sampling levels:

Sampling level	Sampling time
T1	5.0 [ms]
T2	20.0 [ms]
T3	40.0 [ms]
T4	160.0 [ms]
T5	640.0 [ms]

Sampling time changes should, if possible, be avoided. This means that the sampling time levels are functionally unified for the standard software package, i.e. open-loop and closed-loop controls etc. are implemented in the same sampling time, as their input signals. However, as connectors can be used as source, such sampling time changes can occur and result in significant delays. Especially for the free blocks, most functions exist in various sampling times, so that the appropriate can be selected.

The connectors are supplied in an increasing sequence from the software. If signal paths go through several multiplexers, and in this case connectors are not used in an increasing sequence, then dead times occur, just like for sampling time changes.

The following is generally valid: For the worst case (this must be assumed), for each sampling time change, a signal delay of at least the duration of the highest sampling time must be taken into account, which is the same for the jump into the connector list.

5.2 The connector list

Explanations: The *source parameter* column includes those H parameters which supply the fixed setpoints. Thus, a fast cross coupling from the multiplexers to the fixed setpoint sources can be established.

Connector number	Value / description	Source parameter	Cross reference_ sampling time	Dia-gram
K000	Fixed value 0 (0000h or 0%)	-	INPUT.FP5000.X_T5	[F1.2]
K001	Fixed value 1 (4000h or 100%)	-	INPUT.FP5010.X_T5	[F1.2]
K002	Fixed value 2 (FFFFh)	-	INPUT.FP5020.X_T5	[F1.2]
K003	Selectable fixed value 3	H166	INPUT.FP5030.X_T5	[F1.2]
K004	Selectable fixed value 4	H167	INPUT.FP5040.X_T5	[F1.2]
K005	Selectable fixed value 5	H168	INPUT.FP5050.X_T5	[F1.2]
K006	Selectable fixed value 6	H169	INPUT.FP5060.X_T5	[F1.2]
K007	Selectable fixed value 7	H170	INPUT.FP5070.X_T5	[F1.2]
K008	Selectable fixed value 8	H171	INPUT.FP5080.X_T5	[F1.2]
K009	Selectable fixed value 9	H172	INPUT.FP5090.X_T5	[F1.2]
K010	Selectable fixed value 10	H173	INPUT.FP5100.X_T5	[F1.2]
K011	Selectable fixed value 11	H174	INPUT.FP5110.X_T5	[F1.2]
K012	Selectable fixed value 12	H175	INPUT.FP5120.X_T5	[F1.2]
K013	Selectable fixed value 13	H176	INPUT.FP5130.X_T5	[F1.2]
K014	Selectable fixed value 14	H177	INPUT.FP5140.X_T5	[F1.2]
K015	Selectable fixed value 15	H178	INPUT.FP5150.X_T5	[F1.2]
K016	Selectable fixed value 16	H179	INPUT.FP5160.X_T5	[F1.4]
K017	Selectable fixed value 17	H180	INPUT.FP5170.X_T5	[F1.4]
K018	Selectable fixed value 18	H181	INPUT.FP5180.X_T5	[F1.4]
K019	Selectable fixed value 19	H182	INPUT.FP5190.X_T5	[F1.4]
K020	Word 1 from CB	-	INPUT.RXCB1.X_T1	[A3.3]
K021	Word 2 from CB	-	INPUT.RXCB2.X_T1	[A3.3]
K022	Word 3 from CB	-	INPUT.RXCB3.X_T1	[A3.3]
K023	Word 4 from CB	-	INPUT.RXCB4.X_T1	[A3.3]
K024	Word 5 from CB	-	INPUT.RXCB5.X_T1	[A3.3]
K025	Word 6 from CB	-	INPUT.RXCB6.X_T1	[A3.3]
K026	Word 7 from CB	-	INPUT.RXCB7.X_T1	[A3.3]
K027	Word 8 from CB	-	INPUT.RXCB8.X_T1	[A3.3]
K028	Word 9 from CB	-	INPUT.RXCB9.X_T1	[A3.3]
K029	Word 10 from CB	-	INPUT.RXCB10.X_T1	[A3.3]
K030	Word 1 from peer-to-peer	-	INPUT.RXPP1.X_T1	[A3.3]
K031	Word 2 from peer-to-peer	-	INPUT.RXPP2.X_T1	[A3.3]
K032	Word 3 from peer-to-peer	-	INPUT.RXPP3.X_T1	[A3.3]
K033	Word 4 from peer-to-peer	-	INPUT.RXPP4.X_T1	[A3.3]
K034	Word 5 from peer-to-peer	-	INPUT.RXPP5.X_T1	[A3.3]
K035	Word 6 from peer-to-peer	-	INPUT.RXPP6.X_T1	[A3.3]

Connector number	Value / description	Source parameter	Cross reference_ sampling time	Dia-gram
K036	Word 7 from peer-to-peer	-	INPUT.RXPP7.X_T1	[A3.3]
K037	Word 8 from peer-to-peer	-	INPUT.RXPP8.X_T1	[A3.3]
K038	Word 9 from peer-to-peer	-	INPUT.RXPP9.X_T1	[A3.3]
K039	Word 10 from peer-to-peer	-	INPUT.RXPP10.X_T1	[A3.3]
K040	Word 1 from CU Bit 0: Ready to power-up Bit 1: Ready Bit 2: Run Bit 3: Fault Bit 4: No OFF2 Bit 5: No OFF3 Bit 6: Power-up inhibit Bit 7: Alarm Bit 8: Setpoint-actual value deviation Bit 9: PZD control requested Bit 10: Comparison frequency reached Bit 11: Undervoltage Bit 12: Main contactor energized Bit 13: Ramp-function generator active Bit 14: Clockwise phase sequence Bit 15: Kinetic buffering active	-	INPUT.RXCU11.X_T1	[A1.3]
K041	Word 2 from CU	-	INPUT.RXCU12.X_T1	[A1.3]
K042	Word 3 from CU	-	INPUT.RXCU13.X_T1	[A1.3]
K043	Word 4 from CU Bit 0: Restart-on-the-fly active Bit 1: Synchronism reached Bit 2: No overspeed Bit 3: Fault, external 1 Bit 4: Fault, external 2 Bit 5: Alarm, external Bit 6: Alarm, i^2t Bit 7: Fault, overtemperature Bit 8: Alarm, overtemperature Bit 9: Alarm, overtemperature motor Bit 10: Fault, overtemperature motor Bit 11: 0 Bit 12: Motor stalled/rotor locked Bit 13: Bypass contactor energized Bit 14: Fault, synchronization Bit 15: Pre-charging active	-	INPUT.RXCU14.X_T1	[A1.3]
K044	Word 5 from CU	-	INPUT.RXCU15.X_T1	[A1.3]
K045	Word 6 from CU	-	INPUT.RXCU16.X_T1	[A1.3]
K046	Word 7 from CU	-	INPUT.RXCU17.X_T1	[A1.3]
K047	Word 8 from CU	-	INPUT.RXCU18.X_T1	[A1.3]
K048	Word 9 from CU	-	INPUT.RXCU19.X_T1	[A1.3]
K049	Word 10 from CU	-	INPUT.RXCU20.X_T1	[A1.3]
K050	Word 11 from CU	-	INPUT.RXCU21.X_T1	[A1.3]
K051	Word 12 from CU	-	INPUT.RXCU22.X_T1	[A1.3]
K052	Word 13 from CU	-	INPUT.RXCU23.X_T1	[A1.3]
K053	Word 14 from CU	-	INPUT.RXCU24.X_T1	[A1.3]
K054	Word 15 from CU	-	INPUT.RXCU25.X_T1	[A1.3]
K055	Word 16 from CU	-	INPUT.RXCU26.X_T1	[A1.3]

Connector number	Value / description	Source parameter	Cross reference_ sampling time	Dia-gram
K060	Analog input 1	-	INPUT.AI45.X_T1	[A5.3]
K061	Analog input 2	-	INPUT.AI85.X_T1	[A5.3]
K062	Analog input 3	-	INPUT.AI125.X_T3	[A5.3]
K063	Analog input 4	-	INPUT.AI165.X_T3	[A5.3]
K064	Analog input 5	-	INPUT.AI205.X_T3	[A5.3]
K065	Analog input 6	-	INPUT.AI245.X_T4	[A5.3]
K066	Analog input 7	-	INPUT.AI285.X_T4	[A5.3]
K067	Tachometer input 1	-	INPUT.TA13.X_T1	[A6.7]
K068	Tachometer input 2	-	INPUT.TA15.X_T1	[A6.7]
K069	Status word, binary inputs Bit 0: Binary input 1 to Bit 15: Binary input 16	-	INPUT.BI50.X_T3	[A4.3]
K070	Setpoint, byte-serial	-	INPUT.SR45.X_T3	[A7.7]
K071	Setpoint from the decade switch	-	INPUT.SR80.X_T3	[A7.7]
K072	Status word, INPUT function package Bit 0: Tachometer input 1, synchronizing signal identified Bit 1: Tachometer input 2, synchronizing signal identified Bit 2: Speed is positive Bit 3: Speed is zero Bit 4: Speed is negative Bit 5: Length 1, less than the setpoint Bit 6: Length 1, greater than the setpoint Bit 7: Length 2, less than the setpoint Bit 8: Length 2, greater than the setpoint Bit 9: System fault, SIMADYN D Bit 10: Send to CU o.k. Bit 11: Send to CB o.k. Bit 12: Send to peer-to-peer o.k. Bit 13: Receive from CU o.k. Bit 14: Receive from CB o.k. Bit 15: Receive from peer-to-peer o.k.	-	INPUT.STAT20.X_T3	[A8.8]
K073	System error word, processor Bit 0: Fatal system error Bit 1,2: 0 Bit 3: Task administration error Bit 4: Monitor fault Bit 5: Hardware fault Bit 6: Communications error Bits 7 to 9: 0 Bit 10: User fault Bit 11-14: 0 Bit 15: Toggle bit	-	INPUT.SYS30.X_T4	[A8.4]
K074	Length actual value from pulse encoder 1	-	INPUT.TA26.X_T3	[A6.7]
K075	Length actual value from pulse encoder 2	-	INPUT.TA46.X_T3	[A6.7]
K076	Actual drive line speed	-	INPUT.TA125.X_T3	[A8.3]

Connector number	Value / description	Source parameter	Cross reference_ sampling time	Dia-gram
K077	Control bits for the decade switch Bit 0: Decade 0 (10^0) Bit 1: Decade 1 (10^1) Bit 2: Decade 2 (10^2) Bit 3: Decade 3 (10^3) Bit 4: Decade 4 (10^4) Bit 5 to 15: 0	-	INPUT.SR70.X_T4	[A7.7]
K078-099	(Unused)	-		
K100	Main setpoint	-	SETPNT.S1025.X_T1	[D1.2]
K101	Supplementary setpoint	-	SETPNT.S1075.X_T1	[D2.3]
K102	Ratio setpoint	-	SETPNT.S3025.X_T3	[D1.2]
K103	(Unused)			
K104	Output, machine ramp-function generator	-	SETPNT.S3105.X_T3	[D1.4]
K105	Acceleration from the machine RFG	-	SETPNT.S3115.X_T3	[D1.4]
K106	Setpoint at the cascade	-	SETPNT.S1095.X_T1	[D1.5]
K107	Setpoint with slack take-up/slack-off	-	SETPNT.S1225.X_T1	[D1.8]
K108	Setpoint with supplementary setpoint and technological controller	-	SETPNT.S1235.X_T1	[D2.3]
K109	Compensation setpoint	-	SETPNT.S3075.X_T3	[D2.5]
K110	Bias setpoint with sign correction	-	SETPNT.S3535.X_T3	[D2.7]
K111	Line speed setpoint smoothed	-	SETPNT.S1515.X_T3	[D2.6]
K112	Speed setpoint, smoothed with bias	-	SETPNT.S1525.X_T3	[D2.7]
K113-119	(Unused)			
K120	Output, motorized potentiometer 1	-	MOTPOT.M330.X_T3	[A10.4]
K121	Output, motorized potentiometer 2	-	MOTPOT.M530.X_T3	[A10.8]
K122-129	(Unused)			
K130	Technological setpoint after the RFG	-	TREG.T460.X_T2	[C1.7]
K131	Technological actual value after offset correction and smoothing	-	TREG.T320.X_T2	[C2.3]
K132	Offset, technological actual value	-	TREG.T299.X_T4	[C1.7]
K133	Technological setpoint-actual value difference	-	TREG.T651.X_T2	[C2.4]
K134	Integral component, technological controller	-	TREG.T652.X_T2	[C2.5]
K135	Differential component, technological controller	-	TREG.T550.X_T2	[C2.5]
K136	Technological status word Bit 0: Technological controller switched-in Bit 1: Technological controller parameter set 2 active Bit 2: Techn. Setpoint ramp-function generator at target Bit 3: Technological setpoint at the upper limit Bit 4: Technological setpoint at the lower limit Bit 5: Technological controller at the upper limit Bit 6: Technological controller at the lower limit Bit 7: Offset above the positive limit Bit 8: Offset below the negative limit Bits 9 to 15: 0	-	TREG.T1010.X_T3	[C3.5]

Connector number	Value / description	Source parameter	Cross reference_ sampling time	Dia-gram
K137	Influence, technological controller on the torque	-	TREG.T741.X_T2	[C2.8]
K138	Influence, technological controller on the line speed	-	TREG.T746.X_T2	[C2.8]
K139	(Unused)			
K140	Power-down word Bit 0: Off after inching Bit 1: Off after braking Bit 2: Fault trip Bit 3: Fault from CU Bit 4: Electrical off Bits 5 to 15: 0	-	CONTRL.C3845.X_T3	[B1.6]
K141	Fault word Bit 0: Error, communications with CB Bit 1: Error, communications with CU Bit 2: Basic drive converter shutdown without request Bit 3: Fault, power-up routine, group Bit 4: Error, peer-to-peer communications Bit 5: External fault Bit 6: Overspeed, positive Bit 7: Overspeed, negative Bit 8: Drive stalled (rotor locked) Bits 9 to 15: 0	-	CONTRL.F4940.X_T4	[B5.7]
K142	Operating mode word Value 0: No local fixed setpoint selected Value 1: Local setpoint 1 Value 2: Local setpoint 2 Value 3: Local setpoint 3 Value 4: Local setpoint 4 Value 5: Local setpoint 5 Value 6: Local setpoint 6 Value 7: Local setpoint 7 Value 8: Inching setpoint 1 Value 9: Inching setpoint 2 Values 10 to 65535: No local fixed setpoint selected	-	CONTRL.M3205.X_T3	[B4.7]
K143	Control word 1 Bit 0: No standard stop (OFF1) Bit 1: No electrical off (OFF2) Bit 2: No fast stop (OFF3) Bit 3: Inverter enable Bit 4: Ramp-function generator enable Bit 5: Ramp-function generator start Bit 6: Setpoint enable Bit 7: Fault acknowledge Bit 8: Inching 1 on Bit 9: Inching 2 on Bit 10: Control from the PLC Bit 11: Enable, clockwise phase sequence Bit 12: Enable, counter-clockwise phase sequence Bit 13: Motorized potentiometer, raise Bit 14: Motorized potentiometer, lower Bit 15: No fault, external 1	-	CONTRL.ST3210.X_T3	[A2.8]

Connector number	Value / description	Source parameter	Cross reference_ sampling time	Dia-gram
K144	Control word 2 Bit 0: Setpoint channel data set bit 0 Bit 1: Setpoint channel data set bit 1 Bit 2: Motor data set bit 0 Bit 3: Motor data set bit 1 Bit 4: Converter fixed setpoint selection bit 0 Bit 5: Converter fixed setpoint selection bit 1 Bit 6: Synchronizing enable Bit 7: Restart-on-the-fly enable Bit 8: Droop enable Bit 9: Controller enable Bit 10: No external fault 2 Bit 11: Slave drive Bit 12: No alarm from the alarm word Bit 13: No alarm, external 2 Bit 14: Reserve setting Bit 15: Main contactor checkback signal	-	CONTRL.ST3410.X_T3	[A2.8]
K145	Alarm word Bit 0: Alarm, communications CB Bit 1: Alarm, communications CU Bit 2: Alarm, converter checkback signal Bit 3: Alarm from the group control Bit 4: Alarm, peer communications Bit 5: Alarm, from external fault Bits 6 and 7: 0 Bit 8: Alarm, anti-stall protection Bits 9 to 14: 0 Bit 15: No alarm, external 2	-	CONTRL.ST3360.X_T3	[B6.8]
K146	Status word, control Bit 0: Request start enable Bit 1: Start enable Bit 2: Power-up command Bit 3: Fast stop Bit 4: No fast stop Bit 5: Line speed is zero Bit 6: Drive is powered-up Bit 7: Drive is powered-down Bit 8: Drive is ready to be powered-up Bit 9: Inverter enable Bit 10: Setpoint enable Bit 11: Local operation Bit 12: Drive fault Bit 13: Open brake Bit 14: Close brake Bit 15: Close brake stored for zero speed	-	CONTRL.ST3910.X_T3	[B6.4]
K147-149	(Unused)			
K150	Accelerating torque	-	TORQ.T55.X_T3	[E1.5]
K151	Supplementary torque at CU	-	TORQ.T65.X_T1	[E1.8]
K152	Torque limit, positive	-	TORQ.T1240.X_T3	[E2.8]
K153	Torque limit, negative	-	TORQ.T1250.X_T3	[E2.8]
K154	Friction torque	-	TORQ.T405.X_T4	[E1.3]
K155	Load component, slave	-	TORQ.T1002.X_T1	[E2.2]
K156	Acceleration with ratio influence	-	TORQ.T67.X_T1	[E1.4]
K157-159	(Unused)			

Connector number	Value / description	Source parameter	Cross reference_ sampling time	Dia-gram
K160	Status word, limit value monitor Bit 0: Limit value monitor 1, greater than comp. value Bit 1: Limit value monitor 1, same as the comp. value Bit 2: Limit value monitor 1, less than the comp. value Bit 3: Limit value monitor 1, not equal to the comp. value Bit 4: Limit value monitor 2, greater than comp. value Bit 5: Limit value monitor 2, same as the comp. value Bit 6: Limit value monitor 2, less than the comp. value Bit 7: Limit value monitor 2, not equal to the comp. value Bit 8: Limit value monitor 3, greater than comp. value Bit 9: Limit value monitor 3, same as the comp. value Bit 10: Limit value monitor 3, less than the comp. value Bit 11: Limit value monitor 3, not equal to the comp. value Bit 12: Limit value monitor 4, greater than comp. value Bit 13: Limit value monitor 4, same as the comp. value Bit 14: Limit value monitor 4, less than the comp. value Bit 15: Limit value monitor 4, not equal to the comp. value	-	OUTPUT.GW910.X_T3	[A9.8]
K161	Definable status word	-	OUTPUT.ST3190.X_T3	[A9.4]
K162	Factor kp adaption, basic drive converter speed controller 100% corresponds to a factor of 10	-	OUTPUT.KP1020.X_T1	[A8.3]
K163-199	(Unused)			
K200	Selectable fixed value 20	H183	INPUT.FP5200.X_T5	[F1.4]
K201	Selectable fixed value 21	H184	INPUT.FP5201.X_T5	[F1.4]
K202	Selectable fixed value 22	H185	INPUT.FP5202.X_T5	[F1.4]
K203	Selectable fixed value 23	H186	INPUT.FP5203.X_T5	[F1.4]
K204	Selectable fixed value 24	H187	INPUT.FP5204.X_T5	[F1.4]
K205	Selectable fixed value 25	H188	INPUT.FP5205.X_T5	[F1.4]
K206	Selectable fixed value 26	H189	INPUT.FP5206.X_T5	[F1.4]
K207	Selectable fixed value 27	H190	INPUT.FP5207.X_T5	[F1.4]
K208	Selectable fixed value 28	H191	INPUT.FP5208.X_T5	[F1.4]
K209	Selectable fixed value 29	H192	INPUT.FP5209.X_T5	[F1.4]
K210	Selectable fixed value 30	H193	INPUT.FP5210.X_T5	[F1.4]
K211	Selectable fixed value 31	H194	INPUT.FP5211.X_T5	[F1.6]
K212	Selectable fixed value 32	H195	INPUT.FP5212.X_T5	[F1.6]
K213	Selectable fixed value 33	H196	INPUT.FP5213.X_T5	[F1.6]
K214	Selectable fixed value 34	H197	INPUT.FP5214.X_T5	[F1.6]
K215	Selectable fixed value 35 (Hex)	H198	INPUT.FP5215.X_T5	[F1.6]
K216	Selectable fixed value 36 (Hex)	H199	INPUT.FP5216.X_T5	[F1.6]
K217-229	(Unused)			
K230	Free inverter 1	-	AUXIL.WR3010.X_T3	[F2.2]
K231	Free adder 1	-	AUXIL.WR3030.X_T3	[F2.2]
K232	Free subtracter 1	-	AUXIL.WR3050.X_T3	[F2.2]

Connector number	Value / description	Source parameter	Cross reference_ sampling time	Dia-gram
K233	Free multiplier 1	-	AUXIL.WR3070.X_T3	[F2.2]
K234	Free divider 1	-	AUXIL.WR3090.X_T3	[F2.4]
K235	Free limiter 1	-	AUXIL.WR3120.X_T3	[F2.4]
K236	Free changeover switch 1	-	AUXIL.WR3150.X_T3	[F2.4]
K237	Free filter 1	-	AUXIL.WR3170.X_T3	[F2.6]
K238/239	(Unused)			
K240	Free inverter 2	-	AUXIL.WR4010.X_T4	[F2.6]
K241	Free inverter 3	-	AUXIL.WR4015.X_T4	[F2.6]
K242	Free adder 2	-	AUXIL.WR4030.X_T4	[F2.6]
K243	Free adder 3	-	AUXIL.WR4035.X_T4	[F2.8]
K244	Free subtracter 2	-	AUXIL.WR4050.X_T4	[F2.8]
K245	Free subtracter 3	-	AUXIL.WR4055.X_T4	[F2.8]
K246	Free multiplier 2	-	AUXIL.WR4070.X_T4	[F2.8]
K247	Free multiplier 3	-	AUXIL.WR4075.X_T4	[F3.2]
K248	Free divider 2	-	AUXIL.WR4090.X_T4	[F3.2]
K249	Free divider 3	-	AUXIL.WR4095.X_T4	[F3.2]
K250	Free limiter 2	-	AUXIL.WR4120.X_T4	[F3.4]
K251	Free limiter 3	-	AUXIL.WR4125.X_T4	[F3.4]
K252	Free changeover switch 2	-	AUXIL.WR4150.X_T4	[F3.6]
K253	Free changeover switch 3	-	AUXIL.WR4155.X_T4	[F3.6]
K254	Free filter 2	-	AUXIL.WR4170.X_T4	[F3.6]
K255	Free filter 3	-	AUXIL.WR4175.X_T4	[F3.8]
K256	Free absolute value generator 1	-	AUXIL.WR4180.X_T4	[F3.8]
K257	Free square-root extractor 1	-	AUXIL.WR4190.X_T4	[F3.8]
K258	Free maximum evaluator 1	-	AUXIL.WR4210.X_T4	[F3.8]
K259	Free minimum evaluator 1	-	AUXIL.WR4230.X_T4	[F4.2]
K260	Free sinusoidal function 1	-	AUXIL.WR4240.X_T4	[F4.2]
K261-264	(Unused)			
K265	Free word EXOR gate 1	-	AUXIL.WR4260.X_T4	[F4.4]
K266	Free word EXOR gate 2	-	AUXIL.WR4280.X_T4	[F4.4]
K267	Free word EXOR gate 3	-	AUXIL.WR4300.X_T4	[F4.4]
K268	Free word EXOR gate 4	-	AUXIL.WR4320.X_T4	[F4.6]
K269	Flashing frequency (e.g. clock frequency) Bit 0: Flashing frequency Bit 1: Flashing frequency, inverted Bits 2 to 15: 0	-	AUXIL.BL30.X_T4	[F4.6]
K270	Flashing frequency, word	-	AUXIL.BL60.X_T4	[F4.6]

Connector number	Value / description	Source parameter	Cross reference_ sampling time	Dia-gram
K271	Position difference	**-**	INPUT.TA11.X	[F4.7]
K272-298	(Unused)			
K299	Status word, free functions Bit 0: Divider 1, division by zero Bit 1: Limiter 1 at the upper limit Bit 2: Limiter 1 at the lower limit Bit 3: Switch 1 changed over Bit 4: Divider 2, division by zero Bit 5: Divider 3, division by zero Bit 6: Limiter 2 at the upper limit Bit 7: Limiter 2 at the lower limit Bit 8: Limiter 3 at the upper limit Bit 9: Limiter 3 at the lower limit Bit 10: Switch 2 changed over Bit 11: Switch 3 changed over Bit 12: Input absolute value generator negative Bit 13: Input square-root extractor negative Bit 14: OR logic operation of the output word EXOR gate 1 Bit 15: OR logic operation of the output word EXOR gate 2	**-**	AUXIL.STWD20.X_T3	[F5.4]
K300-511	(Unused)			

Connector number	Value / description	Source parameter	Cross reference_ sampling time	Dia-gram

6 Start-up

WARNING

6SE70 converters are operated at high voltages.
Hazardous voltages are still present in the drive converter up to 5 minutes after it has been powered-down as a result of the DC link capacitors. Only qualified personnel may be involved in start-up work.
When working with the equipment powered-up:

- Never touch any live components or parts.
- Never insert or remove boards or connecting cables.
- Always use equipment which is in a perfect operating condition and is suitable for the job.

WARNING

The basic drive converter itself must be ready to operate and fully functional in order to commission the multi-motor module, i.e. the speed controller must be optimized. The drive can rotate for some of the optimization work. It must be absolutely ensured that none of the rotating components and parts can cause personal injury.

The information and specifications in the basic drive converter Instruction Manual are valid. A completely functioning basic drive converter is required to commission the „multi-motor drive“ module (refer to the Manual).

NOTE

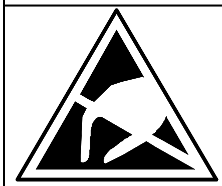
- The basic drive converter must be configured according to Section 6.2.10.
- All parameters must be entered.
- The technological module setpoint system must be used to enter setpoints (line speed, torque), i.e. it is not permissible to directly enter setpoints at the T300 bypassing the basic drive converter.
- All of the open-loop control commands (power-up, power-down, etc.) must be used from the technological module open-loop control, i.e. it is not permissible that open-loop control commands are directly entered at the T300 bypassing the basic drive converter.

The functioning of the equipment cannot be guaranteed for functions which are parameterized other than that clearly specified in the following start-up instructions.

6.1 Installing the boards

The basic drive converter must be equipped with a T300 technological processor and if required, with a CB1/CBP interface board. The LBA bus adapter is always required.

6.1.1 Handling boards

	**WARNING** Only qualified personnel may replace boards. It is not permissible to insert or withdraw boards when the equipment is powered-up (under voltage). If this is not observed, this can result in death, severe bodily injury or significant material damage.
	**CAUTION** The boards contain components which can be destroyed by electrostatic discharge. Before an electronics board is touched, you must discharge your own body. This can be done by touching a conductive, grounded object immediately beforehand (e.g. bare metal cabinet parts). The potential bonding must be maintained if at all possible.

6.1.2 Installing and replacing boards

- Release the mounting bolts for the boards above and below the handle.
- Carefully withdraw the board from the electronics box using the handle, and ensure that the board doesn't catch on anything.
- Cautiously insert the new board into the guiderails in the electronic box until the board is completely inserted in the bus connector.
- Tighten the retaining screws above and below the board handle

Note
All of the changed parameters are stored on the memory module EEPROM. If the technology board is replaced, then the memory module with all parameters can be used; if the memory module is replaced, all of the changed parameters must be re-entered.

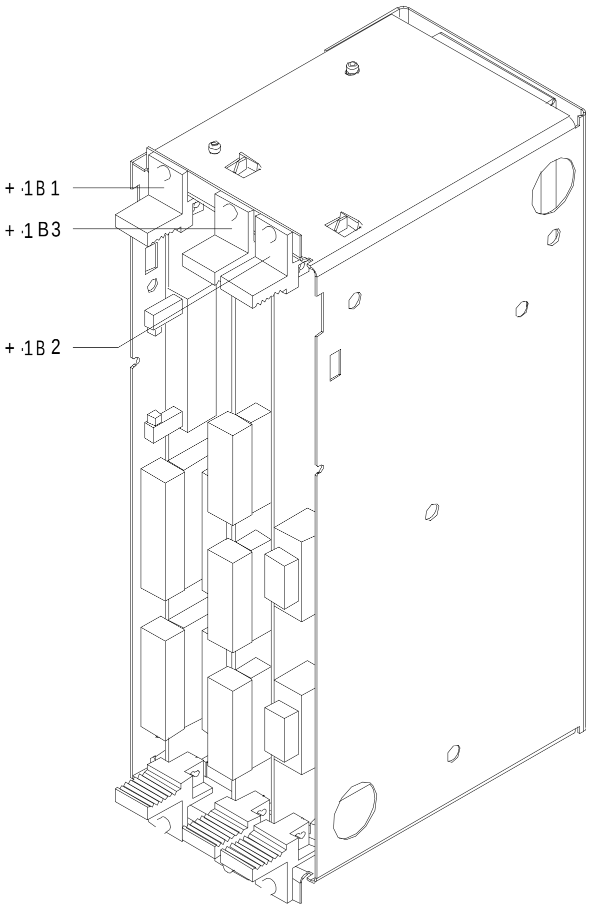


Fig 6.1 Electronics box equipped with CU and options (+.1B2 /+.1B3)

6.1.3 Options

One or two of the option boards, listed in Table 6.1, can be inserted in the electronics box using the LBA option (**L**ocal **B**us **A**dapter).

Designation	Description
LBA	This is required for the T300-, CB1/CBP-, SCB1- and SCB2 boards; it connects the option boards with the CU board
T300	Technology board to control technological processes/functions
CB1/CBP	Communications board with L2-DP interface, (Profibus)
ADB	Adaption Board to accept the CBP
SCB1	Serial communications board with fiber-optic cable for the serial I/O system and peer-to-peer connection
SCB2	Serial communications board for a peer-to-peer connection and USS protocol via RS485 in two- or four-wire technology
TSY	Digital tachometer (Midi Master) and synchronizing board (Multi Master)

Table 6.1 Option boards and bus adapter

<table>
<tr><th>Slot in the electronics box</th><th></th><th>Boards</th></tr>
<tr><td>+1.B1</td><td>Standard board</td><td>CU</td></tr>
<tr><td>+1.B3</td><td rowspan="2">Option boards</td><td>CBP / CB1 / SCB1 / SCB</td></tr>
<tr><td>+1.B2</td><td>CBP / CB1 / SCB1 / SCB / T300</td></tr>
<tr><td colspan="3">NOTE</td></tr>
<tr><td colspan="3">T300 must always be inserted in slot 2
If there is only one option board, this must be inserted in slot 2.
It is only permissible to insert one of any one particular type.</td></tr>
</table>

Table 6.2 Slots for the option boards in the electronics box

6.2 Start-up, basic drive converter

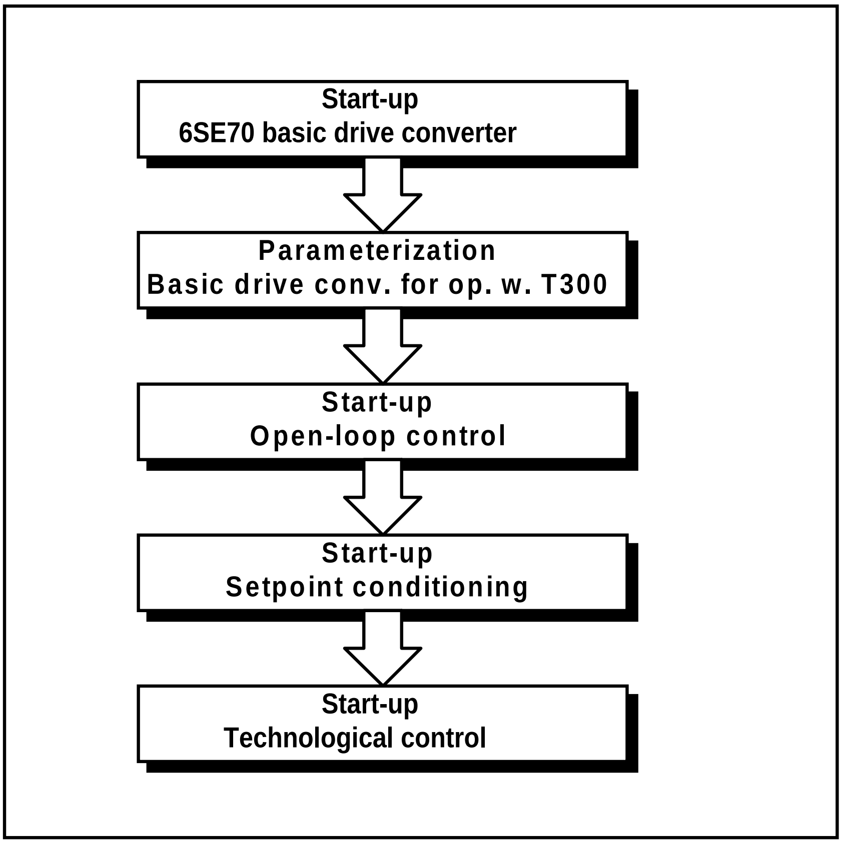
It should be noted that two different configuration settings can be parameterized in the converter basic unit. The settings are the basic setting and reserve setting, or BICO-Dataset 1 and 2.

Both settings allow a changeover to different configurations. Using this second setting, for example, emergency operation without automation can be implemented. Changeover into the reserve setting is realized via bit 30 of the control word (= bit 14 in control word 2). The parameters for the basic setting / BICO-Dataset 1 have index 001 in the basic drive converter; and index 002 for the reserve setting / BICO Dataset 2.
The active setting can be read-out of r012.

In the following text, it is assumed that the basic setting is active, i.e. the index is 001. The same is also valid for the motor data set and setpoint data set.

The multi-motor module only uses the basic setting / BICO Dataset 1.

The basic start-up sequence is shown in the following:



6.2.1 Parameterizing enable

The following steps briefly describe drive converter start-up with motor and pulse encoder for the multi-motor module. Detailed start-up instructions are provided in the 6SE70 Manual.

6.2.1.1 CUVC, CUMC:

The following steps briefly describe drive converter start-up with motor and pulse encoder for the multi-motor module. Detailed start-up instructions are provided in the 6SE70 Manual.

6.2.1.2 CU2, CU3:

The following steps briefly describe drive converter start-up with motor and pulse encoder for the multi-motor module. Detailed start-up instructions are provided in the 6SE70 Manual.

6.2.2 Factory setting

6.2.2.1 CUVC, CUMC:

Before the multi-motor module is commissioned, the factory setting must first be established, as the subsequent parameterization is based on this particular status. **P060** is set to **2** and **P970** to 0 and the P key depressed to establish the factory setting.

6.2.2.2 CU2, CU3:

Before the multi-motor module is commissioned, the factory setting must first be established, as the subsequent parameterization is based on this particular status. **P052** is set to **1** and the P key depressed to establish the factory setting.

6.2.3 MLFB input

Generally, this step is not required (status as shipped), as the factory setting is not changed. If software has been replaced, or a new processor board (CU) has been installed in the drive converter, then the equipment must be newly set.

6.2.3.1 CUVC, CUMC:

To realize this, **P060** is set to **8**. 000 is displayed. The following parameters must then be entered:

Set **P053** to **22** (access authorization) (TechBd:16 + SST1:4 + PMU:2).

Set **P070** (MLFB). The values to be set should be taken from the MLFB table of the basic drive converter manual*, Initialization*. The values for P072 (rated current) and P073 (rated output) can be found there.

Set **P060** from **8** to **0** and depress P. Wait until the display changes over to 009 (ready).

6.2.3.2 CU2, CU3:

To realize this, **P052** is set to **2**. 000 is displayed. The following parameters must then be entered:

Set **P053** to **22** (access authorization) (TechBd:16 + SST1:4 + PMU:2).

Set **P070** (MLFB). The values to be set should be taken from the MLFB table in Section *4.3.9.2* of the basic drive converter manual*, Initialization*. The values for P072 (rated current) and P073 (rated output) can be found there.

Set **P052** from **2** to **0** and depress P. The display indicates that initialization is running with 001. Wait until the display changes over to 009 (ready).

6.2.4 Hardware configuration

6.2.4.1 CUVC,CUMC:

The system itself identifies if the CBP and SCB modules are inserted. A hardware configuration is not required.
Depending on the module, additional parameter settings are required. Also refer to the „Module configuration“ Section in the basic drive manual.

6.2.4.2 CU2, CU3:

To input the hardware configuration, **P052** must first be set **to 4** (display 004). Now, only r000, r001, P051-053, P090 and P091 can be manipulated. The following parameters must be entered:

The technology board (righthand slot in the technology box) is enabled with **P090 = 2**.

If there is also a communications board (center slot, technology box), then:

P091 = 1 for the PROFIBUS communications board (CB) or

P091 = 3 for the peer-to-peer communications board or USS (SCB) must be entered.

P052 must then again be set to **0** so that the settings become effective. After the P key has been depressed, the converter checks as to whether the specified configuration is available (display 002). An appropriate fault message is displayed if this is not the case. If everything is correct, the display changes to 009.

6.2.4.3 Others

Further, the following LEDs must flash on the TB:

The **red LED (H1)** indicates that the program is being processed on the TB.

The **yellow LED (H3)** indicates that communications between the TB and the CU are O.K..

The **green LED (H4)** indicates that communications between the TB and the CB or SCB are O.K..

6.2.5 Entering the drive data

P052 must be set to **5** (CU2,CU3); **P060** must be set to **5** (CUVC,CUMC) to enter the drive data (display 005). Then, the following parameters must be entered:

P071 [line supply voltage]
P100 [motor type]
P101 [rated motor voltage],
P102 [rated motor current]
P104 [cosφ]
P107 [rated motor frequency]
P108 [rated motor speed]
P109 [pole pair number]

Closed-loop speed control (**CUVC: P100=4; CU2: P163=4**) must be selected.
A pulse encoder (**CUVC: P130; CU2: P208**) is parameterized as speed actual value source, whose pulse number is specified in **CUVC: P151; CU2: P209.**

The rated system frequency and speed is defined using parameter **CUVC, CUMC: P352/P353; CU2,CU3: P420**. P352/P353; P420 is the reference quantity for all setpoint inputs, i.e., if 100% speed is entered from the multi-motor module, then the motor rotates with the frequency entered in P352/P353; P420.
The maximum frequency for clockwise phase sequence **P452** and counter-clockwise phase sequence **P453** should be selected to be 5%-10% higher.

It is not permissible that the ramp-function generator is effective, thus, 0 must be entered in **P462** (ramp-up time) and **P464** (ramp-down time); the units of these values is seconds (**P463** and **P465** to 0).

The nominal quantity for the rated system torque is specified at **CUVC,CUMC: P354; CU2,CU3: P485.** The specified torque setpoints are multiplied by this factor.
100% (CU2,CU3); Motor nominal torque (CUMC,CUVC) is entered for operation with T300.

Automatic parameterization should now be started. by setting **P115=1** (CUVC,CUMC); **P052 to 6** (CU2,CU3).

003 is displayed. Wait until the display changes to 009 (ready). The drive converter calculates the most important closed-loop control settings from the specified converter and motor data.

6.2.6 Automatic parameterization

The following is valid for the automatic parameterization:
CUVC: **P60 = 5**, after which automatic parameterization is started with **P115 = 1**. After this, **P60** is set to **1**.
CU2: **P52 = 5**, afterwards start automatic parameterization with **P52 = 6**.

003 is displayed. Wait until the display changes to 009 (ready). The drive converter calculates the most important control settings from the specified converter and motor data.

6.2.7 Motor identification at standstill (only CUVC, CU2)

WARNING

The converter output becomes live and voltage is applied to the motor terminals in this step. It must be ensured that the drive converter output terminals or motor terminals cannot be touched.

When powered-up, the drive converter injects current into the motor and measures the parameters which are used to set the controller parameters. Set **P115=2 (CUVC); P052=7 (CU2)** and depress P. A078 is displayed. The on key must now be depressed to acknowledge. The drive converter is powered-up, and displays 018 during the measurement. After successful identification the converter shuts down and displays 009.

6.2.8 No-load measurement, (CUVC,CU2)

WARNING

The drive rotates in this step. It must be ensured that the drive is ready to mechanically rotate.

It must be ensured that all of the rotating parts/components do not present a danger to personnel.

When powered-up, the drive converter accelerates the motor and measures its no-load current. The measured no-load current is entered into parameter P103. **CUVC: P115=4; CU2: P052=9** to make the no-load measurement. Finally, the drive converter must be powered-up.
A080 is displayed during the measurement (=rotating measurement). The drive converter shuts down with display 009 after a successful no-load measurement.

6.2.9 Speed controller optimization (only CUVC, CU2)

WARNING

The drive rotates in this step. It must be ensured that the drive is ready to mechanically rotate.

It must be ensured that all of the rotating parts/components do not present a danger to personnel.

The speed controller is automatically optimized with the rotating measurement. The required dynamic performance can be pre-selected using **P536 (CUVC); P346 (CU2)** (values between 10 and 20 are, from experience, favorable). Set **CUVC: P115=5; CU2: P052=10** and depress P. A080 is displayed. The ON key must now be depressed to acknowledge. The drive converter is powered-up and displays 019 during the measurement. The converter shuts down with display 009 after successful optimization.

Tip:

For high drive moments of inertia and without regenerative feedback, F006 will be output (DC link overvoltage). The regenerative active power limit (**CUVC: P259; CU2: P233**) must then be reduced.

NOTE:
With the rotating measurement, parameters are changed which were already set.

The ramp-up and ramp-down times (**P462** and **P464)** as well as the speed controller pre-control (**CUVC: P471; CU2: P243**) should be again set to 0.

NOTE:
The parameterization set by the drive converter **must always** be checked by making the appropriate measurements. The automatic optimization cannot handle all of the possible situations (play, elasticity, slip etc.).

6.2.10 Data transfer, CU-T300

NOTE
The parameters, shown in table 6.2.x must be entered completely. Before this parameter is entered, the basic drive should be operated in the speed-loop controlled mode, with the speed controller optimized, without the T300. Only then should the subsequently described parameterization be made.

These parameters and their recommended setting for operation with the multi-motor module are included in Table 6.2.a; 6.2.d. Settings, deviating from the factory setting, have a dark background.

Only the basic setting is relevant for operation with T300 as already mentioned. Thus, the subsequent parameters refer to index 001.

The parameterization of the T300 when using the CUVC and CUMC basic boards is described in Section 6.2.10.1, and the parameterization of the T300 when using the CU2 and CU3 basic modules, in Section 6.2.10.2.

6.2.10.1 Parameterization when using the CUVC and CUMC

Data from the T300 to the basic drive converter for CUVC, addition for MC see table 6.2.c.

Parameter	Significance	Designation	Setting		Factory setting
P232	Source, controller adaption	kadap	3008 (DPR w8)		0
P233, P234, P235, P236	Controller adaption, kp 2)	-	100.00%		100.00%
P433	Source, supplementary setpoint 1 before the RFG	-	0		0
P434	Supplementary setpoint 1, kp	-	100.00%		100.00%
P438	Source, supplementary setpoint 2 before the RFG	-	0		0
P439	Supplementary setpoint 2, kp	-	100.00%		100.00%
P443	Source, main setpoint	n^*	3002 (DPR w2)		58
P444	Main setpoint, kp	-	100.00%		100.00%
P486	Source, torque setpoint	-	0		0
P487	Torque setpoint, kp	-	100.00%		100.00%
P493	Source, positive torque limit	Mb^+	3006 (DPR w6)		78
P494	Positive torque limit kp	-	100.00%		100.00%
P499	Source, negative torque limit	Mb^-	3007 (DPR w7)		79
P500	Negative torque limit kp	-	100.00%		100.00%
P506	Source, supplementary torque/current setpoint	Madd	3005 (DPR w5)		87
P507	Suppl. torque/current setpoint kp	-	100.00%		100.00%
P554	Source, *OFF1*	STW1.0	3100 (DPR w1)		0
P555	Source, 1 *OFF2*	STW1.1	3101 (DPR w1)		1
P556	Source, 2 *OFF2*	STW1.1	1		1
P557	Source, 3 *OFF2*	STW1.1	5 (PMU)		1

P558	Source, 1 *OFF3*	STW1.2	3102 (DPR w1)		1
P559	Source, 2 *OFF3*	STW1.2	1		1
P560	Source, 3 *OFF3*	STW1.2	1		1
P561	Source, *inverter enable*	STW1.3	3103 (DPR w1)		1
P562	Source, *RFG enable*	STW1.4	3104 (DPR w1)		1
P563	Source, *no RFG stop*	STW1.5	3105 (DPR w1)		1
P564	Source, *setpoint enable*	STW1.6	3106 (DPR w1)		1
P565	Source 1, *acknowledge*	STW1.7	3107 (DPR w1)		0
P566	Source 2, *acknowledge*	STW1.7	0		0
P567	Source 3, *acknowledge*	STW1.7	0		0
P568	Source, *inching 1*	STW1.8	3108 (DPR w1)		0
P569	Source, *inching 2*	STW1.9	3109 (DPR w1)		0
P571	Source, *clockwise phase sequence*	STW1.11	3111 (DPR w1)		1
P572	Source, *counter-clockwise phase sequence*	STW1.12	3112 (DPR w1)		1
P573	Source, *raise motorized potentiometer*	STW1.13	3113 (DPR w1)		0
P574	Source, *lower motorized potentiometer*	STW1.14	3114 (DPR w1)		0
P575	Source, *no fault 1 external* 1)	STW1.15	3115 (DPR w1)		1
P576	Source, *function data set, bit 0*	STW2.0 (16)	3400 (DPR w4)		0
P577	Source, *function data set, bit 1*	STW2.1 (17)	3401 (DPR w4)		0
P578	Source, *motor data set , bit 0*	STW2.2 (18)	3402 (DPR w4)		0
P579	Source, *motor data set, bit 1*	STW2.3 (19)	3403 (DPR w4)		0
P580	Source, *fixed setpoint bit 0*	STW2.4 (20)	3404 (DPR w4)		0
P581	Source, *fixed setpoint bit 1*	STW2.5 (21)	3405 (DPR w4)		0
P583	Source, *restart-on-the-fly enable*	STW2.7 (23)	3407 (DPR w4)		0
P584	Source, *droop enable*	STW2.8 (24)	3408 (DPR w4)		0
P585	Source, *controller enable*	STW2.9 (25)	3409 (DPR w4)		1
P586	Source, *no fault 2 external*	STW2.10 (26)	3410 (DPR w4)		1
P587	Source, *master/slave changeover*	STW2.11 (27)	3411 (DPR w4)		0
P588	Source, *no alarm 1 external*	STW2.12 (28)	3412 (DPR w4)		1
P589	Source, *no alarm 2 external*	STW2.13 (29)	3413 (DPR w4)		1
P590	Source, *BICO data set 1/2*	STW2.14 (30)	3414 (DPR w4)		0

Data from the basic drive converter to T300 converter for CUVC, CUMC

P734.001	Source, *status word 1 basic drive converter*		32		32
P734.002	Source, *speed actual value, basic drive converter*		148		0
P734.003	-		0		0
P734.004	Source, *status word 2, basic drive converter*		33		0
P734.005	Source, *torque setpoint, basic drive converter*		155		0
P734.006	Source, *torque actual value basic drive converter*		900		0

Table 6.2.a Configuration parameter values

Table 6.2.b includes additional parameters which must be checked to ensure that they are correctly set.

Parameter	**Description**	**Setting**
P100	Open-loop/closed-loop control type selection	4 (speed control with tachometer)
P259	Max. regenerative active power	-100 % (-10 % without regenerative feedback)
P471	Pre-control, closed-loop speed/frequency controller	0.0 % (no pre-control)
P245	Droop selection	155 (dependent on the speed controller I component)
P246	Droop factor	0.001 = 0.1% to 0.499 = 49.9%, (generally 2%)
P375	Selection, ground fault test	0 (no ground fault test)
P352	Rated frequency	x.xx Hz (corresponds to 100% setpoint)
P455	Suppression frequency	0.00 Hz (no suppression)
P456	Suppression bandwidth	0 %
P457	Minimum frequency	0.00 Hz (inactive)
P462	Ramp-up time	0.1 or minimum possible value
P463	Units, ramp-up time	0 (seconds)
P464	Ramp-down time	0.1 or minimum possible value
P465	Ramp-down time units	0 (seconds)
P466	OFF3 ramp-down time	0.0 sec
P469	Initial rounding-off	0 sec
P470	Final rounding-off	0 sec
P354	Rated torque	xx Nm (corr. to 100% setpoint)
P492	Torque limit, positive	100.00 %
P498	Torque limit, negative	-100.00 %
P505	Supplementary torque setpoint, fixed	0.0 %
P792	Setpoint-actual value difference for stalled motor	10 %
P794	Time, setpoint-actual value deviation	3 sec
P805	Time, motor stalled/rotor locked	2 sec

Table 6.2.b Values for additional configuration parameters

1) When setting this parameter, fault F035 (external fault 1) can be output. In this case, the T300 parameterization (fault word generation) should be checked. (refer to Section 3.2.11)

2) The following values are set on the T300, if the KP adaption is required; also refer to function diagram A8: H871, H872 = 0, H873 = 199,99% and H874 = 19,99%. The KP adaption is then realized in the basic drive (P233, P234, P235, P236).

Refer also to CUMC, CUVC Compendium Function bloc 360.

Additions to the parameterization when using CUMC.
Non listed parameters should be set as shown in table 6.2.a and 6.2.b or are ignored.

Additional parameterlist when using CUMC		
Parameter	description	setting/ remarks
P353	Rated speed in RPM	x.xx 1/min (corresponds to 100% setpoint)
P260	Source, torque setpoint	153
P262	Source, supplementary torque setpoint	3005
P265	Source, positive torque limit	3006
P266	Source, negative torque limit	3007
P734.002	Speed act. value	91
P734.006	Torque setpoint from base unit to T300 3)	184

Table 6.2.c Additions to the parameterization when using CUMC.

3) For CUMC, instead of the torque actual value, the actual value of the torque-generating current ISQ (act), K184 should be used.

Thus, this completes all of the required basic drive converter settings. The setting of the technological functions is now defined in the next section.

6.2.10.2 Parameterization when using the CU2 and CU3

Data from the T300 to the basic drive for VC (CU2), supplements to SC (CU3) refer to Table 6.2.f.

Parameter	Significance	Designation	Setting		Factory setting
P226	Source, controller adaption	kadap	3008 (DPR w8)		1001
P227	Controller adaption, kp	-	100.00%		100.00%
P433	Source, supplementary setpoint 1 before the RFG	-	0		0
P434	Supplementary setpoint 1, kp	-	100.00%		100.00%
P438	Source, supplementary setpoint 2 before the RFG	-	0		0
P439	Supplementary setpoint 2, kp	-	100.00%		100.00%
P443	Source, main setpoint	n^*	3002 (DPR w2)		1002
P444	Main setpoint, kp	-	100.00%		100.00%
P445	Basic setpoint	-	0.0%		0.0%
P486	Source, torque setpoint	-	0		0
P487	Torque setpoint, kp	-	100.00%		100.00%
P493	Source, positive torque limit	Mb^+	3006 (DPR w6)		1001
P494	Positive torque limit kp	-	100.00%		100.00%
P499	Source, negative torque limit	Mb^-	3007 (DPR w7)		1001
P500	Negative torque limit kp	-	100.00%		100.00%
P506	Source, supplementary torque/current setpoint	Madd	3005 (DPR w5)		0
P507	Suppl. torque/current setpoint kp	-	100.00%		100.00%
P554	Source, *OFF1*	STW1.0	3001 (DPR w1)		1010
P555	Source, 1 *OFF2*	STW1.1	3001 (DPR w1)		1
P556	Source, 2 *OFF2*	STW1.1	1		1
P557	Source, 3 *OFF2*	STW1.1	1010 (PMU)		1
P558	Source, 1 *OFF3*	STW1.2	3001 (DPR w1)		1
P559	Source, 2 *OFF3*	STW1.2	1		1
P560	Source, 3 *OFF3*	STW1.2	1		1
P561	Source, *inverter enable*	STW1.3	3001 (DPR w1)		1
P562	Source, *RFG enable*	STW1.4	3001 (DPR w1)		1
P563	Source, *no RFG stop*	STW1.5	3001 (DPR w1)		1
P564	Source, *setpoint enable*	STW1.6	3001 (DPR w1)		1
P565	Source 1, *acknowledge*	STW1.7	3001 (DPR w1)		0
P566	Source 2, *acknowledge*	STW1.7	0		0
P567	Source 3, *acknowledge*	STW1.7	0		2001
P568	Source, *inching 1*	STW1.8	3001 (DPR w1)		0
P569	Source, *inching 2*	STW1.9	3001 (DPR w1)		0
P571	Source, *clockwise phase sequence*	STW1.11	3001 (DPR w1)		1
P572	Source, *counter-clockwise phase sequence*	STW1.12	3001 (DPR w1)		1
P573	Source, *raise motorized potentiometer*	STW1.13	3001 (DPR w1)		1010

P574	Source, *lower motorized potentiometer*	STW1.14	3001 (DPR w1)		1010
P575	Source, *no fault 1 external* [1)]	STW1.15	3001 (DPR w1)		1
P576	Source, *setpoint data set, bit 0*	STW2.0 (16)	3004 (DPR w4)		0
P577	Source, *setpoint data set, bit 1*	STW2.1 (17)	3004 (DPR w4)		0
P578	Source, *motor data set , bit 0*	STW2.2 (18)	3004 (DPR w4)		0
P579	Source, *motor data set, bit 1*	STW2.3 (19)	3004 (DPR w4)		0
P580	Source, *fixed setpoint bit 0*	STW2.4 (20)	3004 (DPR w4)		0
P581	Source, *fixed setpoint bit 1*	STW2.5 (21)	3004 (DPR w4)		0
P582	Source, *synchronizing enable*	STW2.6 (22)	3004 (DPR w4)		0
P583	Source, *restart-on-the-fly enable*	STW2.7 (23)	3004 (DPR w4)		0
P584	Source, *droop enable*	STW2.8 (24)	3004 (DPR w4)		0
P585	Source, *controller enable*	STW2.9 (25)	3004 (DPR w4)		1
P586	Source, *no fault 2 external*	STW2.10 (26)	3004 (DPR w4)		1
P587	Source, *master/slave changeover*	STW2.11 (27)	3004 (DPR w4)		0
P588	Source, *no alarm 1 external*	STW2.12 (28)	3004 (DPR w4)		1
P589	Source, *no alarm 2 external*	STW2.13 (29)	3004 (DPR w4)		1
P590	Source, *basic/reserve setting*	STW2.14 (30)	3004 (DPR w4)		1005

Data from the basic drive converter to T300 converter for VC, addition for SC see table 6.5a.

P694.001	Source, *status word 1 basic drive converter*		968		968
P694.002	Source, *speed actual value, basic drive converter*		214		0
P694.003	-		0		0
P694.004	Source, *status word 2, basic drive converter*		553		0
P694.005	Source, *torque setpoint, basic drive converter*		237		0
P694.006	Source, *torque actual value basic drive converter*		007		0

Table 6.2.d Configuration parameter values

Table 6.2.e includes additional parameters which must be checked to ensure that they are correctly set.

Parameter	**Description**	**Setting**
P163	Open-loop/closed-loop control type selection	4 (speed control with tachometer)
P190	Soft start selection	0 (no soft start)
P233	Max. regenerative active power	-100 % (-10 % without regenerative feedback)
P243	Pre-control, closed-loop speed/frequency controller	0.0 % (no pre-control)
P247	Droop selection	0 (dependent on the speed controller I component)
P248	Droop factor	0.001 = 0.1% to 0.499 = 49.9%, (generally 2%)
P354	Selection, ground fault test	0 (no ground fault test)
P420	Rated frequency	x.xx Hz (corresponds to 100% setpoint)
P455	Suppression frequency	0.00 Hz (no suppression)

P456	Suppression bandwidth	0.00 Hz
P457	Minimum frequency	0.00 Hz (inactive)
P462	Ramp-up time	0.1 or minimum possible value
P463	Units, ramp-up time	0 (seconds)
P464	Ramp-down time	0.1 or minimum possible value
P465	Ramp-down time units	0 (seconds)
P466	OFF3 ramp-down time	0.0 sec
P469	Initial rounding-off	0 %
P470	Final rounding-off	0 %
P485	Rated torque	100.00 % (corr. to 100% setpoint)
P492	Torque limit, positive	100.00 %
P498	Torque limit, negative	-100.00 %
P505	Supplementary torque setpoint, fixed	0.0 %
P517	Setpoint-actual value difference for stalled motor	5 Hz
P518	Time, setpoint-actual value deviation	3 sec
P520	Time, motor stalled/rotor locked	2 sec

Table 6.2.e Values for additional configuration parameters

[1] When setting this parameter, fault F035 (external fault 1) can be output. In this case, the T300 parameterization (fault word generation) should be checked. (refer to Section 3.2.11)

Additions to the parameterization when using SIMOVERT SC.
Non listed parameters should be set as shown in table 6.2.d and 6.2.e or are ignored.

Additional parameterlist when using SIMOVERT SC (CU3)		
Parameter	description	setting/ remarks
P226	Source, controller adaption	Function and parameter not present
P227	Controller adaption KP	Function and parameter not present
P420	Rated speed in 1/min	Function and parameter not present
P466	OFF3 ramp-down time	Function and parameter not present
P469	Initial rounding-off	Function and parameter not present
P470	Final rounding-off	Function and parameter not present
P517	Setpoint-actual value difference for stalled motor.	1,1*nmax/ Bei Lastverteilung, Abschnitt 3.7 u. U. höhererer Wert erforderlich
P520	Time, motor stalled/rotor locked	Funktion und Parameter nicht vorhanden
P694.002	Speed act. value	219
P694.005	Torque setpoint from base unit to T300	0/ not present, K044 without meaning

Table 6.2.f Additions to the parameterization when using CU3.

Thus, this completes all of the required basic drive converter settings. The setting of the technological functions is now defined in the next section.

6.3 Commissioning the technology module

6.3.1 Technological parameters

The following parameter ranges are assigned to the technology module:

d001 to **d099** are display parameters,

H101 to **H999** are setting parameters.

The technological parameters lie above the parameters of the basic drive converter (P/r000 to P/r999).

6.3.1.1 Setting via the operator control panel and SIMOVIS (normal case by commissioning)

All of the technological parameters can be read and changed via the basic drive converter operator control panel. The parameters lie above the r- and p- parameter ranges. They can be reached by leaving the basic drive converter parameter range using the raise/lower keys. In this case, it is insignificant as to whether the overflow is towards the top (from r992 to d001) or below (from r001 to H999).

When changing over to the value mode (by depressing the P key), the operator control panel displays the actual value of the selected parameter. This can now be increased or decreased. However, the change is only effective after the parameter mode has been reselected (by depressing the P key again). Thus, the new value is then saved in the EEPROM, and is available even after power failure.

NOTE
INIT parameters, see parameterlist, are only read in when the unit is switched off and on again. See also chapter 4.1.2.
using SIMOVIS: please refere to Section 6.4

6.3.1.2 Setting via the symbolic monitor (not for normal applications)

The short parameter list, which can be used to determine the STRUC connectors associated with the particular parameters, is provided in Section 11. In this case, for start-up, a PC with a service program for the symbolic monitor can be used. This is advantageous due to the flexible access (on the control panel, the parameter numbers can only be changed with the raise/lower keys).

Further, several values can be simultaneously displayed (only one on the operator control panel), which is practical for adjustment and calibration procedures. Thus, values can be monitored, and in the meantime, another adjusted. The new value becomes effective immediately after the input, however is only first saved in the RAM. Saving is only realized when requested.

Refer to Section 7 for service program applications and for information on the STRUC G function diagrams

6.3.2 Commissioning the open-loop control

The parameterization of the open-loop control signals is subsequently described. This is sub-divided into open-loop control signals which must be parameterized (designated with **!** in the short parameter list), and signals, which can be parameterized.

Signals, which are not required for the application, can be supplied with a fixed value. The following parameterization should generally be made:

Permanent 1 signal

A permanent 1 signal is generated by entering 0001h for the signal source, connector 002, and in the mask.

Permanent 0 signal

A permanent 0 signal is generated by entering 0000h for the signal source, connector 000 and in the mask.

6.3.2.1 Powering-up (!)

The *power-up command* is selected via **H200/H201.** In this case, direct power-up is possible or a *power-up sequence* (power-up enable request, accoustic signal, delay, time, and then a time-limited power-up enable during which time the drives can be powered-up).

The power-up sequence is selected via value 1 in parameter **H251**. If the on command is available, the drive issues a *start request*. This is in the control status word, bit 0 (connector 145 mask 0001h) and can be transferred to the higher-level open-loop control via one of the eight binary outputs or using the communications. The start requests for all drives are connected there and an accoustic *start alarm* initiated. The open-loop control issues a *start enable signal* to all drives in parallel. This can also be, for example, read-in via a binary input (parameter **H230/231**) and allows the drive to be powered-up after the on command has been issued again.

Tip:
If the drive is to be powered-up and down with only **one** command, then the *on command* and *no standard stop* commands can be connected to the same source.

6.3.2.2 No standard stop (!)

The *standard stop signal* switches the main setpoint to 0 and the drive is controlled down to standstill along the ramp of the triggerable ramp-function generator; the drive is then shutdown. The standard stop source is specified in parameters H202 and H203. This can either be a pushbutton or a communications interface.

6.3.2.3 No fast stop (!)

For a fast stop, the setpoint is immediately switched to zero, and the drive is decelerated along the torque limit. The time, in which the braking torque is to be established, can be set in **H729.** The drive should establish the braking current without causing gearbox stressing. If there is a significant amount of play, it may be necessary to increase the ramp time in H729. The braking torque is controlled as a function of the speed, and reduced around zero speed so that the drive doesn't overshoot.

The signal is selected with **H206/H207.** Generally, the *fast stop* signal is combined with ´EMERGENCY-OFF´ or ´EMERGENCY STOP´.

If fast stop is not required, a 1 signal can be permanently entered by setting **H206** to 2 and **H207** to 0001h.

6.3.2.4 No electrical off (!)

After the basic drive converter parameter **P557** has been set to 1010, the 0 key (OFF) on the converter operator control panel immediately results in a no-torque condition. Such an electrical shutdown can also be selected via parameter **H204/H205**.

If electrical off is not required, a permanent 1 signal can be entered by setting **H204** to 2 and **H205** to 0001h.

6.3.2.5 Inverter enable

In addition to the *inverter enable* generated from the technology module, an external inverter enable can be parameterized. Thus, it is possible to inhibit and enable the inverter pulses from an external source. The inverter enable is parameterized in **H208/H209**. If no external *inverter enable* is used, set H208=2 and H209=1.

6.3.2.6 Setpoint enable

In addition to the *setpoint enable*, generated from the technology module, an external setpoint enable can be parameterized. The setpoint enable is set in parameters **H214/H215**. If no external *setpoint enable* is used, set H214=2 and H215=1.

6.3.2.7 No local operation

The open-loop control automatically switches to local operation, if one of the local operating modes (inching, fixed setpoints) is entered. This automatic changeover to local setpoints can be inhibited by setting the control bit to enable local operation.

This enable is entered in parameter **H218/H219**.

6.3.2.8 Inching 1 / inching 2

The inching function is implemented via parameters
  H220/H221 for inching 1 and
  H222/H223 for inching 2.
The line speed setpoints are entered at **H538** for inching 1 and **H539** for inching 2. Using parameter **H256** it can be specified as to whether the drive
  brakes (H256=1) or
  coasts down (H256=0)
when the inching button is released.

6.3.2.9 Checkback signal, group control

If the group control (**H251**) function was activated, a source for the group control checkback signal must be specified in parameter **H232/H233**. The on status must be transferred to the group control via a binary output.

6.3.2.10 Local operating modes

The local operating modes are binary coded with 3 bits, and have a value range from 0 to 7. The control bits are selected using the following parameters:

H224/H225	bit 0
H226/H227	bit 1
H228/H229	bit 2

The associated setpoints are entered in parameters **H531** to **H539**.

Tip:

If only a maximum of 3 local operating modes are required, binary coding can be eliminated.
However, all of the fixed setpoints in H531 to H539 must still be parameterized, so that when two control bits are simultaneously set, a defined status is obtained.

6.3.2.11 External fault

An external fault can be activated via parameters **H260/H261**. If there is an external fault, then this causes a drive, which is powered-up, to be shutdown after a time, set in parameter **H262**.

6.3.2.12 External alarm

The external alarm is set via parameters **H246/H247**.

6.3.3 Commissioning the setpoint conditioning

6.3.3.1 Selecting the speed actual value

The speed actual value source, which in most cases, is received from the basic drive converter, is specified at parameter **H156**. Thus, 041 is pre-set here (main actual value from the CU). Otherwise, either one of the T300 tachometer inputs (K067 or K068) or one of the faster analog inputs (K060 to K064) must be selected.

6.3.3.2 Selecting the line speed setpoint

The drive setpoint can be selected via **H500**. Adaption is possible using **H501**(gain) and H502 (offset).

6.3.3.3 Setting the central ramp-function generator

For a multi-motor drive (sectional drive), the machine ramp-function generator is only used for the master drive. The line speed setpoint and acceleration for the complete machine is generated here. The setpoint is transferred to the individual drives via the peer-to-peer coupling.

Parameters **H513 to H520** are available to implement a central ramp-function generator. The ramp-function generator receives the setpoint, selected via H500, its ramp-up and ramp-down time from **H515** or **H516**, the rounding-off times from **H517** and **H518,** and the upper- and lower limits are set at **H519** and **H520.** The ramp-function generator output can be selected at connector K104 and at d040.
If the machine ramp-function generator is to be effective for the drive and the setpoint cascade, **H513** must be changed-over to 1.

The ramp-function generator also provides an acceleration signal. This is available at K105 and can be normalized via **H521**. The acceleration signal is 100% if the ramp-up time is entered there. The lower of the two values should be entered for different times for ramp-up/ramp-down.

IMPORTANT:
This parameter may not be changed after the inertia compensation has been set, even if the ramp-up and ramp-down times were subsequently modified.

6.3.3.4 Ratio

A ratio setpoint source is selected using parameter **H506**. It can also be adapted with a factor (**H507**) as well as an offset (**H508**). The result is stored in connector K102 and can be monitored at d047.

If the ratio setpoint setting range is not sufficient (as, e.g., as stretch would require values greater than 200%), then instead of a factor, a quotient can be selected, by setting **H522** to 1. By dividing by values lower than 50%, factors greater than 2 can be implemented. The thus corrected main setpoint can be displayed in d048.

6.3.3.5 Slack take-up/slack-off

The main setpoint can be temporarily increased or decreased using binary commands. This is required in order to remove sag from the material web (slack take-up) or to reduce excessive tension (slack-off).
The source for slack take-up is defined with parameters **H524/H525**, the supplementary setpoint in **H526.**
Analog to this, slack-off is defined in parameters **H527/H528** and **H529**.
Further, **H523** can be used to define whether the slack take-up value is dependent on the line speed.
Supplementary setpoint looping is entered in **H530**.

Tip:

If two different slack take-up values are required, then the slack-off value can be entered as positive value.

6.3.3.6 Supplementary setpoint

A supplementary setpoint can be enabled via parameter **H503**, adapted via **H504**, and provided with an offset via **H505**.

6.3.3.7 Local setpoints

The local setpoints are entered in parameters **H531 to H539.** The local setpoint is selected according to the operating mode coding.
An exception in this case, is local operating mode 4; it allows a variable local setpoint (analog, communications etc.) to be entered via parameter **H534**.
The local setpoints are fed through a dedicated ramp-function generator, whose ramp-up time is set in **H540** and ramp-down time in **H541**.

6.3.3.8 Triggerable ramp-function generator

The triggerable ramp-function generator is used to bring the drive up to the machine line speed. The ramp-up time (accelerating time) is set in **H540** and the ramp-down time (decelerating time) in **H541**.

6.3.3.9 Droop

The droop value is specified in the basic drive converter, parameter **CUVC, CUMC: P246; CU2: P248**.
The droop is enabled via parameters **H511/H512**. The source for the droop compensation is selected via parameter **H509**, which generally is the integral component of the main drive speed controller. The compensation factor is entered in parameter **H510**, which, for similar drives should correspond to approximately the set droop.

6.3.3.10 Diameter/gearbox correction

For changing roll diameters or different gearbox stages, it is necessary to apply a correction in the speed setpoint / speed actual value channel. The correction factor is selected with **H157**. This factor is generally 1 (100%). The speed actual value, at rated line speed, and for a minimum roll diameter d_{min} should be calibrated for 100%. The following convention is implemented for a gearbox changeover: For the low gearbox stage (defined as the nominal ratio), the tachometer is calibrated for 100% at the rated machine speed. The speed actual value must be divided by the ratio of the gearbox factors. The correction factor is now $100\% * i_{act}/i_{rated}$. If both occur, the correction factor is $100\% * (d_{act}/d_{min}) * (i_{act}/i_{rated})$. The speed actual value is obtained if the speed is multiplied by the diameter/gearbox.

6.3.3.11 Load distribution

The load distribution function is activated using parameters **H544/H545**.
When load distribution is selected, the bias, stored in **H546**, is entered into the speed controller, and the torque limit is ramped to the torque setpoint from the reference drive along the ramp, set in **H728**.

6.3.3.12 Friction

Friction compensation can be set for machine group drives. This characteristic is dependent on the line speed and can be freely parameterized. The associated friction torque can be defined using parameters **H700-H711** using 6 line speed points.
The friction characteristic is determined by approaching various line speeds in the closed-loop speed controlled mode, and after stabilization, the steady-state torque is determined using parameter r007 in the basic drive converter. A characteristic can now be plotted. It is also possible to switch the friction torque immediately as supplementary torque input (H892 to 154) and to adjust the speed controller output (r237) to zero at the set line speed points by changing the particular friction value.

Note:

If the drive is reversed, the friction torques should also be determined for the negative line speeds. These must be entered with the correct sign. The calculated friction torque is available as connector 154 and can be monitored at d065.

6.3.3.13 Inertia compensation

In order to adjust the accelerating torque, the friction characteristic must already be plotted. Friction and acceleration are switched-in as supplementary torque signal (H892 to 151). The acceleration value must first be generated. This can be directly selected via **H712.** Normally, the acceleration value of the central ramp-function generator is selected. If an acceleration value is not available, a line speed signal can be selected using H712 which is then differentiated. **H713** is entered as reference time (=shortest ramp-up time) and the differentiated signal is selected with **H714=1**.
For fixed drive moments of inertia, a fixed value is entered (H717, e.g. to three positions and the associated fixed value H166 to 10%). To determine adaption factor **H718**, the machine is accelerated via the central ramp-function generator. The drive torque is read-out at parameter r007 and the machine acceleration at **d067**.

The following is valid for adaption factor **H718**:

$$\boxed{H718 = \frac{r007}{d067} \times 100\%}$$

After H718 has been set, it must again be checked as to whether the factor is correct by monitoring the speed controller output ramp-up in r237(CU2); K155 (CUVC,CUMC) (I component). During the complete ramp-up phase, this must have a value of about 0. If this is not the case, H718 must be re-adjusted.

6.3.3.14 Braking characteristic

If fast stop is activated, the control switches over to the braking characteristic. The braking torque can be read-out at d072, which would be effective for braking at a specific drive line speed. The braking torque is defined with H726. Starting at a line speed, defined using H726, the braking torque is linearly decreased to zero (H725). The drive should come to a standstill without overshooting. If this is not the case, H724 can be changed. Further, the window width for the line speed zero signal (H158) can be increased so that the drive shuts down faster.

6.3.4 Start-up, technological control

The technological control can be used for many applications, e.g. web tension control with measuring transducer or dancer roll, pressure and flow controls.

6.3.4.1 Enabling/disabling the technological control

The technological control can be enabled/disabled from two sources. It is enabled in parameters **H404/H405** and **H406/H407**. It is disabled in parameters **H408/H409** and **H410/H411**.

Tip:
As second source to disable the technological controller, the checkback signal „drive powered-down“ should be used, so that the technological control can only operate with the drive powered-up.

6.3.4.2 Technological actual value selection

The technological actual value is selected in **H402** and can be adapted via **H403**. If the actual value has an offset, this can be compensated by a fixed value in **H430**. The fixed offset is enabled for **H431=1**.
The offset can possibly change over time, e.g. due to aging, so that an internal offset compensation can also be used. In this case, a signal is parameterized in **H428/H429**, which activates an automatic offset compensation. The actual offset is determined and stored as long as the signal is available. **H431** must be set to 0 for the automatic offset compensation.

Tip:
The automatic offset compensation should be controlled from a key-actuated switch, so that the conditions to calibrate the offset can be checked (no material web in the machine etc.).

6.3.4.3 Technological setpoint selection

The technological setpoint is selected using parameter **H400** and can be adapted with **H401** and provided with an offset via **H422**.

6.3.4.4 Closed-loop control parameters

The technological controller is a PID controller. Two parameter sets can be defined. The assignment is shown in the following table:

	Parameter set 1	Parameter set 2	Display in
Control signal	0	1	K136.1
Actual value smoothing	H414	H415	d030
Proportional gain	H416	H417	d031
Integral action time	H418	H419	d032
Derivative action time	H420	H421	d033

The source to changeover the parameter set is defined in parameters H412/H413.

6.3.4.5 Controller limits

The controller limits are entered in parameters **H436/H437** for the positive limit and in **H438/H439** for the negative limit.

Tip:
If a material web has been thread, it is possible to keep the technological controller enabled and only to control the controller limits. Thus, for example, for closed-loop tension control, the lower limit is always enabled in order to prevent excessive tension when threading the material web. Under normal operating conditions, the upper controller limit is also enabled.

NOTE
After commissioning/start-up has been completed, enter all of the modified/changed parameters into the parameter list in Section 9. Always have access to this parameter list as well as the software version code (d002) for questions at a later date.

6.3.4.6 Factory settings

See parameter H999.

6.4 Parameterization with Simovis for Windows

Up to Simovis V5.1, the T300 parameterization can be done with SIMOVIS, like the base units thrue the PMU connection. Please refere to section 6.4.3.

6.4.1 Creating the data base for a technology type.

In order to parameterize every drive and technology type, SIMOVIS requires exact information about the number and characteristics of the available parameters, e.g. parameter numbers, value limits, etc.. This information is stored in data base files.

If a T300 with „unknown“ data base is connected (data base not available in SIMOVIS), the necessary technology data base may be created online.

In both cases it is assumed that the communication to the drives is intact.

Preconditions:

- For the learn process the technology type’s parameter set should be reset to the factory settings (refer to parameter H999).

If during the learn process the technology type’s parameter set was not reset to the factory settings, the functions refer to the status of the technology type when the data base was created and not to the factory settings.

Note: It is recommened, but not essential, that step as described above is carried out. During the learn procedure SIMOVIS also generates a file (by upreading), which is interpreted during offline mode to be the factory setting of a technology type. This file is used for example:

- when opening an offline file as the basis for the factory setting,
- when printing a parameter set, where only the changes compared with the factory setting are to be printed.

- The dialogue to create the data base of a technology type will only be displayed if the base unit, to which SIMOVIS is connected, has a slot for technology boards (MASTERDRIVES Compact units).

- If the technology board has to be registered to the base unit by parameterization (MASTERDRIVES with CU2 or CU3: parameters P90 or P91) the „learning“ process will only start if the technology board is registered.

<u>Proceed as follows:</u>

1. For MASTERDRIVES with CU2 or CU3 the technology board has to be registered

2. Reset the technology board to the factory setting.

In the nenu BUS CONFIGURATION:

3. Dependant on the Baud rate, increase the "number of request repeats" under the "extended" tab(refer to section 6.4.3.).

4. Select the drive by clicking on the lefthand mouse key, and establish the connection (clicking toolbar „connect. On/Off). The communication to the drives is intact if this toolbar changes to green colour.

5. Disconnect other drives (if available) to reduce the time required for the „learning process“.

6. Disconnect all other communication systems (Profibus, Peer-to-Peer) for example by pulling off the connecting plug.

7. In the function bar, click on the button „Create data base“ or
7. Select the menu Edit > Create („learn“) data base.

8. In the „Create data base“ dialogue (in the „technology type“ folder), the bus address, type and SW version of the connected base unit can be checked. In the dropdown list box „Name technology type“, select (or enter) the name of the technology type to be learned (default name: TECHN000). If a name is selected, which already exists, the data base will be overwritten by the new one.

   The technology type T300 to be learned does not make use of parameters 3000 ...3999, deactivate the checkbox „L/c parameters“. The „learning“ time will then be significantly reduced.

9. Click on the Start button to start creating the technology type data base

-The following „learn“ process will take several minutes. Progress can be monitored in the displayed dialogue. Upon successful completion, the new technology type is available for all drives (which have a slot for technology boards) in the Add drive or Change drive dialogue. The drive should now be disconnected, and the new technology type selected in the „Change drive“ dialogue.

<u>Note:</u> Should errors be detected at the end of the learn procedure, then further information can be displayed by clicking on the „details“ button. The cause of the errors (e.g. restricted parameter access) should be corrected and the learning process repeated.

6.4.2 T300 parameterization

After a technology data base has been created, the T300 can be parametrized with SIMOVIS.
(Please refer to the SIMOVIS help system if you require further information).

- Parameter list complete

  opens a parameter table (same structure as standard parameter table) with all of the parameters of the drive type, which is assigned to the actual drive window. (H and d parameter are displayed after the base unit parameter P and r)

  Double click somewhere in the appropriate line of the table to change the parameter value.

- Free parameterization:

  opens a parameter table, where parameters can be individually listed by entering parameter numbers (e.g. H103 or d010, resp. 1103 or 1010).

  Double click somewhere in the appropriate line of the table to change the parameter value.

- Download: The parameter set (Upread files, offline generated files) can be directly saved in the RAM or EEPROM memory of the drive.

  When downloading, the actual parameter values in the drive are overwritten by the parameter values in the parameter set.

6.4.3 Important notes

Note 1: Dependant on the Baud rate, increase the "number of request repeats" under the "extended" tab.

Empirical values:

38400 Baud: Number of request repeats = 200

19200 Baud: Number of request repeats = 100

9600 Baud: Number of request repeats = 50

Refer to: online help (BUSKON): Help topics > Editing projects

> Configuring the interface.

Note 2: Disconnect other drives (if available) to reduce the time required for the „learning process“.

Disconnect all other communication systems (Profibus, Peer-to-Peer) for example by pulling off the connecting plug.

Note 3: If more serial interfaces are used addition to SIMOVIS (e.g. Profibus and T300 Peer-to-Peer interface), the Peer-to-Peer baud rate should be set to values $\leq$ 19200 Bauds (H197 $\leq$ 7).

A simultaneous data transmission with several interfaces (and high baudrates) can, under these circumstances, cause a T300 overload.

7 SIMADYN D functions

7.1 STRUC G graphics

7.1.1 Sheet structure

The structure of a STRUC G function diagram is shown in Fig. 7.1.

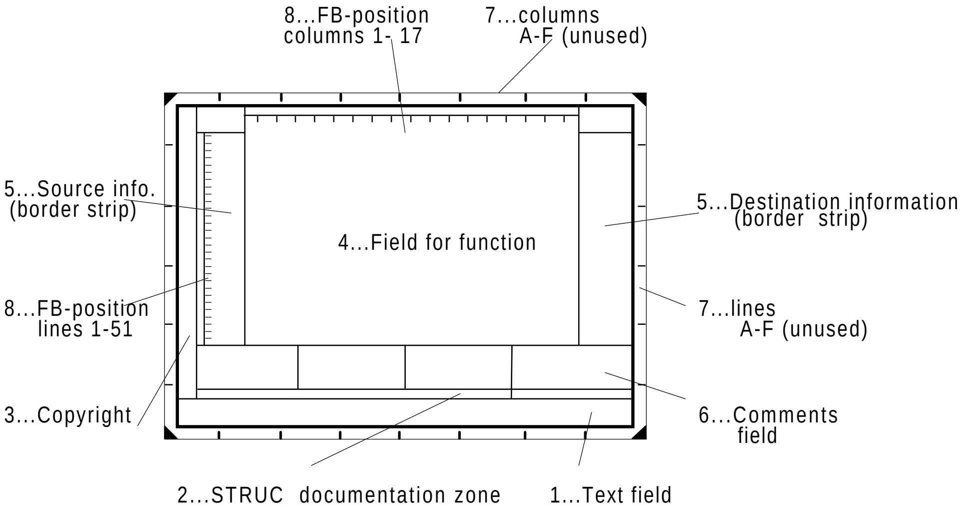


Fig.. 7.1 STRUC G function diagram

Explanation:

1 *Text field*
The text field is structured according to DIN 6771, Part 5.

2 *STRUC documentation line*
Information regarding the version, libraries and configuring levels are entered here.

3 *Copyright and additional documentation information*

4 *Character field for function blocks*
This is the actual function diagram. The function blocks are located in this field, arranged using position numbers (refer to Point 8 below), and displayed with the connections and constants. The sheet comments are also placed here.

5 *Source- and destination information*
Function package connections ($ signals) with source- and destination-function package names are specified in this field where the system ID, page number and column number are specified. Further, cross-references for communication- and hardware assignments are also provided here.

6 *Comments field*
Plain text comments, blocks, connectors or the signals on the border panel are entered here. Connector attributes are also entered (,MIN=...,MAX=...,SCAL=..., etc.).

7 *Sheet lines and columns*
The sheet is sub-divided into 8 columns (1-8), which is taken into account when generating cross-references. The lines (vertically, A-F) are not used.

8 *FB position lines and columns*
as character field, it has 17 columns and 51 lines. These allow function blocks to be positioned.

7.1.2 Block structure

There is a graphic function symbol for every function block (FB), which is used to document the FB and the user-specific features. In addition to the input- and output signal connections, there are also signal values specified and some of the connector attributes, which are significant for the sequence and embedding the function block in the function package (FP).

A function block with STRUC G is illustrated in Fig. 7.2.

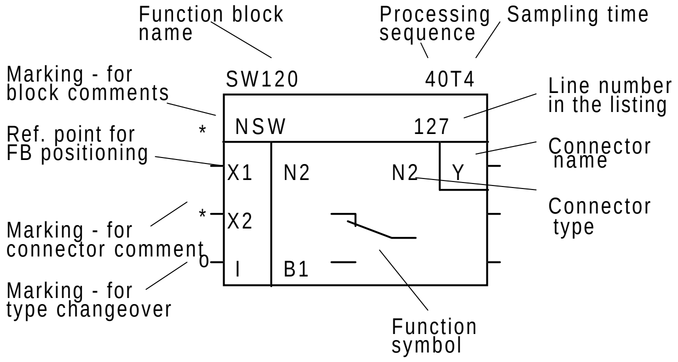


Fig. 7.2 STRUC G function block (example)

7.1.3 STRUC connectors

The STRUC connectors are used to supply the FB with input information and output the results to other function blocks or peripheral boards.

The connectors are identified in the FB mask via the connector name and connector type.
A connector is supplied with a signal connection or constant, and optionally, also, with a signal ID, attributes and comment. As not all of this information can be located in the graphics section, some information is located in the comments field below the graphic field. A star at the connector indicates that this information is available.

7.1.4 Cross-references

Generally, connections between FBs are shown as a line. If space is restricted, a letter (A-Z) is assigned so that a connection can be identified. The line is continued at another position on the same sheet (connection on the sheet).

For connections over several sheets (global connections), within the same FP, the block name, connector name, sheet number and sheet column number are specified as source/destination information. If there is insufficient space in the graphics field, or if there are several cross-references, then the entry is made in the border panel (source/destination information field):

B420.QS / 3.1 ....FB name.connector name/sheet number.sheet column number

External connections (from one FP to another) are completely reference with their symbolic names ($ name) in the source/destination information field. Further, the following are also specified: The bus data transport sampling time with bus access time, source/destination processor(s), source/destination function package(s) with system IDs as well as sheet- and sheet column number(s):

$NREG PN T2C .... Signal name, processor-local access, bus access and data transport time

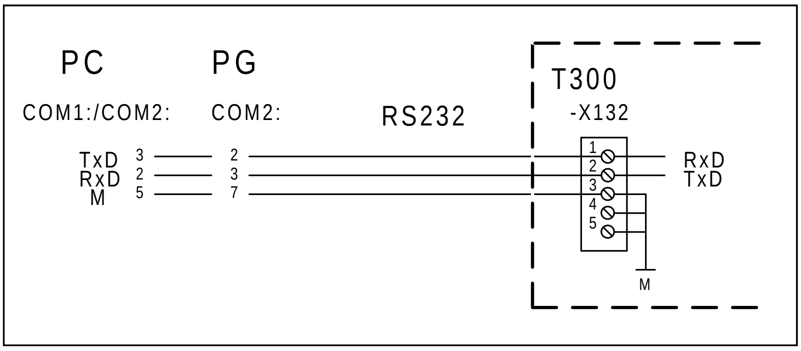
=.W30/3.1 .... System ID/sheet number.sheet column number

7.2 Symbolic monitor

7.2.1 Prerequisites

The standard software package includes a monitor program which allows all of the technological parameters, and each connector of all the function blocks to be accessed. It uses the technology board serial interface.

A suitable connecting cable is illustrated in the following diagram. Plug-in screw terminals (mini modicon“ type) are used to establish the connection at the T300.



A conventional computer or a programming unit (PG) can be used as terminal. The connection is established via the drive converter serial interface. The specified assignment can be used for a PC-AT, otherwise it can be taken from the Manual.

The so-called IBS (start-up) program (PCP/M on the PG730/750 or with emulator under DOS), Telemaster Service (DOS) or SIMOVIS SIMADYN Service (DOS) are suitable terminal programs.

7.2.2 Operator control

Every connector can be addressed via a so-called path name. This path name consists of the processor number (in this case, always 1), the function package names, function block names and connector names:

#FP-fpname.fbname.conname

As an example, the following path name belongs to connector QS of block BI230 in the INPUT function package:

1FP-INPUT.BI230.QS

The pathname is also specified for every technological parameter, in the parameter list.

7.3 SIMADYN D value ranges and normalization

SIMADYN D connector types are only interesting, if the connector is accessed via the symbolic monitor.

If the parameter is accessed via a communications board, USS protocol or the drive converter operator control panel, then the MASTER DRIVE parameter types are valid.

7.3.1 Proportional types

	HEX format V2	Standard format N2	Integer format I2	Ordinal format O2	E format E2
Significance	16-bit word	% quantity	Integer numbers	Integer number, only positive	Extended signal
Value range	0000h...FFFFh	-200%...199.99%	-32768...32767	0...32767	-256.00...255.99
Resolution	0001h	0.0061%	1	1	0.0078125

V2 quantities are mainly masks to suppress or enable individual signals of a status word. The N2 format is used for process quantities such as setpoints and actual valuess. I2 and O2 are integer quantities, such as, for example, rated speeds and encoder pulse numbers, shifts by binary positions etc. The E2 quantity is used exclusively for gains.

7.3.2 Time-dependent types

Time-dependent parameters are fractions or multiples of the sampling time. The 5 time levels *T1*, *T2*, *T3*, *T4* and *T5* of the system define the ranges of the time-dependent parameters; they cannot be changed and are permanently assigned the following values:

Time level	**Sampling time**
T1	5.0 [ms]
T2	20.0 [ms]
T3	40.0 [ms]
T4	160.0 [ms]
T5	320.0 [ms]

7.3.2.1 Time-proportional types

Time-proportional types implement times or time factors, which are proportional to the hexadecimal value or the standardized quantity. However, negative values are not permissible here. A negative value entry is rejected.

The assignment of the types is shown in the following table; the hex and standard quantity N2 types are also included for a better understanding:

HEX format V2	Standard format N2	D format D2	T format T2
0000h	0.0000%	0.000000xTA	0xTA
0001h	0.0061%	0.000061xTA	1xTA
0002h	0.0122%	0.000122xTA	2xTA
...	...	...	...
4000h	100.0000%	1.000000xTA	16384xTA
...	...	...	...
7FFFh	199.9939%	1.999939xTA	32767xTA

7.3.2.2 Time-reciprocal type

The reciprocal type is used when entering time constants for filters (PT1) or integration times, ramp-up and ramp-down times etc. A special feature worth noting is that high values at the connector result in low times and vice versa:

HEX format V2	Standard format N2	Reciprocal format R2
0000h	0.0000%	1.000000xTA
0001h	0.0061%	16384xTA
0002h	0.0122%	8192xTA
...	...	...
3FFEh	99.9878%	1.000122xTA
3FFFh	99.9939%	1.000061xTA
4000h	100.0000%	1.000000xTA
...	...	...
7FFFh	199.9939%	1.999939xTA

When entered via the operator control panel, a time is always entered. This is also signaled back. Knowledge regarding the internal notation is not necessary, but explains the different stages/levels for the R2 type.

8 Program example

The use of the module in a practical software package is now illustrated.

8.1 System configuration

In the following example, the following configuration is assumed:

The drive is part of a multi-motor (sectional) drive. It has a closed-loop tension control. An automation system is available for monitoring and visualization, which is connected to the drives via PROFIBUS.
The setpoint cascade is implemented using the peer-to-peer couplings of the technology board.
The control signals are directly wired from the control desk to the technology board.

The configuration is illustrated on page 1 of the program example. Thus, the task can be sub-divided into three areas:

- **Signal transfer with the automation system**
- **Peer-to-peer coupling to adjacent drives** and
- **Signals directly connected to the technology board**

8.2 Parameterization

8.2.1 Signal transfer with the automation system

The stretch, web tension reference value and tension control enable/disable are to be input from the automation system.
The actual line speed, torque actual value and web tension action value are signaled back from the drive for visualization purposes.

The following signals are output from the automation system to the drive:

Ratio (stretch)

The stretch is entered in the range from -5% to +5% as word 4 in the PROFIBUS telegram.
Parameterization:
H506=023 Receive word 4 (select word 2) from the CB is the source for the ratio reference value.

Web tension reference value

The web tension reference value is entered in the range from 0% to 100% (maximum tension) in word 5 of the PROFIBUS telegram.
Parameterization:
H400=024 Receive word 5 (select word 3) from the CB is the source for the web tension reference value.

Enabling/disabling the web tension control

The web tension control should be enabled via bit 0 in receive word 6 of the CB and disabled via bit 1.
Parameterization:
H404=025 Receive word 6 is the source for enabling the technological controller (select word 4) from CB
H405=0001h Selecting bit 0
H408=025 Receive word 6 (select word 4) from CB is the source to disable the technological controller
H409=0002h Selecting bit 1

The following signals are sent from the drive to the automation system:

Line speed actual value

The line speed actual value is signaled back in word 2 of the PROFIBUS telegram for visualization
Parameterization:
H905=076 K076 (=internal line speed actual value) is the source for send word 1 at CB

Torque actual value

The torque actual value is transferred via word 3 of the PROFIBUS telegram.
Parameterization:
H906=045 K045 (= torque actual value from CU) is the source for send word 3 at CB

Web tension actual value

The web tension actual value is transferred in word 4 of the PROFIBUS telegram.
H907=131 K131 (=technological actual value after offset compensation and actual value smoothing) is the source for send word 4 at CB

Note:
Nothing changes regarding the telegram structure and thus the signal connections, if a SCB1 or SCB2 communications board with USS protocol is connected instead of a CB1 communications board with PROFIBUS DP.

8.2.2 Peer-to-peer coupling to the adjacent drives

The setpoint cascade is established using the peer-to-peer coupling. The folllowing data transfer is to be realized:

8.2.3 Receiving, peer-to-peer

The line speed setpoint is to be transferred from the previous drive via word 1 and the acceleration value of the central acceleration ramp, via word 2.
Parameterization:
H500=030 Receive word 1 from the peer-to-peer is the source for the main setpoint
H712=031 Receive word 2 from the peer-to-peer is the source for the acceleration value

8.2.4 Sending, peer-to-peer

The line speed setpoint is to be transferred to the next drive in word 1 and the acceleration value in word 2.
Parameterization:
H879=107 The line speed setpoint is the source for send word 1, peer-to-peer coupling
H881=031 The acceleration value, which was also received, is the source for send word 2, peer-to-peer coupling

8.2.5 Signals directly connected to the technology board

The following signals are connected to the technology board via the SE300 interface board:

Input signals:

Actual web tension

The web tension actual value is to be read-in via the fast analog input 1
The voltage range of the tension measuring transducer : 0...+10V.
Parameterization:
H402=060 Analog input 1 is the source for the technological actual value (tension actual value)

Powering-up the drive

The drive is to be powered-up via binary input 1.
Parameterization:

H200=069	A binary input is the source to power-up
H201=0001h	Selecting binary input 1

Powering-down the drive

The drive is to be powered-down via binary input 2 using an NC contact. Power-down should be realized via the stop command.
Parameterization:

H202=069	A binary input is the source to power-down
H203=0002h	Selecting binary input 2

No fast stop

The fast stop is connected at binary input 3, and is implemented using an NC contact.
Parameterization:

H206=069	A binary input is the source for fast stop.
H207=0004h	Selecting binary input 3

Inching 1

The inching button is connected to binary input 4.
Parameterization:

H220=069	A binary input is the source for inching 1
H221=0008h	Selecting binary input 4
H538=2%	Inching setpoint

Crawl and reverse crawl

The crawl and reverse crawl functions are implemented using an operating mode selector switch. It is a switch with 3 positions.

Position 1: No crawl setpoint selected. The drive can run at the production speed.
Position 2: Crawl forwards
Position 3: Crawl backwards.

Parameterization: (refer to function diagram B4)
H224=069 A binary input is the source for operating mode, bit 0 (in this case, crawl forwards)
H225=0010h Selecting binary input 6
H531=5% Fixed setpoint when crawl is selected
H226=069 A binary input is the source for operating mode, bit 1 (in this case, crawl backwards)
H227=0020h Selecting binary input 7
H532=-5% Fixed setpoint when crawl backwards is selected

Slack take-up

Parameterization:
H524=069 A binary input is the source for slack take-up
H525=0100h Selecting binary input 9
H520=2% Supplementary setpoint for slack take-up.

Output signals:

Two lamps for status display are mounted in the control desk, which are controlled from the technology board.

Signaling lamp for operation

The signaling lamp should be lit when the drive is powered-up.
Parameterization:
H833=146 The control status word is the source for binary output 1
H834=0040h Selecting bit 6 (drive powered-up)

Signaling lamp for a fault condition

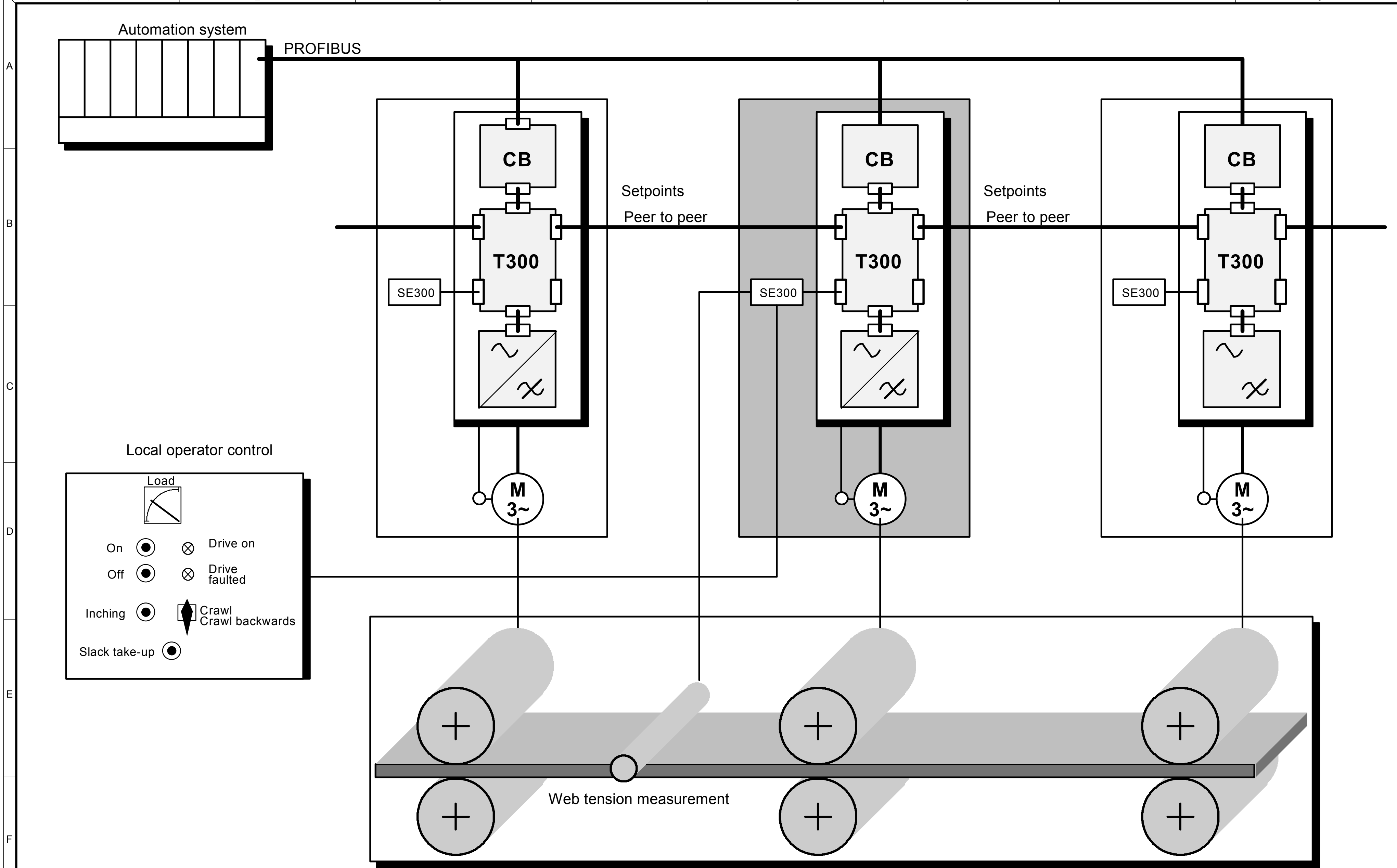
This signaling lamp should be lit if the drive is faulted.
Parameterization:
H835=146 The control status word is the source for binary output 2
H836=1000h Selecting bit 12 (drive faulted)

Torque actual value display

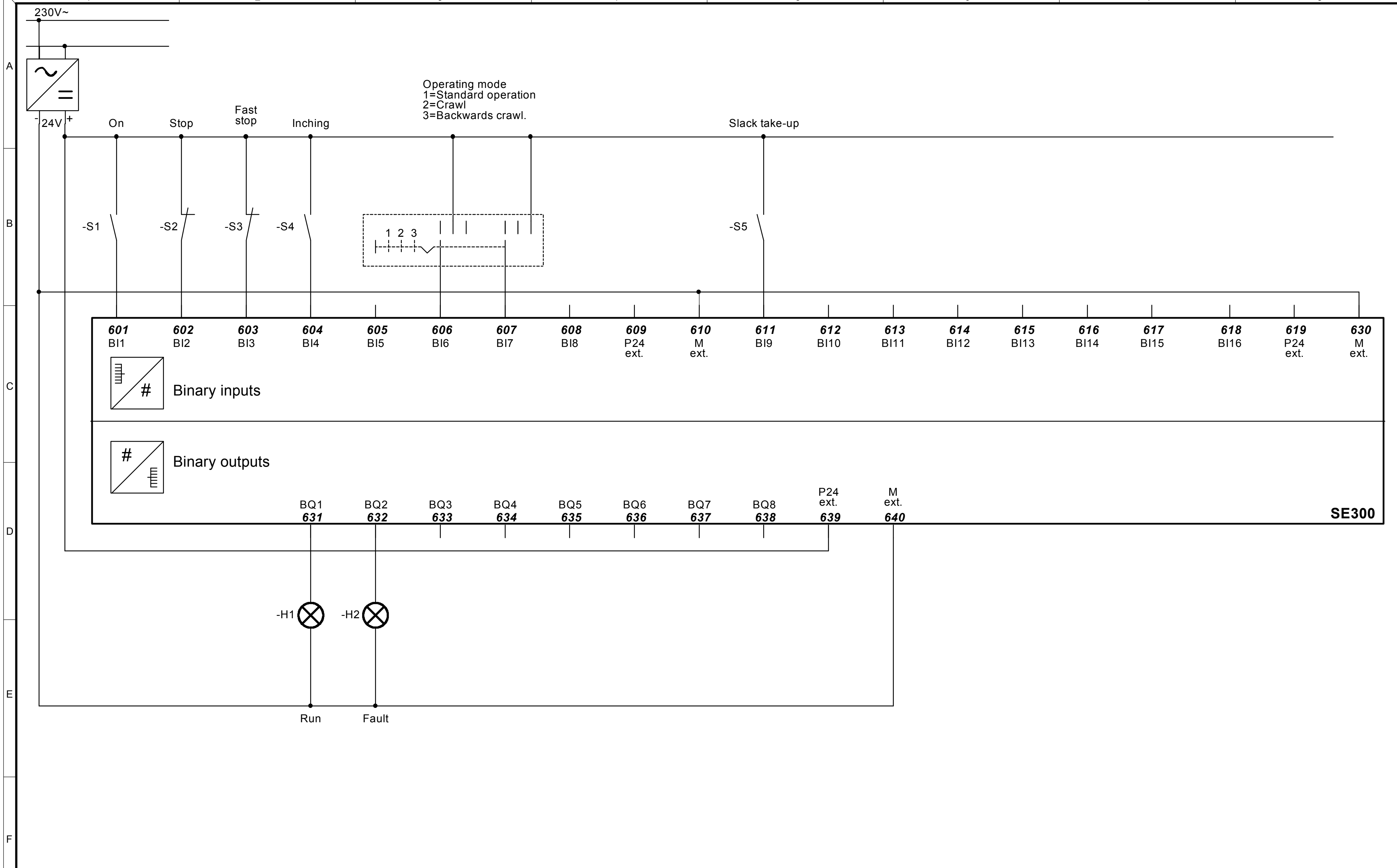
A load display instrument is to be controlled. In this case, 10 V should correspond to 100% of the rated motor torque.
Parameterization:
H850=045 The torque actual value from the CU is the source for analog output 1

8.3 Function diagram

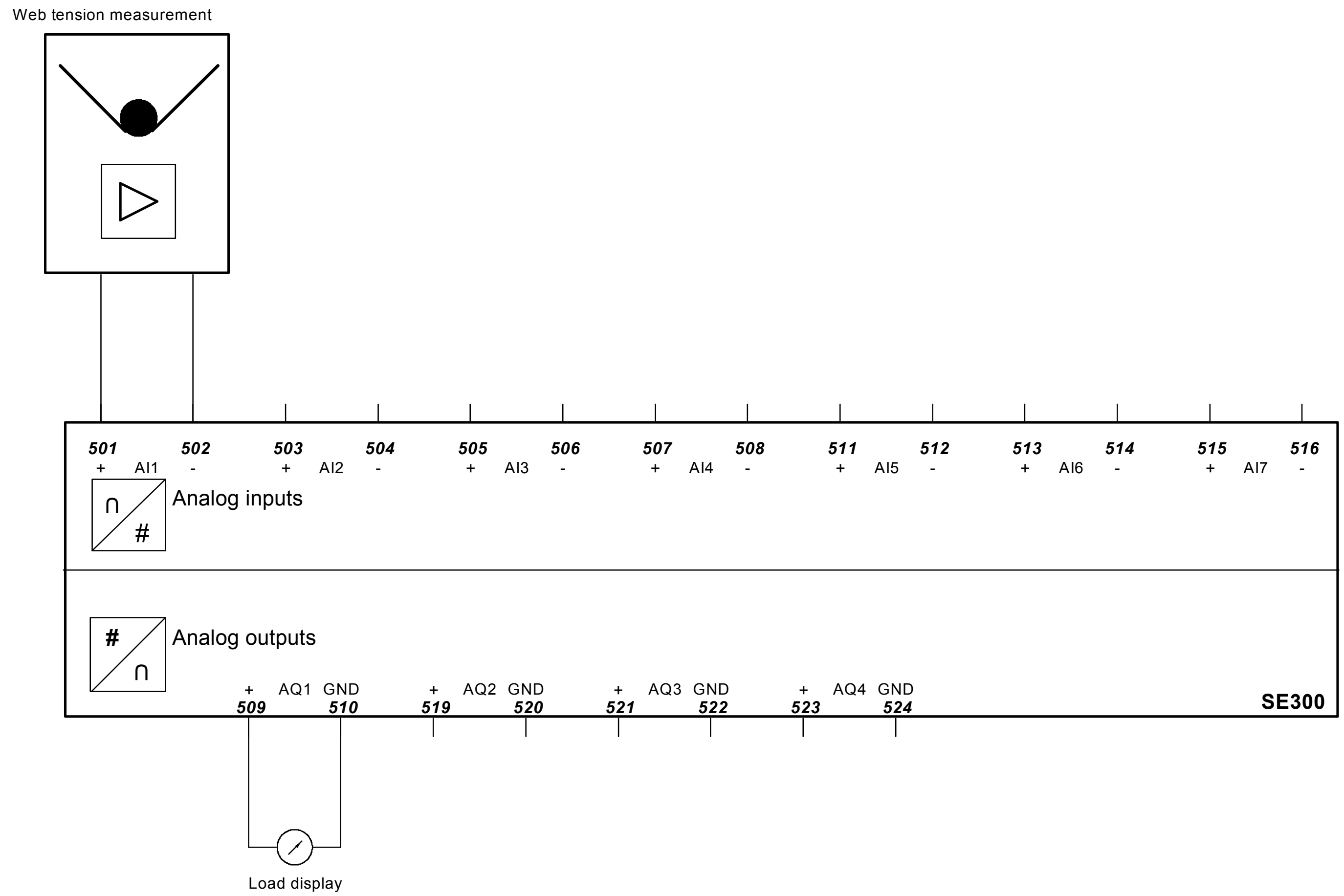
The function diagrams of the parameterization example include a block diagram, where the drive machine is shown. This is followed by the hardware diagrams, which show the connection of the local operator control elements. Parameterization is explained using the function diagrams from Section 3.2.



Date: 1.8.94	Standard software package	SIEMENS	Typical configuration	=	
Person: Reh / Michaelis	Sectional drive		Block diagram	+	
Chk.				BSP_1_5	Sheet 1+
Status / Change / Date / Name Std.					Sh.



Date 1.8.94	Standard software package	SIEMENS	Typical configuring	=	
Person Reh / Michaelis	Sectional drive		Binary inputs	+	
Chk.			Binary outputs	BSP_1_5	Sheet 2+
Status / Change / Date / Name Std.					Sh.



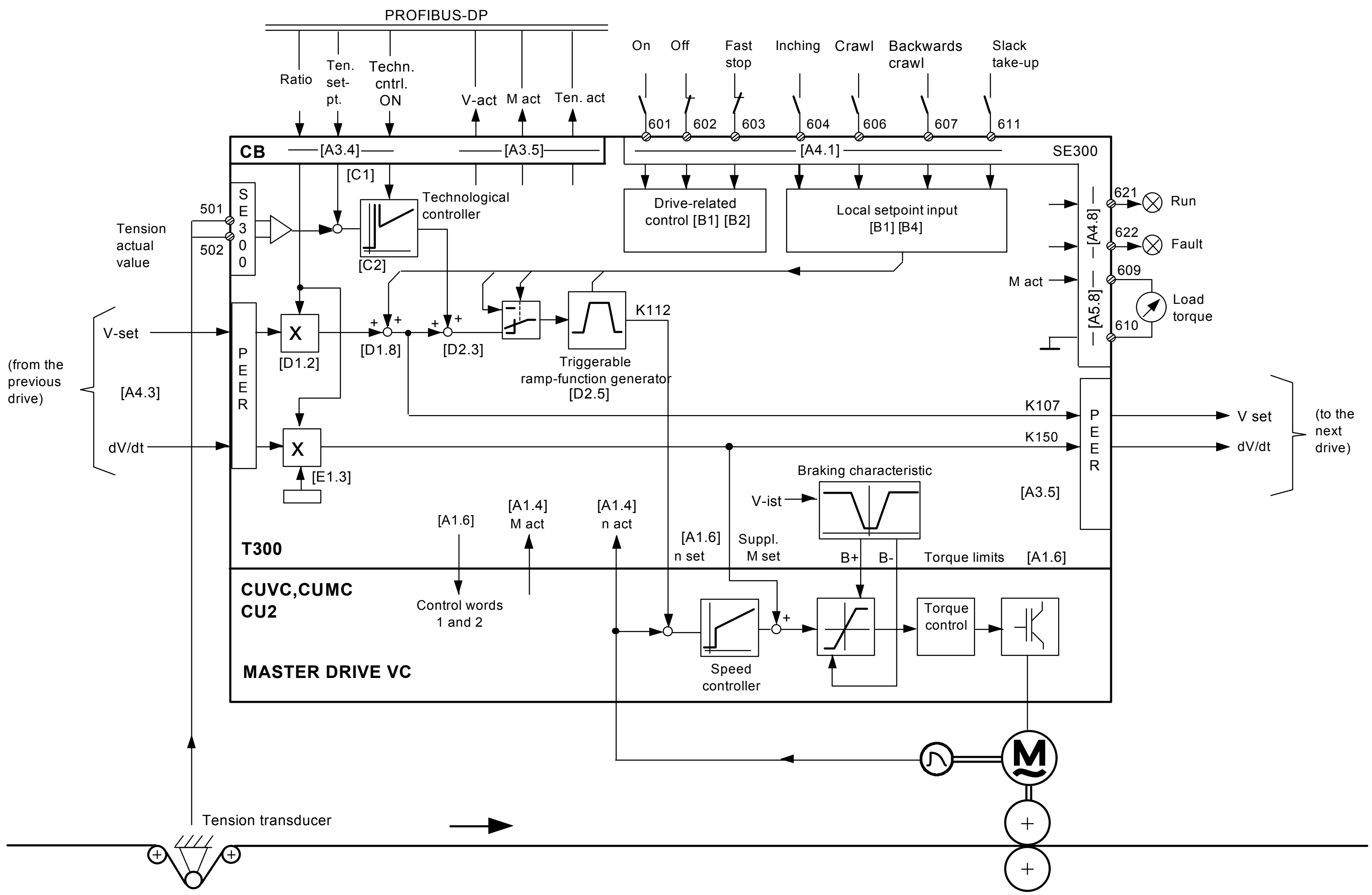
Date	1.8.94	Standard software package	SIEMENS	Typical configuring	=
Person	Reh / Michaelis	Sectional drive		Analog inputs	+
Chk.				Analog outputs	BSP_1_5
Status. Change Date Name Std.					Sheet 3+ Sh.

531	532	533	534	535	536	537	538	539	540
1A+	GND	1B+	GND	SYN	GND	CSYN	GND ext.	GND ext.	P15
Track1A		Track 1B		Synchronizing pulse		Rough-pulse			

Pulse encoderr 1

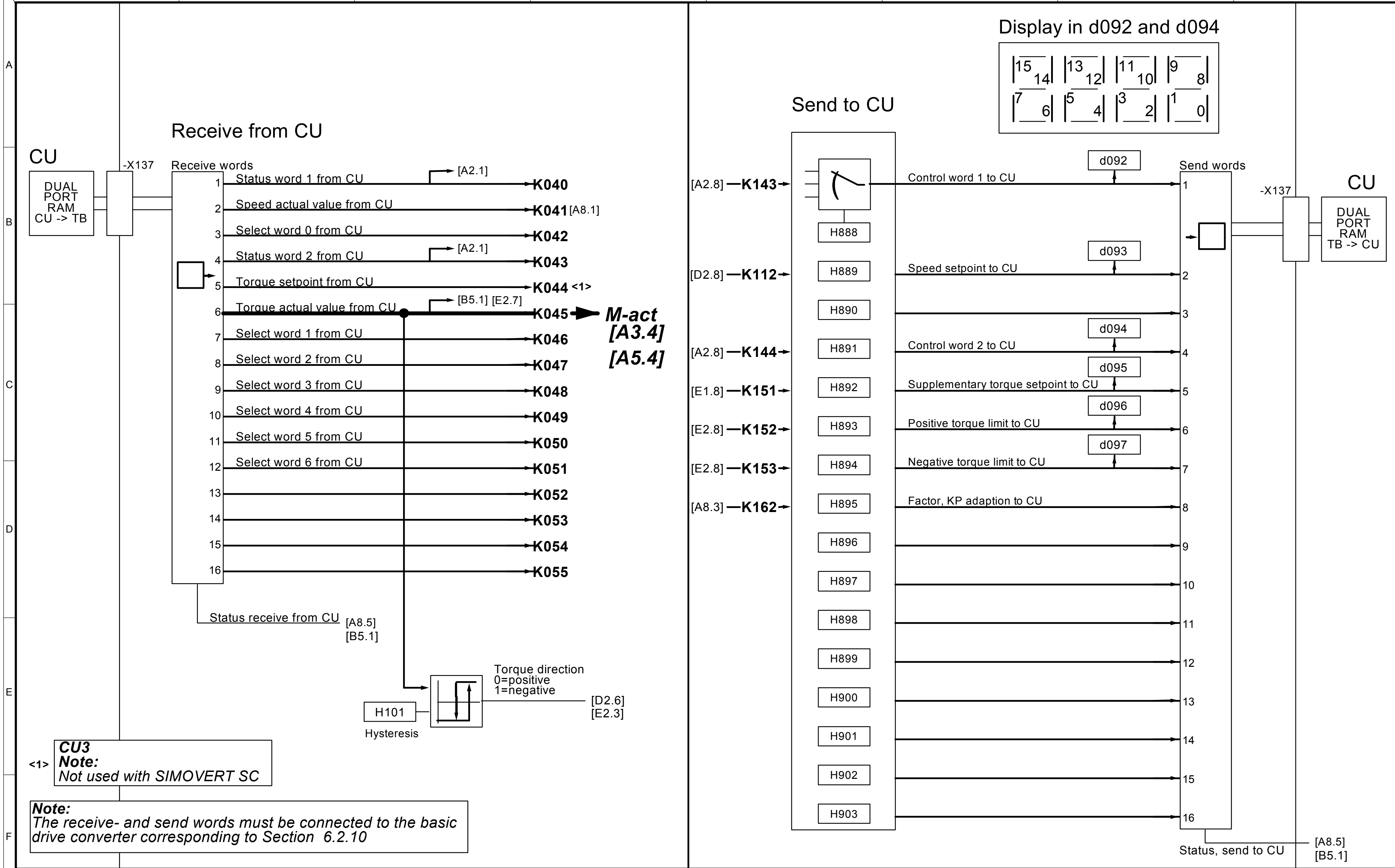
541	542	543	544	545	546	547	548	549	540
1A+	GND	1B+	GND	SYN	GND	CSYN	GND ext.	GND ext.	P15
Track 1A		Track 1B		Synchronizing pulse		Rough pulse			

Pulse encoder 2

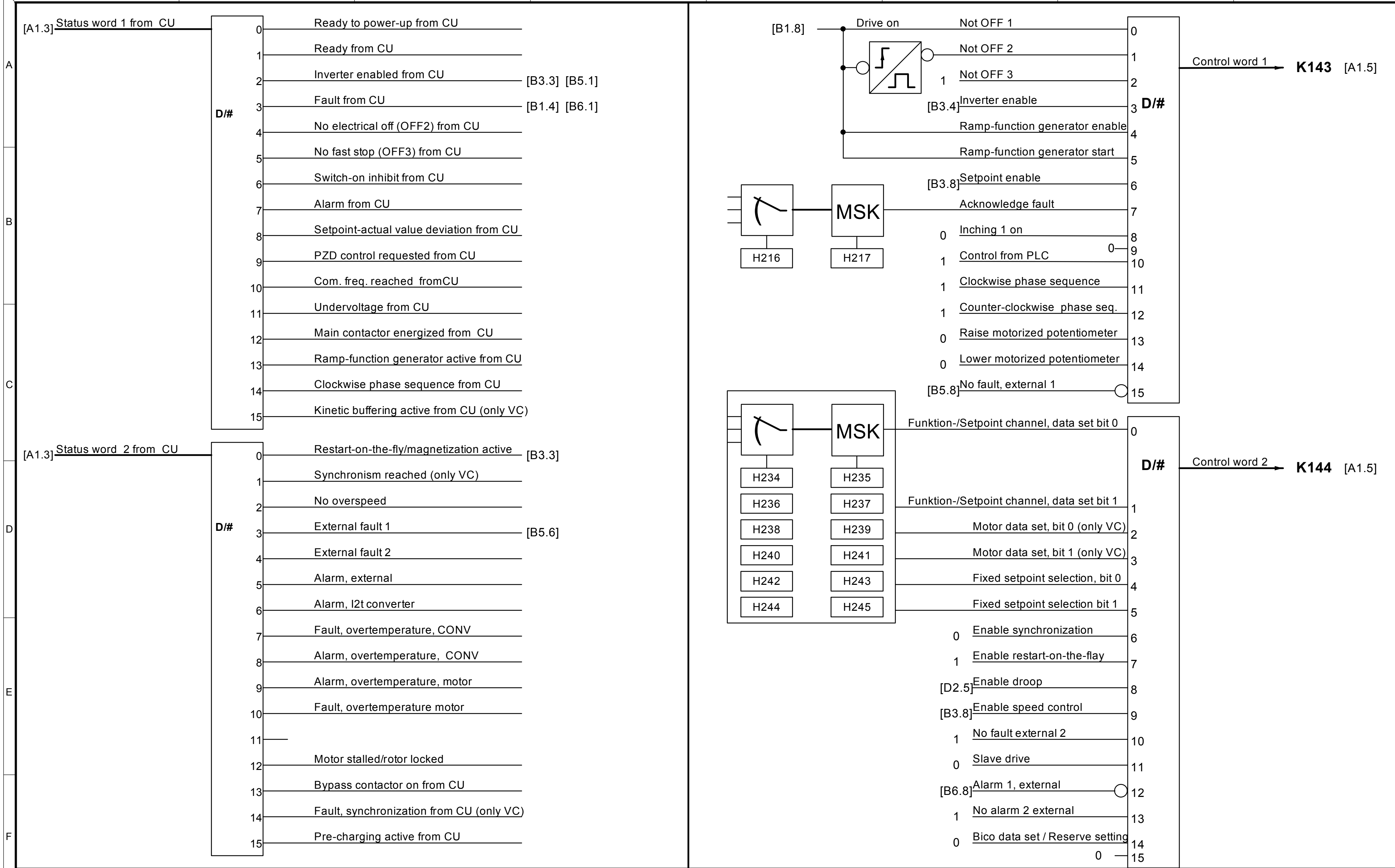


Standard multi-motor drive software package, typical configuration, signal flow diagram

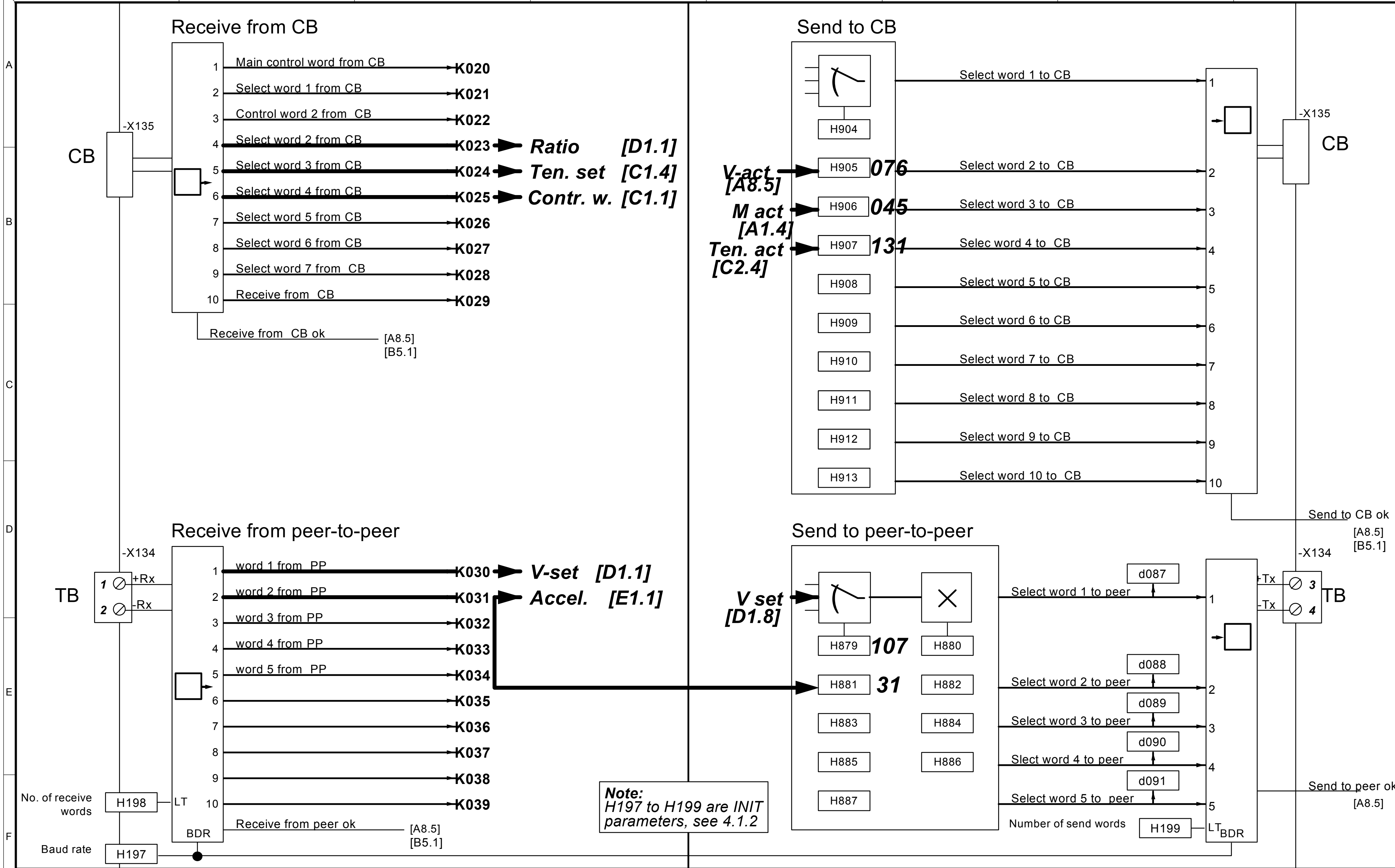
			Date	1.8.94	Standard software package	SIEMENS	Typical configuring	=
			Person	Reh / Michaelis	Sectional drive		Overview, signal paths	+
			Chk.					BSP_1_5
Status	Change	Date	Name	Std.				Sheet 5- Sh.



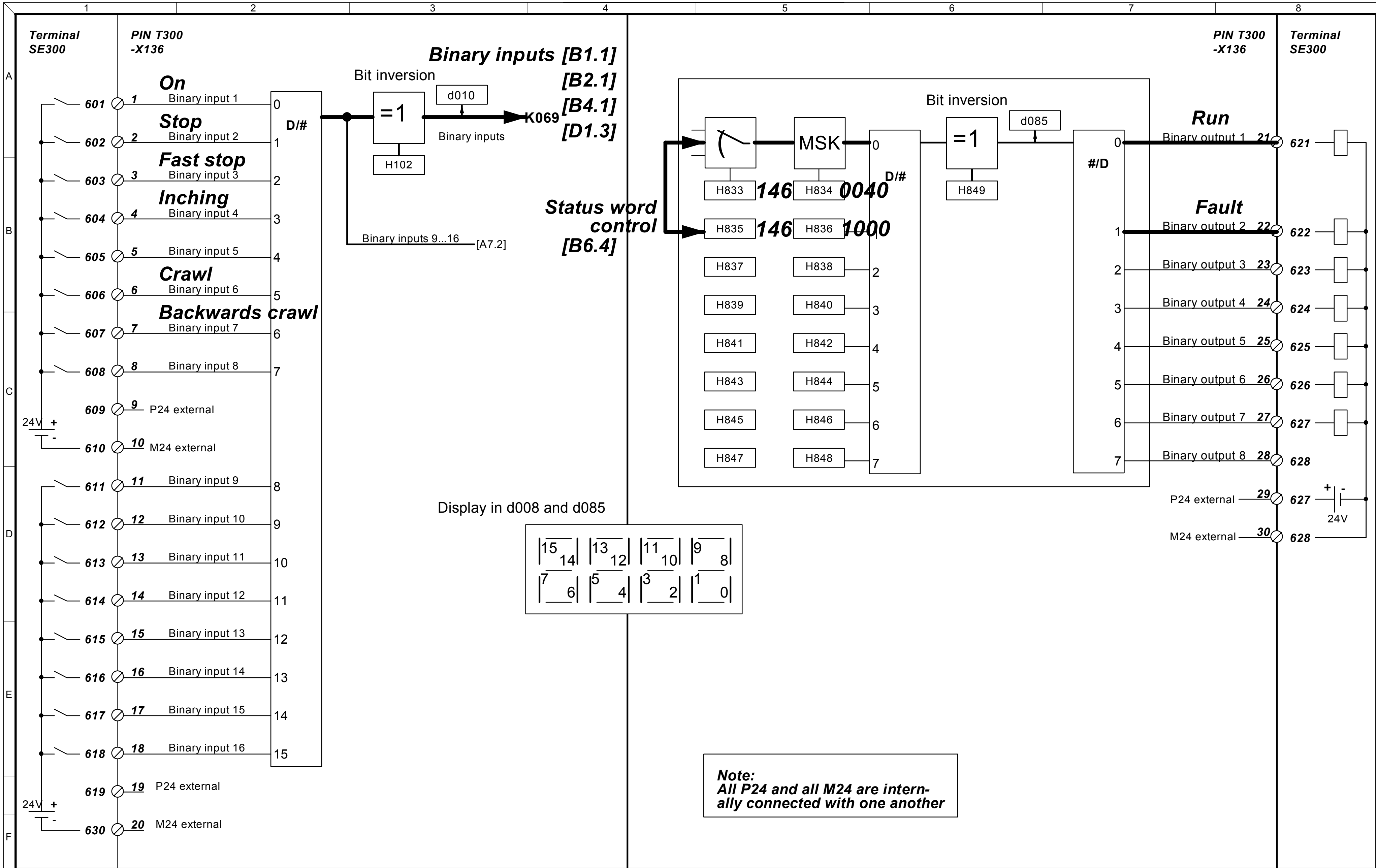
Status	Änderung	Date	Name	Date 19.8.96 / Person Reh / Michaelis / Chk / Std.	Standard software package Sectional drive	SIEMENS	Communications with the basic drive converter (CU) Receive/send telegram	FP_A1_6	Function diagram A1	Sheet A1+ Bl.



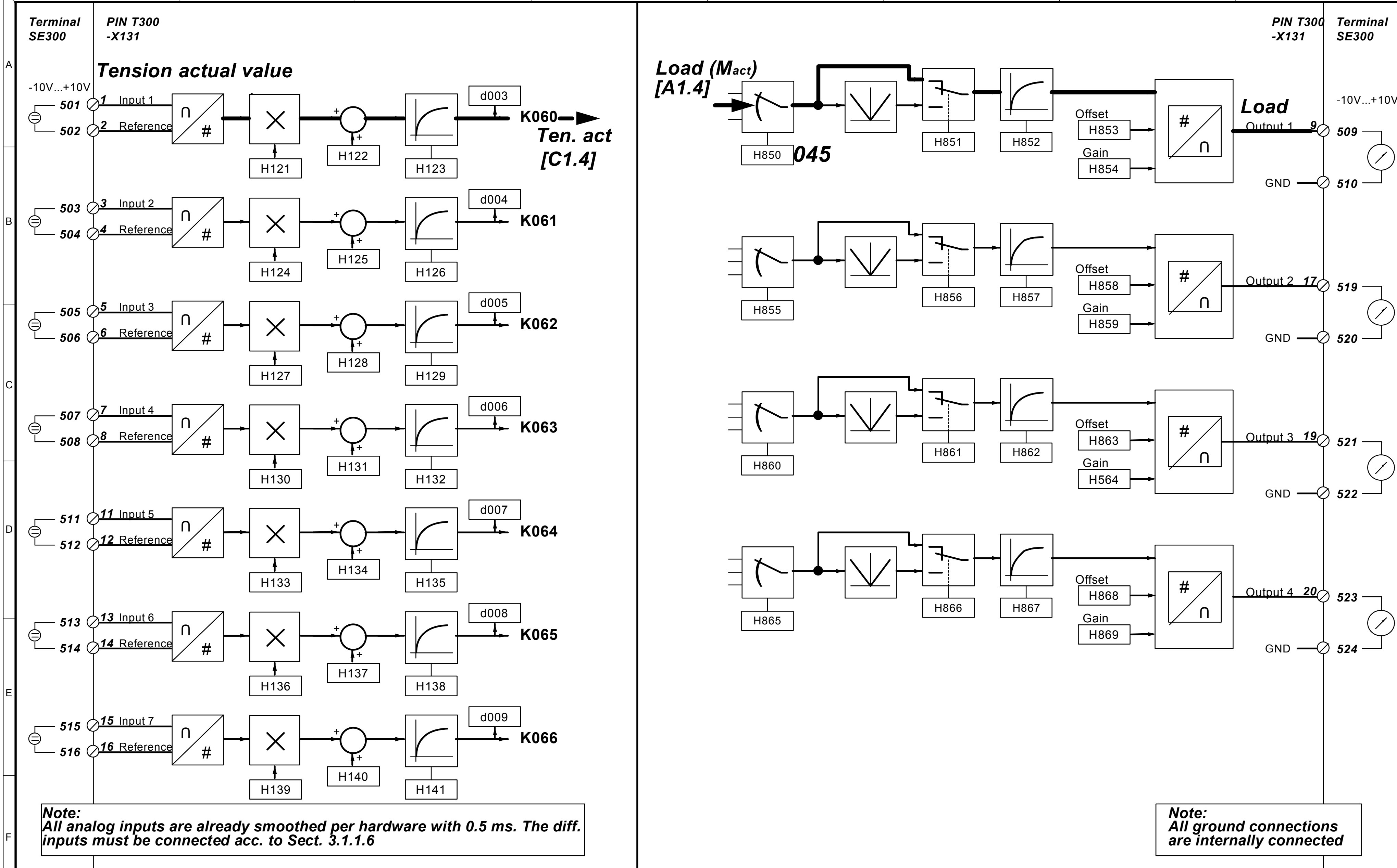
Status	Change	Date	Name	Date / Person / Chk. / Std.	1.12.94 / Reh / Michaelis	Standard software package Sectional drive	SIEMENS	Status words from the basic conv. Control words to the basic conv.	FP_A1_6	Function diagram A2	Sheet A2+ Sh.



			Date 19.8.96	Standard software package	SIEMENS	Comm. with the COM-BOARD	FP_A1_6	Function diagram A3	Sheet A3+
			Person Reh / Michaelis	Sectional drive		Peer-to-peer coupling			Sh.
Zustand.	Änderung	Date	Name Chk. Std.						



Status.	Change	Date	Name	Date 1.12.94 / Person Reh / Michaelis / Chk. / Std.	Standard software package Sectional drive	SIEMENS	Binary inputs Binary outputs	FP_A1_6	Function diagram A4	Sheet A4+ Sh.



Status	Change	Date	Name		
				Date	1.12.94
				Person	Reh / Michaelis
				Chk.	
				Std.	

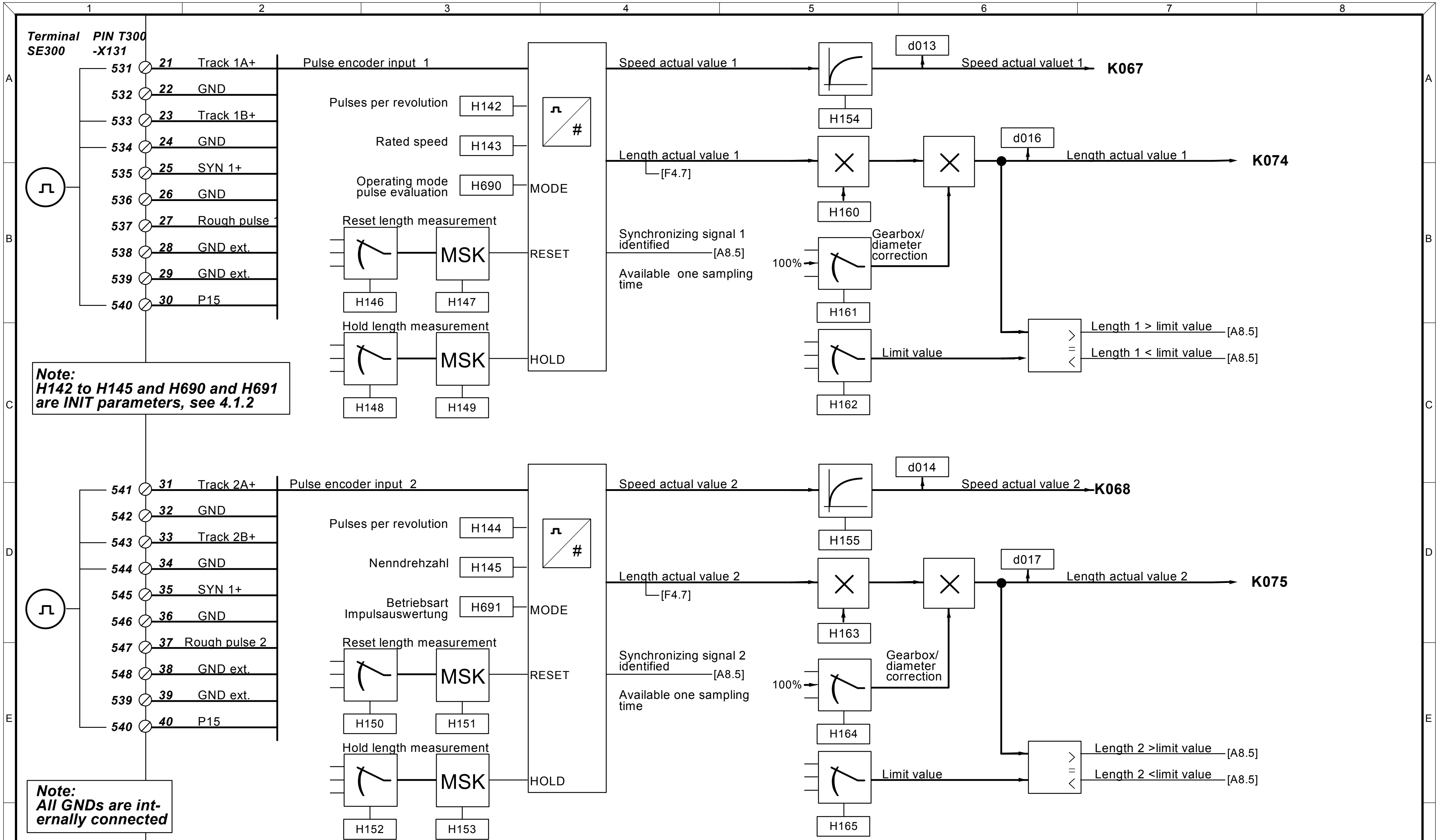
Standard software package
Sectional drive

SIEMENS

Analog inputs
Analog outputs

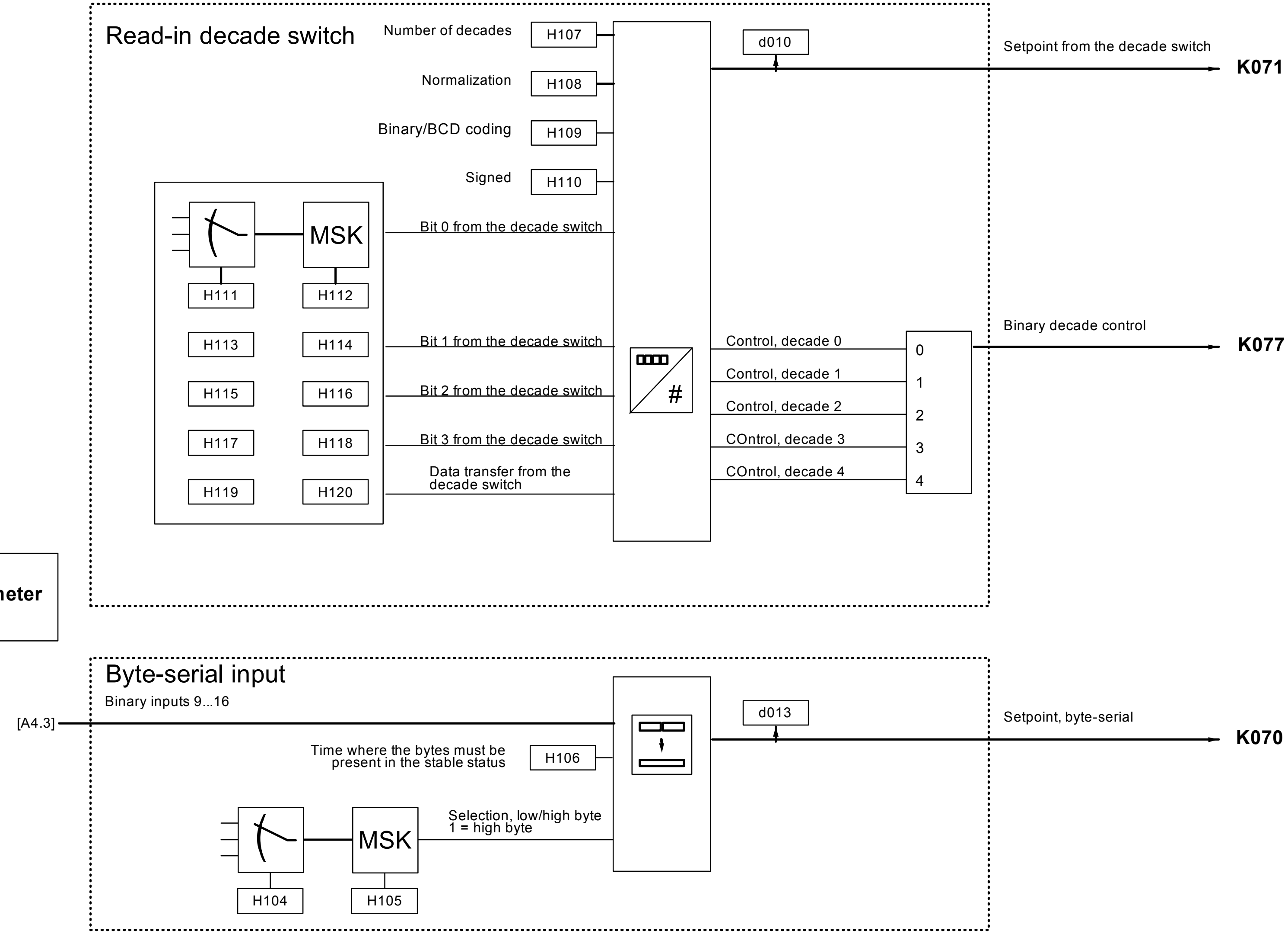
FP_A1_6 Function diagram A5

Sheet A5+
Sh.



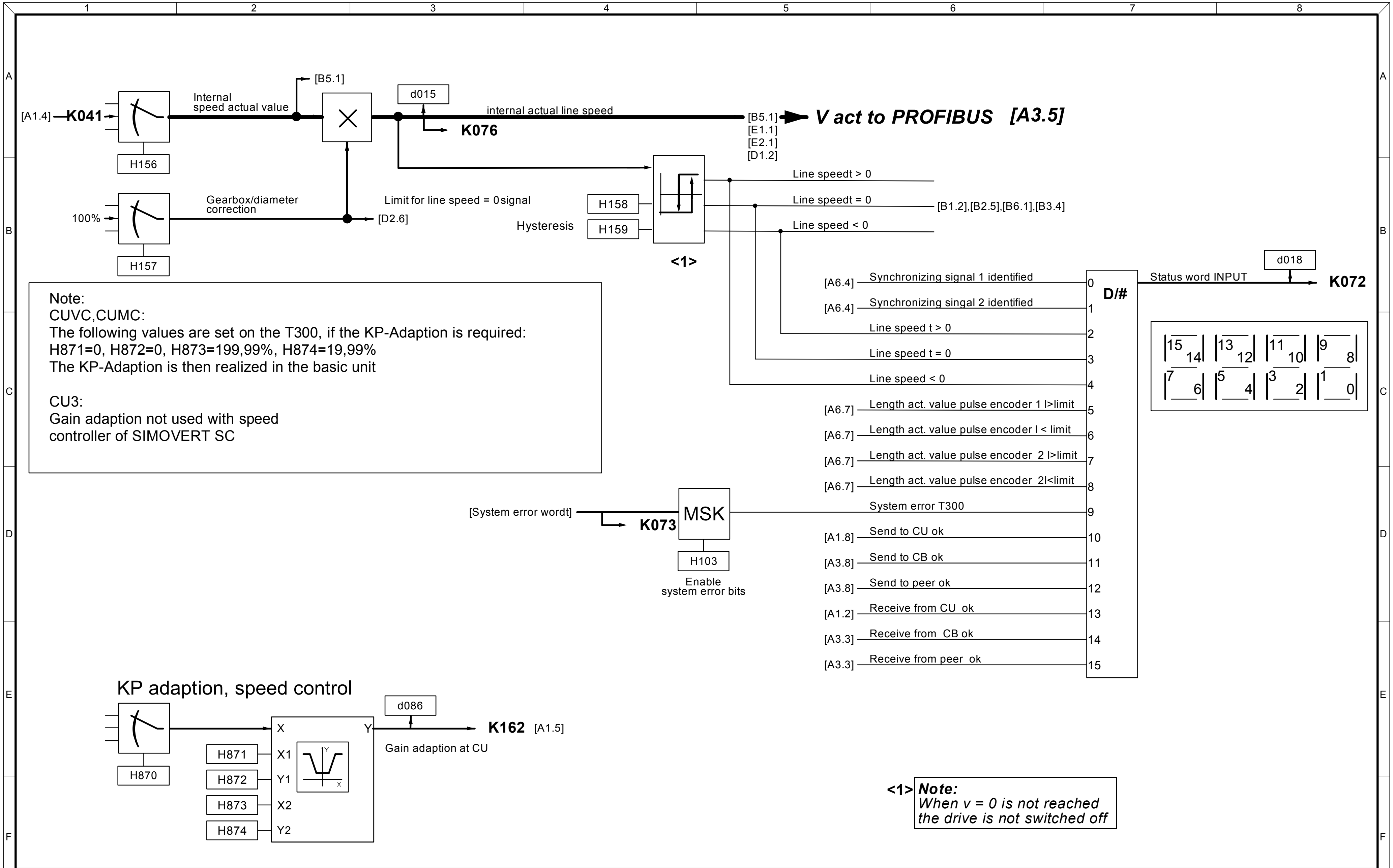
Note:
Only one pulse encoder can be supplied from the technology board.
A pulse encoder with an external power supply must be used if 2 pulse encoders are connected.

Status.	Change	Date	Name	Date / Person / Chk. / Std.	19.8.96 / Reh / Michaelis	Standard software package Sectional drive	SIEMENS	Pulse encoder inputs Length measurement	FP_A1_6	**Function diagram A6**	Sheet A6+ Sh.

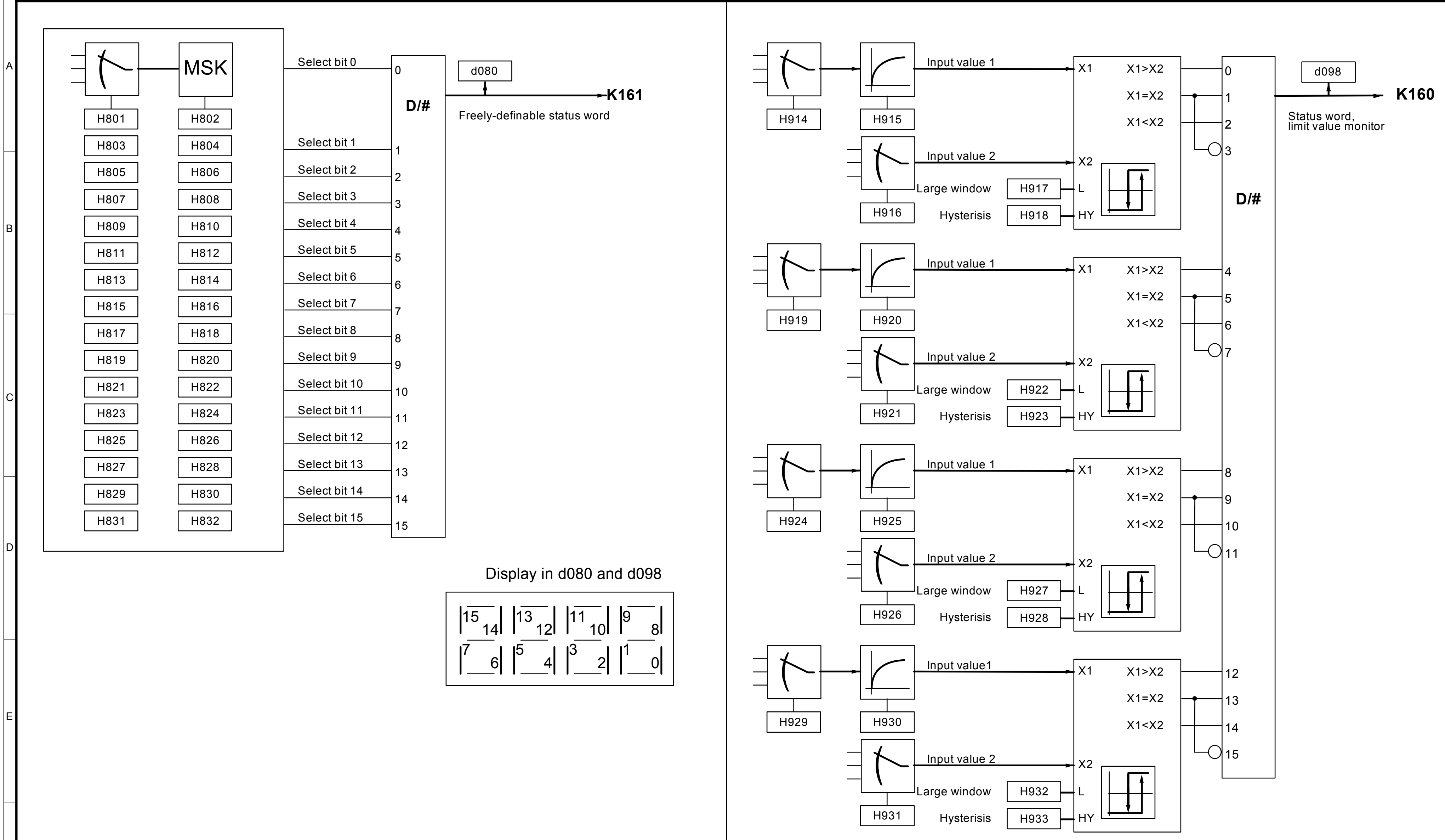


Note:
H107 is a INIT-parameter see 4.1.2

				Date	19.8.96	Standard software package	SIEMENS	Setpoint input via		=
				Person	Reh / Michaelis	Sectional drive		decade switches		+
				Chk.				Byte-serial input	FP_A7_10	Function diagram A7 Sheet A7+
Zustand	Änderung	Date	Name	Std.						Sh.

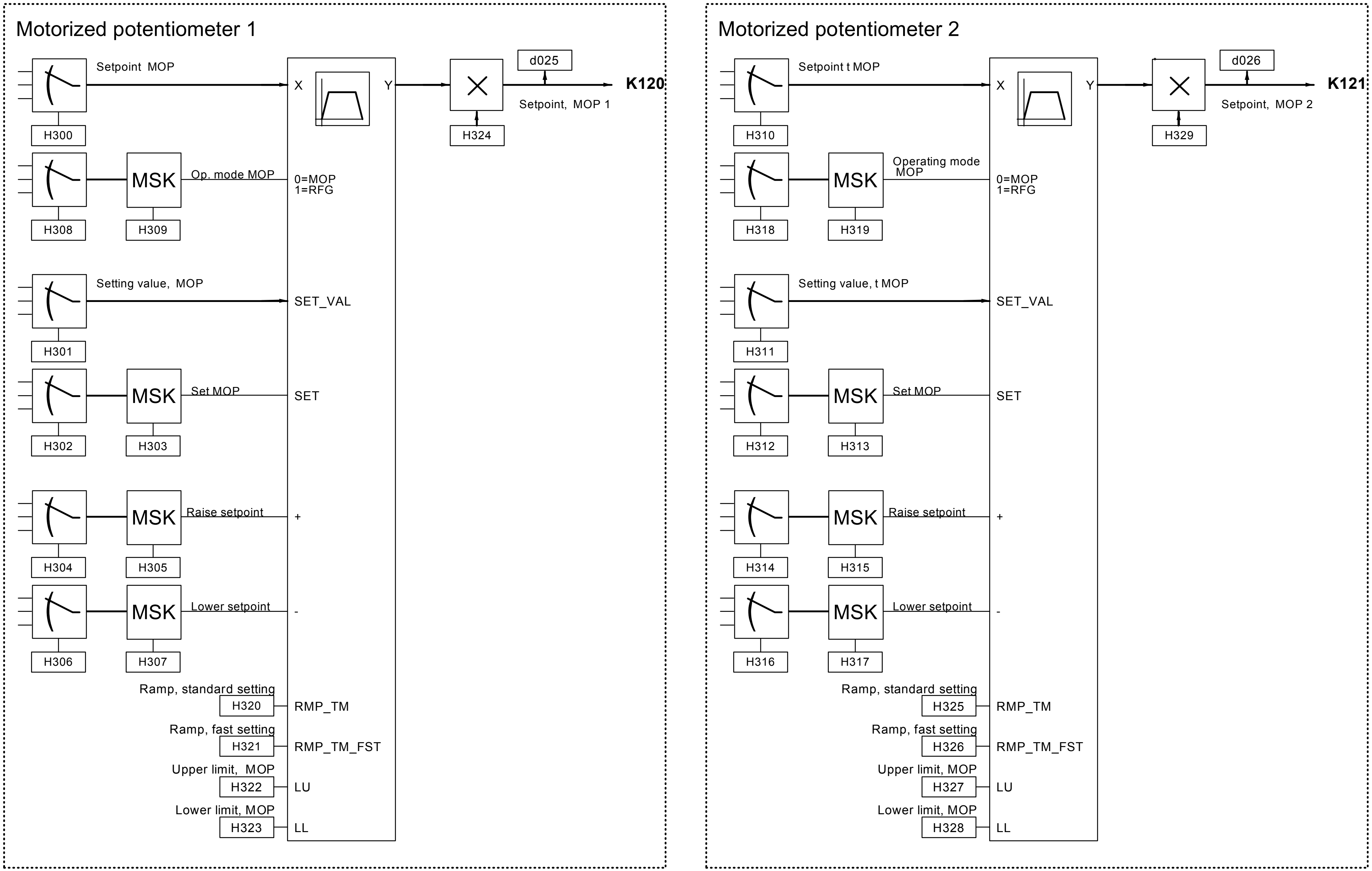


Status.	Change	Date	Name	Date 19.8.96 / Person Reh / Michaelis / Chk. / Std.	Standard software package Sectional drive	SIEMENS	Line speed actual value Status word input/output KP adaption, speed control	FP_A7_10	Function diagram A8	Blatt A8+ Bl.

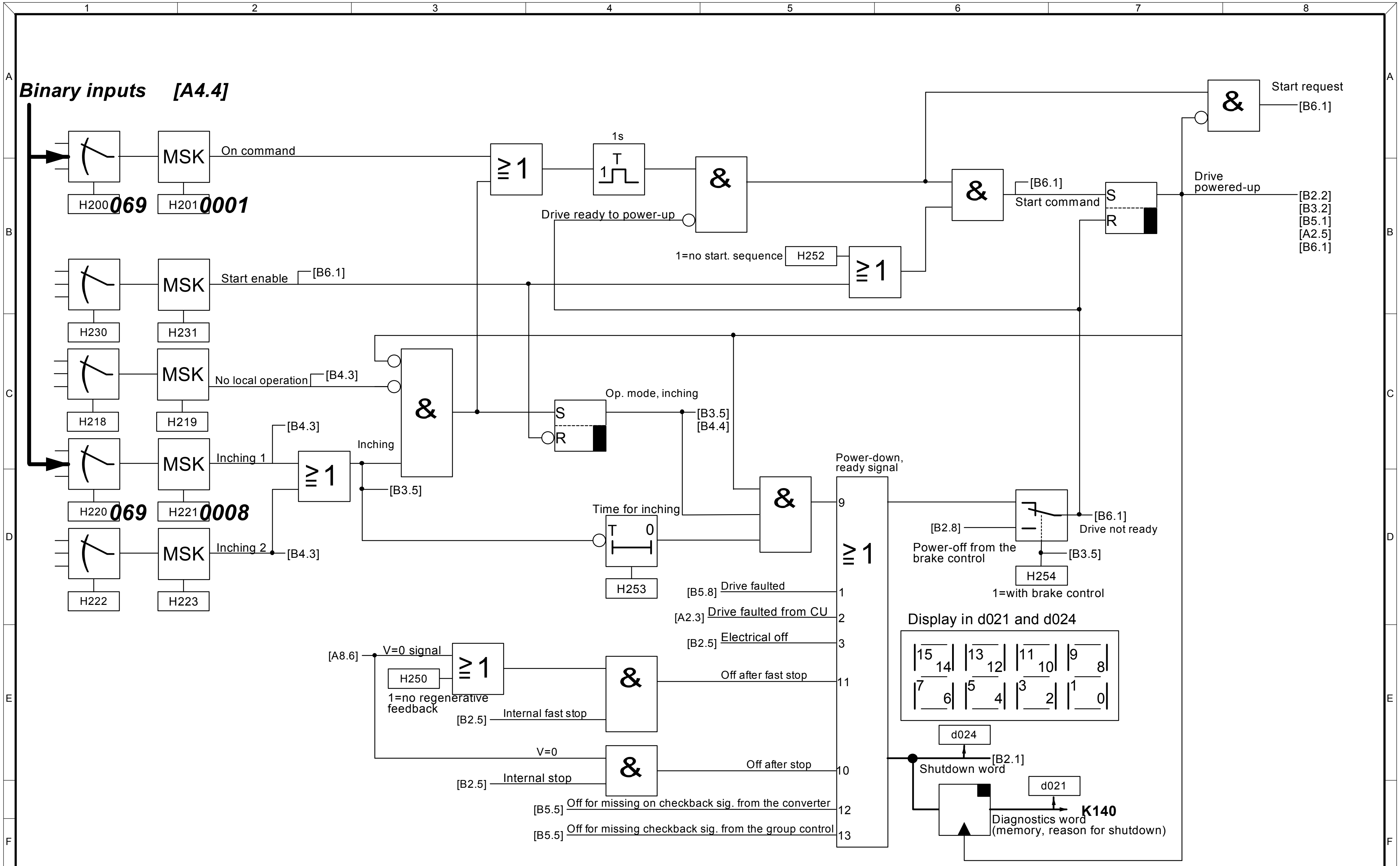


Note:
The switching characteristics is described in Sec. 3.1.1.5

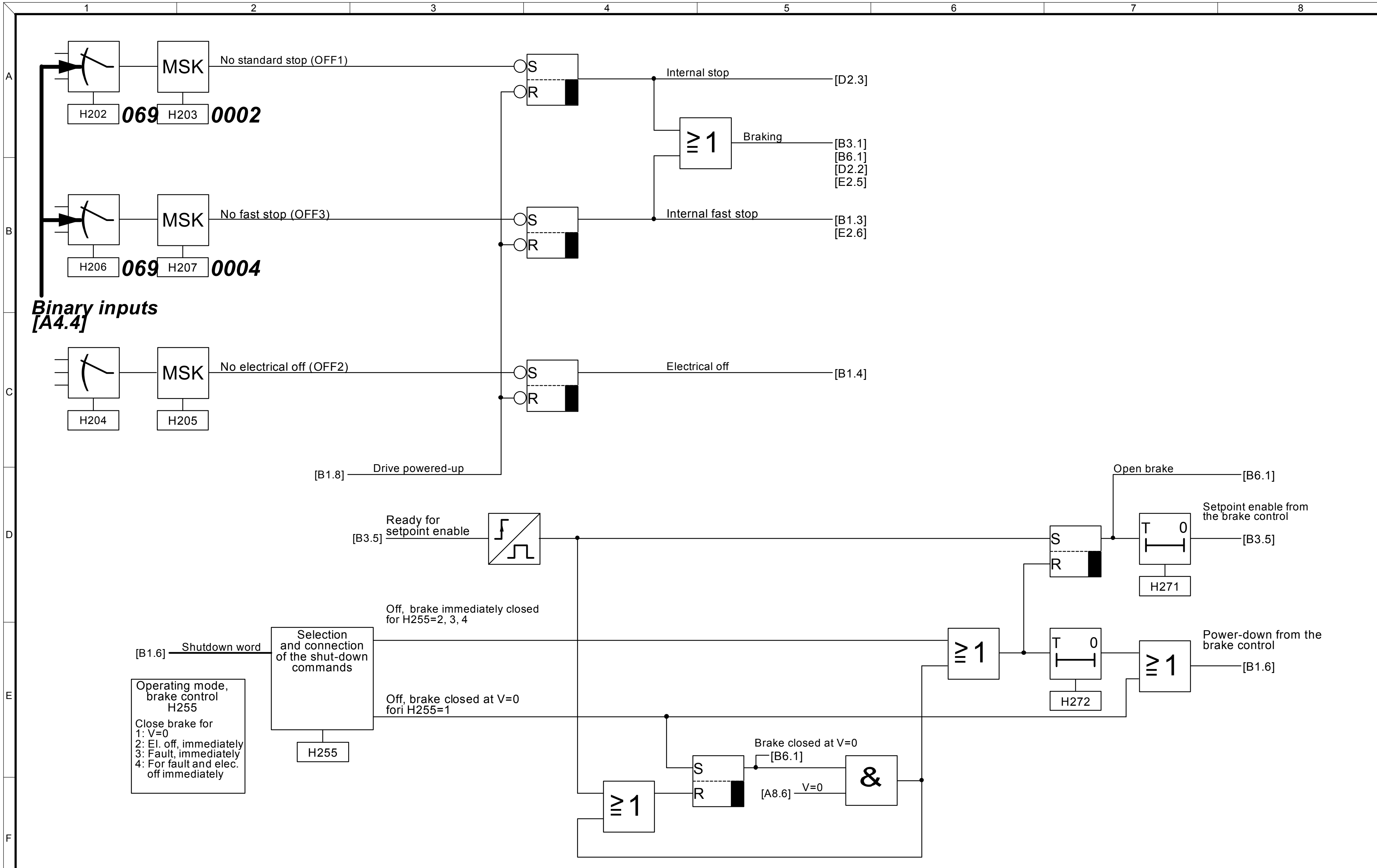
Status	Change	Date	Name	Date / Person / Chk. / Std.	1.8.94 / Reh / Michaelis	Standard software package / Sectional drive	SIEMENS	Freely-definable status word / Freely-connectable lim. val. monit. / Status word, limit value monitor	FP_A7_10	Function diagram A9	Sheet A9+ / Sh.



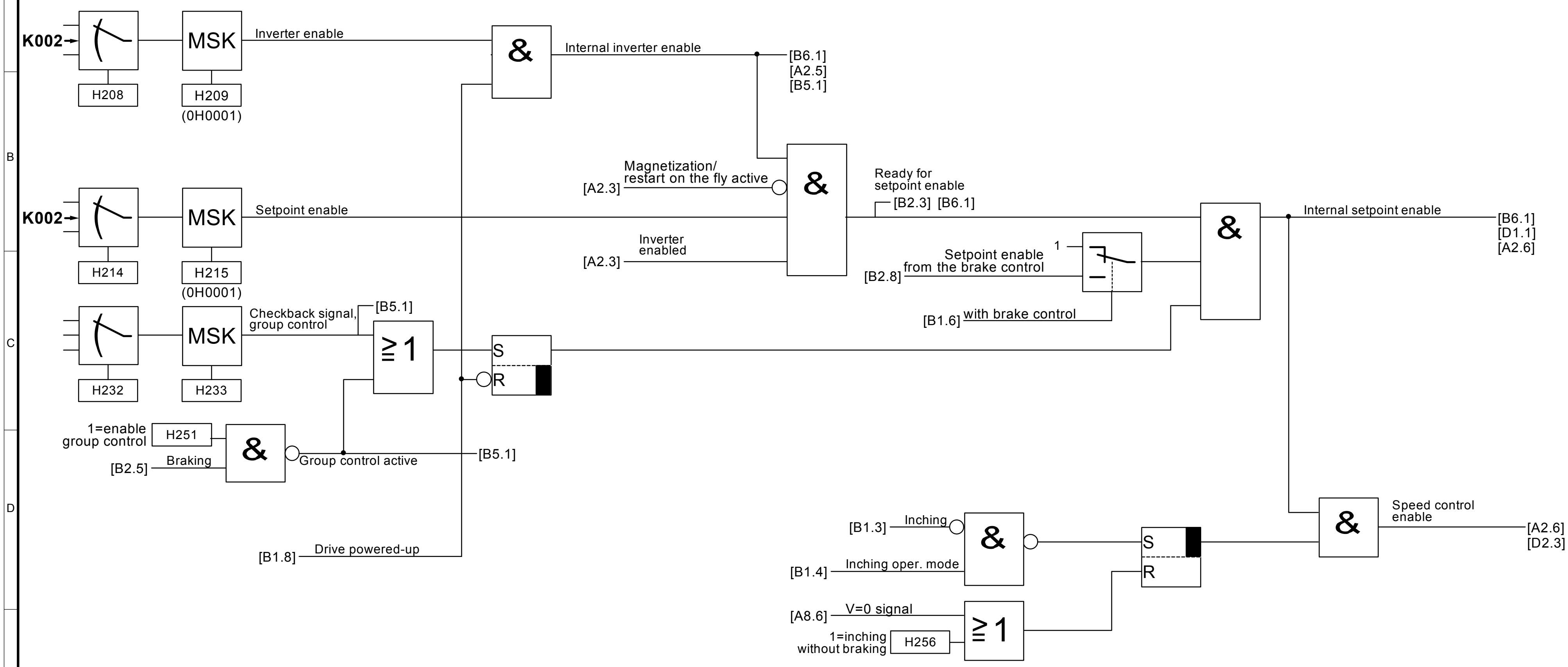
				Date	1.8.94	Standard software package	SIEMENS	Motorized potentiometers 1 and 2	=
				Person	Reh / Michaelis	Sectional drive			+
				Chk.				FP_A7_10	**Function diagram A10** Sheet A10-
Zustand.	Änderung	Date	Name	Std.					Sh.



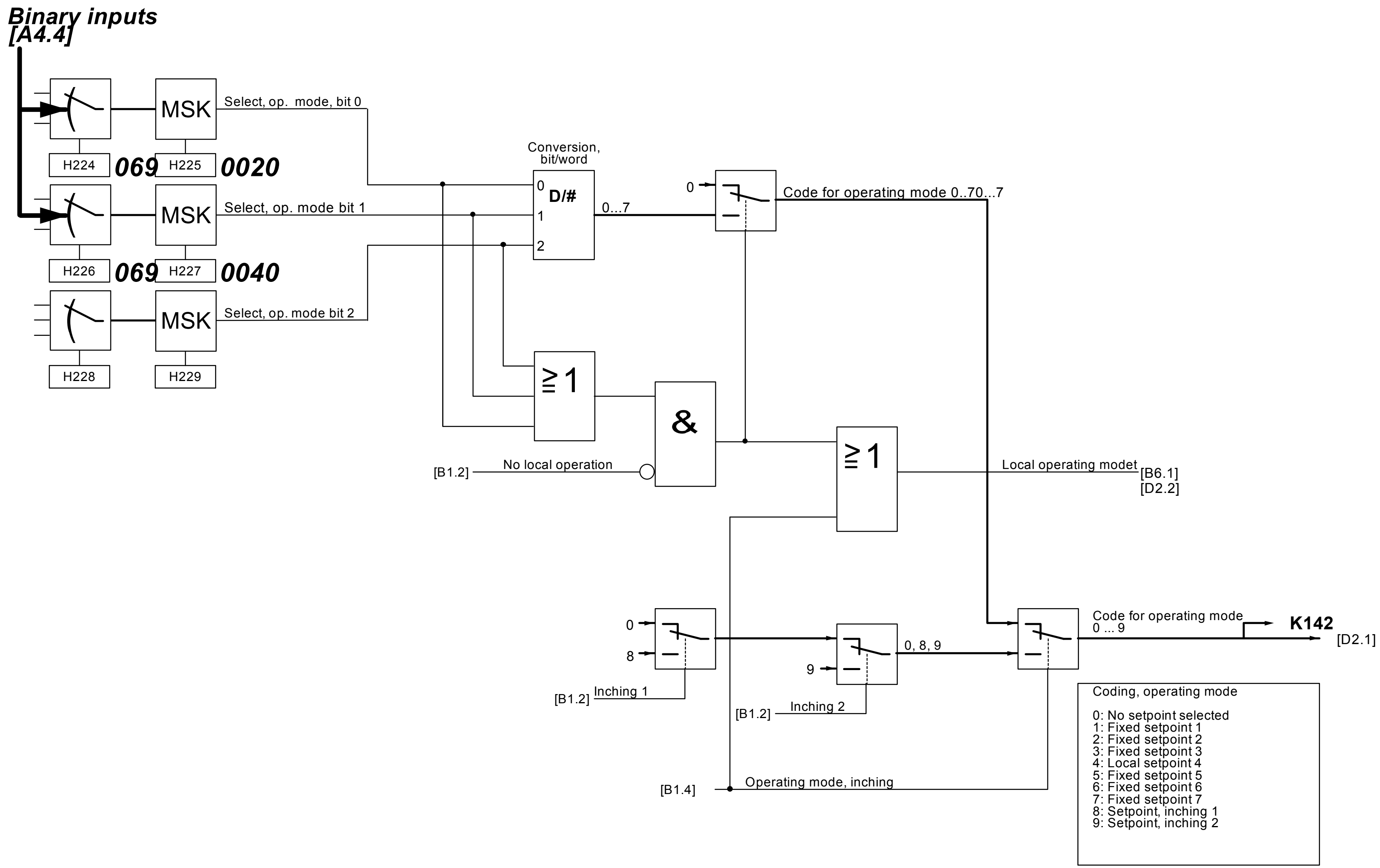
Zustand	Änderung	Date	Name	Datum 1.8.94 Person Reh / Michaelis Chk. Std.	Standard software package Sectional drive	SIEMENS	Drive power-up, power-down	FP_B1_6	Function diagram B1	Sheet B1+ Sh.



				Date	1.8.94	Standard software package	SIEMENS	Stop, electrical off/fast stop	=
				Person	Reh / Michaelis	Sectional drive		Brake control	+
				Chk.					FP_B1_6 · Function diagramB2 · Sheet B2+
Status	Change	Date	Name	Std.					Sh.

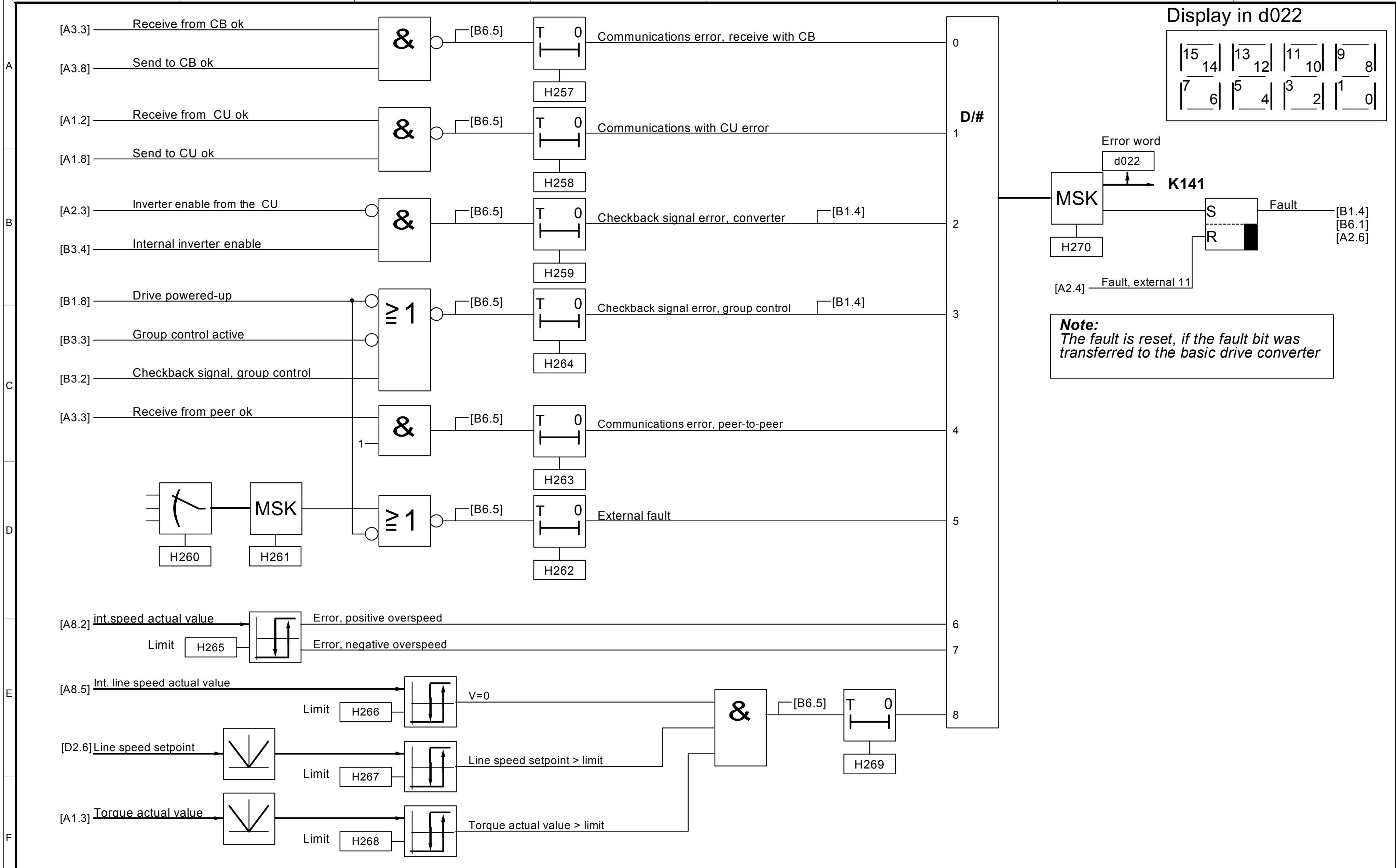


				Date	1.8.94	Standard software package Sectional drive	SIEMENS	Inverter enable Setpoint enable Speed control enable	= +
				Person	Reh / Michaelis				
				Chk.				FP_B1_6	Function diagram B3	Sheet B3+
Zustand	Änderung	Date	Name	Std.					Sh.

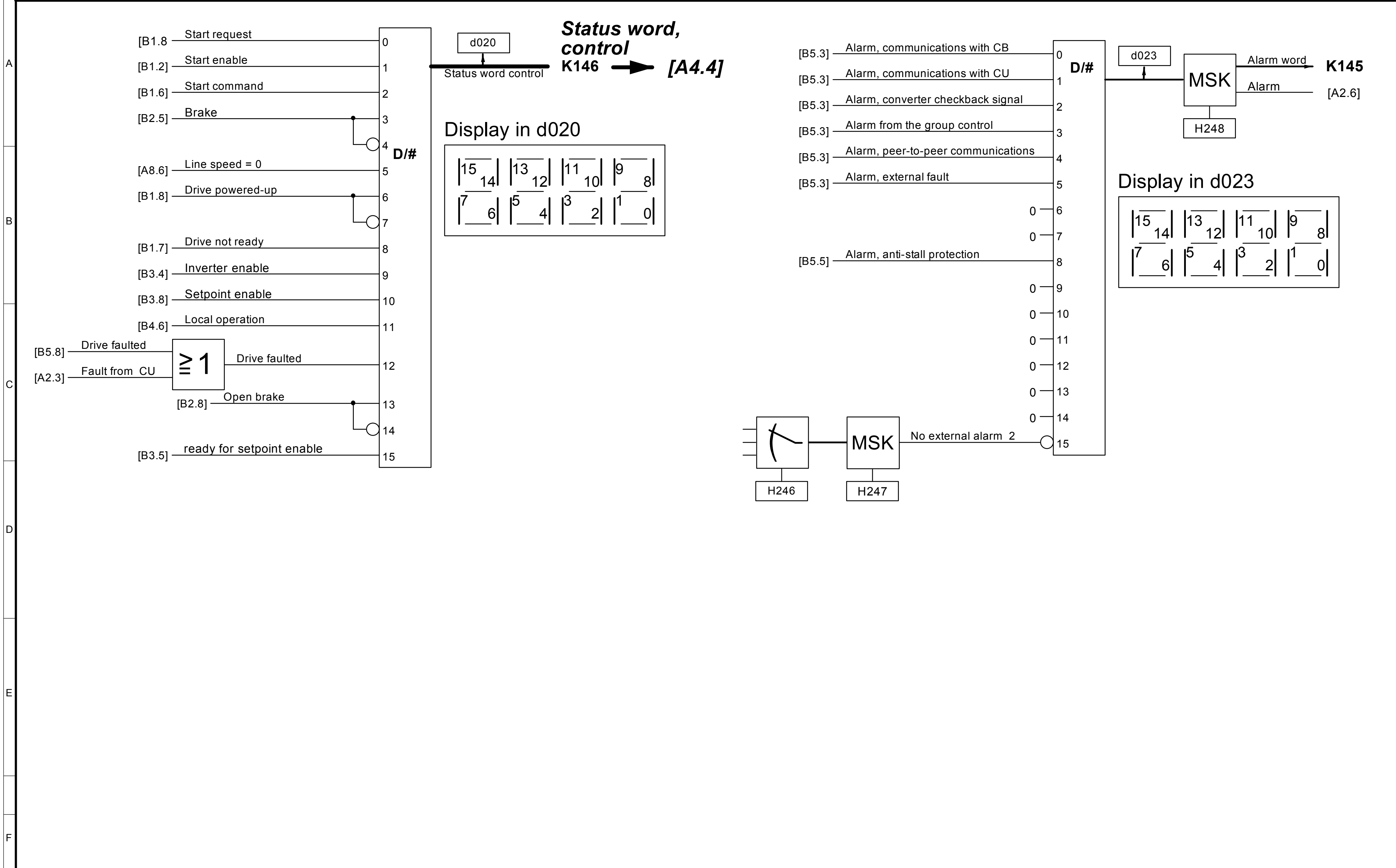


Note:
Local setpoint selection is coded in a word from 0 to 9. The local setpoints are parameterized in diagram D2.

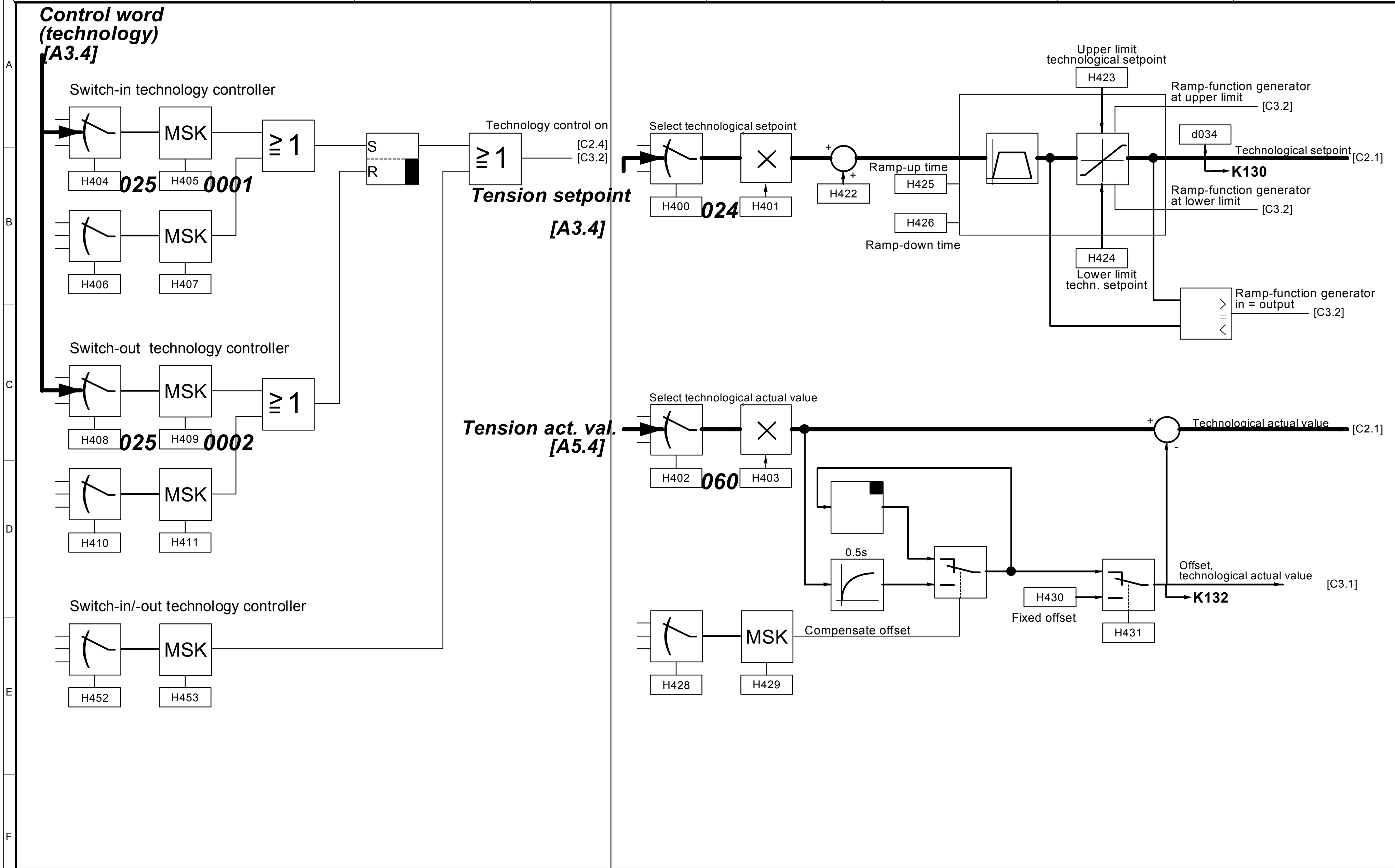
				Datum	1.8.94	Standard software package	SIEMENS	Local setpoint selection
				Person	Reh / Michaelis	Sectional drive		
				Chk.				FP_B1_6
Status.	Change	Date	Name	Std.				**Function diagram B4** Sheet B4+ . Sh.



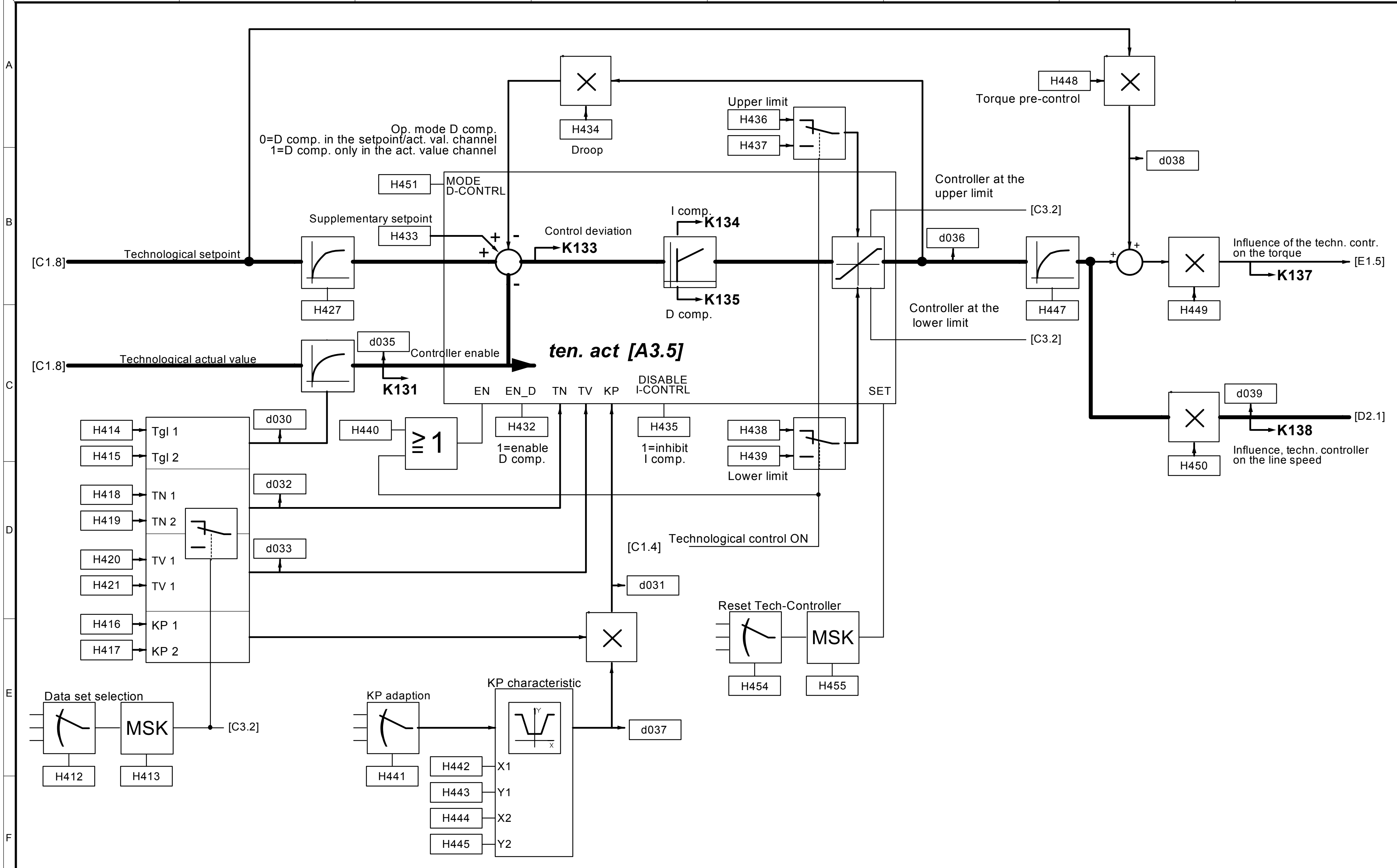
Status.	Change	Date	Name	Date 1.8.94 Person Reh / Michaelis Chk. Std.	Standard software package Sectional drive	SIEMENS	Error word generation	FP_B1_6	Function diagram B5	Sheet B5+ Sh..



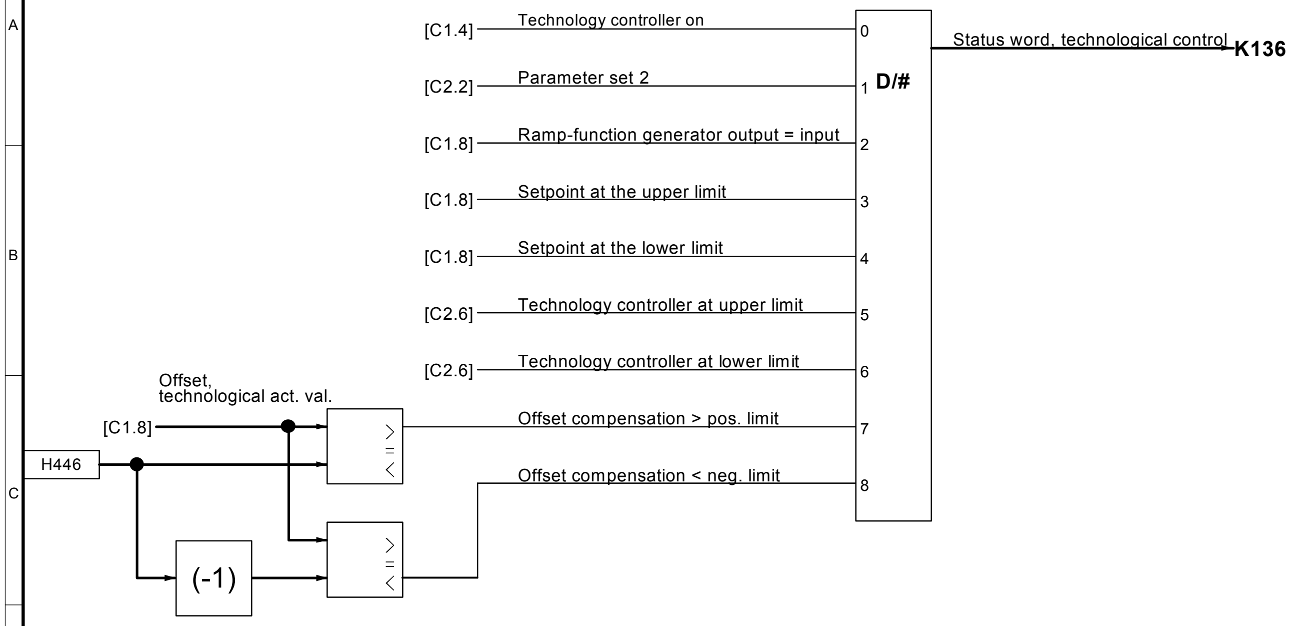
Status.	Change	Date	Name	Date 1.8.94 Person Reh / Michaelis Chk. Std.	Standard software package Sectional drive	SIEMENS	Status word, control Alarm word	FP_B1_6	Function diagram B6	Sheet B6- Sh.



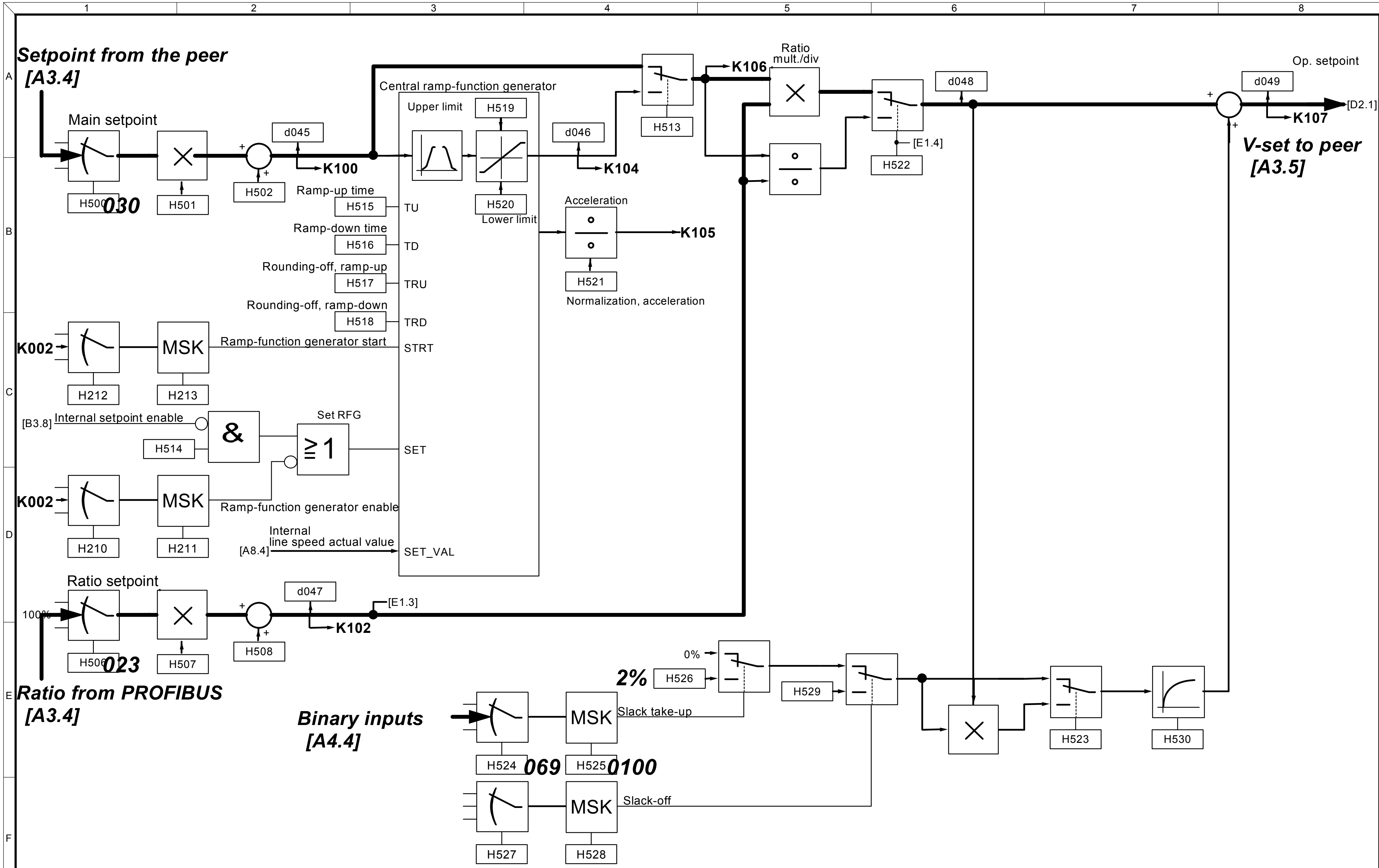
				Date	1.8.94	Standard software package	SIEMENS	Switching-in the techn.controller	=
				Person	Reh / Michaelis	Sectional d rive		Technological setpoint	+
				Chk.				Technological actual value	FP_C1_3 / Function diagram C1 / Sheet C1+ Sh
Status.	Change	Date	Name	Std.					



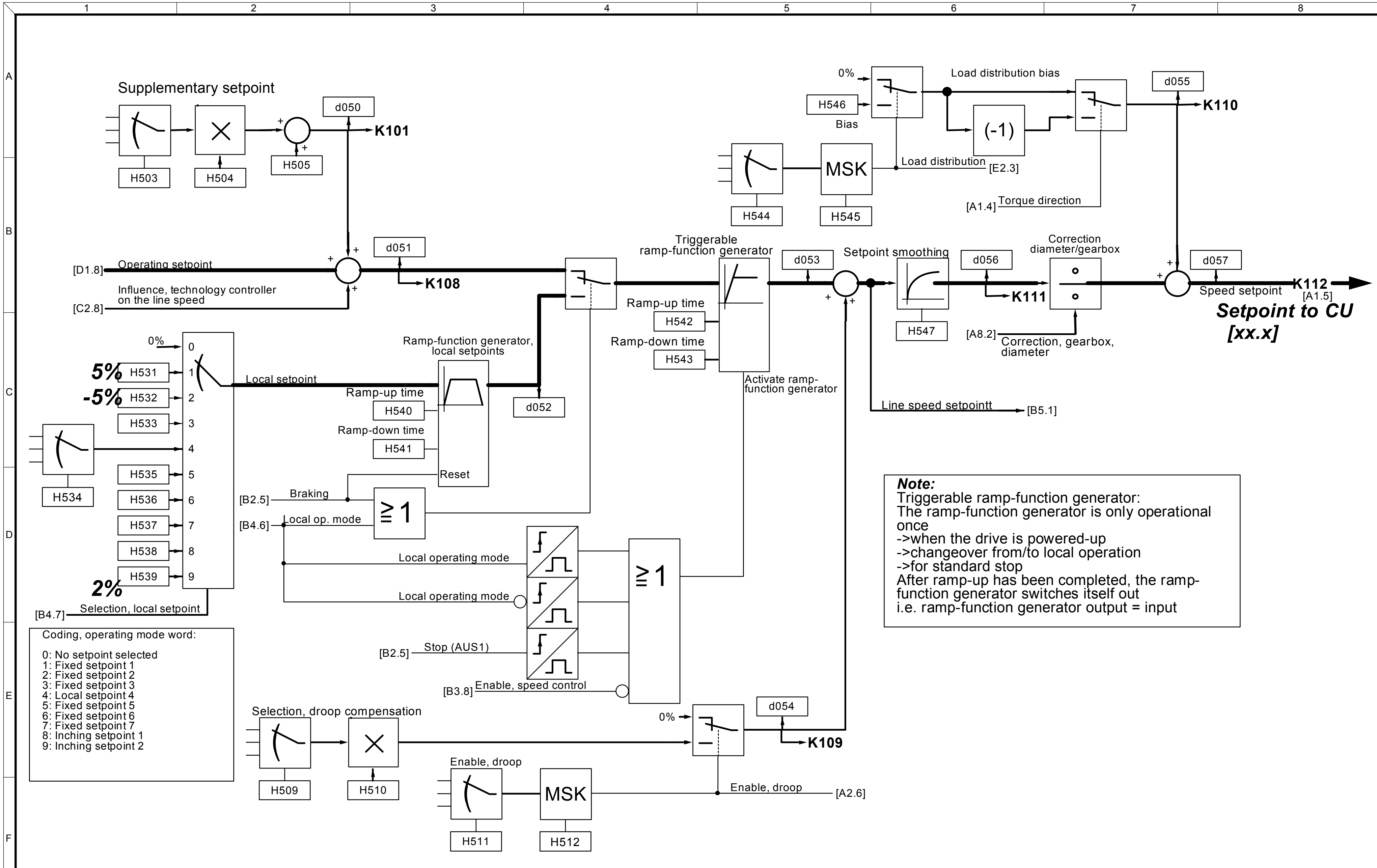
				Date	1.8.94	Standard software package	SIEMENS	Technological controller		=
				Person	Reh / Michaelis	Sectional drive				+
				Chk.						
Status.	Change	Date	Name	Std.					FP_C1_3	Function diagram C2	Sheet C2+ Sh



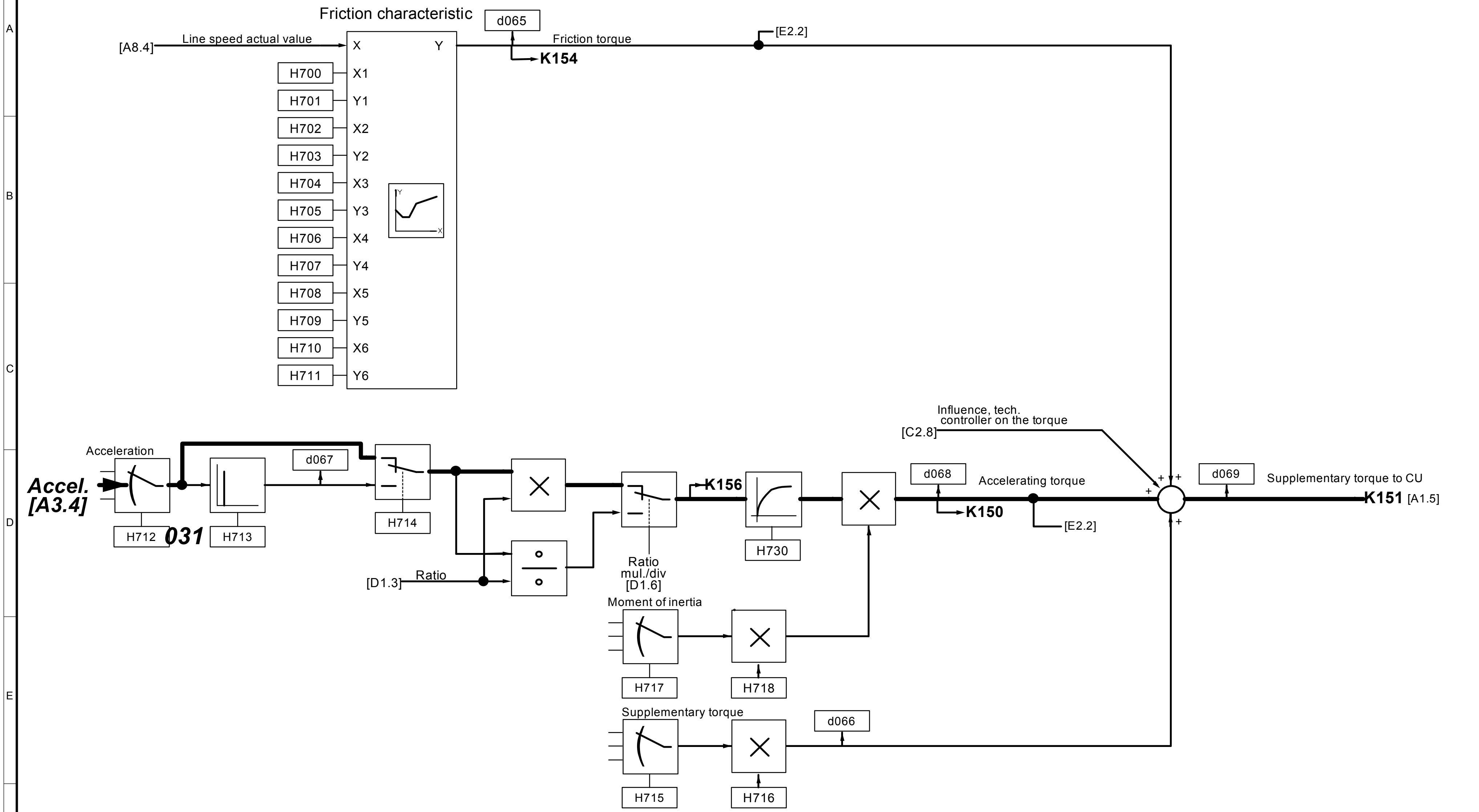
Date 1.8.94	Standard software package	SIEMENS	Statusword, technological control	=
Person Reh / Michaelis	Sectional drive			+
Chk.			FP_C1_3	Function diagram C3
Status. Change Date Name Std.				Sheet C3- Sh.



				Date	1.8.94	Standard software package Sectional drive	SIEMENS	Central ramp-function generator Ratio/slack take-up/slack-off	=
				Person	Reh / Michaelis				+
				Chk.				FP_D1_2	Function diagram D1	Sheet D1+
Status.	Change	Date	Name	Std.					Sh.



Status.	Change	Date	Name						
				Date	1.8.94	Standard software package	SIEMENS	Local fixed setpoints	=
				Person	Reh / Michaelis	Sectional drive		Triggerable ramp-function generator	+
				Chk.					FP_D1_2
				Std.					Function diagram D2 — Sheet D2+ Sh.



				Date	1.8.94	Standard software package	
				Person	Reh / Michaelis	Sectional drive	
				Chk.			
Zustand	Änderung	Date	Name	Std.			

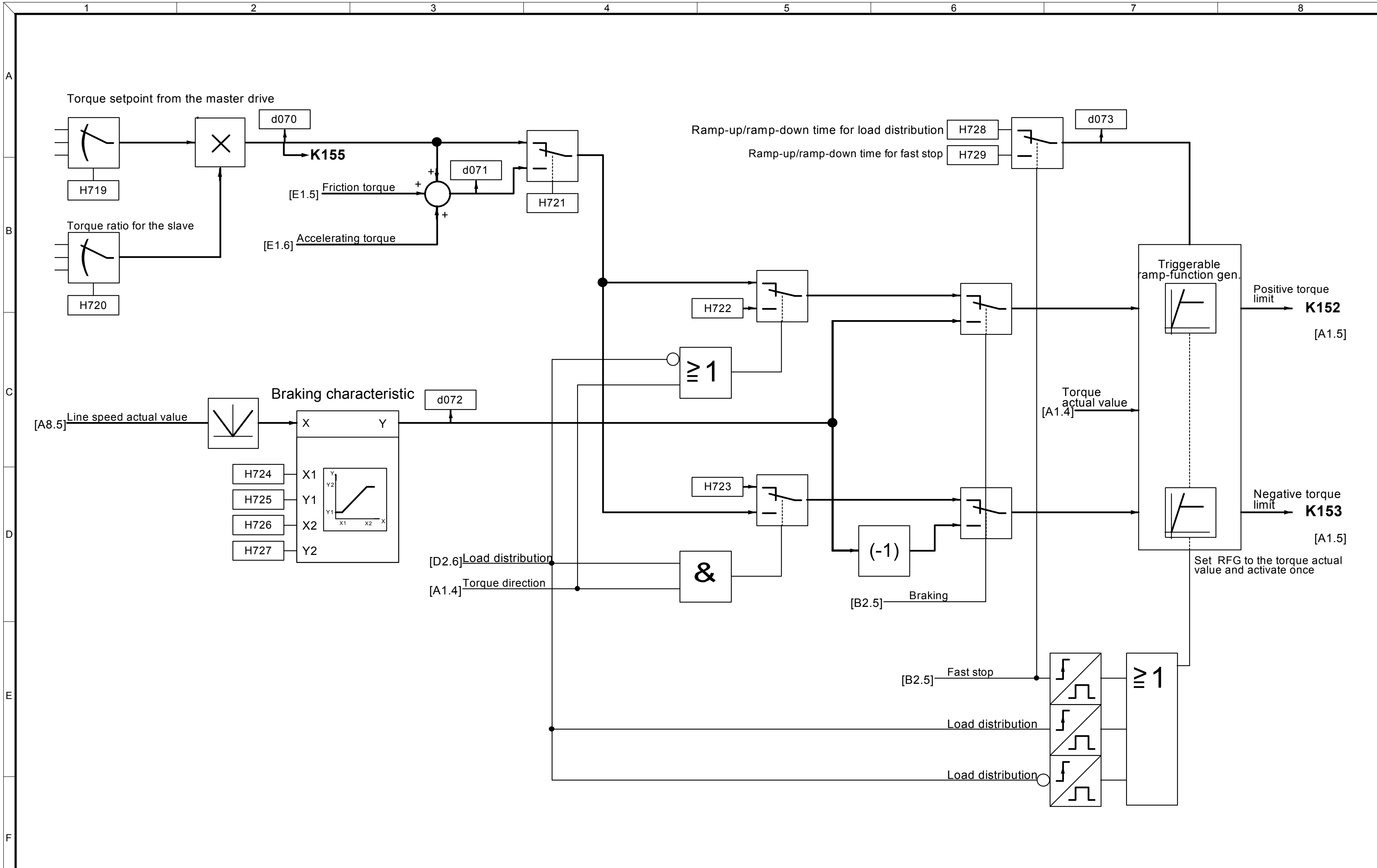
SIEMENS

Friction characteristic
Inertia compensation
Supplementary torque

FP_E1_2

Function diagram E1

Sheet E1+
Sh.



				Date	19.8.96	Standard software package	SIEMENS	Load distribution		=
				Person	Reh / Michaelis	Sectional drive		Braking characteristic		+
				Chk.					FP_E1_2	Function diagram E2
Zustand.	Änderung	Date	Name	Std.						Sheet E2- Sh.

9 Changes

The version has an associated code, which can be read-out of display parameter d002.

Version	Comment
1.0 d002=1.00	Pilot version
1.1 D002=1.00	1) New peer to peer function blocks 2) Changed baudrates in H197 3) Connectors K035 to K039 not more existing 4) d002 = 1.00 (Software-version)
1.2 09.95 d002=1.2	1) Reset of Tec. Controller: H454, H455 new 2) FP-SETPRN.S3100.RQN=1 instead of =0 (rounding of RFG) 3) H998 Drive number new)
1.3 05.96 d002=1.3	1) Designed with STRUC 4.2.3 2) Small improvements in the use of parameters, also when using SIMOVIS
1.4 06.97	Designed with STRUC 4.2.4 Sample time of speed actual value 1 (K067) and speed actual value 2 is calculated in T1.

10 Short parameter list, display parameters

Display parameters	Value/description	Function diagram ref.
d000	Hardware identifier	[F1.8]
d001	Software identifier	[F1.8]
d002	Software release	[F1.8]
d003	Signal from analog input 1	[A5.3]
d004	Signal from analog input 2	[A5.3]
d005	Signal from analog input 3	[A5.3]
d006	Signal from analog input 4	[A5.3]
d007	Signal from analog input 5	[A5.3]
d008	Signal from analog input 6	[A5.3]
d009	Signal from analog input 7	[A5.3]
d010	Status, binary inputs Bit 0: Binary input 1 to Bit 15: Binary input 16	[A4.3]
d011	Setpoint from byte-serial input	[A7.5]
d012	Setpoint from the decade switch	[A7.5]
d013	Speed actual value from pulse encoder 1	[A6.6]
d014	Speed actual value from pulse encoder 2	[A6.6]
d015	Line speed actual value	[A8.3]
d016	Length actual value from pulse encoder 1	[A6.6]
d017	Length actual value from pulse encoder 2	[A6.6]
d018	Status word, input functions Bit 0: Tachometer 1, synchronizing signal identified Bit 1: Tachometer 2, synchronizing signal identified Bit 2: Line speed actual value, greater than zero Bit 3: Line speed actual value equal to zero Bit 4: Line speed actual value less than zero Bit 5: Length actual value 1, less than the setpoint Bit 6: Length actual value 1 greater than the setpoint Bit 7: Length actual value 2 less than the setpoint Bit 8: Length actual value 2 greater than the setpoint Bit 9: System fault, SIMADYN D Bit 10: Send to CU o.k. Bit 11: Send to CB o.k. Bit 12: Send to peer o.k. Bit 13: Receive from CU o.k. Bit 14: Receive from CU o.k. Bit 15: Receive from the peer-to-peer o.k.	[A8.8]
d019	(Unused)	

Display parameters	Value/description	Function diagram ref.
d020	Status word, control Bit 0: Start enable request Bit 1: Start enable Bit 2: Power-up command Bit 3: Fast stop Bit 4: No fast stop Bit 5: Line speed is zero Bit 6: Drive is powered up Bit 7: Drive is powered-down Bit 8: Drive ready Bit 9: Inverter enable Bit 10: Setpoint enable Bit 11: Local operation Bit 12: Fault Bit 13: Close holding brakes Bit 14: Open holding brakes Bit 15: Close holding brakes, stored for zero speed	[B6.3]
d021	Diagnostics word, drive Bit 0: Drive fault Bit 1: Fault from CU Bit 2: Electrical off Bit 3 to bit 7: Unused Bit 8: Off after inching Bit 9: Off after stop command Bit 10: Off after fast stop Bit 11: No on checkback signal from the basic drive converter Bits 12 to bit 15: Unused	[B1.6]
d022	Fault word, drive Bit 0: Communications error CB Bit 1: Communications error CU Bit 2: Fault checkback signal, converter Bit 3: Fault from the group control Bit 4: Communications error, peer-to-peer Bit 5: External fault Bit 6: Overspeed, positive Bit 7: Overspeed, negative Bit 8: Anti-stall protection Bits 9 to 15: 0	[B5.7]
d023	Alarm word, drive Bit 0: Alarm from communications CB Bit 1: Alarm from communications CU Bit 2: Alarm, converter checkback signal Bit 3: Alarm from the group control Bit 4: Alarm from peer-to-peer communications Bit 5: Alarm from an external fault Bit 6, 7: 0 Bit 8: Alarm, anti-stall protection Bits 9 to 14: 0 Bit 15: External alarm	[B6.7]
d024	Power-down conditions, drive Bit 0: Drive fault Bit 1: Fault from the CU Bit 2: Electrical off Bits 3 to Bit 7: Unused Bit 8: Off after inching Bit 9: Off after a stop command Bit 10: Off after fast stop Bit 11: No on checkback signal from the basic drive converter Bits 12 to bit 15: Unused	
d025	Output, motorized potentiometer 1	[A10.4]
d026	Output, motorized potentiometer 2	[A10.8]
d027 to d029	(Unused)	

Display parameters	Value/description	Function diagram ref.
d030	Smoothing, technological actual value	[C2.2]
d031	Effective gain, technological controller	[C2.2]
d032	Integral action time, technological controller	[C2.2]
d033	Derivative action time, technological controller	[C2.2]
d034	Technological setpoint after the ramp-function generator	[C1.7]
d035	Technological actual value after smoothing	[C2.3]
d036	Output, technological controller	[C2.6]
d037	Kp adaption factor	[C2.4]
d038	Technological pre-control	[C2.7]
d039	Technological line speed influence	[C2.8]
d040 to d044	(Unused)	
d045	Main setpoint	[D1.2]
d046	Central ramp-function generator output	[D1.4]
d047	Ratio setpoint	[D1.2]
d048	Main setpoint with ratio	[D1.6]
d049	Main setpoint with ratio and slack take-up/slack-off	[D1.8]
d050	Supplementary setpoint	[D2.2]
d051	Total setpoint with supplementary setpoint and technological controller	[D2.3]
d052	Local setpoint	[D2.4]
d053	Line speed setpoint after the triggerable ramp-function generator.	[D2.5]
d054	Compensation setpoint	[D2.5]
d055	Bias setpoint	[D2.7]
d056	Total setpoint with compensation, smoothed	[D2.6]
d057	Speed setpoint, smoothed with bias	[D2.7]
d058 to d064	(Unused)	
d065	Friction torque	[E1.3]
d066	Supplementary torque	[E1.5]
d067	Result of differentiation	[E1.2]
d068	Accelerating torque	[E1.5]
d069	Summed torque	[E1.7]
d070	Torque setpoint, slave	[E2.2]
d071	Torque setpoint, slave with friction and acceleration.	[E2.3]
d072	Braking characteristic	[E2.3]
d073	Effective changeover time for the torque ramp-function generator	[E2.7]

Display parameters	Value/description	Function diagram ref.
d074 to d079	(Unused)	
d080	Selectable status word	[A9.3]
d081	Monitoring parameter 1	[F1.6]
d082	Monitoring parameter 2	[F1.6]
d083	Monitoring parameter 3	[F1.6]
d084	Monitoring parameter 4	[F1.8]
d085	Status, binary outputs Bit 0: Binary output 1 to Bit 7: Binary output 8 Bits 8 to 15: 0	[A4.6]
d086	Kp adaption factor, speed controller CU	
d087	Word 1 to peer-to-peer	[A3.7]
d088	Word 2 to peer-to-peer	[A3.7]
d089	Word 3 to peer-to-peer	[A3.7]
d090	Word 4 to peer-to-peer	[A3.7]
d091	Word 5 to peer-to-peer	[A3.7]
d092	Word 1 to CU Bits 0 to 6: Drive on Bit 7: Acknowledge fault Bits 8 and 9: 0 Bits 10 to 12: 1 Bits 13 and 14: 0 Bit 15: 1	[A1.6]
d093	Word 2 to CU	[A1.6]
d094	Word 4 to CU Bit 0: Setpoint channel data set, bit 0 Bit 1: Setpoint channel data set, bit 1 Bit 2: Motor data set, bit 0 Bit 3: Motor data set, bit 1 Bit 4: Fixed setpoint selection, bit 0 Bit 5: Fixed setpoint selection, bit 1 Bit 6: 0 Bit 7: 1 Bit 8: Droop on Bit 9: Controller enable Bit 10: 1 Bit 11: 0 Bit 12 and 13: 1 Bit 14 and 15: 0	[A1.6]
d095	Word 5 to CU	[A1.6]
d096	Word 6 to CU	[A1.6]
d097	Word 7 an CU	[A1.6]

Display parameters	Value/description	Function diagram ref.
d098	Status word, limit value monitor Bit 0: Limit value monitor 1 higher than limit value Bit 1: Limit value monitor 1 same as limit value Bit 2: Limit value monitor 1 lower than limit value Bit 3: Limit value monitor 1 not equal to limit value Bit 4: Limit value monitor 2 higher than limit value Bit 5: Limit value monitor 2 same as limit value Bit 6: Limit value monitor 2 lower than limit value Bit 7: Limit value monitor 2 not equal to limit value Bit 8: Limit value monitor 3 higher than limit value Bit 9: Limit value monitor 3 same as limit value Bit 10: Limit value monitor 3 lower than limit value Bit 11: Limit value monitor 3 not equal to limit value Bit 12: Limit value monitor 4 higher than limit value Bit 13: Limit value monitor 4 same as limit value Bit 14: Limit value monitor 4 lower than limit value Bit 15: Limit value monitor 4 not equal to limit value	[A9.8]
d099	Unused	

Display parameters	Value/description	Function diagram ref.

11 Short parameter list / logbook

The logbook must be completed after start-up has been completed.

Always keep the logbook handy for any questions which may arise.

Completed entries are important for maintenance/service, and could be relevant for warranty issues.

Location:			Drive:	
	Date	Name	Department	Signature
Start-up settings				
Start-up setting change				
Software release, multi-motor module:				

Parameter-number		Designation	Factory setting	Start-up value	Change after start-up
H101		Hysteresis, torque polarity change	2%		
H102		Mask, binary input inversion	0000h		
H103		Mask, system error bit enable	0429h		
H104		Source bit hibyte enable byte serial	0		
H105		Mask bit hibyte enable byte serial	0000h		
H106		Acceptance time, byte serial	40[ms]		
H107		Number of decades, decade switch	4		
H108		Normalization factor, decade switch	100		
H109		Coding, BCD decade switch	1		
H110		Signed, decade switch	0		
H111		Source, bit 0 from the decade switch	0		
H112		Mask, bit 0 from the decade switch	0000h		
H113		Source, bit 1 from the decade switch	0		
H114		Mask, bit 1 from the decade switch	0000h		
H115		Source, bit 2 from the decade switch	0		
H116		Mask, bit 2 from the decade switch	0000h		
H117		Source, bit 3 from the decade switch	0		
H118		Mask, bit 3 from the decade switch	0000h		

Parameter-number		Designation	Factory setting	Start-up value	Change after start-up
H119		Source bit, data transfer from the decade switch	0		
H120		Mask bit, data transfer from the decade switch	0000h		
H121		Gain, analog input 1	50%		
H122		Offset, analog input 1	0%		
H123		Smoothing, analog input 1	5[ms]		
H124		Gain, analog input 2	50%		
H125		Offset, analog input 2	0%		
H126		Smoothing, analog input 2	5[ms]		
H127		Gain, analog input 3	50%		
H128		Offset, analog input 3	0%		
H129		Smoothing, analog input 3	40[ms]		
H130		Gain, analog input 4	50%		
H131		Offset, analog input 4	0%		
H132		Smoothing, analog input 4	40[ms]		
H133		Gain, analog input 5	50%		
H134		Offset, analog input 5	0%		
H135		Smoothing, analog input 5	40[ms]		
H136		Gain, analog input 6	50%		
H137		Offset, analog input 6	0%		
H138		Smoothing, analog input 6	160[ms]		
H139		Gain, analog input 7	50%		
H140		Offset, analog input 7	0%		
H141		Smoothing, analog input 7	160[ms]		
H142		Pulse number, pulse encoder 1	500		
H143		Rated speed, pulse encoder 1	500		
H144		Pulse number, pulse encoder 2	500		
H145		Rated speed, pulse encoder 2	500		
H146		Source bit, reset length counter 1	0		
H147		Mask bit, reset length counter 1	0000h		
H148		Source bit, reset length counter 2	0		
H149		Mask bit, reset length counter 2	0000h		
H150		Source bit, hold length counter 1	0		
H151		Mask bit, hold length counter 1	0000h		
H152		Source bit, hold length counter 2	0		
H153		Mask bit, hold length counter 2	0000h		
H154		Smoothing, tachometer actual value 1	40[ms]		

Parameter-number		Designation	Factory setting	Start-up value	Change after start-up
H155		Smoothing, tachometer actual value 2	40[ms]		
H156	!	Source, speed actual value for V-act., internal	41		
H157	!	Source, diameter/gearbox correction	1		
H158		Window width, zero line speed signal	0.5%		
H159		Hysteresis, zero speed signal	0.1%		
H160		Range selection, length measurement 1	0		
H161		Source, correction factor, length measurement 1	1		
H162		Source, length setpoint 1	0		
H163		Range selection, length measurement 2	0		
H164		Source, correction factor, length measurement 2	1		
H165		Source, length setpoint 2	0		
H166		Fixed setpoint 3 (connector 003)	0%		
H167		Fixed setpoint 4 (connector 004)	0%		
H168		Fixed setpoint 5 (connector 005)	0%		
H169		Fixed setpoint 6 (connector 006)	0%		
H170		Fixed setpoint 7 (connector 007)	0%		
H171		Fixed setpoint 8 (connector 008)	0%		
H172		Fixed setpoint 9 (connector 009)	0%		
H173		Fixed setpoint 10 (connector 010)	0%		
H174		Fixed setpoint 11 (connector 011)	0%		
H175		Fixed setpoint 12 (connector 012)	0%		
H176		Fixed setpoint 13 (connector 013)	0%		
H177		Fixed setpoint 14 (connector 014)	0%		
H178		Fixed setpoint 15 (connector 015)	0%		
H179		Fixed setpoint 16 (connector 016)	0%		
H180		Fixed setpoint 17 (connector 017)	0%		
H181		Fixed setpoint 18 (connector 018)	0%		
H182		Fixed setpoint 19 (connector 019)	0%		
H183		Fixed setpoint 20 (connector 200)	0%		
H184		Fixed setpoint 21 (connector 201)	0%		
H185		Fixed setpoint 22 (connector 202)	0%		
H186		Fixed setpoint 23 (connector 203)	0%		
H187		Fixed setpoint 24 (connector 204)	0%		
H188		Fixed setpoint 25 (connector 205)	0%		
H189		Fixed setpoint 26 (connector 206)	0%		
H190		Fixed setpoint 27 (connector 207)	0%		

Parameter-number		Designation	Factory setting	Start-up value	Change after start-up
H191		Fixed setpoint 28 (connector 208)	0%		
H192		Fixed setpoint 29 (connector 209)	0%		
H193		Fixed setpoint 30 (connector 210)	0%		
H194		Fixed setpoint 31 (connector 211)	0%		
H195		Fixed setpoint 32 (connector 212)	0%		
H196		Fixed setpoint 33 (connector 213)	0%		
H197		Baud rate for a peer-to-peer coupling	0%		
H198		Number of receive words, peer-to-peer	0%		
H199		Number of transmit words, peer-to-peer	0%		
H200	!	Source on	0		
H201	!	Mask on	0000h		
H202	!	Source, no standard stop	0		
H203	!	Mask, no standard stop	0000h		
H204	!	Source, no electrical off	0		
H205	!	Mask, no electrical off	0000h		
H206	!	Source, no fast stop	0		
H207	!	Mask, no fast stop	0000h		
H208		Source, inverter enable	2		
H209		Mask, inverter enable	0001h		
H210		Source, ramp-function generator enable	2		
H211		Mask, ramp-function generator enable	0001h		
H212		Source, ramp-function generator start	2		
H213		Mask, ramp-function generator start	0001h		
H214		Source, setpoint enable	2		
H215		Mask, setpoint enable	0001h		
H216		Source, fault acknowledgement	0		
H217		Mask, fault acknowledgement	0000h		
H218		Source, no local operation	0		
H219		Mask, no local operation	0000h		
H220		Source, inching 1	0		
H221		Mask, inching 1	0000h		
H222		Source, inching 2	0		
H223		Mask, inching 2	0000h		
H224		Source, operating mode bit 0	0		
H225		Mask, operating mode bit 0	0000h		
H226		Source, operating mode bit 1	0		

Parameter-number		Designation	Factory setting	Start-up value	Change after start-up
H227		Mask, operating mode bit 1	0000h		
H228		Source, operating mode bit 2	0		
H229		Mask, operating mode bit 2	0000h		
H230		Source, start enable	0		
H231		Mask, start enable	0000h		
H232		Source, checkback signal, group control	0		
H233		Mask, checkback signal, group control	0000h		
H234		Source, setpoint channel data set, bit 0	0		
H235		Mask, setpoint channel data set, bit 0	0000h		
H236		Source, setpoint channel data set, bit 1	0		
H237		Mask, setpoint channel data set, bit 1	0000h		
H238		Source, motor data set, bit 0	0		
H239		Mask, motor data set, bit 0	0000h		
H240		Source, motor data set, bit 1	0		
H241		Mask, motor data set, bit 1	0000h		
H242		Source, fixed setpoint selection, bit 0	0		
H243		Mask, fixed setpoint selection, bit 0	0000h		
H244		Source, fixed setpoint selection, bit 1	0		
H245		Mask, fixed setpoint selection, bit 1	0000h		
H246		Source, no external alarm 2	2		
H247		Mask, no external alarm 2	0001h		
H248		Mask, no external alarm 2	0000h		
H249		(Unused)			
H250		No regenerative feedback	0		
H251		Enable group control	0		
H252		No starting sequence	1		
H253		Delay, shutdown after inching	30[s]		
H254		Operation with holding brakes	0		
H255		Operating mode for holding brakes	0		
H256		Inching without braking	0		
H257		Tolerance time, CB-communications error	100[ms]		
H258		Tolerance time, CU-communications error	100[ms]		
H259		Tolerance time, checkback signal error, converter	1[s]		
H260		Source, no external fault	2		
H261		Mask, no external fault	0001h		
H262		Tolerance time, external fault	1[s]		

Parameter-number		Designation	Factory setting	Start-up value	Change after start-up
H263		Tolerance time, peer-to-peer error, communications	100[ms]		
H264		Tolerance time, group control fault	100[ms]		
H265	!	Threshold, overspeed fault	120%		
H266		Threshold, line speed actual value for anti-stall protection	0.5%		
H267		Threshold, line speed setpoint for anti-stall protection	1%		
H268		Threshold, torque actual value for anti-stall protection	80%		
H269		Tolerance time, anti-stall protection fault	1[s]		
H270		Mask, fault enable	FFFFh		
H271		Holding brake opening time	0[s]		
H272		Holding brake closing time	0[s]		
H273-299		(Unused)			
H300		Source, input motorized potentiometer 1	0		
H301		Source, setting value motorized potentiometer 1	0		
H302		Source bit, set motorized potentiometer 1	0		
H303		Mask bit, set motorized potentiometer 1	0000h		
H304		Source bit, raise motorized potentiometer 1	0		
H305		Mask bit, raise motorized potentiometer 1	0000h		
H306		Source bit, lower motorized potentiometer 1	0		
H307		Mask bit, lower motorized potentiometer 1	0000h		
H308		Source bit, track motorized potentiometer 1	0		
H309		Mask bit, track motorized potentiometer 1	0000h		
H310		Source, input motorized potentiometer 2	0		
H311		Source, setting value motorized potentiometer 2	0		
H312		Source bit, set motorized potentiometer 2	0		
H313		Mask bit, set motorized potentiometer 2	0000h		
H314		Source bit, raise motorized potentiometer 2	0		
H315		Mask bit, raise motorized potentiometer 2	0000h		
H316		Source bit, lower motorized potentiometer 2	0		
H317		Mask bit, lower motorized potentiometer 2	0000h		
H318		Source bit, track motorized potentiometer 2	0		
H319		Mask bit, track motorized potentiometer 2	0000h		
H320		Slow ramp time, motorized potentiometer 1	60[s]		
H321		Fast ramp time, motorized potentiometer 1	25[s]		
H322		Upper limit, motorized potentiometer 1	120%		

Parameter-number		Designation	Factory setting	Start-up value	Change after start-up
H323		Lower limit, motorized potentiometer 1	-120%		
H324		Influence factor, motorized potentiometer 1	0%		
H325		Slow ramp time, motorized potentiometer 2	60[s]		
H326		Fast ramp time, motorized potentiometer 2	25[s]		
H327		Upper limit, motorized potentiometer 2	120%		
H328		Lower limit, motorized potentiometer 2	-120%		
H329		Influence factor, motorized potentiometer 2	0%		
H330-399		(Unused)			
H400		Source, technological setpoint	0		
H401		Adaption factor, technological setpoint	100%		
H402		Source, technological actual value	0		
H403		Adaption factor, technological actual value	100%		
H404		Source bit, enable 1 technological controller	0		
H405		Mask bit, enable 1 technological controller	0000h		
H406		Source bit, enable 2 technological controller	0		
H407		Mask bit, enable 2 technological controller	0000h		
H408		Source bit, disable 1 technological controller	0		
H409		Mask bit, disable 1 technological controller	0000h		
H410		Source bit, disable 2 technological controller	0		
H411		Mask bit, disable 2 technological controller	0000h		
H412		Source, parameter changeover, technological controller	0		
H413		Mask, parameter changeover, technological controller	0000h		
H414		Smoothing P1, technological actual value	100[ms]		
H415		Smoothing P2, technological actual value	100[ms]		
H416		Gain P1, technological controller	1		
H417		Gain P2, technological controller	1		
H418		Integral action time P1 technological controller	1000[ms]		
H419		Integral action time P2 technological controller	1000[ms]		
H420		Derivative action time P1 technological controller	10[ms]		
H421		Derivative action time P2 technological controller	10[ms]		
H422		Supplementary setpoint before the ramp-function generator, technological setpoint	0%		
H423		Setpoint upper limit, technological controller	100%		
H424		Setpoint lower limit, technological controller	10%		
H425		Setpoint ramp-up time, technological controller	10[s]		

Parameter-number		Designation	Factory setting	Start-up value	Change after start-up
H426		Setpoint ramp-down time, technological controller	10[s]		
H427		Setpoint smoothing, technological controller	0.1[s]		
H428		Source, offset adjustment technological actual value	0		
H429		Mask, offset adjustment technological actual value	0000h		
H430		Fixed offset, technological controller	0%		
H431		Manual offset adjustment, technological actual value	0		
H432		Active derivative action time, technological controller	0		
H433		Supplementary setpoint, technological controller	0%		
H434		Droop factor, technological controller	0%		
H435		Inhibit I component, technological controller	0		
H436		Upper limit technological controller off	100%		
H437		Upper limit, technological controller on	100%		
H438		Lower limit, technological controller off	-100%		
H439		Lower limit, technological controller on	-100%		
H440		Technological controller continuously on	0		
H441		Source, kp adaption quantity, technological controller	0		
H442		Start of kp adaption, technological controller	0%		
H443		Factor, start of kp adaption, technological controller	100%		
H444		End of kp adaption, technological controller	100%		
H445		Factor, end of kp adaption, technological controller	100%		
H446		Offset monitoring limit, technological controller	30%		
H447		Smoothing, technological controller output	20[ms]		
H448		Factor, technological controller pre-control	0%		
H449		Torque influence, technological controller	0%		
H450		Line speed influence, technological controller	0%		
H451		Operating mode, D component technological controller	0%		
H452		Source, bit on/off, technological controller	0		
H453		Mask, bit on/off, technological controller	0000h		
H454		Source technological controller reset	1462		
H455		Mask technological controller reset	0080h		
H456-499		(Unused)			
H500		Source, main setpoint	0		
H501		Gain, main setpoint	100%		
H502		Offset, main setpoint	0%		
H503		Source, supplementary setpoint	0		

Parameter-number		Designation	Factory setting	Start-up value	Change after start-up
H504		Gain, supplementary setpoint	100%		
H505		Offset, supplementary setpoint	0%		
H506		Source, ratio reference value	1		
H507		Gain, ratio reference value	100%		
H508		Offset, ratio reference value	100%		
H509		Source, compensation setpoint	0		
H510		Gain, compensation setpoint	0%		
H511		Source, enable droop	0		
H512		Mask, enable droop	0000h		
H513		No bypass, central ramp-function generator	0		
H514		Set central ramp-function generator for drive off	0		
H515		Ramp-up time, central ramp-function generator	60[s]		
H516		Ramp-down time, central ramp-function generator	60[s]		
H517		Initial rounding-off, central ramp-function generator	6[s]		
H518		Final rounding-off, central ramp-function generator	6[s]		
H519		Upper limit, central ramp-function generator	150%		
H520		Lower limit, central ramp-function generator	-150%		
H521		Normalization time, acceleration	60[s]		
H522		Ratio as divisor	0		
H523		Slack take-up/slack-off, relative	0		
H524		Source bit, slack take-up	0		
H525		Mask bit, slack take-up	0000h		
H526		Setpoint, slack take-up	2%		
H527		Source bit, slack-off	0		
H528		Mask bit, slack-off	0000h		
H529		Setpoint, slack-off	-2%		
H530		Smoothing, slack take-up/slack-off	40[ms]		
H531		Local setpoint 1	0%		
H532		Local setpoint 2	0%		
H533		Local setpoint 3	0%		
H534		Source, local setpoint 4	0		
H535		Local setpoint 5	0%		
H536		Local setpoint 6	0%		
H537		Local setpoint 7	0%		
H538		Inching setpoint 1	0%		
H539		Inching setpoint 2	0%		

Parameter-number		Designation	Factory setting	Start-up value	Change after start-up
H540		Ramp-up time, local ramp-function generator	10[s]		
H541		Ramp-down time, local ramp-function generator	10[s]		
H542		Ramp-up time, triggerable ramp-function generator	60[s]		
H543		Ramp-down time, triggerable ramp-function gen.	60[s]		
H544		Source bit, bias on	0		
H545		Mask bit, bias on	0000h		
H546		Setpoint, bias	5%		
H547		Smoothing, line speed setpoint	5[ms]		
H548-599		(Unused)			
H600		Source, input free inverter 1	0		
H601		Source, summand 1 free adder 1	0		
H602		Source, summand 2 free adder 1	0		
H603		Source, minuend free subtractor 1	0		
H604		Source, subtrahend free subtractor 1	0		
H605		Source, factor 1 free multiplier 1	0		
H606		Source, factor 2 free multiplier 1	0		
H607		Source, dividend free divider 1	0		
H608		Source, divisor free divider 1	0		
H609		Source, input free limiter 1	0		
H610		Source, upper limit free limiter 1	0		
H611		Source, lower limit free limiter 1	0		
H612		Source 1, free changeover switch 1	0		
H613		Source 2, free changeover switch 1	0		
H614		Source, control bit free changeover switch 1	0		
H615		Mask, control bit free changeover switch 1	0000h		
H616		Source, input free filter 1	0		
H617		Source, time constant free filter 1	0		
H618		Source, input free inverter 2	0		
H619		Source, input free inverter 3	0		
H620		Source, summand 1 free adder 2	0		
H621		Source, summand 2 free adder 2	0		
H622		Source, summand 1 free adder 3	0		
H623		Source, summand 2 free adder 3	0		
H624		Source, minuend free subtractor 2	0		
H625		Source, subtrahend free subtractor 2	0		
H626		Source, minuend free subtractor 3	0		

Parameter-number		Designation	Factory setting	Start-up value	Change after start-up
H627		Source, subtrahend free subtractor 3	0		
H628		Source, factor 1 free multiplier 2	0		
H629		Source, factor 2 free multiplier 2	0		
H630		Source, factor 1 free multiplier 3	0		
H631		Source, factor 2 free multiplier 3	0		
H632		Source, dividend free divider 2	0		
H633		Source, divisor free divider 2	0		
H634		Source, dividend free divider 3	0		
H635		Source, divisor free divider 3	0		
H636		Source, input free limiter 2	0		
H637		Source, upper limit free limiter 2	0		
H638		Source, lower limit free limiter 2	0		
H639		Source, input free limiter 3	0		
H640		Source, upper limit free limiter 3	0		
H641		Source, lower limit free limiter 3	0		
H642		Source 1, free changeover switch 2	0		
H643		Source 2, free changeover switch 2	0		
H644		Source, control bit, free changeover switch 2	0		
H645		Mask, control bit, free changeover switch 2	0000h		
H646		Source 1, free changeover switch 3	0		
H647		Source 2, free changeover switch 3	0		
H648		Source, control bit free changeover switch 3	0		
H649		Mask, control bit free changeover switch 3	0000h		
H650		Source, input free filter 2	0		
H651		Source, time constant free filter 2	0		
H652		Source, input free filter 3	0		
H653		Source, time constant free filter 3	0		
H654		Source, input free absolute value generator 1	0		
H655		Source, input free square root extractor 1	0		
H656		Source, input 1 maximum evaluator 1	0		
H657		Source, input 2 maximum evaluator 1	0		
H658		Source, input 1 minimum evaluator 1	0		
H659		Source, input 2 minimum evaluator 1	0		
H660		Source, input sinusoidal function	0		
H661-674		(Unused)			
H675		Source, input 1 word EXOR gate 1	0		

Parameter-number		Designation	Factory setting	Start-up value	Change after start-up
H676		Source, input 2 word EXOR gate 1	0		
H677		Source, input 1 word EXOR gate 2	0		
H678		Source, input 2 word EXOR gate 2	0		
H679		Source, input 1 word EXOR gate 3	0		
H680		Source, input 2 word EXOR gate 3	0		
H681		Source, input 1 word EXOR gate 4	0		
H682		Source, input 2 word EXOR gate 4	0		
H683		Pulse duration flashing frequency	1[s]		
H684		Source, flashing requency word	0		
H685		Pulse duration, flashing requency word	1[s]		
H686		Counter, position difference correction	1		
H687		Denominator, position difference correction	1		
H688		Source, reset position difference	0		
H689		Mask, reset position difference	0000h		
H690		Definition, pulse encoder evaluation 1	0000h		
H691		Definition, pulse encoder evaluation 2	0000h		
H692-699		(Unused)			
H700		Friction characteristic, line speed 1	0%		
H701		Friction characteristic, torque 1	0%		
H702		Friction characteristic, line speed 2	20%		
H703		Friction characteristic, torque 2	0%		
H704		Friction characteristic, line speed 3	40%		
H705		Friction characteristic, torque 3	0%		
H706		Friction characteristic, line speed 4	60%		
H707		Friction characteristic, torque 4	0%		
H708		Friction characteristic, line speed 5	80%		
H709		Friction characteristic, torque 5	0%		
H710		Friction characteristic, line speed 6	100%		
H711		Friction characteristic, torque 6	0%		
H712		Source, acceleration	0		
H713		Reference time, acceleration	0.1[s]		
H714		Acceleration from differentiation	0		
H715		Source, supplementary torque	0		
H716		Adaption factor, supplementary torque	100%		
H717		Source, moment of inertia	0		
H718		Adaption factor, moment of inertia	100%		

Parameter-number		Designation	Factory setting	Start-up value	Change after start-up
H719		Source, torque setpoint from the master	0		
H720		Source, torque ratio	0		
H721		Torque setpoint with friction/acceleration	0		
H722		Maximum torque, positive	100%		
H723		Maximum torque, negative	-100%		
H724		Braking characteristic, line speed 1	0%		
H725		Braking characteristic, torque 1	0%		
H726		Braking characteristic, line speed 2	5%		
H727		Braking characteristic, torque 2	100%		
H728		Change time, load distribution torque ramp-function generator	3000[ms]		
H729		Change time, braking, torque ramp-function generator	1000[ms]		
H730		Smoothing, accelerating torque	5[ms]		
H731-800		(Unused)			
H801		Source, bit 0 free status word	0		
H802		Mask, bit 0 free status word	0000h		
H803		Source, bit 1 free status word	0		
H804		Mask, bit 1 free status word	0000h		
H805		Source, bit 2 free status word	0		
H806		Mask, bit 2 free status word	0000h		
H807		Source, bit 3 free status word	0		
H808		Mask, bit 3 free status word	0000h		
H809		Source, bit 4 free status word	0		
H810		Mask, bit 4 free status word	0000h		
H811		Source, bit 5 free status word	0		
H812		Mask, bit 5 free status word	0000h		
H813		Source, bit 6 free status word	0		
H814		Mask, bit 6 free status word	0000h		
H815		Source, bit 7 free status word	0		
H816		Mask, bit 7 free status word	0000h		
H817		Source, bit 8 free status word	0		
H818		Mask, bit 8 free status word	0000h		
H819		Source, bit 9 free status word	0		
H820		Mask, bit 9 free status word	0000h		
H821		Source, bit 10 free status word	0		
H822		Mask, bit 10 free status word	0000h		

Parameter-number		Designation	Factory setting	Start-up value	Change after start-up
H823		Source, bit 11 free status word	0		
H824		Mask, bit 11 free status word	0000h		
H825		Source, bit 12 free status word	0		
H826		Mask, bit 12 free status word	0000h		
H827		Source, bit 13 free status word	0		
H828		Mask, bit 13 free status word	0000h		
H829		Source, bit 14 free status word	0		
H830		Mask, bit 14 free status word	0000h		
H831		Source, bit 15 free status word	0		
H832		Mask, bit 15 free status word	0000h		
H833		Source, bit 0 binary outputs	0		
H834		Mask, bit 0 binary outputs	0000h		
H835		Source, bit 1 binary outputs	0		
H836		Mask, bit 1 binary outputs	0000h		
H837		Source, bit 2 binary outputs	0		
H838		Mask, bit 2 binary outputs	0000h		
H839		Source, bit 3 binary outputs	0		
H840		Mask, bit 3 binary outputs	0000h		
H841		Source, bit 4 binary outputs	0		
H842		Mask, bit 4 binary outputs	0000h		
H843		Source, bit 5 binary outputs	0		
H844		Mask, bit 5 binary outputs	0000h		
H845		Source, bit 6 binary outputs	0		
H846		Mask, bit 6 binary outputs	0000h		
H847		Source, bit 7 binary outputs	0		
H848		Mask, bit 7 binary outputs	0000h		
H849		Mask, inversion binary outputs	0000h		
H850		Source, analog output 1	41		
H851		Select, absolute value analog output 1	0		
H852		Smoothing, analog output 1	5[ms]		
H853		Offset, analog output 1	0%		
H854		Gain, analog output 1	2		
H855		Source, analog output 2	0		
H856		Selection, absolute value analog output 2	0		
H857		Smoothing, analog output 2	5[ms]		
H858		Offset, analog output 2	0%		

Parameter-number		Designation	Factory setting	Start-up value	Change after start-up
H859		Gain, analog output 2	2		
H860		Source, analog output 3	0		
H861		Selection, absolute value analog output 3	0		
H862		Smoothing, analog output 3	40[ms]		
H863		Offset, analog output 3	0%		
H864		Gain, analog output 3	2		
H865		Source, analog output 4	0		
H866		Selection, absolute value analog output 4	0		
H867		Smoothing, analog output 4	40[ms]		
H868		Offset, analog output 4	0%		
H869		Gain, analog output 4	2		
H870		Source, kp adaption speed controller	0		
H871		Start of kp adaption, speed controller	0%		
H872		Factor, start of kp adaption, speed controller	1		
H873		End of kp adaption speed controller	100%		
H874		Factor, end of kp adaption speed controller	1		
H875		Source, monitoring parameter 1	0		
H876		Source, monitoring parameter 2	0		
H877		Source, monitoring parameter 3	0		
H878		Source, monitoring parameter 4 (hex)	0		
H879		Source, word 1 to peer-to-peer	0		
H880		Factor, free word 1 to peer-to-peer	0%		
H881		Source, word 2 to peer-to-peer	0		
H882		Factor, free word 2 to peer-to-peer	0%		
H883		Source, word 3 to peer-to-peer	0		
H884		Factor, free word 3 to peer-to-peer	0%		
H885		Source, word 4 to peer-to-peer	0		
H886		Factor, free word 4 to peer-to-peer	0%		
H887		Source, word 5 to peer-to-peer	0		
H888		Source, word 1 to CU	143		
H889		Source, word 2 to CU	112		
H890		Source, word 3 to CU	0		
H891		Source, word 4 to CU	144		
H892		Source, word 5 to CU	151		
H893		Source, word 6 to CU	152		
H894		Source, word 7 to CU	153		

Parameter-number		Designation	Factory setting	Start-up value	Change after start-up
H895		Source, word 8 to CU	162		
H896		Source, word 9 to CU	0		
H897		Source, word 10 to CU	0		
H898		Source, word 11 to CU	0		
H899		Source, word 12 to CU	0		
H900		Source, word 13 to CU	0		
H901		Source, word 14 to CU	0		
H902		Source, word 15 to CU	0		
H903		Source, word 16 to CU	0		
H904		Source, word 1 to CB	0		
H905		Source, word 2 to CB	0		
H906		Source, word 3 to CB	0		
H907		Source, word 4 to CB	0		
H908		Source, word 5 to CB	0		
H909		Source, word 6 to CB	0		
H910		Source, word 7 to CB	0		
H911		Source, word 8 to CB	0		
H912		Source, word 9 to CB	0		
H913		Source, word 10 to CB	0		
H914		Source, value 1, limit value monitor 1	0		
H915		Smoothing, value 1, limit value monitor 1	40[ms]		
H916		Source, value 2, limit value monitor 1	0		
H917		Window size, limit value monitor 1	0%		
H918		Hysteresis, limit value monitor 1	0%		
H919		Source, value 1, limit value monitor 2	0		
H920		Smoothing, value 1, limit value monitor 2	40[ms]		
H921		Source, value 2, limit value monitor 2	0		
H922		Window size, limit value monitor 2	0%		
H923		Hysteresis, limit value monitor 2	0%		
H924		Source, value 1, limit value monitor 3	0		
H925		Smoothing, value 1, limit value monitor 3	320[ms]		
H926		Source, value 2, limit value monitor 3	0		
H927		Window size, limit value monitor 3	0%		
H928		Hysteresis, limit value monitor 3	0%		
H929		Source, value 1, limit value monitor 4	0		
H930		Smoothing, value 1, limit value monitor 4	320[ms]		

Parameter-number		Designation	Factory setting	Start-up value	Change after start-up
H931		Source, value 2, limit value monitor 4	0		
H932		Window size, limit value monitor 4	0%		
H933		Hysteresis, limit value monitor 4	0%		
H934-997		(Unused)			
H998		Drive number	0		
H999		Establish factory setting	0		

	0	1	2	3	4	5	6	7	8	9
H10_										
H11_										
H12_										
H13_										
H14_										
H15_										
H16_										
H17_										
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H93_										
H99_										

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Die STRUC G Pläne sind aus der Betriebsanleitung „Mehrmotorenantrieb MS360“
zu entnehmen.
Bestell-Nr: 6SE7080-0CX84-6AH1

STRUC G function diagrams - refere to the manual „Sectional Drive“.
Order-No: 6SE7087-6CX84-6AH1

The following editions have been published so far:

Edition	Internal Item Number
08.96	477 407 4086 76
11.98	477 407 4186 76
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Version 04.99 consists of the following chapters:

Chapter		Changes	Pages	Version date
0	Warning information	reviewed edition	2	04.99
1	Overview	reviewed edition	14	04.99
2	T300 technology board	Page: 1, 3, 10, 11, 12	12	04.99
3	Function description Diagrams	Page: 3, 9, 16, 36	42 36	04.99 11.98
4	Parameter list	Page: 24	76	04.99
5	Connectors	Page: 10, 11	14	04.99
6	Start-up	reviewed edition	26	04.99
7	SIMADYN D functions	Page: 3	6	04.99
8	Program example Diagrams		4 30	11.98 11.98
9	Changes		2	11.98
10	Short parameter list, display parameter		6	11.98
11	Short parameter list / logbook		18	11.98
	Indexregister	reviewed edition	2	04.99
	Appendix: STRUC G diagrams		136	11.98

Group: Automation and Drives (A&D)
Division: Variable-Speed Drive Systems
Postfach 3269, D-91050 Erlangen

SIEMENS

Standard Software Package

MS380 POSITIONING

for T300 Technology Board

in SIMOVERT MASTER DRIVES 6SE70/71

Software release 1.32

Manual

Edition **04.99**

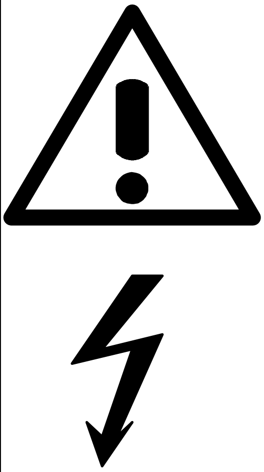
Order No. 6SE7087-6CX84-8AH1

This Manual is available in the following languages:

Language	**German**		
Order-No.	6SE7080-0CX84-8AH1		

English

0 Definitions



WARNING

Hazardous voltages are present in this electrical equipment during operation. Non-observance of the safety instructions can result in severe personal injury or property damage.

Only qualified personnel should work on or around this equipment after becoming thoroughly familiar with all warnings, safety notices and maintenance procedures contained herin.

The successful and safe operation of this equipment is dependent on proper transportation, storage, installation and assembly, and on careful operation and maintenance.

Pay particular attention to the warnings in the SIMOVERT Instruction Manuals.

• ***QUALIFIED PERSONNEL***

For the purpose of this Manual and product labels, a „Qualified person“ is someone who is familiar with the installation, mounting, start-up and operation of the equipment and the hazards involved. He or she must have the following qualifications:

1. Trained and authorized to energize, de-energize, clear, ground and tag circuits and equipment in accordance with established safety procedures.
2. Trained in the proper care and use of protective equipment in accordance with established safety procedures.
3. Trained in rendering first aid.

• ***DANGER***

For the purpose of this Manual and product labels, „Danger“ indicates death, severe personal injury and/or substantial property damage will result if proper precautions are not taken..

• ***WARNING***

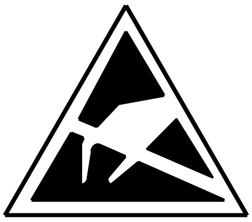
For the purpose of this User Manual and product labels, „Warning“ indicates death, severe personal injury or property damage can result if proper precautions are not taken.

• ***CAUTION***

For the purpose of this Manual and product labels, „Caution“ indicates that minor personal injury or material damage can result if proper precautions are not taken.

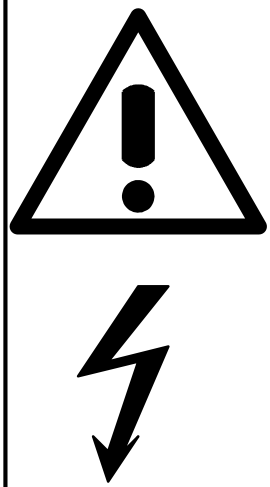
• ***NOTE***

For the purpose of this Manual, „Note“ indicates information about the product or the respective part of the Manual which is essential to highlight.



CAUTION

The boards contain components which can be destroyed by electrostatic discharge. Before touching an electronic board, the human body must be electrically discharged. This can be simply done by touching a conductive, grounded object immediately beforehand (e.g. a bare metal cabinet component, protective conductor contact).



WARNING

Hazardous voltages are present in this electrical equipment during operation. Non-observance of the safety instructions can result in severe personal injury or property damage.

Only qualified personnel should work on or around this equipment after becoming thoroughly familiar with all warnings, safety notices and maintenance procedures contained herein.

The successful and safe operation of this equipment is dependent on proper transportation, storage, installation and assembly, and on careful operation and maintenance.

The warning information supplied with the SIMOVERT Instruction Manuals must be observed.

NOTE

This Instruction Manual does not purport to cover all details or variations in equipment, not to provide for every possibly contingency to be met in connection with the installation, operation or maintenance.

Should further information be desired or should particular problems arise, which are not covered sufficiently for the purchasers purposes, please contact your local Siemens office..

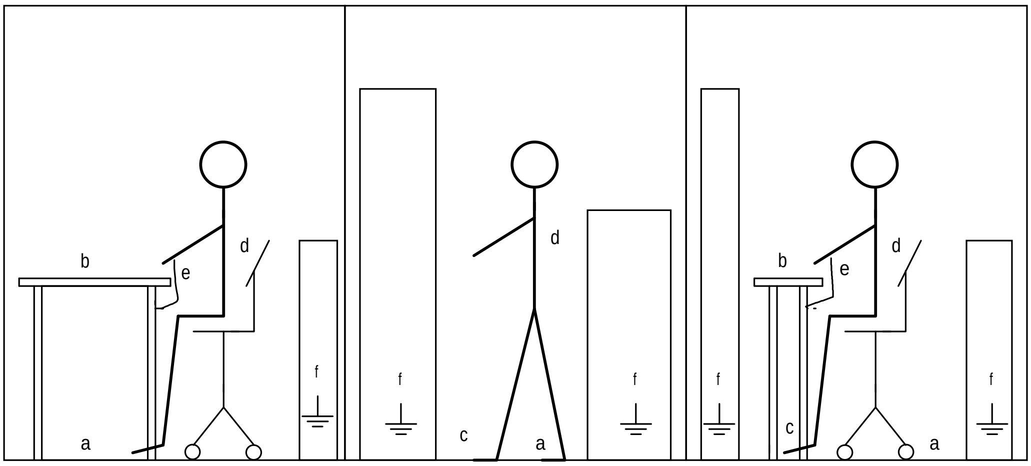
The contents of this Manual shall neither become part of nor modify an prior or existing agreement, commitment or relationship. The sales contract contains the entire obligation of Siemens.
The warranty contained in the contract between the parties is the sole warranty of Siemens.
Any statements contained here do not create new warranties nor modify the existing warranty.

CAUTION

Electrostatically sensitive devices (ESD)

- Electronic modules contain electrostatically sensitive devices that can easily be destroyed if they are improperly handled. However, if your work does involve the handling of such devices, please observe the following information:
- Electronic modules should not be touched unless work has to be carried out on them.
- If it is essential for you to touch an electronic module, make sure that your body is electrostatically discharged beforehand (EGB- Armband).
- Modules must not be allowed to come into contact with electrically insulating materials such as plastic foil, insulating table tops or clothing made of synthetic fibers.
- Modules may only be set down or stored on electrically conducting surfaces.
- The soldering tip of soldering devices must be earthed before they are used on modules.
- Modules and electronic components should generally be packed in electrically conducting containers (such as metallized plastic boxes or metal canisters) before being stored or shipped.
- If the use of non-conducting packing containers cannot be avoided, modules must be wrapped in a conducting material before being put into such containers. Examples of such materials include electrically conducting foam rubber or household aluminium foil.
- For easy reference, the protective measures necessary when dealing with electrostatic sensitive devices are illustrated in the sketches below:

a = Conductive floor surface	d = ESD overall
b = ESD table	e = ESD chain
c = ESD shoes	f = Cabinet grounding connection



Seated Standing Standing / sitting

1 Overview

1.1 General information

There are various supplementary boards for 6SE70/71 SIMOVERT MASTERDRIVES drive converters. Communication boards (CBP/CB1, SCB1, SCB2) allow the drive to be coupled to an automation system, or the drives to be coupled with one another. The drive functionality can be expanded by using technology boards (T100 and T300).

The T300 Technology Board is a freely-configurable processor board with periphery (analog and binary I/O, pulse encoder inputs, serial interfaces, dual port RAM to the drive converter etc.). It is configured using a configuring language (STRUC-L) in a list form, or with a graphic MMI (STRUC-G).

Standard software packages (programmed EPROM memory modules) are available for frequently required applications. Thus, no additional costs are incurred for engineering/configuring, testing or documentation. The modules can either be parameterized via the drive converter operator control panel, or using SIMOVIS via a PC. When required, the standard software can be adapted or expanded for special applications (up to STRUC V4.2).

1.2 Validity

This User Manual is valid for the standard ***”Positioning ” MS380*** software package, **Release 1.32**. Differences to the previous versions are listed in Section 1.5 ”Changes”.

With the exception of the expanded functionality, described in the ”Changes” section, this software release is compatible to the previous releases. This is the reason that this Manual can be used for the start-up of previous versions.

The MS380 standard software package can only run on the T300 technology board.

The functions explained here for SIMADYN D and the T300 technology board only refer to the standard **MS380** ” ***Positioning*** ” software package and they do not represent a general statement for SIMADYN D or the technology module. For instance, ”fastest cycle time 5 ms” only means that no faster cycle time may be used in the MS380 standard software package.

This standard software package is enabled for the following SIMOVERT MASTERDRIVES (6SE70, 6SE71) drive converters described in the next section.

1.2.1 Hardware/Software requirement

MASTERDRIVES basic units

MASTERDRIVES basic units (new Series, introduced from 1998)
The T300 has been approved for operation in the following MASTER DRIVES basic units:

- ❑ SIMOVERT VC with electronic board CUVC: Software release ≥ 3.11

- ❑ SIMOVERT MC with electronic board CUMC: Software release ≥ 1.2.

The T300 can only be used with Compact-, Chassis- and Cubicle-type units. The use with "Compact Plus" type units is not possible.

MASTERDRIVES basic units (older series, introduced from 1995)
The T300 has been approved for operation in the following MASTER DRIVES basic units:

- ❑ SIMOVERT VC with electronic board CU2: Software release ≥ 1.2

- ❑ SIMOVERT SC with electronic board CU3: Software release ≥ 1.1

CAUTION:	When a t300 board is installed in a SIMOVERT SC unit, the pulse frequency of the converter must not be increased above the factory setting value of P761 = 5kHz to avoid overloading the convertre processor.

Communication boards

The standard software packages can run with and without communication board (CB1/CBP or SCB1/2). In this case the parameter H280 and H281 (Alarm-/ Fault mask) has to be set.

The T300 can be combined with the following communications boards

- ❑ PROFIBUS-DP interface CBP , Software release ≥ 1.0

  Only one fieldbus communication board can be used. It must be mounted in mounting location 3 (middle location). Communication boards which are designed as Mini-Slot-Boards (e.g. CBP, CBC) must additionally be mounted in Slot "G" of an ADB Adaption Bord before inserted in mounting location 3. The T300 can not communicate with a communication board mounted on he CU (in slot A or C).

- ❑ PROFIBUS interface module CB1, software release ≥ 1.3

- ❑ SCB2 Board software release ≥ 1.3
  The SCB2 has an opto-isolated serial interface which is capable of operating with either a USS protocol or a peer-to-peer protocol.

- ❑ SCB1 board
  The SCB1 is equipped with a fibre-optic interface for peer-to-peer communication or terminal extension modules SCI1 and/or SCI2.

- ❑ SLB SIMOLINK interface board for CUVC or CUMC.
  If a Peer-to-Peer communication in not possible (for example for „Compact Plus“ type units) the SLB board can be installed instead of the T300 Peer-to-Peer interface.

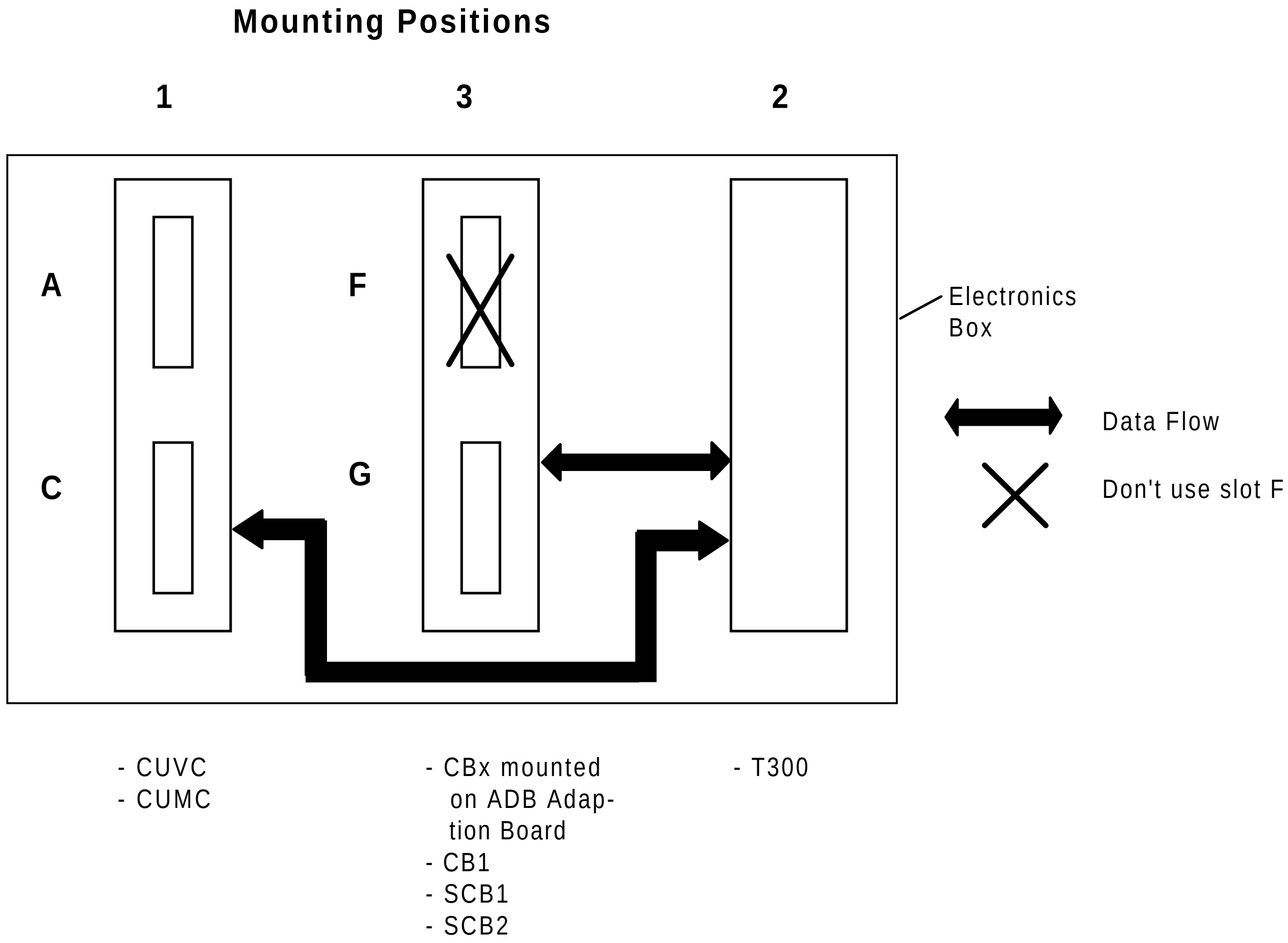
CAUTION:	- An optinal SLB SIMOLINK Interface Board must be mounted in a slot on the CUVC or CUMC base electronics board, most preferably in Slot A. The combination T300 and SLB SIMOLINK Interface mounted in location 3 is not possible! The SLB borad communicates directly with the base unit. Signal interconnections to the T300 board must be softwired via Binectors-/ Connectors. - Example for Binectors-/ Connectors softwiring, please refere to Section 2.3.10 - A T300 board with Hardware release ≥ B, or newer, is needed for use with an SLB SIMOLINK interface board. The correct hardware release code can be detected on the component side of the T300 in the neighbourhood of the lower backplane connector.

Note: MASTERDRIVES basic drive parameter and T300 Parameter can be read and write thrue all the serial Interfaces (with the exception of Peer-to-Peer interface and SIMO-LINK interface board).

Allowed mounting combinations / Mounting positions

Please adhere to the following rules for mounting the T300 and other supplementary boards into the electronics box.

Please note: **Only the following combinations and mounting positions are allowed.**



– The T300 must be mounted in mounting location 2 (rightmost mounting location)

– Only one fieldbus communication board can be used. It must be mounted in mounting location 3 (middle location). Communication boards which are designed as Mini-Slot-Boards (e.g. CBP, CBC) must additionally be mounted in Slot "G" of an ADB Adaption Bord before inserted in mounting location 3. The T300 can not communicate with a communication board mounted on the CU (in slot A or C).

– The Communication Board communicates directly with the T300 board.

– An optinal SLB SIMOLINK Interface Board must be mounted in a slot on the CUVC or CUMC base electronics board, most preferably in Slot A..

The combination T300 and SLB SIMOLINK Interface mounted in location 3 is not possible!

CAUTION:	A T300 board with Hardware release $\geq$ B, or newer, is needed for use with an SLB SIMOLINK interface board. The correct hardware release code can be detected on the component side of the T300 in the neighbourhood of the lower backplane connector.

T300 parameter settings

The following devices can be used to set the parameters of the T300 board:

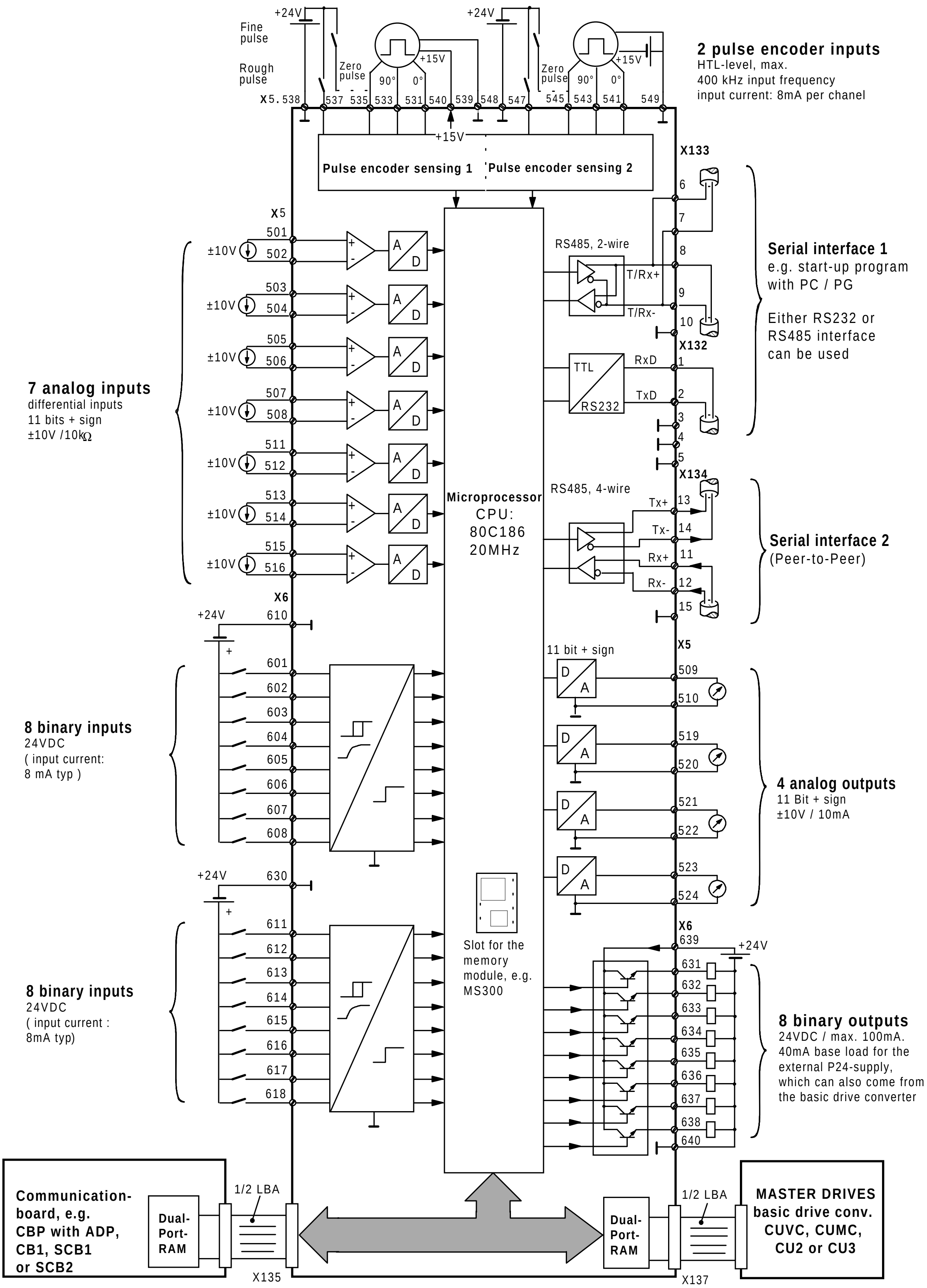
- ❑ Standard parameterizing unit (PMU) for basic converters
- ❑ A PC or programmer with the SIMOVIS service program (refer also to section 1.13)
- ❑ Optional OP1S plaintext operator device
- ❑ Optional OP1 plaintext operator device version 1.1 or higher

1.2.2 T300 technology module

The T300 technology module is a processor module, which can be freely configured using STRUC. It is compatible to SIMADYN D, and it has been especially designed for use with SIMOVERT MASTER-DRIVES drive converters. The function of the modules is defined using the function block-oriented STRUC L / STRUC G configuring language. The configured software which is generated is programmed in a program memory sub-module, which is inserted on the processor module. An EEPROM is provided on the program memory sub-module to save parameter changes (EEPROM = electrically write- and deletable memory). Communications with the basic drive is realized through a parallel interface, which is implemented as DUAL PORT RAM (DPR).

Processor / clock frequency	80C186 / 20 MHz		
RAM memory	128 Kbytes		
Communications with unit	Parallel bus, 2 kbyte dual port RAM		
Program memory sub-module	MS300 with 512 kbyte EPROM and 2 kbyte EEPROM		
Binary inputs	16	non-floating	24 V
Binary outputs	8	non-floating	24 V
Analog inputs	7	11 bits + sign	± 10 V (differential inputs)
Analog outputs	4	11 bits + sign	± 10 V, 10 mA
Serial interfaces	2	1* RS232 and RS485 (2 wire) 1* RS485 (2- or 4 wire)	
Pulse encoder inputs	2	2* track A,B, zero, fmax = 400 kHz	

Table 1.2.2: Overview of the T300 technology module. For details refer to the Instruction Manual and connecting diagram T300, refer to Fig. 1.2.2.



terminal series X5, X6:connect at terminal bloc SE300.
terminal series X132, X133, X134: connect at T300.

Fig. 1.2.2

1.3 Ordering information

The following table provides an overview of the components required to operate an SIMOVERT MASTER-DRIVES with the basic modules CUVC and CUMC as well as CU2 and CU3 with the standard MS380 positioning software package.

Product description	Comment	Order No.
T300 technology board including SC58 and SC60 connecting cables, SE300 terminal block hardware Instruction Manual, German / English		6SE7090-0XX87-4AH0
LBA local bus adapter for MASTER DRIVES- electronics box	Is also used to install a communications board	6SE7090-0XX84-4HA0
ADB adaption board for mounting the CBP board	Is used to install a communications board	6SE7090-0XX84-0KA0
MS380 Positioning Standard Software Package on a memory module without Manual	Observe the information below	6SE7098-8XX84-0AH0
Positioning Manual	German English	6SE7080-0CX84-8AH1 6SE7087-6CX84-8AH1

The technology board components can also be individually ordered as spare parts:

T300 technology board	6SE7090-0XX84-0AH2
Hardware Instruction Manual, T300 technology board German / English	6SE7087-6CX84-0AH1
SC58 connecting cable	6DD3461-0AB0
SC60 connecting cable	6DD3461-0AE0
SE300 terminal block	6SE7090-0XX84-3EH0

Further, if the standard software package is to be modified, the following is also available:

- STRUC L PT to implement your own functions, in list form. This can run on a PC under WINDOWS.
- STRUC G PT to implement your own functions in a graphic form. This can run on a PC under SCO-UNIX.
- Prommer for memory modules with connection via a parallel PC interface.
- STRUC Service Program for the symbolic monitor.
- STRUC configuring software for the angular synchronous control on floppy disk.

Refer to next table or Catalog DA65.10 for more precise information.

Note:

The memory module can be identified as follows:
A label is glued to the rear of the device with the Order No. 6SE7098-8XX84-0AH0
On the front, on the EPROM device, there is a label with the following inscription:
MS380 Vx.y (e.g. V1.3)

Standard software package on floppy disk

The source codes of the MS380 standard software package are available as STRUC files on floppy disk (designation, MD380). When required, the angular synchronous control function can be adapted to specific requirements using conventional SIMADYN D resources.

Components to adapt the standard software package with STRUC:

Designation	Explanation	MLFB / Order No.
MD380	MS380 angular synchronous control on a $3^1/_2$ inch floppy disk (without documentation)	6SW1798-8XX84-0AH0
MS300	EPROM for T300 **-empty-**	6SE7098-0XX84-0AH0
PP1X	Parallel Programmer (PC-) external	6DD1672-0AD0
UP3	Programming adapter for MS47/MS300	6DD3462-0AB0
STRUC	A STRUC version 4.2.4 or higher is required	Refer to Catalog DA99
	If required, start-up program (SIMOVIS, IBS/SERVICE-program)	Refer to Catalog DA99

1.4 Guidelines to use this Manual

Section	**Subject**	**Notes**
1	Overview and application instructions for the MS380 Positioning Software Package.	
2	Installing the T300 Technology Board and the MS300 EPROM module.	Detailed information in the T300 Instruction Manual. Example to connect-up positioning, in Section 8.
3	Function diagrams and function description	The function diagram shows the complete configuring of the MS380. Further, the connecting terminals and data transfer routes to the basic drive converter are shown. This is important information for configuring and commissioning the system.
4	Parameter list	Also important as supplementary information to the function diagrams in Section 3.
5	Connector list (freely-connectable signals)	
6	Commissioning	When commissioning the basic drive converters, the Instruction Manuals of SIMOVERT DC and VC should be used.
7	SIMADYN D functions	Only for users, who wish to modify the Standard Software Package, or for detailed information. Detailed information is provided in the Manuals for the digital SIMADYN D control system.
8	Engineering/configuring examples	Entry into positioning using practical examples.
9	Short parameter list/log book	Plant/system documentation log book. A list of the selected/set parameters can also be generated using SIMOVIS.
10	Index	

1.5 Changes

The version has a code, which can be read-out in display parameter d002.

Version	Comment
0.1	Pilot version
1.0	Series (standard) version
1.1	Improved characteristics for rotary-axis applications. The drive is powered-down when the referencing command is withdrawn. Simulation of the control bits from CB with H104 Positioning reference input, also as word-format quantity with H359 Minimum approach path can be entered, independently of the drive play using H312. Factory setting for H164=60 New fault messages, incorrect position reference point and pulse encoder sensing overflow. Settable PT1 elements for V set, P set, P act. Factory setting for H702=90, H703=10h Additional condition for drive has positioned: V act=0 Analog inputs from T1 to T2 Analog outputs from T1 to T2 Relative positioning improved Parameterization, upread and download possible via SIMOVIS.
1.2	Support, TR encoder H335 = Operation with TR encoder H336, H337 = TR encoder, load output H338, H339 = Referencing, TR encoder (manual) H340 = Delay time for loading after zero speed and inverter inhibit H341 = Maximum load time The position actual value is saved when changing-over to relative positioning Step input to optimize position controller H728 Error message F131: Loading error absolute encoder.

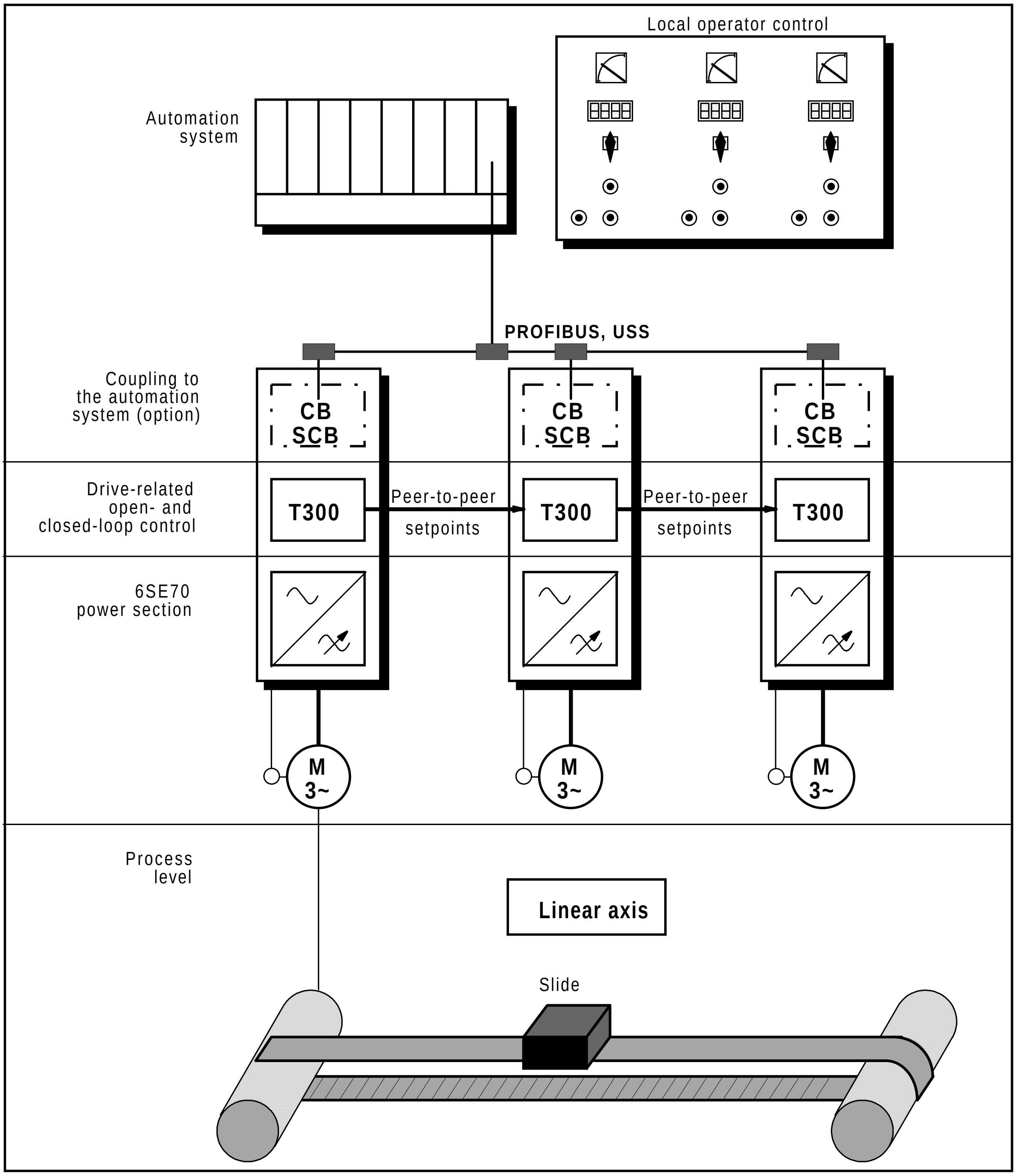
1.3	Pre-control, speed setpoint which can be disabled using H739. The zero pulse enable for pulse encoder sensing 2 can be controlled via connector: H141: Source, zero pulse evaluation enable H142: Mask, zero pulse evaluation enable Brake control: At power-on, the speed controller is immediately enabled; the speed setpoint after the time entered in H243. At power-off, the speed setpoint is inhibited; the speed controller is only inhibited after the time entered in H244 has expired. Thus, there are no torque-free phases when powering-up and powering-down. Extremely long times (>≈2 000 000[ms]) can be entered using the range changeover with H719. The enable control for reference point with parameter H172 has been eliminated. The position actual smoothing H729 has been eliminated. When required, the speed setpoint smoothing in the basic drive converter can be used. **Extending the rotary axis function for roll feed** The rotary axis can be endlessly operated without using a reference point. Using parameter H474 it can be defined as to whether a) in the "relative positioning" mode, the internal position reference value is reset to the position actual value each time the system is powered-up b) in the "relative positioning" mode, the internal position reference value is kept. This means that errors are not summed at power-on and power-off. Tracking error of the positioning controller, scaled in connector K208 and parameter D075. Extended tracking error monitoring: H741= Tolerance limit for tracking errors H745= Delay time for tracking errors Error message F121: tracking error outside the tolerance The "drive has positioned" signal is only output if the software limit switch has not been actuated (violated). Load equalization for hoisting drives (i.e. cranes): The source can be selected in parameter H746. TR encoder control: The load operation is aborted, if loading is already active when the unit is running-up.
1.31	Position reference value transfer (parameters H464, H465) has been shifted into T2.
1.32	Time delay after the magnetising is finished bevor the signal break open is given

1.6 Applications

Drive converters equipped with the technology module, have the required functionality to establish positioning functions for rotary- or linear axes. The module can also be used without any supplementary automation as the open-loop control is integrated on the module.
In the following examples, the encoder (encoder for SC, or pulse encoder for VC) are mounted on the motor shaft. An additional pulse encoder can be mounted on the machine component which is to be positioned, so that the position actual value can be sensed without mechanical play, torsional effects etc.

1.6.1 Example of a linear axis

A traversing slide is positioned via toothed belts.
A possible system configuration is shown below:

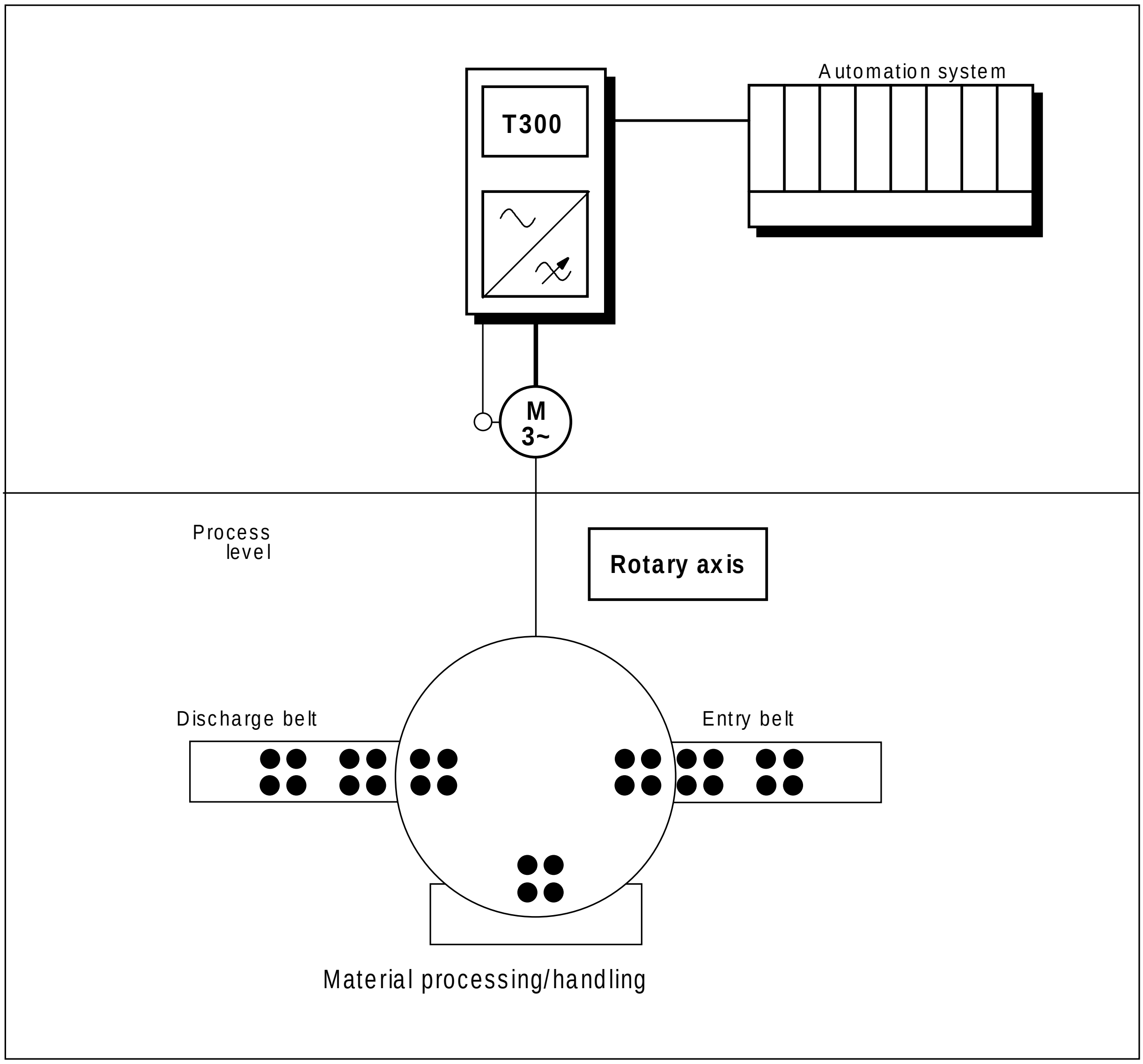


Data can be directly transferred between the drives via the peer-to-peer coupling. This data can include, for example, control signals for slave drives or positioning values for multi-axis positioning systems.

1.6.2 Example of a rotary axis

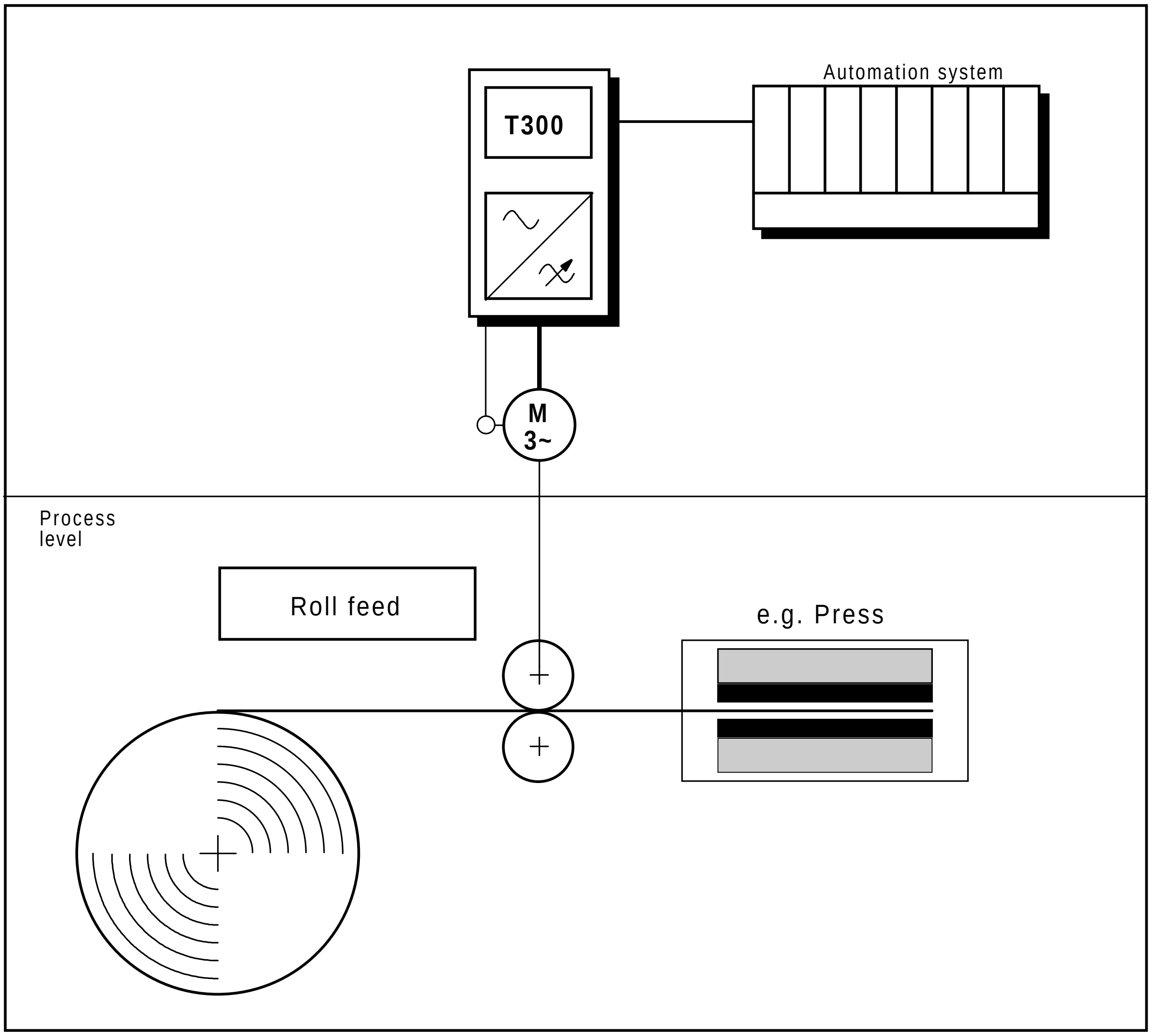
Material is transported to a rotating platform via a conveyor belt. The material is then positioned for further processing and transport.

A possible system configuration is shown below.



1.6.3 Example of a basic roll feed

From a winding device the preselected lenght is drawed off.



1.7 Functional scope

The functions included in the module are as follows:

- **Signal input / output**

- 7 freely-available analog inputs
- 4 freely-available analog outputs
- 16 freely-available binary inputs
- 8 freely-available binary outputs

- peer-to-peer coupling for fast master-slave applications
- serial interface for diagnostics using the SIMADYN D service / diagnostics program via PC/PG
- 2 pulse encoder sensing inputs, can be set / reset
- absolute encoder support (TR ELECTRONIC company) for absolute positioning without referencing travel
- setpoint input via *byte-serial input*
- setpoint input via thumbwheel switch

- **Open-loop drive control**
  - evaluation of hardware limit switches / emergency limit switches
  - power-on / power-off control
  - 2 x inching, closed-loop speed controlled, 2 x inching, position controlled
  - 3 closed-loop speed controlled modes
  - brake control
  - fault monitoring (pulse encoder, communications, anti-stall protection)

- **Referencing control**
  - referencing with shutdown
  - flying referencing
  - automatic post referencing
  - reference direction selection
  - taking into account the shortest approach path
  - reference point monitoring

- **Traversing data sets for:**
  - 100 fixed position reference values or variable reference value from the communications system
  - 3 x 6 position limiting values for the limit value monitor
  - 6 x software limits
  - 6 x maximum speeds/velocities
  - 6 x adaption factors, closed-loop speed control
  - 6 x drive play
  - 6 x ramp-up/ramp-down times for ramp-function generators
  - 6 x rounding-off functions for ramp-function generators
  - 6 x down ramps when a limit switch is activated

- **Closed-loop position control**
  - linear- or rotary axis
  - absolute or relative positioning
  - position ramp-function generator with rounding-off function
  - position controller with P- or PI characteristics
  - friction compensation
  - automatic load measurement

- **Special functions**
  - motorized potentiometer function
  - 4 x limit value monitor for position limit values
  - 4 x limit value monitor, freely-connectable
  - freely-definable status word

1.8 Faults and fault messages/signals

1.8.1 Diagnostic LEDs

Three diagnostic LEDs are provided on the technology board.
The red and yellow LEDs must always flash if the standard software package is to be used. The green LED must additionally flash if a communications board is used.

Red LED
The red LED flashes if the technology board software is running.
If the red LED does not flash although the drive converter is powered-up, then one of the following faults could be present:

Fault cause	Remedy
Defective technology board / LED	Replace board
Board incorrectly or not completely inserted	Insert the board in the right slot and screw into place
Defective LBA	Replace the LBA
Memory module incorrectly inserted or missing	Correctly insert the memory module
Memory module failed or not programmed also refer to the information below.	Replace the memory module (also refer to Section 1.3)

Yellow LED
The yellow LED flashes if the technology board is communicating with the basic drive converter (CU).
If the red LED flashes, but not the yellow LED, then one of the following faults may be present:

Fault cause	Remedy
Defective technology board (DPR) / LED	Replace the board
CUVC, CUMC: Basic drive has not recognized the T300. CU2, CU3: T300 not logged-on in the basic drive or not recognized.	CUVC, CUMC: Replace the CUVC, CUMC / T300. CU2, CU3: Log-on T300, refer to Section 6 or replace CU2, CU3 / T300
Board incorrectly or not completely inserted	Insert the board into the correct slot and screw into place

Green LED
The green LED flashes, when the technology board is communicating with the communications board .
If the red LED flashes but the green LED does not flash, then one of the following faults may be present:

Fault cause	Remedy
Technology module/LED or communications module failed	Replace the board
CUVC, CUMC: T300 has not recognized the CBP. CU2, CU3: T300 not logged-on in the basic drive or not recognized.	CUVC, CUMC: Replace T300 or CBP CU2, CU3: Log-on T300, CB1, refer to Section 6 or replace T300 or CB1
Board T300 incorrectly or not completely inserted	Insert the board into the correct slot and screw into place
Communications board incorrectly or not completely inserted	Insert the board into the correct slot and screw into place

Note:
The red LED must always flash if the technology board is O. K. CU2, CU3: The yellow and green LEDs only start to flash if the hardware setting (P052=4) has been completed.

The MS380 memory module is identified by the Order No. on the PC board, refer to Section 1.3 and on the "MS 380 V1.xy" label on one of the components.

1.8.2 Fault messages F116 to F131, alarm messages A097 to A112

Fault messages/signals are transferred to the basic drive converter from the technology board. They are indicated as faults F116 to F131 on the basic drive converter. Alarms are also transferred, which are displayed as alarms A097 to A112.

The following table provides an overview

Fault No.	Alarm No.	Designation	Cause
F116	A097	Error, CB communications	Communications board incorrectly inserted/not inserted or not provided *). No valid telegrams are received. Word 1 (main control word): all bits = 0 (at least 1 bit ≠ 0).
F117	A098	Error, CU communications	Communications to the basic drive converter faulted
F118	A099	Error, peer-to-peer communications	No valid telegram is received from the peer to peer coupling or the coupling is not used *).
F119	A100	User error/fault 1	Parameterized error signal from the user
F120	A101	User error/fault 2	Parameterized error signal from the user
F121	A102	Tracking error outside the tolerance	The error is generated if the difference between the position reference value and the actual value exceeds the limit value in H741 and the delay time in H745 has expired.
F122	A103	Overspeed, positive	Speed actual value > pos. limit value
F123	A104	Overspeed, negative	Speed actual value < neg. limit value
F124	A105	Drive stalled/blocked	Drive does not rotate although setpoint and torque available.
F125	A106	Pulse encoder fault	Difference between the pulse encoder sensing of the basic drive converter and the technology board out of tolerance.
F126	A107	Emergency limit switch A3 actuated	
F127	A108	Emergency limit switch B3 actuated	
F128	A109	Referencing fault	Reference point wasn't found when referencing
F129	A110	Reference point incorrect / not identified	Referencing point at the incorrect position or not identified when positioning
F130	A111	Position actual value overflow	The permissible numerical range of $\pm 2^{31}$ pulses was exceeded.
F131	A112	Loading error, absolute encoder	Only for operation with absolute encoder, loading was neither able to started, executed nor successfully completed.

Error messages which are not required, can be suppressed (H280) or displayed as alarm (H281).

*) No communications board inserted (e.g. CBP/CB1):
H280/H281: bit 0 = 0
Peer to peer not used: H280/H281: bit 2 = 0

1.9 Overview of the control signals

All of the control signals are subsequently tabulated. More detailed information is provided in the parameter list in Section 4 as well as in the function description, Section 3.

Reset, position actual value 1	H131/H132	
Set position actual value 1	H133/H134	
Enable P act transfer from the NOVRAM	H135	
Reset position actual value 2	H136/H137	
Set position actual value 2	H138/H139	
Enable P act 2 transfer from the NOVRAM	H140	
Power-up	H200/H201	
Standard stop (OFF1)	H202/H203	
Electrical off (OFF2)	H204/H205	
Fast stop (OFF3)	H206/H207	
Inverter enable	H208/H209	
Setpoint enable to basic drive converter control word bit 1.6	H210/H211	
Fault acknowledgement	H212/H213	
Inching 1, speed-controlled	H214/H215	
Inching 2, speed-controlled	H216/H217	
Closed-loop speed control 1	H218/H219	
Closed-loop speed control 2	H220/H221	
Closed-loop speed control 3	H222/H223	
Inching 1, position-controlled	H224/H225	
Inching 2, position-controlled	H226/H227	
Hardware limit switch A2	H228/H229	For referencing and travel limit
Hardware limit switch B2	H230/H231	For referencing and travel limit
Emergency limit switch A3	H232/H233	
Emergency limit switch B3	H234/H235	
Enable holding brake control	H240	Also operating brake possible
User error 1	H262/H263	Only enabled for drive on
User error 2	H264/H265	Only enabled for drive on
Referencing with power-down	H300/H301	
Flying referencing	H302/H303	
Automatic post referencing	H304/H305	
Pre-contact to the reference point	H308/H309	
Start direction when referencing	H310/H311	

Direction when passing the reference point		Is defined by the polarity of the minimum approach path
Operating mode, rotary axis	H353	
Operating mode, relative positioning	H468/H469	Moves the drive through the specified position reference value.
Relative positioning: Forwards / reverse	H470/H471	Defines the traversing direction for relative positioning.
Relative positioning: Forwards inching	H472/H473	For a positive edge, the drive moves by the specified position reference value.
Relative positioning: Reference value memory when synchronizing is enabled	H474	Defines whether the internal reference value memory for relative positioning is set to the actual position at each power-on
External enable, position control 1	H700/H701	
External enable, position control 2	H702/H703	
Reverse traversing direction, rotary axis	H704/H705	0=drive only rotates forwards 1=drive only rotates backwards
Traversing direction, direct rotary axis	H706/H707	Drive determines the shortest path itself
Set motorized potentiometer	H784/H785	
Raise motorized potentiometer	H786/H787	
Lower motorized potentiometer	H788/H789	
MOP operating mode	H790/H791	0=MOP, 1=ramp-function generator
Referencing, TR absolute encoder	H338/H339	TR encoder loading is manually initiated
Positioning with the TR absolute encoder	H335	
TR encoder, load output	H336/H337	TR encoder, load output

1.10 Overview of the status messages

The status messages which the positioning system can access are listed in the following tables. Especially important messages are highlighted in bold.

Status word, input/output (d031)		
Zero pulse, pulse encoder 1 identified	Bit 0	Or the reference point, when connected as zero pulse.
Zero pulse, pulse encoder 2 identified	Bit 1	
Speed actual value > 0 (V>0)	Bit 2	
Speed actual value = 0 (V=0)	Bit 3	
Speed actual value < 0 (V<0)	Bit 4	
Traversing direction, pulse encoder 1	Bit 5	(0=pos., 1=neg.)
Traversing direction, pulse encoder 2	Bit 6	(0=pos., 1=neg.)
System error T300	Bit 9	
Sending to CU O.K.	Bit 10	
Sending to CB O.K.	Bit 11	
Sending to peer-to-peer O.K.	Bit 12	
Receiving from CU O.K.	Bit 13	
Receiving from CB O.K.	Bit 14	
Receiving from peer-to-peer O.K.	Bit 15	

Status word, open-loop control (d041)		
Braking	Bit 3	Drive is braking after stop or fast stop
No braking	Bit 4	
Velocity actual value = 0 (V=0)	Bit 5	$V < V_{min}$
Drive powered-up	Bit 6	Control bit on/stop for the basic drive converter
Drive not powered-up	Bit 7	
Drive not ready	Bit 8	
Internal inverter enable	Bit 9	
Internal setpoint enable	Bit 10	
Drive faulted	Bit 12	
Open holding/operating brake	Bit 13	
Close holding/operating brake	Bit 14	
Close brake at n=0	Bit 15	

Status word 1, referencing control (d045)		
Enable reference point (zero pulse) sensing	Bit 0	
Referencing with power-down active	Bit 1:	
Flying referencing active	Bit 2	
Referencing mode active	Bit 3:	
Drive has referenced	Bit 4	
Drive has not referenced	Bit 5	
Crawl to the reference point	Bit 6	
Approach route, long approach path	Bit 7	
Approach route, short approach path	Bit 8	
Referencing direction B→A	Bit 9	
Referencing direction A→B	Bit 10	
Referencing direction O.K.	Bit 11	
Referencing direction not O.K.	Bit 12	
Hardware limit switch A2 reached	Bit 13	
Hardware limit switch B2 reached	Bit 14	
Referencing error	Bit 15	

Status word 2, referencing control (d046)		
Error, reference point not/incorrectly identified	Bit 0	
Hardware limit switch A2 actuated	Bit 1	
Hardware limit switch B2 actuated	Bit 2	
Reference point range O.K.	Bit 3	
TR encoder: Loading requested	Bit 7	
TR encoder: Loading active	Bit 8	
TR encoder: Encoder has referenced	Bit 9	
TR encoder: Load input	Bit 10	Is used to connect to the TR encoder, load input via binary output
TR encoder: Error, start of loading	Bit 12	No checkback signal at the TR encoder load output for a high signal at the TR encoder, load input
TR encoder: Error, loading	Bit 13	Speed not identified for TR encoder, load
TR encoder: Max. load time exceeded	Bit 14	The maximum load time, set in H341, was exceeded

Status word, reference value conditioning (d069)		
Software limit A1 violated	Bit 0	Traversing task was rejected
Software limit B1 violated	Bit 1	Traversing task was rejected

Status word, position control (d081)		
Tracking error outside the tolerance	Bit 0	
Tracking error within the tolerance	Bit 1	
Velocity setpoint > actual value	Bit 2	
Velocity setpoint = actual value	Bit 3	
Velocity setpoint < actual value	Bit 4	
Position reference value > actual value	Bit 5	
Position reference value = actual value	Bit 6	
Position reference value < actual value	Bit 7	
Position control enabled	Bit 8	
Speed-controlled operation	Bit 9	
Position controller at the upper limit	Bit 10	
Position controller at the lower limit	Bit 11	
Drive has positioned	Bit 12	

Status word, special functions (d086)		
EEPROM is empty	Bit 5	
MOP : output = input	Bit 6	
MOP at the upper limit	Bit 7	
MOP at the lower limit	Bit 8	

Further, there are 4 limit value monitors for position values and 4 limit value monitors for other control quantities, whose output signals are collected in two status words.

1.11 Configuring/engineering information

The most important configuring/engineering information is summarized in the following.

1.11.1 Connecting-up control signals

When the MS380 positioning software package is used, the control signals are connected to the T300, i. e., they are not connected to the basic drive converter. The exception are signals which fulfill safety functions.
These are:
- emergency stop
- emergency limit switch

1.11.2 Binary inputs

All of the T300 binary inputs can be individually inverted. Thus, every input signal can be implemented as either an NC- or an NO contact.

1.11.3 Pulse encoders, resolvers

Generally, the incremental track signals of the motor encoder are fed via the backplane bus to the T300.

Information regarding CUMC with resolvers, if the resolver is also to output the position actual value for the closed-loop positioning control:
An SBR2 (resolver evaluation with pulse encoder simulation) must be used. **In this case at T300 board with product stand ≥ 8 is also required.**

The encoder, connected at the basic drive converter, can transfer signals instantaneously to the technology board, i. e., the encoder is only connected once and is used by the basic drive converter for the speed control and by the T300 for positioning.

Only if a second pulse encoder is mounted on the machine part to be positioned, is this directly connected to the T300 via the SE300 terminal block.

Zero pulse, resolvers / encoders

Encoder: For encoders, the zero mark is optically generated as for a pulse encoder, and therefore reproducibly defines the motor position.

Resolvers: For resolvers, the zero mark is a calculated help parameter. Only a two-pole resolver provides a motor position which can be reproduced, and can therefore be used just like an encoder. For multi-pole resolvers, the zero pulse cannot be practically used for positioning.

1.11.4 Maximum cable lengths

The subsequently specified values are system-confirmed guide values. If values are required, which lie above the limit values specified here, then the equipment documentation and configuring information must be observed. EMC-correct design and cable routing must be carefully implemented.

Caution:
By connecting reactors and filters in the motor feeder cable, the drive dynamic performance is reduced. For this reason, the specified cable lengths and speeds for high dynamic requirements should not be exceeded.

SIMOVERT VC
The specified values refer to the 1PX8001-1 pulse encoders and the pulse encoders integrated in the 1PA- and 1PH motors.

Distance between the converter and motor : Less than 100 m for f_{max} = 120 kHz

CUMC/CU3:
Resolver: Distance between the converter and motor : Less than 100 m for n_{max} = 3000 RPM

Encoder: Distance between the converter and motor : Less than 100 m for n_{max} = 3000 RPM

Information regarding the encoders / resolvers
- only use the original cable with the correct length.
- encoder signals may not be fed through terminals.

1.11.5 Commissioning

Parameterization
Parameterization is possible via the drive converter operator control panel (PMU), however this is not particularly user-friendly. Thus, for faster and more reliable parameterization, the operator control panel OP1S (software release ≥2.1) / OP1 (software release ≥1.1) should be used with plain text display or PC-based SIMOVIS.

Basic/reserve setting
In practice, it has been proven, that the basic drive converter should be parameterized, so that after the changeover from the basic to the reserve setting (or changeover the BICO data set), the drive can be operated without positioning.

1.11.6 Limit switches

The limit switch signals should be implemented, so that they always supply a range signal up to the mechanical endstop. This can either be achieved by using an appropriately long actuator or by using changeover switches, which, after being actuated, supply a steady-state one- or zero signal.

1.11.7 Mechanical brake

The drive coasts down when the drive converter fails either as result of an internal fault or power failure. This means that if the drive is transversing, it can no longer be braked to a standstill. A mechanical brake is mounted on the motor or on the machine part to be positioned thus preventing hazardous conditions from developing.

1.12 Establishing the factory setting

All of the changed technology board parameters are stored on the EEPROM of the MS300 memory module. This means, that when the board is replaced, the parameterized module can be transferred. It is not necessary to re-enter the parameters.
The *establish factory setting* function deletes the data in the EEPROM. The next time the board runs-up, the values in the EPROM are transferred. In this case, parameter H998 must have the value 165, and then 0 must then be re-entered.

Note	See also section 1.13
After the value has been entered to establish the factory setting, at first, the parameter settings are retained. To transfer the factory setting, the unit must be powered-down and up again.	

1.13 Parameterization with Simovis for Windows

Up to Simovis V5.1, the T300 parameterization can be done with SIMOVIS, like the base units thrue the PMU connection. Please refere to section 1.13.3.

1.13.1 Creating the data base for a technology type.

In order to parameterize every drive and technology type, SIMOVIS requires exact information about the number and characteristics of the available parameters, e.g. parameter numbers, value limits, etc.. This information is stored in data base files.

If a T300 with „unknown“ data base is connected (data base not available in SIMOVIS), the necessary technology data base may be created online.

In both cases it is assumed that the communication to the drives is intact.

Preconditions:

- For the learn process the technology type’s parameter set should be reset to the factory settings (refer to parameter H998).

If during the learn process the technology type’s parameter set was not reset to the factory settings, the functions refer to the status of the technology type when the data base was created and not to the factory settings.

Note: It is recommened, but not essential, that step as described above is carried out. During the learn procedure SIMOVIS also generates a file (by upreading), which is interpreted during offline mode to be the factory setting of a technology type. This file is used for example:

 - when opening an offline file as the basis for the factory setting,

 - when printing a parameter set, where only the changes compared with the factory setting are to be printed.

- The dialogue to create the data base of a technology type will only be displayed if the base unit, to which SIMOVIS is connected, has a slot for technology boards (MASTERDRIVES Compact units).

- If the technology board has to be registered to the base unit by parameterization (MASTERDRIVES with CU2 or CU3: parameters P90 or P91) the „learning“ process will only start if the technology board is registered.

Proceed as follows:

1. For MASTERDRIVES with CU2 or CU3 the technology board has to be registered

2. Reset the technology board to the factory setting.

In the nenu BUS CONFIGURATION:

3. Dependant on the Baud rate, increase the "number of request repeats" under the "extended" tab(refer to section 1.13.3.).

4. Select the drive by clicking on the lefthand mouse key, and establish the connection (clicking toolbar „connect. On/Off). The communication to the drives is intact if this toolbar changes to green colour.

5. Disconnect other drives (if available) to reduce the time required for the „learning process“.

6. Disconnect all other communication systems (Profibus, Peer-to-Peer) for example by pulling off the connecting plug.

7. In the function bar, click on the button „Create data base“ or

7. Select the menu Edit > Create („learn“) data base.

8. In the „Create data base“ dialogue (in the „technology type“ folder), the bus address, type and SW version of the connected base unit can be checked. In the dropdown list box „Name technology type“, select (or enter) the name of the technology type to be learned (default name: TECHN000). If a name is selected, which already exists, the data base will be overwritten by the new one.

   The technology type T300 to be learned does not make use of parameters 3000 ...3999, deactivate the checkbox „L/c parameters“. The „learning“ time will then be significantly reduced.

9. Click on the Start button to start creating the technology type data base

-The following „learn“ process will take several minutes. Progress can be monitored in the displayed dialogue. Upon successful completion, the new technology type is available for all drives (which have a slot for technology boards) in the Add drive or Change drive dialogue. The drive should now be disconnected, and the new technology type selected in the „Change drive“ dialogue.

Note: Should errors be detected at the end of the learn procedure, then further information can be displayed by clicking on the „details“ button. The cause of the errors (e.g. restricted parameter access) should be corrected and the learning process repeated.

1.13.2 T300 parameterization

After a technology data base has been created, the T300 can be parametrized with SIMOVIS.
(Please refer to the SIMOVIS help system if you require further information).

- Parameter list complete

  opens a parameter table (same structure as standard parameter table) with all of the parameters of the drive type, which is assigned to the actual drive window. (H and d parameter are displayed after the base unit parameter P and r)

  Double click somewhere in the appropriate line of the table to change the parameter value.

- Free parameterization:

  opens a parameter table, where parameters can be individually listed by entering parameter numbers (e.g. H010 or d016, resp. 1010 or 1016).

  Double click somewhere in the appropriate line of the table to change the parameter value.

- Download: The parameter set (Upread files, offline generated files) can be directly saved in the RAM or EEPROM memory of the drive.

  When downloading, the actual parameter values in the drive are overwritten by the parameter values in the parameter set.

1.13.3 Important notes

Note 1: Dependant on the Baud rate, increase the "number of request repeats" under the "extended" tab.

Empirical values:

38400 Baud: Number of request repeats = 200

19200 Baud: Number of request repeats = 100

9600 Baud: Number of request repeats = 50

Refer to: online help (BUSKON): Help topics > Editing projects

> Configuring the interface.

Note 2: Disconnect other drives (if available) to reduce the time required for the „learning process“.

Disconnect all other communication systems (Profibus, Peer-to-Peer) for example by pulling off the connecting plug.

Note 3: If more serial interfaces are used addition to SIMOVIS (e.g. Profibus and T300 Peer-to-Peer interface), the Peer-to-Peer baud rate should be set to values ≤ 19200 Bauds (H999 ≤ 7).

A simultaneous data transmission with several interfaces (and high baudrates) can, under these circumstances, cause a T300 overload.

Note 4: When using the MS380 module only the parameters which have been changed should be downloaded via a comparison file and not the complete parameter set. Trying to download the complete parameter set will result in non-volatile memory overflow. SIMOVIS will generate the following error message when the memory is full „Error when writing“.

- Overflow of the non-volatile memory
The non-volatile memory is full when no more parameters may be written to the memory.
How to proceed in this case:

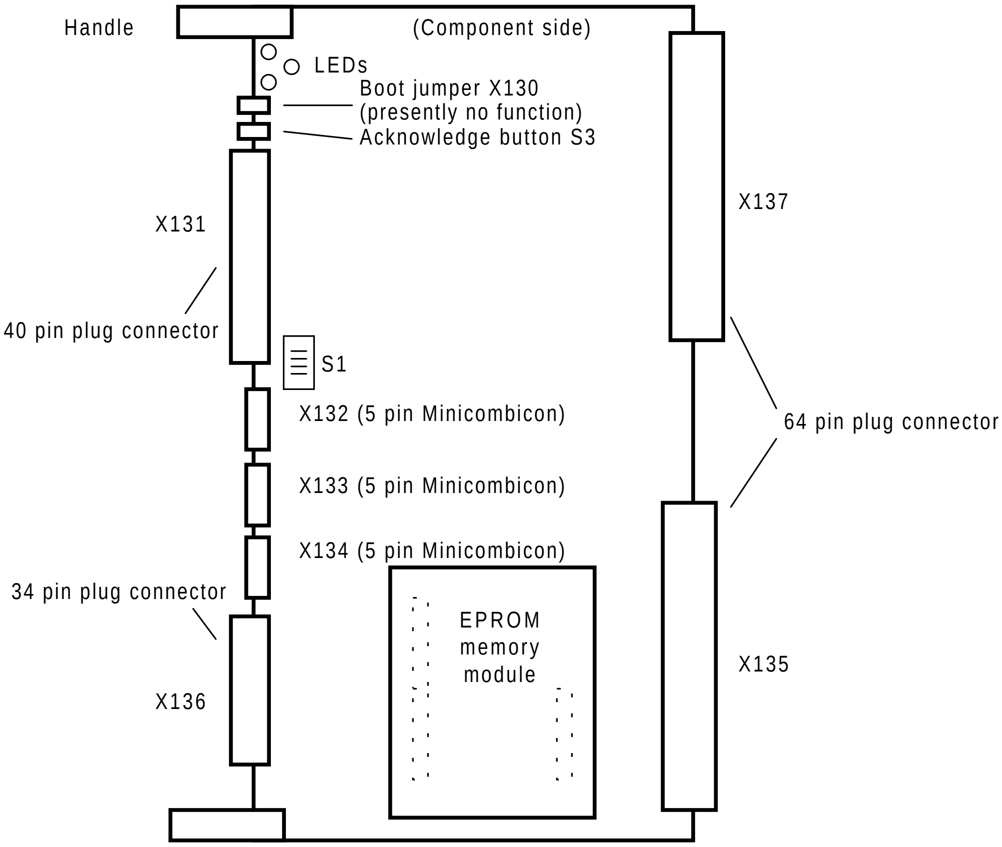
Establish the factory setting (H998).
Create a comparison file.
Download this comparison file

2 T300 technology board

The T300 technology board is a configurable microprocessor board to implement drive-related technological open- and closed-loop control tasks. It has memory for programs and parameters as well as interfaces to the process.

2.1 Hardware

The board is a microprocessor board with an 80C186 CPU, which is clocked with 20MHz. 128kbyte RAM for the user program, 1kword dual port RAM for CU communications and various interfaces are also available. A special real time operating system, in conjunction with the CPU performance, permits extremely fast closed-loop controls to be implemented with short response times, but with simultaneous stable and reliable operation.



X131 : Analog inputs, outputs, speed inputs
X132 : RS232 (SIMADYN D service-, start-up program)
X134 : 4-wire RS485 (peer-to-peer)
X136 : Binary inputs/outputs
X135 : Dual port RAM interface to the COM board (e.g. CB1/CBP)
X137 : Dual port RAM interface to the basic drive converter (CU)

The drive converter must be equipped with a local bus adapter (LBA) so that the board can be used. This local bus adapter (LBA) is inserted in the electronics box, and provides the mechanical guides for the supplementary boards and also the electrical connection to the drive converter through a bus PC board. The board is powered through this connection and also communications are established to the drive converter. Further, the pulses of the encoder, connected at CUx, are available there, and can be evaluated on the T300.

The connection to the periphery must be established using the SE300 terminal block, which is connected via two coded, 2 m shielded round cables SC58 and SC60.

LEDs are provided on the terminal block, which indicate the statuses of the binary I/O. Binary signals, analog signals and pulse encoder are connected through screw terminals. Additional terminals are not required (e. g. terminals on a top-hat mounting rail in the cabinet).

The T300 has two serial communication interfaces SS1 and SS2. SS1 is configured for diagnostics and commissioning; SS2 is used for the peer-to-peer coupling. The cables are connected directly at the T300 at the plug-in terminals.

Three LEDs are provided on the T300 for diagnostics. When they flash this indicates that the unit is operating correctly, and are assigned to the T300 itself (red LED), communications to the CU (yellow LED) and communications to the CB (green LED). A system error message can be reset using the acknowledge button.

Several watchdogs are provided to monitor the correct functioning. The hardware (ready signal delay when hardware is accessed, double address coding errors, access to non-existent addresses) and the software (cyclic operation, interrupt control of the interfaces, timer and inputs) are monitored.

If faults/errors are identified, then an NMI (Non Maskable Interrupt) is generated. The processor attempts to remove the fault/error cause, and to return to cyclic operation. If this is not successful, the board is deactivated. This means that the processor is stopped, and the drive is powered-down with a fault signal/message.

2.2 Parameterization

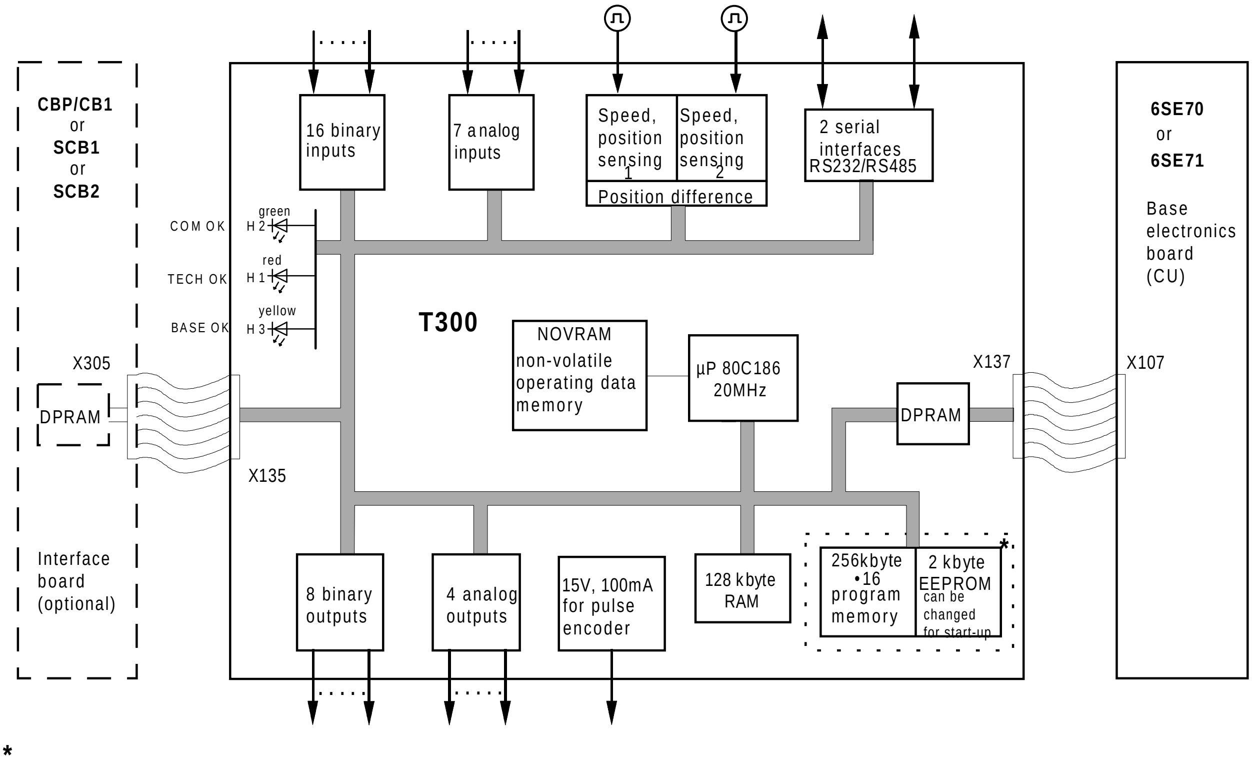
If the board is inserted in the electronics box (CUVC, CUMC) and also logged-on (CU2, CU3: basic drive converter parameter P090=2), the technology board and the standard software package are parameterized using the same resources, which are also available for the basic MASTER DRIVES drive converter.

These are:

- the drive converter operator control panel PMU (restricted for MS380, refer to the configuring information)
- the OP1 or OP1S operator control panel
- the drive converter service program SIMOVIS on PC/PG

2.3 Interfaces and input/output terminals

The following block diagram shows the internal T300 functions as well as the various connections:

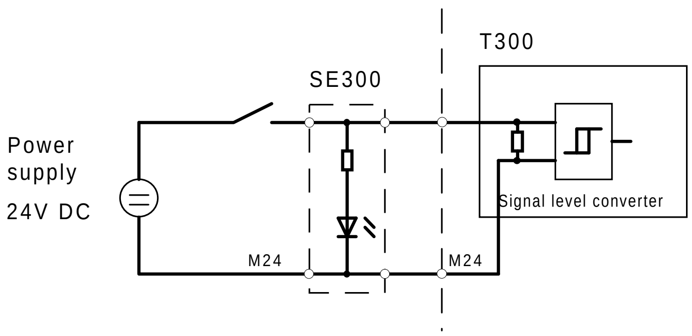


* Plug-in memory module

The connector assignments and the technical data of the inputs and outputs are listed in the following Sections. Only the data which are specified in the actual T300 Instruction Manual are binding.

2.3.1 Binary input terminals

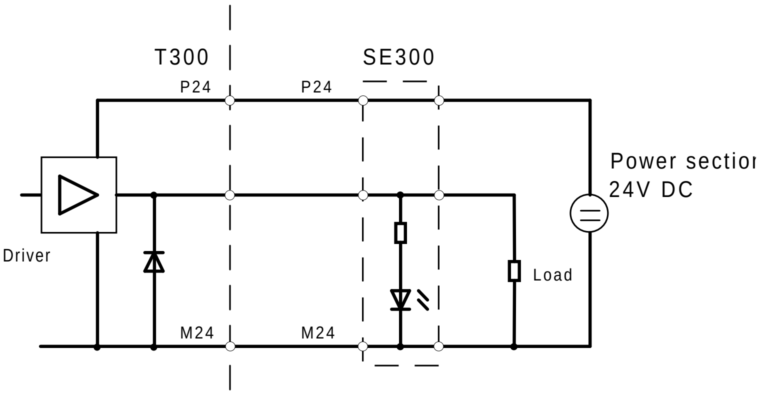
Binary signals have a 24V DC signal level referred to M24 (terminals 610, 630 or 640 on SE300).



An open-circuit input is a logical zero. The inputs can identify a low signal level, also below +6V. High signal levels are voltages between 13V and 33V. The input current at 24V is typically approx. 8mA, the delay time, approx. 1ms.

2.3.2 Binary output terminals

The binary outputs are also 24V DC signals with reference to M24 (terminals 610, 630 or 640 on SE300). They are supplied from the P24 terminals (609, 619 or 639).

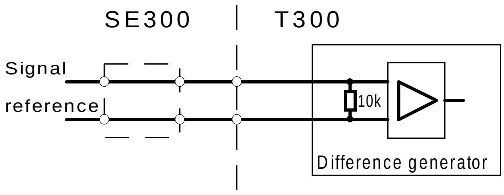


Each of the 8 outputs (terminals 631 to 638) can drive between 0.2mA and 100mA, which is sufficient to control small signaling lamps or coupling relays. A free-wheeling diode is provided on the T300, whereby it is recommended that a free-wheeling diode is directly connected to inductive loads. Further, the outputs have electronic short-circuit protection to ground and P24. The total loading of all of the outputs may not exceed 400mA; the operating voltage range is between +20V and +30V. The switching delay is approx. 300µs.

Note:
The binary inputs and outputs are connected with the internal electronics ground. There is no electrical isolation! When the permissible signal level is exceeded, the input and output stages can be damaged, as well as the complete board itself!

2.3.3 Analog input terminals

The analog input stages are differential inputs to suppress common-mode noise. Thus, the reference potential is not connected to the internal ground, <u>and must be individually connected</u>. It should be ensured, that the voltages at the terminals for the signal and reference potential are not greater than +/-20V!



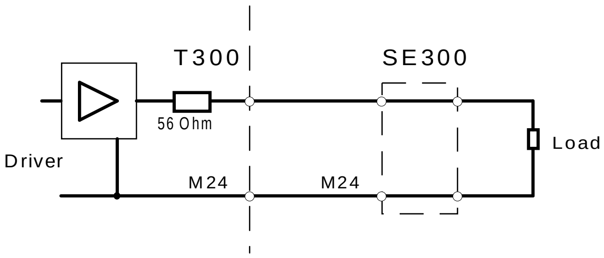
The inputs have a filter with a 1.5 kHz corner (transition) frequency, and a typical input resistance of 10kΩ. The resolution is 12 bits (corresponding to 4.9mV) over the complete input voltage range of +/-10V for a linearity of ≤1LSB. The absolute accuracy is +/-3LSB (3 least significant bits).

7 analog inputs are available.

Note:
It is recommended that an RC hardware filter is connected at the analog input terminals if there is noise on the cables (also refer to the T300 Instruction Manual). In this case, the noise isn't even digitized.
For problems involving the analog inputs, it should be checked as to whether each analog input is connected to the reference terminal.

2.3.4 Analog output terminals

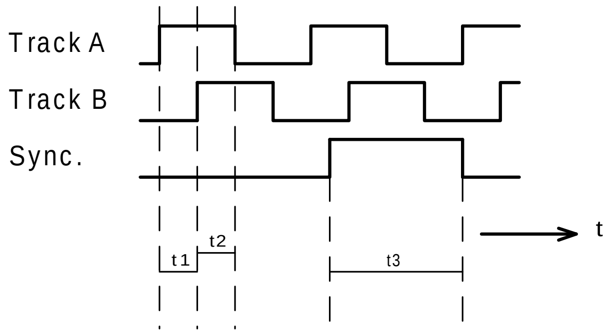
The analog outputs are drivers with a maximum current of +/-10mA and an internal resistance of 56Ω. They can drive display instruments or couplers. They have a 12-bit resolution (corresponding to 4.9mV) over the complete +/-10V range, with a linearity of ≤1LSB and are short-circuit proof to ground. They have common reference potentials, which are connected with the electronics ground.



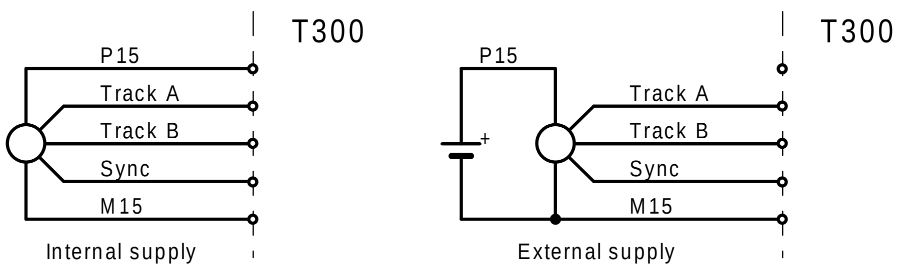
The analog outputs have an undefined status when the system runs-up after the power is connected. The output voltages are retained at reset or when the board develops a fault.

2.3.5 Pulse encoder terminals

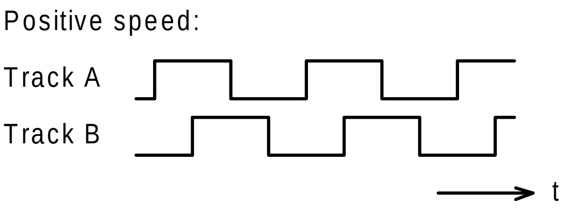
The technology board includes evaluation electronic for two pulse encoders. Terminals are available for each encoder for track A and track B as well as a zero track (synchronizing pulse). These are unipolar inputs, which are <u>not</u> suitable for push-pull operation.
The offset between track A and track B must be 90°; a +/-20° deviation is tolerated. The maximum input frequency is 400kHz. In this case, the pulses or intervals (t1 to t3) must be at least 1µs:



The nominal signal level of the pulse encoder signals is 15V. 0V to 30V is permissible, whereby low signals are below 5V; signals over 8V are high high signals. When connected via SE300, the input current per track is a maximum of 4mA. Pulse encoder types with supply voltages of between 15V and 24V can be used. A 15V power supply voltage is available at terminals 540 (P15) and 539 (ground) of the SE300. The maximum current is 100mA, which is generally only sufficient for one pulse encoder. When an external power supply unit is used, it must be connected to the electronics ground.



The speed actual value is positive if the rising edge of track B is realized when track A has a high signal, and negative, for a low signal level.



2.3.6 Interface to the basic drive converter (CU)

Communications to/from the drive converter is realized via a dual port RAM accommodated on the T300. It permits the T300 and CU to simultaneously access data to be replaced.

16 words are transferred from the T300 to the CU, and the same number of words in the opposite direction. Physically, the connection is established via the rear plug connectors (-X137) when the T300 is inserted.

2.3.7 Peer-to-peer interface (SS2)

The serial interface (-X134) is hardware according to the RS 485 standard up to 115 kbit/s. For the peer-to-peer coupling, the four-wire mode is used.

Please refere also to note 3, Section 1.13.3

The bus terminating resistors can be activated using DIP switch S1, which must be activated at the last receiving node. They are active, if switches S1.3 and S1.4 are set to *ON*.

The following rules should be observed when configuring a bus system:

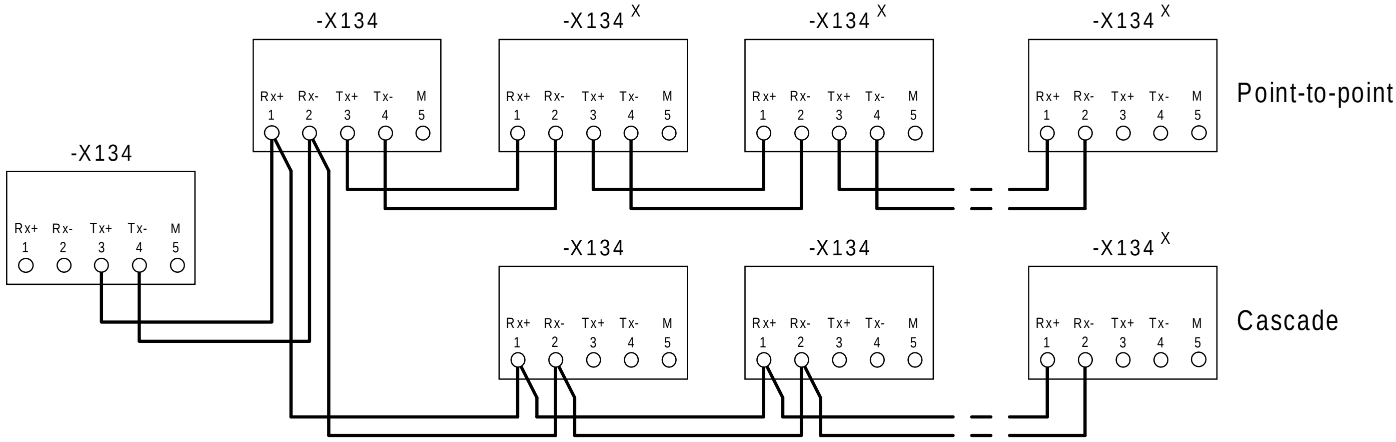
Rule 1: Shielded cables (1 pair) should be used for the connections between T300's without any intermediate terminals. The shield should be connected at both ends to the SIMOVERT, at either the housing or cabinet potential through the lowest possible impedance (using a shield clamp).

Rule 2: Only one conductor may be connected at the send terminals (+Tx/-Tx).

Rule 3: At the receiver terminals (+Rx/-Rx), either one conductor can be connected (in this case, the terminating resistors must be switched-in), or two conductors (in this case, it is not permissible that the terminating resistors are activated). In the first case, it involves a point-to-point connection; in the later case, a cascade (point-to-multi-point).

Rule 4: A cascade may include a maximum of 31 receivers.

The following diagram illustrates the connection assignment and the possible arrangements. Bus termination is required at the connectors designated with x.



2.3.8 Serial interface for service (SS1)

The serial interface is either RS 232 (-X132) or hardware, according to the RS 485 standard (two-wire) up to 38400 baud (-X133). However, it is not possible that both connectors are simultaneously used. Bus terminating resistors at -X133 can be activated using DIP switch S1, if switches S1.1 and S1.2 are set to *ON*. For long cable lengths, they must available at the last receiver nodes.

Cable assignment, PC - X132

```
PC (9pin SUB-D)                T300 (Minicombicon 5)
        RxD  2 ----------- 2  TxD
        TxD  3 ----------- 1  RxD
          M  5 ----------- 3  M
```

Cable assignment for PG7x0

```
PG (25pin SUB-D)               T300 (Minicombicon 5)
        RxD  3 ----------- 2  TxD
        TxD  2 ----------- 1  RxD
          M  7 ----------- 3  M
```

2.3.9 Interface to the CB communications board

Communications to/from the communications board is realized via a dual port RAM on the communications board. It allows the T300 and communications board to simultaneously access the data to be transferred.

Presently the following can be used as communications board

- **CBP/CB1** for PROFIBUS DP (SINEC L2 DP),
- **SCB1** terminal expansion via SCI1 and SCI2
- **SCB2** for the USS protocol via RS485,

A maximum of 10 words are transferred from the T300 to the communications board, and the same number in the opposite direction. Physically, the connection is established via the rear plug connector (-X135) when the communications board is inserted.

Please refere also to note 3, Section 1.13.3

2.3.10 Replacing peer to peer using SIMOLINK

In a multi-motor drive group with Compact Plus units, it is not possible to use peer to peer communications. However, it is possible to replace the peer to peer functionality using SIMOLINK on the CUVC and CUMC modules.

Using the transfer of the maximum speed and the position limit value X via SIMOLINK as well as the operating setpoint and output of the technology controller, we will briefly see how the basic drive and T300 should be parameterized. The SIMOLINK interface is inserted in slot A (upper slot). The example is the same for CUVC and CUMC. It is assumed that the SIMOLINK was already commissioned in accordance with the basic drive Instruction Manual (Compendium).

Setpoints from SIMOLINK to the T300 via the basic drive:

- Receive SIMOLINK at the basic drive:
  The maximum speed is available at connector K7001
  The positive limit value X is available at connector K7002.
- Transfer to T300, refer to function diagram Sheet A1:
  P734.6=7001: The maximum speed is available at receive word 6 from the CU.
  P734.7=7002: The positive limit value X is available at receive word 7 from the CU.
- Connect the setpoints to the T300, refer to the function diagram, Sheets C5 and C4:
  H550 = 15, select max. speed
  H500 = 16, select pos. limit value X.

(Actual) values from the T300 to SIMOLINK via the basic drive:

- Select the values on the T300, refer to the function diagram, Sheet A6, Sheet E1 as well as Sheet A1:
  The position actual value (double word) [A6] is available at words 6 **and** 7 to CU [A1]: H956 = 62.;
  H957 = 63
  The motorized potentiometer output [E1] is available at word 3 to the CU [A1]: H953 = 249.
- Receive the values at the basic drive:
  The position actual value is available as double word at KK3036.
  The motorized potentiometer output is available at K3003.
- Connect to SIMOLINK:

P751.01=3036
P751.02=3036
P751.03=3003.

CAUTION:	A T300 board with Hardware release ≥ B, or newer, is needed for use with an SLB SIMOLINK interface board. The correct hardware release code can be detected on the component side of the T300 in the neighbourhood of the lower backplane connector.

3 Function description

The function description consists of a text part as well as the graphic documentation in the form of function diagrams. The function diagrams allow configuring and commissioning (start-up) without using the text description. The later is conceived as detailed information to the diagrams.

The function diagrams are structured as follows:

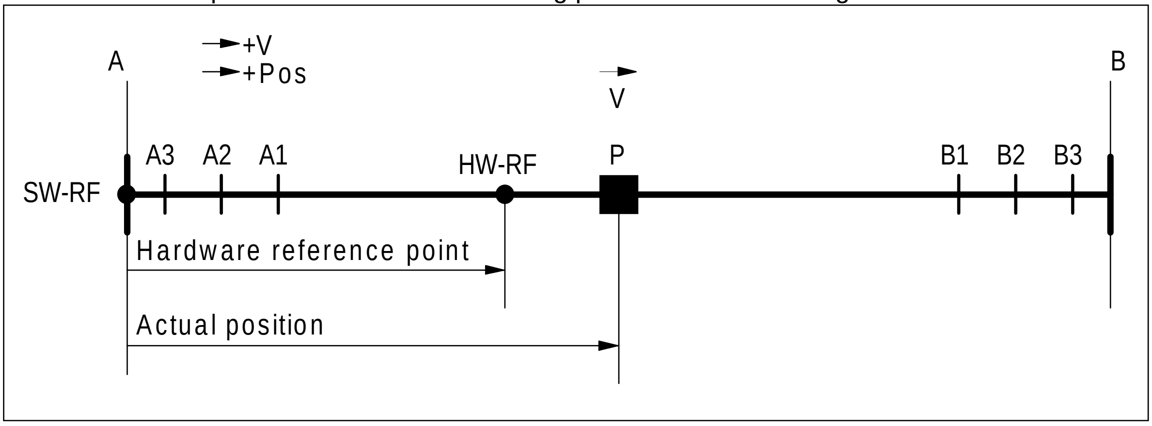
Function diagrams	Contents
A	Signal input/output, signal conditioning
B	Drive control
C	Handling traversing data sets, generating the position reference value
D	Closed-loop position control
E	Special functions

Note:
Knowledge regarding the connector principle is required in order to be able to understand the function diagrams. This technique allows unified documentation to be generated with the highest level of flexibility. It is described at the beginning of Section 5.

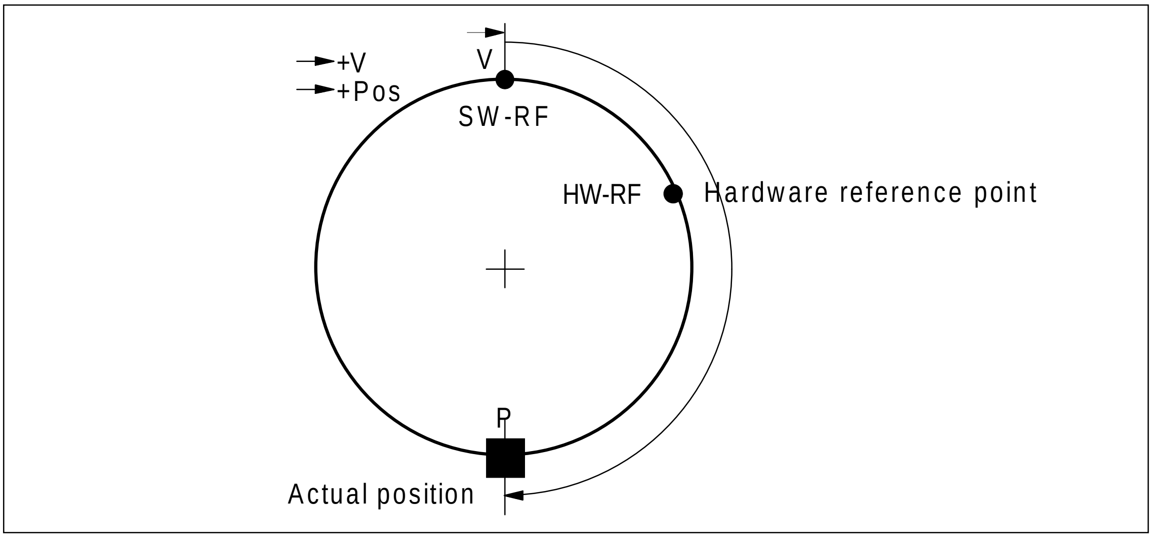
3.1 Definitions

The terminology, which is used in the function description, is now described.

Definition, linear axis:
A linear axis is characterized by the fact that the traversing path is limited in both directions. Positioning is realized between points A and B. The traversing path is monitored using limit switches.



Definition, rotary axis
A rotary axis is characterized by the fact that there are no traversing path limits. The machine to be positioned is at the initial point again after one revolution. The positioning task is always in the 0° to 360° range. There are no hardware limit switches and emergency limit switch.



A: Mechanical initial position of the linear axis
B: Mechanical end position of the linear axis

A3: Emergency limit switch A3
B3: Emergency limit switch B3

A2: Hardware limit switch A2
B2: Hardware limit switch B2

A1: Software limit switch A1
B1: Software limit switch B1

P: Actual position
HW-RF: Hardware reference point
SW-REF: Software reference point
V: Traversing velocity

Note:
A rotary axis with restricted traversing angle is treated just the same as a linear axis.

3.1.1 Mechanical initial position A and final position B

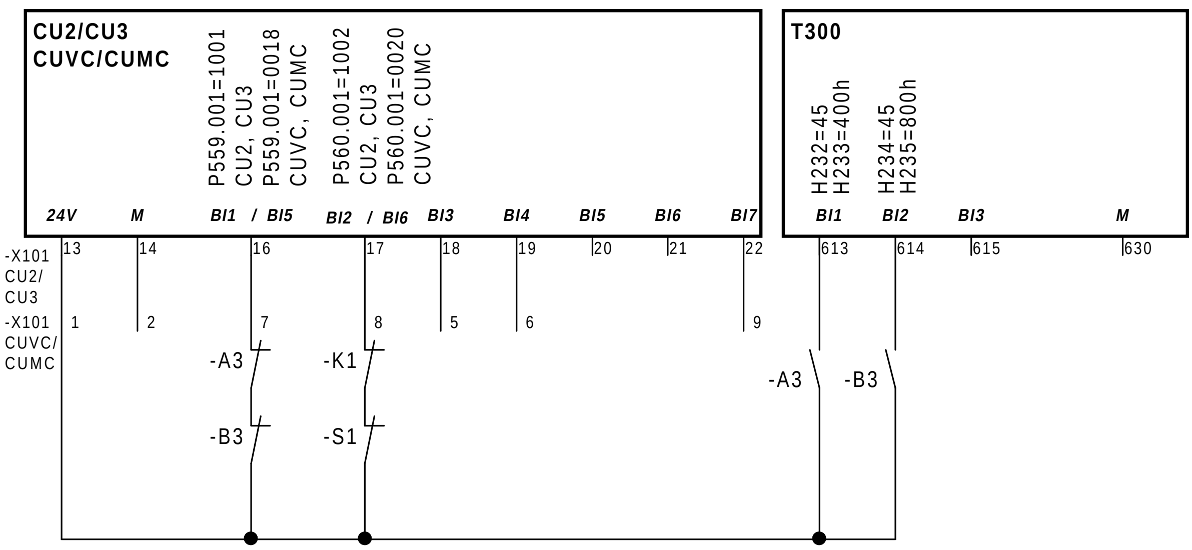
Initial position A is the mechanical endstop for the traversing direction between B and A, and the final position B is the mechanical endstop for the traversing direction from A to B.

3.1.2 Emergency limit switches A3 and B3

Emergency limit switches A3 and B3 are used to bring the drive to a standstill, before the mechanical endstop, when the closed-loop control fails (measuring error, incorrect parameterization). The emergency limit switches should be implemented as range signal up to the mechanical endstop.
In order that the emergency limit switches act as quickly as possible, they must be directly connected to the basic drive converter, where they initiate the fast stop (OFF3) function. Thus, the minimum response time, and therefore the shortest deceleration distance is guaranteed. The signal must be available for at least 4xT0 (CUVC, CUMC: T0 = 1/P340, for the factory setting, the following is valid for T0: CUVC = 400 µs or CUMC = 200 µs; CU2, CU3: T0 = P308, for the factory setting the following is valid for T0:
CU2 = 1,2 ms, for CU3 = 800 µs) so that it is recognized.

If the limit switches are connected in parallel to the technology board, then, in addition, fault /messages F126 and F127 are generated. In this case, the signal must be available for longer than 10ms. When switches A3, B3 respond, then power-on inhibit is realized, and must be acknowledged. As the signals directly effect the basic drive converter, the fast stop (OFF3) is available until the drive is no longer located in the emergency limit switch range. If the drive is to be moved, the limit switch signals for the basic drive converter must be bypassed (key-actuated switch). However, the safety function is no longer effective, so that only trained personal may move the drive. Alternatively, the basic drive converter can be parameterized, so that the hardware limit switch can be ignored with a control signal. This is possible by changing-over from the basic- to the reserve setting (or chnageover the BICO data set) with the appropriate parameterization.
The limit switch position must be selected so that, for the maximum braking torque, the braking travel is less than the distance to the mechanical endstop.

The emergency limit switches should be connected as follows:



-A3 : Emergency limit switch A3
-B3 : Emergency limit switch B3
-K1 : Emergency stop
-S1 : Fast stop switch for commissioning

Warning
Fast stop is not possible when the T300 fails - the motor just coasts down. A mechanical brake must be provided if this results in a hazardous situation/condition.

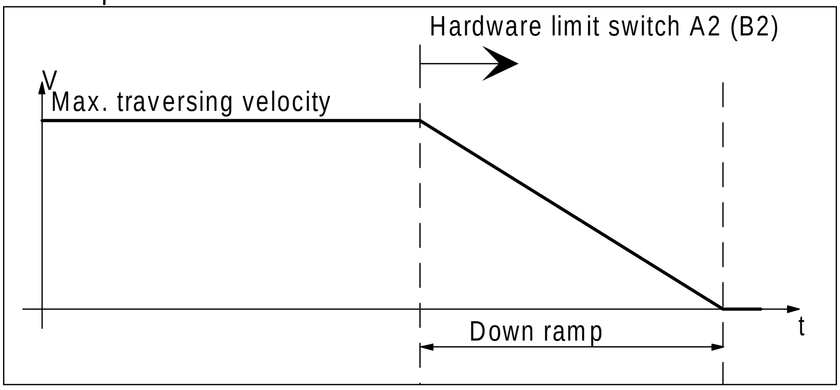
3.1.3 Hardware limit switches A2 and B2

Hardware limit switches A2 and B2 should be implemented so that they provide a signal over the complete range from the limit switch up to the mechanical endstop. In this case, both NC as well as NO contacts can be connected (refer to H102).
Depending on the particular mode, the hardware limit switches fulfill different functions:

a) **Referencing mode**
When referencing, the hardware limit switches are used to reverse the traversing direction. If the reference point is not found in a traversing direction, when the hardware limit switch is reached, the traversing direction is reversed. If a reference point is also not found in this direction, the drive shuts down with a fault signal.

b) **Position control mode**
If the drive actuates the hardware limit switch in the closed-loop position controlled mode, a standard stop is generated. In this case, the ramp-function generator is changed-over to the down ramp A2 (H640...H646) and B2 (H650...H656) from the traversing data set. The ramp times specified there must be dimensioned so that the drive comes to a standstill before the emergency limit switch or mechanical endstop. The drive is then again in the *ready to power-up* status, i. e. acknowledgement is not required.

The ramp time is calculated as follows:



$$Down\_ramp = \frac{2 \cdot distance[limit\_switch \Leftrightarrow endstop]}{max\_traversing\_velocity} \cdot 0.8$$ (0.8= safety factor)

The drive can only be operated in the closed-loop speed controlled mode when the hardware limit switch has been actuated. Thus, it is possible to re-reference, or to move out of the limit switch range with *inching, closed-loop speed controlled*.

Note:
The limit switch signal must be available for at least 10ms so that it is identified.

Special case: Positioning beyond the hardware limit switch:
Sometimes, due to the mechanical design, the drive must be positioned after referencing, in the range beyond the hardware limit switches. For this special case (possibly when the equipment is being serviced), using H236=0, a stop can be prevented after the hardware limit switch has been actuated. In order that the safety strategy remains intact, the maximum traversing velocity in the hardware limit switch range must be limited up to the mechanical endstop. This is possible via H560/H561/H562, whereby the maximum velocity must be selected, so that the drive comes to a standstill when the emergency limit switch is reached, but still in front of the mechanical endstop.

3.1.4 Software limit switches A1 and B1

Software limit switches A1 and A2 prevent position reference values being input, which lie outside the permissible traversing range; this means that the positioning range must always lie between software limit switches A1 and B1. The software limit switches are only passed-over (actuated) when referencing. If a reference value is entered, which lies outside the permissible traversing range, the reference value is not accepted. In this case, the drive remains at the last specified position.

3.1.5 Position values

The position values always increase from A to B, i. e., the position actual value increases for a traversing direction from A to B, and decreases from B to A.

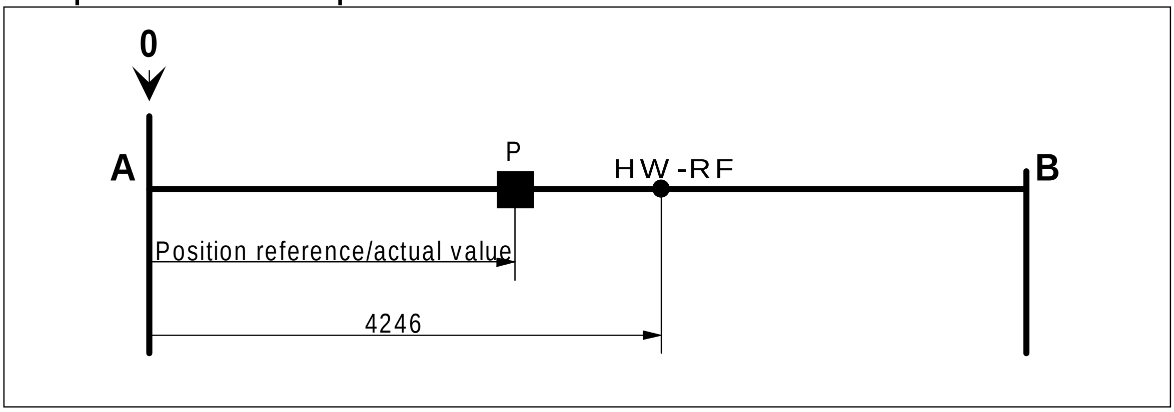
3.1.6 Velocity values

A positive traversing direction always means that the drive moves from A to B; a negative traversing direction means that the drive moves from B to A.

3.1.7 Hardware reference point

The hardware reference point is a contact, located in the traversing range, i. e. between limit switches A2 and B2. When this point is passed, the position actual value is set to the value specified in H531. The value is the distance between the hardware reference point and the software reference point. If the reference point was sensed at least once, then the drive absolute position is known. The reference point search is executed for the *referencing with shutdown and flying referencing* functions.

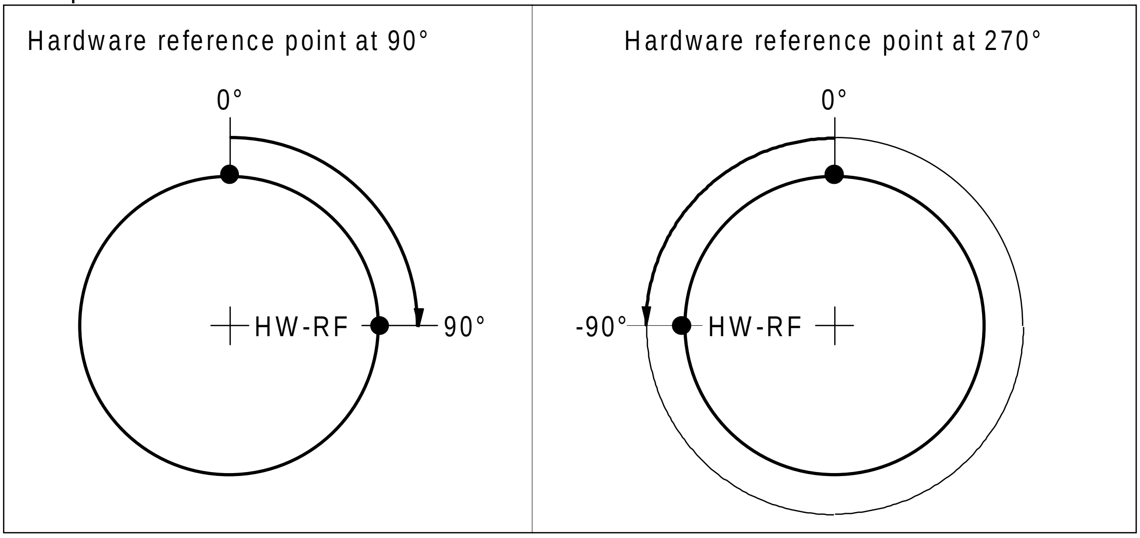
Example for the reference point for a linear axis



Hardware reference point for a rotary axis

For a rotary axis, the hardware reference point is specified positive in the range 0° to 180° , in the range 180° to 360° negative, i. e. -0° to -180°.

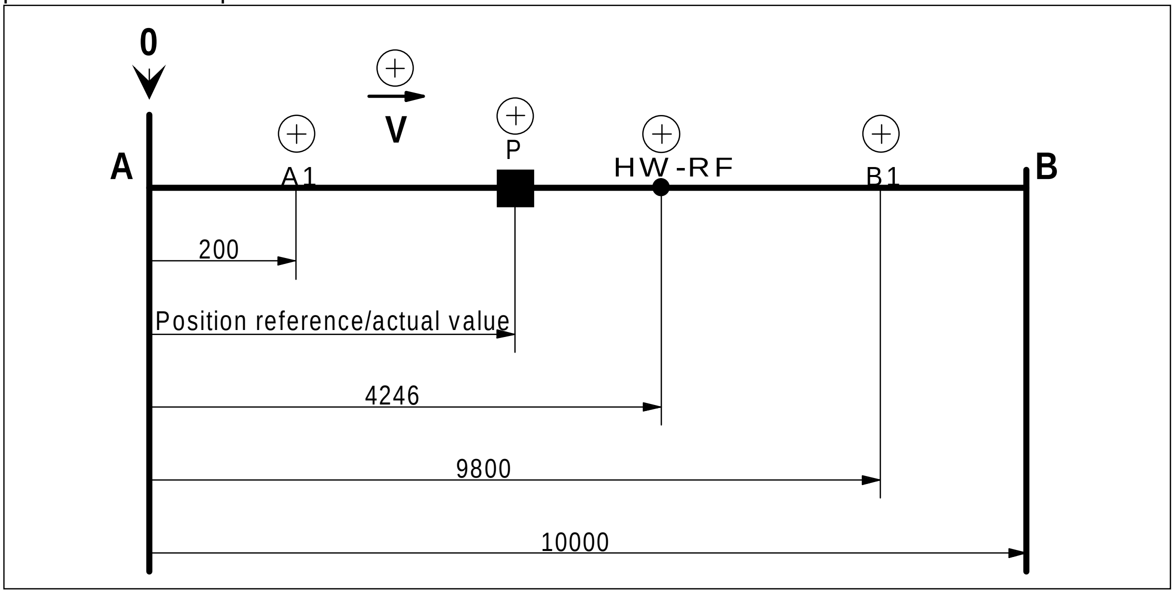
Example:


Hardware reference point at 90°
0°
HW-RF
90°
Hardware reference point at 270°
0°
-90°
HW-RF

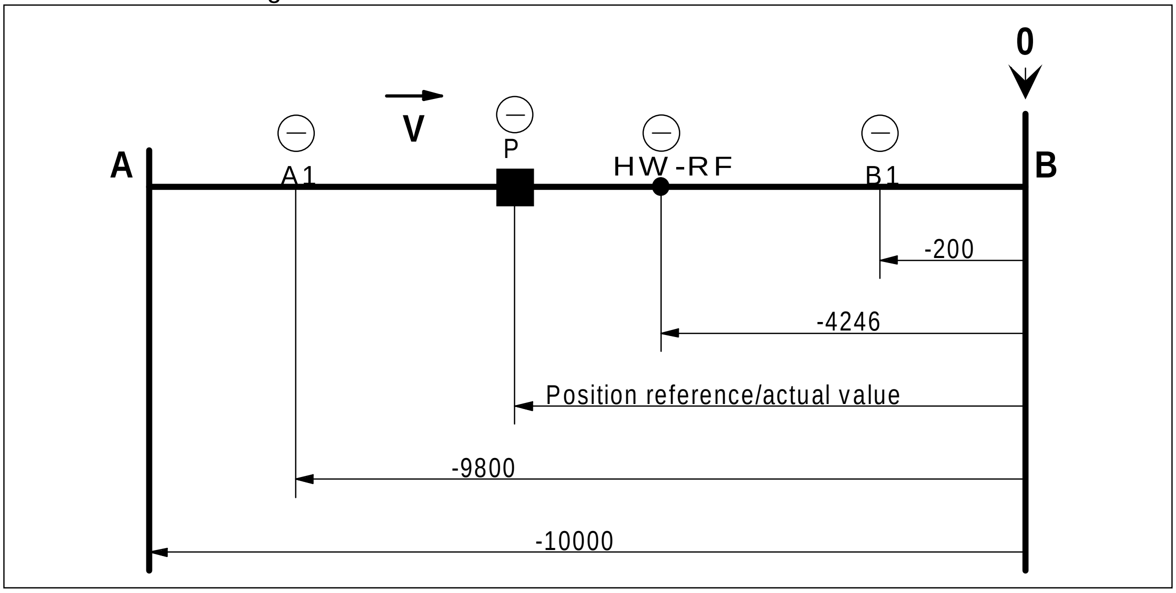
3.1.8 Polarity

The following drawings provide an overview of the polarities which must be entered. In this case, it has been assumed, that the software reference point is zero.

Case A
In case A, the drive moves, with a positive motor speed, in the direction A→B. The software reference point should be at point A.



Case B
In case B, the drive moves, with a positive motor speed, in the direction A→B. The software reference point should be at **point B**. However, this means, that the position actual value decreases when moving in the direction B→A, i. e. is negative. Thus, the position reference- and actual values, as well as the limits, must be entered as negative values.



Possibilities of not entering a negative position reference:

CUVC, CU2:	Interchanging 2 motor phases and tracks A and B of the pulse encoder.
CUMC:	Activate clockwise/counter clockwise in the control word.
CU3:	This is practically not possible.

3.1.9 Software reference point

The software reference point defines the mechanical drive position when a position reference value of zero is entered. It is practical to define the traversing distance, so that mechanical endstop A corresponds to position zero.

3.1.10 Position reference values/actual values, normalized/scaled

There are two ways of representing the position reference- and actual values. The normalized notation is for the closed-loop control; the scaled notation for setpoint input via parameter or communications interface. The various notations are described in the following.

a) **Normalized position values**
The position controller operates exclusively with normalized values. Normalized values means that the system does not calculate using absolute quantities (e. g. mm), but only with relative quantities (%) referred to the maximum value. This has the advantage, that for the closed-loop control, it is irrelevant as to whether positioning is in the µm- or km range. The maximum distance is defined via the pulse encoder sensing parameterization.

b) **Scaled position values**
The scaled position values consist of a 16- or 32-bit fixed-point number. In this case, it is previously agreed as to how this fixed-point number is to be interpretted. This is defined using parameter H350. The integer number which corresponds to the maximum length is defined here.
For practical reasons, positioning is normalized to ´even´ values. For example, if the maximum mechanical traversing distance is 19.2m, then the pulse encoder sensing should be normalized to 20m.
For a positioning scaling, it is now important as to how accurate the position reference value should be input. If the input must be accurate to 0.1mm, then 200000 (20000.0 mm) must be specified as scaling. The reference value is entered as fixed-point number, without the decimal point.
If, for example, position reference value 9.2m (=9200.0mm) is to be entered, then the fixed-point number 92000 must be entered. All positioning reference- and limit values are entered as scaled quantities and all position actual values are displayed, scaled in the visualization parameters.

The following quantities are entered, scaled

Position reference values	H361-H459
Setting values, pulse encoder evaluation	H169 (H170)
Software limit switches A1, B1	H530 to H536, H540 to H546
Inching reference values, position-controlled	H466, H467
Hardware reference point position	H351
Enable window reference point	H172
Position limit values, X, Y, Z	H500 to H506, H510 to H516, H520 to H526 H820 to H829
Minimum approach path when referencing	H312
Drive play	H590 to H596

For position actual values, in the function diagrams it is specified as to whether the quantity is normalized or scaled.

3.2 Sampling times

The standard software package uses 5 different *sampling times*, which are designated by T1 to T5. Only this code is used in the text. The assignment is as follows:

Time level	Sampling time
T1	5.0 [ms]
T2	10.0 [ms]
T3	40.0 [ms]
T4	160.0 [ms]
T5	640.0 [ms]

The sampling time defines in which time interval the particular function is "sampled" i. e. calculated. The inputs and outputs of the function are updated at the start and end of the sampling interval (because the sampling times are cyclically repeated, this is one and the same). However this can be put simply if you consider that the complete sequence comprising of input, calculation and output are realized simultaneously at an instant in time, and between these intervals, nothing happens. Thus, the term sampling.

3.3 Inputs/outputs (diagrams A)

3.3.1 Hardware-, software codes (diagram A1)

In order to be able to identify the standard software packages, even with the equipment powered-up, there are codes, which can be interrogated using display parameters.

a) Hardware code (d000)
   indicates which technology board is inserted, T300=133

b) Software code (d001)
   indicates the board standard software package, e. g. MS380=80.0

c) Version code (d002)
   indicates the software release of the standard software package.

d) Drive code (d099)
   indicates the drive for which the module was parameterized. The drive code must be entered into parameter H997 at start-up. Thus, parameterized EPROM MS380 memory modules can be assigned to a drive.

3.3.2 System error T300

The technology board operating system generates a system error word. The error word is displayed in d003 and includes the following messages:

Bit	Description	Enable in H100 with
0	Fatal system error	0001
3	Task administrator error	0008
4	Monitor error	0010
5	Hardware monitoring responded	0020
6	Communications error	0040

For hardware faults, all of the T300 plug-in cables should be withdrawn. If the fault re-occurs after the unit has been powered-down and up again, T300 should be replaced; this is also true if fatal system errors occur.

A communications error occurs if a communications board is not inserted. In this case, it can be ignored.

When other system errors occur, the documentation of the digital SIMADYN D control system should be referred to, as it involves a tested standard software package and these errors are of no significance to the user.

3.3.3 Communications with the CU (basic drive converter) (diagrams A1, A2)

A maximum of 16 words can be received from the basic drive converter. The first 5 words are reserved for the closed-loop control. All of the other words can be freely defined so that actual values can be evaluated by the drive converter. The source of the actual values is defined by parameter P694 (CU2, CU3) and P734 (CUVC, CUMC) in the basic drive converter. The index corresponds to the position in the telegram.

8 words are transferred from the technology board to the basic drive converter. Of these 8 words, 6 are reserved for positioning and 2 can be freely-assigned by the user. The send words are available in the basic unit as source CB/TB values 3001 to 3008.

Note:
If communications between the CU and the T300 are o.k., the yellow LED on the T300 flashes. If the communications is faulted, fault messages F080/F081/F082 in the drive converter are activated. The data interface is processed (dual port RAM) after the technology module and the CU have run-up, and for CU2, CU3, the technology board is parameterized in P090.

The assignment of the *control*- and *status words* are listed on Page A2 of the function diagrams. In order that individual bits of control words 1 and 2 (e. g. select motor data set) can still be entered from the automation, there is a bypass function for control words 1 and 2. The control bits, generated by the technology module, are OR'd with the bypass control words.

3.3.4 Communications with CB (diagram A3)

A maximum of 10 words can be received via a communications board (CB). The technology module has access to these via connectors. For start-up and service, the communications board control word (word 1) can be simulated using parameter H104. The control word from CB is inhibited for as long as a simulated control word is entered.
The communications status is simulated in *status word INPUT* and can be determined via d031 and K079. In addition, communications can also be checked via the diagnostics LEDs of the communications board.

3.3.5 Communications via peer-to-peer (diagram A3)

Peer-to-peer communications permits fast data transfer between two technology modules. In this case, 5 send- and receive words can be freely configured. The baud rate can be parameterized from 300 baud to 115200.
The communications status is specified in the *status word INPUT*, and can be determined via d031 and K079.

3.3.6 Binary inputs (diagram A4)

The statuses of the binary inputs are read-in as word quantity. The individual binary signals from the terminals can be *inverted* using H102 before these are deposited in K045. The status of the input signals can be displayed using d009. Binary inputs 9 to 16 are additionally directly connected with the *byte-serial data input* function. The bit inversion function is not effective for these. The connection and internal structure of the binary inputs is described in Section 2.3.1. The binary inputs are processed in T2.

3.3.7 Binary outputs (diagram A4)

The 8 binary outputs are parameterized via parameters H900 to H916. Every internally generated control- and status bit can be output at a binary output. Further, every binary output can be logically inverted. The connection and internal structure of the binary outputs is described in Section 2.3.2. The binary outputs are processed in T3. While the processor is being *reset*, the outputs are low.

Note:
The binary inputs and outputs are connected with the internal electronics ground. There is no electrical isolation! If the permissible signal level is exceeded, the input or output stages can be destroyed as well as the complete board itself!

3.3.8 Analog inputs (diagram A5)

7 analog inputs are available in various sampling times. The classification is as follows:

Input	1	2	3	4	5	6	7
Sampling time	T2	T2	T3	T3	T4	T4	T5

Each analog input can be adapted with a smoothing as far as the range and offset are occurred. The connection and internal structure of the analog inputs is described in Section 2.3.3.

3.3.9 Analog outputs (diagram A5)

Each control signal, defined as connector, can be output via one of the 4 analog outputs. In this case, it is defined, via parameter, as to whether the relevant signal is to be output *with sign* or as *absolute value*, and with which *smoothing, offset* and *gain*. The analog outputs are updated in the following sampling times:

Analog output	1	2	3	4
Sampling time	T2	T2	T3	T3

Generally, for inputs and outputs the following assignment is true: ±100% corresponds to ±5V and ±200% corresponds to ±10V. The connection and the internal structure of the analog outputs is described in Section 2.3.4.

3.3.10 Pulse encoder inputs (diagrams A6, A7)

2 pulse encoders can be evaluated by the technology board. Each pulse encoder input supplies a speed- and position actual value. The position measurement can be set and reset using a control bit. A control input can instantaneously evaluate a reference point (zero pulse). The parameterization is separately realized for both pulse encoder inputs. In this case the following information is required: The number of pulses per revolution, rated speed, at which the measured speed actual value should be 100% as well as the rated length at which the measured position actual value should be 100%. Further, there are 2 control words which are used to define the pulse encoder input mode.

3.3.10.1 Normalization, pulse encoder inputs

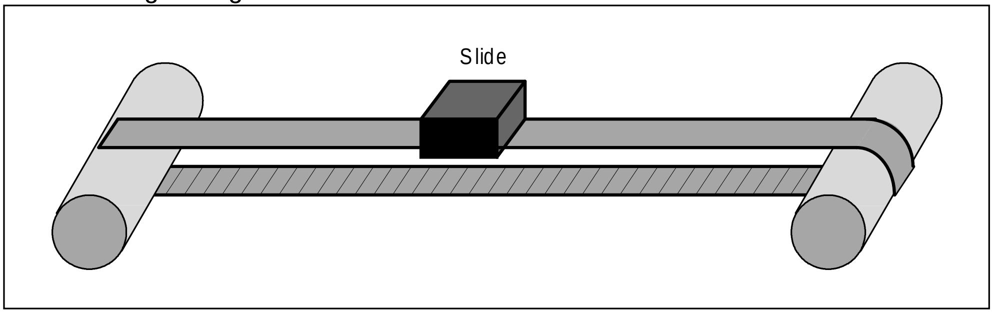
Note
After the pulse encoder inputs have been parameterized, the unit must be powered-down and up again so that the values are transferred (INIT values)

The *number of encoder pulses* per revolution (without quadrupling) are specified in parameter H151 (H156).

It is valid for the CUMC or CU3: Encoder: 2048 pulses / revolution. The following values are obtained for resolvers: For CUMC (SBR2 required): Depending on the parameterization, 512 or 1024 pulses / revolution. For CU3, 2048 pulses / revolution.

The *rated speed* H152 (H157) is the speed which the drive reaches at the rated traversing velocity.
For SIMOVERT SC (CU3), the value is entered as negative value.
The pulse encoder normalization H153 (H158) specifies how many quadrupled encoder pulses are received when traversing the nominal length. For rotary axes, the number of pulses for one revolution of the machine component to be positioned is entered.

Example: Linear axis
The following arrangement is to be normalized:



Pulse encoder: .... 1024 pulses per revolution
Gearbox: 1:10
Diameter of the drive roll: .... 300 mm
Total traversing distance: .... 20 m (= nominal length)

Note:
The pulse encoder sensing **quadruples the pulses**,
i. e. for one revolution, 4 x number of pulses per revolution are summed, and must therefore be taken into account in the calculation.

The number of pulses received is calculated according to the following formula:

$$Rated\_pulses = 4 \cdot pulses\_per\_revolution \cdot gearbox\_ratio \cdot \frac{nominal\_length}{\pi \cdot roll\_diameter}$$

Using the values in the example, the following is obtained:

$$Rated\_pulses = 4 \cdot 1024 \cdot 10 \cdot \frac{20m}{\pi \cdot 0.3m}$$
$$Rated\_pulses = 869198$$

869198 must be entered into parameter H153 (H158).

When scaling the position values, it is practical, if an ´even´ value is used when normalizing the pulse encoder. For example, if the actual traversing distance is 15.45m, then the nominal length should be specified as 16m.

The pulse encoder evaluation operates internally with a 32-bit numerical value. This then results in a maximum counting range (number range) of $\pm 2^{31}$ pulses.

Example: Rotary axis
The following arrangement is to be normalized:

Pulse encoder: .... 1024 pulses per revolution
Gearbox: 1:7

For rotary axes, the number of **quadrupled** encoder pulses is always entered, which are received for one revolution of the part to be positioned.

The number of pulses received is calculated according to the following formula:

$$Rated\_pulses = 4 \cdot pulses\_per\_revolution \cdot gearbox\_ratio \cdot$$

The following is obtained with the values in the example:

$$Rated\_pulses = 4 \cdot 1024 \cdot 7$$
$$Rated\_pulses = 28672$$

28672 must be entered into parameter H153 (H158).

3.3.10.2 Hardware mode of the pulse encoder

The hardware mode of the pulse encoder evaluation is defined using parameter H150 (H155). The control word is defined as follows:

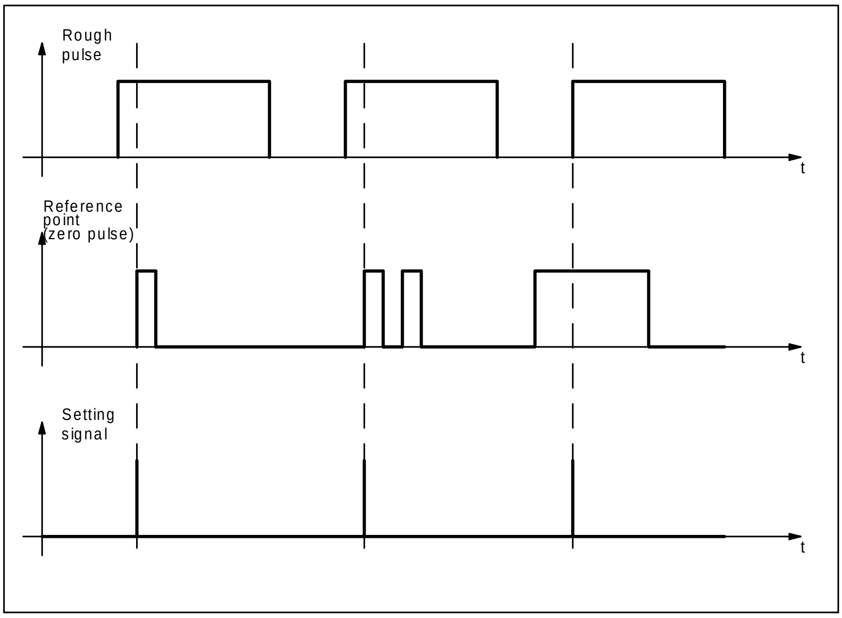
Bits 0 to 3	**Setting for the digital filter:** 0: 500kHz 1: No filter 2: 2MHz 3: 500kHz 4: 126kHz 5: 62.5kHz The digital filter allows noise signals to be suppressed. The filter is pre-set to 500kHz. If this value is changed, the pulse encoder frequency at maximum speed must first be determined. The filter setting must remain above this frequency. The maximum pulse encoder frequency is calculated as follows: $f_{\max} = \frac{H151(H156) \cdot n_{\max}}{60}$
Bits 4 to 7	**Pulse encoder type:** 0: Pulse encoder with two tracks displaced through 90° (standard) 1: Separate tracks for forward- and reverse pulses (special) 2: Zero pulse via LBA from the basic drive converter 4: Track A, track B via LBA from the basic drive converter 6: Tracks A, B and zero pulse via LBA from the basic drive converter A pulse encoder, connected at the basic drive converter, must not be connected in parallel to the technology board. The basic drive converter instantaneously provides the signals at the backplane bus (LBA). When using CUMC or CU3, the encoder- or resolver signals, converted into pulse encoder tracks, are transferred via the LBA. **Note:** The pulse encoder signals from LBA can only be used for pulse encoder sensing 1.
Bits 8 to 11	**Rough pulse selection:** 0: No rough pulse evaluation 1: Rough pulse type 1 2: Rough pulse type 2 If rough pulse evaluation is not parameterized, then only the reference point (zero pulse) is sensed.
Bits 12 to 15	**Zero pulse evaluation:** 0: Not direction of rotation dependent 1: Direction of rotation dependent, i. e. positive edge for a positive speed negative edge for a negative speed

Example:

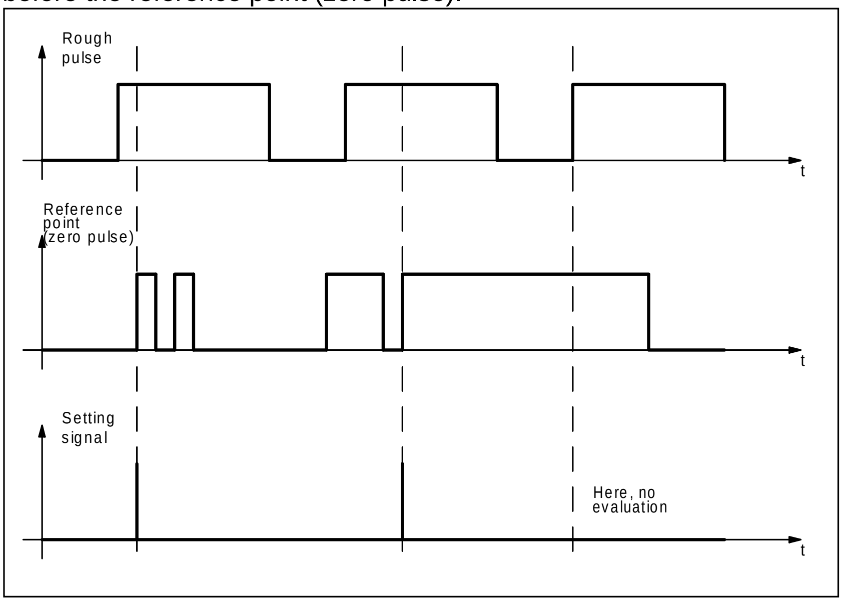
Bit	**12 - 15**	**8 - 11**	**4 - 7**	**0 - 3**
Example	1	0	6	4
	Zero pulse evaluation, direction of rotation dependent	No rough pulse evaluation	Pulse encoder, tracks A, B, zero pulse from the basic drive converter	Dig. filter 126kHz

Explanations:

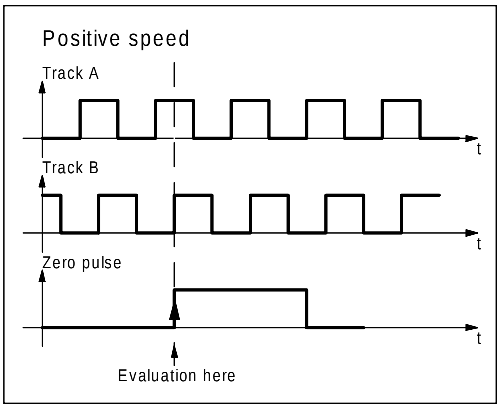
For **rough pulse type 1**, for a positive edge at the rough pulse input, the reference point (zero pulse) is enabled once.

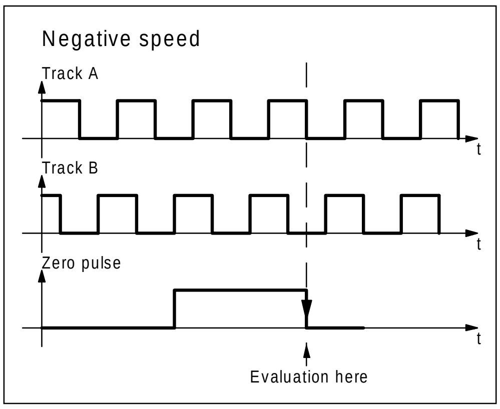


Contrary to rough pulse type 1, for **rough pulse type 2**, it is only evaluated, if the rough pulse is present before the reference point (zero pulse).



Evaluation is as follows for direction of rotation-dependent zero pulse evaluation:





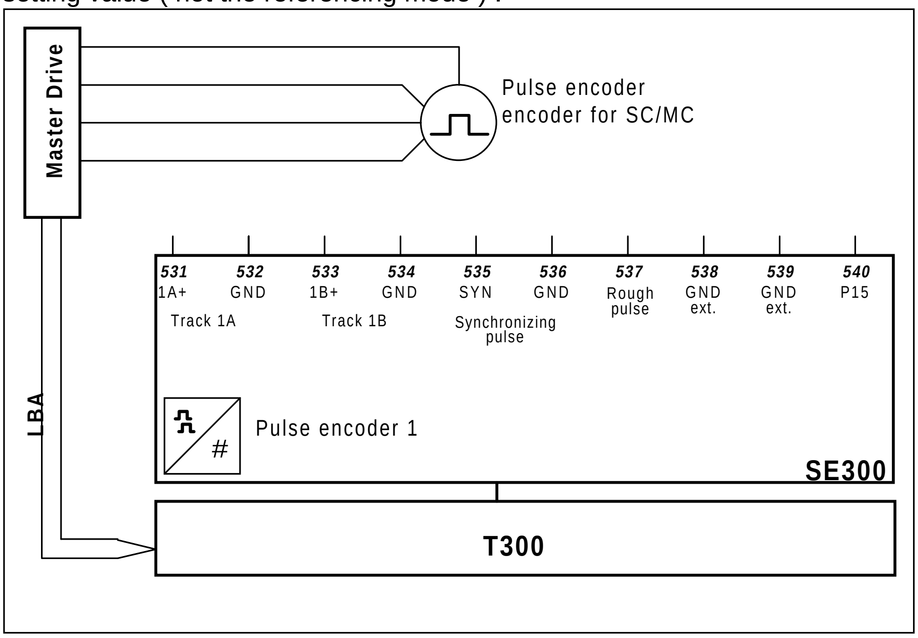
3.3.10.3 Control word, pulse encoder

The control word, pulse encoder allows the pulse encoder input to be adapted to specific applications. The control word is defined using parameters H154 (H159). The control word is defined as follows:

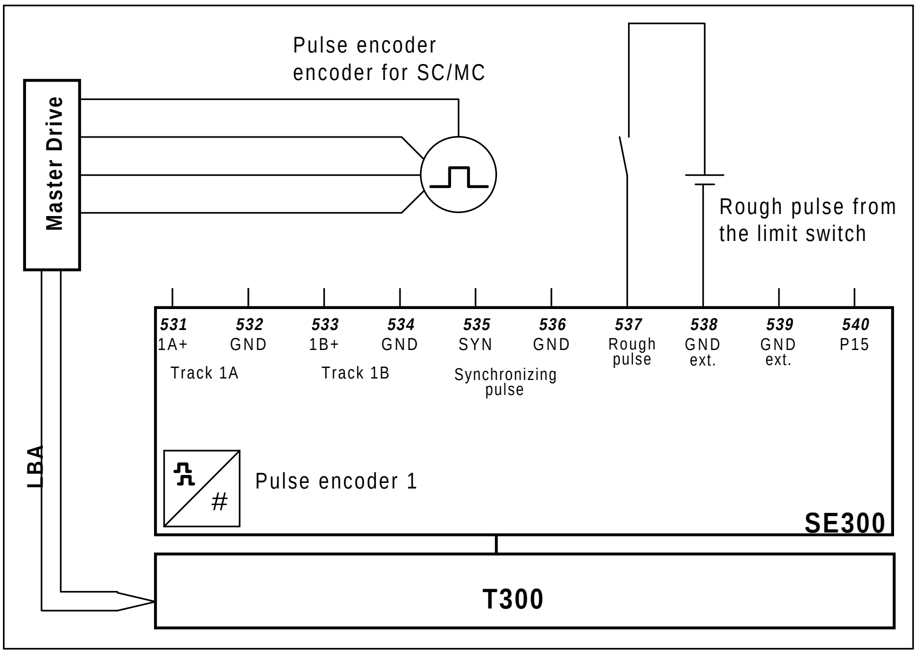
Bits 0 to 7	**Standstill limit** 0: 4 sampling times n: The speed actual value is set to zero after n sampling times The measuring time can be extended to sense very low speeds if no encoder pulses have been received. Thus, a new measured value is not output for the specified interval, but the speed actual value resolution is improved at zero.
Bit 8	**Evaluation of the setting signal** 0: The position is set to the setting value 1: The setting value is subtracted from the current position
Bit 12	**Evaluation, zero pulse** 0: The position is set to the setting value 1: The setting value is subtracted from the current position

3.3.10.4 Switching versions, pulse encoder

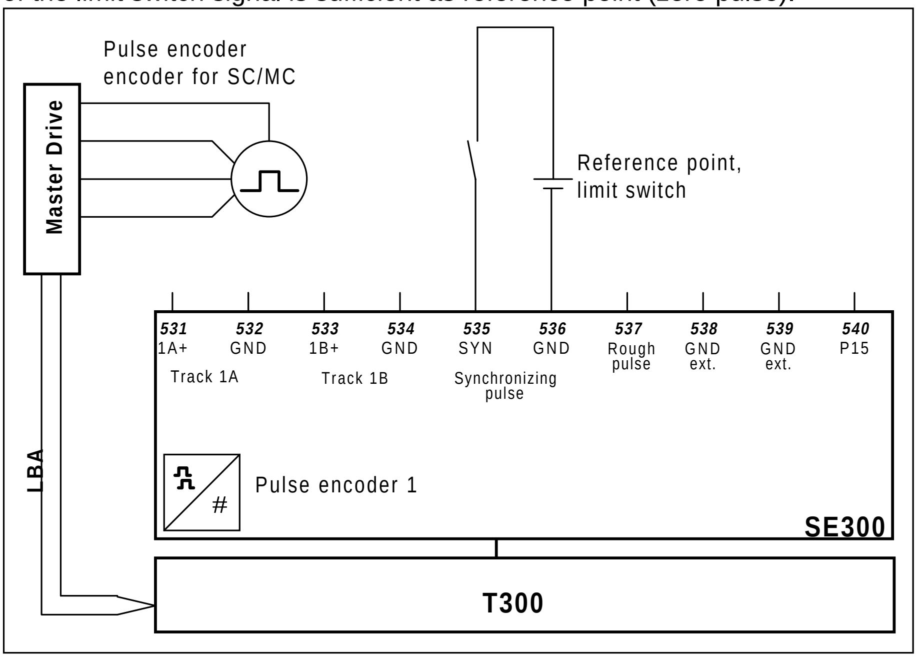
a) **Track A, track B, reference point (zero pulse) via LBA, no rough pulse**
This circuit version can only be used, if the machine is coupled 1:1 with the motor, and the traversing range is less than one motor revolution (rotary axis), or if the reference point is set using a position setting value (not the referencing mode) .



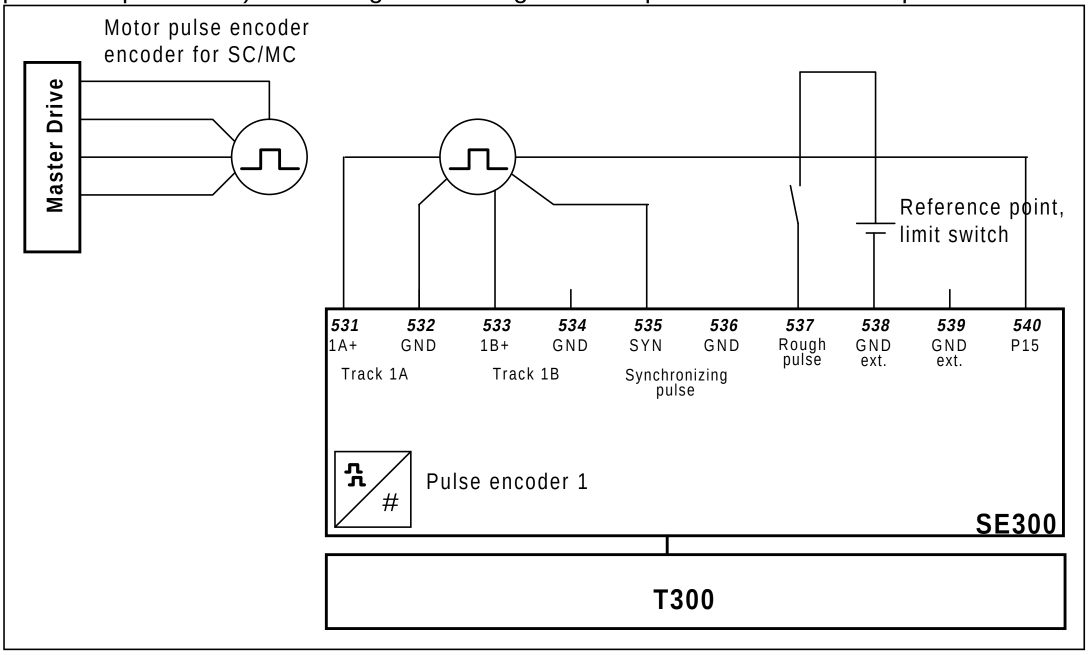
b) Track A, track B, reference point (zero pulse) via LBA, with rough pulse
For this circuit version, the reference point is only evaluated,, if the rough pulse is present. In this case, the complete accuracy of the reference point (zero pulse) is maintained; the rough pulse is received from a limit switch.



c) Track A, track B from the LBA, reference point from the SE300 (e. g. proximity switch)
This circuit version can be selected, if the pulse encoder does not have a zero pulse, and the accuracy of the limit switch signal is sufficient as reference point (zero pulse).



d) Track A, track B, zero pulse from the SE300
This version is only practical, if a pulse encoder signal is available at the gearbox output side (or at the part to be positioned). An arrangement using a double pulse encoder is also possible.



3.3.10.5 Positioning actual value from the NOVRAM

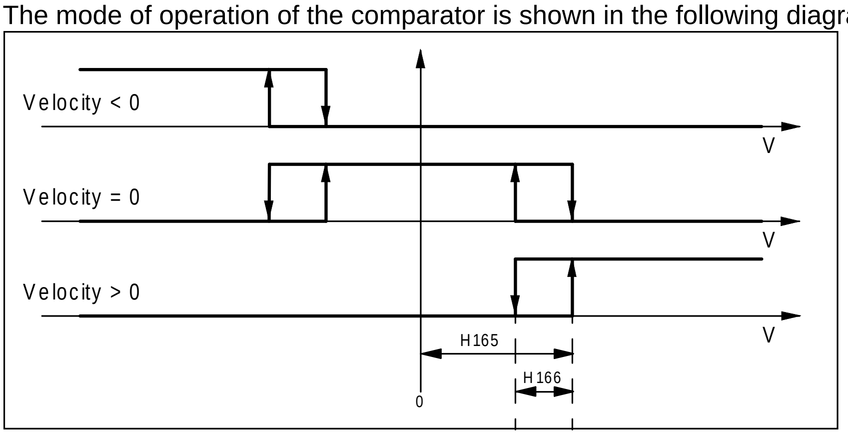
Using parameter H135 (H140), it can be defined as to whether the last position actual value is loaded from the NOVRAM (factory setting), when the board restarts after a voltage failure, i. e., if the drive was not moved after a power failure, then positioning is possible without having to re-reference.

3.3.10.6 Setting/resetting position actual values

The pulse encoder sensing inputs can be set and reset using control bits. Thus, a new software reference point can be defined at any time. This function can also be used, for example, to transfer the position actual value from an external absolute value encoder to the pulse encoder sensing after power-up.

3.3.11 Generating the internal velocity actual value (diagram A8)

The speed actual value for the closed-loop positioning control is selected using parameter H164. The speed actual value from the basic drive converter is preset as default. The velocity actual value is obtained by multiplying it by the correction factor. The following limit value monitor generates the signals *V=0, V<0, V>0.* In this case, the tolerance limit is defined in parameter H165; the hysteresis in H166.
The mode of operation of the comparator is shown in the following diagram.



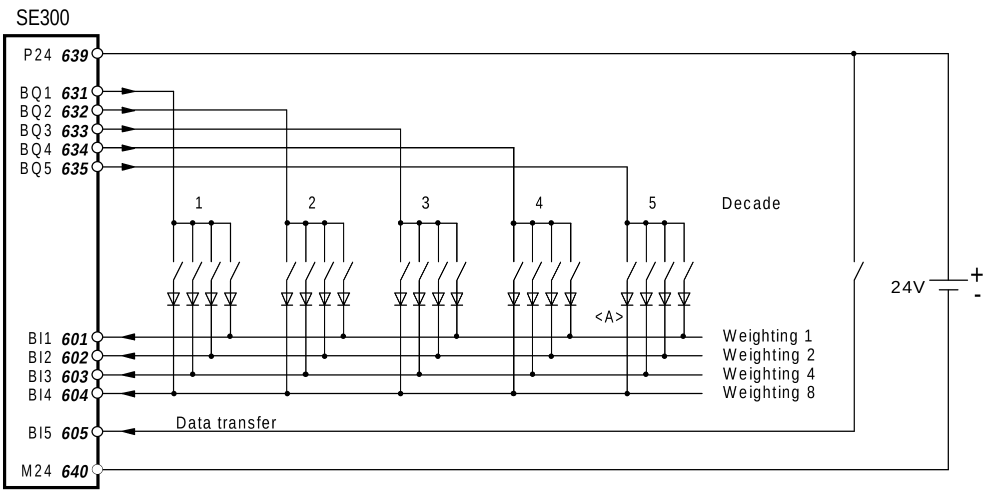
3.3.12 Generating the internal position actual value (diagram A8)

The position actual value for the closed-loop control can either be taken from pulse encoder sensing 1, or alternatively via the DPR from the basic drive converter. The source is specified in H168. The position actual value is multiplied by the correction factor. If the rotary axis mode has been selected, the measured position actual value is also conditioned for the closed-loop control.

3.3.13 Input from a thumbwheel switch (diagram A9)

Using binary inputs and outputs, a circuit can be implemented, which can be used to read-in values from *thumbwheel switches.* These can be used to enter a position reference value or to select a traversing data set. 5 inputs are always required and, for each decade, an output. The module cyclically activates the control lines for the individual decades, and reads-in the switch settings via diodes. This input is de-coupled through the diodes.

Connecting example:



<A> : Weighting 8 from decade 5 can be alternatively used as sign bit.

The control bits for the maximum of 5 decades are located in K053, bits 0 to 4. From there, they must be switched to binary outputs. Further, for the weighting (bit 0=1, bit 1=2, bit 2=4 and bit 3=8) an input is reserved. Data is only entered, if the *data transfer* signal is present.

The following parameterization is required for the connecting example shown above:

Parameter No.	Description	Value
H187	Source, bit 0 from the thumbwheel switch	45
H188	Mask, bit 0 from the thumbwheel switch	0001h
H189	Source, bit 1 from the thumbwheel switch	45
H190	Mask, bit 1 from the thumbwheel switch	0002h
H191	Source, bit 2 from the thumbwheel switch	45
H192	Mask, bit 2 from the thumbwheel switch	0004h
H193	Source, bit 3 from the thumbwheel switch	45
H194	Mask, bit 3 from the thumbwheel switch	0008h
H195	Source, data transfer bit, thumbwheel switch	45
H196	Mask, data transfer bit, thumbwheel switch	0010h

H183 is used to specify how many decades are to be read-in. Data at H184 defines that switch setting in the BCD format, which should result in 100%. The following table clearly indicates this:

H183	Switch settings	H184	Value range / steps
1	0...9	5	0...180% / 20%
2	0...99	50	0...198% / 2%
3	0...999	500	0...199.8% / 0.2%
4	0...9999	5000	0...199.98% / 0.02%
5	0...65536 [1)]	32768	0...199.9939% / 0.0061%

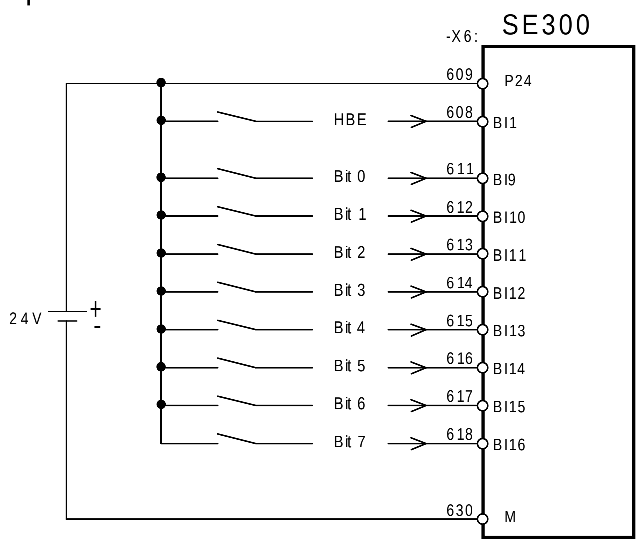
[1)] Note: Above 32767, the output value is limited to ±200% or ±32768.

Binary coding can be selected using H185 (value 0). The signal which is read-in is then interpreted as hexadecimal number.
If negative values must also be input, the most significant bit of the highest decade represents the *sign bit* (high, if negative). The value which was read-in, is displayed in d030, and can be used as connector K054 at any position. Processing is realized in T3. The periphery must be accessed for each decade, which means, that for n decades, a new value is available, at the earliest, after n sampling cycles.

3.3.14 Byte-serial data input (diagram A9)

The *byte-serial data input* allows quasi-parallel coupling to an automation system, if it doesn't make sense to establish a serial link via bus for just one single value. The word to be transferred is broken-down into two bytes. These are switched, alternating, to a group of 8 binary inputs. Using a control bit (HBE *high byte enable*), the module is signaled, that the presently available byte is the most significant byte.

Connecting example:

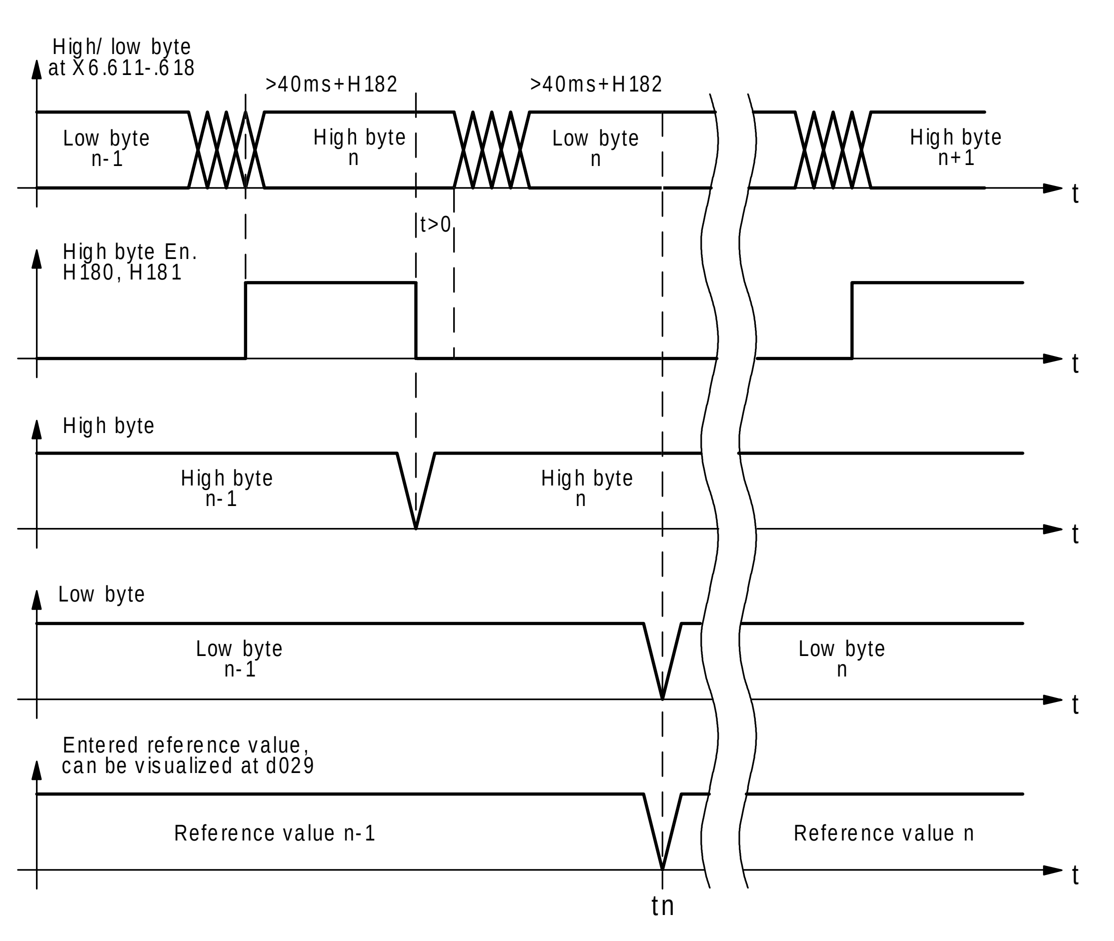


In order to keep the parameterizing costs within reasonable limits, binary inputs 9 to 16 are permanently assigned this function. Control bit HBE can be freely-assigned one of the other binary inputs using H180 (source) and H181 (mask). The time, for which the byte to be read-in must remain unchanged in order that it is accepted as being valid, is defined in parameter H182. The time is pre-set with 40ms, and can be increased in 40ms steps.

The value which is read-in remains stored until it is overwritten by a new value. It can be read-out from display parameter d029, and can be further used as K055.

The timing for byte-serial data input is shown in the following timing diagram.

It should be noted, that the high byte before low byte sequence must be maintained. The next data is only transferred if this is the case.



Notes:
- the reference value is available from time instant t_n.
- the high byte is valid, if it is available ≥40ms+H182 <u>and</u> the high byte enable goes to 0.
- the low byte is valid, if it remains unchanged for ≥40ms+H182.
- H182 can be entered in 40ms steps.

3.3.15 Generating the status word input/output (diagram A10)

The *input/output status word* includes the status messages/signals from the input and output functions. They are shown in the table; the text describes the active status of the particular binary signal:

Bit	Description
0	Reference point (zero pulse) identified, pulse encoder 1
1	Reference point (zero pulse) identified, pulse encoder 2
2	Velocity > 0
3	Velocity = 0
4	Velocity < 0
5	Traversing direction, pulse encoder 1
6	Traversing direction, pulse encoder 2
7	Not used
8	Not used
9	System error, T300
10	Communications, sending to CU o.k.
11	Communications, sending to CB o.k.
12	Communications, sending to peer-to-peer o.k.
13	Communications, receiving from CU o.k.
14	Communications, receiving from CB o.k.
15	Communications, receiving from peer-to-peer o.k.

The word is in K079 and d031. It is updated in T3.

3.4 Open-loop control (diagrams B)

This section of the functional scope includes binary signal handling. It powers-up and powers-down the drive converter, controls the brakes and reference values, monitors the drive, signals faults and errors, and processes, for multi-motor groups, the interlocking controls and feedback signals.

Note
When using the MS380 positioning software package, the control signals must be connected to the T300 and not at the basic drive converter. Exceptions: - emergency stop - emergency limit switch - fault acknowledgement can be connected at the basic drive converter or the T300.

3.4.1 Powering-up the drive (diagram B1)

The *power-up command* is selected using H200 (source) and H201 (mask). It causes the drive to be immediately powered-up if there is no shutdown condition(*fast stop, electric off, standard stop or drive fault/error*) (refer to d035).

3.4.2 Inching 1/2, speed controlled (diagram B1)

Two binary signals are provided for drive *inching*; each has its own setpoint. *Inching 1, speed-controlled* (H214 source, H215 mask, H753 setpoint) and *inching 2*, *speed-controlled* (H216 source, H217 mask, H754 setpoint) powers-up the drive and this receives its setpoint as long as the inching command is active. In order to prevent multiple power-up and power-down commands (main contactor wear), when the inching command is withdrawn, the drive is not immediately powered-down, but only after a time which can be set in H245.
In order to be able to select the *inching, speed-controlled* mode, the drive must be powered-down. If the drive is in the *inching, speed-controlled* mode, this can only be exited by powering-down the drive.

3.4.3 Inching 1/2, position-controlled (diagram B1)

Two binary signals are provided for drive *inching*, each has its own setpoint. *Inching 1, position-controlled* (H224 source, H225 mask, H466 setpoint) and *inching 2, position-controlled* (H226 source, H227 mask, H467 setpoint) powers-up the drive and traverses the drive at each positive edge of the inching command, by the distance specified in the reference value. In order to prevent multiple power-up and power-down commands (main contactor wear), when the inching command is withdrawn, the drive is not immediately powered-down, but only after a time which can be set in H245.
In order to select the *inching, position-controlled* mode, the drive must be powered-down. If the drive is in the *inching, position-controlled* mode, this can only be exited by powering-down the drive.

3.4.4 Power-down word / diagnostics word (diagram B1)

All of the power-down conditions are combined in a word. If the drive cannot be powered-up, it should first be checked as to whether a power-down condition is present. The power-down word is stored at each power-down, and is therefore available as diagnostics word, which contains the last power-down reason.

The diagnostics word / power-down word is assigned as follows:

Bit	Description
0	Drive faulted
1	Drive faulted from CU
2	Electrical off
3 to 7	Not used
8	Off after inching
9	Off after standard stop
10	Off after fast stop
11	Off, as there is no drive converter checkback signal
12 to 15	Not used

3.4.5 Standard stop / fast stop / electrical off (diagram B2)

The *standard stop* function (H202 source and H203 mask) runs down the drive to standstill along the ramp set in H760, and then shuts the drive down. In order to be able to power-up in the inching mode, *standard stop* is not effective in the inching modes. If the drive is to be powered-down after inching, a delay must either be inserted until the inching time has expired, or fast stop or electrical off output.

The drive is immediately powered-down for *electrical off* (H204 source and H205 mask). The drive then coasts down. Thus, it is possible to immediately bring the drive into a no-torque condition.

Note*:*
Electrical off does not mean that the drive is also isolated from the line supply. If this is to be achieved, a main contactor must be used. Drives which are connected to a common DC link, are still live (at a hazardous potential), even after *electrical off*.

For *fast stop* (H206 source and H207 mask), the setpoint is immediately switched to zero, and the drive is braked down to standstill along the torque limit.

3.4.6 Brake control (diagram B3)

The brake control can be used as holding brake as well as a brake which is supplied under fault conditions. If the drive has a mechanical brake, H240 must be set to 1. Thus, an additional part of the control becomes active, which coordinates the brake control and the internal control (drive on/off, setpoint enable etc.).

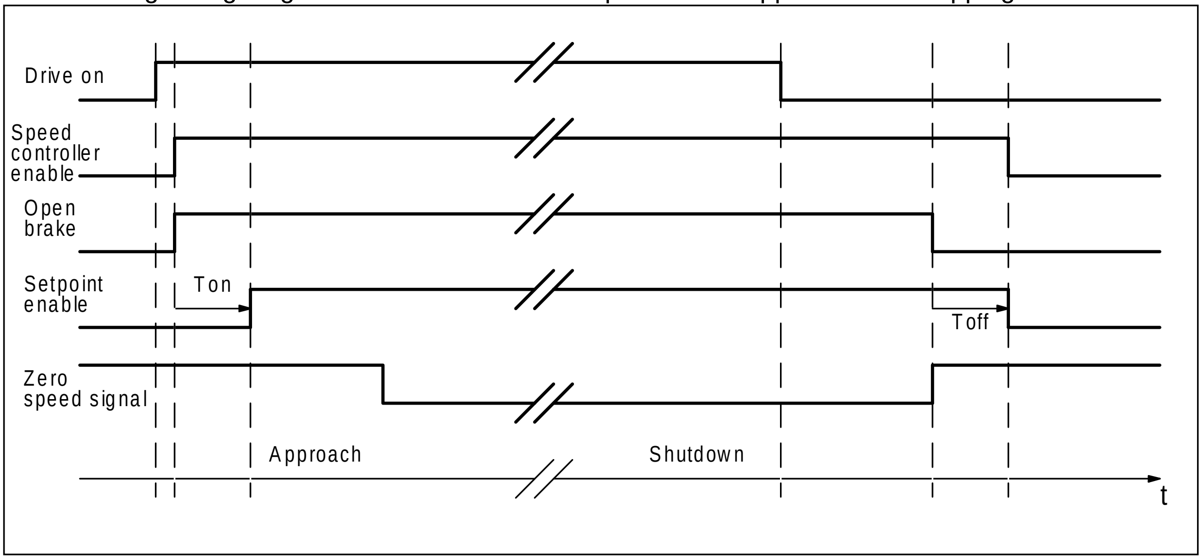
The time, which expires between the output of the command *open brake* up to when the brake has actually been released, and the drive can rotate, is defined as the *opening time*, and must be entered in H243. It comprises of the delays between intermediate control elements, control solenoid valves and the brake itself (Note: It is generally not practical to insert logic circuitry as only the drive itself can control the brakes. From experience, any additional logicconditions result in problems).

After *controller enable*, the command to open the brake is output. The *setpoint is enabled* after the opening time has expired.

The time between the *close brake* command and when the brake is actually applied is called the *closing time*, and is entered in H244. Generally, it is longer than the opening time.

The command to close the brake is output at *zero velocity*, and the drive is shutdown after the closing time has expired.

The following timing diagram is for the standard sequence with approach and stopping.



The braking mode is defined using parameters H241 and H242. At each power-off signal, it can be defined as to whether the brake is immediately closed (fault brake) or the brake is first closed at n=0.

The fault brake is practical, if the brake is used as a holding brake under normal conditions, however it is used to shutdown the drive when a fault condition develops, as otherwise a dangerous status could occur if the drive was to just coast down.

The power-down word is defined as follows:

Bit	Description
0	Drive faulted
1	Drive faulted from the CU
2	Electrical off
3 to 7	Not used
8	Off after inching
9	Off after standard stop
10	Off after fast stop
11	Off, as there is no drive converter checkback signal
12 to 15	Not used

The brake control is pre-assigned so that the brake operates exclusively as holding brake. If the brake control is parameterized, so that the brake is immediately closed when a fault develops, then proceed as follows:
Bit 0 of the power-down word is selected in H241, i. e. 0001h. The procedure is the same if other bits are to be selected.

3.4.7 Setpoint / inverter enable (diagram B3)

The inverter is only enabled if the drive is powered-up, and if the *inverter enable* signal (H208 source and H209 mask) are available. If this is not required, it can be permanently set to one (pre-setting).

The same is true for the *setpoint enable* control signal (source H210 and mask 211). If this bit is low, the setpoint in the drive converter is set to zero.

3.4.8 Generation of the fault word / alarm word (diagram B4)

All of the signals are combined in the *error word* which can cause the drive to be shutdown with a fault message. All of the fault causes can be suppressed (H280) or parameterized as alarm (H281).

The error bits are transferred to the basic drive converter via the error/fault- and alarm channel. There, they appear as faults F116 to F131 or as alarms A097 to A112.

An overview is provided in the following table

Bit	Designation	Mask	Fault No.	Alarm No.
0	Error, communications CB	0001h	F116	A097
1	Error, communications CU	0002h	F117	A098
2	Error, communications peer-to-peer	0004h	F118	A099
3	User error 1	0008h	F119	A100
4	User error 2	0010h	F120	A101
5	Tracking error outside the tolerance	0020h	F121	A102
6	Overspeed, positive	0040h	F122	A103
7	Overspeed, negative	0080h	F123	A104
8	Drive locked	0100h	F124	A105
9	Pulse encoder fault	0200h	F125	A106
10	Emergency limit switch A3 actuated	0400h	F126	A107
11	Emergency limit switch B3 actuated	0800h	F127	A108
12	Referencing error	1000h	F128	A109
13	Refer. point incorrectly/not identified.	2000h	F129	A110
14	Overflow, position actual value	4000h	F130	A111
15	Transmission error TR-Encoder	8000h	F131	A112

3.4.8.1 Fault suppression / alarm display

All of the faults can be suppressed. When faults are suppressed, this can result in potentially hazardous situations.
Each error bit has its particular significance in the error word. If an error bit is to be suppressed, then the corresponding significance in the suppression mask must be set to zero. The procedure remains the same when suppressing several errors.

Example:
The *communications with CB* error message is to be suppressed and the *communications with peer-to-peer* error message should only act as alarm.
1st step
Suppress bit 0 and bit 2 with H280: H280=1111 1111 1111 1010 = FFFAh

2nd step
Display bit 2 in the alarm word with H281=0000 0000 0000 0100 = 0004h

3.4.8.2 Error, communications CB [F116]

If communications with the communications board (CB) is faulted, the fault message is initiated after the time parameterized in H260.

Note:
For communication errors, the actual setpoints/reference values and control bits are ´frozen´. Thus, the drive remains in exactly the same condition as before the communications error. If the drive is exclusively operated via the communications channel, the error message must remain parameterized to prevent hazardous situations from developing.

The error message is also generated, if there is no CB. In this case, it must be suppressed.

3.4.8.3 Error, communications CU [F117], [F080, F081, F082]

Communications between the basic drive converter board (CU) and the technology board is monitored by both boards. If the basic drive converter identifies an initializing error (F080), hardware monitoring error (F081) or telegram failure (F082), this is displayed on the basic unit. The technology board monitoring attempts to initiate the fault message after the time parameterized in H261, when a communications error is identified. This can only succeed, if communications to the basic drive converter still function, which means, that either only the CU→TB direction is faulted, or the telegram failure time on T300 is set less than that for the basic unit.

If the fault/error cannot be acknowledged, and if it re-occurs after the unit is powered-down and on again, the T300 and/or CU board must be replaced (observe the diagnostic LEDs).

3.4.8.4 Error, peer-to-peer communications [F118]

If no telegrams are received via the peer-to-peer coupling, then the fault message is initiated after the time parameterized in H268.

3.4.8.5 User error 1 [F119]

Contrary to the external faults in the basic drive converter (F035, F036), user errors are only enabled when the drive is powered-up. This allows functions to be monitored which are only relevant after the drive has been powered-up. For example, this could include an external motor fan with monitoring element. The fault is only initiated if it is present for a time longer than that parameterized in H264.

3.4.8.6 User error 2 [F120]

The function is identical with that of user error 1.

3.4.8.7 Tracking error outside the tolerance [F121]

The fault message "tracking error outside tolerance" is output if the difference between the position reference value and actual value exceeds the tolerance limit in H741 for a time exceeding the delay time set in H745.

3.4.8.8 Overspeed fault, positive [F122]

If the speed actual value exceeds the speed specified in H269 in the positive direction, the overspeed fault, positive is initiated.

3.4.8.9 Overspeed fault, negative [F123]

If the speed actual value exceeds the speed specified in H269 in the negative direction, the overspeed fault, negative is initiated.

3.4.8.10 Fault, drive blocked [F124]

Anti-stall protection can be set to protect the mechanical drive system and the motor. The anti-stall protection responds if the drive is at zero speed (limit H272), a velocity setpoint has been entered (limit H273) and the drive torque is greater than the limit value in H274.

3.4.8.11 Fault, pulse encoder [F125]

The pulse encoder monitoring continuously compares the speed actual value, sensed at the pulse encoder monitoring 1, with the value, which is transferred from the drive converter via the dual port RAM. If a fault message is output, either the speed sensing at the basic drive converter itself or the T300 is defective.
A fault message can also be initiated, if the speed actual value in the basic drive converter (CUVC:P352; CUMC:P353; CU2,CU3:P420) is normalized differently than in the positioning (H152), or if the pulse encoder was incorrectly defined (CUVC,CUMC:P151; CU2:P209 / H151). The function of the pulse encoder itself is not checked.

3.4.8.12 Fault, emergency limit switch A3 actuated [F126]

If the drive actuates emergency limit switch A3, fast stop is initiated (refer to Section 3.1.3). The fault is generated when the drive comes to a standstill.

3.4.8.13 Fault, emergency limit switch B3 actuated [F127]

If the drive actuates emergency limit switch B3, fast stop is initiated (refer to Section 3.1.3). The fault is generated when the drive comes to a standstill.

3.4.8.14 Referencing error [F128]

If the drive reaches hardware limit switch A2 as well as hardware limit switch B2 in the *referencing* mode, it is assumed that the reference point was not found, and the drive is shutdown with a fault message.

3.4.8.15 Incorrect reference point position [F129]

If the *automatic post-referencing* function or the *rotary axis mode* is active, it is checked as to whether the reference point lies within the specified tolerance range (H322). If a reference point is identified outside this range or is not even identified, fault message F129 is initiated. Fault signals can be suppressed using the *fault pulse suppression at the reference point* function.

3.4.8.16 Overflow, position actual value [F130]

If the permissible numerical range of the pulse encoder sensing 1 of $\pm 2^{31}$ pulses is exceeded, fault message F130 is output.

3.4.8.17 TR-Encoder transmission error [F131]

The TR-Encoder does not transmit its absolute position for further information see function diagram B11

3.4.9 Fault acknowledgement (diagram B5)

The module provides 3 possibilities to acknowle a fault:

a) External fault acknowledgement
   An external acknowledge signal can be selected using parameters H212/H213.

b) Acknowledge button on the technology board

c) P button on PMU/OP1
   Technology board faults/errors can also be acknowledged via the basic drive converter.

3.4.10 Generating the control status word (diagram B5)

Important control signals are located in the *status word*. The assignment is as follows:

Bit	Description
0	Not used
1	Not used
2	Not used
3	Braking
4	No braking
5	Velocity actual value = 0 (V=0)
6	Drive powered-up
7	Drive not powered-up
8	Drive not ready
9	Internal inverter enable
10	Internal setpoint enable
11	Not used
12	Drive faulted
13	Open holding/operating brake
14	Close holding/operating brake
15	Close brake at n=0

3.5 Referencing control (diagrams B6 to B9)

The position actual value is sensed via a pulse encoder. As the pulse encoder can only sense relative distances (number of pulses), the system must first sense the absolute position when the board is first powered-up. This is realized using a reference point, whose geometrical position is known. When this reference point is passed, the position sensing is set to a defined value. The absolute position is now known.
The reference control knows various operating modes and parameterizations, which are subsequently explained. The following table provides an overview of the various referencing types and parameterizations.

Mode	Explanation
Referencing with standstill	The drive shuts down after the reference point has been identified
Flying referencing	The drive moves directly to the specified position reference value after identification

Parameter	Effect
Minimum approach path	The reference point is only passed in one direction The reference point is only evaluated if the traversing path is greater than the minimum approach path
Referencing start direction	Determines in which direction the drive starts when referencing
Automatic post referencing	The position reference value can be corrected each time the reference point is passed.
Referencing velocity	Defines the traversing velocity when referencing

3.5.1 Referencing with shutdown

If the *referencing with shutdown* mode is selected, when the reference point is identified, a standard stop is initiated. The drive is shutdown. The mode is selected with a positive edge at the control input (H300/H301). The mode is exited, if the referencing control bit is withdrawn at shutdown, a referencing error has occurred, or the reference point was found.

3.5.2 Flying referencing

If *flying referencing* mode (H302/H303) is selected, after the reference point has been identified, the specified position reference value is approached. To exit the operating mode, the same conditions are valid as for *referencing with shutdown.*

3.5.3 Minimum approach path

Parameter H312 defines the minimum approach path, i. e. the drive must move through this distance before the reference point is accepted. Thus, it is possible

- to exclude inaccuracy as a result of play.
- the reference point is passed under defined conditions, i. e. with constant velocity, without acceleration- or deceleration phases.

The direction which the reference point is passed is defined by the sign of the minimum approach path. For

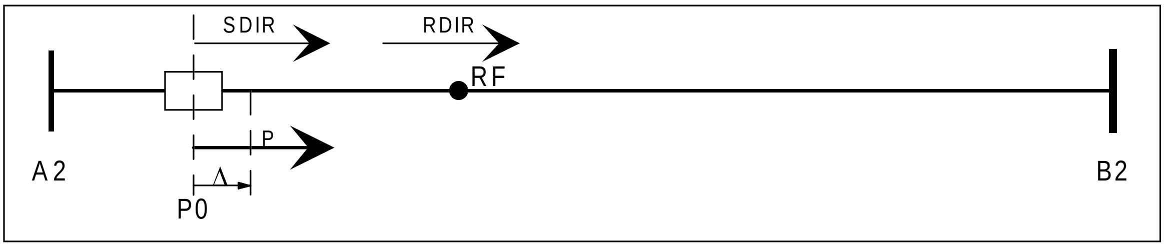
- positive sign, the reference point must be passed in the direction A→B,
- negative sign, the reference point must be passed in the direction B→A.

Note:
If the rough/fine pulse evaluation function is used, and several fine pulses are present in the rough pulse area, then the minimum approach path must be greater than the rough pulse range.

3.5.4 Various situations when referencing

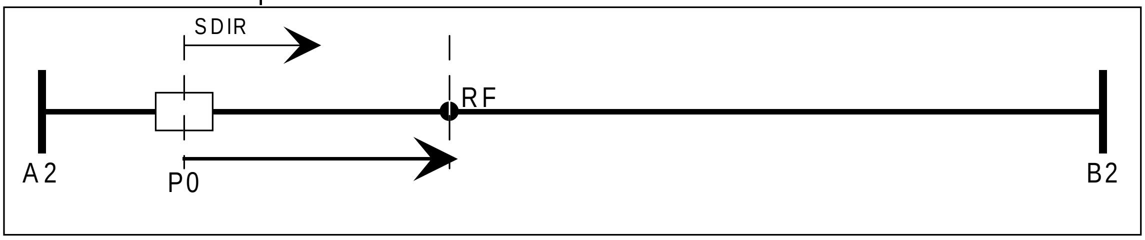
The various motion sequences as a function of the selected parameters are subsequently shown.

Definitions:

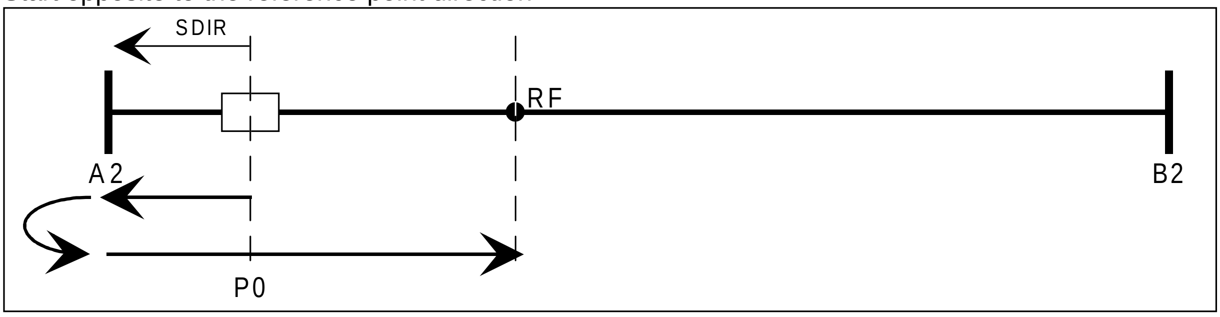


P0:..........actual position
RF: ....reference point
SDIR: .....start direction for referencing
RDIR: .....requested reference point approach direction
P:............traversing direction
A2:..........hardware limit switch A2
B2:..........hardware limit switch B2
Δ:............minimum approach path

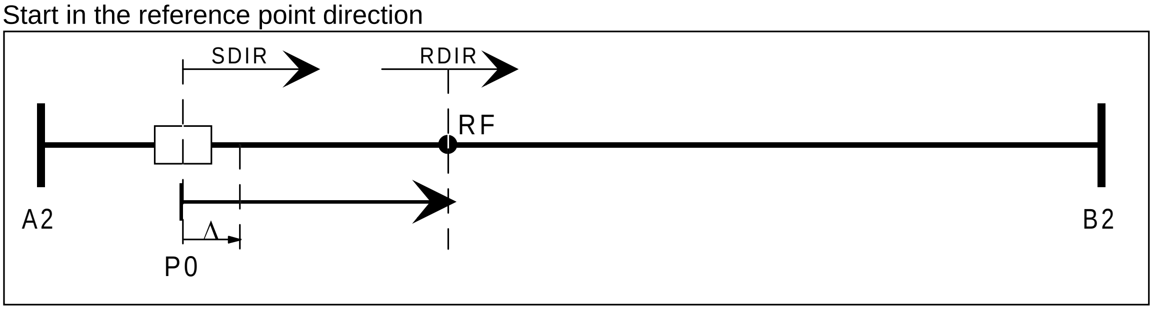
Case A) Referencing without secondary conditions
Start in the reference point direction



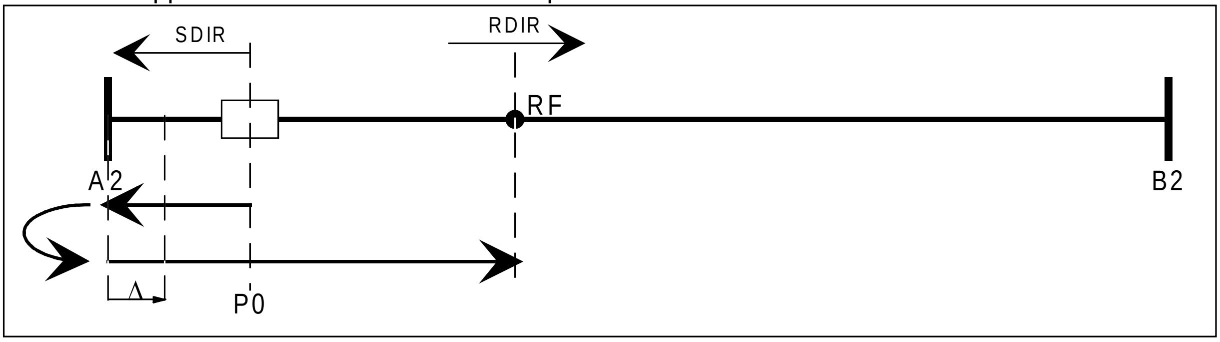
Start opposite to the reference point direction



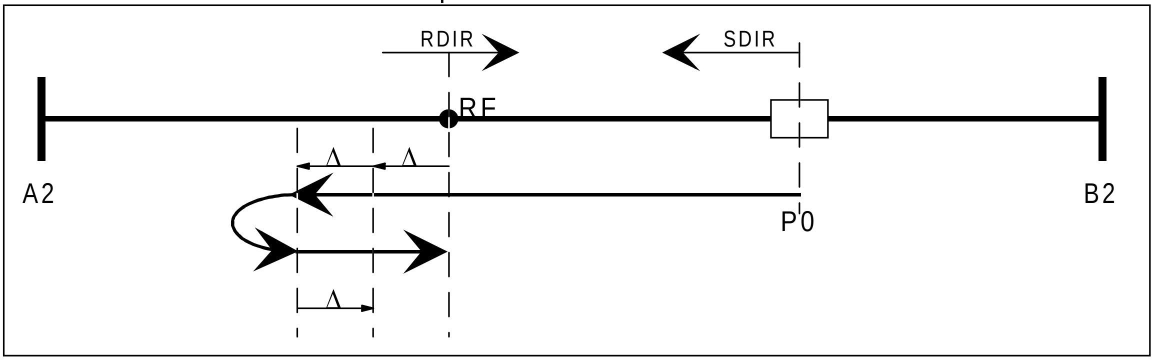
Case B) Referencing, taking into account the minimum approach path
If the minimum approach path is greater than zero, the reference point must be passed in the direction A to B. Thus, the reference point must be passed in the direction B to A, if the minimum approach path is less than zero.
Start in the reference point direction



Start in the opposite direction to the reference point

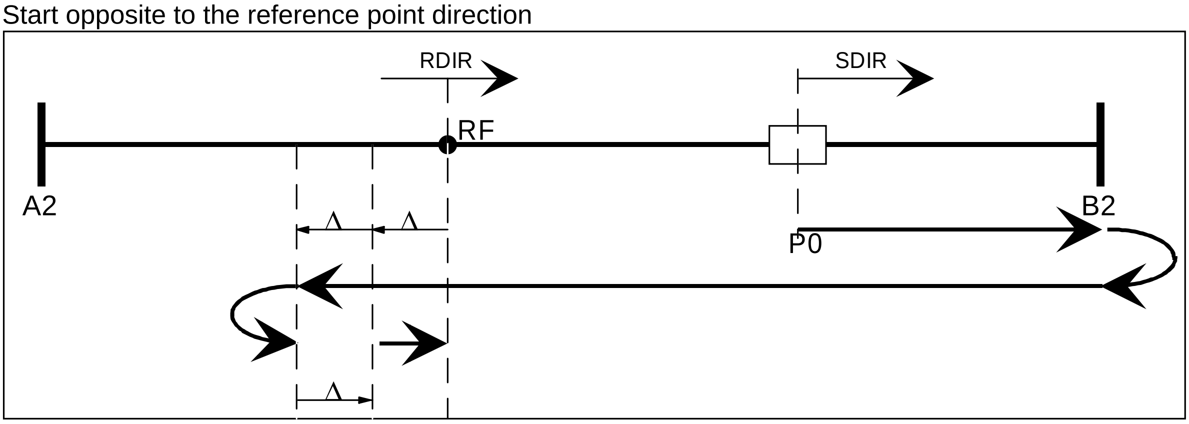


Start in the direction of the reference point



Explanation:
If the reference point is passed in the incorrect direction, after 2 x Δ, the traversing direction is reversed, and the reference point is passed in the correct direction.

Start opposite to the reference point direction

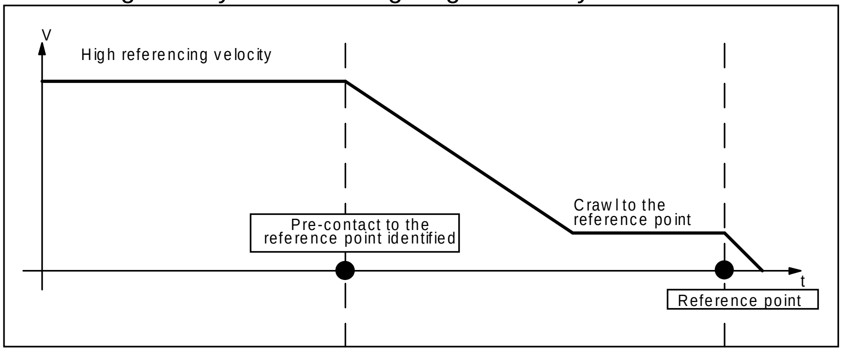


3.5.5 Signal, drive has referenced (diagram B6)

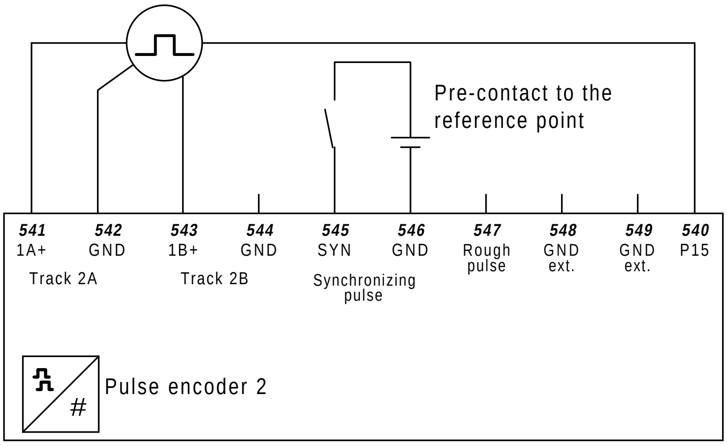
The *drive has referenced* signal is generated if the reference point was found. The referencing mode is simultaneously reset with the signal. If a minimum approach path is parameterized, in addition to the reference point identification, the direction in which the reference point was passed must also coincide, and the traversing distance after a direction change must be greater than the minimum approach path (refer to various situations when referencing). The signal is reset, when a board runs-up, if a new referencing command is output, or if H320 is parameterized each time the drive is powered-up.

3.5.6 Referencing velocity / pre-contact to the reference point (diagram B7))

The referencing start direction is defined using parameters H310/H311. The velocity reference value for referencing direction A→B is in H330, and for direction B→A, in H332. If the drive reaches the hardware limit switch, the referencing direction is reversed. In order to start referencing with a high velocity if large distances are involved, the *pre-contact to the reference point* function can be used. In this case, a pre-contact is installed close to the reference point, which then causes the drive to slow down to a lower referencing velocity. The following diagram clearly indicates this.



The *pre-contact to reference point* control bit is selected using parameters H308/309. If the signal is available for less than 40ms as a result of the high referencing velocity, the identification of the reference point (zero pulse) from pulse encoder sensing 2 can be used. The following circuit configuration is required:



The pulse encoder (or pulse encoder simulation for CUMC,CU3) must be again connected to pulse encoder sensing 2. The *pre-contact to the reference point* must be connected to the reference point (zero pulse), and thus acts instantaneously. Bit 1 from the *status word input/output* (refer to Section 3.3.15) must be used as source for the pre-contact.

3.5.7 Automatic post-referencing (diagram B7)

Parameter H304/H305 is used to determine as to whether the drive is automatically post-referenced each time the reference point is passed. If there are no technological reasons against this, the function should always be enabled. Thus, errors, which could occur as a result of slip or noise pulses, can be continuously compensated. Also for *automatic post-referencing*, the secondary condition regarding the pass direction is valid if a minimum approach path is parameterized.

3.5.8 Referencing errors (diagram B7)

If the drive reaches hardware limit switch A2 and hardware limit switch B2 in the referencing mode, it is assumed that the reference point was not found, and the drive is shutdown with a referencing fault message.

3.5.9 Monitoring the reference point position (diagram B8)

In order to monitor the drive unit for slip and fault/noise pulses, the difference between the parameterized and actual position of the reference point is sensed. If this difference exceeds the tolerance limit in H320, the reference point not/incorrectly identified fault message is initiated.
Note:
If the *noise pulse suppression at the reference point* function is used, the effects of an erroneously sensed reference point can be limited. As the reference point is only enabled in the tolerance bandwidth parameterized there, only this bandwidth can occur as maximum error. Although the drive doesn't achieve the required positioning accuracy, larger deviations can be essentially eliminated. The *reference point position* monitoring can be used as a status signal to request a new reference movement.

3.5.10 Status words, referencing control (diagram B10)

2 status words are generated by the reference control which have the following assignment:

Status word 1, referencing control

Bit	Description
0	Reference point (zero pulse) identification enabled
1	Referencing with shutdown active
2	Flying referencing active
3	Referencing mode active
4	Drive has referenced
5	Drive has not referenced
6	Pre-contact to the reference point identified
7	Approach path, high play
8	Approach path, low play
9	Referencing direction B→A active
10	Referencing direction A→B active
11	Referencing direction o.k.
12	Referencing direction not o.k.
13	Hardware limit switch A2 reached
14	Hardware limit switch B2 reached
15	Referencing error

Status word 2, referencing control

Bit	Description
0	Erroneous reference point position
1	Hardware limit switch A2 passed
2	Hardware limit switch B2 passed
3	Range for reference point o.k.
4 to 6	Not used
7	TR-Encoder transmission requested
8	TR-Encoder transmission active
9	TR-Encoder referenced
10	TR-Encoder transmission input
11	Not used
12	TR-Encoder start transmission error
13	TR-Encoder transmission error
14	TR-Encoder transmission timeout
15	Not used

3.6 Setpoint generation, traversing data sets

In order to be able to flexibly use the positioning, traversing data sets have been introduced. The aim of these traversing data sets is to implement essentially all drive-related functions using the technology board. If limits are reached with these traversing data sets, then it is possible to couple-in the values via an automation system.

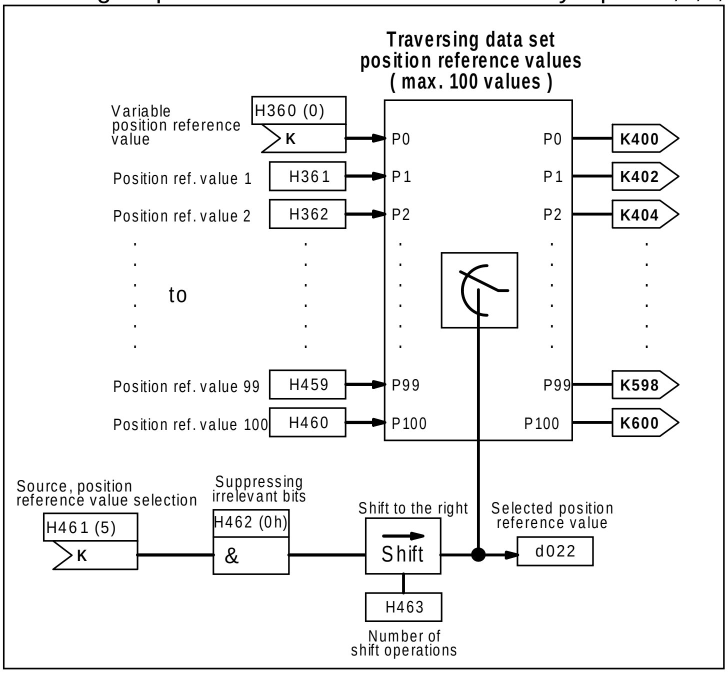
The following table provides an overview of the various traversing data sets

Traversing data set for:	**No. of values**	**Explanation**
Position reference values	100	
Position limit value X	6	Comparison value for position limit value monitor X
Position limit value Y	6	Comparison value for position limit value monitor Y
Position limit value Z	6	Comparison value for position limit value monitor Z
Software limit switch A1	6	Traversing path limiting in the direction of mechanical endstop A
Software limit switch B1	6	Traversing path limiting in the direction of mechanical endstop B
Maximum velocity	6	Maximum traversing velocity when positioning
KP speed controller	6	Adapting the dynamic performance of the speed control loop
Drive play	6	Adapting the play, e. g. if different slides are to be positioned using one drive converter
Ramp-up time, position ramp-function generator	6	Input, ramp-up time, velocity setpoint = maximum acceleration during approach
Rounding-off time constant ramp-up position-RFG	6	Input, rounding-off time constant to adapt the drive dynamic performance or to dampen the mechanical system
Ramp-down time, position ramp-function generator	6	Input, ramp-down time, velocity setpoint = maximum acceleration when braking
Rounding-off time constant ramp-down position-RFG	6	Input, rounding-off time constant to adapt the drive dynamic performance or to dampen the mechanical system
Down ramp A2	6	Input, ramp-down time when passing the limit switch in the direction, mechanical endstop A
Down ramp B2	6	Input, ramp-down time when passing the limit switch in the direction, mechanical endstop B

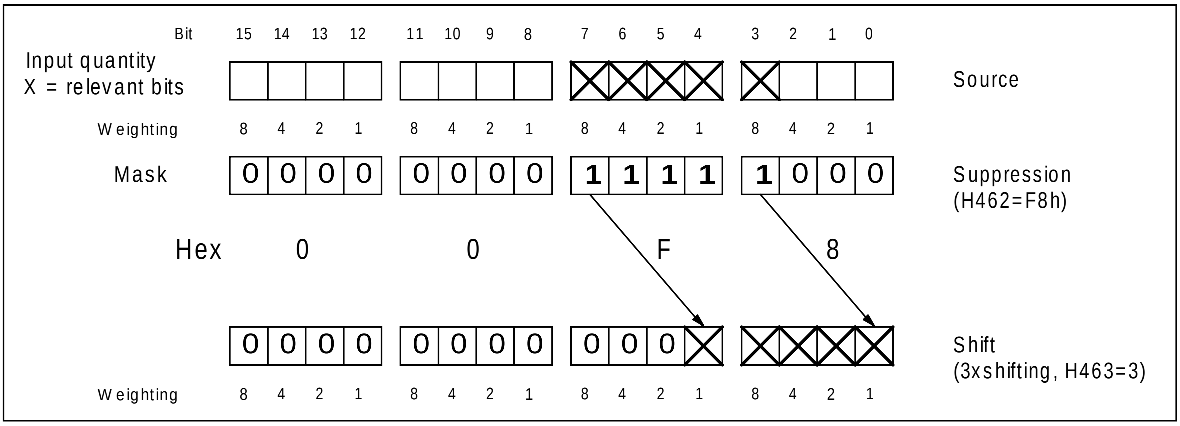
3.6.1 Selecting the traversing data sets

The traversing data sets principally operate as multiplexer. A code is entered at a control input which selects the appropriate traversing setpoint. The code is generated from a logic circuit, so that it can be easily entered through binary inputs. Further, the control code for several traversing data sets can be simultaneously transferred in a control word. Control code 0 always enables traversing setpoint 0, code 1, setpoint 1, etc.. The logic function to select the control code consists of defining the source, suppressing irrelevant bits, and establishing the significance (weighting). The procedure is illustrated using the following example:

Example:
Selecting 20 position reference values via binary inputs 3,4,5,6,7



Initially, the source for control code K045 is specified with parameter H461 as source. However, as other binary inputs could be used, to start of with, all non-relevant bits are suppressed using H462. The correct significance (weighting) of the control bits as code for the multiplexer is established by shifting to the right (H463).



Several traversing data sets can be selected (e. g. software limit switches A1 and B1) using the same control bits by specifying the same source (the same connector).

3.6.2 Correction factor (diagram C1)

If positioning is established using roller wheels (rubber wheels, plastic wheels), whose diameter decreases with time, positioning must always be re-normalized to the actual diameter. However, in order to prevent this having to be done, a correction factor has been introduced. The velocity setpoint and actual value as well as the position actual value are multiplied or divided by this factor. After commissioning, the factor is 100%=neutral. However, if it is determined that the diameter has decreased, for example, from 100mm to 98mm, then 98/100 x 100% must be entered as correction factor. The direct diameter measurement can also be eliminated, if the positioning travel is checked. If the drive no longer positions quite so accurately, the mechanical position is measured, and is compared with the position actual value of the closed-loop control. For example, if the mechanical position is 9990mm, however the position actual value is 10000mm, then the operating diameter has decreased. Thus, a correction factor of 9990/10000 x 100% = 99.9% must be entered.

Note:
Deviations can also occur, if a certain amount of slip involved. Before the diameter is corrected, all other fault/error sources must first be investigated.

3.6.3 Fixed setpoints (reference values) (diagram C1)

Fixed setpoints (reference values) are required everywhere, where connectors are expected, but constants are entered. The fixed setpoints (reference values) are directly combined with connectors, and can supply all relevant data formats which are used.

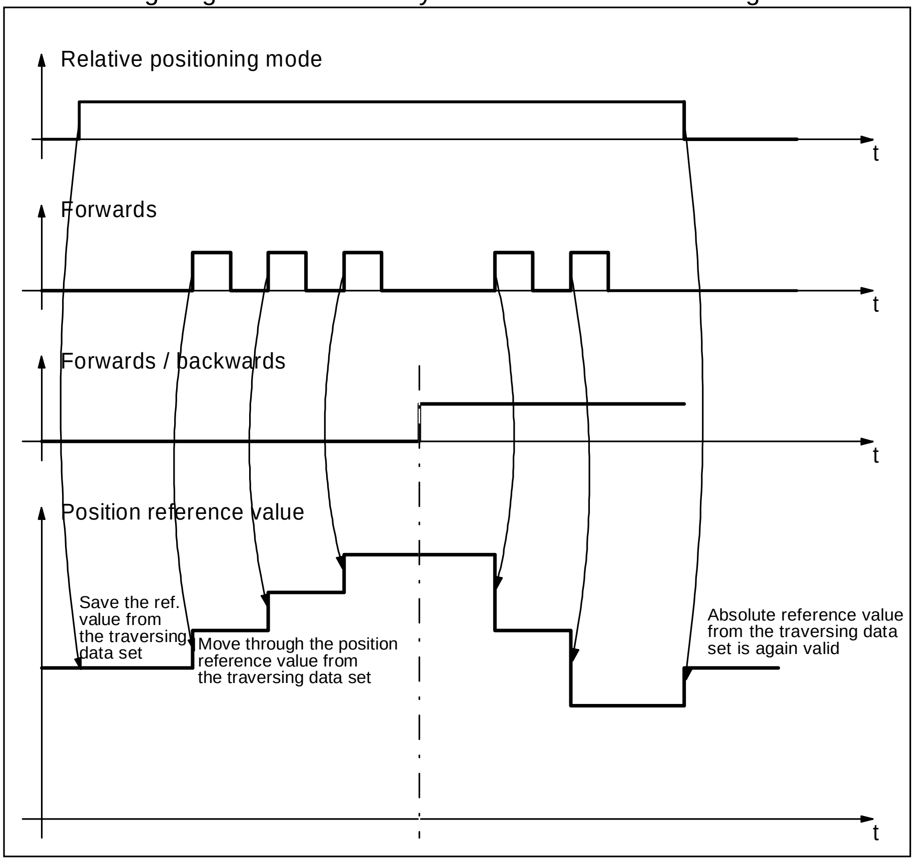
3.6.4 Generating position reference values (diagram C2)

The automation interface can input up to max. 100 fixed position reference values or a variable reference value. The reference value is selected as described in Section 3.6.1. In order to inhibit the intermediate statuses of the binary inputs, the position reference value can be transferred from the traversing data set via parameters H464/H465.
Before the position reference value is fed to the position ramp-function generator, it is checked that the valid value range is involved. If the reference value lies outside the software limit, the traversing task is rejected (not limited), and the software limit violated fault message is output.

3.6.4.1 Relative positioning (diagram C2)

The *relative positioning* mode is selected via parameters H468/469. The current position is saved when changing-over to the operating. Then, the selected reference value from the traversing data set can be applied using a positive edge at the control bit advance (H472/H473). Thus, the traversing data set fulfills two functions. For absolute positioning, the absolute position is entered via the traversing data set and for relative positioning, the reference value, which is to be moved. The reference value can also be inverted via parameters H470/H471, i. e., the traversing direction can also be reversed. However, the same can be achieved using a negative reference value in the traversing data. Positive reference values traverse in the direction A→B, and negative reference values, in the direction B→A.

The following diagram should clearly indicate how the control signals interact:



Note:
If positioning is to involve several steps, but the drive is only to be moved once, then you can proceed as follows:

Step 1: Select relative positioning.
Step 2: The control bit, transfer position reference value (H464/465) is returned to zero.
Step 3: At the advance control bit, the required number is generated at the positive edges.
Step 4: The control bit, transfer position reference value (H464/465) is also set to 1.

A simple grid positioning system can be configured in this way with a low amount of logic circuitry and control bits.

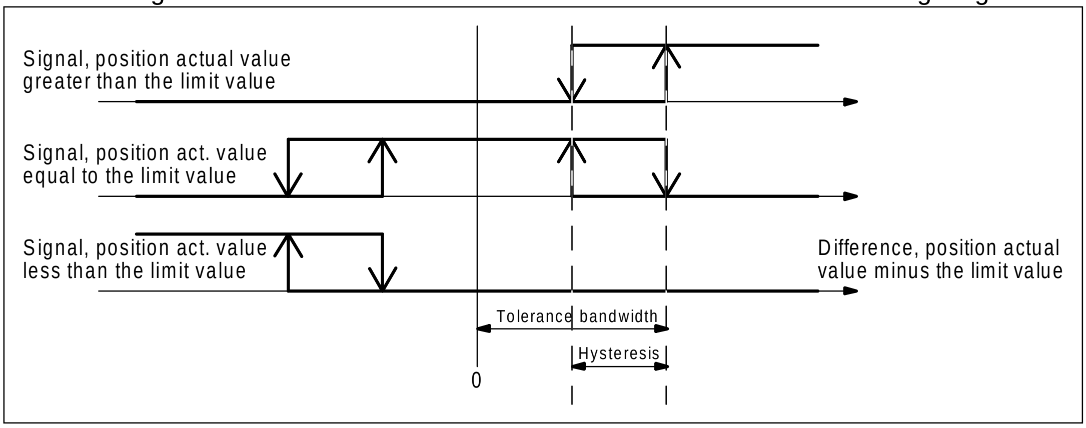
3.6.4.2 Inching, position-controlled (diagram C2)

In the *inching, position-controlled* mode, just as for relative positioning, at each positive edge of the inching control bit, the drive traverses a distance specified in parameters H466 and H467. The control functions of *inching, position-controlled*, are in Section **Fehler! Verweisquelle konnte nicht gefunden werden.**.

3.6.5 Traversing data sets, position limit values X, Y, Z (diagram C4)

The traversing data sets for the position limit values provide the comparison values for the position limit value monitors. The position limit value monitors are used to compare the position actual value with a position limit value. There are 3 position limit value monitors, which are designated with X, Y, Z.
Each of the limit value monitors provide the following information:
- position actual value greater than the position limit value
- position actual value equal to the position limit value
- position actual value less than the position limit value
In this case, a tolerance bandwidth as well as hysteresis can be parameterized.

The switching characteristics of the limit value monitor is shown in the following diagram:



The position limit values are selected as described in Section 3.6.1

3.6.6 Traversing data set, software limit switches A1, B1 (diagram C5)

The traversing data sets, software limit switches A1 and B1 provide the limit values for the position reference value input. The function is described in Section **Fehler! Verweisquelle konnte nicht gefunden werden.**.

3.6.7 Traversing data set, maximum velocity (diagram C5)

The maximum velocity traversing data set supplies the limit value for the position ramp-function generator. In addition to selecting the traversing data set, the maximum velocity can still be influenced via an adaption factor. The adaption factor is selected via parameter H560 and is switched-through via H561/H662.

Note:
The maximum drive traversing velocity consists of the sum of V_{max} from the traversing data set and the maximum possible position controller intervention (H732, H733).

3.6.8 Traversing data set, drive play (diagram C5)

The drive play traversing data set supplies the amount of play which is taken into account when referencing and when generating the reference value. Drive play is not just limited to the gearbox, but refers to the total of all the plays up to the object which is to be positioned.

The following table provides an overview regarding the effective direction of the play compensation.

Play	Traversing direction	Position reference value
Is equal to zero	A→B	Unchanged
Is equal to zero	B→A	Unchanged
Greater than zero	A→B	Position ref. value + play
Greater than zero	B→A	Unchanged
Less than zero	A→B	Unchanged
Less than zero	B→A	Position ref. value - play

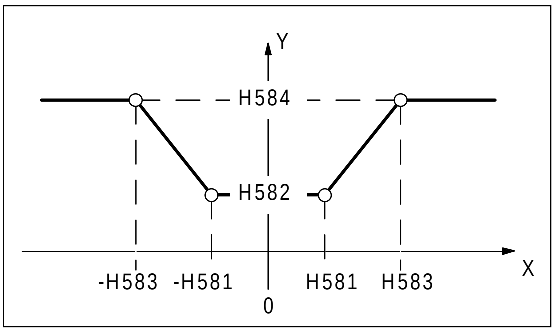
3.6.9 Traversing data set, speed controller gain adaption (diagram C6)

A *characteristic* with two points allows the proportional gain of the speed controller to be *adapted* in the basic unit as a function of any quantity. This is useful, if no constant controller parameters can be found as the loop is too complex. Frequently, the gain has a relationship to one of the loop parameters and the problem can be reduced, by adaption, to one involving just a linear loop.

The adaption is supplied with a selectable value, which is defined using H580. This is the input quantity for a characteristic, which, dependent on its absolute value, defines the factor with which the speed controller proportional gain in the drive converter is multiplied.

Information regarding CUVC and CUMC:
The following parameterization should be made in the basic drive: P233 = 0, P234 = 200%, P235 = 0 and P236 = 20. With this setting, the proportional gain, generated on the T300 is transferred 1 to 1 to the basic drive.

The two points are defined using H581 and H582, or H583 and H584. The characteristic is linearly interpolated between the points, and outside the points remains constant at the particular value.



The output value of the KP adaption is multiplied by the selected KP from the traversing data set, and transferred to the basic drive converter.

3.6.10 Traversing data sets, ramp-up/down time, position ramp-function generator (diagram C6)

The ramp-up and ramp-down times of the position ramp-function generator can be separately adjusted and are defined as follows:
In the ramp-up time, the drive goes from zero- up to the rated velocity. The same is true for the ramp-down time but in the opposite direction.
The ramp-up time represents the drive acceleration. If an absolute acceleration is to be converted into a ramp-up time, then proceed as follows:

$$Tu = \frac{Rated\_velocity}{Acceleration}$$

Example:
The rated drive velocity is 8m/s, and the maximum acceleration should be 2m/s²:

$$Tu = \frac{Rated\_velocity}{Acceleration} = \frac{8 \cdot \frac{m}{s}}{2 \cdot \frac{m}{s^2}} = 4 \cdot s$$

The mode of operation of the position ramp-function generator is described in more detail in Section 3.7.2.

3.6.11 Traversing data set, rounding-off time constant, position ramp-function generator (diagram C7)

The rounding-off time constant is used to round-off the drive torque at the start of the ramp-up and at the end of the ramp-up. The rounding-off time constant must be dimensioned, so that the mechanical system isn't excited resulting in oscillations.
Oscillations can also be propagated to the associated process, for example
- elasticities of the shaft and toothed belts.
- viscosity of fluids in packing machines.
- comfort level in elevators.

If there are no external boundary conditions, the rounding-off time constant should be between approximately 10 and 50ms. If acceleration should be noticeably gentler, then the values should be approximately 1/20 to 1/10 of the ramp-up time.

For especially critical applications, the natural system frequency should be analyzed. The rounding-off time constant must be significantly greater than the period of the natural oscillation .
The mode of operation of the position ramp-function generator is described in more detail in Section 3.7.2.

3.6.12 Traversing data set, ramp-down ramp A2, B2 (diagram C7))

The ramp times when passing over hardware limit switches A2 and B2 are defined using this traversing data set. Section 3.7.2 describes how these ramp times can be calculated.

3.6.13 Status word, reference value generation

The *status word, reference value conditioning* is defined as follows:

Bit	Description
0	Software limit A1 violated
1	Software limit B1 violated
2 to 15	Not used

3.7 Closed-loop position control (diagrams D)

The function diagrams of the closed-loop position control include the on/off control of the position control, position ramp-function generator, the position controller as well as the generation of the torque setpoint from acceleration and friction.

3.7.1 Switching the position control in/out (diagram D1)

The control differentiates between closed-loop speed- and closed-loop position controlled operation. As long as a closed-loop speed controlled mode is available, it is not possible to changeover to closed-loop position control. Closed-loop position controlled operation can be externally enabled (H700/H701 and H702/H703). If the position control is not enabled, and a closed-loop speed controlled mode is also not selected, the drive is speed-controlled with reference value zero.

3.7.2 Position ramp-function generator (diagram D2)

The position ramp-function generator calculates, for a traversing task, the accelerating-, velocity- and position characteristics. Secondary conditions such as the maximum velocity and the ramp-up- and ramp-down times are taken into account. The ramp-function generator can handle all parameter changes at any instant in time. Even when traversing, a new position reference value can be entered, or the ramp-up- and ramp-down times changed.

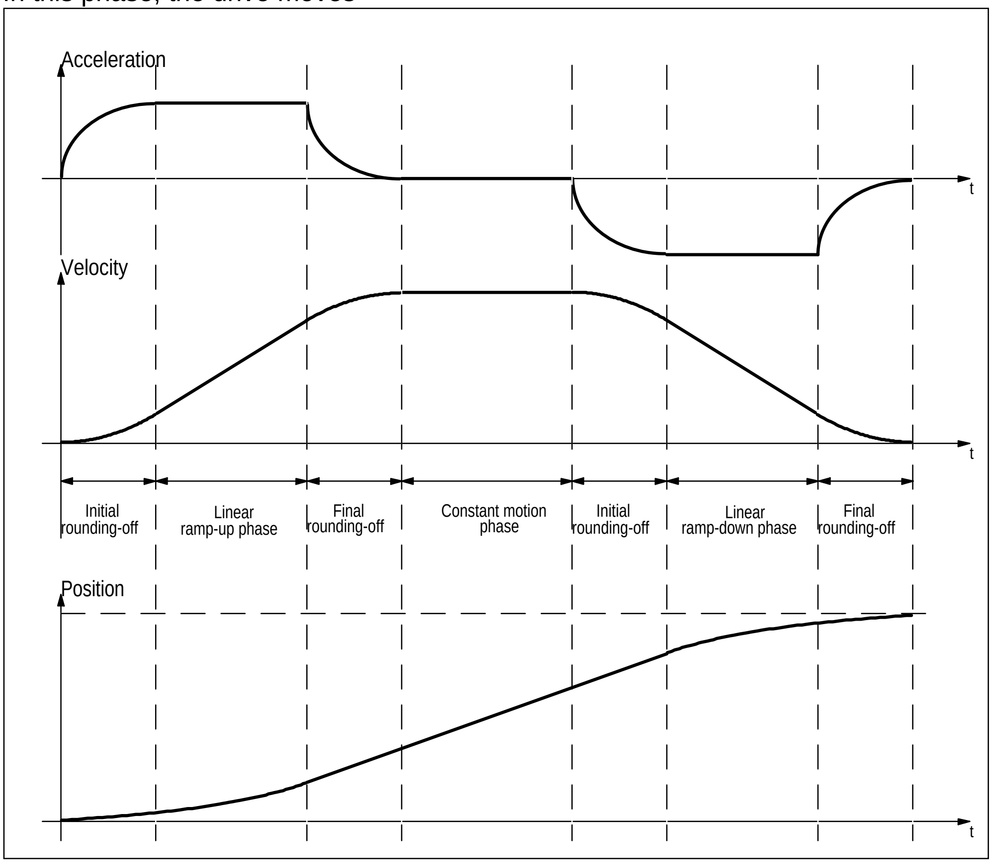
The drive motion when positioning can be sub-divided into several phases:

a) Initial rounding-off
In this phase, acceleration is increased from zero up to the maximum value

b) Linear ramp-up phase
In this phase, the velocity is ramped-up with constant acceleration

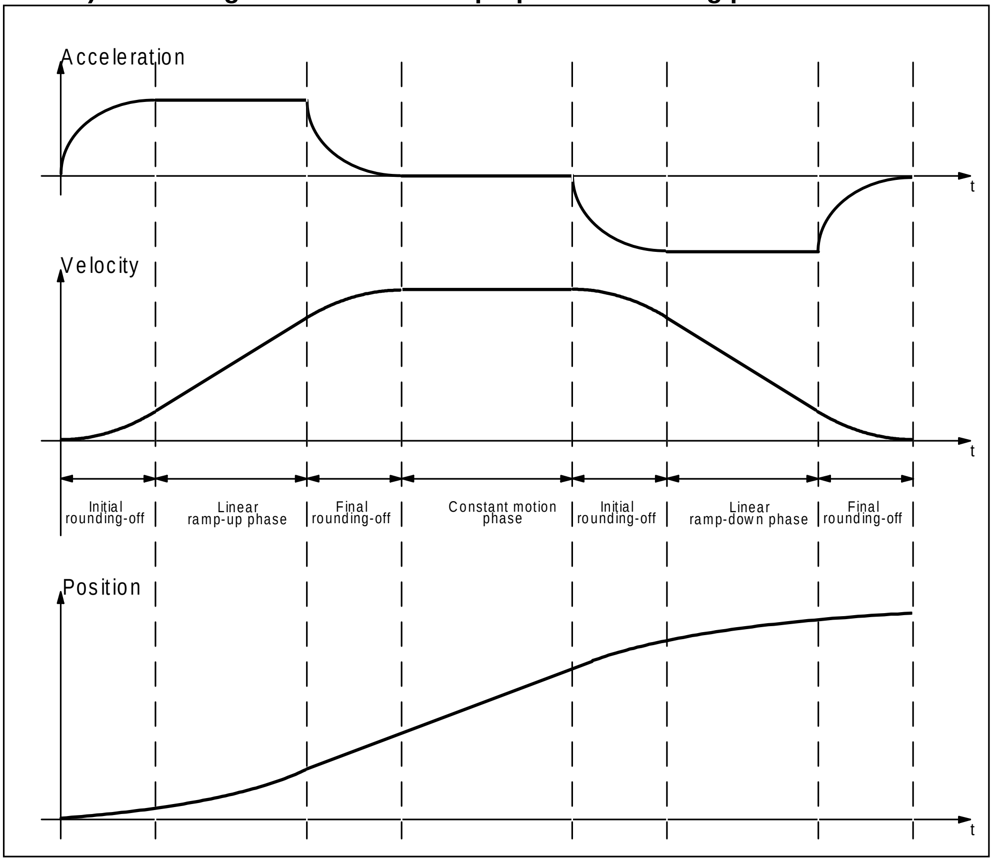
c) Final rounding-off
In this phase, acceleration is reduced from the maximum value down to zero

d) Constant motion phase
In this phase, the drive moves

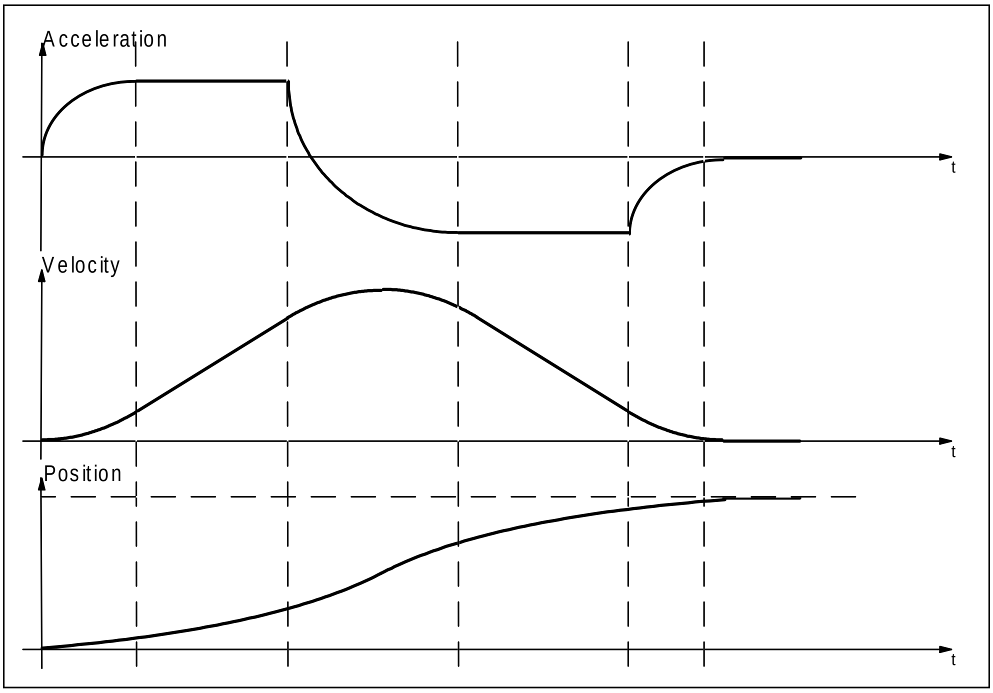


The most important cases when traversing are now illustrated.

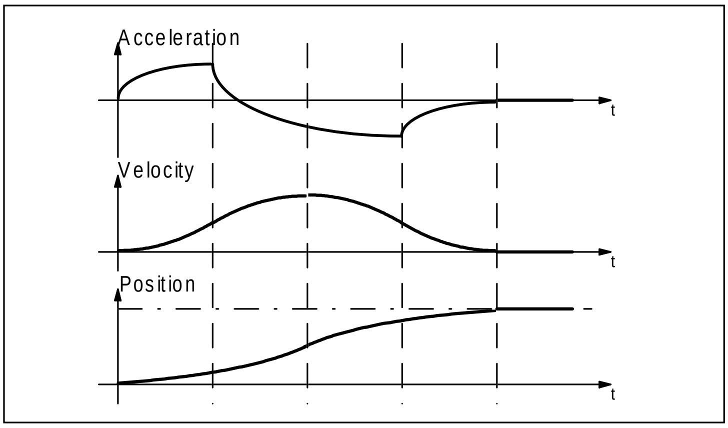
Case a) Traversing with constant ramp-up and traversing phase



Case b) Traversing with constant ramp-up, but without a constant traversing phase

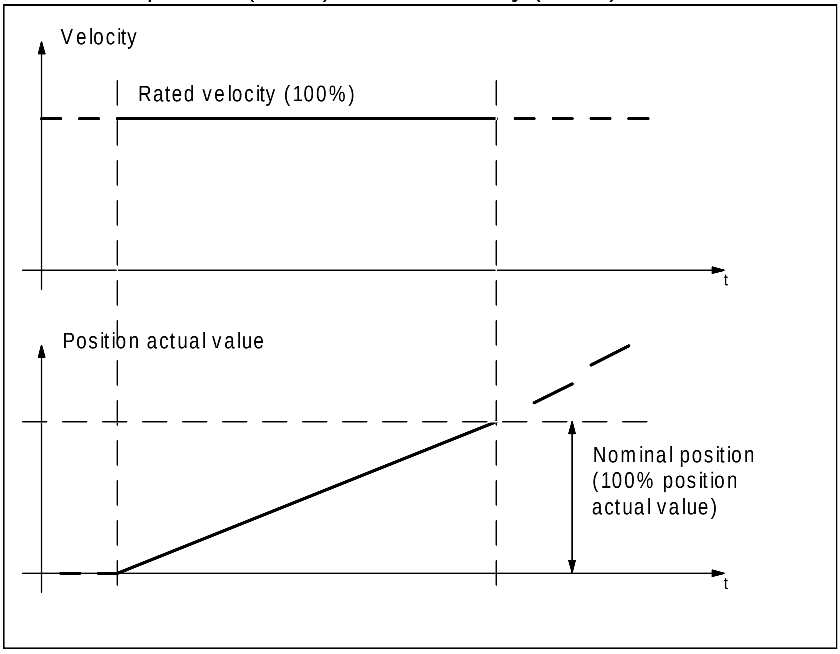


Case c) Traversing without constant ramp-up- and traversing phase



3.7.3 Integrating time, position control loop (diagram D2)

The integrating time of the position control loop is an elementary quantity of the position ramp-function generator, and must be set at start-up.
Definition:
The integrating time of the position control loop is the time which the drive requires to move from zero to the nominal position (100%) at rated velocity (100%).



The integrating time is calculated using the following formula:

$$Ti = \frac{\text{Nominal length}}{\text{Rated velocity}}$$

The rated velocity and nominal length must correspond with the parameterization of the pulse encoder inputs.
Example with data from Section **Fehler! Verweisquelle konnte nicht gefunden werden.**:

Pulse encoder:.......................... 1024 pulses per revolution
Gear:.. 1:10
Drive roll diameter:.................... 300 mm
Total traversing distance:.......... 20 m (= nominal length)
Maximum velocity .... 2m/s (= rated velocity)

Thus, with these values:

$$Ti = \frac{\text{Nominal length}}{\text{Rated velocity}} = \frac{20m}{2m/s} = 10s$$

For this normalization, 10000ms time should be entered into parameter H720.

Extremly long times (≥ 2 000 000 [ms]) can be entered using the range changeover with H719.

The resulting time value will be:

Time value = H720 * 2^{H719}

Example:

The time 10 000 000 [ms] has to be set. This time is 5 times higher as the maximum value adjustable in H720. The range can be set in 2^n steps, the value for H719 will be set to 3 (2^3=8)

$$H720 = \frac{\text{Time value}}{\text{Range}} = \frac{10\,000\,000\ [ms]}{8} = 1250\,000\ [ms]$$

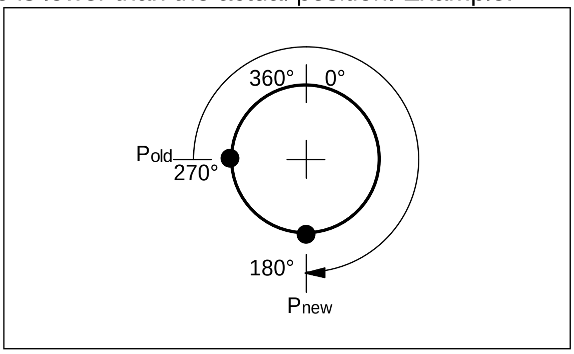
3.7.4 Normalization, acceleration (diagram D2)

In order that the numerical range and the resolution can be optimally used, the acceleration value of the ramp-function generator must be normalized. In this case, the lowest ramp-up and ramp-down time must be entered into H722.
This normalization may no longer be changed after commissioning, even if the ramp-up- or ramp-down time is changed.
Note:
If the lowest ramp-up time is entered when commissioning the system, then a 100% acceleration signal is obtained with this time. However, as the arithmetic range extends up to 200%, the ramp-up- or ramp-down time can be reduced to half the value after commissioning.

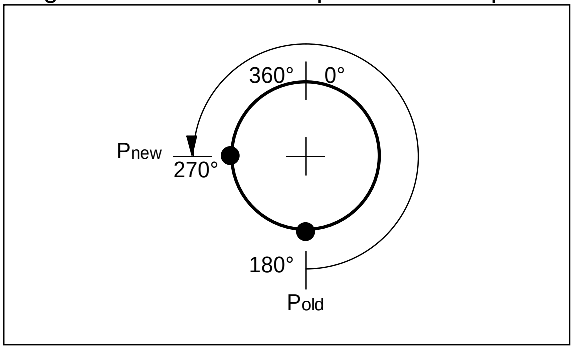
3.7.5 Reference value generation for rotary axis (diagram D2)

When positioning the rotary axis, there are three additional secondary conditions which must be taken into account. These are:

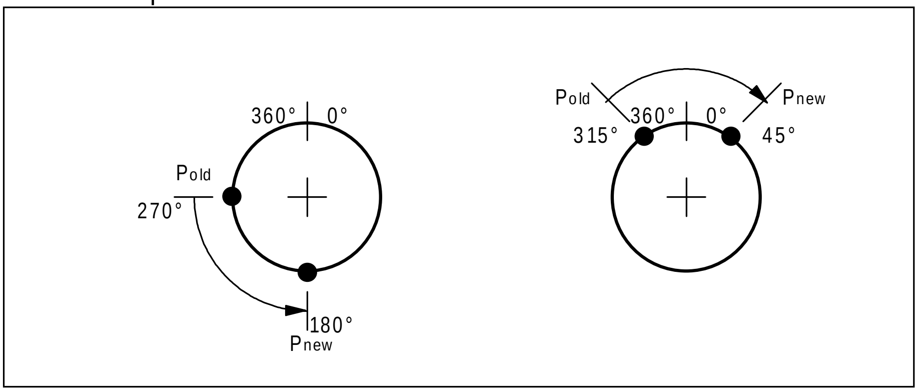
a) **Traversing direction only positive**
   When positioning, the drive only rotates in the positive direction, even if the new position reference value is lower than the actual position. Example:



b) Traversing direction only negative
When positioning, the drive only rotates in the negative direction, even if the new position reference value is greater than the actual position. Example:



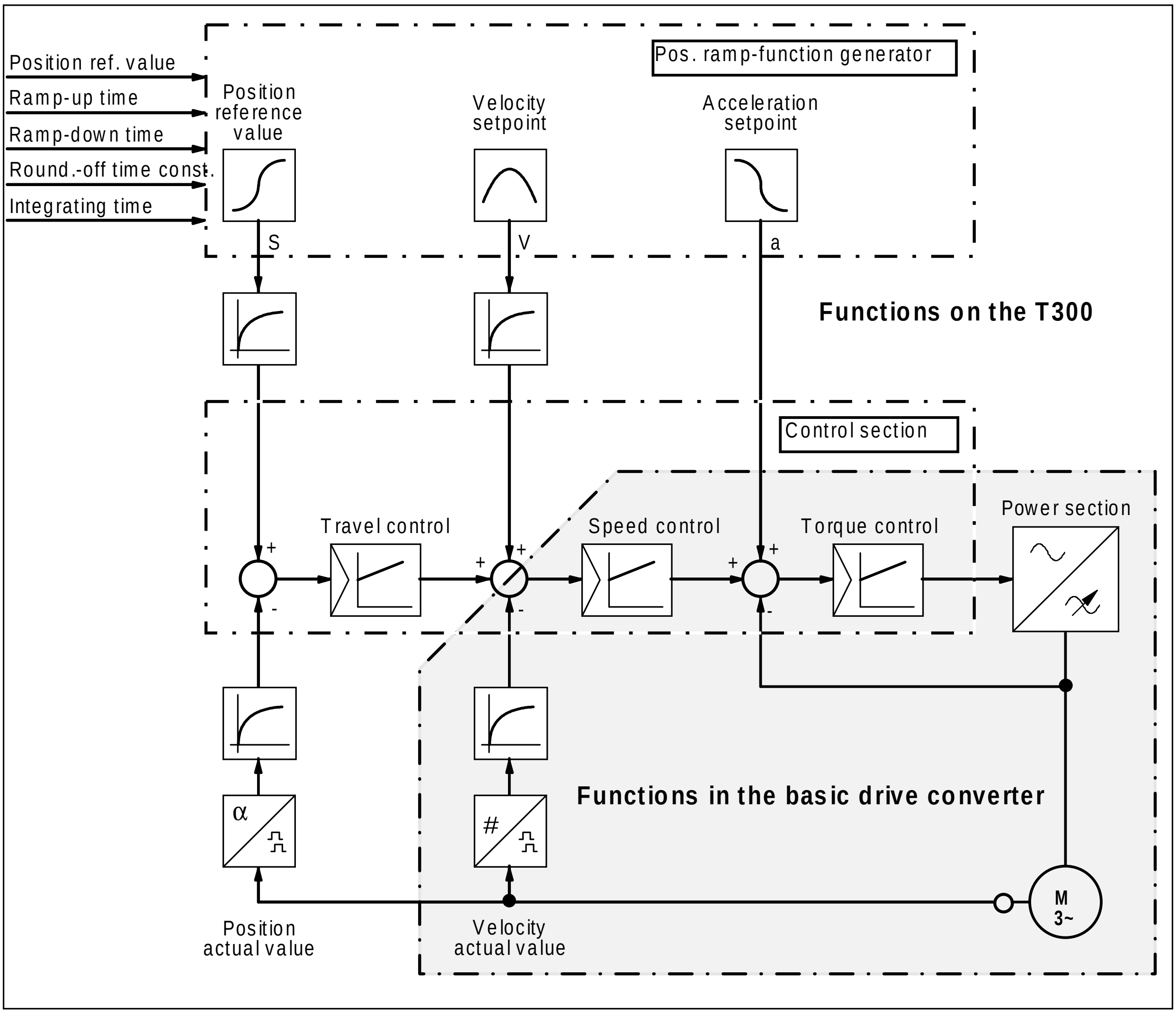
c) Shortest traversing path
In this mode, at each positioning, it is checked which traversing direction results in a shorter positioning travel. Examples:



3.7.6 Position controller, control structure (diagram D3)

The position controller can be used as either P- or PI controller. The position ramp-function generator generates the position-, velocity- and accelerating setpoints/reference values from the specified parameters. These signals are fed to the controllers as pre-control quantities. The smoothing functions in the actual value channel are used to dampen the control loop as far as drive play and elasticities are concerned. The smoothing functions in the setpoint channel must correspond with these smoothing functions.

The control structure is illustrated below:



The position reference value smoothing (H730) must be as high as the equivalent time constant of the speed controller loop plus a possibly existing smoothing time constant of the position actual value.

The speed reference value smoothing (H740) must be as high as the equivalent time constant of the torque control loop plus a possibly existing smoothing time constant of the speed actual value.

KP1 of the position controller is used to increase the proportional gain in H734 (-256...256) in a restricted range. In this case, the control difference can be increased to the power of two. Example:
A total Kp of 350 is to be implemented. In this case, for example, the control difference is first pre-amplified with 2^1 (H731=1). The remaining gain of 350/2=175 can be adjusted in H734.

The influence range of the position controller is defined using parameters H732/H733. If all of the pre-controls are correctly set, the position controller must only act to correct. Thus, normally a influence range of approx. 10% is adequate.

The speed reference pre-control can be set using H739. Is H739 set to 100%, the pre-control is enabled. By setting 0%, the pre-control is disabled. In this case the position controller output limiting has to be increased (H732=100%, H733=-100%). Generally H739=100%. H739=0% (special case) means also dynamic losses.

The position controller can be toggled between P- and PI controller characteristics using parameter H734. The PI characteristics of the position controller is only practical, if the speed controller in the basic drive converter is operated as P controller.

3.7.7 Tracking error monitoring (diagram D5)

The correct position control mode is monitoring using the tracking error monitoring function. The position reference value is compared to the actual value. If the difference exceeds the limit value, entered in H741, error message F121 is issued after the delay time in H745 has expired.

If the tracking error monitoring function responds, the reasons can be as follows:

Position controller

- Position controller gain too low (H731/H734)
- The position controller output limiting has been set too low (H732/H733), especially if the speed setpoint pre-control has been disabled. (H739=0).
- For extremely high dynamic drive requirements (fast response speed), inertia compensation is not selected (H738).

The drive cannot provide the torque

- The ramp-up- (H601), or ramp-down time (H621) of the position ramp-function generator has been set too low.
- The torque limits have been set too low
- The load is demanding excessive torque, or the drive is locked

Basic drive converter

- The basic drive converter has been incorrectly parameterized/not set-up according to the Start-up Instructions, Section 6.
- Speed control not optimized

Tracking error monitoring

- The limit is set too low, H741
- Delay time is set too low.

3.7.8 Generating the torque reference value (diagram D3)

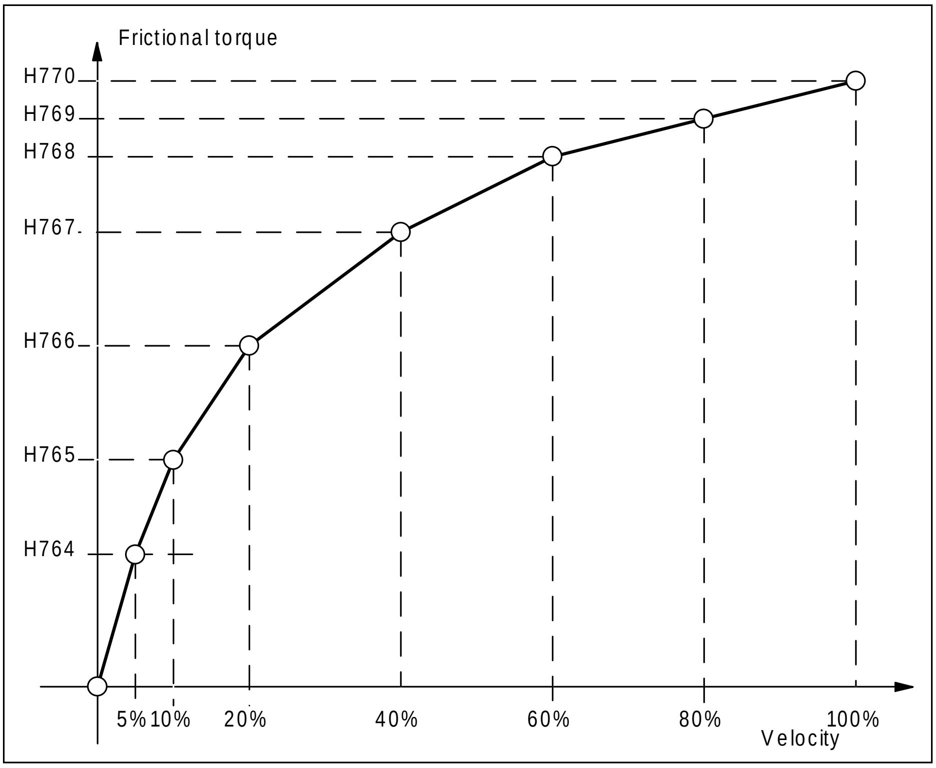
3.7.8.1 Friction characteristic (diagram D3)

The *friction compensation* controls the velocity-dependent torque losses of the drive. The friction compensation only has a slight influence on the drive dynamic performance. It is practical if the *automatic load measurement* function is used. If the friction characteristic is parameterized, the frictional torque when measuring the load is taken into account which results in more accurate measured values. Further, for drives which have a large friction, inertia compensation is only practical, if the friction characteristic has been determined.

Note:
The friction characteristic is significantly dependent on the temperature- and aging of the mechanical system. Thus, when determining the characteristic, the conditions actually encountered in practice should be used as far as possible.
The friction characteristic is very dependent on the drive design. There is no generally valid equation for the frictional torque. Generally it has fixed components and a velocity-proportion component, but it can also have a square-law (air resistance) or, for example, for oil-filled bearings, functions which are extremely complicated to define.

For these reasons, a characteristic with 7 points is provided. The abscissa values are fixed at 5%, 10%, 20%, 40%, 60%, 80%, 100%, and the ordinate values must be determined by measurement.

The frictional torques are entered in parameters H764 to H770. The characteristic is symmetrical, so that at negative velocities, the frictional torques are also negatively pre-controlled. The characteristic is linearly interpolated between the points, and outside the range defined by the points, the characteristic is horizontal.



The friction characteristic is determined as follows:
The velocities (5%, 10%, 20%, etc.) are approached in closed-loop speed controlled operation and after stabilization, the static torque is determined.

It is also possible to switch the frictional torque immediately as supplementary torque, and to adjust the speed controller output (CUVC,CUMC:r255; CU2,CU3:r245) to zero at the selected velocity points by changing the particular friction coefficient.

3.7.8.2 Inertia compensation (diagram D3)

The pre-control of the *accelerating torque* relieves the controller when the velocity is changed. Otherwise, the velocity controller would first have to establish the accelerating torque as result of the setpoint- actual value difference, it is now calculated and pre-controlled. The controller must only generate low correction torques, if the pre-controlled torque is not exactly correct. The accelerating torque is generated by multiplying the accelerating setpoint from the position ramp-function generator and the moment of inertia (H738).

As frequently the moment of inertia is not constant, a circuit to measure the actual loading is integrated. When the velocity increases, the moment of inertia is measured, and is taken into account for the positioning at braking. In this case, a fixed moment of inertia is first specified (empty trolley). The influence of the *automatic load measurement* can be set using parameter H772.

3.7.9 Setpoint generation, speed-controlled modes (diagram D4)

All of the closed-loop speed controlled modes are illustrated in the following Table.

Mode	Comments
Speed control 1	The drive rotates with the setpoint parameterized in H750
Speed control 2	The drive rotates with the setpoint parameterized in H751
Speed control 3	The drive rotates with the setpoint parameterized in H752
Referencing	The drive rotates with the setpoint from the referencing control (H330, H332)
Inching 1 and 2	The drive powers-up and rotates with the setpoint parameterized in H753 (inching 1) and H754 (inching 2).
Standard stop	The ramp-function generator input is switched to zero

A dedicated ramp-function generator is available for the speed-controlled modes. A closed-loop speed controlled mode can be selected jolt-free. The ramp-up time is set in parameter H761, and the ramp-down time in H760. If hardware limit switch A2 or B2 is actuated, the ramp-down time, set in H760 is changed over to the down ramp in the traversing data set.

3.7.10 Status word, position control (diagram D5)

The position control status word is defined as follows:

Bit	Description
0	Tracking error outside the tolerance
1	Tracking error within the tolerance
2	Velocity setpoint greater than the actual value
3	Velocity setpoint equal to the actual value
4	Velocity setpoint less than the actual value
5	Position ref. value greater than the position act. value
6	Position ref. value equal to the position actual value
7	Position ref. value less than the position actual value
8	Position control enabled
9	Speed-controlled operation
10	Position controller at the upper limit
11	Position controller at the lower limit
12	Drive has positioned
13	Not used
14	Not used
15	Not used

3.7.10.1 Status bit, drive has positioned

The *drive has positioned* signal is a checkback signal that the positioning task was executed. In this case, in addition to checking that the position reference value and actual value are the same, it is also checked as to whether the velocity setpoint and actual value are zero. If the signal is available for longer than the time specified in H735, the positioning signal is output.

3.8 Special functions (diagrams E)

3.8.1 Motorized potentiometer (diagram E1)

The motorized potentiometer is essentially used to select a setpoint using the *raise setpoint and lower setpoint* control signals. The motorized potentiometer can be set to a specific value.
The motorized potentiometer can also be used as ramp-function generator.

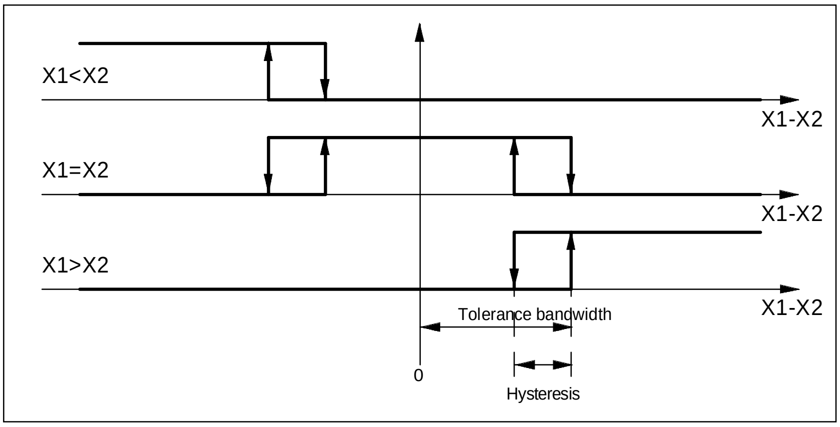
3.8.2 Visualization parameters (diagram E1)

In addition to permanently assigned display parameters, there are 6 free visualization parameters. Using these parameters, any connector can be displayed.
An overview of the visualization parameters is provided in the subsequent table:

Visualization parameters	Selection parameters	Data type
d089	H846	Normalized word quantities (% quantities) e. g. velocities, torque
d090	H847	Normalized double-word quantities (% double word quantities) e. g. positioning control loop signals
d091	H848	Hex quantities, e. g. status- and control words
d092	H849	Integer word quantities
d093	H850	Integer double word quantities, e. g. scaled position values
d094	H851	% double-word quantities, scaled.

3.8.3 Limit value monitors (diagram E2)

The *limit value monitors* are used to compare process quantities with one another or with fixed threshold values. The limit value monitors are sub-divided into two groups. Group 1 consists of 4 limit value monitors which compare the double-word quantities and are therefore used for position limit values. Group 2 consists of 4 limit value monitors for word quantities. A tolerance bandwidth and a hysteresis can be set for each limit value monitor.
The following schematic clearly shows the switching characteristics.



3.8.4 Generating a freely-definable status word (diagram E3)

Using the *freely-definable status word*, a user can create a 16-bit word from any status signal. Each bit position can be assigned a binary status signal. Thus, a status word can be generated for an automation, a partner drive or for internal control bits.

It can also occur, that several bits (OR logic operation) can be used for a control function. If these come from the same source, so this can be simply realized by specifying a mask in which these bits are set. However, if bits are used from various sources, then this can be implemented by first gathering the signals of interest in a free status word, and then evaluating as described.

3.8.5 Free functions

A selection of functions is available for test purposes. The free functions are displayed in the STRUC diagram FP-RANDOM, and can be used with the SIMADYN D service- and start-up program.

3.8.6 NOVRAM assignment

32 bytes can be stored on the board, which are then also available after a voltage failure. In addition to the pre-programmed values, any word can be stored in the NOVRAM.

The NOVRAM is assigned as follows:

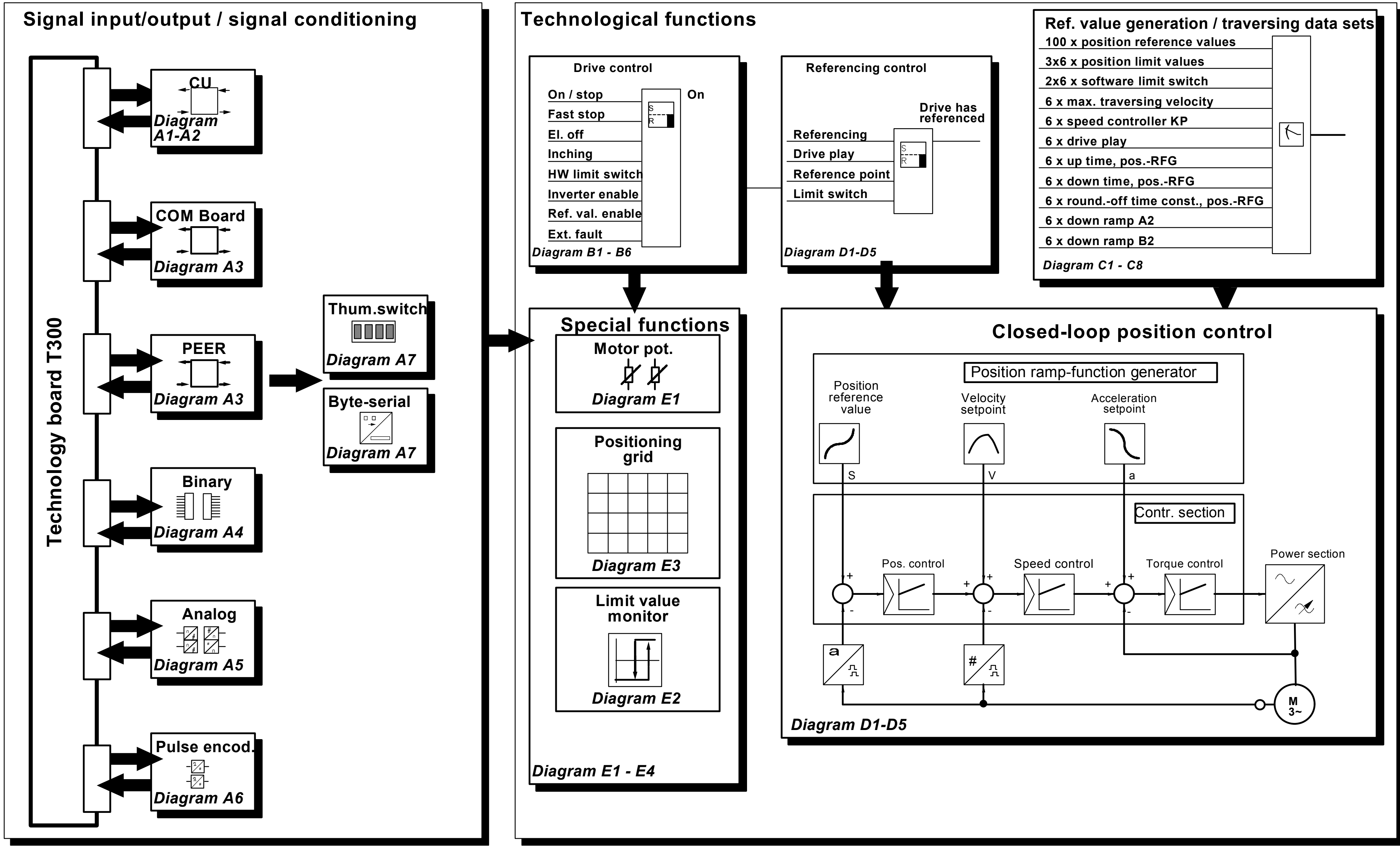
Connector	Contents
K062 K063	Position actual value, pulse encoder 1
K064 K065	Position actual value, pulse encoder 2
K081	Diagnostics word, shutdown
K254	Freely-definable word
K249 K250	Motorized potentiometer output

3.9 Function diagrams

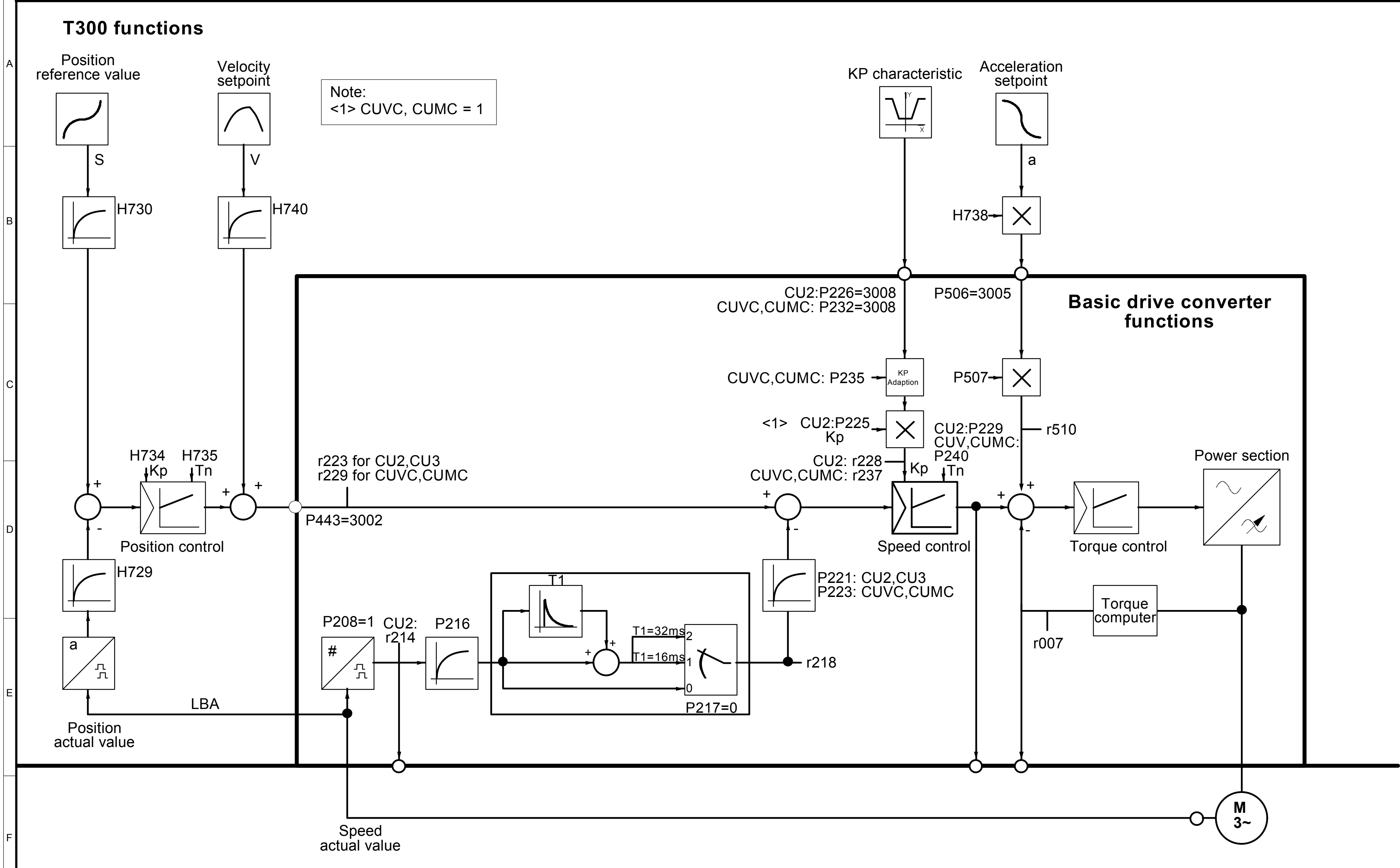
Function diagrams A-E now follow.

Page	Contents
1	Function overview
2	Block diagram, closed-loop control
3	General information
4	Handling connectors
5-6	Function symbols
	Diagrams A : Signal input/output / signal conditioning
A1	Communications with the basic drive converter (CU) / IDs
A2	Status words from the basic drive conv. / control words to the basic drive converter
A3	Communications with the COM-BOARD / peer-to-peer coupling
A4	Binary inputs / binary outputs
A5	Analog inputs / analog outputs
A6	Pulse encoder evaluation 1
A7	Pulse encoder evaluation 2
A8	Velocity actual value / position actual value for the closed-loop control
A9	Setpoint input via thumbwheel switch / byte-serial data input
A10	Status word, input/output / constant values
	Diagrams B : Open-loop drive control / referencing control
B1	Powering-up / powering-down the drive
B2	Stop / electrical off / fast stop
B3	Inverter enable / setpoint enable / brake control
B4	Generating the error word / alarm word
B5	Status word, control / fault acknowledgement
B6	Referencing mode / signal that the drive has referenced
B7	Changeover, referencing direction / enable reference point evaluation, referencing error
B8	Checking that the approach path is greater than the minimum approach path
B9	Monitoring the reference point position
B10	Status words, referencing control
B11	TR-encoder load control

Page	Contents
	Diagrams C : Setpoint/reference value conditioning
C1	Parameterization, setpoint conditioning / fixed setpoints
C2	Selecting the position ref. value / inching, position controlled / play compensation
C3	Monitoring software limits
C4	Position limit values X, Y, Z
C5	Software limit switches A1, B1 / maximum velocity / drive play
C6	KP adaption, speed controller / ramp-up - ramp-down time, position RFG
C7	Rounding-off time constant. position RFG / down ramps A2 and B2
C8	Status word, reference value conditioning
	Diagrams D : Closed-loop position control
D1	Enabling the position control / speed-controlled modes
D2	Position ramp-function generator
D3	Position controller / friction characteristic / automatic load measurement
D4	Setpoint generation, speed-controlled modes
D5	Status word, closed-loop position control
	Diagrams E : Special functions
E1	Motorized potentiometer / visualization parameters
E2	Position limit value monitor / free limit value monitor
E3	Freely-definable status word / status word, special functions



Status	Change	Date	Name	Date 15.1.97 / C. pers. Reh / Checked / Standard	Standard MS380 positioning software package	SIEMENS	Function overview	OVERVIEW	Sheet 1+



				Date	15.1.97	Standard MS380 positioning software package	SIEMENS	Block diagram closed-loop control	=
				C. pers.	Reh				+
				Checked				OVERVIEW	Sheet 2+
Status	Change	Date	Name	Standard					Sh.

Types of lines:

Depending on the particular signal type, various line types can be assigned in the diagrams	Example:
Signals, which represent a bit quantity, are shown as a thin line.	
Signals, which represent a word quantity, are shown as a thick line.	
Signals, which represent a closed-loop control signal in a word format, are shown as a thick line with arrow.	
Signals, which represent a closed-loop control signal in a double-word format, are shown as double line with arrow.	

Cross references

Cross references are provided with page and column data	Example: Cross reference on Page 10, column 8 [10.8]

Cross references to the hardware

Cross references to the inputs/outputs of the board are realized by specifying the terminal on terminal block SE300 as well as specifying the connector and pins on the technology board	Example: Binary input ***Terminal SE300*** ***PIN T300 -X136*** ***601*** ***1***

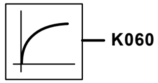
Binary signals

The description of the binary signals is always realized for the 1 state	Example No fast stop Fast stop is not present for signal state=1

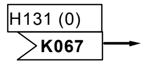
Many signals are defined to be freely connected-up as connectors (also refer to Section 5)

Example:

Connector
The connector, in which the signal is deposited, is located at the function block.

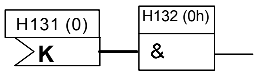


Selecting a connector
If the connector is to be further connected, the connector number is entered as source.
Example:
Connector K067 is to be further connected to parameter H131. The connector is entered in the function diagram

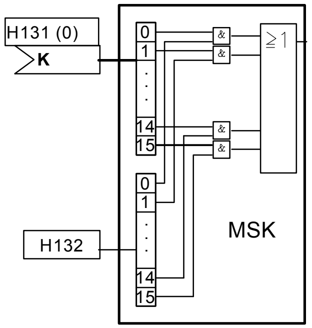


H131=67

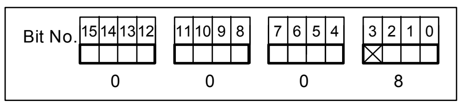
Selecting bits from a connector
A connector always consists of 16 bits.
If one or several bits are to be selected from a connector, a masking block is used.
The circuit below has the function shown in the adjacent diagram



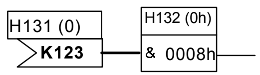
Also refer to Section 5



Selecting a bit from a connector
If it involves a word-format quantity for the connector, from which a bit is to be selected, in addition to the multiplexer at the masking block, the bit to be selected is also specified.
Example:
Bit No. 3 of connector 123 is to be switched-through to the output. Thus, 123 must be entered in H131 as source. The mask to select bit 3 is thus obtained as follows:

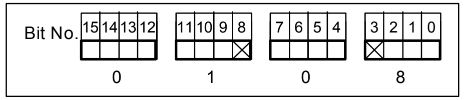


Selecting from bit No. 3 in connector K123



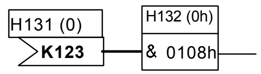
H131=123 ***H132=0008***

Selecting several bits from a connector
It is also possible to simultaneously select bits from a connector.
Example:
Bit No. 3 and bit 8 of connector 123 are switched-through to the output.
The selection mask is obtained as follows:



The masking block output is set to 1, if bit 3 or bit 8 is set in the connector.

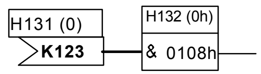
Selecting from bit No. 3 and bit No. 8 in connector K123



H131=123 ***H132=0108***

Pre-assigning connectors and maskings
The pre-assignment is specified after the param. No. of the connector selection in brackets.
Example:
0 is pre-assigned in H131 as source

Masking blocks without any data are pre-assigned FFFFh.



Logic symbols

AND

I1, I1 — & — Q

I1	I2	Q
0	0	0
0	1	0
1	0	0
1	1	1

OR

I1, I1 — ≧1 — Q

I1	I2	Q
0	0	0
0	1	1
1	0	1
1	1	1

Flip-flop reset dominant

S, R — Q

S	R	Q
0	0	Q
0	1	0
1	0	1
1	1	0

Flip-flop set dominant

S, R — Q

S	R	Q
0	0	Q
0	1	0
1	0	1
1	1	1

EXCLUSIVE OR

I1, I1 — =1 — Q

I1	I2	Q
0	0	0
0	1	1
1	0	1
1	1	0

NOT

I — 1 — Q

I	Q
0	1
1	0

Edge evaluation

I — Q

I	Q
0	0
1>0	1

MONOFLOP

I — 1 T — Q

I	Q
0	0
0>1	T

Switch-off delay

I — 0 T — Q

I	Q
1	1
1>0	T

Switch-on delay

I — T 0 — Q

I	Q
0	0
0>1	T

Comparator

X1, X2 — QU (1 at X1>X2), QE (1 at X1=X2), QL (1 at X1<X2)

Limit value monitor with hysteresis

Bit selection

X — H132 (0h) & 0108h

With the parameter a bit is filtered from word X and switched-through to output Q

Input/output signals

Pulse encoder evaluation (#)

A/D conversion (∩ / #) — **Digital/Analog** (# / ∩)

Binary input — **Binary output**

Communications receive — **send**

Conversion bits->word (D/#) — **word->bits** (#/D)

Control blocks

PT1 element — X, Y

Integrator — X, Y

Differentiator — X, Y

PI controller — XE, Y

PID controller — XE, Y

Limiter — X, Y

Ramp-function generator — X, Y

Arithmetic blocks

Multiplier — X1, X2, Y or X1, X2, Y — $Y = \frac{X1 * X2}{100\%}$

Adder — X2, X1, Y — Y = X1 + X2

Sign reversal — X, (-1), Y — Y = -X

Polygon characteristic — X, Y — Y = f(x) — Can be defined using points

Multiplexer — X1, Xn, n, Y — Y(n) = Xn

Divider — X1, X2, Y or X1, X2, Y — $Y = \frac{X1}{X2} \times 100\%$

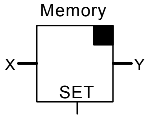
Change-over switch — X1, X2, I, Y

I	Y
0	X1
1	X2

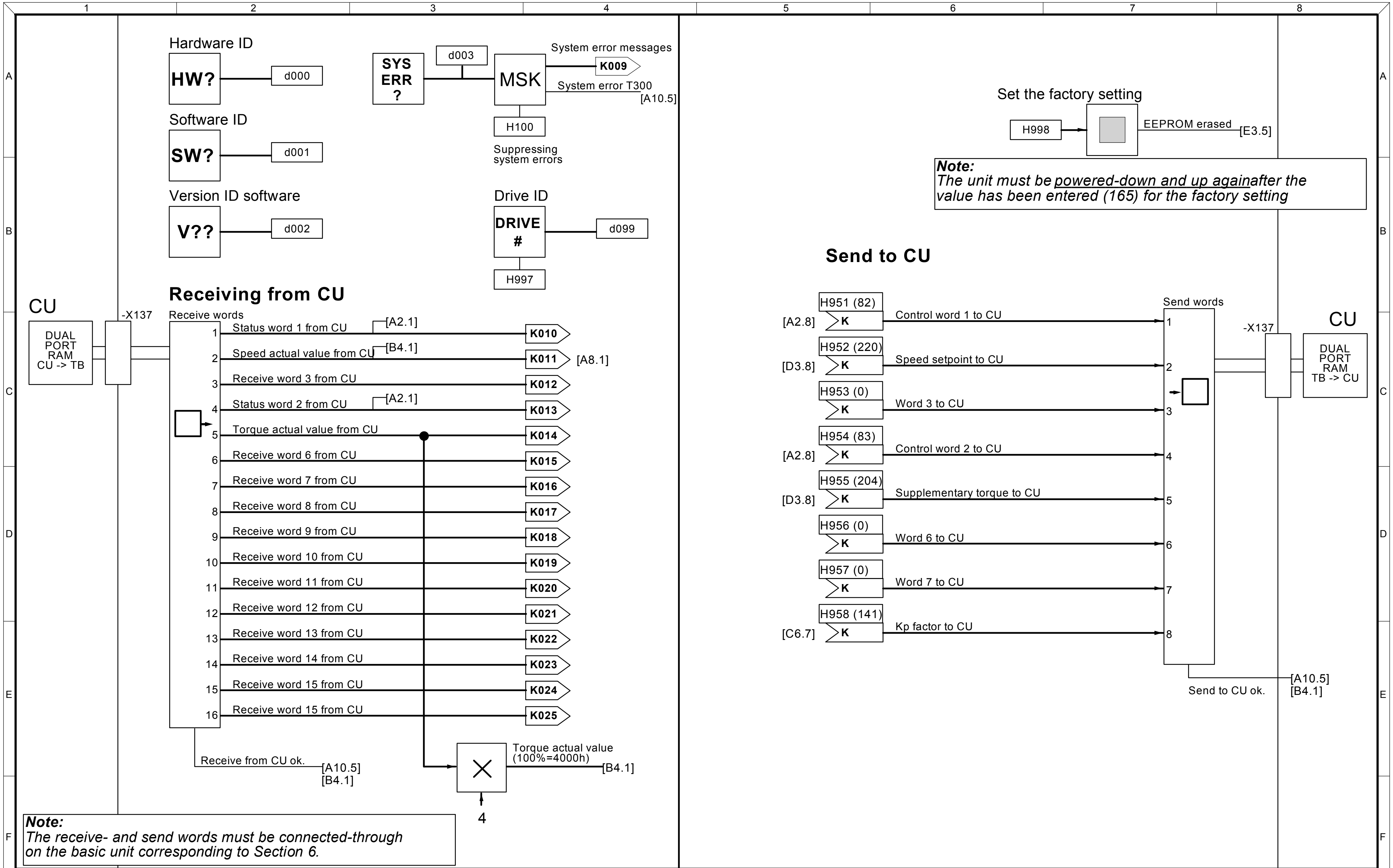
Absolute value generator — X, Y — Y = |X|

Status	Change	Date	Name	Date 15.1.97 / C. pers. Reh / Checked Bader / Standard	Standard MS380 positioning software package	SIEMENS	Function symbols I	FP_DEF	= +	Sheet 5+ Sh.

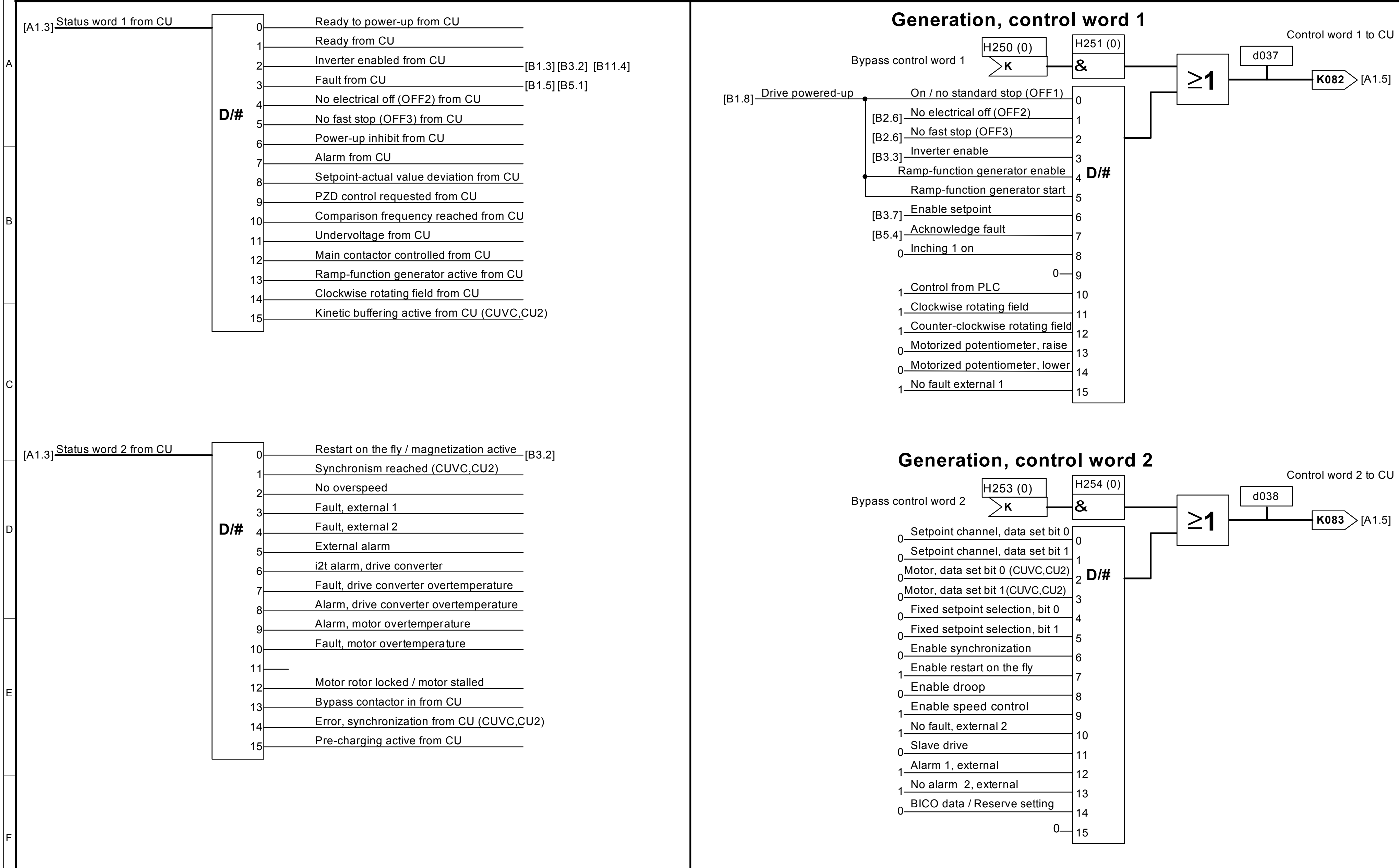
Memory blocks



SET	Y
0	Y
1	X



Status	Change	Date	Name	Date 15.1.97 / C. pers. Reh / Checked Bader / Standard	Standard MS380 positioning software package	SIEMENS	Communications with the basic drive converter (CU), receive/send telegram	FP_A1_6	Function diagram A1	Sheet A1+ Sh.

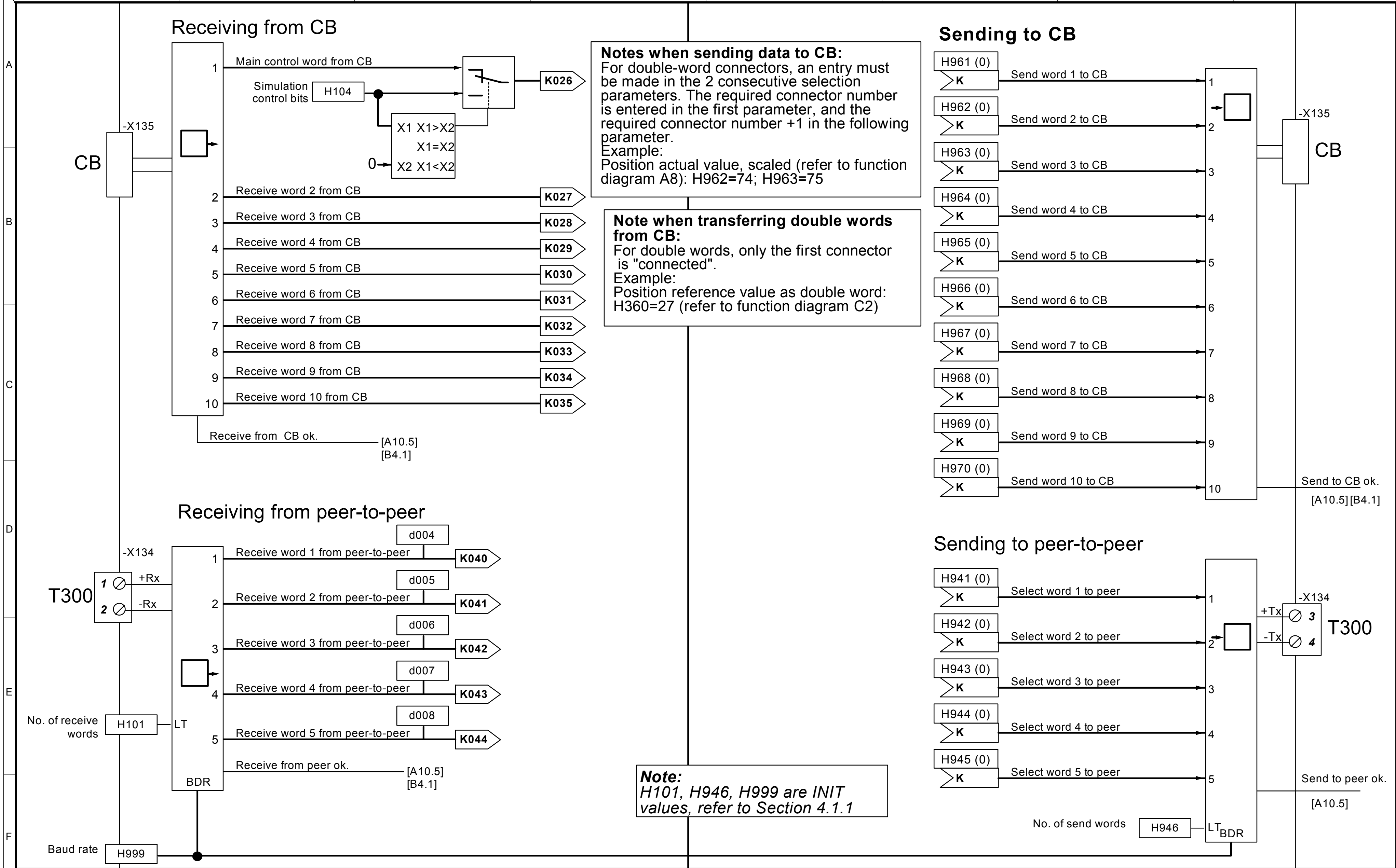


			Date	15.1.97	Standard MS380 positioning software package
			C. pers.	Reh	
			Checked	Bader	
Status	Change	Date	Name	Standard	

SIEMENS

Status words from the basic drive converter
control words to the basic drive converter

FP_A1_6 — **Function diagram A2** — Sheet A2+ Sh.



Status	Change	Date	Name		
				Date	15.1.97
				C. pers.	Reh
				Checked	Bader
				Standard	

Standard MS380 positioning software package

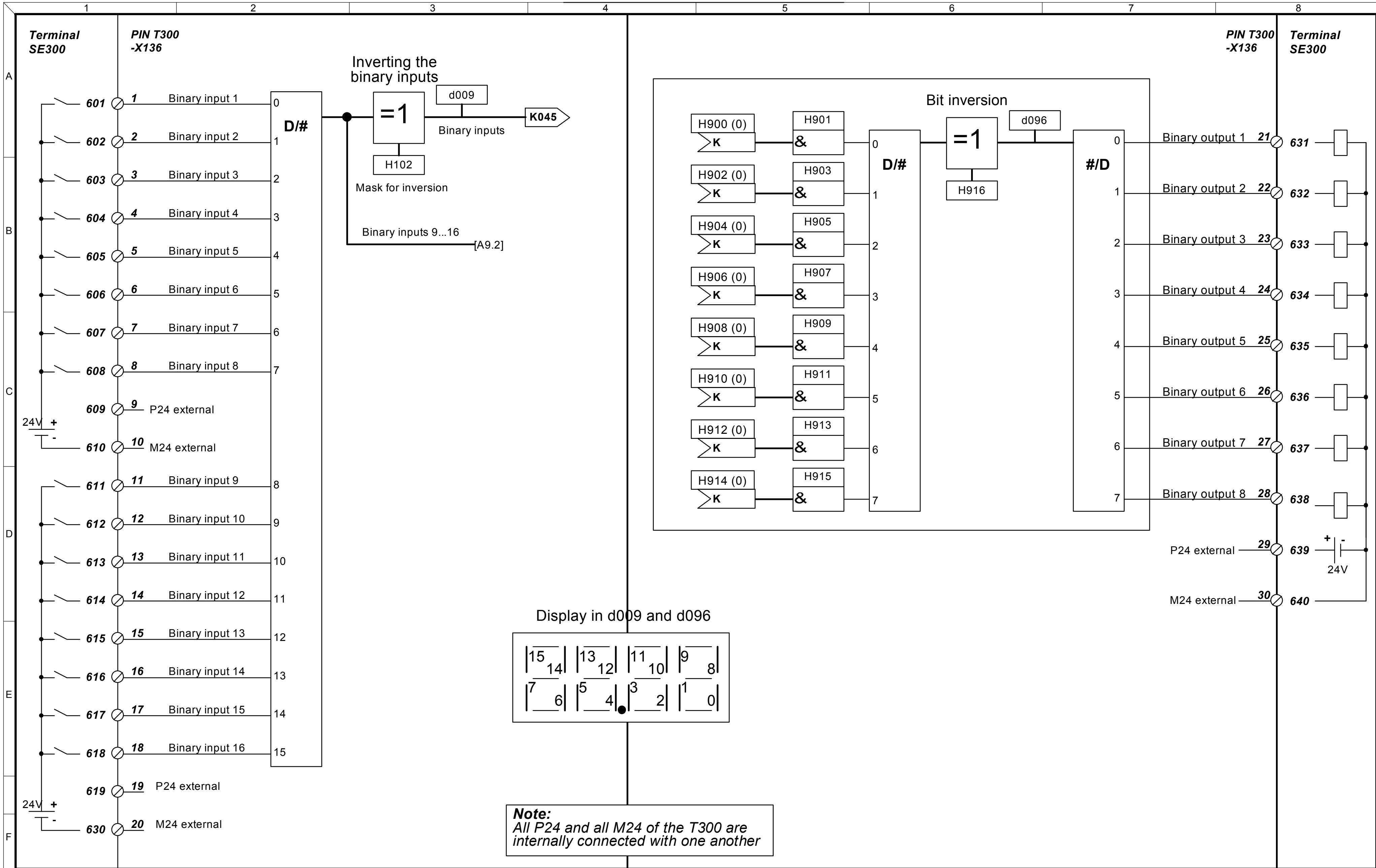
SIEMENS

Communications with the COM-BOARD, peer-to-peer coupling

FP_A1_6

Function diagram A3

Sheet A3+
Sh.

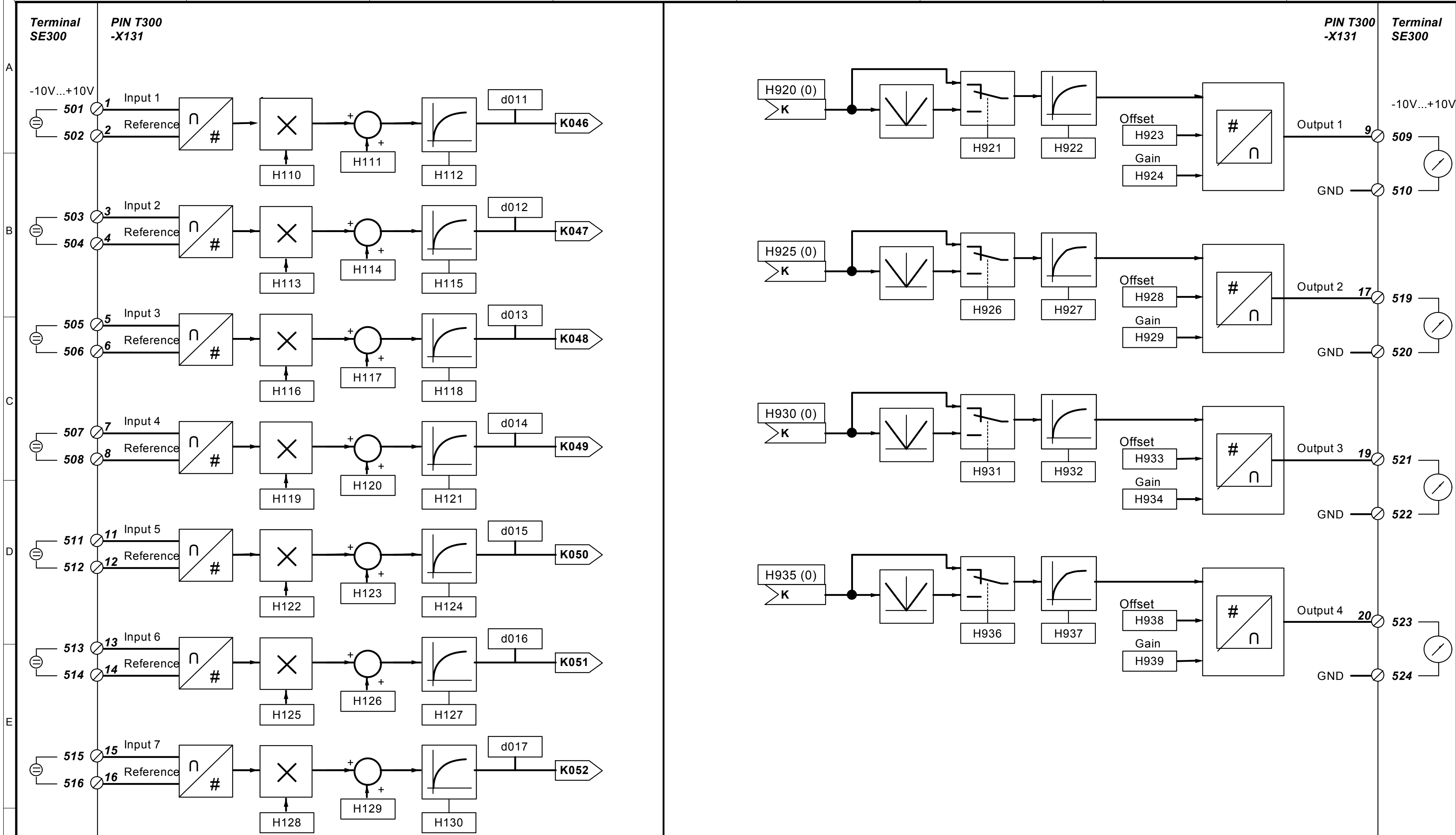


			Date	15.1.97	Standard MS380 positioning software package
			C. pers.	Reh	
			Checked	Bader	
Status	Change	Date	Name	Standard	

SIEMENS

Binary inputs
binary outputs

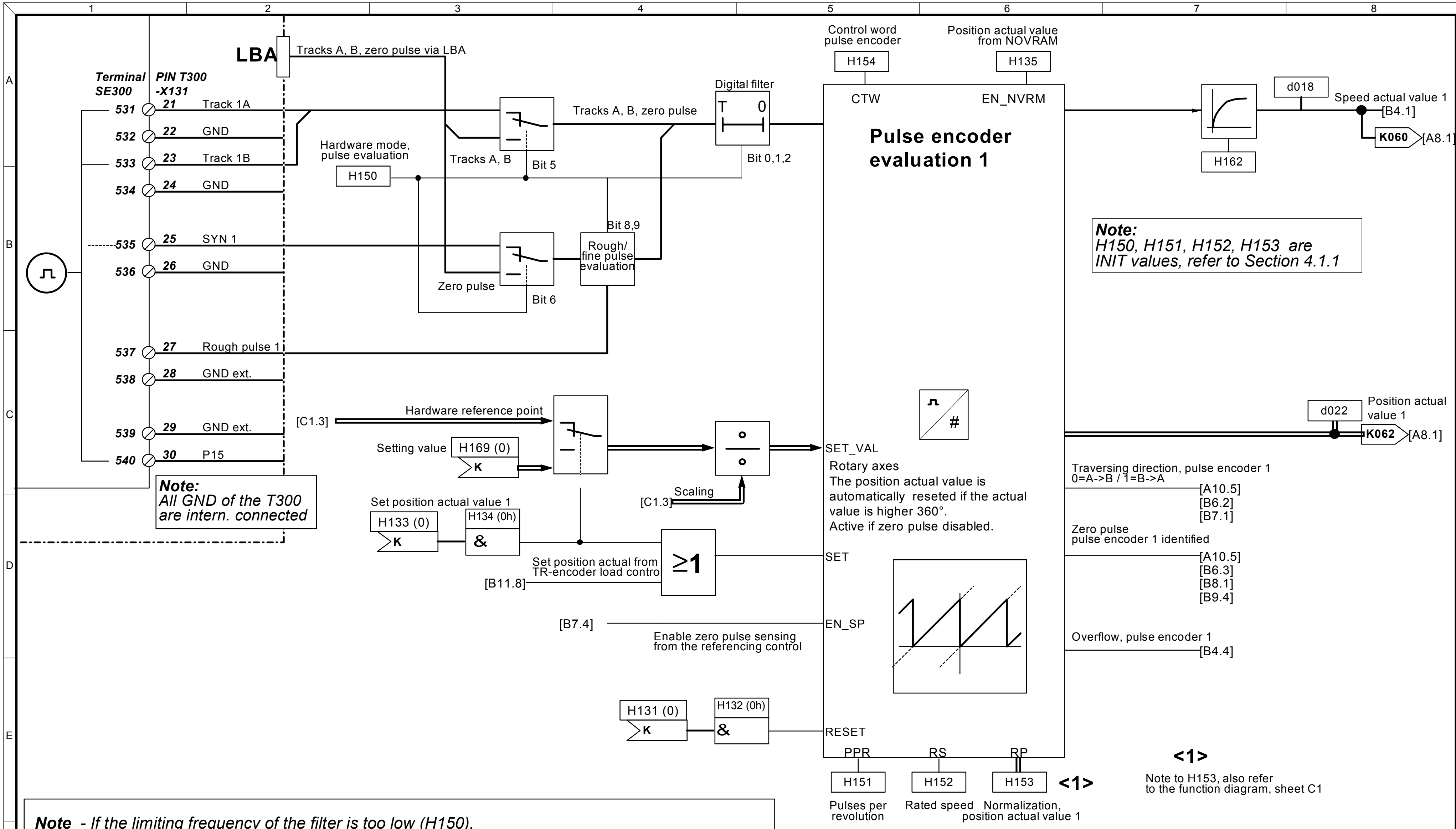
FP_A1_6 — **Function diagram A4** — Sheet A4+ Sh.



Note:
All analog inputs are already smoothed per hardware with 0.5 ms.
The differential inputs must be connected according to Section 2

Note:
All GND connections of T300 are intern. connected

Status	Change	Date	Name	Date	15.1.97	Standard MS380 positioning software package	SIEMENS	Analog inputs, analog outputs	FP_A1_6	Function diagram A5	Sheet A5+ Sh.
				C. pers.	Reh						
				Checked	Bader						
				Standard							



Note - *If the limiting frequency of the filter is too low (H150), this results in an erroneous and non-reproducible position actual value measurement.*

Note - *Only one pulse encoder can be supplied from the technology board. If 2 pulse encoders are to be connected, one pulse encoder must be supplied from an external power supply unit.*

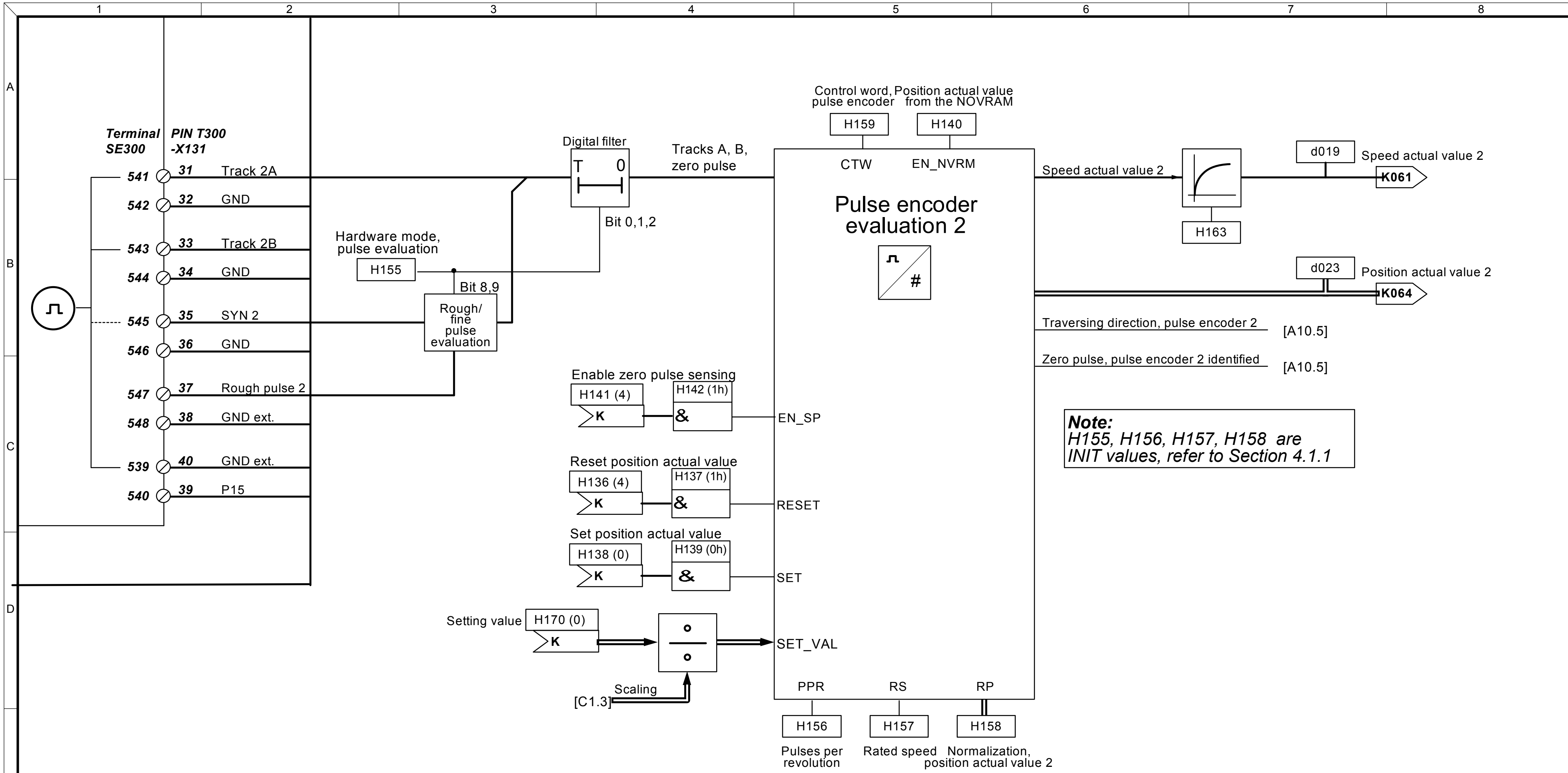
Status	Change	Date	Name		
				Date	15.1.97
				C. pers.	Reh
				Checked	Bader
				Standard	

Standard MS380 positioning software package

SIEMENS

Pulse encoder evaluation 1

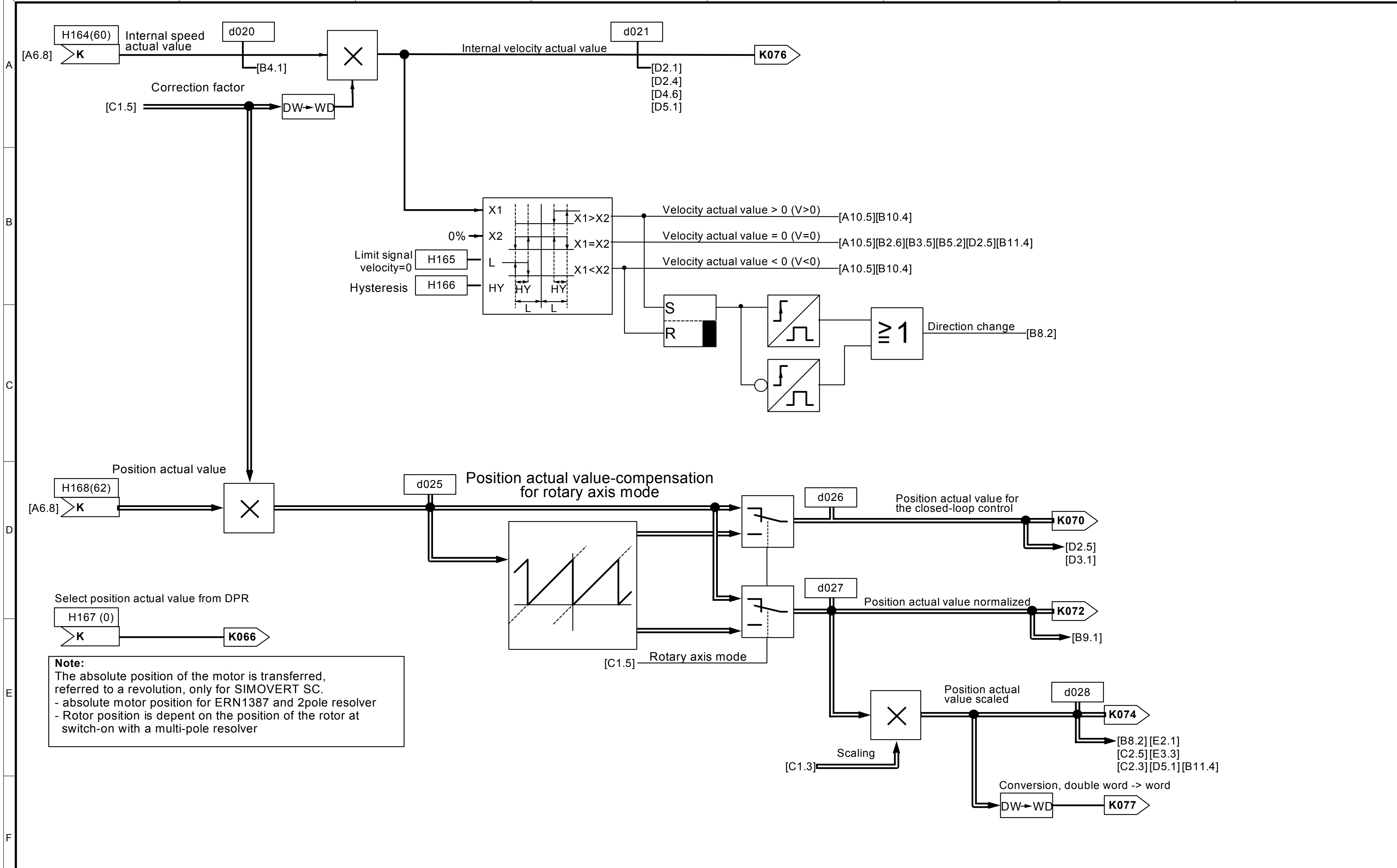
FP_A1_6 — **Function diagram A6** — Sheet A6+ Sh.



Note:
All GND are internally connected

Note:
Only one pulse encoder can be supplied from the technology board.
If 2 pulse encoders are to be connected, one pulse encoder must be supplied from an external power supply unit.

Status	Change	Date	Name	Date 15.1.97 / C. pers. Reh / Checked Bader / Standard	Standard MS380 positioning software package	SIEMENS	Pulse encoder evaluation 2	FP_A7_13	Function diagram A7	Sheet A7+ Sh.



Note:
The absolute position of the motor is transferred, referred to a revolution, only for SIMOVERT SC.
- absolute motor position for ERN1387 and 2pole resolver
- Rotor position is depent on the position of the rotor at switch-on with a multi-pole resolver

Status	Change	Date	Name		
				Date	15.1.97
				C. pers.	Reh
				Checked	Bader
				Standard	

Standard MS380
positioning software package

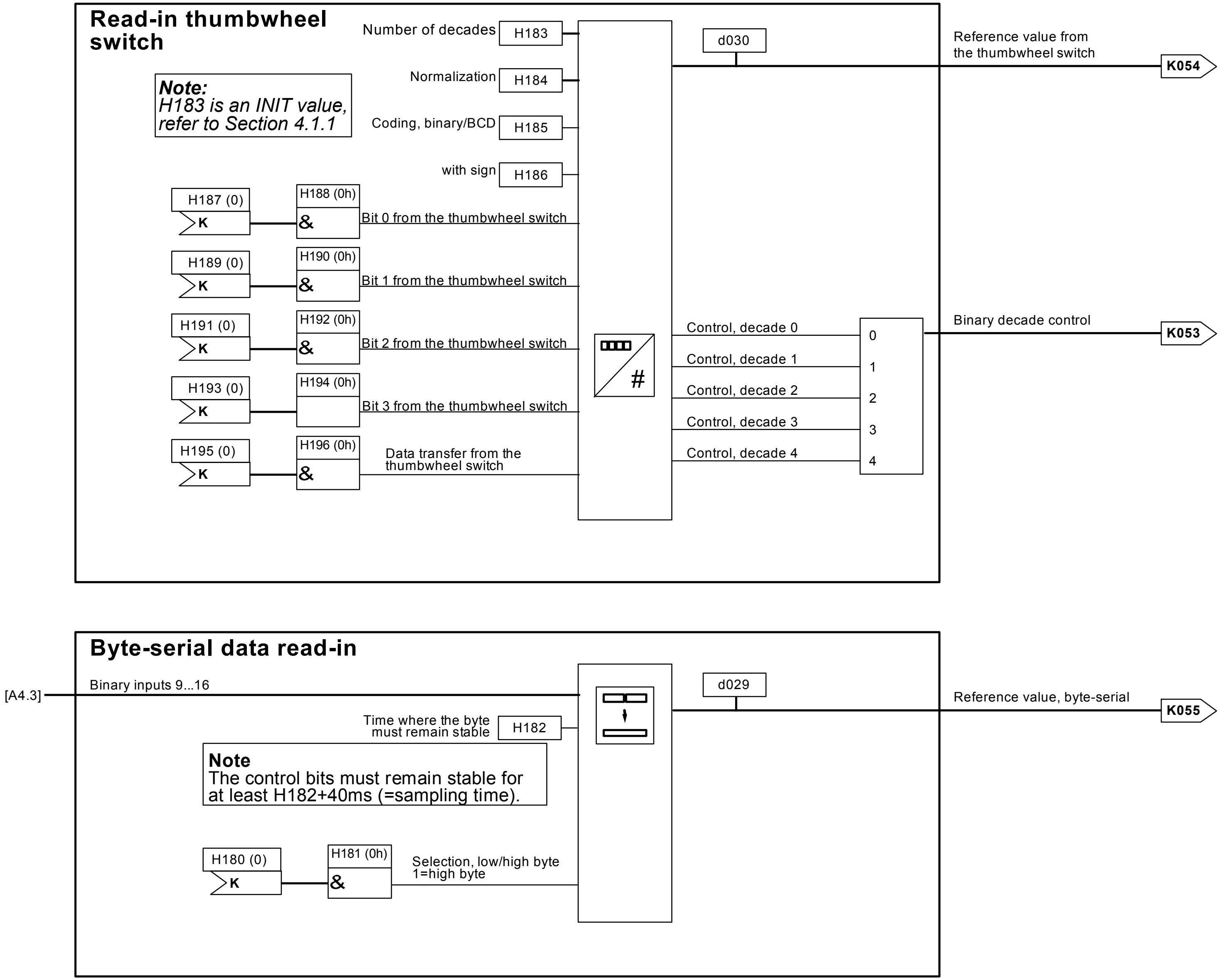
SIEMENS

Select., velocity act. value source
select., pos. actual value source
act. value comp. for the rotary axis

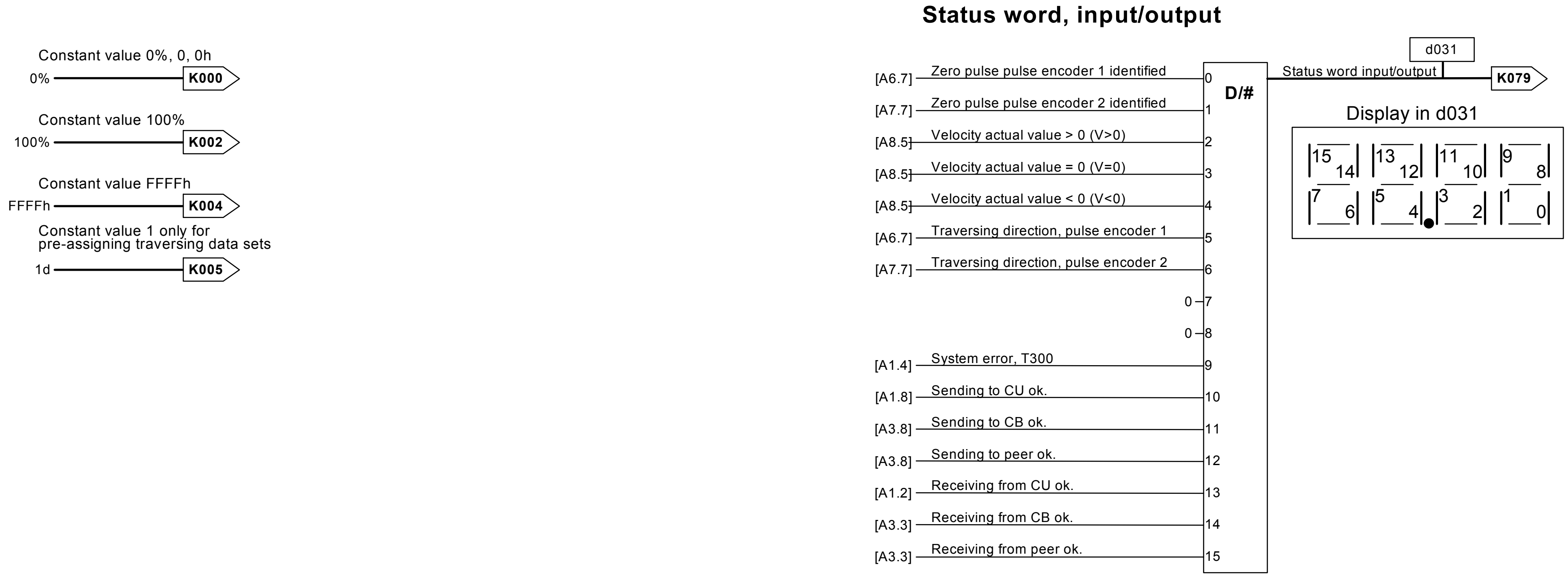
FP_A7_13

Function diagram A8

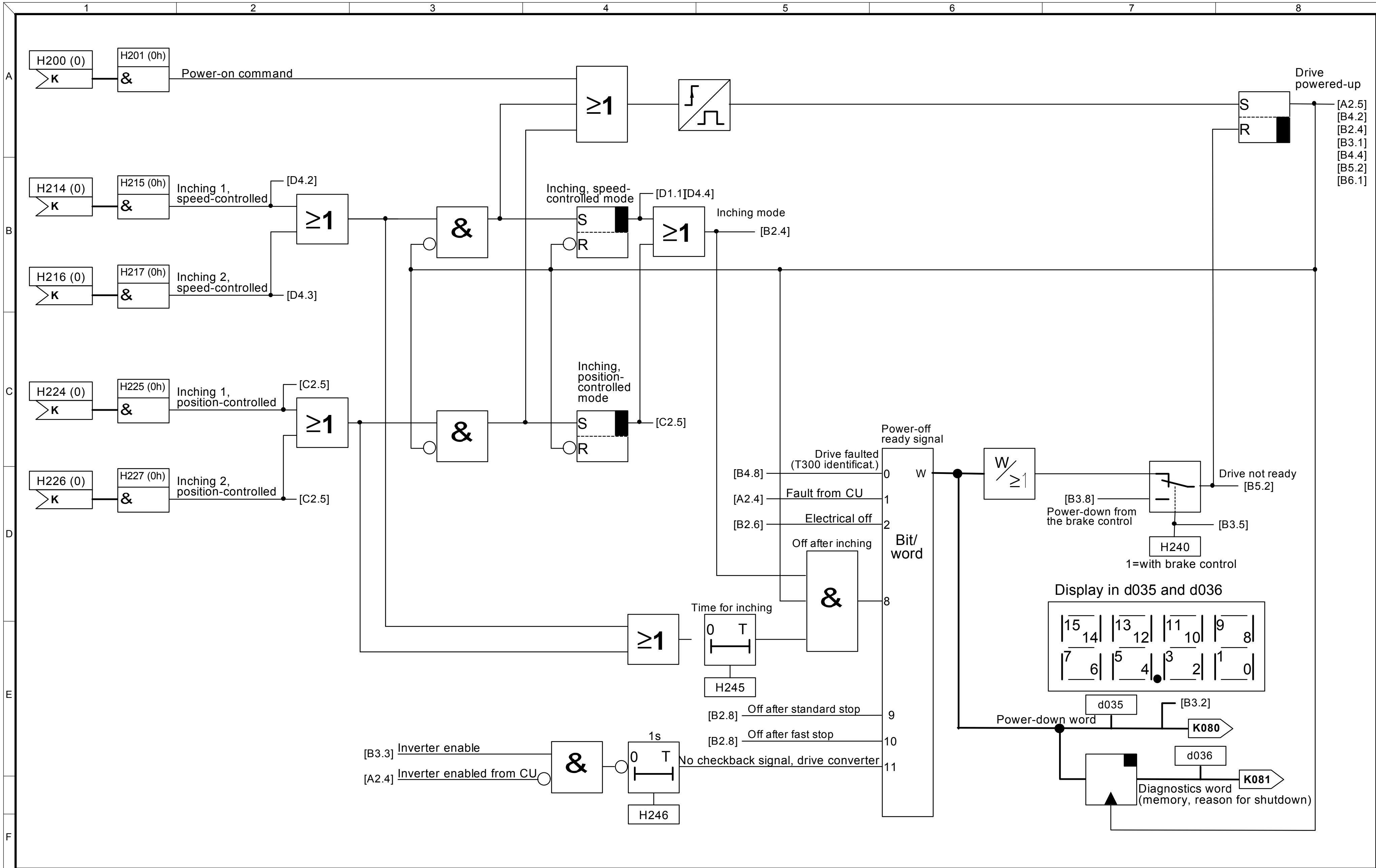
=
+
Sheet A8+
Sh.



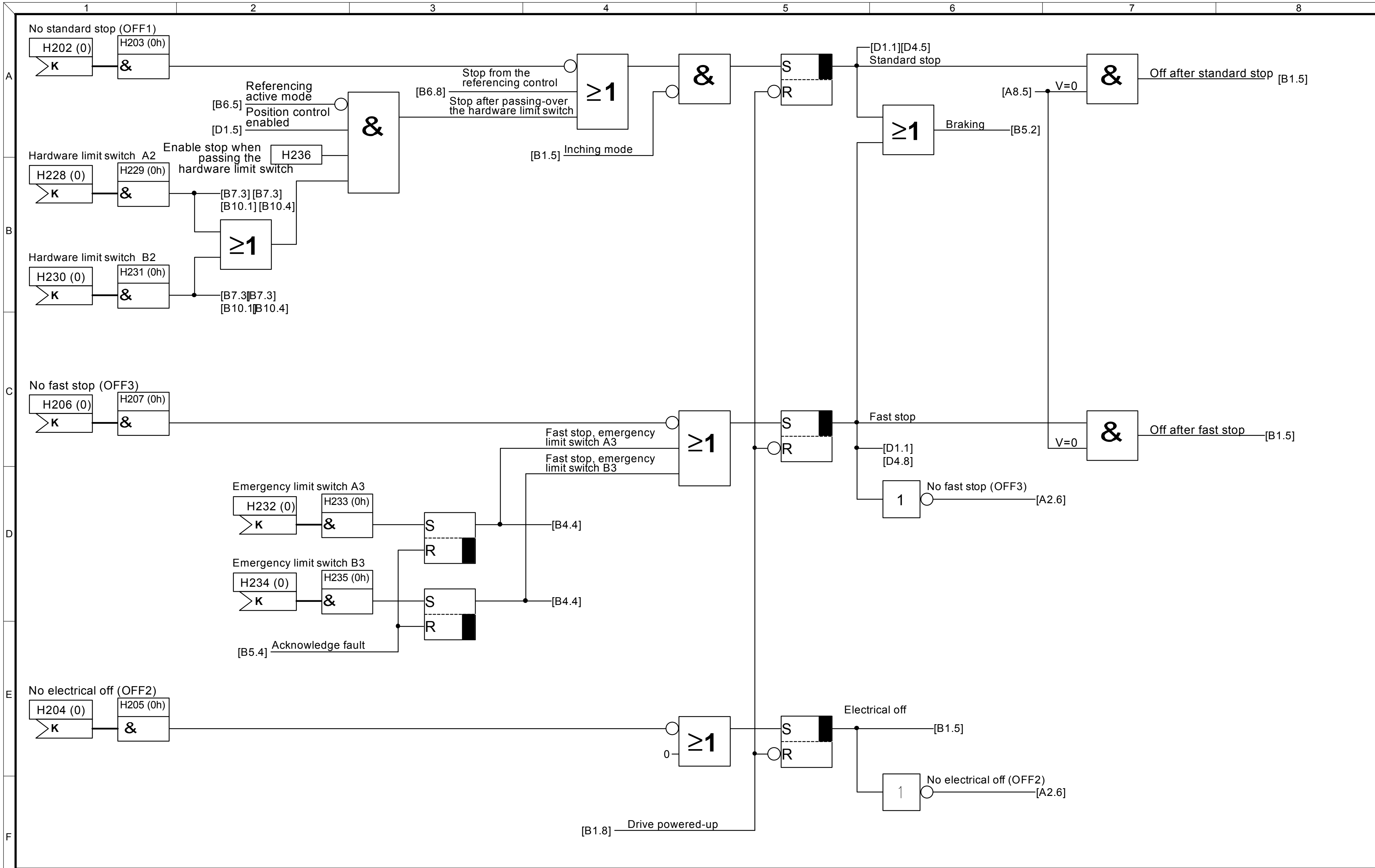
Status	Change	Date	Name						
				Date	15.1.97	Standard MS380 positioning software package	SIEMENS	Thumbwheel switch, byte-serial data read-in	FP_A7_13
				C. pers.	Reh				Function diagram A9
				Checked	Bader				Sheet A9+ Sh.
				Standard					



Date	15.1.97	Standard MS380 positioning software package	SIEMENS	Status word, input/output constant values	FP_A7_13 Function diagram A10 Sheet A10- Sh.
C. pers.	Reh				
Checked	Bader				
Status / Change / Date / Name	Standard				



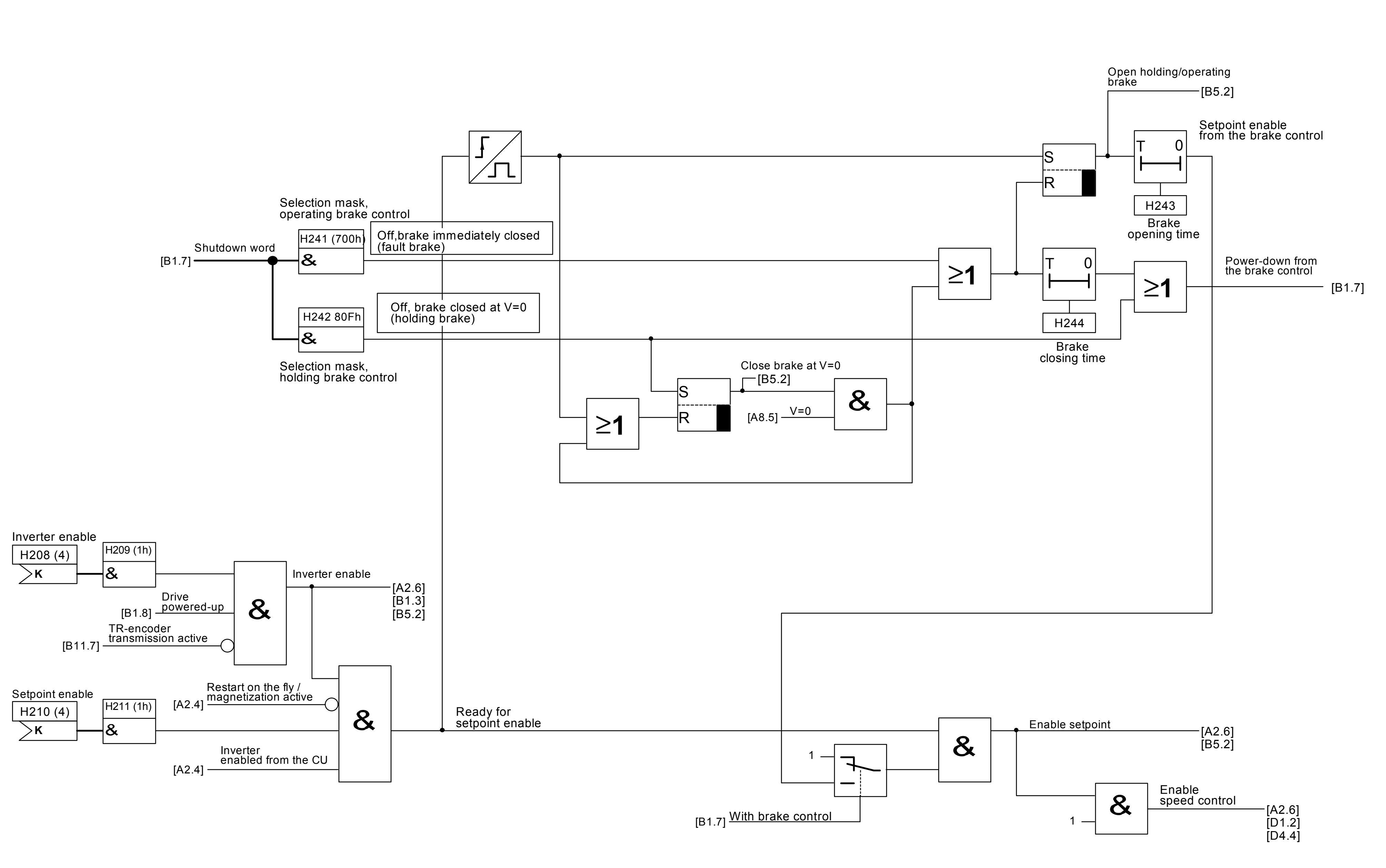
Status	Change	Date	Name	Date 15.1.97 / C. pers. Reh / Checked Bader / Standard	Standard MS380 positioning software package	SIEMENS	Drive power-up, power-down	FP_B1_6	Function diagram B1	Sheet B1+ / Sh.



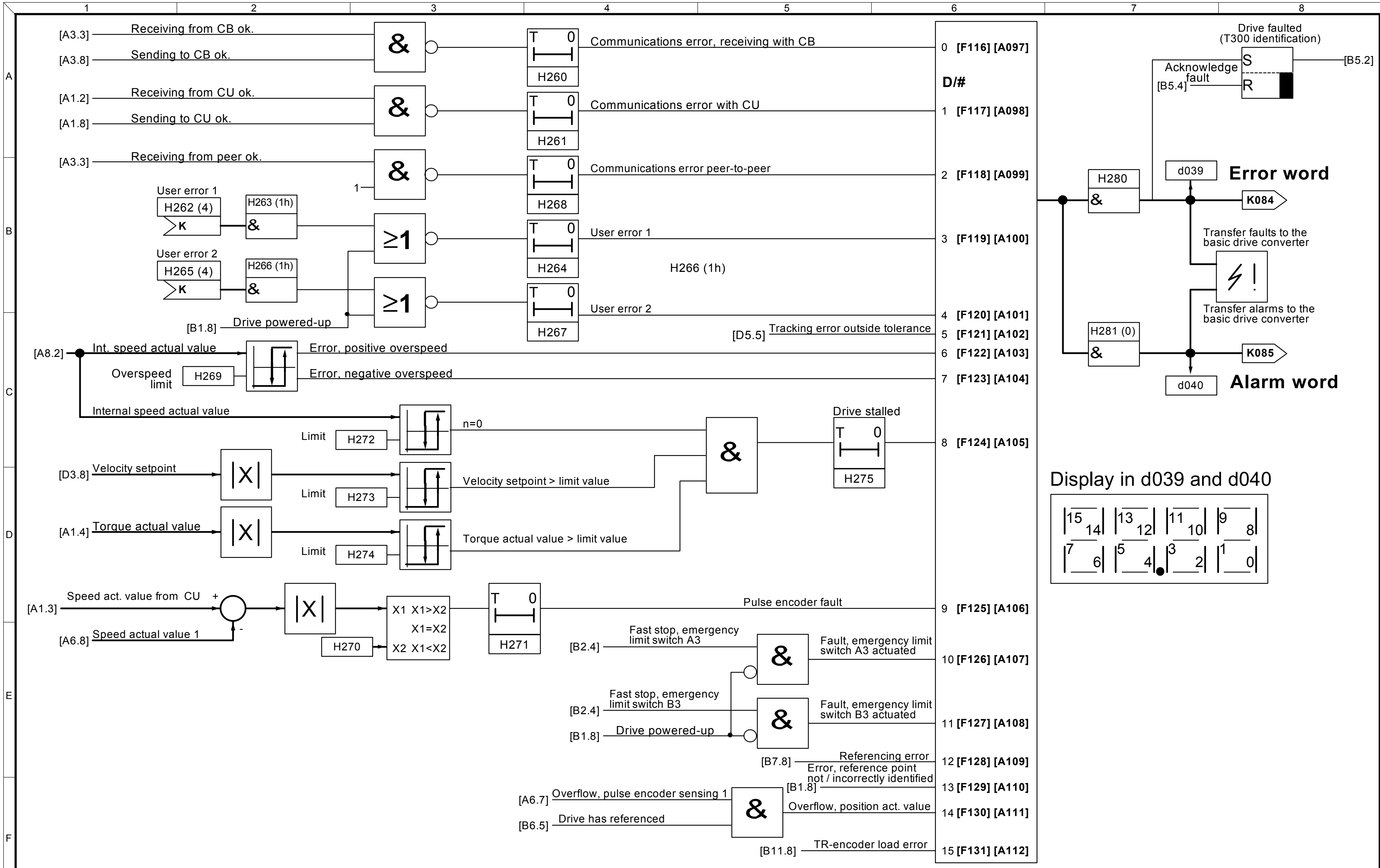
				Date	15.1.97	Standard MS380 positioning software package	SIEMENS
				C. pers.	Reh		
A	H236	19.2.96	Reh	Checked	Bader		
Status	Change	Date	Name	Standard			

Stop / electrical OFF / fast stop

FP_B1_6 **Function diagram B2** = + Sheet B2+ Sh.

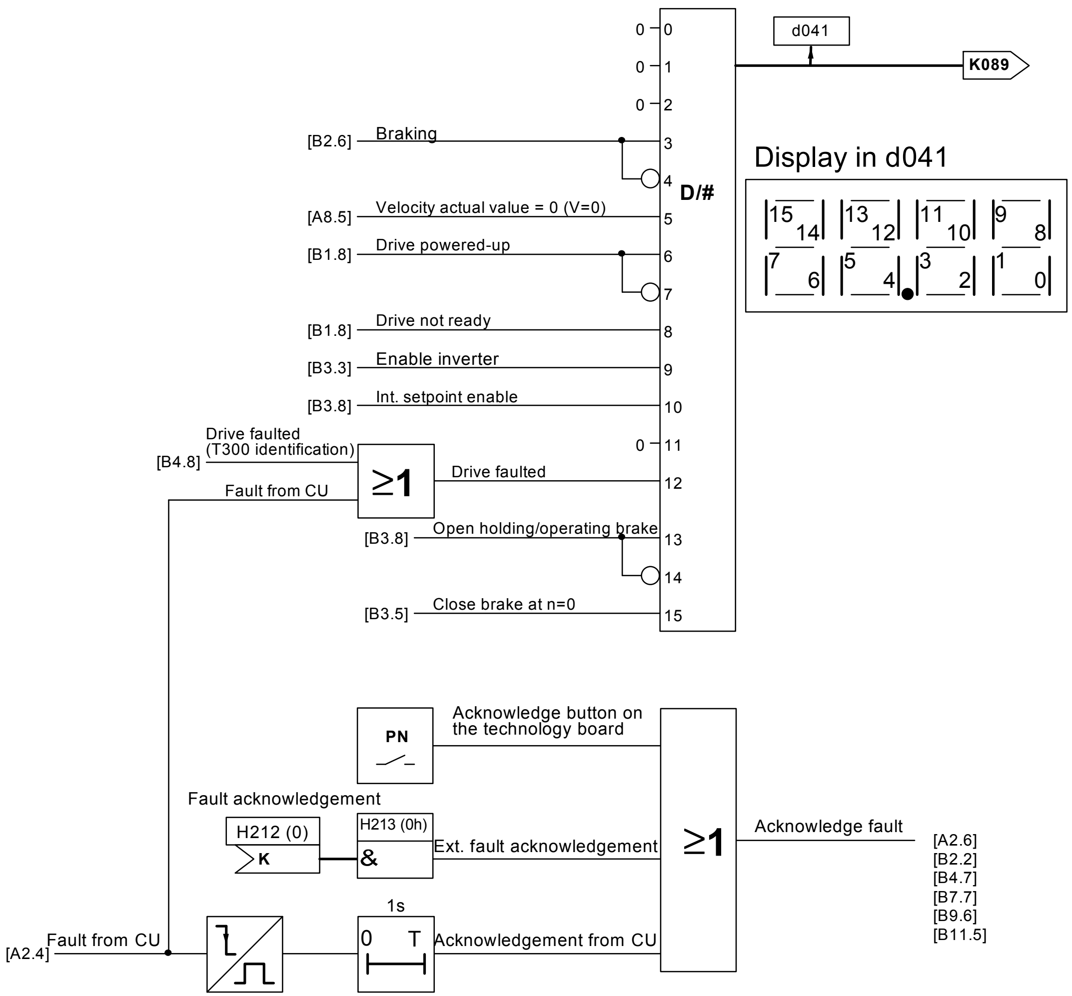


				Date	15.1.97	Standard MS380 positioning software package	SIEMENS	Inverter enable, setpoint enable brake control	= +
				C. pers.	Reh				
				Checked	Bader				FP_B1_6 · Function diagram B3 · Sheet B3+
Status	Change	Date	Name	Standard					Sh.

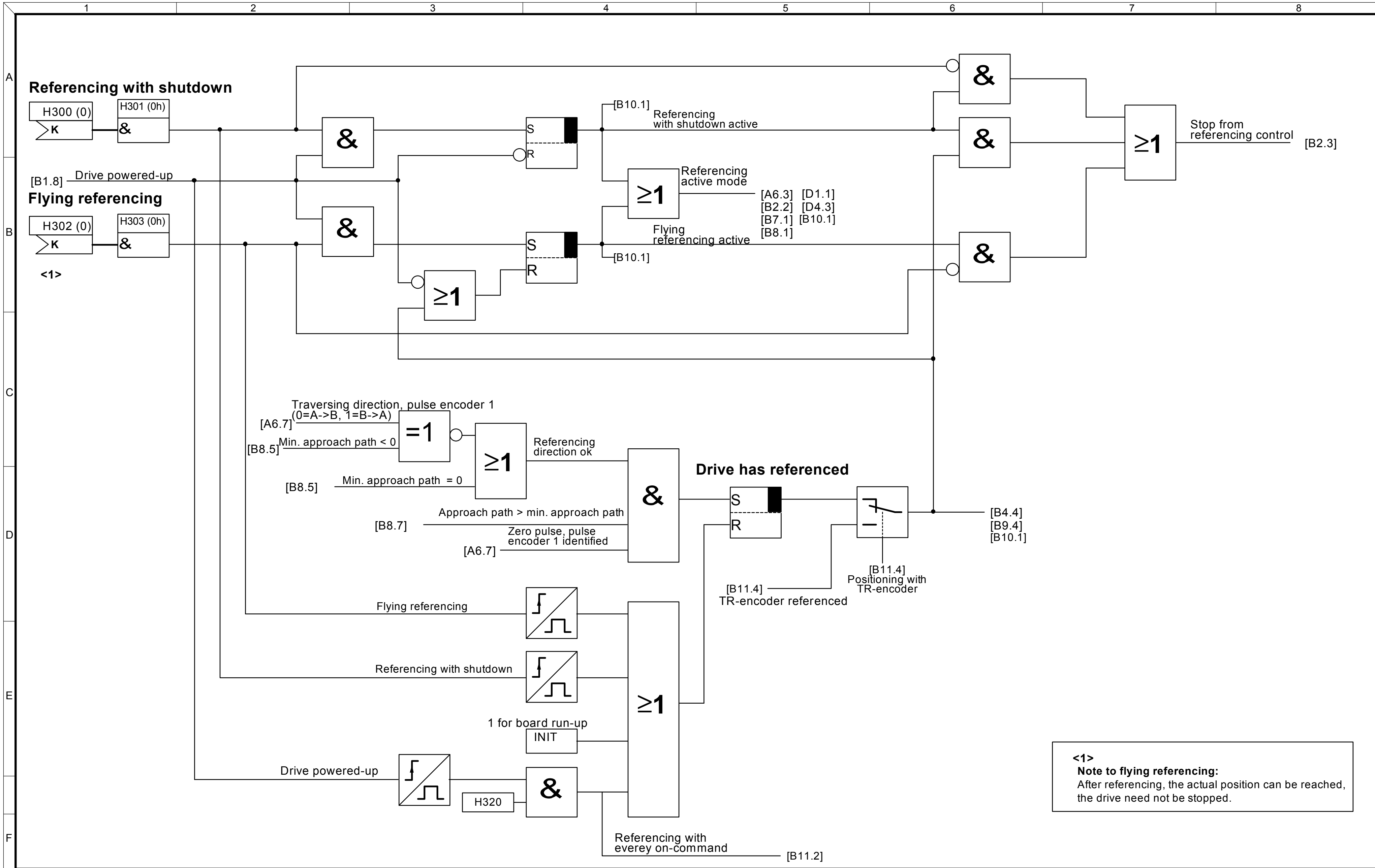


				Date	15.1.97	Standard MS380 positioning software package	SIEMENS	Error word / alarm word generation	FP_B1_6	Function diagram B4	Sheet B4+
				C. pers.	Reh						
				Checked	Bader						
Status	Change	Date	Name	Standard							Sh.

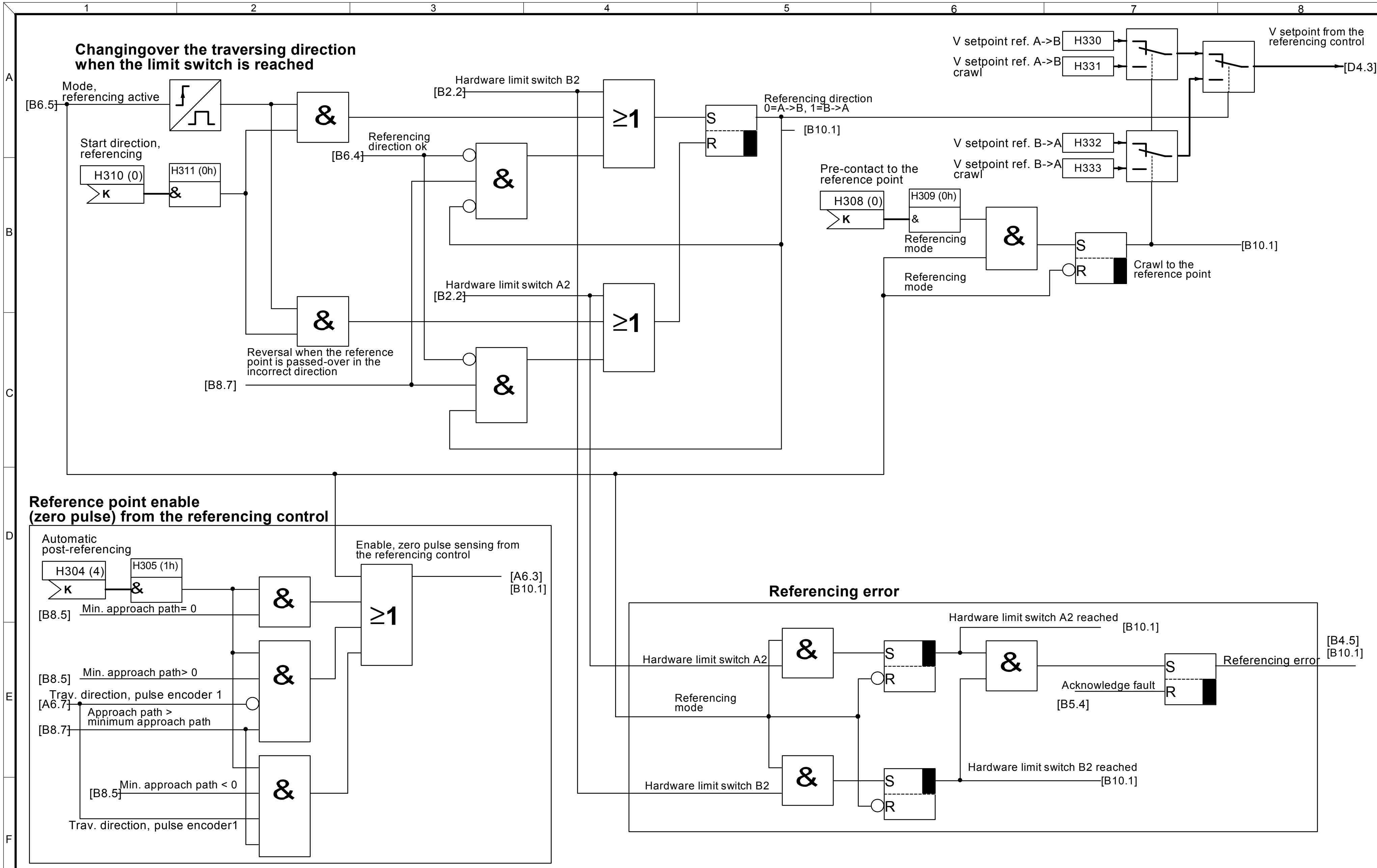
Status word, open-loop control



				Date	15.1.97	Standard MS380 positioning software package	SIEMENS	Status word, open-loop control fault acknowledgement	= +
				C. pers.	Reh				
				Checked	Bader			FP_B1_6	Function diagram B5 Sheet B5+ Sh.
Status	Change	Date	Name	Standard					



Status	Change	Date	Name	Date 15.1.96 C. pers. Reh Checked Bader Standard	Standard MS380 positioning software package	SIEMENS	Referencing mode signal, drive has referenced	FP_B7_12	Function diagram B6	= + Sheet B6+ Sh.



			Date	15.1.97	
			C. pers.	Reh	
			Checked	Bader	
Status	Change	Date	Name	Standard	

Standard MS380
positioning software package

SIEMENS

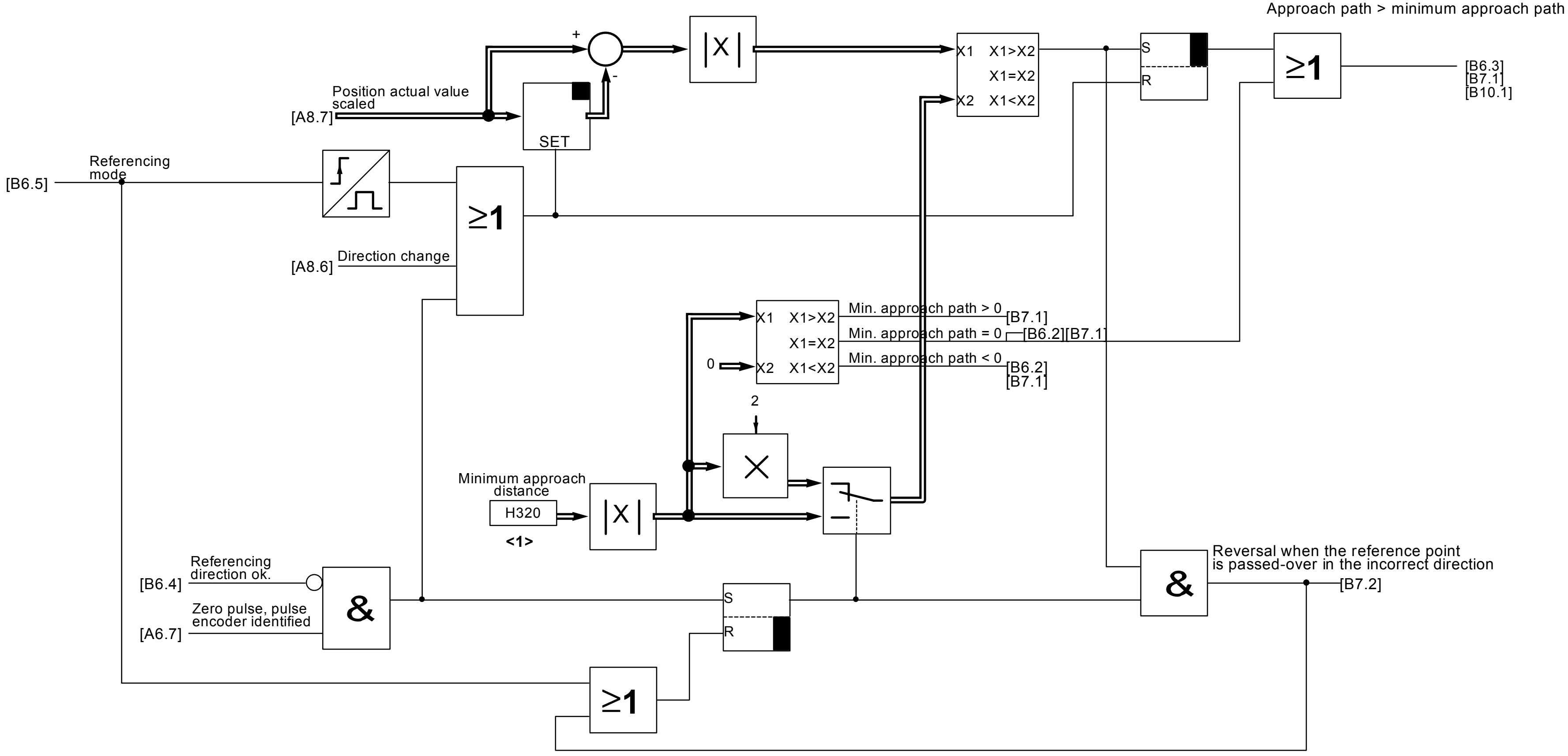
Referencing direction changeover
enable, reference point
referencing error evaluation

FP_B7_12

Function diagram B7

=
+
Sheet B7+
Sh.

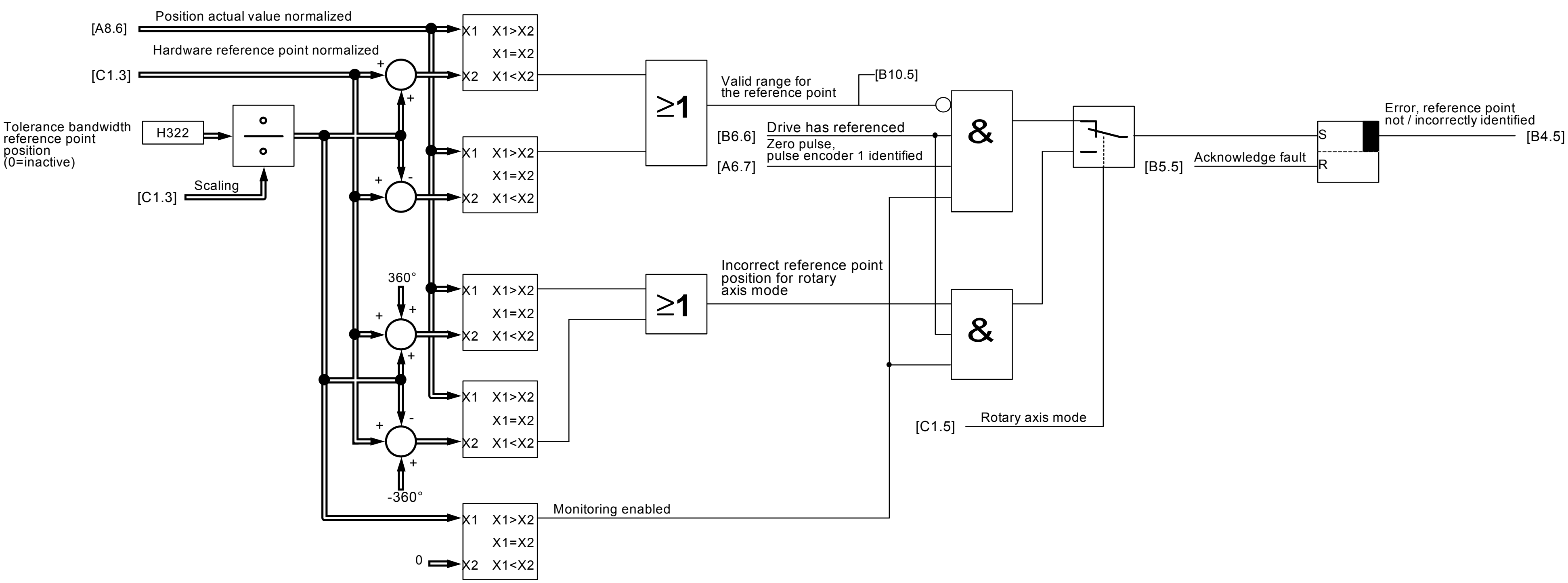
Checking whether the referencing path > minimum approach path



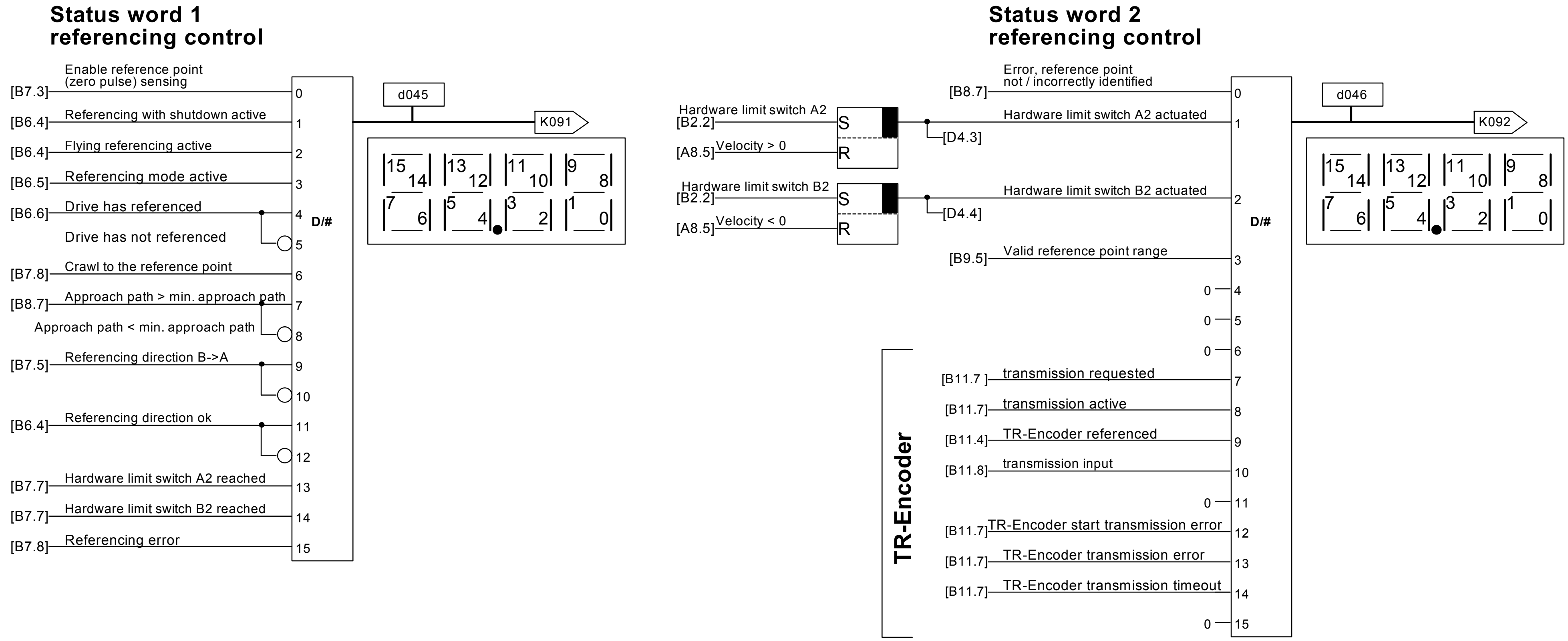
<1> The polarity of H312 also defines the travel direction through the reference point, refer to Section 3.5.3.

Status	Change	Date	Name	Date 15.1.97 / C. pers. Reh / Checked Bader / Standard	Standard MS380 positioning software package	SIEMENS	Checking that the approach path is greater than the minimum approach path	FP_B7_12	Function diagram B8	Sheet B8+ Sh.

Monitoring the reference point position



				Date	15.1.97	Standard MS380 positioning software package	SIEMENS	Monitoring, reference point position		=
				C. pers.	Reh					+
				Checked	Bader				FP_B7_12	Function diagram B9
Status	Change	Date	Name	Standard						Sheet B9+ Sh.



Status	Change	Date	Name		
				Date	15.1.97
				C. pers.	Reh
				Checked	Bader
				Standard	

Standard MS380
positioning software package

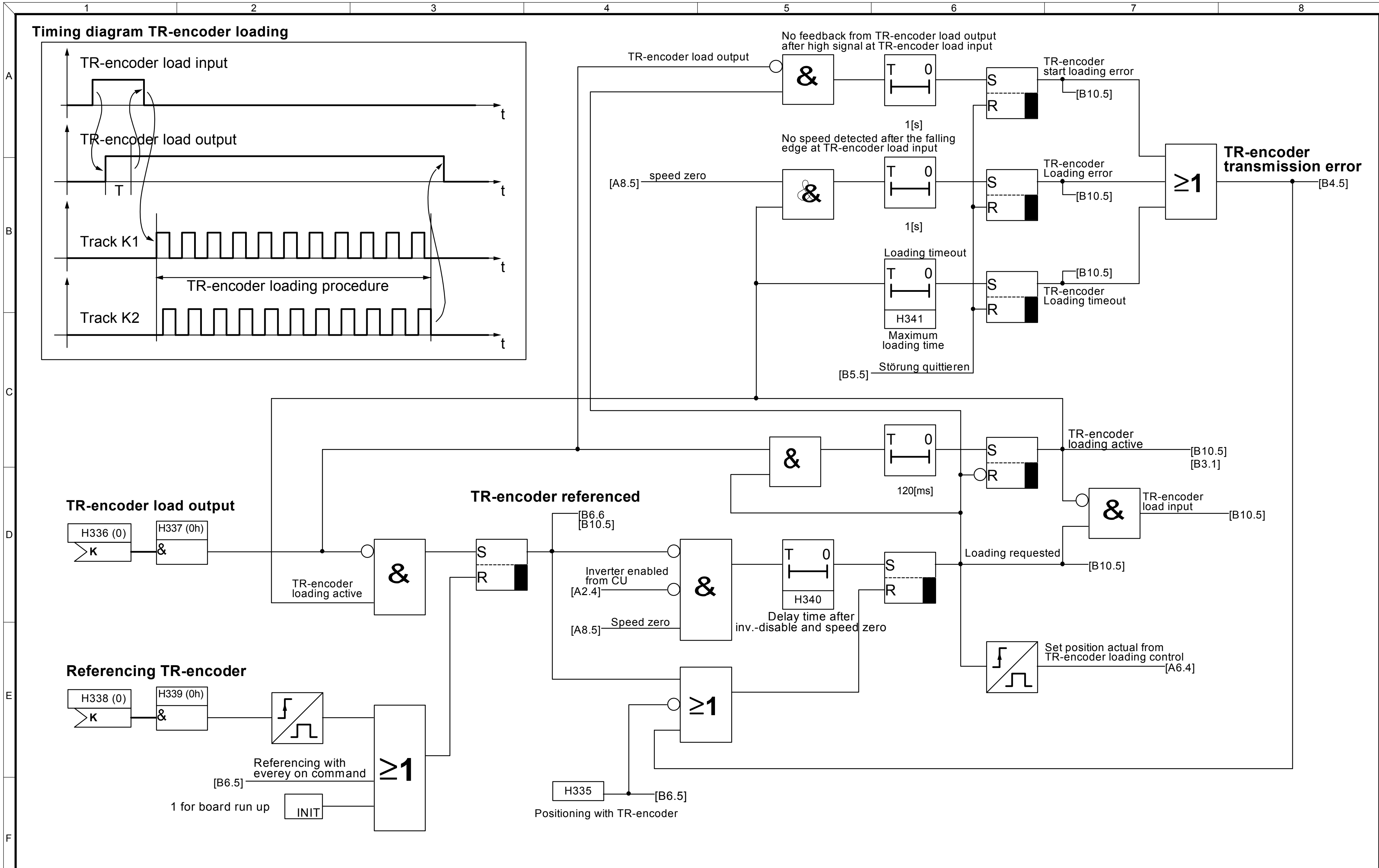
SIEMENS

Status words,
referencing control

FP_B7_12

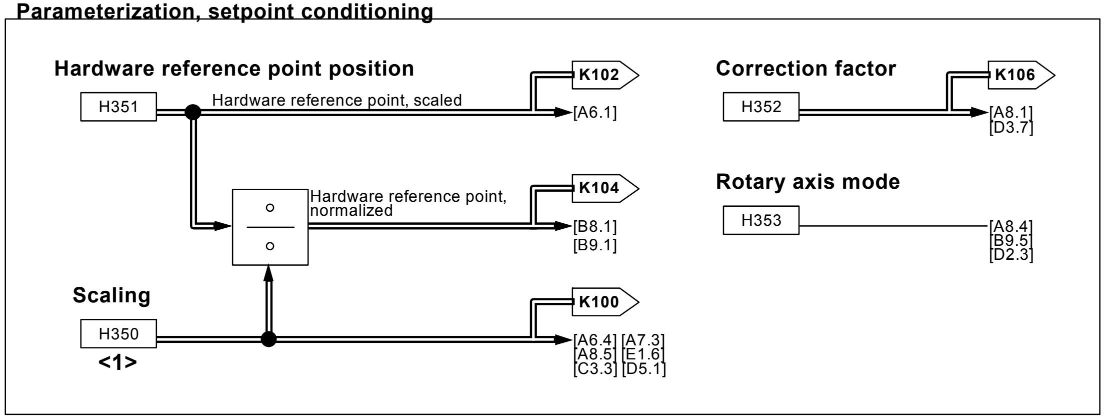
Function diagram B10

=
+
Sheet B10+
Sh.



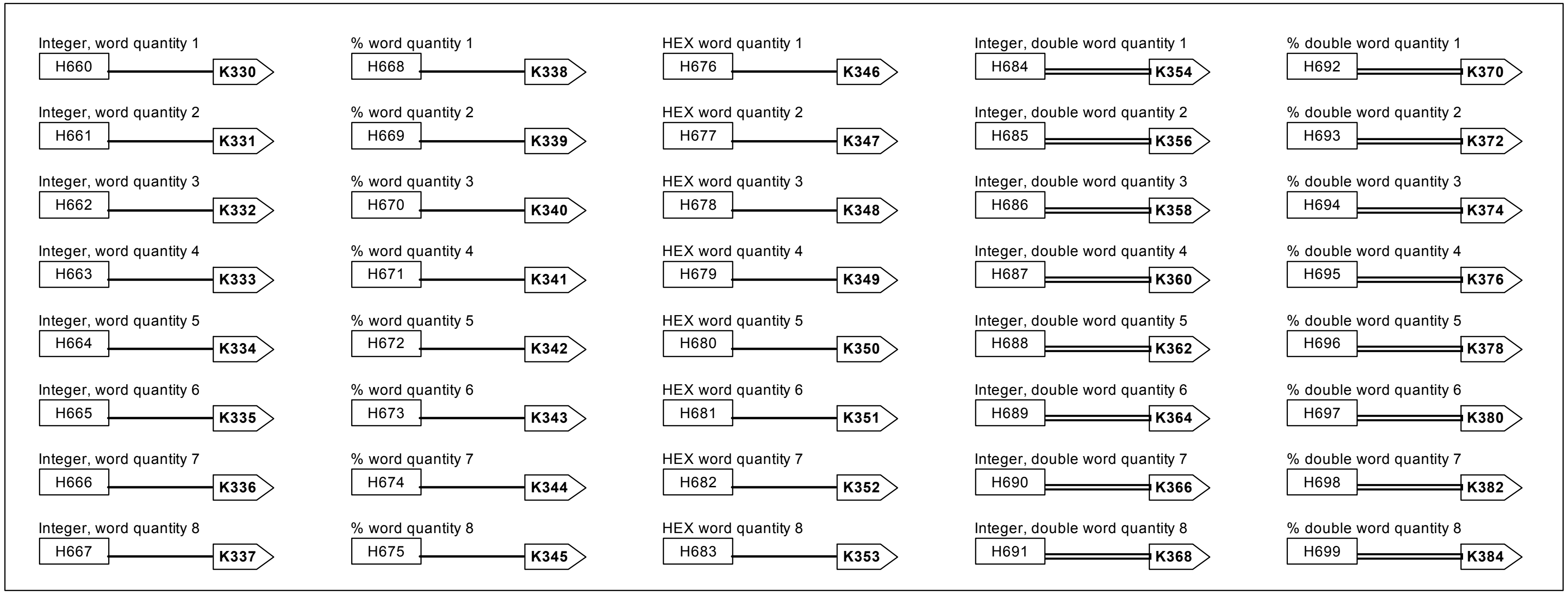
			Date	15.1.97	Standard MS380 positioning software package	SIEMENS	Referencing with TR-encoder TR-encoder loading control TR-encoder load monitoring	= +
			C. pers.	Reh				
			Checked	Bader				FP_B7_12 · Function diagram B11 · Sheet B11- Sh.
Status	Change	Date	Name	Standard				

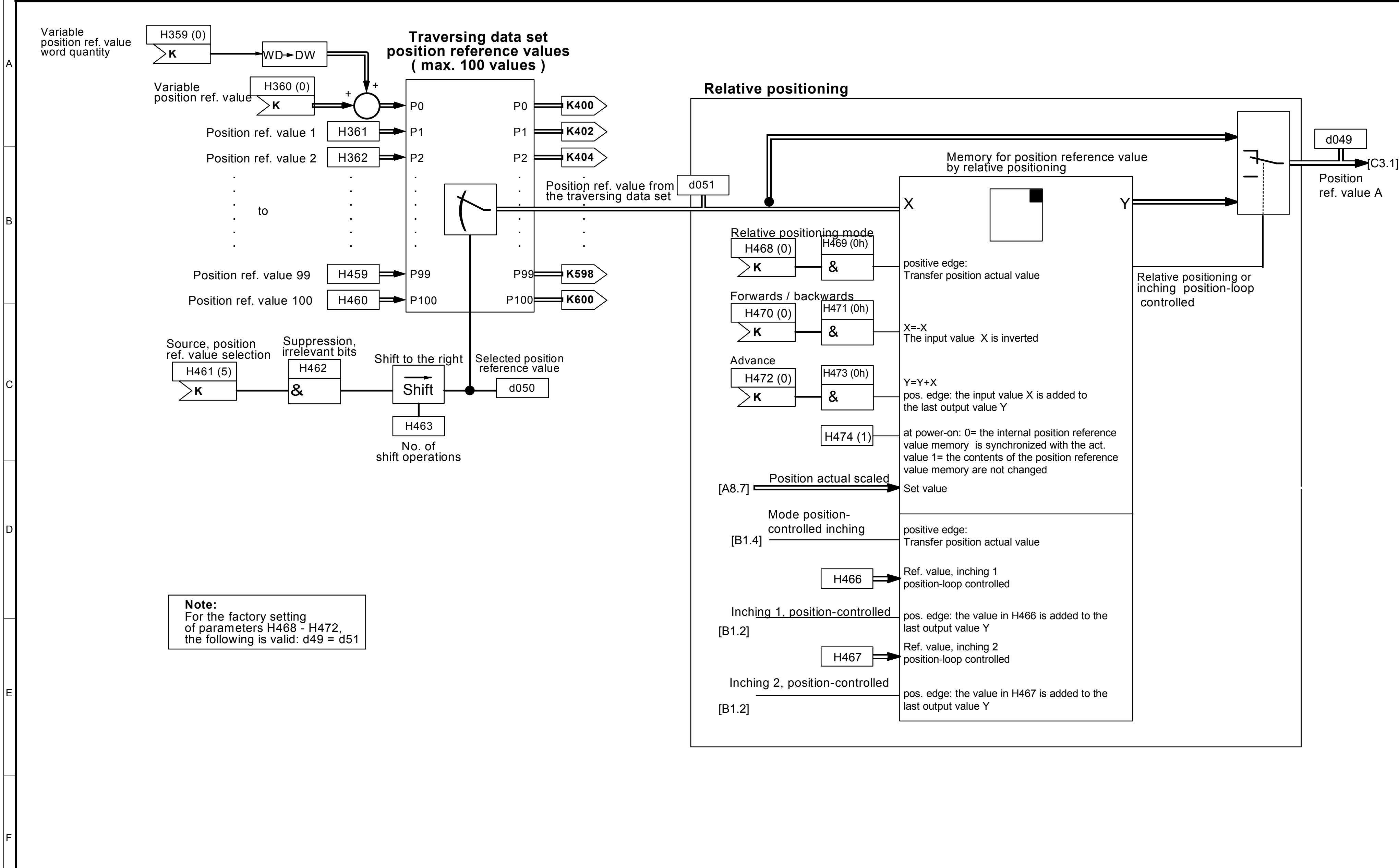
Parameterization, setpoint conditioning



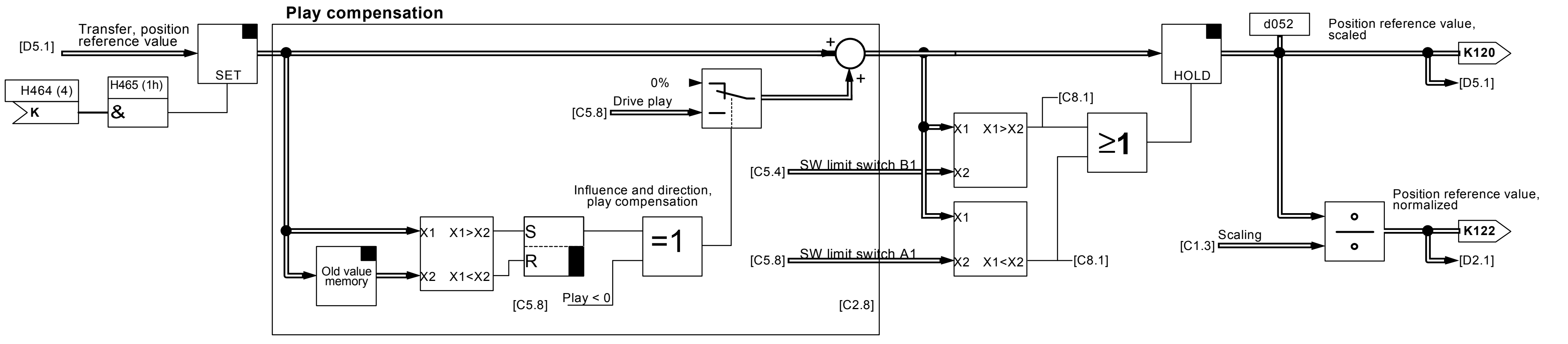
<1> If H350 is selected the same as H153, then the number of received encoder increments appears at d022, refer to [A6].
Example: H153 = 1 000 000, H350 = 1 000 000
d022 = 40
40 encoder increments or 10 pulses
have been received.

Fixed setpoints





Status	Change	Date	Name	Date 15.1.97 / C. pers. Reh / Checked Bader / Standard	Standard MS380 positioning software package	SIEMENS	Selection, position ref. value inching, position-controlled play compensation	FP_C1_6	Function diagram C2	Sheet C2+ Sh.



Status	Change	Date	Name		
				Date	15.1.97
				C. pers.	Reh
				Checked	Bader
				Standard	

Standard MS380 positioning software package

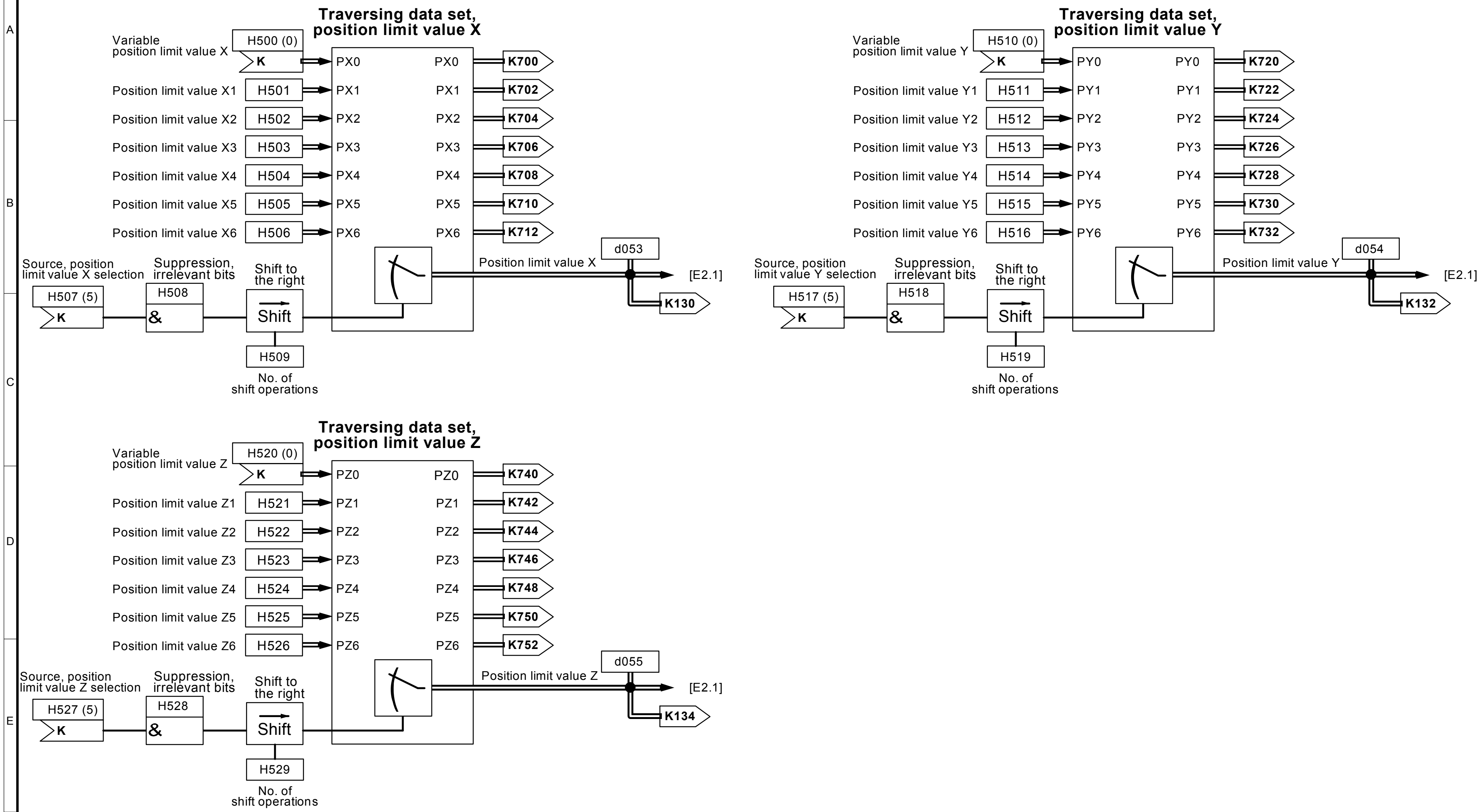
SIEMENS

Software limit monitoring

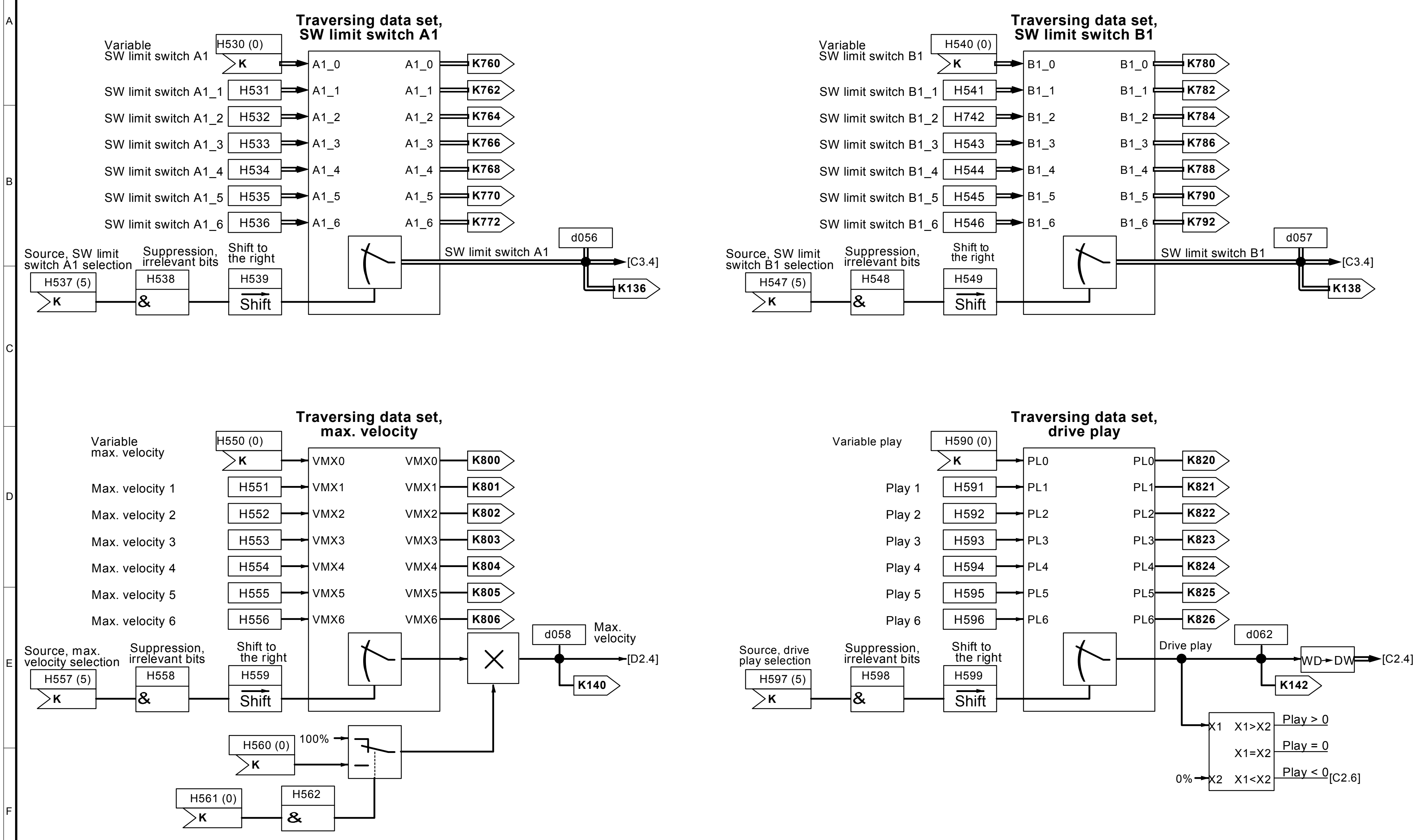
FP_C1_6

Function diagram C3

Sheet C3+
Sh.



Status	Change	Date	Name	Date 15.1.97 C. pers. Reh Checked Bader Standard	Standard MS380 positioning software package	SIEMENS	Position limit values X, Y, Z	FP_C1_6	Function diagram C4	Sheet C4+ Sh.



Status	Change	Date	Name	Date	15.1.97
				C. pers.	Reh
				Checked	Bader
				Standard	

Standard MS380
positioning software package

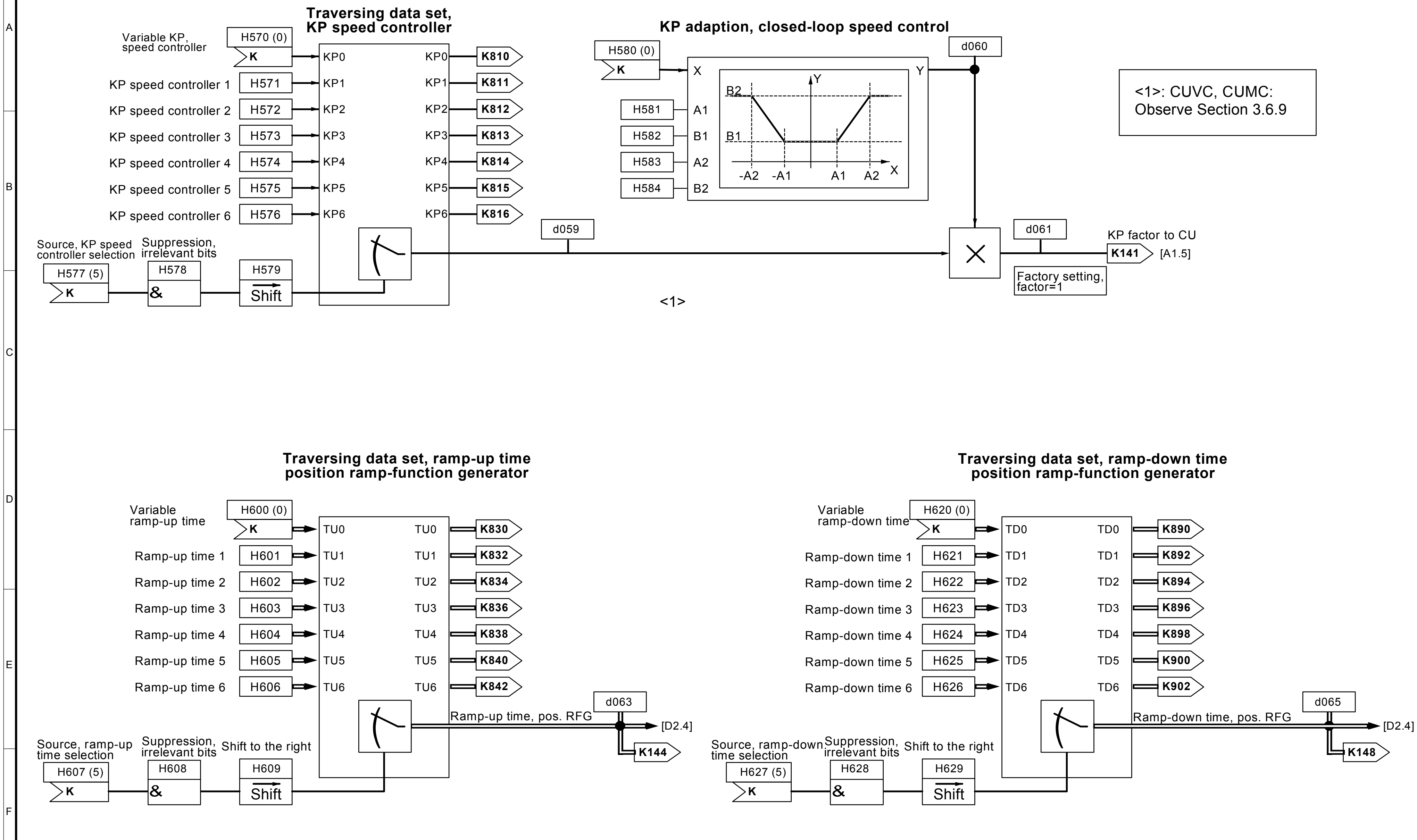
SIEMENS

SW limit switches A1, B1
max. velocity,
drive play

FP_C1_6

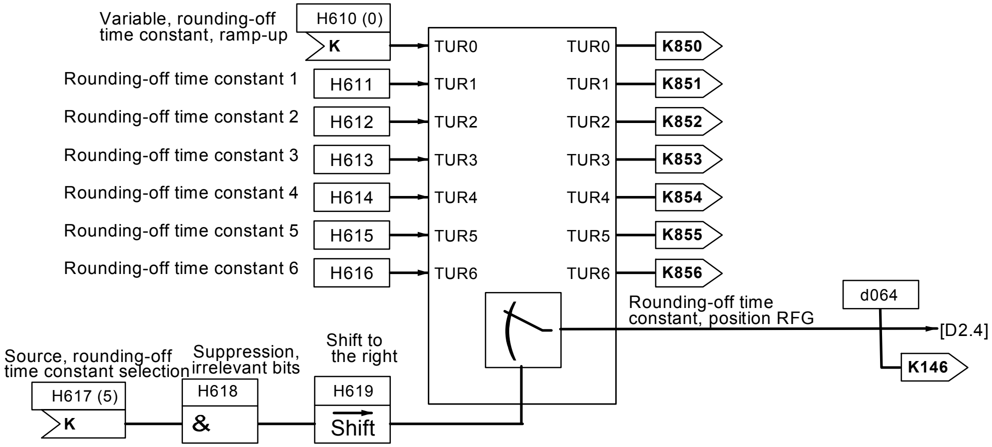
Function diagram C5

Sheet C5+
Sh.

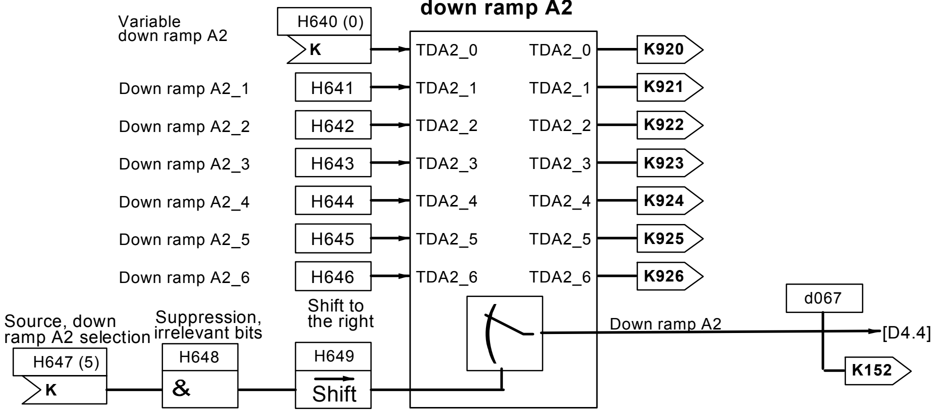


			Date	15.1.97	Standard MS380 positioning software package	SIEMENS	KP adaption, speed controller ramp-up, ramp-down time, position RFG	= +
			C. pers.	Reh				
			Checked	Bader			FP_C1_6	Function diagram C6 — Sheet C6+ Sh.
Status	Change	Date	Name	Standard				

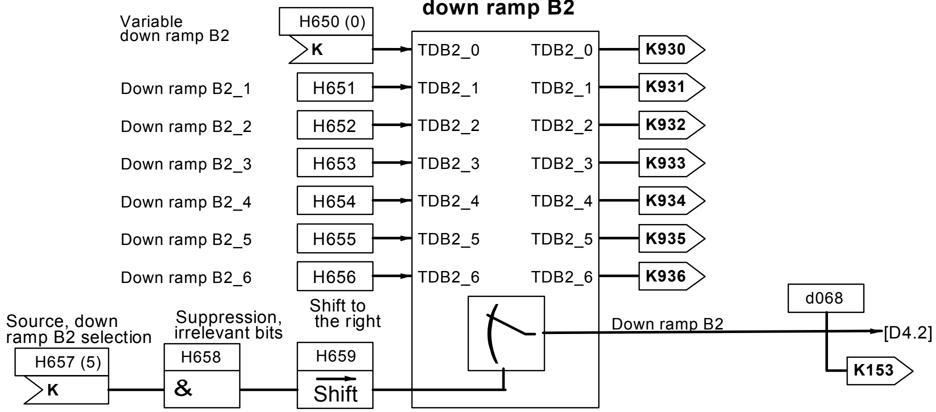
Traversing data set, rounding-off time constant position ramp-function generator



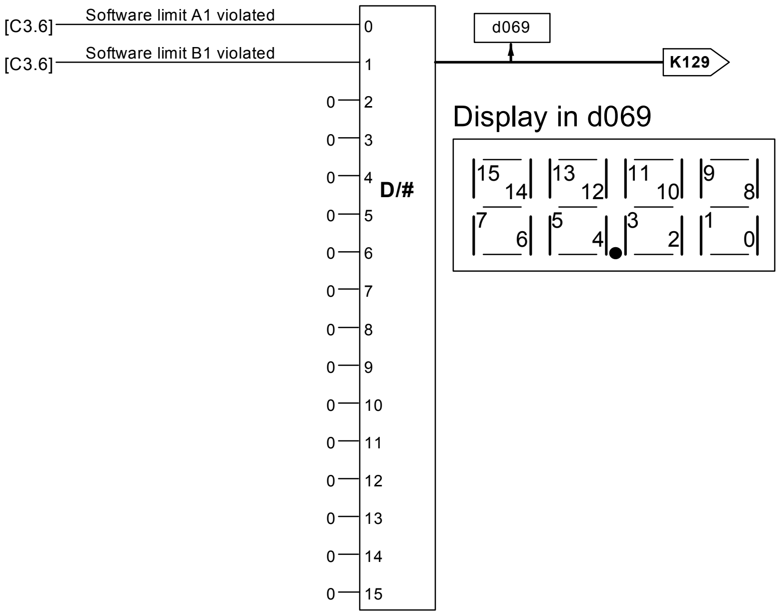
Traversing data set, down ramp A2



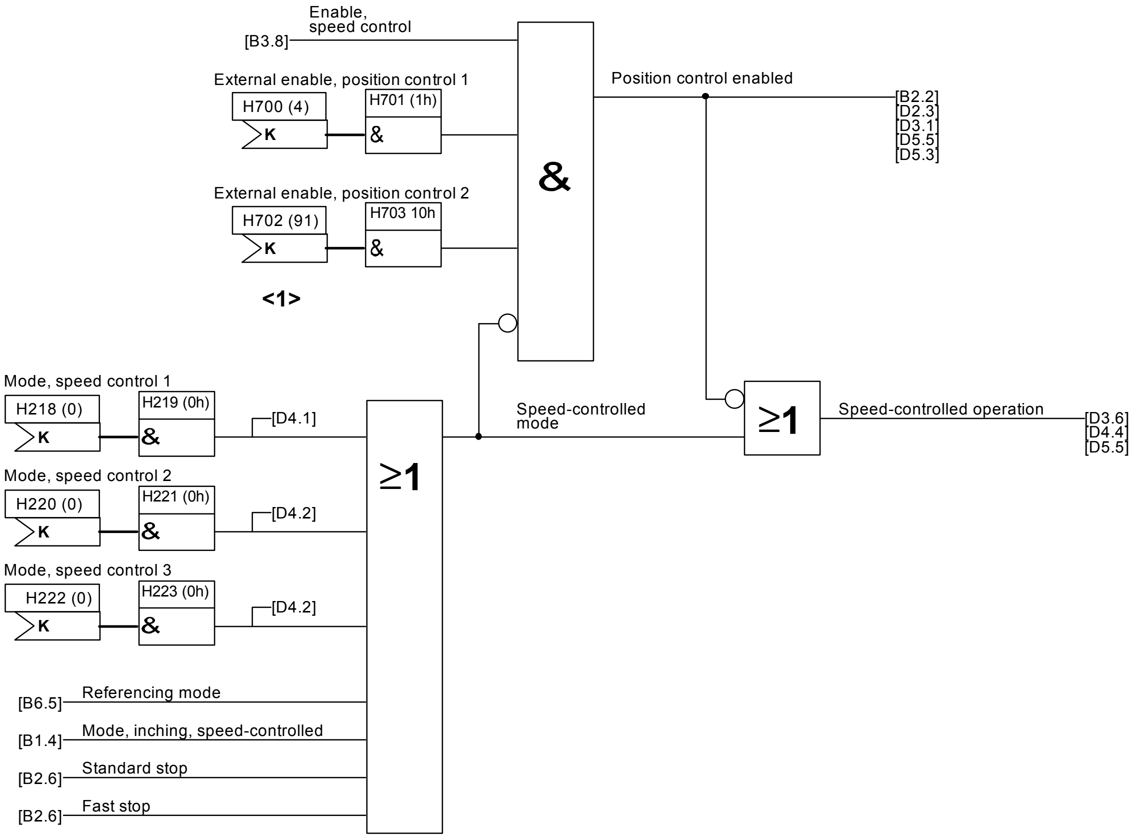
Traversing data set, down ramp B2



Status word, reference value conditioning

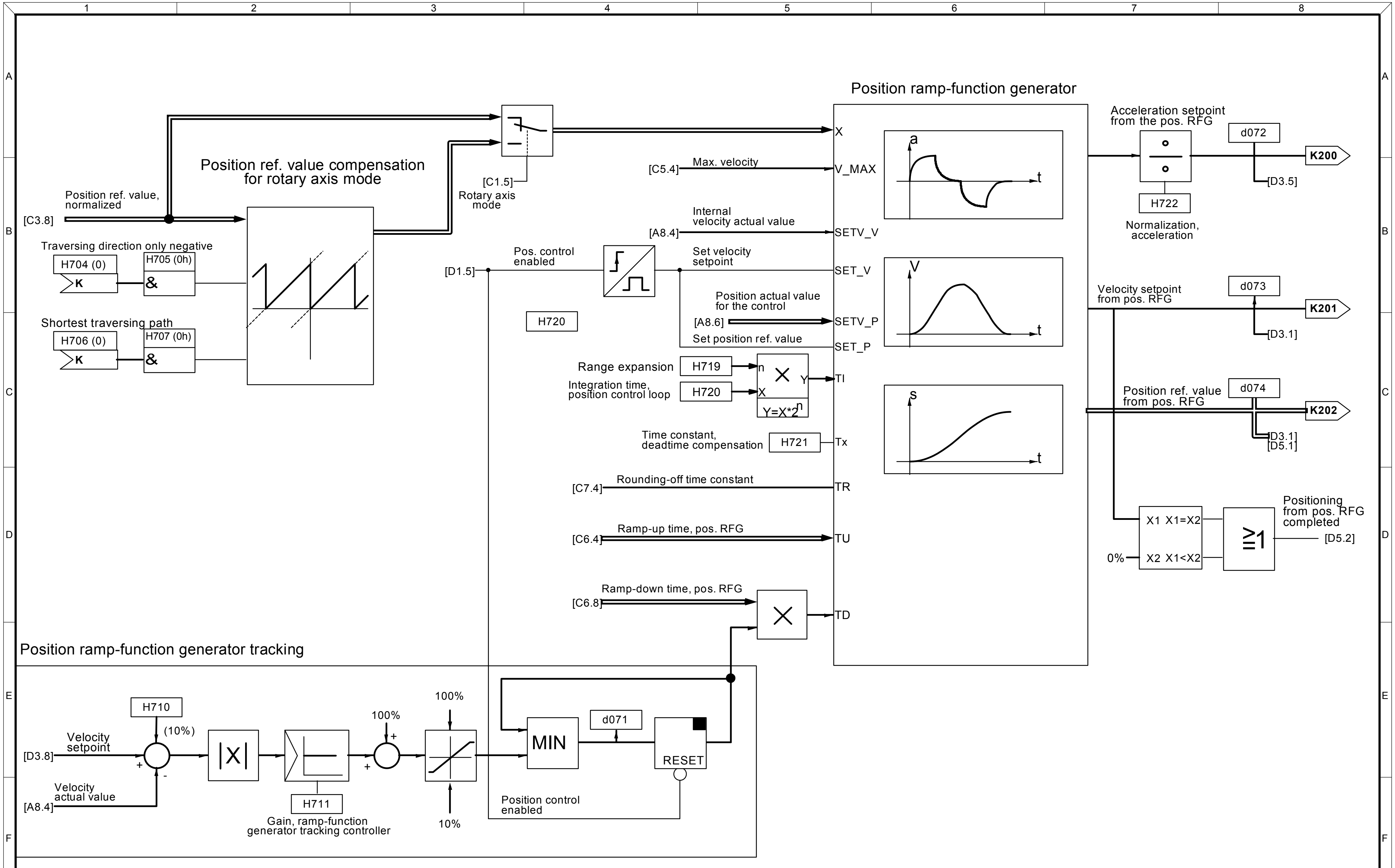


				Date	15.1.97	Standard MS380 positioning software package	SIEMENS	Status word, reference value conditioning	FP_C7_12
				C. pers.	Reh				Function diagram C8
				Checked	Bader				Sheet C8- Sh.
Status	Change	Date	Name	Standard					

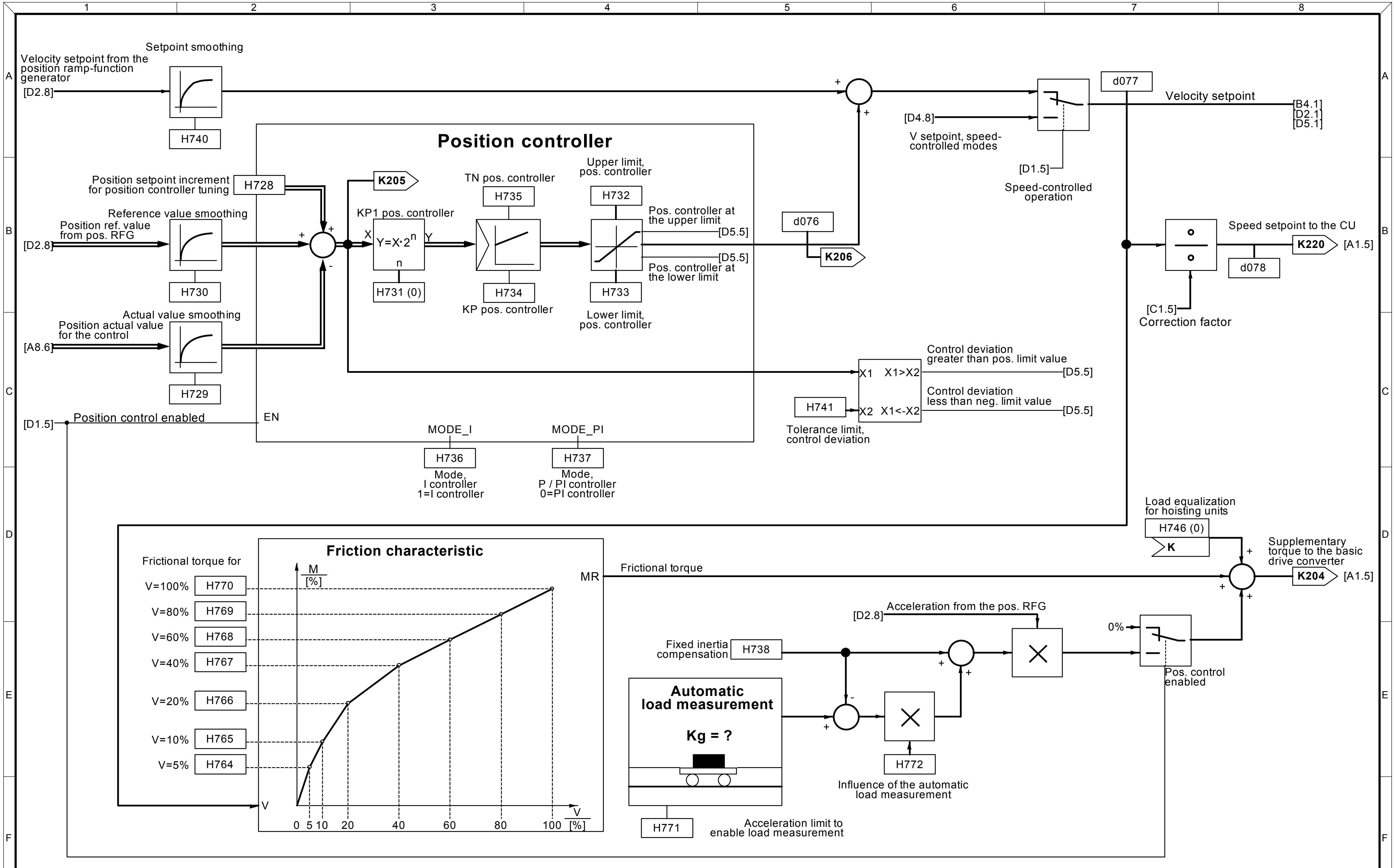


<1> Note:
For the factory setting of H702/H703, the following is valid:
Positioning is only possible after referencing has been successfully completed.

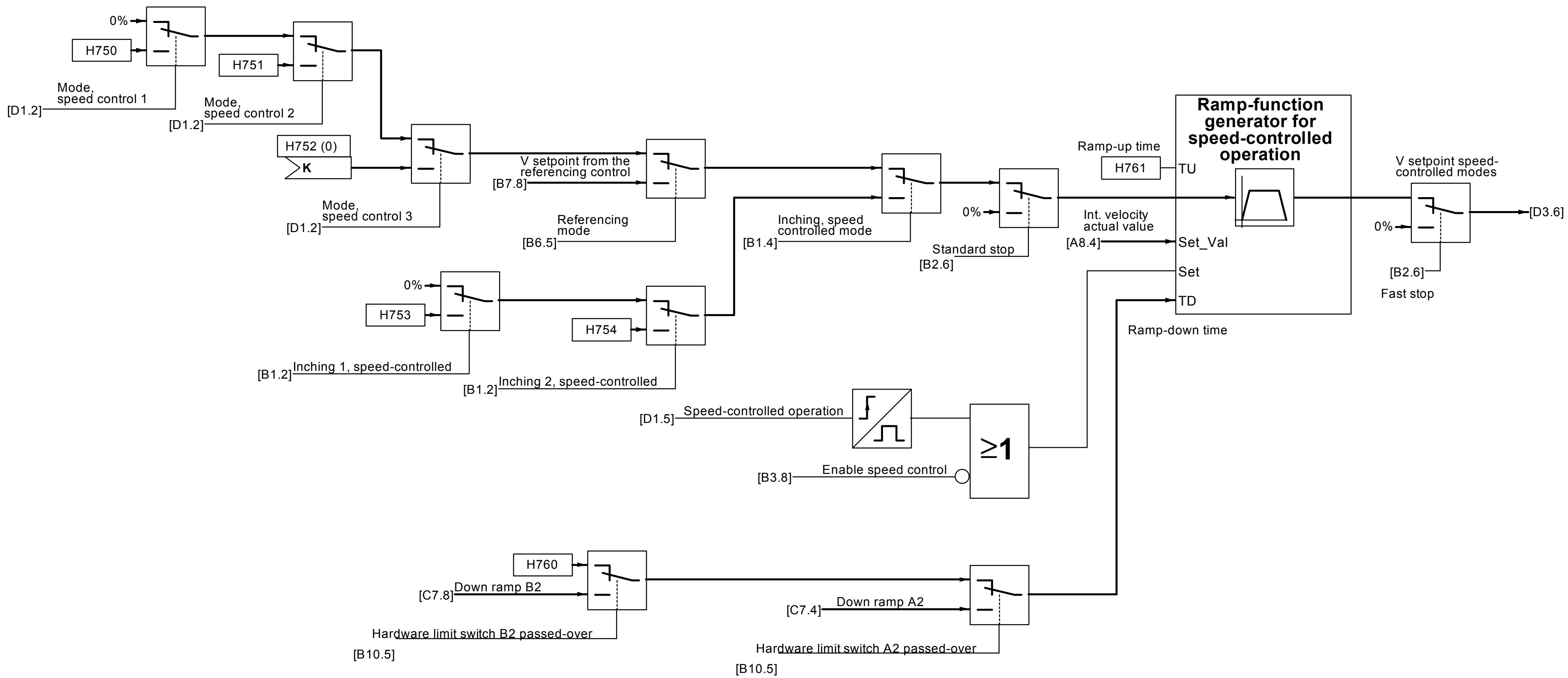
<2> Note:
When the drive converter is powered-up and the position control is inhibited, for SIMOVERT SC the motor might manifest drift effects (rotate through angle).



Status	Change	Date	Name						
				Date	15.1.97	Standard MS380 positioning software package	SIEMENS	Position ramp-function generator	FP_D1_6 — Function diagram D2 — Sheet D2+ Sh.
				C. pers.	Reh				
				Checked	Bader				
				Standard					



Status	Change	Date	Name	Date	15.1.97	Standard MS380 positioning software package	SIEMENS	Position controller friction characteristic automatic load measurement	FP_D1_6	Function diagram D3	Sheet D3+ Sh.
				C. pers.	Reh						
				Checked	Bader						
				Standard							



				Date	15.1.97
				C. pers.	Reh
				Checked	Bader
Status	Change	Date	Name	Standard	

Standard MS380
positioning software package

SIEMENS

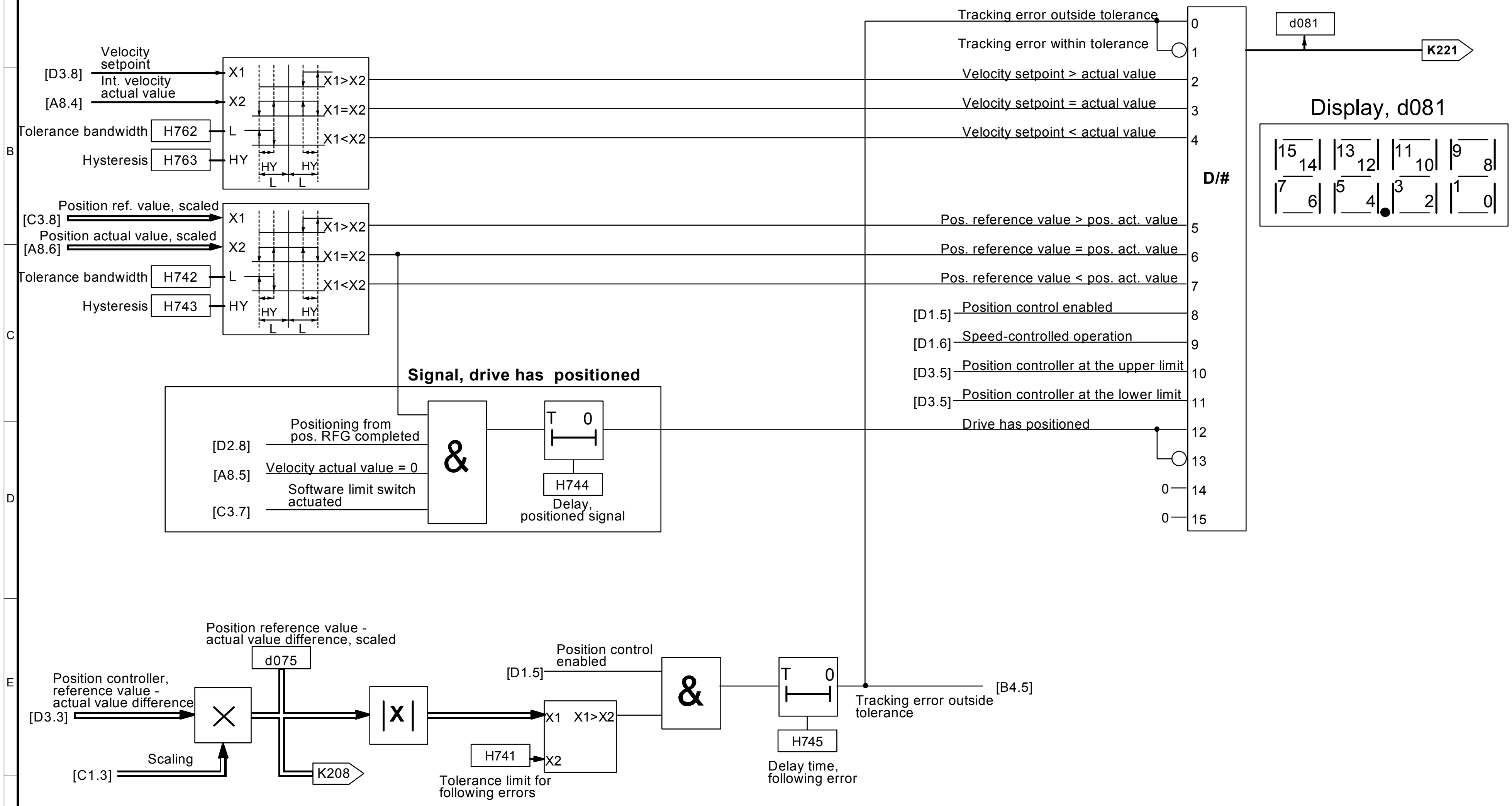
Setpoint generation,
speed-controlled modes

FP_D1_6

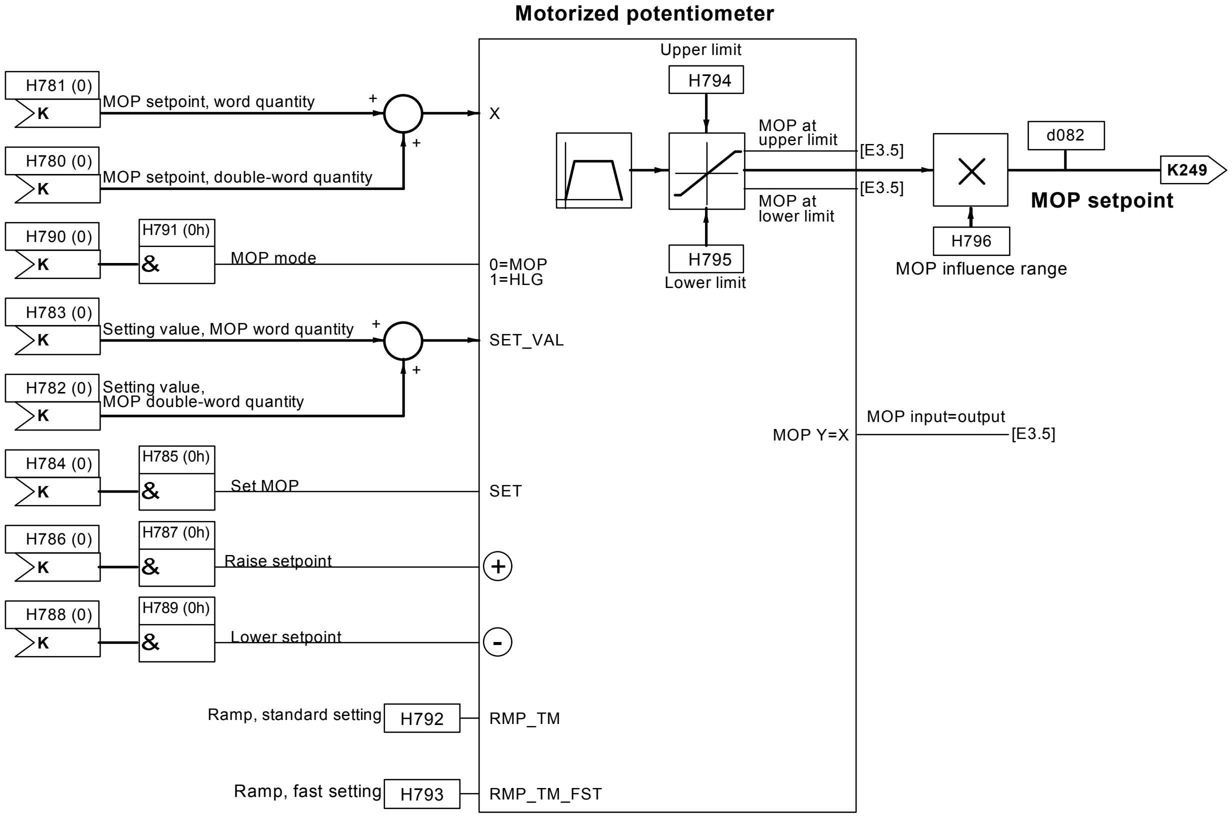
Function diagram D4

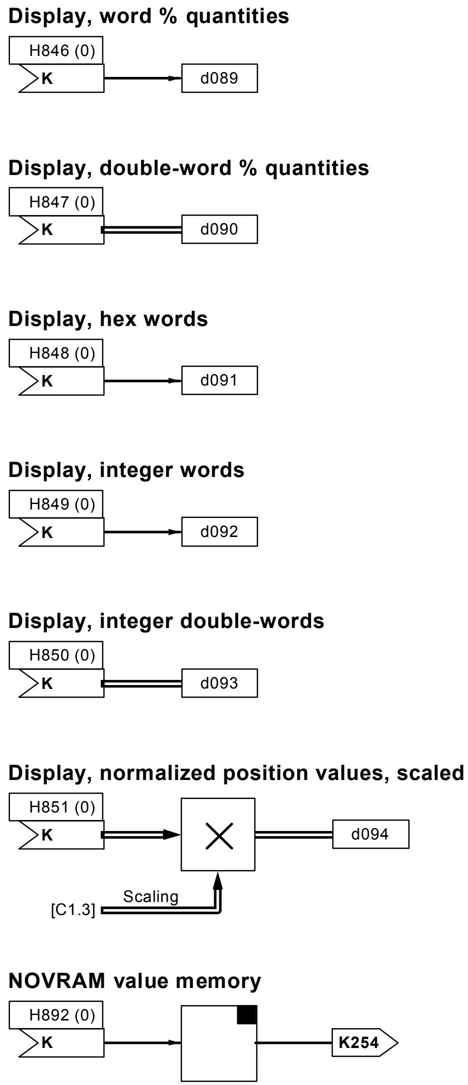
Sheet D4+
Sh.

Status word, position control



Status	Change	Date	Name	Date 15.1.97 / C. pers. Reh / Checked Bader / Standard	Standard MS380 positioning software package	SIEMENS	Status word, position control	FP_D1_6	Function diagram D5	Sheet D5- Sh.





			Date	15.1.97
			C. pers.	Reh
			Checked	Bader
Status	Change	Date	Name	Standard

Standard MS380
positioning software package

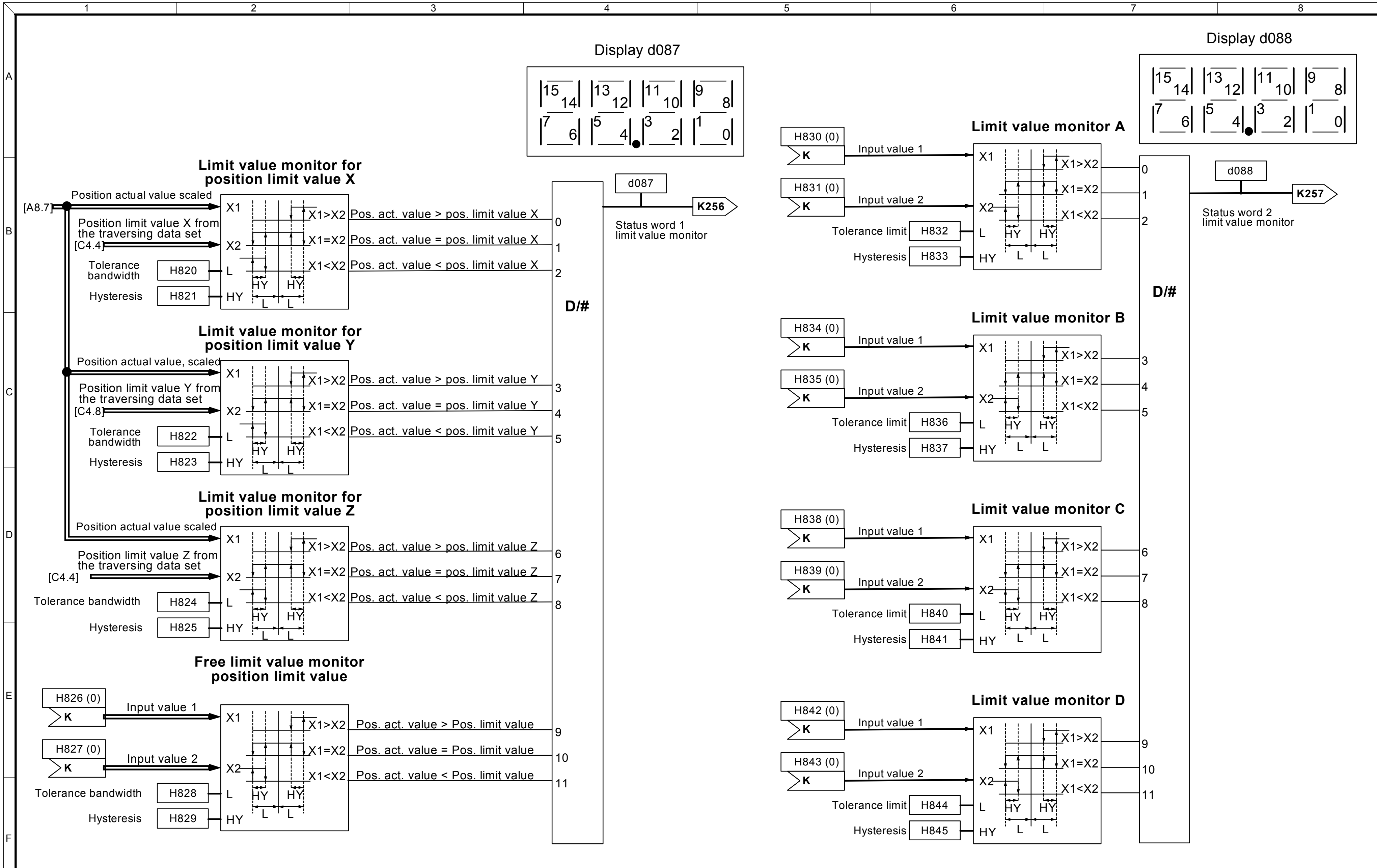
SIEMENS

Motorized potentiometer
visualization parameters

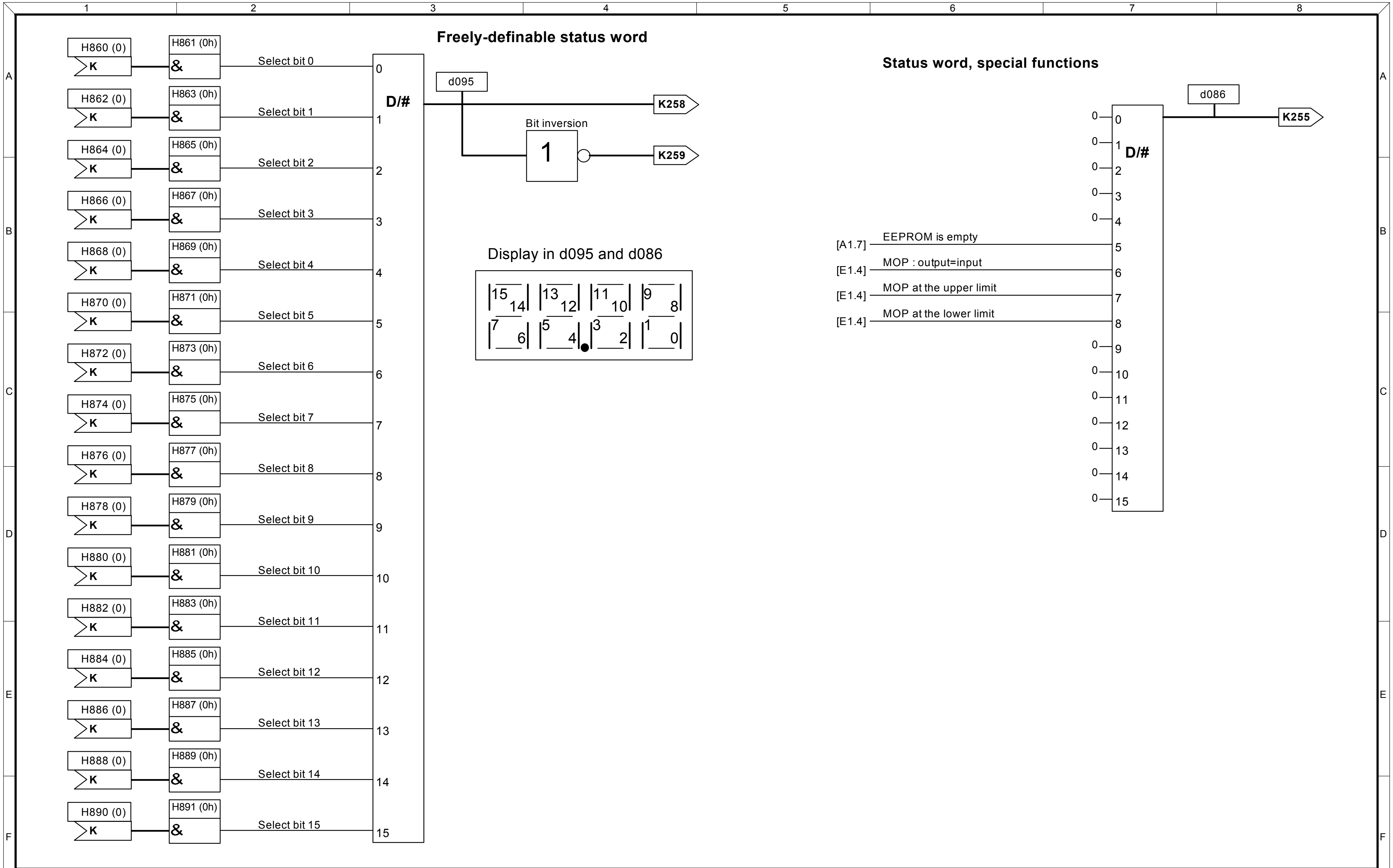
FP_E1_6

Function diagram E1

Sheet E1+
Sh.



				Date	15.1.97	Standard MS380 positioning software package	SIEMENS	Position limit value monitor free limit value monitor	FP_E1_6
				C. pers.	Reh				Function diagram E2
				Checked	Bader				Sheet E2+
Status	Change	Date	Name	Standard					Sh.



			Date	15.1.97	Standard MS380 positioning software package
			C. pers.	Reh	
			Checked	Bader	
Status	Change	Date	Name	Standard	

SIEMENS

Freely-definable status word, status word, special functions

FP_E1_6 — **Function diagram E3** — Sheet E3- Sh.

4 Parameter list

4.1 General information

The technological functions are set using parameters. These can be displaying parameters, and are designated with d..., or changeable parameters, which are designated H....

4.1.1 List of the display parameters

All of the process quantities, which are suitable to visualize the module characteristics, are provided in the display parameter list. These are exclusively used for visualization, and cannot be connected back into the process. The more detailed list of connectors is provided for tasks such as these.

The display parameter list is structured as follows:

Display parameter	Value/description	Value range steps	Function diagram references
d000 (1) 1000d (2) 03E8 (3)	**HARDWARE_ID (4)** Hardware Identifier (5) Identifier for the technology board used (6) e. g. T300 = 133 INPUT.HWID.X_T5 (7) SIMADYN:O2 PKW-TYP:O2 (8) (INIT)(11)	0 ... 32767 (9) 1 (10)	[A1.2]

Explanations:

Display parameters
The parameter number is specified in the display parameter column (1). If the parameter is to be addressed via dual port RAM, 1000 must be added to the parameter number. This value is specified in the decimal (2) and hexadecimal notation (3).

Value/description
The parameter display text is specified in (4) when using the OP1 or SIMOVIS. This text consists of a maximum of 16 characters. The significance of the parameter is briefly described in line (5) and described in detail in (6).
The SIMADYN connector is specified in line (7), which supplies this parameter, as well as the sampling time of the function block.
The SIMADYN D connector format and the parameter type via PROFIBUS is in line (8). Parameter handling via a communications interface is described in Section 4.2.

Value range/steps
The minimum and maximum values which can be set are specified in the column, value range/step, line (9). The range within which the value can be changed is specified in line (10).

Caution INIT values
The drive converter must be powered-down and up again after the initialization values (11) have been entered. The changed value only becomes effective after this.

INFORMATION regarding PMU operator control
When the parameter numbers are counted-up/counted-down in the parameterizing unit display, at first, a differentiation is not made between ´d´- and ´H´ parameters. The correct letter ´d´ or ´H´ only appears with the parameter number after the raise- or lower key has been released.

INFORMATION regarding OP1 operator control
In order to select a technology parameter, 1000 must be added to the parameter number. Example: To select parameter d025, parameter number 1025 must be entered.

4.1.2 List of the setting parameters

The parameter list describes the H parameters as well as their functions.
The setting parameter list is structured as follows:

Par. number	**Value/description**	**Value steps**	**Factory setting**	**Section [diagram]**
H151 (1) 1151d (2) 047Fh (3)	**PULSES_PG1 (4)** Pulses per revolution, pulse encoder 1 (5) Number of pulses per revolution, pulse encoder 1 (6) INPUT.PG1000.PR1_T1 (7) SIMADYN D:O2 PKW-TYP:O2 (INIT) (8)	0...32767 (9) 1 (10)	1024 (11)	(12)

The parameter list, lines (1) to (10) have the same structure as the parameter list of the display parameters. The following columns are additionally provided:

Factory setting (11)
The factory setting is the parameter value which is stored in the EPROM. The value is in the status as shipped, and is active after the *establish factory setting function*.

Section (12)
In the Section line, there is cross-reference to the function description Section, in which the function of the parameter or the partial circuit is described in more detail.

4.2 Parameter normalization

Generally, the parameters are normalized via the interfaces, just as they appear in the unit operator control panel (PMU) display. However, the decimal point is eliminated.
The value range as well as the position of the decimal point can be determined from the *value range* column of the parameter list.
The smallest possible increment can be read from the „*Steps*“ column. In this case, it should be observed, that the value can be entered via the interface for specific parameter types, with a smaller step range. However, from the system, only the specified step range can be realized, i. e., it is rounded-off.
The parameters can be either 1-bit, 16-bit or 32-bit quantities. Various parameter types are available depending on the definition.

The available parameter types are listed as overview in the following table

Parameter type	**Significance**
Boolean	Binary value
O2	Unsigned 16-bit value
I2	Signed 16-bit value
I4	Signed 32-bit value
V2	16-bit word (binary vector)

Example:
21.9% is to be entered for parameter H531. The parameter type is I4.

Required value for H531	Value range for parameter	**Value to be entered via interface**
21.9%	-200.000 ... 199.993	**21*900*** as decimal number

The parameter has 3 decimal points, specified by the data in the value range, i. e. 2 zeros must be attached.
Leading zeros need not be specified.

Display par.	Value/description	Value range steps	Funct. diagr. reference
d000 1000d 03e8	**HARDWARE_ID** Hardware identifier Identifier for the technology board used e. g. T300 = 133 INPUT.HWID.X_T5 SIMADYN:O2 PKW-TYP:O2	0 ... 32767 1	[A1.2]
d001 1001d 03E9h	**SOFTWARE_ID** Software identifier Identifier for the software used e. g. positioning = 380 INPUT.SWID.X_T5 SIMADYN D:O2 PKW-TYP:O2	0 ... 32767 1	[A1.2]
d002 1002d 03EAh	**SOFTWARE_VERSION** Software version INPUT.SWVER.X_T5 SIMADYN D:N2, SCAL=5100 PKW-TYP:I4	0.0 ... 10199.9 0.1	[A1.2]
d003 1003d 03EBh	**SIMD_SYS_ERR** System error analysis Status word, generated by the operating system 15 14 | 13 12 | 11 10 | 9 8 7 6 | 5 4 . 3 2 | 1 0 Bit 0: Fatal system error Bit 3: Task administrator error Bit 4: Monitor error Bit 5: Hardware fault Bit 6: Communications error Bit 10: User error INPUT.I5010.QS_T5 SIMADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 0001h	[A1.3]
d004 1004d 03ECh	**PEER_RECWD_1** Receive word 1, peer-to-peer coupling INPUT.R2500.Y1_T2 SIMADYN D:N2 PKW-TYP:I4	-200.000% ... 199.993% 0.006%	[A3.3]
d005 1005d 03EDh	**PEER_RECWD_2** Receive word 2, peer-to-peer coupling INPUT.R2500.Y2_T2 SIMADYN D:N2 PKW-TYP:I4	-200.000% ... 199.993% 0.006%	[A3.3]
d006 1006d 03EEh	**PEER_RECWD_3** Receive word 3, peer-to-peer coupling INPUT.R2500.Y3_T2 SIMADYN D:N2 PKW-TYP:I4	-200.000% ... 199.993% 0.006%	[A3.3]
d007 1007d 03EFh	**PEER_RECWD_4** Receive word 4, peer-to-peer coupling INPUT.R2500.Y4_T2 SIMADYN D:N2 PKW-TYP:I4	-200.000% ... 199.993% 0.006%	[A3.3]
d008 1008d 03F0h	**PEER_RECWD_5** Receive word 5, peer-to-peer coupling INPUT.R2500.Y5_T2 SIMADYN D:N2 PKW-TYP:I4	-200.000% ... 199.993% 0.006%	[A3.3]

Display par.	Value/description	Value range steps	Funct. diagr. reference
d009 1009d 03F1h	**BINARY_INPUTS** Status, binary inputs 15 14 | 13 12 | 11 10 | 9 8 7 6 | 5 4 . 3 2 | 1 0 Bit 0: Binary input 1 to Bit 15: Binary input 16 INPUT.BI2030.QS_T2 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	[A4.3]
d011 1011d 03F3h	**ANALOG_INPUT_1** Signal from analog input 1 Analog signal which is read-in after adaption and smoothing. INPUT.AI2030.Y_T2 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	[A5.3]
d012 1012d 03F4h	**ANALOG_INPUT_2** Signal from analog input 2 Analog signal which is read-in after adaption and smoothing. INPUT.AI2130.Y_T2 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	[A5.3]
d013 1013d 03F5h	**ANALOG_INPUT_3** Signal from analog input 3 Analog signal which is read-in after adaption and smoothing. INPUT.AI3030.Y_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	[A5.3]
d014 1014d 03F6h	**ANALOG_INPUT_4** Signal from analog input 4 Analog signal which is read-in after adaption and smoothing. INPUT.AI3140.Y_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	[A5.3]
d015 1015d 03F7h	**ANALOG_INPUT_5** Signal from analog input 5 Analog signal which is read-in after adaption and smoothing. INPUT.AI4030.Y_T4 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	[A5.3]
d016 1016d 03F8h	**ANALOG_INPUT_6** Signal from analog input 6 Analog signal which is read-in after adaption and smoothing. INPUT.AI4130.Y_T4 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	[A5.3]
d017 1017d 03F9h	**ANALOG_INPUT_7** Signal from analog input 7 INPUT.AI5030.Y_T5 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	[A5.3]
d018 1018d 03FA	**NACT_PG1** Speed actual value from pulse encoder 1 Smoothed speed actual value from pulse encoder 1 INPUT.PG2100.Y_T2 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	[A6.8]
d019 1019d 03FB	**NACT_PG2** Speed actual value from pulse encoder 2 Smoothed speed actual value from pulse encoder 2 INPUT.PG2200.Y_T2 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	[A7.6]

Display par.	Value/description	Value range steps	Funct. diagr. reference
d020 1020d 03FCh	**NACT_INT** Internal speed actual value Speed actual value which is used for the closed-loop control INPUT.PG2250.Y_T2 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	[A8.2]
d021 1021d 03FDh	**VACT_INT** Internal velocity actual value Velocity actual value which is used for the control INPUT.PG2260.Y2_T2 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	[A8.3]
d022 1022d 03FEh	**PACT_PG1** Position actual value from pulse encoder 1 INPUT.PG1000.YP1_T1 SIMADYN D:N4 PKW-TYP:I4	-200.000%...199.993% 0.006%	[A6.7]
d023 1023d 03FFh	**PACT_PG2** Position actual value from pulse encoder 2 INPUT.PG1000.YP2_T1 SIMADYN D:N4 PKW-TYP:I4	-200.000%...199.993% 0.006%	[A7.5]
d025 1025d 0401h	**PACT_POSREG** Position actual value for the position control Display of the position actual value selected using H168. INPUT.PG1330.Y_T1 SIMADYN D:N4 PKW-TYP:I4	-200.000%...199.993% 0.006%	[A8.3]
d026 1026d 0402h	**PACT_REG** Position actual value for the closed-loop control Position actual value which is used for the closed-loop control. Compensation circuit output for rotary axes. INPUT.PG1490.Y_T1 SIMADYN D:N4 PKW-TYP:I4	-200.000%...199.993% 0.006%	[A8.5]
d027 1027d 0403h	**PACT_DSP** Position actual value, normalized Position actual value which is used for checkback signals. Compensation circuit output for rotary axes. INPUT.PG1525.Y_T1 SIMADYN D:N4 PKW-TYP:I4	-200.000%...199.993% 0.006%	[A8.5]
d028 1028d 0404h	**PACT_SCAL** Position actual value for display, scaled Position actual value which is used for checkback signals. The value refers to the defined scaling. Compensation circuit output for rotary axes. INPUT.PG2420.Y_T1 SIMADYN D:I4 PKW-TYP:I4	-2 147 483 648... ... 2 147 483 647 1	[A8.6]
d029 1029d 0405h	**BYTESER_INP** Reference value from byte-serial data input The value read-in remains stored until a new value is transferred. INPUT.BS3020.Y_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	[A9.5]
d030 1030d 0406h	**THUMBWHEEL_INP** Reference value from the thumbwheel switch A new reference value is only read-in, if this is requested with the data transfer binary command. INPUT.TW3150.Y_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	[A10.5]

Display par.	Value/description	Value range steps	Funct. diagr. reference
d031 1031d 0407h	**STW_IO_FUNCT** Status word, input/output functions 15 14 | 13 12 | 11 10 | 9 8 7 6 | 5 4 | 3 2 | 1 0 Bit 0: Zero pulse, pulse encoder 1 identified Bit 1: Zero pulse, pulse encoder 2 identified Bit 2: Velocity actual value > 0 (V>0) Bit 3: Velocity actual value = 0 (V=0) Bit 4: Velocity actual value < 0 (V<0) Bit 5: Traversing direction, pulse encoder 1 (0=pos., 1=neg.) Bit 6: Traversing direction, pulse encoder 2 (0=pos., 1=neg.) Bit 7: Not used Bit 8: Not used Bit 9: System error, T300 Bit 10: Send to CU ok. Bit 11: Send to CB ok. Bit 12: Send to peer-to-peer ok. Bit 13: Receive from CU ok. Bit 14: Receive from CB ok. Bit 15: Receive from peer-to-peer ok. INPUT.STAT10.QS_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	[A10.8]
d035 1035d 040Bh	**OFF_CONDITIONS** Power-off conditions If the drive cannot be powered-up even if there is an on command, then there is a power-on inhibit. The reasons are as follows: 15 14 | 13 12 | 11 10 | 9 8 7 6 | 5 4 | 3 2 | 1 0 Bit 0: Drive is faulted (T300 identification) Bit 1: Drive is faulted (status word from the CU) Bit 2: Electrical OFF (OFF2) Bits 3 to bits 7: Not used Bit 8: Off after inching Bit 9: Off for standard stop (OFF1) Bit 10: Off for fast stop (OFF3) Bit 11: No checkback signal, drive converter Bits 12 to 15: Not used CONTRL.CC3600.QS_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	[B1.6]
d036 1036d 040Ch	**DIAGNOSTIC_WORD** Diagnostics word The last power-down cause is stored in the diagnostics word. The assignment is the same as the power-down conditions in d035. CONTRL.CD3520.Y_T3 SIMADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 1h	[B1.7]

Display par.	Value/description	Value range steps	Funct. diagr. reference
d037 1037d 040Dh	**CNTRL_WD_1_CU** Control word 1 at CU 15 14 | 13 12 | 11 10 | 9 8 7 6 | 5 4 . 3 2 | 1 0 Bit 0: On/no stop (OFF1) Bit 1: No electrical off (OFF2) Bit 2: No fast stop (OFF3) Bit 3: Inverter enable Bit 4: Ramp-function generator enable Bit 5: No ramp-function generator stop Bit 6: Setpoint enable Bit 7: Fault acknowledgement Bit 8: Inching 1 Bit 9: Inching 2 Bit 10: Control from the PLC Bit 11: Clockwise rotating field Bit 12: Counter-clockwise rotating field Bit 13: Motorized potentiometer, raise Bit 14: Motorized potentiometer, lower Bit 15: No fault, external 1 CONTRL.CE3210.QS_T3 SIMADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 0001h	[A2.8]
d038 1038d 040Eh	**CNTRL_WD_2_CU** Control word 2 at CU 15 14 | 13 12 | 11 10 | 9 8 7 6 | 5 4 . 3 2 | 1 0 Bit 0: Setpoint data set, bit 0 Bit 1: Setpoint data set, bit 1 Bit 2: Motor data set, bit 0 Bit 3: Motor data set, bit 1 Bit 4: Fixed setpoint bit 0 Bit 5: Fixed setpoint bit 1 Bit 6: Synchronizing enable Bit 7: Restart-on-the-fly enable Bit 8: Droop enable Bit 9: Controller enable Bit 10: No fault, external 2 Bit 11: Slave drive Bit 12: No alarm, external 1 Bit 13: No alarm, external 2 Bit 14: Select reserve setting Bit 15: Main contactor checkback signal CONTRL.CC3510.QS_T3 SIMADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 0001h	[A2.8]

Display par.	Value/description	Value range steps	Funct. diagr. reference
d039 1039d 040Fh	**FAULT_WORD** Fault word 15 14 | 13 12 | 11 10 | 9 8 7 6 | 5 4 . 3 2 | 1 0 Bit 0: Communications error with CB [F116] Bit 1: Communications error with CU [F117] Bit 2: Communications error, peer-to-peer [F118] Bit 3: User error 1 [F119] Bit 4: User error 2 [F120] Bit 5: Tracking error outside tolerance [F121] Bit 6: Overspeed, positive [F122] Bit 7: Overspeed, negative [F123] Bit 8: Drive stalled [F124] Bit 9: Pulse encoder error [F125] Bit 10: Emergency limit switch A3 actuated [F126] Bit 11: Emergency limit switch B3 actuated [F127] Bit 12: Referencing error [F128] Bit 13: Reference point incorrect / not recognized [F129] Bit 14: Overflow, position actual value [F130] Bit 15: Loading error, absolute encoder [F131] CONTRL.F4960.Y_T4 SIMADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 0001h	[B4.7]
d040 1040d 0410h	**WARN_WORD** Alarm word 15 14 | 13 12 | 11 10 | 9 8 7 6 | 5 4 . 3 2 | 1 0 Bit 0: Communications error with CB [A097] Bit 1: Communications error with CU [A098] Bit 2: Communications error, peer-to-peer [A099] Bit 3: User error 1 [A100] Bit 4: User error 2 [A101] Bit 5: Tracking error outside tolerance [A102] Bit 6: Overspeed, positive [A103] Bit 7: Overspeed, negative [A104] Bit 8: Drive stalled [A105] Bit 9: Pulse encoder fault [A106] Bit 10: Emergency limit switch A3 actuated [A107] Bit 11: Emergency limit switch B3 actuated [A108] Bit 12: Referencing error [A109] Bit 13: Reference point incorrect / not recognized [A110] Bit 14: Overflow, position actual value [A111] Bit 15: Loading error, absolute encoder [A112] CONTRL.F4985.QS_T4 SIMADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 0001h	[B4.7]
d041 1041d 0411h	**STW_CONTROL** Status word, open-loop control 15 14 | 13 12 | 11 10 | 9 8 7 6 | 5 4 . 3 2 | 1 0 Bit 0 to bit 2: Not used Bit 3: Braking Bit 4: No braking Bit 5: Velocity actual value = 0 (V=0) Bit 6: Drive powered-up Bit 7: Drive not powered-up Bit 8: Drive not ready Bit 9: Internal inverter enable Bit 10: Internal reference value enable Bit 11: Not used Bit 12: Drive faulted Bit 13: Open holding/operating brake Bit 14: Close holding/operating brake Bit 15: Close brake at n=0 CONTRL.ST3900.QS_T3 SIMADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 0001h	[B5.4]

Display par.	Value/description	Value range steps	Funct. diagr. reference
d045 1045d 0415h	**STW_1_REFCTRL** Status word 1, referencing control 15 14 · 13 12 · 11 10 · 9 8 7 6 · 5 4 • 3 2 · 1 0 Bit 0: Enable reference point (zero pulse) sensing Bit 1: Referencing with shutdown active Bit 2: Flying referencing active Bit 3: Referencing mode active Bit 4: Drive has referenced Bit 5: Drive has not referenced Bit 6: Crawl to the reference point Bit 7: Approach path greater than the minimum approach path Bit 8: Approach path less than the minimum approach path Bit 9: Referencing direction B→A Bit 10: Referencing direction A→B Bit 11: Referencing direction o.k. Bit 12: Referencing direction not o.k. Bit 13: Hardware limit switch A2 reached Bit 14: Hardware limit switch B2 reached Bit 15: Referencing error REFCTL.PS3900.QS_T3 SIMADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 0001h	[B10.3]
d046 1046d 0416h	**STW_2_REFCTRL** Status word 2, referencing control 15 14 · 13 12 · 11 10 · 9 8 7 6 · 5 4 • 3 2 · 1 0 Bit 0: Error, reference point not/incorrectly identified Bit 1: Hardware limit switch A2 actuated Bit 2: Hardware limit switch B2 actuated Bit 3: Reference point range ok. Bits 4 to 6: Not used Bit 7: TR-Encoder transmission requested Bit 8: TR-Encoder transmission active Bit 9: TR-Encoder referenced Bit 10: TR-Encoder transmission input Bit 11: not used Bit 12: TR-Encoder start transmission error Bit 13: TR-Encoder transmission error Bit 14: TR-Encoder transmission timeout Bit 15: not used REFCTL.PS3950.QS_T3 SIMADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 0001h	[B10.7]
d049 1049d 0419h	**POSREF_REL.POS** Position reference value from the relative positioning SETPNT.PR2137.Y._T2 SIMADYN D:I4 PKW-TYP:I4	-2 147 483 648... ... 2 147 483 647 1	[C2.8]
d050 1050d 041Ah	**POSREF_SEL_DB** Number of the selected position reference value SETPNT.PR3112.QS_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 100	[C2.3]
d051 1051d 041Bh	**POSREF_DB** Position reference value from the traversing data set Position reference value, which is transferred from the traversing data set to the reference value conditioning. SETPNT.PR2100.Y_T2 SIMADYN D:I4 PKW-TYP:I4	-2 147 483 648... ... 2 147 483 647 1	[C2.4]

Display par.	Value/description	Value range steps	Funct. diagr. reference
d052 1052d 041Ch	**POSREF_POSREG** Position reference value to the position control Position reference value, which is transferred from the reference value conditioning to the position controller. SETPNT.PR2430.Y_T2 SIMADYN D:I4 PKW-TYP:I4	-2 147 483 648... ... 2 147 483 647 1	[C3.3]
d053 1053d 041Dh	**P_LIM_X_DB** Position limit value X from the traversing data set Selected position limit value, which is transferred to the position limit value monitor X. SETPNT.PLX330.Y_T3 SIMADYN D:I4 PKW-TYP:I4	-2 147 483 648... ... 2 147 483 647 1	[C4.4]
d054 1054d 041Eh	**P_LIM_Y_DB** Position limit value Y from the traversing data set Selected position limit value, which is transferred to the position limit value monitor Y. SETPNT.PLY330.Y_T3 SIMADYN D:I4 PKW-TYP:I4	-2 147 483 648... ... 2 147 483 647 1	[C4.8]
d055 1055d 041Fh	**P_LIM_Z_DB** Position limit value Z from the traversing data set Selected position limit value, which is transferred to the position limit value monitor Z. SETPNT.PLZ330.Y_T3 SIMADYN D:I4 PKW-TYP:I4	-2 147 483 648... ... 2 147 483 647 1	[C4.4]
d056 1056d 0420h	**SW_LIMA1_DB** Software limit switch A1 from the traversing data set Selected software limit switch, which is transferred as setpoint limiting in the traversing direction B→A. SETPNT.SWA330.Y_T3 SIMADYN D:I4 PKW-TYP:I4	-2 147 483 648... ... 2 147 483 647 1	[C5.4]
d057 1057d 0421h	**SW_LIMB1_DB** Software limit switch B1 from the traversing data set Selected software limit switch, which is transferred as setpoint limiting in the traversing direction A→B. SETPNT.SWB330.Y_T3 SIMADYN D:I4 PKW-TYP:I4	-2 147 483 648... ... 2 147 483 647 1	[C5.8]
d058 1058d 0422h	**VMAX_DB** Maximum velocity from the traversing data set Maximum velocity from the traversing data set multiplied by the velocity adaption (H560/H561/H562). SETPNT.VMX370.Y2_T3 SIMADYN D:N2 PKW-TYP:I4	0.000%...199.993% 0.006%	[C5.4]
d059 1059d 0423h	**KP_DB** KP factor speed controller from the traversing data set The speed controller KP can be influenced using this value. SETPNT.KPV330.Y_T3 SIMADYN D:N2,SCAL=10 PKW-TYP:I4	0.000 ... 10.000 0.001	[C6.4]
d060 1060d 0424h	**KP_ADAP** Output of the signal-dependent KP adaption Factor, which is generated by the KP characteristic. SETPNT.KPV340.Y_T3 SIMADYN D:N2 PKW-TYP:I4	0.000%...199.993% 0.006%	[C6.6]

Display par.	Value/description	Value range steps	Funct. diagr. reference
d061 1061d 0425h	**KP_ADAP_CU** KP adaption factor at the CU The speed controller KP can be influenced using this value. SETPNT.KPV345.Y2_T3 SIMADYN D:N2,SCAL=10 PKW-TYP:I4	0.000 ... 10.000 0.001	[C6.6]
d062 1062d 0426h	**PLAY_DB** Drive play from the traversing data set Selected drive play, which is transferred to the setpoint generation. SETPNT.PY330.Y_T3 SIMADYN D:I2 PKW-TYP:I2	-32768 ... 32767 1	[C6.6]
d063 1063d 0427h	**TU_DB** Ramp-up time, pos. RFG from the traversing data set Selected ramp-up time, which is transferred to the position ramp-function generator. SETPNT.TU330.Y_T3 SIMADYN D:R4:T1 PKW-TYP:O4	5.000[ms] ... ... 5 368 709 120[ms]	[C5.8]
d064 1064d 0428h	**TR_DB** Rounding-off time constant, pos. RFG from DB Selected rounding-off time constant, which is transferred to the position ramp-function generator. SETPNT.TR340.Y_T3 SIMADYN D:R2:T1 PKW-TYP:O4	5.000[ms] ... ... 81 920[ms]	[C7.4]
d065 1065d 0429h	**TD_DB** Ramp-down time, pos. RFG from the traversing data set Selected ramp-down time, which is transferred to the position ramp-function generator. SETPNT.TD330.Y_T3 SIMADYN D:R4:T1 PKW-TYP:O4	5.000[ms] ... ... 5 368 709 120[ms]	[C6.8]
d067 1067d 042Bh	**TD_A2_DB** Down ramp A2 from the traversing data set Selected down ramp, which is transferred to the ramp-function generator for closed-loop speed controlled modes. This ramp time is selected when hardware limit switch A2 is actuated. SETPNT.TDA330.Y_T3 SIMADYN D:R2 PKW-TYP:O4	40.000[ms] ... ... 655 360[ms]	[C7.4]
d068 1068d 042Ch	**TD_B2_DB** Down ramp B2 from the traversing data set Selected down ramp, which is transferred to the ramp-function generator for closed-loop speed controlled modes. This ramp time is selected when hardware limit switch B2 is actuated. SETPNT.TDB330.Y_T3 SIMADYN D:R2 PKW-TYP:O4	40.000[ms] ... ... 655 360[ms]	[C7.8]
d069 1069d 042Dh	**STW_SETPNT** Status word, reference value conditioning 15 14	13 12	11 10	9 8 7 6	5 4 . 3 2	1 0 Bit 0: Software limit A1 violated Bit 1: Software limit B1 violated SETPNT.ST3100.QS_T3 SIMADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 0001h	[C8.3]

Display par.	Value/description	Value range steps	Funct. diagr. reference
d071 1071d 042Fh	**KP_DEV_LIM_CTL** Output, pos. RFG tracking The ramp-up/ramp-down time of the velocity setpoint is multiplied by this factor. POSREG.PR3220.Y_T3 SIMADYN D:N2 PKW-TYP:I4	10.000%...100.000% 0.006%	[D2.4]
d072 1072d 0430h	**ACC_POSRAMP** Acceleration value from pos. RFG Acceleration value of the position ramp-function generator after normalization in H722. POSREG.RB1330.Y_T1 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	[D2.8]
d073 1073d 0431h	**VSP_POSRAMP** Velocity setpoint from pos. RFG Velocity reference value generated from the position ramp-function generator. POSREG.RB1410.Y_T1 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	[D2.8]
d074 1074d 0432h	**POS_POSRAMP** Position reference value from the pos. RFG Normalized position ramp-function generator output. POSREG.RB1510.Y_T1 SIMADYN D:N4 PKW-TYP:I4	-200.000%...199.993% 0.006%	[D2.8]
d075 1075d 0433h	**POSREG_YE** Setpoint-actual value difference, position controller Control error of the position controller POSREG.P3150.Y_T3 SIMADYN D:I4 PKW-TYP:I4	-2 147 483 648 ... ... 2 147 483 647	[D5.3]
d076 1076d 0434h	**POSREG_Y** Output, position controller Position controller output signal. POSREG.P1500.Y2_T1 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	[D3.5]
d077 1077d 0435h	**VSP_DRIVE** Velocity setpoint for the drive The direct velocity setpoint for the drive. POSREG.P1750.Y_T1 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	[D3.7]
d078 1078d 0436h	**NSP_CU** Speed setpoint at CU This speed setpoint is sent to the basic drive converter via the DPR. POSREG.P1760.Y_T1 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	[D3.8]

Display par.	Value/description	Value range steps	Funct. diagr. reference
d081 1081d 0439h	**STW_POSREG** Status word, position control 15 14 | 13 12 | 11 10 | 9 8 7 6 | 5 4 . 3 2 | 1 0 Bit 0: tracking error outside tolerance Bit 1: tracking error within tolerance Bit 2: Velocity setpoint > actual value Bit 3: Velocity setpoint = actual value Bit 4: Velocity setpoint < actual value Bit 5: Position reference value > actual value Bit 6: Position reference value = actual value Bit 7: Position reference value < actual value Bit 8: Closed-loop position control enabled Bit 9: Closed-loop speed controlled mode Bit 10: Position controller at the upper limit Bit 11: Position controller at the lower limit Bit 12 : **Drive has positioned** Bits 13 to 15: Not used POSREG.PS3100.QS_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	[D5.7]
d082 1082d 043Ah	**MOP_OUTPUT** Output, motorized potentiometer Motorized potentiometer output signal. AUXIL.M4590.Y_T4 SIMADYN D:N4 PKW-TYP:I4	-200.000%...199.993% 0.006%	[E1.5]
d086 1086d 043Eh	**STW_AUX_FUNC** Status word, special functions 15 14 | 13 12 | 11 10 | 9 8 7 6 | 5 4 . 3 2 | 1 0 Bit 0 to bit 4: Not used Bit 5: EEPROM is empty Bit 6: MOP : Output = input Bit 7: MOP at the upper limit Bit 8: MOP at the lower limit Bit 9 to bit 15: Not used AUXIL.SC4470.QS_T4 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	[E4.7]
d087 1087d 043Fh	**STW_COMP_1** Status word, limit value monitor 1 15 14 | 13 12 | 11 10 | 9 8 7 6 | 5 4 . 3 2 | 1 0 Bit 0: Position actual value > position limit value X Bit 1: Position actual value = position limit value X Bit 2: Position actual value < position limit value X Bit 3: Position actual value > position limit value Y Bit 4: Position actual value = position limit value Y Bit 6: Position actual value < position limit value Y Bit 7: Position actual value > position limit value Z Bit 8: Position actual value = position limit value Z Bit 9: Position actual value < position limit value Z Bit 10: Input value 1 > input value 2 GWM 1 Bit 11: Input value 1 = input value 2 GWM 1 Bit 12: Input value 1 < input value 2 GWM 1 Bit 13 to bit 15: Not used AUXIL.LM3900.QS_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	[E2.4]

Display par.	Value/description	Value range steps	Funct. diagr. reference
d088 1088d 0440h	**STW_COMP_2** Status word, limit value monitor 2 15 14 | 13 12 | 11 10 | 9 8 7 6 | 5 4 . 3 2 | 1 0 Bit 0: Input value 1 > input value 2 GWM A Bit 1: Input value 1 = input value 2 GWM A Bit 2: Input value 1 < input value 2 GWM A Bit 3: Input value 1 > input value 2 GWM B Bit 4: Input value 1 = input value 2 GWM B Bit 6: Input value 1 < input value 2 GWM B Bit 7: Input value 1 > input value 2 GWM C Bit 8: Input value 1 = input value 2 GWM C Bit 9: Input value 1 < input value 2 GWM C Bit 10: Input value 1 > input value 2 GWM D Bit 11: Input value 1 = input value 2 GWM D Bit 12: Input value 1 < input value 2 GWM D Bit 13 to bit 15: Not used AUXIL.LM3950.QS_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	[E2.4]
d089 1089d 0441h	**DSP_PAR_%_WD** Display, normalized word quantities Connectors can be displayed at this display parameter. This parameter is provided for normalized word quantities, i. e. 4000h = 100%. The connector is selected via parameter H846 AUXIL.DP4000.Y_T4 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	[E1.7]
d090 1090d 0442h	**DSP_PAR_%_DW** Display, normalized double-word quantities Connectors can be displayed at this display parameter. This parameter is provided for normalized double-word quantities, i. e. 4000 0000h = 100%. The connector is selected using parameter H847. AUXIL.DP4010.Y_T4 SIMADYN D:N4 PKW-TYP:I4	-200.000%...199.993% 0.006%	[E1.7]
d091 1091d 0443h	**DSP_PAR_HEX_WD** Displaying hexadecimal word quantities Connectors can be displayed at this display parameter. This parameter is provided for hexadecimal word quantities, i. e. 16 status/control bits. The connector is selected via parameter H848. 15 14 | 13 12 | 11 10 | 9 8 7 6 | 5 4 . 3 2 | 1 0 Bit 0: Status / control bit 0 to Bit 15: Status / control bit 15 AUXIL.DP4020.Y_T4 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	[E1.7]
d092 1092d 0444h	**DSP_PAR_INT_WD** Displaying integer word quantities Connectors can be displayed at this display parameter. This parameter is provided for integer word quantities, i. e. integer numbers. The connector is selected using parameter H849. AUXIL.DP4040.Y_T4 SIMADYN D:I2 PKW-TYP:I2	-32768 ... 32667 1	[E1.7]

Display par.	Value/description	Value range steps	Funct. diagr. reference
d093 1093d 0445h	**DSP_PAR_INT_DW** Displaying integer double-word quantities Connectors can be displayed at this display parameter. This parameter is provided for integer double-word quantities, i. e. integer numbers, e. g. all position actual/reference values, scaled. The connector is selected using parameter H850. AUXIL.DP4050.Y_T4 SIMADYN D:I4 PKW-TYP:I4	-2 147 483 648... ... 2 147 483 647 1	[E1.7]
d094 1094d 0446h	**DSP_PAR_P_SCAL** Displaying position actual values, scaled Connectors can be displayed at this display parameter. This parameter is provided for integer double-word quantities, i. e. integer numbers, e. g. all position actual/reference values, scaled. The connector is selected via parameter H851. AUXIL.DP4070.Y_T4 SIMADYN D:I4 PKW-TYP:I4	-2 147 483 648... ... 2 147 483 647 1	[E1.7]
d095 1095d 0447h	**STW_SEL** Freely-definable status word 15 14 | 13 12 | 11 10 | 9 8 7 6 | 5 4 | 3 2 | 1 0 Bit 0: Status bit 0 to Bit 15: Status bit 15 AUXIL.ST3180.QS_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	[E3.3]
d096 1096d 0448h	**BINARY_OUTPUTS** Status, binary outputs 15 14 | 13 12 | 11 10 | 9 8 7 6 | 5 4 | 3 2 | 1 0 Bit 0: Binary output 1 to Bit 7: Binary output 8 OUTPUT.BQ3100.QS_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	[A4.6]
d099 1099d 044Bh	**DRIVE_ID** Drive identification Displays the drive identification entered in H997 INPUT.DRID.X_T5 SIMADYN D:O2 PKW-TYP:O2	0 ... 32767 1	[A1.4]

Par. No.	Value/description	Value range steps	Factory setting	Sect. [diagr.]
H100 1100d 044Ch	**MSK_EN_SYS_ERR** Mask, system error bits enable Bit 0: Fatal system error Bit 1,2: (Not used) Bit 3: Task administrator error Bit 4: Monitor error Bit 5: Hardware fault Bit 6: Communications error Bits 7 to 9: (Not used) Bit 10: User error Bits 11 to 14: (Not used) INPUT.I5020.IS2_T5 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0429h	[A1.3] 3.3.2
H101 1101d 044Dh	**TEL_LEN_P2P** Length, receive telegram, peer-to-peer Number of receive words of the peer-to-peer coupling INPUT.R2500.LTW_T2 SIMADYN D:O2 PKW-TYP:O2 (INIT)	0...5 1	5	[A3.1] 3.3.5
H102 1102d 044Eh	**MSK_INV_BIN** Mask, inverting binary inputs Permits bitwise inversion of the 16 binary inputs. Bit 0: Inversion, binary input 1 to Bit 15: Inversion, binary input 16 INPUT.BI2030.IS2_T2 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	[A4.3] 3.3.6
H104 1104d 0450h	**SIM_CTW_CB** Mask, simulation, control word from the CB For commissioning and service, the control word received from the communications board can be simulated. **Note:** As long as a control word is entered via parameter H104, all control bits from CB are inhibited. INPUT.R5200.IS1_T5 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	[A3.2] 3.3.4
H110 1110d 0456h	**MUL_ANALOG_IN1** Gain, analog input 1 Value, with which the analog signal is multiplied. INPUT.AI2010.X2_T2 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	50%	[A5.2] 3.3.8
H111 1111d 0457h	**OFF_ANALOG_IN1** Offset, analog input 1 Constant value, which is added to the signal. INPUT.AI2020.X2_T2 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	[A5.2] 3.3.8
H112 1112d 0458h	**FLT_ANALOG_IN1** Smoothing, analog input 1 Time constant to smooth the analog signal. INPUT.AI2030.T_T2 SIMADYN D:R2 PKW-TYP:O4	10.000[ms]... ...163 840.000[ms]	10[ms]	[A5.3] 3.3.8
H113 1113d 0459h	**MUL_ANALOG_IN2** Gain, analog input 2 Value, with which the analog signal is multiplied. INPUT.AI2110.X2_T2 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	50%	[A5.2] 3.3.8
H114 1114d 045Ah	**OFF_ANALOG_IN2** Offset, analog input 2 Constant value, which is added to the signal. INPUT.AI2120.X2_T2 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	[A5.2] 3.3.8

Par. No.	Value/description	Value range steps	Factory setting	Sect. [diagr.]
H115 1115d 045Bh	**FLT_ANALOG_IN2** Smoothing, analog input 2 Time constant to smooth the analog signal. INPUT.AI2130.T_T2 SIMADYN D:R2 PKW-TYP:O4	10.000[ms]... ...163 840.000[ms]	10[ms]	[A5.3] 3.3.8
H116 1116d 045Ch	**MUL_ANALOG_IN3** Gain, analog input 3 Value, with which the analog signal is multiplied. INPUT.AI3010.X2_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	50%	[A5.2] 3.3.8
H117 1117d 045Dh	**OFF_ANALOG_IN3** Offset, analog input 3 Constant value, which is added to the signal. INPUT.AI3020.X2_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	[A5.2] 3.3.8
H118 1118d 045Eh	**FLT_ANALOG_IN3** Smoothing, analog input 3 Time constant to smooth the analog signal. INPUT.AI3030.T_T3 SIMADYN D:R2 PKW-TYP:O4	40.000[ms]... 655 360.000[ms]	40[ms]	[A5.3] 3.3.8
H119 1119d 045Fh	**MUL_ANALOG_IN4** Gain, analog input 4 Value, with which the analog signal is multiplied. INPUT.AI3110.X2_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	50%	[A5.2] 3.3.8
H120 1120d 0460h	**OFF_ANALOG_IN4** Offset, analog input 4 Constant value, which is added to the signal. INPUT.AI3120.X2_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	[A5.2] 3.3.8
H121 1121d 0461h	**FLT_ANALOG_IN4** Smoothing, analog input 4 Time constant to smooth the analog signal. INPUT.AI3130.T_T3 SIMADYN D:R2 PKW-TYP:O4	40.000[ms]... 655 360.000[ms]	40[ms]	[A5.3] 3.3.8
H122 1122d 0462h	**MUL_ANALOG_IN5** Gain, analog input 5 Value, with which the analog signal is multiplied. INPUT.AI4010.X2_T4 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	50%	[A5.2] 3.3.8
H123 1123d 0463h	**OFF_ANALOG_IN5** Offset, analog input 5 Constant value, which is added to the signal. INPUT.AI4020.X2_T4 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	[A5.2] 3.3.8
H124 1124d 0464h	**FLT_ANALOG_IN5** Smoothing, analog input 5 Time constant to smooth the analog signal. INPUT.AI4030.T_T4 SIMADYN D:R2 PKW-TYP:O4	160.000[ms]... ...2 621 440.000[ms]	160[ms]	[A5.3] 3.3.8
H125 1125d 0465h	**MUL_ANALOG_IN6** Gain, analog input 6 Value, with which the analog signal is multiplied. INPUT.AI4110.X2_T4 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	50%	[A5.2] 3.3.8

Par. No.	Value/description	Value range steps	Factory setting	Sect. [diagr.]
H126 1126d 0466h	**OFF_ANALOG_IN6** Offset, analog input 6 Constant value, which is added to the signal. INPUT.AI4120.X2_T4 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	[A5.2] 3.3.8
H127 1127d 0467h	**FLT_ANALOG_IN6** Smoothing, analog input 6 Time constant to smooth the analog signal. INPUT.AI4130.T_T4 SIMADYN D:R2 PKW-TYP:O4	160.000[ms]... ...2 621 440.000[ms]	160[ms]	[A5.3] 3.3.8
H128 1128d 0468h	**MUL_ANALOG_IN7** Gain, analog input 7 Value, with which the analog signal is multiplied. INPUT.AI5010.X2_T5 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	50%	[A5.2] 3.3.8
H129 1129d 0469h	**OFF_ANALOG_IN7** Offset, analog input 7 Constant value, which is added to the signal. INPUT.AI5020.X2_T5 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	[A5.2] 3.3.8
H130 1130d 046Ah	**FLT_ANALOG_IN7** Smoothing, analog input 7 Time constant to smooth the analog signal. INPUT.AI5030.T_T5 SIMADYN D:R2 PKW-TYP:O4	320.000[ms]... ...5 242 880.000[ms]	320[ms]	[A5.3] 3.3.8
H131 1131 046Bh	**SRC_RESET_PG1** Source, resetting position actual value 1 Connector number of the supplying value. INPUT.PG3100.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...1024 1	0	[A6.4] 3.3.10.6
H132 1132 046Ch	**MSK_RESET_PG1** Mask, resetting position actual value 1 Mask to select the bit to be controlled. Sets the position actual value from pulse encoder 1 to zero. INPUT.PG3100.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	[A6.4] 3.3.10.6
H133 1133d 046Dh	**SRC_SET_PG1** Source, setting position actual value 1 Connector number, description, refer to H134. INPUT.PG3120.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...1024 1	0	[A6.3] 3.3.10.6
H134 1134d 046Eh	**MSK_SET_PG1** Mask, setting position actual value 1 Mask to select the bit to be controlled. Sets the position actual value from pulse encoder 1 to the setting value selected with H169. INPUT.PG3120.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 0001h	0000h	[A6.3] 3.3.10.6
H135 1135d 046Fh	**EN_SAV_PG1** Enable, transfer P act 1 from NOVRAM If the enable bit is set, when the voltage returns, position actual value 1 is set to the value stored in the NOVRAM. INPUT.PG3020.I2_T3 SIMADYN D:B1 PKW-TYP:Boolean	0 ... 1 1	1	[A6.6] 3.3.10.6

Par. No.	Value/description	Value range steps	Factory setting	Sect. [diagr.]
H136 1136 0470h	**SRC_RESET_PG2** Source, resetting position actual value 2 Connector number, description refer to H137. INPUT.PG3150.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...1024 1	4	[A7.3] 3.3.10.6
H137 1137d 0471h	**MSK_RESET_PG2** Mask, resetting position actual value 2 Mask to select the controlling bit. Sets the position actual value from pulse encoder 2 to zero. INPUT.PG3150.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0001h	[A7.3] 3.3.10.6
H138 1138d 0472h	**SRC_SET_PG2** Source, setting position actual value 2 Connector number of the supplying value. INPUT.PG3170.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...1024 1	0	[A7.3] 3.3.10.6
H139 1139d 0473h	**MSK_SET_PG2** Mask, setting position actual value 2 Mask to select the controlling bit. Sets the position actual value from pulse encoder 2 to the setting value selected with H170. INPUT.PG3170.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	[A7.3] 3.3.10.6
H140 1140d 0474h	**EN_SAV_PG2** Enable, transfer P act 2 from the NOVRAM If the enable bit is set, when the voltage returns, position actual value 1 is set to the value stored in the NOVRAM. INPUT.PG3030.I2_T3 SIMADYN D:B1 PKW-TYP:Boolean	0 ... 1 1	1	[A7.4] 3.3.10.5
H141 1141d 0475h	**SRC_EN_SYNC_PG2** Source, zero pulse evaluation 2 enable Connector number, description, refer to H142 INPUT.PG3190.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	4	[A7.4]
H142 1142d 0476h	**MSK_EN_SYNC_PG2** Mask, zero pulse evaluation 2 enable Mask to select the controlling bit for the zero pulse evaluation enable. Is the contolling bit = 1, the zero pulse evaluation 2 is enabled. Is the controlling bit 0, there is no zero pulse evaluation. INPUT.PG3190.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 0001h	0001h	[A7.4]

Par. No.	Value/description	Value range steps	Factory setting	Sect. [diagr.]
H150 1150d 047Eh	**HW_MODE_PG1** Hardware mode, pulse encoder 1 Defines the pulse encoder source, filter, rough pulse and zero pulse evaluation. Coding: Bit 0 to bit 3 : Digital filter setting 0: 500kHz 1: no filter 2: 2MHz 3: 500kHz 4: 126kHz 5: 62.5kHz Bits 4 to 7 : Pulse encoder type 0: Pulse encoder with two tracks displaced through 90° 1: Separate tracks for up- and down pulses 2: Zero pulse via LBA from the basic drive converter 4: Track A, track B via LBA from the basic drive converter 6: Tracks A, B and zero pulse via LBA from the basic drive converter Bits 8 to 11 : Rough pulse selection 0: No rough pulse evaluation 1: Rough pulse type 1 2: Rough pulse type 2 Bits 12 to 15 : Zero pulse evaluation 0: Not direction of rotation dependent 1: direction of rotation dependent, i. e. rising edge for positive speed falling edge for negative speed INPUT.PG1000.IT1_T1 SIMADYN D:V2 PKW-TYP:V2 (INIT)	0000h ... FFFFh 0001h	1064h	[A6.5] 3.3.10.2
H151 1151d 047Fh	**PULSES_PG1** Pulses per revolution, pulse encoder 1 Number of pulses per revolution, pulse encoder 1 INPUT.PG1000.PR1_T1 SIMADYN D:O2 PKW-TYP:O2 (INIT)	0...32767 1	1024	[A6.5] 3.3.10.1
H152 1152d 0480h	**NOM_RPM_PG1** Rated speed, pulse encoder 1 Speed of the motor shaft in [RPM], at which the pulse evaluation should provide 100% actual value. INPUT.PG1000.RS1_T1 SIMADYN D:I2 PKW-TYP:I2 (INIT)	-32768...32767 1	3000	[A6.6] 3.3.10.1
H153 1153d 0481h	**NOM_LEGTH_PG1** Normalization, position actual value 1 Number of pulses, at which the pulse encoder evaluation should provide 100% actual value, i. e., for the defined nominal length or for rotary axes, 1 revolution of the driven machine. ***Note:*** The quadrupled pulses are counted. INPUT.PG1000.RP1_T1 SIMADYN D:I4 PKW-TYP:I4 (INIT)	0 ... 1 073 741 824 1	4096000	[A6.6] 3.3.10.1

Par. No.	Value/description	Value range steps	Factory setting	Sect. [diagr.]
H154 1154d 0482h	**CTW_MOD_PG1** Control word, pulse encoder 1 The control word defines the standstill limit and the setting characteristics: Coding: Bits 0 to 7 : Standstill limit 0: 4 sampling times n: Speed actual value is set to zero after n sampling times Bit 8 : Setting signal evaluation 0: Position is set to the setting value 1: The setting value is subtracted from the current position Bit 12 : Zero pulse evaluation 0: Position is set to the setting value 1: The setting value is subtracted from the actual position INPUT.PG1000.CW1_T1 SIMADYN D:I2 PKW-TYP:I2 (INIT)	0000h ... FFFFh 0001h	0000h	[A6.6] 3.3.10.3
H155 1155d 0483h	**HW_MODE_PG2** Hardware mode, pulse encoder 2 Defines the pulse encoder, filter, rough pulse and zero pulse evaluation. Coding: Bits 0 to 3 : Digital filter setting 0: 500kHz 1: no filter 2: 2MHz 3: 500kHz 4: 126kHz 5: 62.5kHz Bits 4 to 7 : Pulse encoder type 0: Pulse encoder with two tracks displaced through 90° 1: Separate tracks for up- and down pulses Bits 8 to 11 : Rough pulse selection 0: No rough pulse evaluation 1: Rough pulse type 1 2: Rough pulse type 2 Bits 12 to 15 : Zero pulse evaluation 0: Not direction of rotation dependent 1: Direction of rotation dependent, i. e. rising edge for positive speed falling edge for negative speed ***Note:*** It is not possible to inject the pulse encoder signals via the LBA from the basic drive converter for sensing 2. INPUT.PG1000.IT2_T1 SIMADYN D:O2 PKW-TYP:O2 (INIT)	0000h ... FFFFh 0001h	1004h	[A7.4] 3.3.10.2
H156 1156d 0484h	**PULSES_PG2** Pulses per revolution, pulse encoder 2 Number of pulses per revolution, pulse encoder 2 INPUT.PG1000.PR2_T1 SIMADYN D:O2 PKW-TYP:O2 (INIT)	0...32767 1	1024	[A7.4] 3.3.10.1
H157 1156d 0485h	**NOM_RPM_PG2** Rated speed, pulse encoder 2 Speed of the motor shaft in [RPM] at which the pulse evaluation must provide 100% actual value. INPUT.PG1000.RS2_T1 SIMADYN D:I2 PKW-TYP:I2 (INIT)	-32768...32767 1	3000	[A7.4] 3.3.10.1

Par. No.	Value/description	Value range steps	Factory setting	Sect. [diagr.]
H158 1158d 0486h	**NOM_LENGTH_PG2** Normalization, position actual value 2 Number of pulses, for which the pulse encoder evaluation should provide 100% actual value, i. e. for the defined nominal length or for rotary axes, 1 revolution of the driven machine. ***Note:*** The quadrupled pulses are counted. INPUT.PG1000.RP2_T1 SIMADYN D:I4 PKW-TYP:I4 (INIT)	0 ... 1 073 741 824 1	1073741824	[A7.4] 3.3.10.1
H159 1159d 0487h	**CTW_MOD_PG2** Control word, pulse encoder 2 The control word defines the standstill limit and the setting characteristics: Coding: Bits 0 to 7 : Standstill limit 0: 4 sampling times n: Speed actual value is set to zero after n sampling times Bit 8 : Evaluation of the setting signal 0: Position is set to the setting value 1: Setting value is subtracted from the actual position Bit 12 : Zero pulse evaluation 0: Position is set to the setting value 1: Setting value is subtracted from the actual position INPUT.PG1000.CW2_T1 SIMADYN D:I2 PKW-TYP:I2 (INIT)	0000h ... FFFFh 0001h	0000h	[A7.4] 3.3.10.3
H162 1162d 048Ah	**FLT_NACT_PG1** Smoothing, speed actual value 1 Smoothing time constant, speed actual value from pulse encoder evaluation 1. INPUT.PG2100.T_T2 SIMADYN D:R2 PKW-TYP:O4	10.000[ms]... ...163 840.000[ms]	10[ms]	[A6.7] 3.3.10
H163 1163d 048Bh	**FLT_NACT_PG2** Smoothing, speed actual value 2 Smoothing time constant, speed actual value from pulse encoder evaluation 2. INPUT.PG2200.T_T2 SIMADYN D:R2 PKW-TYP:O4	10.000[ms]... ...163 840.000[ms]	10[ms]	[A7.6] 3.3.10
H164 1164d 048Ch	**SRC_NACT_INT** Source, internal speed actual value Connector number of the supplying value. Defines the speed actual value source for the closed-loop control. The speed actual value from the basic drive converter is pre-assigned. INPUT.PG2250.NC_T2 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	60	[A8.1] 3.3.11
H165 1165d 048Dh	**LIM_VACMP_ZERO** Tolerance limit, zero velocity signal If the absolute velocity actual value exceeds this limit, the v=0 signal is withdrawn. INPUT.PG3300.L_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0.5%	[A8.3] 3.3.11
H166 1166d 048Eh	**HY_VACMP_ZERO** Hysteresis, zero velocity signal The tolerance limit H165 minus the hysteresis is the limit, which if fallen below, for the first time, results in the v=0 signal. INPUT.PG3300.HY_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0.1%	[A8.3] 3.3.11

Par. No.	Value/description	Value range steps	Factory setting	Sect. [diagr.]
H167 1167d 048Fh	**SRC_PACT_DPR** Source, position actual value from dual port RAM Connector number of the receive word from the CU, in which the position actual value is transferred. INPUT.R1300.NC_T1 SIMADYN D:N2 PKW-TYP:I4	0 ... 1024 1	0	[A8.1] 3.3.12
H168 1168d 0490h	**SRC_PACT_INT** Source, position actual value for the closed-loop control Connector number of the position actual value which is to be used for the closed-loop control. INPUT.PG1320.NC_T1 SIMADYN D:V2 PKW-TYP:V2	0 ... 1024 1	62	[A8.1] 3.3.12
H169 1169d 0491h	**SRC_SVPOS_PG1** Source, position setting value, pulse encoder 1 Connector number of the value, to which the position actual value is set with the setting signal (H133/H134). INPUT.PG3450.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[A6.3] 3.3.10.6
H170 1170d 0492h	**SRC_SVPOS_PG2** Source, position setting value, pulse encoder 2 Connector number of the value, to which the position actual value is set with the setting signal (H138/H139). INPUT.PG3550.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[A7.3] 3.3.10.6
H180 1180d 049Ch	**SRC_HBE_BYTESER** Source, hibyte bit enable, byte-serial Connector number of the supplying value. INPUT.BS3000.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[A9.3] 3.3.14
H181 1181d 049Dh	**MSK_HBE_BYTESER** Mask, hibyte bit enable, byte-serial Mask to select the controlling bit. Indicates the block read-ing-in the data, that the most significant byte of the word is available for transfer. INPUT.BS3000.MSK_T3 SIMADYN D:O2 PKW-TYP:O2	0000h...FFFFh 0001h	0000h	[A9.3] 3.3.14
H182 1182d 049Eh	**ACC_TIM_BYTESER** Setting time, byte-serial Minimum time for which the particular byte must be present unchanged in order to be accepted. Note: The control bits must be present for H182+40ms (=sampling time). INPUT.BS3010.TC_T3 SIMADYN D:T2 PKW-TYP:O4	0[ms]...1 310 680[ms] 40[ms]	40[ms]	[A9.4] 3.3.14
H183 1183d 049Fh	**NUM_DEC_TWS** Decade number, thumbwheel switch Number of decades of the reference value thumbwheel switch. INPUT.TW3150.STZ_T3 SIMADYN D:O2 PKW-TYP:O2 (INIT)	2...5 1	4	[A9.4] 3.3.13
H184 1184d 04A0h	**REF_FAC_TWS** Normalization factor, thumbwheel switch Number, read-in from the thumbwheel switch, which should correspond to 100% reference value. INPUT.TW3150.NF_T3 SIMADYN D:O2 PKW-TYP:O2	0...65536 1	100	[A9.4] 3.3.13

Par. No.	Value/description	Value range steps	Factory setting	Sect. [diagr.]
H185 1185d 04A1h	**BCD_TPE_TWS** BCD coding, thumbwheel switch Selection, binary- coded, decimal. Setting range of the individual positions: 0...9 : BCD coding: H109=1 0...F : HEX coding: H109=0 INPUT.TW3150.BCD_T3 SIMADYN D:B1 PKW-TYP:BOOLEAN	0...1 1	1	[A9.4] 3.3.13
H186 1186d 04A2h	**NEG_SGN_TWS** Thumbwheel switch, with sign When entering positive and negative values, the most significant position only in a range -7...+7. The sign is attached instead of the most significant bit of this decade. INPUT.TW3150.VZ_T3 SIMADYN D:B1 PKW-TYP:BOOLEAN	0...1 1	0	[A9.4] 3.3.13
H187 1187d 04A3h	**SRC_BIT0_TWS** Source, bit 0 from the thumbwheel switch Connector number of the supplying value. INPUT.TW3100.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...1024 1	0	[A9.3] 3.3.13
H188 1188d 04A4h	**MSK_BIT0_TWS** Mask, bit 0 from the thumbwheel switch Mask, which selects the bit with weighting 1 of the decade. INPUT.TW3100.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	[A9.3] 3.3.13
H189 1189d 04A5h	**SRC_BIT1_TWS** Source, bit 1 from the thumbwheel switch Connector number of the supplying value. INPUT.TW3110.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...1024 1	0	[A9.3] 3.3.13
H190 1190d 04A6h	**MSK_BIT1_TWS** Mask, bit 1 from the thumbwheel switch Mask, which selects the bit with weighting 2 of the decade. INPUT.TW3110.MSK_T3 SI- MADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	[A9.3] 3.3.13
H191 1191d 04A7h	**SRC_BIT2_TWS** Source, bit 2 from the thumbwheel switch Connector number of the supplying value. INPUT.TW3120.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...1024 1	0	[A9.3] 3.3.13
H192 1192d 04A8h	**MSK_BIT2_TWS** Mask, bit 2 from the thumbwheel switch Mask, which selects the bit with weighting 4 of the decade. INPUT.TW3120.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	[A9.3] 3.3.13
H193 1193d 04A9h	**SRC_BIT3_TWS** Source, bit 3 from the thumbwheel switch Connector number of the supplying value. INPUT.TW3130.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...1024 1	0	[A9.3] 3.3.13
H194 1194d 04AAh	**MSK_BIT3_TWS** Mask, bit 3 from the thumbwheel switch Mask, which selects the bit with weighting 8 of the decade INPUT.TW3130.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	[A9.3] 3.3.13

Par. No.	Value/description	Value range steps	Factory setting	Sect. [diagr.]
H195 1195d 04ABh	**SRC_DAK_TWS** Source, data transfer bit, thumbwheel switch Connector number of the supplying value. INPUT.TW3140.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...1024 1	0	[A9.3] 3.3.13
H196 1196d 04ACh	**MSK_DAK_TWS** Mask, data transfer bit, thumbwheel switch Mask, which selects the bit to ransfer data from the thumbwheel switch. INPUT.TW3140.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	[A9.3] 3.3.13
H200 1200d 04B0h	**SRC_DRIVE_ON** Source on Connector number, description refer to H201. CONTRL.P3000.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[B1.1] 3.4.1
H201 1201d 04B1h	**MSK_DRIVE_ON** Mask on Mask, which selects the control bit to power-up the drive. The drive is powered-up for a positive edge. CONTRL.P3000.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	[B1.1] 3.4.1
H202 1202d 04B2h	**SRC_DRIVE_STOP** Source, no standard stop Connector number, description refer to H203. CONTRL.P3010.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[B2.1] 3.4.5
H203 1203d 04B3h	**MSK_DRIVE_STOP** Mask, no standard stop Mask, which selects the control bit for the standard stop. A zero signal causes the drive to decelerate along the internal ramp down to standstill, and then electrical shut-down. CONTRL.P3010.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	[B2.1] 3.4.5
H204 1204d 04B4h	**SRC_DRV_EL-OFF** Source, no electrical off Connector number, description refer to H205. CONTRL.P3020.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[B2.1] 3.4.5
H205 1205d 04B5h	**MSK_DRV_EL-OFF** Mask, no electrical off Mask, which is used to select the control bit for electrical off. A zero signal inhibits the controller and immediately electrically powers-down the system. CONTRL.P3020.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	[B2.1] 3.4.5
H206 1206d 04B6h	**SRC_DRV_FSTSTP** Source, no fast stop Connector number, description refer to H207. CONTRL.P3030.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...1024 1	0	[B2.1] 3.4.5

Par. No.	Value/description	Value range steps	Factory setting	Sect. [diagr.]
H207 1207d 04B7h	**MSK_DRV_FSTSTP** Mask, no fast stop Mask, which is used to select the control bit for fast stop. A zero signal brakes the drive down to zero speed along the torque limit. The drive is then shutdown. CONTRL.P3030.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	[B2.1] 3.4.5
H208 1208d 04B8h	**SRC_INVERTER_EN** Source, inverter enable Connector number, description refer to H209. CONTRL.P3040.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	4	[B3.1] 3.4.7
H209 1209d 04B9h	**MSK_INVERTER_EN** Mask, inverter enable Mask which is used to select the controlling bit. It allows the inverter to be enabled after the drive has been powered-up. CONTRL.P3040.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0001h	[B3.1] 3.4.7
H210 1210d 04BAh	**SRC_SETPOINT_EN** Source, setpoint enable Connector number, description refer to H211. CONTRL.P3070.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	4	[B3.1] 3.4.7
H211 1211d 04BBh	**MSK_SETPOINT_EN** Mask, setpoint enable Mask, which is used to select the control bit to enable the speed setpoint. CONTRL.P3070.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0001h	[B3.1] 3.4.7
H212 1212d 04BCh	**SRC_FAULT_ACK** Source, fault acknowledgement Connector number, description refer to H213. CONTRL.P3080.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...1024 1	0	[B5.2] 3.4.9
H213 1213d 04BDh	**MSK_FAULT_ACK** Mask, fault acknowledgement Mask, which is used to select the control bit to acknowl-edge faults. CONTRL.P3080.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	[B5.2] 3.4.9
H214 1214d 04BEh	**SRC_JOG1V** Source, inching 1, speed-controlled Connector number, description refer to H215. CONTRL.P3100.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[B1.1] 3.4.2
H215 1215d 04BFh	**MSK_JOG1V** Mask, inching 1, speed-controlled Mask, which is used to select the control bit, inching 1, speed-controlled. If the signal is 1, the drive is powered-up, and rotates with the velocity set in H753. CONTRL.P3100.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 0001h	0000h	[B1.1] 3.4.2
H216 1216d 04C0h	**SRC_JOG2V** Source, inching 2, speed-controlled Connector number, description refer to H217. CONTRL.P3110.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[B1.1] 3.4.2

Par. No.	Value/description	Value range steps	Factory setting	Sect. [diagr.]
H217 1217d 04C1h	**MSK_JOG2V** Mask, inching 2, speed-controlled Mask, which is used to select the control bit, inching 2, speed-controlled. If the signal is 1, the drive is powered-up, and rotates with the velocity set in H754. CONTRL.P3110.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 0001h	0000h	[B1.1] 3.4.2
H218 1218d 04C2h	**SRC_CONST_V1** Source, speed control 1 Connector number, description refer to H219 CONTRL.P3120.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0...1024 1	0	[D1.1] 3.7.9
H219 1219d 04C3h	**MSK_CONST_V1** Mask, speed control 1 Mask, which is used to select the control bit for speed-controlled operation with constant velocity setpoint 1. Velocity setpoint 1 is parameterized in H750. CONTRL.P3120.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	[D1.2] 3.7.9
H220 1220d 04C4h	**SRC_CONST_V2** Source, speed control 2 Connector number, description refer to H221. CONTRL.P3130.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[D1.1] 3.7.9
H221 1221d 04C5h	**MSK_CONST_V2** Mask, speed control 2 Mask, which is used to select the control bit for speed-controlled operation with constant velocity setpoint 2. Velocity setpoint 2 is parameterized in H751. CONTRL.P3130.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	[D1.2] 3.7.9
H222 1222d 04C6h	**SRC_VAR_V3** Source, speed control 3 Connector number, description refer to H223. CONTRL.P3140.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[D1.1] 3.7.9
H223 1223d 04C7h	**MSK_VAR_V3** Mask, speed control 3 Mask, which is used to select the control bit for speed-controlled operation with a variable velocity setpoint. The source of the variable velocity setpoint is parameterized in H752. CONTRL.P3140.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	[D1.2] 3.7.9
H224 1224d 04C8h	**SRC_JOG1P** Source, inching 1, position-controlled Connector number, description refer to H225. CONTRL.P3150.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[B1.1] 3.4.3
H225 1225d 04C9h	**MSK_JOG1P** Mask, inching 1, position-controlled Mask, which is used to select the control bit inching 1, position-controlled. If the signal is 1, the drive is powered-up, and moves through the distance parameterized in H466. (relative) CONTRL.P3150.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 0001h	0000h	[B1.1] 3.4.3

Par. No.	Value/description	Value range steps	Factory setting	Sect. [diagr.]
H226 1226d 04CAh	**SRC_JOG2P** Source, inching 2, position-controlled Connector number, description refer to H227. CONTRL.P3160.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[B1.1] 3.4.3
H227 1227d 04CBh	**MSK_JOG2P** Mask, inching 2, position-controlled Mask, which is used to select the control bit inching 2, position-controlled. If the signal is 1, the drive is powered-up, and moves through the distance parameterized in H228. (relative) CONTRL.P3160.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 0001h	0000h	[B1.1] 3.4.3
H228 1228d 04CCh	**SRC_SWITCH_A2** Source, hardware limit switch A2 Connector number, description refer to H229. CONTRL.P2170.NC_T2 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[B2.1] 3.1.3
H229 1229d 04CDh	**MSK_SWITCH_A2** Mask, hardware limit switch A2 Mask which is used to selects the control bit, hardware limit switch A2 CONTRL.P2170.MSK_T2 SIMADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 0001h	0000h	[B2.1] 3.1.3
H230 1230d 04CEh	**SRC_SWITCH_B2** Source, hardware limit switch B2 Connector number, description refer to H231. CONTRL.P2180.NC_T2 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[B2.1] 3.1.3
H231 1231d 04CFh	**MSK_SWITCH_B2** Mask, hardware limit switch B2 Mask which is used to select control bit ,hardware limit switch A2 CONTRL.P2180.MSK_T2 SIMADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 0001h	0000h	[B2.1] 3.1.3
H232 1232d 04D0h	**SRC_SWITCH_A3** Source, emergency limit switch A3 Connector number, description refer to H233. CONTRL.P2190.NC_T2 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[B2.2] 3.1.2
H233 1233d 04D1h	**MSK_SWITCH_A3** Mask, emergency limit switch A3 Mask which is used to select control bit, emergency limit switch A3 ***Note:*** If the signal is to act as fast as possible, it must be connected to the basic drive converter in parallel as fast stop (OFF3). CONTRL.P2190.MSK_T2 SIMADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 0001h	0000h	[B2.2] 3.1.2
H234 1234d 04D2h	**SRC_SWITCH_B3** Source, emergency limit switch B3 Connector number, description refer to H235. CONTRL.P2200.NC_T2 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[B2.2] 3.1.2

Par. No.	Value/description	Value range steps	Factory setting	Sect. [diagr.]
H235 1235d 04D3h	**MSK_SWITCH_B3** Mask, emergency limit switch B3 Mask which is used to select control bit, emergency limit switch B3 ***Note:*** If the signal is to act as fast as possible, it must be connected to the basic drive converter in parallel as fast stop (OFF3). CONTRL.P2200.MSK_T2 SIMADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 0001h	0000h	[B2.2] 3.1.2
H236 1236d 04D4h	**EN_LIMSW_STP** Enable stop after passing hardware limit switch If the control bit is 1, after the hardware limit switch is passed, a stop is initiated, with down ramp A2 (B2). If the bit is 0, it is possible to position the drive beyond the limit switch after referencing without shutdown. ***Note:*** This measure bypasses a basic safety function of the positioning software package. CONTRL.P2200.MSK_T2 SIMADYN D:V2 PKW-TYP:V2	0 ... 1 1	1	[B2.2] 3.1.3
H240 1240d 04D8h	**EN_MEC_BRK** Enable control, holding/fault brake The brake control is enabled using the control bit. The brake control mode is defined using parameters H241 and H242. CONTRL.P5030.I_T5 SIMADYN D:B1 PKW-TYP:BOOLEAN	0...1 1	0	[B1.7] 3.4.6
H241 1241d 04D9h	**MSK_DIRECT_BRK** Mask, control bits to directly close the brake Masking the control bits, which would cause the brake to be directly closed when the drive is shutdown. Thus, a fault brake can be implemented. Coding: Bit 0: Drive faulted from TB Bit 1: Drive faulted from CU Bit 2: Electrical off Bit 3 to bit 7: Not used Bit 8: Inching time expired Bit 9: Standard stop: Bit 10: Fast stop Bit 11: No on checkback signal from CU CONTRL.CD3310.IS2_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0700h	[B3.2] 3.4.6
H242 1242d 04DAh	**MSK_VZERO_BRK** Mask, control bits, close brake at V=0 Masking the control bits which should cause the brake to be closed at zero velocity. This allows a holding brake to be implemented. Coding: Bit 0: Drive faulted from TB Bit 1: Drive faulted from CU Bit 2: Electrical off Bit 3 to bit 7: Not used Bit 8: Inching time expired Bit 9: Standard stop: Bit 10: Fast stop Bit 11: No on checkback signal from CU CONTRL.CD3320.IS2_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	080Fh	[B3.2] 3.4.6
H243 1243d 04dbh	**TIME_MECBRK_OPN** Time, open holding brake Time between controller enable (command to open brake) and setpoint enable (holding brake is open). CONTRL.CD3380.T_T3 SIMADYN D:T2 PKW-TYP:O4	0[ms]...1 310 680[ms] 40[ms]	0[ms]	[B3.7] 3.4.6

Par. No.	Value/description	Value range steps	Factory setting	Sect. [diagr.]
H244 1244d 04DCh	**TIME_MECBRK_CLS** Time, close holding brake Time between standstill (command, close brake) and drive shutdown (brake is closed). CONTRL.CD3390.T_T3 SIMADYN D:T2 PKW-TYP:O4	0[ms]...1 310 680[ms] 40[ms]	0[ms]	[B3.7] 3.4.6
H245 1245d 04DDh	**JOG_TIMEOUT** Time for inching After this time has expired, the drive automatically shuts down if no inching command was issued. CONTRL.CC3520.T_T3 SIMADYN D:T2 PKW-TYP:O4	0[ms]...1 310 680[ms] 40[ms]	3 000[ms]	[B1.5] 3.4.3
H246 1246d 04DEh	**FEEDBACK_TIMEOUT** Tolerance time, checkback signal error, drive converter Time, where the drive converter ready signal need not be present after power-up or during operation. The drive is shutdown if this time is exceeded. CONTRL.CC3570.T_T3 SIMADYN D:T2 PKW-TYP:O4	0[ms]...1 310 680[ms] 40[ms]	1 000[ms]	[B1.4] 3.4.4
H250 1250d 04E2h	**SRC_BYPASS_CTW1** Source, bypass control word 1 at CU Connector number of the control word, which is to be OR'd with the internally generated control word. CONTRL.CE3100.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[A2.7] 3.3.3
H251 1251d 04E3h	**MSK_BYPASS_CTW1** Mask, bypass control word 1 at CU Mask which is used to select the control bits, which are to be OR'd with the internally generated control word. CONTRL.CE3110.IS2_T3 SIMADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 0001h	0000h	[A2.7] 3.3.3
H253 1253d 04E5h	**SRC_BYPASS_CTW2** Source, bypass control word 2 at CU Connector number of the control word, which is to be OR'd with the internally generated control word. CONTRL.CE3400.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[A2.7] 3.3.3
H254 1254d 04E6h	**MSK_BYPASS_CTW2** Mask, bypass control word 2 at CU Mask which is used to select the control bits which are to be ORd with the internally generated control word. CONTRL.CE3410.IS2_T3 SIMADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 0001h	0000h	[A2.7] 3.3.3
H260 1260d 04ECh	**CB_TIMEOUT** Tolerance time, communications with CB A communications error with CB must be present for at least this time before an error signal is output. CONTRL.F4110.T_T4 SIMADYN D:T2 PKW-TYP:O4	0[ms]...5 242 720[ms] 160[ms]	160[ms]	[B4.4] 3.4.8.2
H261 1261d 04EDh	**CU_TIMEOUT** Tolerance time, communications with CU A communications error with CU must be present for at least of this time before an error signal is output. CONTRL.F4160.T_T4 SIMADYN D:T2 PKW-TYP:O4	0[ms]...5 242 720[ms] 160[ms]	160[ms]	[B4.4] 3.4.8.3

Par. No.	Value/description	Value range steps	Factory setting	Sect. [diagr.]
H262 1262d 04EEh	**SRC_USER_FLT1** Source, no user error 1 Connector number, description refer to H263. CONTRL.F4215.NC_T4 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	4	[B4.2] 3.4.8.5
H263 1263d 04EFh	**MSK_USER_FLT1** Mask, no user error 1 Mask which is used to select the control bit for user error 1. The error is only enabled, if the drive is powered-up,and the time in H264 has expired. CONTRL.F4215.MSK_T4 SIMADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 0001h	0001h	[B4.2] 3.4.8.5
H264 1264d 04F0h	**TIME_USER_FLT1** Tolerance time, user error 1 User error 1 must be present for at least this time before an error signal is output. CONTRL.F4217.T_T4 SIMADYN D:T2 PKW-TYP:O4	0[ms]...5 242 720[ms] 160[ms]	960[ms]	[B4.4] 3.4.8.5
H265 1265d 04F1h	**SRC_USER_FLT2** Source, no user error 2 Connector number, description refer to H266. CONTRL.FX4215.NC_T4 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	4	[B4.2] 3.4.8.6
H266 1266d 04F2h	**MSK_USER_FLT2** Mask, no user error 2 Mask which is used to select the control bit for user error 2. The error is only enabled if the drive is powered-up and the time in H267 has expired. CONTRL.FX4215.MSK_T4 SIMADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 0001h	0001h	[B4.2] 3.4.8.6
H267 1267d 04F3h	**TIME_USER_FLT2** Tolerance time, user error 2 User error 2 must be present for at least this time before an error signal is output. CONTRL.FX4217.T_T4 SIMADYN D:V2 PKW-TYP:O4	0[ms]...5 242 720[ms] 160[ms]	960[ms]	[B4.4] 3.4.8.6
H268 1268d 04F4h	**P2P_TIMEOUT** Tolerance time, peer-to-peer communications A peer-to-peer communications error must be present for at least this time before an error signal is output. CONTRL.F4310.T_T4 SIMADYN D:T2 PKW-TYP:O4	0[ms]...5 242 720[ms] 160[ms]	160[ms]	[B4.4] 3.4.8.4
H269 1269d 04F5h	**LIMIT_OVERSPEED** Threshold, overspeed error If the absolute speed actual value exceeds this limit, the overspeed signal is output. CONTRL.F4220.L_T4 SIMADYN D:N2 PKW-TYP:I4	0.000% ... 199.993% 0.006%	120%	[B4.2] 3.4.8.8
H270 1270d 04F6h	**LIM_DELTA_CU-PG1** Threshold, pulse encoder error If the absolute value of the difference between the speed actual value from pulse encoder sensing 1 and the speed actual value via the dual port RAM exceeds this limit, then the pulse encoder fault signal is output after the time entered in H271. CONTRL.F4420.X2_T4 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	10%	[B4.2] 3.4.8.11

Par. No.	Value/description	Value range steps	Factory setting	Sect. [diagr.]
H271 1271d 04F7h	**TIME_DELTA_CU-PG1** Tolerance time, pulse encoder fault The difference of the pulse encoder signals must exceed the limit must for this time before an error signal is output. CONTRL.F4430.T_T4 SIMADYN D:T2 PKW-TYP:O4	0[ms]...5 242 720[ms] 160[ms]	960[ms]	[B4.3] 3.4.8.11
H272 1272d 04F8h	**LIM_NACT_FLTBLK** Threshold, speed actual value for anti-stall protection If the absolute speed actual value exceeds this threshold, anti-stall protection is enabled. CONTRL.F4225.L_T4 SIMADYN D:N2 PKW-TYP:I4	-200.000% ... 199.993% 0.006%	0.5%	[B4.3] 3.4.8.10
H273 1273d 04F9h	**LIM_NREF_FLTBLK** Threshold, speed setpoint for anti-stall protection If the absolute speed setpoint exceeds this threshold, anti-stall protection is enabled. CONTRL.F4230.M_T4 SIMADYN D:N2 PKW-TYP:I4	0.000% ... 199.000% 0.006%	1%	[B4.3] 3.4.8.10
H274 1274d 04FAh	**LIM_MACT_FLTBLK** Threshold, torque actual value for anti-stall protection If the torque actual value lies above this threshold, and if the conditions for speed setpoint and actual value are fulfilled, the drive stalled signal is output after the time entered in H275. CONTRL.F4235.M_T4 SIMADYN D:N2 PKW-TYP:I4	0.000% ... 199.000% 0.006%	80%	[B4.3] 3.4.8.10
H275 1275d 04FBh	**TIME_FLTBLK** Tolerance time for anti-stall protection The drive stalled signal must be present for at least this time before an error signal is output. CONTRL.F4245.T_T4 SIMADYN D:T2 PKW-TYP:O4	0[ms]...5 242 720[ms] 160[ms]	960[ms]	[B4.5] 3.4.8.10
H280 1280d 0500h	**MSK_EN_FAULTS** Masking, fault/error messages/signals Mask to suppress fault/error messages/signals Coding: Bit 0: Communications error with CB [F116] Bit 1: Communications error with CU [F117] Bit 2: Communications error, peer-to-peer [F118] Bit 3: User error 1 [F119] Bit 4: User error 2 [F120] Bit 5: Tracking error outside tolerance [F121] Bit 6: Overspeed, positive [F122] Bit 7: Overspeed, negative [F123] Bit 8: Drive stalled [F124] Bit 9: Pulse encoder fault [F125] Bit 10: Emergency limit switch A3 actuated [F126] Bit 11: Emergency limit switch B3 actuated [F127] Bit 12: Referencing error [F128] Bit 13: Reference point incorrectly / not identified [F129] Bit 14: Overflow, position actual value [F130] Bit 15: Load error, absolute encoder [F131] CONTRL.F4920.X1_T4 SIMADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 0001h	FFFFh	[B4.7] 3.4.8.1

Par. No.	Value/description	Value range steps	Factory setting	Sect. [diagr.]
H281 1281d 0501h	**MSK_EN_WARNINGS** Masking, alarms All fault messages/signals can be alternatively output as alarms. Mask to suppress alarms. Coding: Bit 0: Communications error with CB [A097] Bit 1: Communications error with CU [A098] Bit 2: Communications error, peer-to-peer [A099] Bit 3: User error 1 [A100] Bit 4: User error 2 [A101] Bit 5: Tracking error outside tolerance [A102] Bit 6: Overspeed, positive [A103] Bit 7: Overspeed, negative [A104] Bit 8: Drive stalled [A105] Bit 9: Pulse encoder fault [A106] Bit 10: Emergency limit switch A3 actuated [A107] Bit 11: Emergency limit switch B3 actuated [A108] Bit 12: Referencing error [A109] Bit 13: Reference point incorrectly / not identified [A110] Bit 14: Overflow, position actual value [A111] Bit 15: Load error, absolute encoder [A112] CONTRL.F4980.X1_T4 SIMADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 0001h	0000h	[B4.7] 3.4.8.1
H300 1300d 0514h	**SRC_MODE_REF_STP** Source, referencing with shutdown Connector number, description refer to H301. REFCTL.PC3000.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[B6.1] 3.5.1
H301 1301d 0515h	**MSK_MODE_REF_STP** Mask, referencing with shutdown Mask which is used to select the control bit, referencing, with subsequent shutdown. The mode is pre-selected for an edge from 0 to 1, and is reset againafter successful referencing or termination. REFCTL.PC3000.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 0001h	0000h	[B6.1] 3.5.1
H302 1302d 0516h	**SRC_MODE_REF_FLY** Source, flying referencing Connector number, description refer to H303. REFCTL.PC3010.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[B6.1] 3.5.2
H303 1303d 0517h	**MSK_MODE_REF_FLY** Mask, flying referencing Mask which is used to select the control bit, flying referencing. The mode is pre-selected for an edge change from 0 to 1, and is again reset after referencing or termination. REFCTL.PC3010.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 0001h	0000h	[B6.1] 3.5.2
H304 1304d 0518h	**SRC_REF_ALWAYS** Source, automatic post-referencing Connector number, description refer to H305. REFCTL.PC3020.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	4	[B7.1] 3.5.7
H305 1305d 0519h	**MSK_REF_ALWAYS** Mask, automatic post-referencing Mask which is used to select the control bit, automatic post-referencing. If the bit is 1, the position actual value is corrected each time the reference point is passed. REFCTL.PC3020.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 0001h	0001h	[B7.1] 3.5.7

Par. No.	Value/description	Value range steps	Factory setting	Sect. [diagr.]
H308 1308d 051Ch	**SRC_REFP_PRECON** Source, pre-contact to the reference point Connector number, description refer to H309. REFCTL.PC3050.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[B7.5] 3.5.6
H309 1309d 051Dh	**MSK_REFP_PRECON** Mask, pre-contact to the reference point Mask which is used to select the control bit, pre-contact to the reference point. If the bit is 1, then the slow referencing velocity is selected. REFCTL.PC3050.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 0001h	0000h	[B7.6] 3.5.6
H310 1310d 051Eh	**SRC_STRT_DIR_REF** Source, start direction when referencing Connector number, description refer to H311. REFCTL.PC3060.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[B7.1] 3.5
H311 1311d 051Fh	**MSK_STRT_DIR_REF** Mask, start direction when referencing Mask, which is used to select the control bit for the start direction when referencing. If the control bit is 0, then the drive starts in the direction A→B, for a 1 signal, in the direction B→A. REFCTL.PC3060.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 0001h	0000h	[B7.2] 3.5
H312 1312d 0520h	**MIN_REF_LEN** Minimum approach path when referencing If referencing is started, at least the set minimum approach path must be traversed before the reference point is accepted. **Note:** If the rough/fine pulse function is used, at least the width of the rough pulse signal must be entered. Otherwise, the value should be greater than the play of the drive unit. REFCTL.PC3070.X_T3 SIMADYN D:I4 PKW-TYP:I4	-2 147 483 648... ... 2 147 483 647 1	0	[B8.3] 3.5.3
H320 1320d 0528h	**RESET_REF_DRON** Resetting the referencing signal at each power-up If the control bit is 1, then each time the drive is powered-up, the *drive has referenced* signal is reset. REFCTL.PC3320.I2_T3 SIMADYN D:B1 PKW-TYP:BOOLEAN	0...1 1	0	[B6.3] 3.5.5
H322 1322d 052Ah	**LIM_ERROR_REFPNT** Tolerance range, reference point If, for the function *automatic post-referencing* or rotary axis, the reference point lies outside the tolerance range, an error signal is generated. The function is disabled with value 0. REFCTL.PF5100.X_T5 SIMADYN D:I4 PKW-TYP:I4	-2 147 483 648... ... 2 147 483 647 1	0	[B9.2] 3.5.5
H330 1330d 0532h	**VREF_REF_A->B** V setpoint, referencing direction A->B REFCTL.PC3950.X1_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000% ... 199.993% 0.006%	10%	[B7.7] 3.5.6

Par. No.	Value/description	Value range steps	Factory setting	Sect. [diagr.]
H331 1331d 0533h	**VREF_SLW_REF_A->B** V setpoint, referencing direction A->B slow Velocity setpoint for the slower reference motion after the pre-contact has been identified. REFCTL.PC3950.X1_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000% ... 199.993% 0.006%	5%	[B7.7] 3.5.6
H332 1332d 0534h	**VREF_REF_B->A** V setpoint, referencing direction B->A REFCTL.PC3960.X1_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	-10%	[B7.7] 3.5.6
H333 1333d 0534h	**VREF_SLW_REF_B->A** V setpoint, referencing direction B->A slow Velocity setpoint for the slower reference motion after the pre-contact has been identified. REFCTL.PC3960.X2_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000% ... 199.993% 0.006%	-5%	[B7.7] 3.5.6
H335 1335d 0537h	**EN_TR_CTRL** Tr-Encoder enable If the control bit is set to 1, then the download control and monitoring for the TR encoder are enabled. REFCTL..TR5000.I_T5 SIMADYN D:B1 PKW-TYP:Boolean	0/1	0	[B11.4]
H336 1336d 0538h	**SRC_TR_LOAD_OUT** Source Tr-encoder output Connector number, for description see H337. REFCTL.TR3100.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[B11.1]
H337 1337d 0539h	**MSK_TR_LOAD_OUT** Tr-encoder download complete mask Mask to select the download output of the TR-encoder. REFCTL.TR3100.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 0001h	0000h	[B11.2]
H338 1338d 053Ah	**SRC_REF_TR** TR-encoder reference source Connector number, for description see H339. REFCTL.TR3150.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[B11.1]
H339 1339d 053Bh	**MSK_REF_TR** Tr-encoder reference mask Mask which selects the control bit to manually initiate the downloading process. Following the initialization of the board, i.e. with the loss of the impulse encoder counter status, the downloading process will be automatically started. The downloading process may be manually retriggered using this control bit. *Note*: The downloading process will first commence following zero speed, inverter inhibit status and the waiting time definded in H340. During the donloading process the inverter is inhibited by the TR-encoder download controller. REFCTL.TR3150.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 0001h	0000h	[B11.2]
H340 1340d 053Ch	**DEL_TM_LDTR** Waiting time download process TR-encoder The downloading process will first commence following zero speed, inverter inhibit status and the entered waiting time. REFCTL.TR3220.T_T3 SIMADYN D:T2 PKW-TYP:O4	0[ms] ... 1 310 680 [ms] 40[ms]	1 000 [ms]	[B11.5]

Par. No.	Value/description	Value range steps	Factory setting	Sect. [diagr.]
H341 1341d 053Dh	**MAX_LOAD_TIME** Maximum downloading time Tr-encoder If the downloading time exceeds the entered value, then the TR-encoder downloading process will be discontinued and the error code F131 will be generated. The maximum downloading time of the TR-encoder may be calculated using the following formula: $Downloading\ time = \frac{No.\ of\ revolutions \times pulses\ per\ revolution}{downloading\ frequency}$. with the values no. of revolutions = 4096 pulses per revolution = 1024 (÷4096 steps TR-encoder) downloading frequency = 12 · 5 kHz the $Downloading\ time = \frac{4096 \times 1024}{12 \cdot 5\,kHz} \approx 335\,sec.$ REFCTL.TR3150.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0[ms] ... 1 310 680 [ms] 40[ms]	600 000 [ms]	[B11.6]
H350 1350d 0546h	**SCAL_POSREG** Scaling, closed-loop position control Scaling quantity, which defines which value represents 100% for the control in the fixed point notation. SETPNT.SCAL.X_T5 SIMADYN D:I4 PKW-TYP:I4	-2 147 483 648... ... 2 147 483 647 1	100000	[C1.1] 3.1.10
H351 1351d 0547h	**POSITION_REFPNT** Position of the hardware reference point The pulse encoder sensing 1 is set to this value when the reference point is passed-over. SETPNT.REFP.X_T5 SIMADYN D:I4 PKW-TYP:I4	-2 147 483 648... ... 2 147 483 647 1	0	[C1.1] 3.1.7
H352 1352d 0548h	**CORR_FACTOR** Correction factor Velocity and position are multiplied by this factor in order to eliminate re-normalization, for example, for wear. SETPNT.DM.X_T5 SIMADYN D:N4 PKW-TYP:I4	-200.000% ... 199.993% 0.006%	100%	[C1.4] 3.6.2
H353 1353d 0549h	**MODE_RNDX** Operating mode, rotary axis The rotary axis mode is selected if the control bit is 1. SETPNT.X_MODE.I_T5 SIMADYN D:B1 PKW-TYP:BOOLEAN	0...1 1	0	[C1.4]
H359 1359d 054Fh	**SRC_PREF_VAR_WD** Source, position reference value, variable word quantity Source for the variable position reference value from the traversing data set position reference values in the single-word format If it is adequate to enter position reference values as integer- single-word quantities (-32768 to 32767) for simple applications this reference value branch can be used. SETPNT.PR2002.NC_T2 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[C2.1] 3.6.4
H360 1360d 0550h	**SRC_PREF_VAR** Source, variable position reference value Source for the variable position reference value from the traversing data set, position reference values. SETPNT.PR2000.NC_T2 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[C2.1] 3.6.4

Par. No.	Value/description	Value range steps	Factory setting	Sect. [diagr.]
H361 1361d 0551h	**PREF_1** Position reference value 1 SETPNT.PR510.X1_T5 SIMADYN D:I4 PKW-TYP:I4	-2 147 483 648... ... 2 147 483 647 1	0	[C2.2] 3.6.4
to H459	Assignment, refer to the short parameter list / logbook			
H460 1460d 05B4h	**PREF_100** Position reference value 100 SETPNT.PR570.X4_T5 SIMADYN D:I4 PKW-TYP:I4	-2 147 483 648... ... 2 147 483 647 1	0	[C2.2] 3.6.4
H461 1461d 05B5h	**SRC_SEL_PREF** Source, data set selection, position reference value Connector number of the word, which selects the position reference value from the traversing data set. SETPNT.PR3100.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	5	[C2.1] 3.6.1
H462 1462d 05B6h	**MSK_SEL_PREF** Mask, data set selection, position reference value Suppresses irrelevant bits. SETPNT.PR3110.IS2_T3 SIMADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 0001h	FFFFh	[C2.2] 3.6.1
H463 1463d 05B7h	**SHIFT_SEL_PREF** Shifts position reference value selection bits to the right If the control bits are in the middle of the word, the correct weighting can be established by shifting to the right. The value specifies the number of shift operations. SETPNT.PR3112.XD_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 32767 1	0	[C2.3] 3.6.1
H464 1464d 05B8h	**SRC_EN_PREF** Source, position reference value enable Connector number, description refer to H465. SETPNT.PR2136.NC_T2 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	4	[C3.1] 3.6.1
H465 1465d 05B9h	**MSK_EN_PREF** Mask, enable position reference value Mask, which selects the control bit to transfer the position reference values from the traversing data set. SETPNT.PR2136.MSK_T2 SIMADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 0001h	0001h	[C3.1] 3.6.1
H466 1466d 05BAh	**PREF_JOG1P** Setpoint, inching 1, position-controlled Value, through which the drive should be moved for *inching 1, position-controlled.* SETPNT.PR3310.X2_T3 SIMADYN D:I4 PKW-TYP:I4	-2 147 483 648... ... 2 147 483 647 1	0	[C2.5] 3.6.4.2
H467 1467d 05BBh	**PREF_JOG2P** Setpoint, inching 2, position-controlled Value, through which the drive should be moved for *inching 2, position-controlled.* SETPNT.PR3320.X2_T3 SIMADYN D:I4 PKW-TYP:I4	-2 147 483 648... ... 2 147 483 647 1	0	[C2.5] 3.6.4.2
H468 1468d 05BCh	**SRC_MOD_RELPOS** Source, relative positioning mode Connector number, description refer to H469. SETPNT.PR3210.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 .... 1024 1	0	[C2.5] 3.6.4.1

Par. No.	Value/description	Value range steps	Factory setting	Sect. [diagr.]
H469 1469d 05BDh	**MSK_MOD_RELPOS** Mask, relative positioning mode Mask, which is used to select the control bit for relative positioning. If the control bit is 1, all of the reference value changes are interpreted as traversing distance referred to the current position. SETPNT.PR3210.MSK_T3 SI-MADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 0001h	0000h	[C2.5] 3.6.4.1
H470 1470d 05BEh	**SRC_DIR_REL.POS** Source, traversing direction, relative positioning Connector number, description refer to H471. SETPNT.PR3220.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 .... 1024 1	0	[C2.5]
H471 1471d 05BFh	**MSK_DIR_REL.POS** Mask, traversing direction, relative positioning Mask, which is used to select the control bits for the reference value polarity. If the bit is 1, the position reference value from the traversing data set, is inverted. The traversing direction can also be directly entered via the polarity of the position reference value. SETPNT.PR3220.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 0001h	0000h	[C2.6]
H472 1472d 05C0h	**SRC_MOVE_REL.POS** Source, advance for relative positioning Connector number, description refer to H473. SETPNT.PR2120.NC_T2 SIMADYN D:O2 PKW-TYP:O2	0 .... 1024 1	0	[C2.5]
H473 1473d 05C1h	**MSK_MOVE_REL.POS** Mask, advance for relative positioning Mask, which is used to select the control bits for advance in the *relative positioning* mode. For a positive edge, the reference value from the traversing data set is added to the last position reference value. SETPNT.PR2120.MSK_T2 SIMADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 0001h	0000h	[C2.6]
H474 1474d 05C2h	**H474 KEEP_MEM_RELPOS** Behavior of the position reference value memory at power-on The position reference value memory is set to the actual value each time the "relative positioning" operating mode is selected. Further, using H574, the reference value memory can be set at power-on. Value 0: If the position control is enabled in the "relative positioning" mode, the internal position reference value memory is synchronized with the actual value. Value 1: If the position control is enabled in the "relative positioning" mode, the contents of the position reference value memory are not changed. SETPNT.PR3211.I1_T3 SIMADYN D:B1 PKW-TYPE: Boolean	0 / 1	1	[C2.5]
H475 to H499	Not used			
H500 1500d 05DCh	**PLIMX_VAR** Source, variable position limit value X Source for the variable position limit value X for the traversing data set SETPNT.PLX300.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[C4.2] 3.6.5

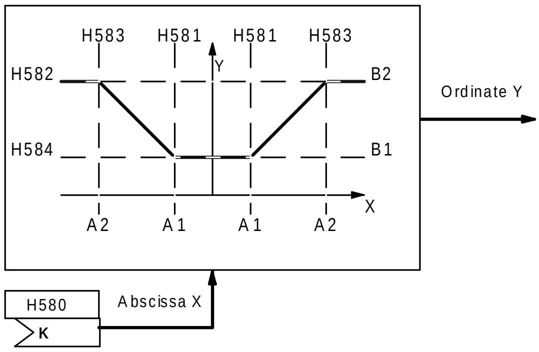
Par. No.	Value/description	Value range steps	Factory setting	Sect. [diagr.]
H501 1501d 05DDh	**PLIM_X_1** Position limit value X 1 SETPNT.PLX510.X1_T5 SIMADYN D:I4 PKW-TYP:I4	-2 147 483 648... ... 2 147 483 647 1	0	[C4.2] 3.6.5
to	Assignment, refer to the short parameter list / logbook			
H506 1506d 05E2h	**PLIM_X_6** Position limit value X 6 SETPNT.PLX510.X6_T5 SIMADYN D:I4 PKW-TYP:I4	-2 147 483 648... ... 2 147 483 647 1	0	[C4.2] 3.6.5
H507 1507d 05E3h	**SRC_SEL_PLIM_X** Source, position limit value X selection Connector number of the word which is used to select the position limit value X from the traversing data set. SETPNT.PLX310.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	5	[C4.1] 3.6.1
H508 1508d 05E4h	**MSK_SEL_PLIM_X** Mask, position limit value X selection Suppresses irrelevant bits. SETPNT.PLX315.IS2_T3 SIMADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 0001h	FFFFh	[C4.1] 3.6.1
H509 1509d 05E5h	**SHIFT_SEL_PLIM_X** Shifts position limit value X selection bits to the right If the control bits are located in the center of the word, the correct weighting can be established by shifting to the right. The value specifies the number of shift operations. SETPNT.PLX317.XD_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 326767 1	0	[C4.2] 3.6.1
H510 1510d 05E6h	**PLIM_Y_VAR** Source, variable position limit value Y Source for the variable position limit value Y for the traversing data set SETPNT.PLY300.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[C4.6] 3.6.5
H511 1511d 05E7h	**PLIM_Y_1** Position limit value Y 1 SETPNT.PLY510.X1_T5 SIMADYN D:I4 PKW-TYP:I4	-2 147 483 648... ... 2 147 483 647 1	0	[C4.6] 3.6.5
to	Assignment, refer to the short parameter list / logbook			
H516 1516d 05ECh	**PLIM_Y_6** Position limit value Y 6 SETPNT.PLY510.X6_T5 SIMADYN D:I4 PKW-TYP:I4	-2 147 483 648... ... 2 147 483 647 1	0	[C4.6] 3.6.5
H517 1517d 05EDh	**SRC_SEL_PLIM_Y** Source, position limit value Y selection Connector number of the word which is used to select the position limit value Y from the traversing data set. SETPNT.PLY310.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	5	[C4.5] 3.6.1
H518 1518d 05EEh	**MSK_SEL_PLIM_Y** Mask, position limit value Y selection Suppresses irrelevant bits. SETPNT.PLY315.IS2_T3 SIMADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 0001h	FFFFh	[C4.5] 3.6.1

Par. No.	Value/description	Value range steps	Factory setting	Sect. [diagr.]
H519 1519d 05EFh	**SHIFT_SEL_PLIM_Y** Shifts position limit value Y selection bits to the right If the control bits are located in the center of the word, the correct weighting can be established by shifting to the right. The value specifies the number of shift operations. SETPNT.PLY317.XD_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 32767 1	0	[C4.6] 3.6.1
H520 1520d 05F0h	**PLIM_Z_VAR** Source, variable position limit value Z Source for the variable position limit value Z for the traversing data set. SETPNT.PLZ300.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[C4.2] 3.6.5
H521 1521d 05F1h	**PLIM_Z_1** Position limit value Z 1 SETPNT.PLZ510.X1_T5 SIMADYN D:I4 PKW-TYP:I4	-2 147 483 648... ... 2 147 483 647 1	0	[C4.2] 3.6.5
to	Assignment, refer to the short parameter list / logbook			
H526 1526d 05F6h	**PLIM_Z_6** Position limit value Z 6 SETPNT.PLZ510.X6_T5 SIMADYN D:I4 PKW-TYP:I4	-2 147 483 648... ... 2 147 483 647 1	0	[C4.2] 3.6.5
H527 1527d 05F7h	**SRC_SEL_PLIM_Z** Source, position limit value Z selection Connector number of the word which selects the position limit value Z from the traversing data set. SETPNT.PLZ310.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	5	[C4.1] 3.6.1
H528 1528d 05F8h	**MSK_SEL_PLIM_Z** Mask, position limit value Z selection Suppresses irrelevant bits. SETPNT.PLZ315.IS2_T3 SIMADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 0001h	FFFFh	[C4.1] 3.6.1
H529 1529d 05F9h	**SHIFT_SEL_PLIM_Z** Shifts position limit value Z selection bits to the right If the control bits are located in the center of the word, the correct weighting can be established by shifting to the right. The value specifies the number of shift operations. SETPNT.PLZ317.XD_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 32767 1	0	[C4.2] 3.6.1
H530 1530d 05FAh	**SW_SWITCH_A1_VAR** Source, variable software limit switch A1 Source, variable software limit switch A1, traversing data set. SETPNT.SWA300.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[C5.2] 3.6.6
H531 1531d 05FBh	**SW_SWITCH_A1_1** Software limit switch A1 Limit value for reference value input in the traversing direction B→A. SETPNT.SWA510.X1_T5 SIMADYN D:I4 PKW-TYP:I4	-2 147 483 648... ... 2 147 483 647 1	0	[C5.2] 3.6.6
to H535	Assignment, refer to the short parameter list / logbook			

Par. No.	Value/description	Value range steps	Factory setting	Sect. [diagr.]
H536 1536d 0600h	**SW_SWITCH_A1_6** Software limit switch A6 Limit value for the setpoint input in the traversing direction B→A. SETPNT.SWA510.X6_T5 SIMADYN D:I4 PKW-TYP:I4	-2 147 483 648... ... 2 147 483 647 1	0	[C5.2] 3.6.6
H537 1537d 0601h	**SRC_SEL_SW_A1** Source, software limit switch A1 selection Connector number of the word, which selects the software limit switch A1 from the traversing data set. SETPNT.SWA310.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	5	[C5.1] 3.6.1
H538 1538d 0602h	**MSK_SEL_SW_A1** Mask, software limit switch A1 selection The irrelevant bits can be suppressed using the mask SETPNT.SWA315.IS2_T3 SIMADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 0001h	FFFFh	[C5.1] 3.6.1
H539 1539d 0603h	**SHIFT_SEL_SW_A1** Shifts software limit switch A1 selection bits to the right If the control bits are located in the center of the word, the correct weighting can be established by shifting to the right. The value specifies the number of shift operations. SETPNT.SWA317.XD_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 32767 1	0	[C5.2] 3.6.1
H540 1540d 0604h	**SW_SWITCH_B1_VAR** Source, variable software limit switch B1 Source, variable software limit switch B1, traversing data set SETPNT.SWB300.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[C5.6] 3.6.6
H541 1541d 0605h	**SW_SWITCH_B1_1** Software limit switch B1 Limit value for reference value input in the traversing direction A→B. SETPNT.SWB510.X1_T5 SIMADYN D:I4 PKW-TYP:I4	-2 147 483 648... ... 2 147 483 647 1	100000	[C5.6] 3.6.6
to H545	Assignment, refer to the short parameter list / logbook			
H546 1546d 060Ah	**SW_SWITCH_B1_6** Software limit switch B6 Limit value for reference value input in the traversing direction A→B. SETPNT.SWB510.X6_T5 SIMADYN D:I4 PKW-TYP:I4	-2 147 483 648... ... 2 147 483 647 1	0	[C5.6] 3.6.6
H547 1547d 060Bh	**SRC_SEL_SW_B1** Source, software limit switch B1 selection Connector number of the word, which selects software limit switch B1 from the traversing data set. SETPNT.SWB310.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	5	[C5.5] 3.6.1
H548 1548d 060Ch	**MSK_SEL_SW_B1** Mask, software limit switch B1 selection Suppresses irrelevant bits. SETPNT.SWB315.IS2_T3 SIMADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 0001h	FFFFh	[C5.5] 3.6.1

Par. No.	Value/description	Value range steps	Factory setting	Sect. [diagr.]
H549 1549d 060Dh	**SHIFT_SEL_SW_B1** Shifts software limit switch B1 selection bits to the right If the control bits are located in the center of the word, the correct weighting can be established by shifting to the right. The value specifies the number of shift operations. SETPNT.SWB317.XD_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 32767 1	0	[C5.6] 3.6.1
H550 1550d 060Eh	**VMAX_VAR** Source, variable maximum velocity Source, variable maximum velocity, traversing data set SETPNT.VMX300.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[C5.2] 3.6.7
H551 1551d 060Fh	**VMAX_1** Maximum velocity 1 Maximum traversing velocity when positioning. SETPNT.VMX510.X1_T5 SIMADYN D:N2 PKW-TYP:I4	0.000% ... 199.993% 0.006%	100%	[C5.2] 3.6.5
to H555	Assignment, refer to the short parameter list / logbook			
H556 1556d 0614h	**VMAX_6** Maximum velocity 6 Maximum traversing velocity when positioning. SETPNT.VMX510.X6_T5 SIMADYN D:N2 PKW-TYP:I4	0.000% ... 199.993% 0.006%	0%	[C5.2] 3.6.7
H557 1557d 0615h	**SRC_SEL_VMAX** Source, maximum velocity selection Connector number of the word, which selects the maximum velocity from the traversing data set. SETPNT.VMX310.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	5	[C5.1] 3.6.1
H558 1558d 0616h	**MSK_SEL_VMAX** Mask, maximum velocity selection Suppresses irrelevant bits. SETPNT.VMX315.IS2_T3 SIMADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 0001h	FFFFh	[C5.1] 3.6.1
H559 1559d 0617h	**SHIFT_SEL_VMAX** Shifting maximum velocity selection bits to the right If the control bits are located in the center of the word, the correct weighting can be established by shifting to the right. The value specifies the number of shift operations. SETPNT.VMX317.XD_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 32767 1	0	[C5.2] 3.6.1
H560 1560d 0618h	**SRC_ADAP_VMAX** Source, maximum velocity adaption factor The maximum velocity from the traversing data set can be multiplied by this factor. In this case, the factor must be activated via H561 and H562. SETPNT.VMX340.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[C5.2] 3.6.7
H561 1561d 0619h	**SRC_EN_ADP_VMX** Source, enable maximum velocity adaption factor Connector number, description refer to H562. SETPNT.VMX350.NC SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[C5.2] 3.6.7

Par. No.	Value/description	Value range steps	Factory setting	Sect. [diagr.]
H562 1562d 061Ah	**MSK_EN_ADP_VMX** Mask, enable maximum velocity adaption factor Mask, which is used to select the control bit,enable maximum velocity adaption factor SETPNT.VMX350.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 0001h	0000h	[C5.2] 3.6.7
H563 to H569	Not used			
H570 1570d 0622h	**KP_FAC_VC_VAR** Source, variable speed controller KP factor Source of the factor with which the speed controller proportional gain is set in the basic drive. SETPNT.KPV300.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[C6.2] 3.6.9
H571 1571d 0623h	**KP_FAC_VC_1** KP factor 1, speed controller The proportional gain in the basic drive is set using this factor. SETPNT.KPV510.X1_T5 SIMADYN D:N2,SCAL=10 PKW-TYP:I4	0 ... 10 0.001	1	[C6.2] 3.6.9
to H575	Assignment, refer to the short parameter list / logbook			
H576 1576d 0628h	**KP_FAC_VC_6** KP factor 6, speed controller The proportional gain in the basic drive is set using this factor. SETPNT.KPV510.X6_T5 SIMADYN D:N2,SCAL=10 PKW-TYP:I4	0 ... 10 0.001	1	[C6.2] 3.6.9
H577 1576d 0629h	**SRC_SEL_KP_FAC** Source, speed controller KP factor selection Connector number of the word which selects the KP factor for the speed controller from the traversing data set. SETPNT.KPV310.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	5	[C6.1] 3.6.1
H578 1578d 062Ah	**MSK_SEL_KP_FAC** Mask, speed controller KP factor selection Suppresses irrelevant bits. SETPNT.KPV315.IS2_T3 SIMADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 0001h	FFFFh	[C6.1] 3.6.1
H579 1579d 062Bh	**SHIFT_SEL_KP_FAC** Shifts KP factor selection bits to the right If the control bits are located in the center of the word, the correct weighting can be established by shifting to the right. The value specifies the number of shift operations. SETPNT.KPV317.XD_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 32767 1	0	[C6.2] 3.6.1

Par. No.	Value/description	Value range steps	Factory setting	Sect. [diagr.]
H580 1580d 062Ch	**SRC_KP-ADAP_VC** Source, speed controller KP adaption Connector number of the value which should be made dependent on the speed controller proportional gain.  SETPNT.KPV335.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[C6.4] 3.6.9
H581 1581d 062Dh	**KP-ADAP_VC_A1** Starting point, speed controller KP adaption Defines the abscissa point A1. SETPNT.KPV340.A1_T3 SIMADYN D:N2 PKW-TYP:I4	0.000% ... 199.993% 0.006%	0%	[C6.4] 3.6.9
H582 1582d 062Eh	**KP-ADAP_VC_B1** KP factor, starting point of the speed controller KP adaption Defines the ordinate point B1. SETPNT.KPV340.B1_T3 SIMADYN D:N2 PKW-TYP:I4	0.000% ... 199.993% 0.006%	100%	[C6.4] 3.6.9
H583 1583d 062Fh	**KP-ADAP_VC_A2** Final point, speed controller KP adaption Defines the abscissa point A2. SETPNT.KPV340.A2_T3 SIMADYN D:N2 PKW-TYP:I4	0.000% ... 199.993% 0.006%	100%	[C6.4] 3.6.9
H584 1584d 0630h	**KP-ADAP_VC_B2** KP factor end point speed controller KP adaption Defines the ordinate point B2. SETPNT.KPV340.B2_T3 SIMADYN D:N2 PKW-TYP:I4	0.000% ... 199.993% 0.006%	100%	[C6.4] 3.6.9
H590 1590d 0636h	**PLAY_VAR** Source, variable drive play Source, variable traversing data set drive play SETPNT.PY300.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[C5.6] 3.6.8
H591 1591d 0637h	**PLAY_1** Drive play 1 SETPNT.PY510.X1_T5 SIMADYN D:I2 PKW-TYP:I2	-32768 ... 32767 1	0	[C5.6] 3.6.8
to H595	Assignment, refer to the short parameter list / logbook			
H596 1596d 063Ch	**PLAY_6** Drive play 6 SETPNT.PY510.X6_T5 SIMADYN D:I2 PKW-TYP:I2	-32768 ... 32767 1	0	[C5.6] 3.6.8

Par. No.	Value/description	Value range steps	Factory setting	Sect. [diagr.]
H597 1597d 063Dh	**SRC_SEL_PLAY** Source, drive play selection Connector number of the word which selects the drive play from the traversing data set. SETPNT.PY310.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	5	[C5.5] 3.6.1
H598 1598d 063Eh	**MSK_SEL_PLAY** Mask, drive play selection Suppresses irrelevant bits. SETPNT.PY315.IS2_T3 SIMADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 0001h	FFFFh	[C5.5] 3.6.1
H599 1599d 063Fh	**SHIFT_SEL_PLAY** Shifting drive play selection bits to the right If the control bits are located in the center of the word, the correct weighting can be established by shifting to the right. The value specifies the number of shift operations. SETPNT.PY317.XD_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 32767 1	0	[C5.6] 3.6.1
H600 1600d 0640h	**TU_PRAMP_VAR** Source, variable ramp-up time, position RFG Source, variable ramp-up time, position RFG, traversing data set SETPNT.TU300.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[C6.2] 3.6.10
H601 1601d 0641h	**TU_PRAMP_1** Ramp-up time, position RFG 1 SETPNT.TU510.X1_T5 SIMADYN D:R4:T1 PKW-TYP:O4	5.000[ms] ... 5 368 709 120.000[ms]	10000[ms]	[C6.2] 3.6.10
to H605	Assignment, refer to the short parameter list / logbook			
H606 1606d 0646h	**TU_PRAMP_6** Ramp-up time, position RFG 6 SETPNT.TU510.X6_T5 SIMADYN D:R4,T1 PKW-TYP:O4	5.000[ms] ... 5 368 709 120.000[ms]	10000[ms]	[C6.2] 3.6.10
H607 1607d 0647h	**SRC_SEL_TU_PRMP** Source, position RFG ramp-up time selection Connector number of the word which is used to select the ramp-up time for the position RFG from the traversing data set. SETPNT.TU310.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	5	[C6.1] 3.6.1v
H608 1608d 0648h	**MSK_SEL_TU_PRMP** Mask, position RFG ramp-up time selection Suppresses irrelevant bits. SETPNT.TU315.IS2_T3 SIMADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 0001h	FFFFh	[C6.1] 3.6.1
H609 1609d 0649h	**SHFT_SEL_ TU_PRMP** Shifts ramp-up time selection bits to the right If the control bits are located in the center of the word, the correct weighting can be established by shifting to the right. The value specifies the number of shift operations. SETPNT.TU317.XD_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 32767 1	0	[C6.2] 3.6.1

Par. No.	Value/description	Value range steps	Factory setting	Sect. [diagr.]
H610 1610d 064Ah	**TR_PRAMP_VAR** Source, rounding-off time constant, variable position RFG Source, variable rounding-off time constant of the position ramp-function generator, traversing data set SETPNT.TR300.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[C7.2] 3.6.11
H611 1611d 064Bh	**TR_PRAMP_1** Rounding-off time constant, position RFG 1 SETPNT.TR510.X1_T5 SIMADYN D:R2,T1 PKW-TYP:O4	5.000[ms] ... 5 368 709 120.000[ms]	100[ms]	[C7.2] 3.6.11
to	Assignment, refer to the short parameter list / logbook			
H616 1616d 0650h	**TR_PRAMP_6** Rounding-off time constant, pos. RFG 6 SETPNT.TR510.X6_T5 SIMADYN D:R2,T1 PKW-TYP:O4	5.000[ms] ... 5 368 709 120.000[ms]	100[ms]	[C7.2] 3.6.11
H617 1617d 0651h	**SRC_SEL_TR_PRMP** Source, select round.-off time const. pos. RFG Connector number of the word, which is used to select the rounding-off time constant for the position ramp-function generator from the traversing data set SETPNT.TR310.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	5	[C7.1] 3.6.1
H618 1618d 0652h	**MSK_SEL_TR_PRMP** Mask, select rounding-off time const. pos. RFG Suppresses irrelevant bits. SETPNT.TR315.IS2_T3 SIMADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 0001h	FFFFh	[C7.1] 3.6.1
H619 1619d 0653h	**SHFT_SEL_ TR_PRMP** Shifts rounding-off time constant selection bits to the right If the control bits are located in the center of the word, the correct weighting can be established by shifting to the right. The value specifies the number of shift operations. SETPNT.TR317.XD_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 32767 1	0	[C7.2] 3.6.1
H620 1620d 0654h	**TD_PRAMP_VAR** Source, variable ramp-down time position RFG Source, variable ramp-down time position RFG traversing data set SETPNT.TD510.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[C6.6] 3.6.10
H621 1621d 0655h	**TD_PRAMP_1** Ramp-down time, position RFG 1 SETPNT.TD510.X1_T5 SIMADYN D:R4,T1 PKW-TYP:O4	5.000[ms] ... 5 368 709 120.000[ms]	10000[ms]	[C6.6] 3.6.10
to H625	Assignment, refer to the short parameter list / logbook			
H626 1626d 065Ah	**TD_PRAMP_6** Ramp-down time, position RFG 6 SETPNT.TD510.X6_T5 SIMADYN D:R4,T1 PKW-TYP:O4	5.000[ms] ... 5 368 709 120.000[ms]	10000[ms]	[C6.6] 3.6.10
H627 1627d 065Bh	**SRC_SEL_TD_PRMP** Source, select ramp-down time, pos. RFG Connector number of the word which is used to select the ramp-down time for the position RFG from the traversing data set. SETPNT.TD310.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[C6.5] 3.6.1

Par. No.	Value/description	Value range steps	Factory setting	Sect. [diagr.]
H628 1628d 065Ch	**MSK_SEL_TD_PRMP** Mask, select ramp-down time pos. RFG Suppresses irrelevant bits. SETPNT.TD315.IS2_T3 SIMADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 0001h	FFFFh	[C6.5] 3.6.1
H629 1629d 065Dh	**SHFT_SEL_ TD_PRMP** Shifts ramp-down time selection bits to the right If the control bits are located in the center of the word, the correct weighting can be established by shifting to the right. The value specifies the number of shift operations. SETPNT.TD317.XD_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 32767 1	0	[C6.6] 3.6.1
H630 to H639	Not used			
H640 1640d 0668h	**TD_RAMP_A2_VAR** Variable down ramp, HW limit switch A2 Source, variable down ramp A2 traversing data set. If the drive passes hardware limit switch A2, then this down ramp is selected. SETPNT.TDA300.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[C7.2] 3.6.12
H641 1641d 0669h	**TD_RAMP_A2_1** Down ramp, HW limit switch A2 1 SETPNT.TDA510.X1_T5 SIMADYN D:R2:T3 PKW-TYP:O4	40.000[ms]... ...655 360.000[ms]	1000[ms]	[C7.2] 3.6.12
to H645	Assignment, refer to the short parameter list / logbook			
H646 1646d 066Eh	**TD_RAMP_A2_6** Down ramp, HW limit switch A2 6 SETPNT.TDA510.X6_T5 SIMADYN D:R2,T3 PKW-TYP:O4	40.000[ms]... ...655 360.000[ms]	1000[ms]	[C7.2] 3.6.12
H647 1647d 066Fh	**SRC_SEL_TD_A2** Source, select down ramp A2 Connector number of the word which is used to select the down ramp for the velocity setpoint from the traversing data set after hardware limit switch A2 is passed,. SETPNT.TDA310.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	5	[C7.1] 3.6.1
H648 1648d 0670h	**MSK_SEL_TD_A2** Mask, select down ramp A2 Suppresses irrelevant bits. SETPNT.TDA315.IS2_T3 SIMADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 0001h	FFFFh	[C7.1] 3.6.1
H649 1649d 0671h	**SHIFT_SEL_TD_A2** Shifts down ramp A2 selection bits to the right If the control bits are located in the center of the word, the correct weighting can be established by shifting to the right. The value specifies the number of shift operations. SETPNT.TDA317.XD_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 32767 1	0	[C7.2] 3.6.1
H650 1650d 0672h	**TD_RAMP_B2_VAR** Variable down ramp HW limit switch B2 Source, variable down ramp B2 traversing data set. If the drive passes hardware limit switch B2, this down ramp is selected. SETPNT.TDB300.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[C7.6] 3.6.12

Par. No.	Value/description	Value range steps	Factory setting	Sect. [diagr.]
H651 1651d 0673h	**TD_RAMP_B2_1** Down ramp, HW limit switch B2 1 SETPNT.TDB510.X1_T5 SIMADYN D:R2:T3 PKW-TYP:O4	40.000[ms]... ...655 360.000[ms]	1000[ms]	[C7.6] 3.6.12
to H655	Assignment, refer to the short parameter list / logbook			
H656 1656d 0678h	**TD_RAMP_B2_6** Down ramp, HW limit switch B2 6 SETPNT.TDB510.X6_T5 SIMADYN D:R2:T3 PKW-TYP:O4	40.000[ms]... ...655 360.000[ms]	1000[ms]	[C7.6] 3.6.12
H657 1657d 0679h	**SRC_SEL_TD_B2** Source, down ramp B2 selection Connector number of the word, which is used to select the down ramp for the velocity setpoint from the traversing data set after hardware limit switch B2 is passed. SETPNT.TDB310.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	5	[C7.5] 3.6.1
H658 1658d 067Ah	**MSK_SEL_TD_B2** Mask, select down ramp B2 Suppresses irrelevant bits. SETPNT.TDB315.IS2_T3 SIMADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 0001h	FFFFh	[C7.5] 3.6.1
H659 1659d 067Bh	**SHIFT_SEL_TD_B2** Shifts down ramp B2 selection bits to the right If the control bits are located in the center of the word, the correct weighting can be established by shifting to the right. The value specifies the number of shift operations. SETPNT.TDB317.XD_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 32767 1	0	[C7.6] 3.6.1
H660 1660d 067Ch	**REF_FIX_INTWD_1** Fixed setpoint 1, integer word quantity Value available via connector K330. SETPNT.FSP500.X1_T5 SIMADYN D:O2 PKW-TYP:O2	-32768 ... 32767 1	0	[C1.1] 3.6.3
H661 1661d 067Dh	**REF_FIX_INTWD_2** Fixed setpoint 2, integer word quantity Value available via connector K331. SETPNT.FSP500.X2_T SIMADYN D:O2 PKW-TYP:O2	-32768 ... 32767 1	0	[C1.1] 3.6.3
H662 1662d 067Eh	**REF_FIX_INTWD_3** Fixed setpoint 3, integer word quantity Value available via connector K332. SETPNT.FSP500.X3_T5 SIMADYN D:O2 PKW-TYP:O2	-32768 ... 32767 1	0	[C1.1] 3.6.3
H663 1663d 067Fh	**REF_FIX_INTWD_4** Fixed setpoint 4, integer word quantity Value available via connector K333. SETPNT.FSP500.X4_T5 SIMADYN D:O2 PKW-TYP:O2	-32768 ... 32767 1	0	[C1.1] 3.6.3
H664 1664d 0680h	**REF_FIX_INTWD_5** Fixed setpoint 5, integer word quantity Value available via connector K334. SETPNT.FSP500.X5_T5 SIMADYN D:O2 PKW-TYP:O2	-32768 ... 32767 1	0	[C1.1] 3.6.3

Par. No.	Value/description	Value range steps	Factory setting	Sect. [diagr.]
H665 1665d 0681h	**REF_FIX_INTWD_6** Fixed setpoint 6, integer word quantity Value available via connector K335. SETPNT.FSP500.X6_T5 SIMADYN D:O2 PKW-TYP:O2	-32768 ... 32767 1	0	[C1.1] 3.6.3
H666 1666d 0682h	**REF_FIX_INTWD_7** Fixed setpoint 7, integer word quantity Value available via connector K336. SETPNT.FSP500.X7_T5 SIMADYN D:O2 PKW-TYP:O2	-32768 ... 32767 1	0	[C1.1] 3.6.3
H667 1667d 0683h	**REF_FIX_INTWD_8** Fixed setpoint 8, integer word quantity Value available via connector K337. SETPNT.FSP500.X8_T5 SIMADYN D:O2 PKW-TYP:O2	-32768 ... 32767 1	0	[C1.1] 3.6.3
H668 1668d 0684h	**REF_FIX_%-WD_1** Fixed setpoint 1 % quantity word Value available via connector K338. SETPNT.FSP500.X9_T5 SIMADYN D:N2 PKW-TYP:I4	-200.000% ...199.993% 0.006%	0	[C1.3] 3.6.3
H669 1669d 0685h	**REF_FIX_%-WD_2** Fixed setpoint 2 % quantity word Value available via connector K339. SETPNT.FSP500.X10_T5 SIMADYN D:N2 PKW-TYP:I4	-200.000% ...199.993% 0.006%	0	[C1.3] 3.6.3
H670 1670d 0686h	**REF_FIX_%-WD_3** Fixed setpoint 3 % quantity word Value available via connector K340. SETPNT.FSP500.X11_T5 SIMADYN D:N2 PKW-TYP:I4	-200.000% ...199.993% 0.006%	0	[C1.3] 3.6.3
H671 1671d 0687h	**REF_FIX_%-WD_4** Fixed setpoint 4 % quantity word Value available via connector K341. SETPNT.FSP500.X12_T5 SIMADYN D:N2 PKW-TYP:I4	-200.000% ...199.993% 0.006%	0	[C1.3] 3.6.3
H672 1672d 0688h	**REF_FIX_%-WD_5** Fixed setpoint 5 % quantity word Value available via connector K342. SETPNT.FSP500.X13_T5 SIMADYN D:N2 PKW-TYP:I4	-200.000% ...199.993% 0.006%	0	[C1.3] 3.6.3
H673 1673d 0689h	**REF_FIX_%-WD_6** Fixed setpoint 6 % quantity word Value available via connector K343. SETPNT.FSP500.X14_T5 SIMADYN D:N2 PKW-TYP:I4	-200.000% ...199.993% 0.006%	0	[C1.3] 3.6.3
H674 1674d 068Ah	**REF_FIX_%-WD_7** Fixed setpoint 7 % quantity word Value available via connector K344. SETPNT.FSP500.X15_T5 SIMADYN D:N2 PKW-TYP:I4	-200.000% ...199.993% 0.006%	0	[C1.3] 3.6.3
H675 1675d 068Bh	**REF_FIX_%-WD_8** Fixed setpoint 8 % quantity word Value available via connector K345. SETPNT.FSP500.X16_T5 SIMADYN D:N2 PKW-TYP:I4	-200.000% ...199.993% 0.006%	0	[C1.3] 3.6.3

Par. No.	Value/description	Value range steps	Factory setting	Sect. [diagr.]
H676 1676d 068Ch	**REF_FIX_WD_1** Fixed setpoint 1 hex quantity word Value available via connector K346. SETPNT.FSP510.X1_T5 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0	[C1.4] 3.6.3
H677 1677d 068Dh	**REF_FIX_WD_2** Fixed setpoint 2 hex quantity word Value available via connector K347. SETPNT.FSP510.X2_T5 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0	[C1.4] 3.6.3
H678 1678d 068Eh	**REF_FIX_WD_3** Fixed setpoint 3 hex quantity word Value available via connector K348. SETPNT.FSP510.X3_T5 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0	[C1.4] 3.6.3
H679 1679d 068Fh	**REF_FIX_WD_4** Fixed setpoint 4 hex quantity word Value available via connector K349. SETPNT.FSP510.X4_T5 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0	[C1.4] 3.6.3
H680 1680d 0690h	**REF_FIX_WD_5** Fixed setpoint 5 hex quantity word Value available via connector K350. SETPNT.FSP510.X5_T5 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0	[C1.4] 3.6.3
H681 1681d 0691h	**REF_FIX_WD_6** Fixed setpoint 6 hex quantity word Value available via connector K351. SETPNT.FSP510.X6_T5 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0	[C1.4] 3.6.3
H682 1682d 0692h	**REF_FIX_WD_7** Fixed setpoint 7 hex quantity word Value available via connector K352. SETPNT.FSP510.X7_T5 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0	[C1.4] 3.6.3
H683 1683d 0693h	**REF_FIX_WD_8** Fixed setpoint 8 hex quantity word Value available via connector K353. SETPNT.FSP510.X8_T5 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0	[C1.4] 3.6.3
H684 1684d 0694h	**REF_FIX_INTDW_1** Fixed setpoint 1, integer quantity double word Value available via connector K354. SETPNT.FSP520.X1_T5 SIMADYN D:I4 PKW-TYP:I4	-2147483648 ... ... 2147483647 1	0	[C1.5] 3.6.3
H685 1685d 0695h	**REF_FIX_INTDW_2** Fixed setpoint 2, integer quantity double word Value available via connector K356. SETPNT.FSP520.X2_T5 SIMADYN D:I4 PKW-TYP:I4	-2147483648 ... ... 2147483647 1	0	[C1.5] 3.6.3
H686 1686d 0696h	**REF_FIX_INTDW_3** Fixed setpoint 3, integer quantity double word Value available via connector K358. SETPNT.FSP520.X3_T5 SIMADYN D:I4 PKW-TYP:I4	-2147483648 ... ... 2147483647 1	0	[C1.5] 3.6.3

Par. No.	Value/description	Value range steps	Factory setting	Sect. [diagr.]
H687 1687d 0697h	**REF_FIX_INTDW_4** Fixed setpoint 4, integer quantity double word Value available via connector K360. SETPNT.FSP520.X4_T5 SIMADYN D:I4 PKW-TYP:I4	-2147483648 ... ... 2147483647 1	0	[C1.5] 3.6.3
H688 1688d 0698h	**REF_FIX_INTDW_5** Fixed setpoint 5, integer quantity double word Value available via connector K362. SETPNT.FSP520.X5_T5 SIMADYN D:I4 PKW-TYP:I4	-2147483648 ... ... 2147483647 1	0	[C1.5] 3.6.3
H689 1689d 0699h	**REF_FIX_INTDW_6** Fixed setpoint 6, integer quantity double word Value available via connector K364. SETPNT.FSP520.X6_T5 SIMADYN D:I4 PKW-TYP:I4	-2147483648 ... ... 2147483647 1	0	[C1.5] 3.6.3
H690 1690d 069Ah	**REF_FIX_INTDW_7** Fixed setpoint 7, integer quantity double word Value available via connector K366. SETPNT.FSP520.X7_T5 SIMADYN D:I4 PKW-TYP:I4	-2147483648 ... ... 2147483647 1	0	[C1.5] 3.6.3
H691 1691d 069Bh	**REF_FIX_INTDW_8** Fixed setpoint 8, integer quantity double word Value available via connector K368. SETPNT.FSP520.X8_T5 SIMADYN D:I4 PKW-TYP:I4	-2147483648 ... ... 2147483647 1	0	[C1.5] 3.6.3
H692 1692d 069Ch	**REF_FIX_%-DW_1** Fixed setpoint 1 % quantity double word Value available via connector K370. SETPNT.FSP520.X9_T5 SIMADYN D:N4 PKW-TYP:I4	-200.000% ... 199.993% 0.006%	0%	[C1.7] 3.6.3
H693 1693d 069Dh	**REF_FIX_%-DW_2** Fixed setpoint 2 % quantity double word Value available via connector K372. SETPNT.FSP520.X10_T5 SIMADYN D:N4 PKW-TYP:I4	-200.000% ... 199.993% 0.006%	0%	[C1.7] 3.6.3
H694 1694d 069Eh	**REF_FIX_%-DW_3** Fixed setpoint 3 % quantity double word Value available via connector K374. SETPNT.FSP520.X11_T5 SIMADYN D:N4 PKW-TYP:I4	-200.000% ... 199.993% 0.006%	0%	[C1.7] 3.6.3
H695 1695d 069Fh	**REF_FIX_%-DW_4** Fixed setpoint 4 % quantity double word Value available via connector K376. SETPNT.FSP520.X12_T5 SIMADYN D:N4 PKW-TYP:I4	-200.000% ... 199.993% 0.006%	0%	[C1.7] 3.6.3
H696 1696d 06A0h	**REF_FIX_%-DW_5** Fixed setpoint 5 % quantity double word Value available via connector K378. SETPNT.FSP520.X13_T5 SIMADYN D:N4 PKW-TYP:I4	-200.000% ... 199.993% 0.006%	0%	[C1.7] 3.6.3
H697 1697d 06A1h	**REF_FIX_%-DW_6** Fixed setpoint 6 % quantity double word Value available via connector K380. SETPNT.FSP520.X14_T5 SIMADYN D:N4 PKW-TYP:I4	-200.000% ... 199.993% 0.006%	0%	[C1.7] 3.6.3

Par. No.	Value/description	Value range steps	Factory setting	Sect. [diagr.]
H698 1698d 06A2h	**REF_FIX_%-DW_7** Fixed setpoint 7 % quantity double word Value available via connector K382. SETPNT.FSP520.X15_T5 SIMADYN D:N4 PKW-TYP:I4	-200.000% ... 199.993% 0.006%	0%	[C1.7] 3.6.3
H699 1699d 06A3h	**REF_FIX_%-DW_8** Fixed setpoint 8 % quantity double word Value available via connector K384. SETPNT.FSP520.X16_T5 SIMADYN D:N4 PKW-TYP:I4	-200.000% ... 199.993% 0.006%	0%	[C1.7] 3.6.3
H700 1700d 06A4h	**SRC_EN_PC_X1** Source, external enable position control 1 Connector number, description refer to H701 POSREG.CA3100.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	4	[D1.2] 3.7.1
H701 1701d 06A5h	**MSK_EN_PC_X1** Mask, external enable position control 1 Mask, which is used to select the control bit for the external enable 1 of the position control. POSREG.CA3100.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 0001h	0001h	[D1.3] 3.7.1
H702 1702d 06A6h	**SRC_EN_PC_X2** Source, external enable position control 2 Connector number, description refer to H703. POSREG.CA3110.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	91	[D1.2] 3.7.1
H703 1703d 06A7h	**MSK_EN_PC_X2** Mask, external enable position control 2 Mask which is used to select the control bit for external enable 2 of the position control. Presetting: Enable only if the drive has referenced. POSREG.CA3110.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 0001h	0010h	[D1.3] 3.7.1
H704 1704d 06A8h	**SRC_REVERSE_RNDX** Source, reverse traversing direction, rotary axis Connector number, description refer to H705. POSREG.CA3500.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[D2.1] 3.7.5
H705 1705d 06A9h	**MSK_REVERSE_RNDX** Mask, reverse traversing direction, rotary axis Mask, which selects the control bit for the traversing direction in the rotary axis mode. If the control bit is 0, then the drive only rotates in the positive direction of rotation. If the control bit is 1, the drive only rotates in the negative direction of rotation. POSREG.CA3500.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 0001h	0000h	[D2.2] 3.7.5
H706 1706d 06AAh	**SRC_DIRECT_RNDX** Source, traversing direction, direct rotary axis Connector number, description refer to H707. POSREG.CA3550.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[D2.1] 3.7.5

Par. No.	Value/description	Value range steps	Factory setting	Sect. [diagr.]
H707 1707d 06ABh	**MSK_DIRECT_RNDX** Mask, traversing direction direct rotary axis Mask which selects the control bit for positioning with the shortest traversing path. If the control bit is 1, the drive, in the rotary axis mode, always moves through the shortest traversing path. If the reference value change is in the following intervals: 0<ΔP<180° drive moves in the pos. direction of rotation. 180<ΔP<360°: drive moves in the neg. direction of rotation 0>ΔP>-180°: drive moves in the neg. direction of rotation. -180>ΔP>-360°: drive moves in the pos. direction of rotation. POSREG.CA3550._T3 SIMADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 0001h	0000h	[D2.2] 3.7.5
H710 1710d 06AEh	**V_DIF_MAX_LIM** Ramp-function generator tracking initiation point If the absolute difference between the velocity setpoint and actual value exceeds this limit, the ramp-up time is increased. ***Note***: The determined ramp time is reset, each time the position control is enabled. POSREG.PR3120.W1_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	10%	[D2.1]
H711 1711d 06AFh	**V_DIV_MAX_KP** Controller gain, RFG tracking KP factor for the intervention of the ramp-function generator tracking. POSREG.PR3120.KP_T3 SIMADYN D:E2 PKW-TYP:I4	-256.000 ... 255.990 0.0078	0	[D2.2]
H719 1719d 06B7h	**EXP_FACTOR_TI** Range changeover Integration time, pos. control Extremly long time value in H720 (≥ 2 000 000 [ms]) can be entered using the range changeover with H719. The resulting time value will be: Time value = H720•2^{H719} **Example:** The time 10 000 000 [ms] has to be set. This time value is 5 time higher as the maximum value adjustable in H720. The range can be set in 2^n steps, the value for H719 will be set to 3 (2^3=8). $H720 = \frac{\text{Time value}}{\text{Range}} = \frac{10\,000\,000\,[ms]}{8} = 1250\,000\,[ms]$ POSREG.PR3605.XD_T3 SIMADYN D:O2 PKW-TYP:O2	0...32	0	[D2.5] 3.7.3
H720 1720d 06B8h	**INT_TIME_PRAMP** Integration time, position control The integration time is obtained from the normalization of the position and velocity, and is defined as follows: The integration time is the time which the drive requires in order to move 100% of the distance at 100% velocity. **Note:** This time must be entered as precisely as possible. The maximum range ≈ 2 000 000 [ms].Higher time values in H720 (≥ 2 000 000 [ms]) can be entered using the range changeover with H719. POSREG.PR3600.X_T3 SIMADYN D:R4 PKW-TYP:O4	5.000[ms]... ...5368709120.000[ms]	20 000[ms]	[D2.5] 3.7.3

Par. No.	Value/description	Value range steps	Factory setting	Sect. [diagr.]
H721 1721d 06B9h	**DEAD_TIME_COMP** Deadtime compensation, position ramp-function generator In order to prevent the position ramp-function generator overshooting, the control deadtimes can be compensated. POSREG.PR3700.X_T3 SIMADYN D:R4 PKW-TYP:O4	5.000[ms]... 5 368 709 120.000[ms]	10[ms]	[D2.5] 3.7.2
H722 1722d 06BAh	**SCL_ACCELERATION** Normalization, acceleration If the position ramp-function generator ramp-up time corresponds to the time set here, an acceleration signal of 100% is output. The lowest ramp-up time of the position ramp-function generator should be entered as normalization time. POSREG.RB1300.X2_T1 SIMADYN D:R4 PKW-TYP:O4	5.000[ms]... 5 368 709 120.000[ms]	10[ms]	[D2.7] 3.7.4
H728 1728d 06C0h	**PROSREG_INCREMENT** Step change input for position controller optimization Using this parameter an additional position reference value for position controller optimization may be switched-in. POSREG.P1415.X2_T1 SIMADYN D:N4 PKW-TYP:I4	-200.000 ... 199.993% 0.006%	0%	[D3.2] 3.7.6
H729 1729d 06C1h	**FLT_ACTUAL.POS** Smoothing, position actual value The position actual value can be smoothed to dampen the position control loop. **From V1.3: Parameter has been eliminated** POSREG.P1405.T_T1 SIMADYN D:R2 PKW-TYP:O4	5.000[ms]... ...81 920.000[ms]	5[ms]	[D3.2] 3.7.6
H730 1730d 06C2h	**FLT_POS.SETPOINT** Smoothing, position reference value The position reference value must be smoothed for the position control with the following time constant: The smoothing time constant for the position reference value is the sum of the equivalent time constants of the speed control loop plus the time constant of the position actual value smoothing. POSREG.P1400.T_T1 SIMADYN D:R2 PKW-TYP:O4	5.000[ms]... ...81 920.000[ms]	5[ms]	[D3.2] 3.7.6
H731 1731d 06C3h	**KP1_POSREG** Pre-amplification gain, controller error, pos. Controller The proportional gain of the position controller (H734) is limited to 259. If this range is not sufficient, the control error can be pre-amplified in stages of 2^n. For example. Value 2 amplifies the controller error by a factor of 4 POSREG.P1420.XD_T1 SIMADYN D:O2 PKW-TYP:O2	0 ... 32767 1	0	[D3.3] 3.7.6
H732 1732d 06C4h	**POSREG_LU** Upper limit, position controller output The influence of the position controller is limited to this value in the positive direction. POSREG.P1500.LU_T1 SIMADYN D:N2 PKW-TYP:I4	-200.000...199.993% 0.006%	10%	[D3.4] 3.7.6
H733 1733d 06C5h	**POSREG_LL** Lower limit, position controller output The influence of the position controller is limited to this value in the negative direction. POSREG.P1500.LL_T1 SIMADYN D:O2 PKW-TYP:O2	-200.000...199.993% 0.006%	-10%	[D3.4] 3.7.6

Par. No.	Value/description	Value range steps	Factory setting	Sect. [diagr.]
H734 1734d 06C6h	**POSREG_KP** Proportional gain, position controller KP of the position controller. If the value range is not adequate, the controller error in H731 can be pre-amplified. POSREG.P1500.KP_T1 SIMADYN D:E2 PKW-TYP:I4	-256 ... 255.990 1	1	[D3.3] 3.7.6
H735 1735d 06C7h	**POSREG_TN** Integral action time, position controller The integral action time is only active, if the position controller is operated as PI controller (H737=0) POSREG.P1500.TN_T1 SIMADYN D:R2 PKW-TYP:O4	5.000[ms]... ...81 920.000[ms]	1000[ms]	[D3.3] 3.7.6
H736 1736d 06C8h	**MODE_POSREG_IC** Mode, I control position controller If the control bit is 1, the position controller operates as pure I controller (current controller) POSREG.P1500.IC_T1 SIMADYN D:B1 PKW-TYP:BOOLEAN	0 ... 1 1	0	[D3.3] 3.7.6
H737 1737d 06C9h	**MODE_POSREG_PI** Mode, P /PI position controller If the control bit is 1, the position controller operates as pure P controller. If the bit is 0, it operates as PI controller. POSREG.P1500.HI_T1 SIMADYN D:B1 PKW-TYP:BOOLEAN	0 ... 1 1	1	[D3.4] 3.7.6
H738 1738d 06CAh	**ACCEL_COMP** Inertia compensation, position control The acceleration value of the position ramp-function generator is multiplied by this factor, and is used as supplementary torque input for the drive. If the *automatic load measurement* function is used, the inertia compensation for the non-loaded status is entered in H738. POSREG.P5950.X_T5 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	[D3.5] 3.7.8.2
H739 1739d 06CBh	**FACTOR N-PRECONTRL** Smoothing, velocity setpoint The velocity setpoint of the position ramp-function generator is multiplied by this value, and is used as supplementary velocity setpoint input for the drive. This factor is always 100%. Only in exceptional cases, by setting 0%, the pre-control can be disabled. (disadvantage: dynamic losses) POSREG.P1610.X2_T1 SIMADYN D:N2 PKW-TYP:I4	0.000%...199.993% 0.006%	100%	[D3.5] 3.7.6
H740 1740d 06CCh	**FLT_V.SETPOINT** Smoothing, velocity setpoint The velocity setpoint should be smoothed for the speed control with the equivalent time constant of the torque control loop plus the time constant of the speed actual value smoothing. POSREG.P1600.T_T1 SIMADYN D:R2 PKW-TYP:O4	5.000[ms]... ...81 920.000[ms]	5[ms]	[D3.2] 3.7.6
H741 1741d 06CDh	**LIM_DEV_POSREG** Tolerance limit for tracking errors If the absolute value of the tracking error lies above this limit, then the error message, tracking error outside tolerance F121 is generated. POSREG.P5100.X_T5 SIMADYN D:N2 PKW-TYP:I4	-2147483648... ... 2147483647 1	1 000	[D5.3] 3.7.7

Par. No.	Value/description	Value range steps	Factory setting	Sect. [diagr.]
H742 1742d 06CEh	**LIM_POSITION_OK** Tolerance limit, drive has positioned signal If the absolute difference between the position reference value and actual value exceeds this limit, then the status signal *drive has positioned* is withdrawn. POSREG.P3720.L_T3 SIMADYN D:I2 PKW-TYP:I2	-32768 ... 32767 1	100	[D5.1] 3.7.10.1
H743 1743d 06CFh	**HY_POSITION_OK** Hysteresis for signal, drive has positioned POSREG.P3720.HY_T3 SIMADYN D:N2 PKW-TYP:I4	-32768 ... 32767 1	10	[D5.1] 3.7.10.1
H744 1744d 06D0h	**DELAY_POS_OK** Delay time, drive has positioned signal The *drive has positioned* signal is only output, if the position actual value remains within the tolerance bandwidth longer than the set time. POSREG.P3730.T_T3 SIMADYN D:T2 PKW-TYP:O4	0.000[ms]... ...1 310 720.0[ms]	120[ms]	[D5.3] 3.7.10.1
H745 1745d 06D1h	**DELAY_DEV_FAULT** Delay time, tracking error If the position reference value-actual value difference exceeds the tolerance limit for longer than this time, the error message "tracking error F121" is generated. POSREG.P3190.T_T3 SIMADYN D:T2 PKW-TYP:O4	0.000[ms]... ...1 310 720.0[ms]	120[ms]	[D5.3]
H746 1746d 06D2h	**M_ADD_LOAD** Source, load equalization for hoisting units The load torque can be pre-controlled so that when the mechanical brake of hoisting units/cranes are opened, the load doesn't sag. POSREG.P2310.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	1	[D4.1]
H747 to H749	Not used			
H750 1750d 06D6h	**V_REF_MOD_V1** V set for velocity control 1 mode Velocity setpoint for the *velocity-controlled operation 1* mode POSREG.P3200.X2_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	5%	[D4.1] 3.7.9
H751 1751d 06D7h	**V_REF_MOD_V2** V set for velocity control 2 operation Velocity setpoint for the *velocity-controlled operation 2* mode POSREG.P3210.X2_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	5%	[D4.2] 3.7.9
H752 1752d 06D8h	**SRC_V_REF_MOD_V2** Source, V set for velocity control 3 operation Connector number of the velocity setpoint for the *velocity-controlled operation 3* mode POSREG.P3220.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[D4.2] 3.7.9
H753 1753d 06D9h	**V_REF_JOG1V** V set for inching 1, speed-controlled Velocity setpoint for the mode *inching 1 speed-controlled* POSREG.P3250.X2_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	1%	[D4.3] 3.7.9

Par. No.	Value/description	Value range steps	Factory setting	Sect. [diagr.]
H754 1754d 06DAh	**V_REF_JOG2V** V set for inching 2, speed-controlled Velocity setpoint for the mode *inching 2 speed-controlled* POSREG.P3260.X2_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	-1%	[D4.3] 3.7.9
H760 1760d 06E0h	**TD_VRAMP** Ramp-down time, speed-controlled operating modes POSREG.P3350.X1_T3 SIMADYN D:R2 PKW-TYP:O4	40.000[ms]... ...655 360.000[ms]	10000[ms]	[D4.3] 3.7.9
H761 1761d 06E1h	**TU_VRAMP** Ramp-up time, speed-controlled operating modes POSREG.P3410.TU_T3 SIMADYN D:R2 PKW-TYP:O4	40.000[ms]... ...655 360.000[ms]	10000[ms]	[D4.6] 3.7.9
H762 1762d 06E2h	**TOL_CMP_VA/VR** Tolerance limit limit value monitor, velocity set-point=actual value If the absolute difference between the velocity setpoint and actual value is greater than this tolerance limit, then the signal V set=V act is withdrawn POSREG.P3600.L_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	1%	[D5.1]
H763 1763d 06E3h	**HY_CMP_VA/VR** Hysteresis, limit value monitor, velocity set-point=actual value POSREG.P3600.HY_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0.5%	[D5.1]
H764 1764d 06E4h	**FRICTION_V=5%** Frictional torque at 5 % velocity POSREG.P5800.X_T5 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	[D3.2] 3.7.8.1
H765 1765d 06E5h	**FRICTION_V=10%** Frictional torque at 10 % velocity POSREG.P5820.X_T5 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	[D3.2] 3.7.8.1
H766 1766d 06E6h	**FRICTION_V=20%** Frictional torque at 20 % velocity POSREG.P5840.X_T5 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	[D3.2] 3.7.8.1
H767 1767d 06E7h	**FRICTION_V=40%** Frictional torque at 40 % velocity POSREG.P5860.X_T5 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	[D3.2] 3.7.8.1
H768 1768d 06E8h	**FRICTION_V=60%** Frictional torque at 60 % velocity POSREG.P5880.X_T5 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	[D3.2] 3.7.8.1
H769 1769d 06E9h	**FRICTION_V=80%** Frictional torque at 80 % velocity POSREG.P5900.X_T5 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	[D3.2] 3.7.8.1
H770 1770d 06EAh	**FRICTION_V=100%** Frictional torque at 100 % velocity POSREG.P5920.X_T5 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	[D3.2] 3.7.8.1

Par. No.	Value/description	Value range steps	Factory setting	Sect. [diagr.]
H771 1771d 06EAh	**ACC_LIM_LOADADJ** Limit, enable automatic inertia compensation If the accelerating value of the position ramp-function generator exceeds this limit value, then the moment of inertia measurement is enabled. The measurement is stopped if the limit is again fallen below. POSREG.P2110.M_T2 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	5%	
H772 1772d 06EBh	**RANGE_LOADADJ** Influence range, automatic inertia compensation The measured value of the automatic inertia compensation is multiplied by this factor, before it is input into the inertia compensation function. POSREG.P2290.X_T2 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	[D3.6]
H780 1780d 030Ch	**SRC_INP_MOP_DW** Source, motorized potentiometer input, double word The motorized potentiometer goes to this value, if the *tracking* mode (H790/H791) is selected. ***Note***: The input value consists of the sum of the word- and double-word input. AUXIL.M4100.NC_T4 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[E1.1] 3.8.1
H781 1781d 030Dh	**SRC_INP_MOP_WD** Source, motorized potentiometer input, word The motorized potentiometer goes to this value, if the *tracking* mode (H790/H791) is selected. ***Note***: The input value consists of the sum of the word- and double-word input. AUXIL.M4110.NC_T4 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[E1.1] 3.8.1
H782 1782d 030Eh	**SRC_SV_MOP_DW** Source, motorized potentiometer setting value, double-word The motorized potentiometer is set to this value, if the MOP set control bit (H784/H785) is active. ***Note***: The setting value is obtained by summing the word- and double-word input. AUXIL.M4140.NC_T4 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[E1.1] 3.8.1
H783 1783d 030Fh	**SRC_SV_MOP_WD** Source, motorized potentiometer setting value, double-word The motorized potentiometer is set to this value, if the MOP set control bit (H784/H785) is active. ***Note***: The setting value is obtained by summing the word- and double-word input. AUXIL.M4150.NC_T4 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[E1.1] 3.8.1
H784 1784d 0310h	**SRC_SET_MOP** Source, set motorized potentiometer Connector number, description refer to H785 AUXIL.M4180.NC_T4 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[E1.1] 3.8.1

Par. No.	Value/description	Value range steps	Factory setting	Sect. [diagr.]
H785 1785d 0311h	**MSK_SET_MOP** Mask, set motorized potentiometer Mask which is used to select the control bit to set the motorized potentiometer. If the control bit is 1, the MOP is set to the value selected in H782/H783. AUXIL.M4180.MSK_T4 SIMADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 0001h	0000h	[E1.1] 3.8.1
H786 1786d 0312h	**SRC_INC_MOP** Source, raise motorized potentiometer Connector number, description refer to H787. AUXIL.M4190.NC_T4 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[E1.1] 3.8.1
H787 1787d 0313h	**MSK_INC_MOP** Mask, raise motorized potentiometer Mask, which is used to select the control bit to move the motorized potentiometer in the positive direction. If the signal is available for longer than 3s, a changeover is made from the standard rate of change time H792 to the fast rate of change H793. AUXIL.M4190.MSK_T4 SIMADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 0001h	0000h	[E1.1] 3.8.1
H788 1788d 0314h	**SRC_DEC_MOP** Source, lower motorized potentiometer Connector number, description refer to H789. AUXIL.M4200.NC_T4 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[E1.1] 3.8.1
H789 1789d 0315h	**MSK_DEC_MOP** Mask, lower motorized potentiometer Mask, which is used to select the control bit to move the motorized potentiometer in the negative direction. If the signal is available for longer than 3s, a changeover is made from the standard rate of change time H792 to the fast rate of change H793. AUXIL.M4200.MSK_T4 SIMADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 0001h	0000h	[E1.1] 3.8.1
H790 1790d 0316h	**SRC_RAMP_MOP** Source, MOP mode, ramp-function generator Connector number, description refer to H791. AUXIL.M4210.NC_T4 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[E1.1] 3.8.1
H791 1791d 0317h	**MSK_RAMP_MOP** Mask, MOP mode, ramp-function generator Mask, which is used to select the control bit to changeover the motorized potentiometer. to RG operation. If the control bit is 1, the motorized potentiometer tracks the input value according to the selected ramp time. AUXIL.M4210.MSK_T4 SIMADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 0001h	0000h	[E1.1] 3.8.1
H792 1792d 0318h	**RAMP_TIME_MOP** Ramp time, normal rate of change MOP The motorized potentiometer changes with this ramp time if the control bit MOP raise or MOP lower is active. ***Note***: A changeover is automatically made to the fast ramp time H793 after 3s. AUXIL.M4320.X1_T4 SIMADYN D:R4 PKW-TYP:O4	160.000[ms]... 17 179 869 118.000[ms]	60000[ms]	[E1.2] 3.8.1

Par. No.	Value/description	Value range steps	Factory setting	Sect. [diagr.]
H793 1793d 0319h	**RAMP_TMFST_MOP** Ramp time, fast rate of change MOP If the control bit MOP raise or MOP lower is available for longer than 3s, a changeover is made to the fast rate of change AUXIL.M4320.X2_T4 SIMADYN D:R4 PKW-TYP:O4	160.000[ms]... 17 179 869 118.000[ms]	25000[ms]	[E1.2] 3.8.1
H794 1794d 031Ah	**MOP_LU** Upper limit, motorized potentiometer The MOP output is limited, in the positive direction, to this value. AUXIL.M4450.LU_T4 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	120%	[E1.3] 3.8.1
H795 1795d 031Bh	**MOP_LL** Lower limit, motorized potentiometer The MOP output is limited, in the negative direction, to this value. AUXIL.M4450.LL_T4 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	-120%	[E1.3] 3.8.1
H796 1796d 031Ch	**MOP_RANGE** Influence range, motorized potentiometer The motorized potentiometer output is multiplied by this factor. AUXIL.M4590.X2_T4 SIMADYN D:N4 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	[E1.5] 3.8.1
H820 1820d 071Ch	**LIM_COMP_PX** Tolerance limit, limit value monitor X If the absolute difference between the position limit value X and the actual position is greater than this tolerance limit, then the position limit value X reached signal is withdrawn. AUXIL.LM3150.L_T3 SIMADYN D:I2 PKW-TYP:I2	-32768 ... 32767 1	100	[E2.1] 3.8.3
H821 1821d 071Dh	**HY_COMP_PX** Hysteresis, limit value monitor X AUXIL.LM3150.HY_T3 SIMADYN D:I2 PKW-TYP:I2	-32768 ... 32767 1	10	[E2.1] 3.8.3
H822 1822d 071Eh	**LIM_COMP_PY** Tolerance limit, limit value monitor Y If the absolute difference between the position limit value Y and the actual position is greater than this tolerance limit, then the position limit value Y reached signal is withdrawn. AUXIL.LM3250.L_T3 SIMADYN D:I2 PKW-TYP:I2	-32768 ... 32767 1	100	[E2.1] 3.8.3
H823 1823d 071Fh	**HY_COMP_PY** Hysteresis, limit value monitor Y AUXIL.LM3250.HY_T3 SIMADYN D:I2 PKW-TYP:I2	-32768 ... 32767 1	10	[E2.1] 3.8.3
H824 1824d 0720h	**LIM_COMP_PZ** Tolerance limit, limit value monitor Z If the absolute difference between the position limit value Z and the actual position is greater than this tolerance limit, then the position limit value Z reached signal is withdrawn. AUXIL.LM3350.L_T3 SIMADYN D:I2 PKW-TYP:I2	-32768 ... 32767 1	100	[E2.1] 3.8.3
H825 1825d 0721h	**HY_COMP_PZ** Hysteresis, limit value monitor Z AUXIL.LM3350.HY_T3 SIMADYN D:I2 PKW-TYP:I2	-32768 ... 32767 1	10	[E2.1] 3.8.3

Par. No.	Value/description	Value range steps	Factory setting	Sect. [diagr.]
H826 1826d 0722h	**SRC_INP1_COMPDW** Source, input free limit value monitor double word Connector number of the quantity which is to be compared. AUXIL.LM3400.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[E2.1] 3.8.3
H827 1827d 0723h	**SRC_INP2_COMPDW** Source, comparison value, free limit value monitor double word Connector number of the comparison quantity AUXIL.LM3410.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[E2.1] 3.8.3
H828 1828d 0724h	**LIM_COMPDW** Tolerance limit, free limit value monitor double word If the absolute difference between the input value and the comparison value is greater than this tolerance limit, then the input value is equal to the comparison value signal is withdrawn. AUXIL.LM3450.L_T3 SIMADYN D:O2 PKW-TYP:O2	-32768 ... 32767 1	100	[E2.1] 3.8.3
H829 1829d 0725h	**HY_COMPDW** Hysteresis, free limit value monitor double word AUXIL.LM3450.HY_T3 SIMADYN D:I2 PKW-TYP:I2	-32768 ... 32767 1	10	[E2.1] 3.8.3
H830 1830d 0726h	**SRC_INP1_COMPA** Source, input free limit value monitor A Connector number of the quantity which is to be compared. AUXIL.LM3500.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[E2.5] 3.8.3
H831 1831d 0727h	**SRC_INP2_COMPA** Source, comparison value free limit value monitor A Connector number of the comparison quantity AUXIL.LM3510.NC_T3 SIMADYN D:N2 PKW-TYP:O2	0 ... 1024 1	0	[E2.5] 3.8.3
H832 1832d 0728h	**LIM_COMPA** Tolerance limit, free limit value monitor A If the absolute difference between the input value and the comparison value is greater than this tolerance limit, then the input value is equal to the comparison value signal is withdrawn. AUXIL.LM3550.L_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	[E2.6] 3.8.3
H833 1833d 0729h	**HY_COMPA** Hysteresis, free limit value monitor A AUXIL.LM3550.HY_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	[E2.6] 3.8.3
H834 1834d 072Ah	**SRC_INP1_COMPB** Source, input free limit value monitor B Connector number of the quantity which is to be compared. AUXIL.LM3600.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[E2.5] 3.8.3

Par. No.	Value/description	Value range steps	Factory setting	Sect. [diagr.]
H835 1835d 072Bh	**SRC_INP2_COMPB** Source, comparison value free limit value monitor B Connector number of the comparison quantity AUXIL.LM3610.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[E2.5] 3.8.3
H836 1836d 072Ch	**LIM_COMPB** Tolerance limit, free limit value monitor B If the absolute difference between the input value and the comparison value is greater than this tolerance limit, then the input value is equal to the comparison value signal is withdrawn. AUXIL.LM3650.L_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	[E2.6] 3.8.3
H837 1837d 072Dh	**HY_COMPB** Hysteresis, free limit value monitor B AUXIL.LM3650.HY_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	[E2.6] 3.8.3
H838 1838d 072Eh	**SRC_INP1_COMPC** Source, input free limit value monitor C Connector number of the quantity which is to be compared. AUXIL.LM3700.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[E2.5] 3.8.3
H839 1839d 072Fh	**SRC_INP2_COMPC** Source, comparison value free limit value monitor C Connector number of the comparison quantity AUXIL.LM3710.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[E2.5] 3.8.3
H840 1840d 0730h	**LIM_COMPC** Tolerance limit, free limit value monitor C If the absolute difference between the input value and the comparison value is greater than this tolerance limit, then the input value is equal to the comparison value signal is withdrawn. AUXIL.LM3750.L_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	[E2.6] 3.8.3
H841 1841d 0731h	**HY_COMPC** Hysteresis, free limit value monitor C AUXIL.LM3750.HY_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	[E2.6] 3.8.3
H842 1842d 0732h	**SRC_INP1_COMPD** Source, input free limit value monitor D Connector number of the quantity which is to be compared. AUXIL.LM3800.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[E2.5] 3.8.3
H843 1843d 0733h	**SRC_INP2_COMPD** Source, comparison value free limit value monitor D Connector number of the comparison quantity AUXIL.LM3810.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[E2.5] 3.8.3

Par. No.	Value/description	Value range steps	Factory setting	Sect. [diagr.]
H844 1844d 0734h	**LIM_COMPD** Tolerance limit, free limit value monitor D If the absolute difference between the input value and the comparison value is greater than this tolerance limit, then the input value is equal to the comparison value signal is withdrawn. AUXIL.LM3850.L_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	[E2.6] 3.8.3
H845 1845d 0735h	**HY_COMPD** Hysteresis, free limit value monitor D AUXIL.LM3850.HY_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	[E2.6] 3.8.3
H846 1846d 0736h	**SRC_DSP_N2** Source, display parameter % quantity word Number of the connector which is to be displayed, interpreted as word % quantity. AUXIL.DP4000.NC_T4 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[E1.6] 3.8.2
H847 1847d 0737h	**SRC_DSP_N4** Source, display parameter % quantity double word Number of the connector which is to be displayed, interpreted as double word % quantity. AUXIL.DP4010.NC_T4 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[E1.6] 3.8.2
H848 1848d 0738h	**SRC_DSP_V2** Source, display parameter word HEX quantity Number of the connector which is to be displayed, interpreted as word HEX quantity. AUXIL.DP4020.NC_T4 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[E1.6] 3.8.2
H849 1849d 0739h	**SRC_DSP_I2** Source, display parameter word integer quantity Number of the connector, which is to be displayed, interpreted as word integer quantity. AUXIL.DP4040.NC_T4 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[E1.6] 3.8.2
H850 1850d 073Ah	**SRC_DSP_I4** Source, display parameter double word integer quantity Number of the connector which is to be displayed, interpreted as double word integer quantity. AUXIL.DP4050.NC_T4 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[E1.6] 3.8.2
H851 1851d 073Bh	**SRC_DSP_PSCAL** Source, display parameter position values scaled Number of the connector which is to be displayed scaled. The % quantities of the control (e. g. control error) are displayed, not normalized (=%), but scaled (mm). AUXIL.DP4070.NC_T4 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[E1.6] 3.8.2
H860 1860d 0744h	**SRC_STW_BIT0** Source, bit 0 free status word Connector number, description refer to H861. AUXIL.ST3000.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[E3.1] 3.8.4

Par. No.	Value/description	Value range steps	Factory setting	Sect. [diagr.]
H861 1861d 0745h	**MSK_STW_BIT0** Mask, bit 0 free status word Mask which is used to select status bit 0 of the *freely-definable status word.* AUXIL.ST3000.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 0001h	0000h	[E3.2] 3.8.4
H862 1862d 0746h	**SRC_STW_BIT1** Source, bit 1, free status word Connector number, description refer to H863. AUXIL.ST3010.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[E3.1] 3.8.4
H863 1863d 0747h	**MSK_STW_BIT1** Mask, bit 1, free status word Mask, which is used to select status bit 1 of the *freely-definable status word.* AUXIL.ST3010.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 0001h	0000h	[E3.2] 3.8.4
H864 1864d 0748h	**SRC_STW_BIT2** Source, bit 2, free status word Connector number, description refer to H865. AUXIL.ST3020.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[E3.1] 3.8.4
H865 1865d 0749h	**MSK_STW_BIT2** Mask, bit 2, free status word Mask, which is used to select status bit 2 of the *freely-definable status word.* AUXIL.ST3020.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 0001h	0000h	[E3.2] 3.8.4
H866 1866d 074Ah	**SRC_STW_BIT3** Source, bit 3, free status word Connector number, description refer to H867. AUXIL.ST3030.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[E3.1] 3.8.4
H867 1867d 074Bh	**MSK_STW_BIT3** Mask, bit 3, free status word Mask, which is used to select status bit 3 of the *freely-definable status word.* AUXIL.ST3030.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 0001h	0000h	[E3.2] 3.8.4
H868 1868d 074Ch	**SRC_STW_BIT4** Source, bit 4, free status word Connector number, description refer to H869. AUXIL.ST3040.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[E3.1] 3.8.4
H869 1869d 074Dh	**MSK_STW_BIT4** Mask, bit 4, free status word Mask, which is used to select status bit 4 of the *freely-definable status word.* AUXIL.ST3040.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 0001h	0000h	[E3.2] 3.8.4
H870 1870d 074Eh	**SRC_STW_BIT5** Source, bit 5, free status word Connector number description refer to H871. AUXIL.ST3050.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[E3.1] 3.8.4

Par. No.	Value/description	Value range steps	Factory setting	Sect. [diagr.]
H871 1871d 074Fh	**MSK_STW_BIT5** Mask, bit 5, free status word Mask, which is used to select status bit 5 of the *freely-definable status word*. AUXIL.ST3050.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 0001h	0000h	[E3.2] 3.8.4
H872 1872d 0750h	**SRC_STW_BIT6** Source, bit 6, free status word Connector number, description refer to H873. AUXIL.ST3060.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[E3.1] 3.8.4
H873 1873d 0751h	**MSK_STW_BIT6** Mask, bit 6, free status word Mask, which is used to select status bit 6 of the *freely-definable status word*. AUXIL.ST3060.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 0001h	0000h	[E3.2] 3.8.4
H874 1874d 0752h	**SRC_STW_BIT7** Source, bit 7, free status word Connector number, description refer to H875. AUXIL.ST3070.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[E3.1] 3.8.4
H875 1875d 0753h	**MSK_STW_BIT7** Mask, bit 7, free status word Mask, which is used to select status bit 7 of the *freely-definable status word*. AUXIL.ST3070.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 0001h	0000h	[E3.2] 3.8.4
H876 1876d 0754h	**SRC_STW_BIT8** Source, bit 8, free status word Connector number, description refer to H877. AUXIL.ST3080.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[E3.1] 3.8.4
H877 1877d 0755h	**MSK_STW_BIT8** Mask, bit 8, free status word Mask which is used to select status bit 8 of the *freely-definable status word*. AUXIL.ST3080.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 0001h	0000h	[E3.2] 3.8.4
H878 1878d 0756h	**SRC_STW_BIT9** Source, bit 9, free status word Connector number, description refer to H879. AUXIL.ST3090.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[E3.1] 3.8.4
H879 1879d 0757h	**MSK_STW_BIT9** Mask, bit 9, free status word Mask, which is used to select status bit 9 of the *freely-definable status word*. AUXIL.ST3090.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 0001h	0000h	[E3.2] 3.8.4
H880 1880d 0758h	**SRC_STW_BIT10** Source, bit 10, free status word Connector number, description refer to H881. AUXIL.ST3100.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[E3.1] 3.8.4

Par. No.	Value/description	Value range steps	Factory setting	Sect. [diagr.]
H881 1881d 0759h	**MSK_STW_BIT10** Mask, bit 10, free status word Mask, which is used to select status bit 10 of the *freely-definable status word*. AUXIL.ST3100.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 0001h	0000h	[E3.2] 3.8.4
H882 1882d 075Ah	**SRC_STW_BIT11** Source, bit 11, free status word Connector number, description refer to H883. AUXIL.ST3110.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[E3.1] 3.8.4
H883 1883d 075Bh	**MSK_STW_BIT11** Mask, bit 11, free status word Mask, which is used to select status bit 11 of the *freely-definable status word*. AUXIL.ST3110.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 0001h	0000h	[E3.2] 3.8.4
H884 1884d 075Ch	**SRC_STW_BIT12** Source, bit 12, free status word Connector number, description refer to H885. AUXIL.ST3120.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[E3.1] 3.8.4
H885 1885d 075Dh	**MSK_STW_BIT12** Mask, bit 12, free status word Mask, which is used to select status bit 12 of the *freely-definable status word*. AUXIL.ST3120.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 0001h	0000h	[E3.2] 3.8.4
H886 1886d 075Eh	**SRC_STW_BIT13** Source, bit 13, free status word Connector number, description refer to H887. AUXIL.ST3130.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[E3.1] 3.8.4
H887 1887d 075Fh	**MSK_STW_BIT13** Mask, bit 13, free status word Mask, which is used to select status bit 13 of the *freely-definable status word*. AUXIL.ST3130.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 0001h	0000h	[E3.2] 3.8.4
H888 1888d 0760h	**SRC_STW_BIT14** Source, bit 14, free status word Connector number, description refer to H889. AUXIL.ST3140.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[E3.1] 3.8.4
H889 1889d 0761h	**MSK_STW_BIT14** Mask, bit 14, free status word Mask, which is used to select status bit 14 of the *freely-definable status word*. AUXIL.ST3140.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 0001h	0000h	[E3.2] 3.8.4
H890 1890d 0762h	**SRC_STW_BIT15** Source, bit 15, free status word Connector number, description refer to H891. AUXIL.ST3150.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[E3.1] 3.8.4

Par. No.	Value/description	Value range steps	Factory setting	Sect. [diagr.]
H891 1891d 0763h	**MSK_STW_BIT15** Mask, bit 15, free status word Mask, which is used to select status bit 15 of the *freely-definable status word*. AUXIL.ST3150.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h ... FFFFh 0001h	0000h	[E3.2] 3.8.4
H892 1892d 0764h	**SRC_SAV_VAL_1** Source, NOVRAM memory word 1 Connector number of the value, which is stored in the NOVRAM, when the power fails. The stored value is available in connector K256 when the power returns AUXIL.SV3000.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[E1.6]
H893 to H899	Not used			
H900 1900d 076Ch	**SRC_BQ1** Source, binary output 1 Connector number, description refer to HXXX. OUTPUT.BQ3000.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[A4.5] 3.3.7
H901 1901d 076Dh	**MSK_BQ1** Mask, binary output 1 Mask, which is used to select the control bit for binary output 1. The signal is output at terminal 621. OUTPUT.BQ3000.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	[A4.5] 3.3.7
H902 1902d 076Eh	**SRC_BQ2** Source, binary output 2 Connector number, description refer to H903. OUTPUT.BQ3020.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[A4.5] 3.3.7
H903 1903d 076Fh	**MSK_BQ2** Mask, binary output 2 Mask, which is used to select the control bit for binary output 2. The signal is output at terminal 622. OUTPUT.BQ3010.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	[A4.5] 3.3.7
H904 1904d 0770h	**SRC_BQ3** Source, binary output 3 Connector number, description refer to H905. OUTPUT.BQ3020.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[A4.5] 3.3.7
H905 1905d 0771h	**MSK_BQ3** Mask, binary output 3 Mask, which is used to select the control bit for binary output 3. The signal is output at terminal 623. OUTPUT.BQ3020.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	[A4.5] 3.3.7
H906 1906d 0772h	**SRC_BQ4** Source, binary output 4 Connector number, description refer to H907. OUTPUT.BQ3030.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[A4.5] 3.3.7

Par. No.	Value/description	Value range steps	Factory setting	Sect. [diagr.]
H907 1907d 0773h	**MSK_BQ4** Mask, binary output 4 Mask, which is used to select the control bit for binary output 4. The signal is output at terminal 624. OUTPUT.BQ3030.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	[A4.5] 3.3.7
H908 1908d 0774h	**SRC_BQ5** Source, binary output 5 Connector number, description refer to H909. OUTPUT.BQ3040.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[A4.5] 3.3.7
H909 1909d 0775h	**MSK_BQ5** Mask, binary output 5 Mask, which is used to select the control bit for binary output 5. The signal is output at terminal 625. OUTPUT.BQ3040.MSK_T3 SIMADYN D:V PKW-TYP:V2	0000h...FFFFh 0001h	0000h	[A4.5] 3.3.7
H910 1910d 0776h	**SRC_BQ6** Source, binary output 6 Connector number, description refer to H911. OUTPUT.BQ3050.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[A4.5] 3.3.7
H911 1911d 0777h	**MSK_BQ6** Mask, binary output 6 Mask, which is used to select the control bit for binary output 6. The signal is output at terminal 626. OUTPUT.BQ3050.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	[A4.5] 3.3.7
H912 1912d 0778h	**SRC_BQ7** Source, binary output 7 Connector number, description refer to H913. OUTPUT.BQ3060.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[A4.5] 3.3.7
H913 1913d 0779h	**MSK_BQ7** Mask, binary output 7 Mask, which is used to select the control bit for binary output 7. The signal is output at terminal 627. OUTPUT.BQ3060.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	[A4.5] 3.3.7
H914 1914d 077Ah	**SRC_BQ8** Source, binary output 8 Connector number, description refer to H915. OUTPUT.BQ3070.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[A4.5] 3.3.7
H915 1915d 077Bh	**MSK_BQ8** Mask, binary output 8 Mask, which is used to select the control bit for binary output 8. The signal is output at terminal 628. OUTPUT.BQ3070.MSK_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	[A4.5] 3.3.7
H916 1916d 077Ch	**MSK_INV_BQ** Mask, invert binary outputs This allows bitwise inversion of 8 binary outputs. Bit 0: Inversion, binary input 1 to Bit 7: Inversion, binary input 8 OUTPUT.BQ3110.IS2_T3 SIMADYN D:V2 PKW-TYP:V2	0000h...FFFFh 0001h	0000h	[A4.6] 3.3.7

Par. No.	Value/description	Value range steps	Factory setting	Sect. [diagr.]
H920 1920d 0780h	**SRC_AQ1** Source, analog output 1 Connector number of the supplying value. OUTPUT.AQ2000.NC_T2 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[A5.5] 3.3.9
H921 1921d 0781h	**ABSOLUTE_AQ1** Selection, absolute value analog output 1 Selects the absolute signal value for output. OUTPUT.AQ2020.I_T2 SIMADYN D:B1 PKW-TYP:BOOLEAN	0 ... 1 1	0	[A5.6] 3.3.9
H922 1922d 0782h	**FILTER_AQ1** Smoothing, analog output 1 Smoothing time constant for analog output 1 OUTPUT.AQ2050.T_T2 SIMADYN D:R2 PKW-TYP:O4	10.000[ms]... ...163840.000[ms]	10[ms]	[A5.6] 3.3.9
H923 1923d 0783h	**OFFSET_AQ1** Offset, analog output 1 This is subtracted from the signal to be output. OUTPUT.AQ2060.OFF_T2 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	[A5.7] 3.3.9
H924 1924d 0784h	**GAIN_AQ1** Gain, analog output 1 The conditioned signal is multiplied by this factor. The following is valid: 100%x1=100% and the assignment 100%=5V. OUTPUT.AQ2060.K_T2 SIMADYN D:E2 PKW-TYP:I4	-256...255.9921875 0.0078125	2	[A5.7] 3.3.9
H925 1925d 0785h	**SRC_AQ2** Source, analog output 2 Connector number of the supplying value. OUTPUT.AQ2100.NC_T2 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[A5.5] 3.3.9
H926 1926d 0786h	**ABSOLUTE_AQ2** Selection, absolute value analog output 2 Selects the absolute signal value for output. OUTPUT.AQ2120.I_T2 SIMADYN D:B1 PKW-TYP:BOOLEAN	0 ... 1 1	0	[A5.6] 3.3.9
H927 1927d 0787h	**FILTER_AQ2** Smoothing, analog output 2 Smoothing time constant for analog output 2 OUTPUT.AQ2150.T_T2 SIMADYN D:R2 PKW-TYP:O4	10.000[ms]... ...163840.000[ms]	10[ms]	[A5.6] 3.3.9
H928 1928d 0788h	**OFFSET_AQ2** Offset, analog output 2 This is subtracted from the signal to be output. OUTPUT.AQ2160.OFF_T2 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	[A5.7] 3.3.9
H929 1929d 0789h	**GAIN_AQ2** Gain, analog output 2 The conditioned signal is multiplied by this factor. The following is valid: 100%x1=100% and the assignment 100%=5V. OUTPUT.AQ2160.K_T2 SIMADYN D:E2 PKW-TYP:I4	-256...255.9921875 0.0078125	2	[A5.7] 3.3.9

Par. No.	Value/description	Value range steps	Factory setting	Sect. [diagr.]
H930 1930d 078Ah	**SRC_AQ3** Source, analog output 3 Connector number of the supplying value. OUTPUT.AQ3000.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[A5.5] 3.3.9
H931 1931d 078Bh	**ABSOLUTE_AQ3** Selection, absolute value analog output 3 Selects the absolute signal value for output. OUTPUT.AQ3020.I_T3 SIMADYN D:B1 PKW-TYP:BOOLEAN	0 ... 1 1	0	[A5.6] 3.3.9
H932 1932d 078Ch	**FILTER_AQ3** Smoothing, analog output 3 Smoothing time constant for analog output 3 OUTPUT.AQ3050.T_T3 SIMADYN D:R2 PKW-TYP:O4	40.000[ms]... ...81920.000[ms]	40[ms]	[A5.6] 3.3.9
H933 1933d 078Dh	**OFFSET_AQ3** Offset, analog output 3 This is subtracted from the signal to be output. OUTPUT.AQ3060.OFF_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	[A5.7] 3.3.9
H934 1934d 078Eh	**GAIN_AQ3** Gain, analog output 3 The conditioned signal is multiplied by this factor. The following is valid: 100%x1=100% and the assignment 100%=5V. OUTPUT.AQ3060.K_T3 SIMADYN D:E2 PKW-TYP:I4	-256...255.9921875 0.0078125	2	[A5.7] 3.3.9
H935 1935d 078Fh	**SRC_AQ4** Source, analog output 4 Connector number of the supplying value. OUTPUT.AQ3100.NC_T3 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[A5.5] 3.3.9
H936 1936d 0790h	**ABSOLUTE_AQ4** Selection, absolute value analog output 4 Selects the absolute signal value for output. OUTPUT.AQ3120.I_T3 SIMADYN D:B1 PKW-TYP:BOOLEAN	0 ... 1 1	0	[A5.6] 3.3.9
H937 1937d 0791h	**FILTER_AQ4** Smoothing, analog output 4 Smoothing time constant for analog output 4 OUTPUT.AQ3150.T_T3 SIMADYN D:R2 PKW-TYP:O4	40.000[ms]... ...655360.000[ms]	40[ms]	[A5.6] 3.3.9
H938 1938d 0792h	**OFFSET_AQ4** Offset, analog output 4 This is subtracted from the signal to be output. OUTPUT.AQ3160.OFF_T3 SIMADYN D:N2 PKW-TYP:I4	-200.000%...199.993% 0.006%	0%	[A5.7] 3.3.9
H939 1939d 0793h	**GAIN_AQ4** Gain, analog output 4 The conditioned signal is multiplied by this factor. The following is valid: 100%x1=100% and the assignment 100%=5V. OUTPUT.AQ3160.K_T3 SIMADYN D:E2 PKW-TYP:I4	-256...255.9921875 0.0078125	2	[A5.7] 3.3.9

Par. No.	Value/description	Value range steps	Factory setting	Sect. [diagr.]
H941 1941d 0795h	**SRC_P2P_WORD_1** Source, word 1 to peer-to-peer Connector number of the supplying value. OUTPUT.PP2000.NC_T2 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[A3.6] 3.3.5
H942 1942d 0796h	**SRC_P2P_WORD_2** Source, word 2 to peer-to-peer Connector number of the supplying value. OUTPUT.PP2100.NC_T2 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[A3.6] 3.3.5
H943 1943d 0797h	**SRC_P2P_WORD_3** Source, word 3 to peer-to-peer Connector number of the supplying value. OUTPUT.PP2200.NC_T2 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[A3.6] 3.3.5
H944 1944d 0798h	**SRC_P2P_WORD_4** Source, word 4 to peer-to-peer Connector number of the supplying value. OUTPUT.PP2300.NC_T2 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[A3.6] 3.3.5
H945 1945d 0799h	**SRC_P2P_WORD_5** Source, word 5 to peer-to-peer Connector number of the supplying value. OUTPUT.PP2400.NC_T2 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[A3.6] 3.3.5
H946 1946d 079Ah	**TEL_LEN_PPT** Length, send telegram, peer-to-peer Number of send words which are to be transferred via the peer-to-peer coupling. OUTPUT.PP2500.LTW_T2 SIMADYN D:O2 PKW-TYP:O2 (INIT)	0 ... 5 1	5	[A3.7] 3.3.5
H951 1951d 079Fh	**SRC_CU_WORD_1** Source, send word 1 to CU Connector number of the supplying value. OUTPUT.SD1000.NC_T1 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	82	[A1.5] 3.3.3
H952 1952d 07A0h	**SRC_CU_WORD_2** Source, send word 2 to CU Connector number of the supplying value. OUTPUT.SD1010.NC_T1 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	220	[A1.5] 3.3.3
H953 1953d 07A1h	**SRC_CU_WORD_3** Source, send word 3 to CU Connector number of the supplying value. OUTPUT.SD1020.NC_T1 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[A1.5] 3.3.3
H954 1954d 07A2h	**SRC_CU_WORD_4** Source, send word 4 to CU Connector number of the supplying value. OUTPUT.SD1030.NC_T1 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	83	[A1.5] 3.3.3
H955 1955d 07A3h	**SRC_CU_WORD_5** Source, send word 5 to CU Connector number of the supplying value. OUTPUT.SD1040.NC_T1 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	204	[A1.5] 3.3.3

Par. No.	Value/description	Value range steps	Factory setting	Sect. [diagr.]
H956 1956d 07A4h	**SRC_CU_WORD_6** Source, send word 6 to CU Connector number of the supplying value. OUTPUT.SD1050.NC_T1 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[A1.5] 3.3.3
H957 1957d 07A5h	**SRC_CU_WORD_7** Source, send word 7 to CU Connector number of the supplying value. OUTPUT.SD1060.NC_T1 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[A1.5] 3.3.3
H958 1958d 07A6h	**SRC_CU_WORD_8** Source, send word 8 to CU Connector number of the supplying value. OUTPUT.SD1070.NC_T1 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	141	[A1.5] 3.3.3
H961 1961d 07A9h	**SRC_CB_WORD_1** Source, send word 1 to CB Connector number of the supplying value. OUTPUT.SD2000.NC_T2 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[A3.6] 3.3.4
H962 1962d 07AAh	**SRC_CB_WORD_2** Source, send word 2 to CB Connector number of the supplying value. OUTPUT.SD2010.NC_T2 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[A3.6] 3.3.4
H963 1963d 07ABh	**SRC_CB_WORD_3** Source, send word 3 to CB Connector number of the supplying value. OUTPUT.SD2020.NC_T2 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[A3.6] 3.3.4
H964 1964d 07ACh	**SRC_CB_WORD_4** Source, send word 4 to CB Connector number of the supplying value. OUTPUT.SD2030.NC_T2 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[A3.6] 3.3.4
H965 1965d 07ADh	**SRC_CB_WORD_5** Source, send word 5 to CB Connector number of the supplying value. OUTPUT.SD2040.NC_T2 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[A3.6] 3.3.4
H966 1966d 07AEh	**SRC_CB_WORD_6** Source, send word 6 to CB Connector number of the supplying value. OUTPUT.SD2050.NC_T2 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[A3.6] 3.3.4
H967 1967d 07AFh	**SRC_CB_WORD_7** Source, send word 7 to CB Connector number of the supplying value. OUTPUT.SD2060.NC_T2 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[A3.6] 3.3.4
H968 1968d 07B0h	**SRC_CB_WORD_8** Source, send word 8 to CB Connector number of the supplying value. OUTPUT.SD2070.NC_T2 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[A3.6] 3.3.4

Par. No.	Value/description	Value range steps	Factory setting	Sect. [diagr.]
H969 1969d 07B1h	**SRC_CB_WORD_9** Source, send word 9 to CB Connector number of the supplying value. OUTPUT.SD2080.NC_T2 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[A3.6] 3.3.4
H970 1970d 07B2h	**SRC_CB_WORD_10** Source, send word 10 to CB Connector number of the supplying value. OUTPUT.SD2090.NC_T2 SIMADYN D:O2 PKW-TYP:O2	0 ... 1024 1	0	[A3.6] 3.3.4
H997 1997d 07CDh	**DRIVE_ID** Drive identification If the system consists of several drives, a drive ID can be entered here. This allows a parameterized positioning to be assigned to the drive. INPUT.DRID.X_T5 SIMADYN D:O2 PKW-Typ:O2	0 ... 32767 1	0	
H998 1998d 07CE	**DEFAULTING** Establish factory setting This allows the EEPROM to be erased so that the factory setting can be re-established. **165** must be entered. **Note:** When the EEPROM is erased, the modified values are retained in the RAM. Thus, to establish the factory setting, the unit must be powered-down and up again. OUTPUT.ER10.X1_T5 SIMADYN D:O2 PKW-TYP:O2	0...32767 1	0	[A1.6] 1.12
H999 1999d 07CFh	**BAUDRATE_P2P** Baud rate for peer-to-peer coupling The following baud rates can be set: 0: 150 Bd 5: 4800 Bd 10: 76800 Bd 1: 300 Bd 6: 9600 Bd 11: Not permitted 2: 600 Bd 7: 19200 Bd 12: 115200 Bd 3: 1200 Bd 8: 38400 Bd 4: 2400 Bd 9: 57600 Bd **Please refere also to note 3, Section 1.13.3** @CMT1.PEER.BDR_T4 SIMADYN D:O2 PKW-TYP:O2 (INIT)	0...12 1	8	[A3.1] 3.3.5

Par. No.	Value/description	Value range steps	Factory setting	Sect. [diagr.]

5 Connectors

5.1 The connector principle

In order to achieve the highest flexibility of the module, the control signals are not permanently connected with one another, but can be configured for the various applications.

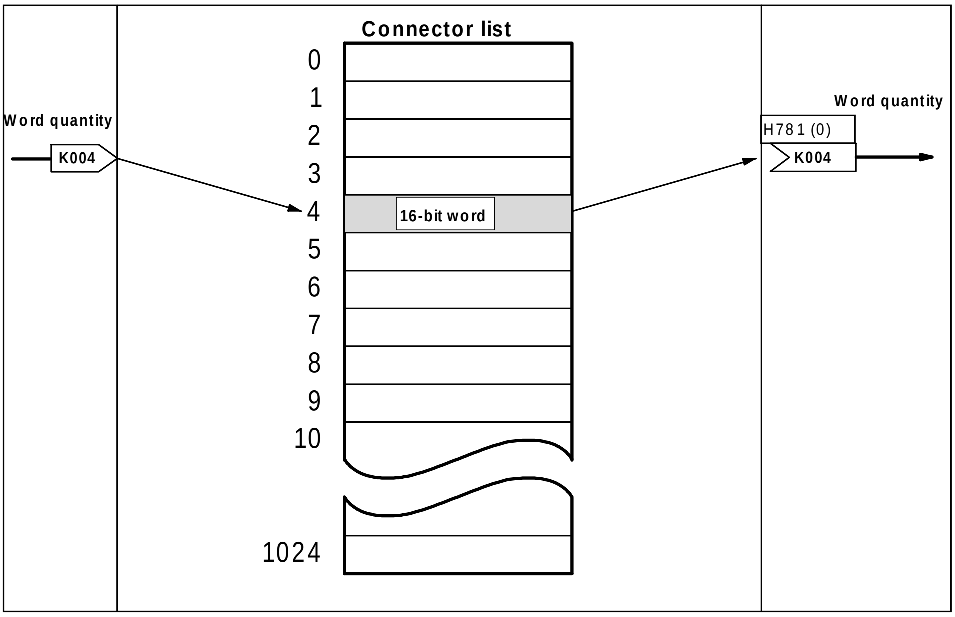
For this reason, these signals are listed in the so-called *Connector list,* where they can be „connected“ into the actual control functionality.

The connector list includes the following signals:

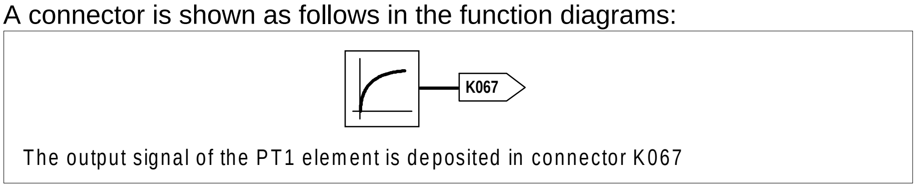
- fixed setpoints and reference values
- receive words from the basic drive converter, COM-BOARD, peer-to-peer
- binary inputs, analog inputs, pulse encoder
- status words from the open- and closed-loop control and setpoint conditioning
- signals from the open- and closed-loop control and setpoint conditioning
- signals from the freely-connectable functions

5.1.1 Single-word quantities

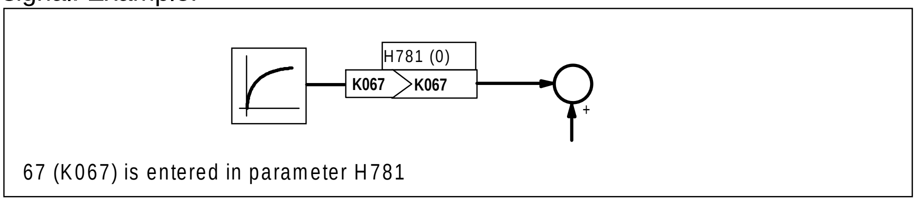
The mode of operation of the connectors is now outlined.



A connector is shown as follows in the function diagrams:



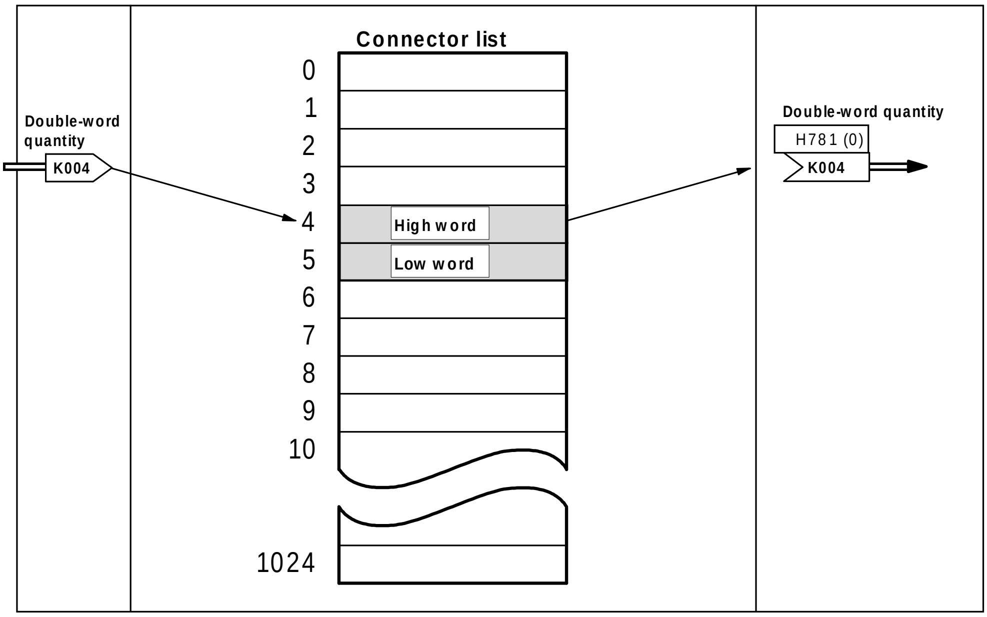
If this connector is to be connected up, then the connector number must be entered when selecting the signal. Example:



For setpoints and actual values, the normalization 4000h = 100% is used if not otherwise specified.

5.1.2 Double-word quantities

As the connector list can only accept a 16-bit word per memory location, the double-word quantity is split up into two 16-bit words. The high word in the specified connector, and the low word in the connector number plus 1.

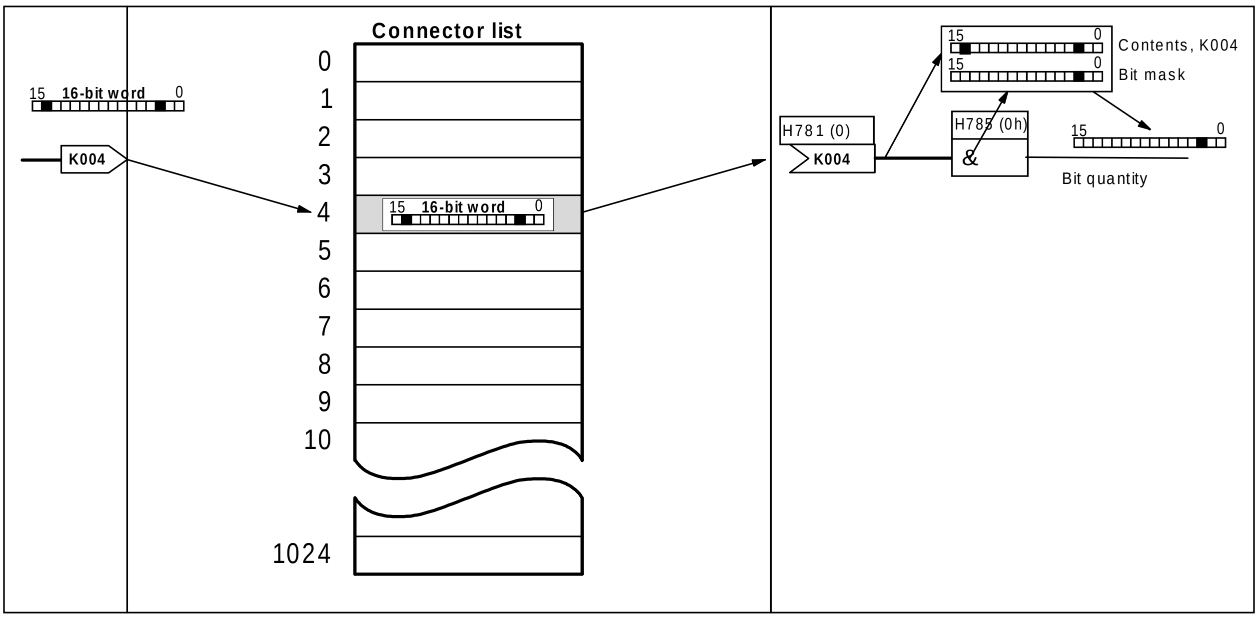


Double-word quantities are used for all position reference and actual values and limit values.

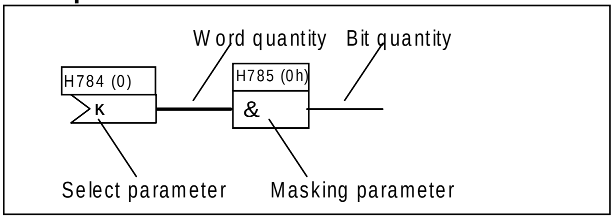
Connections between single-word- and double-word quantities
Single-word- and double-word quantities can only be partially connected. Scaled double-word quantities can only be connected to a single-word quantity if they are positive, as the sign is in bit 15 of the high word. There is no problem for normalized double-word quantities, if the high word is specified as connector number. Thus, for example, it is possible to output every control quantity, irrelevant as to whether it is a single-word or double-word quantity, at an analog output.
Normally, the word-double-word connection is not required.

5.1.3 Bit quantities

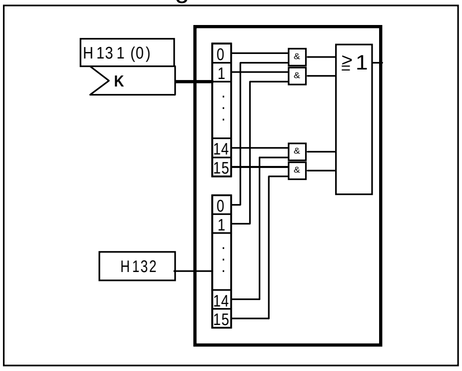
In order to keep the connector list as short as possible, the status bits to status words are combined, and deposited as 16-bit word in the connector list. A bit mask is used to filter out an individual bit from the status word.



For bit quantities, in addition to specifying the connector, a bit is selected.
For this purpose, there is an additional parameter, the ´masked´ bit.
Example:



The bit masking function can be illustrated as follows:



This means, that each bit of the connector is AND'ed with the corresponding bit of the masking, and the result of all AND logic operations, are then OR'ed.

Thus, in the mask, that bit which is to be selected as bit quantity, must be a logical one. The simplest way to understand this is if one considers the word in the binary notation. A one is entered below the bit, which is to control the binary function, and under all others, a logical zero is entered. The required mask is obtained if it is now converted into the hexadecimal notation.

Example:
Masking bit 7 from a control word:

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Input quantity									X							
Significance	8	4	2	1	8	4	2	1	8	4	2	1	8	4	2	1
Mask	0	0	0	0	0	0	0	0	**1**	0	0	0	0	0	0	0
Hex	0				0				8				0			

Note:
By masking several bits, several bits can be simultaneously switched-through to the output. This corresponds to an OR function for these bits.

5.1.4 Selection table for the masking

The subsequent Table is used to help determine the masks to switch-through the bit.

Mask	Bit switched-through to the output
0000h	**No** bit is switched-through
0001h	Bit **0** of the input value
0002h	Bit **1** of the input value
0004h	Bit **2** of the input value
0008h	Bit **3** of the input value
0010h	Bit **4** of the input value
0020h	Bit **5** of the input value
0040h	Bit **6** of the input value
0080h	Bit **7** of the input value
0100h	Bit **8** of the input value
0200h	Bit **9** of the input value
0400h	Bit **10** of the input value
0800h	Bit **11** of the input value
1000h	Bit **12** of the input value
2000h	Bit **13** of the input value
4000h	Bit **14** of the input value
8000h	Bit **15** of the input value

Example 1:

0400h	Bit **10** of the input value

Example 2:

0402h	Bit **10** and **1** of the input value

5.2 Connector list

The connector list is structured as follows:

Connector number	Value/description	Source parameter	Cross-reference_ sampling time	Diagr. ref.
K010 (1)	1st receive word from the CU (2) Word received from the dual port interface (3)	(4)	INPUT.K1100.X1_T1 (5)	(6)

Connector number (1)
The signal in the connector list is deposited under the connector number. If the signal is to be used, the value must be entered as source (without K).

Value / description
The significance of the connector is in line (2); a possibly more detailed description in line (3).

Source parameter (4)
If a parameter directly corresponds with the connector, then it must be entered in the source parameter column. This is, for example, the case for fixed setpoints and the traversing data sets.

Cross-reference_sampling time (5)
The function block in SIMADYN D, which generates the signal as well as its sampling time is specified in this line.

Diagram reference (6)
The cross-reference in the function diagram page, on which this connector is shown, is located in line 6.

Double-word quantities

Connector number	Value/description	Source parameter	Cross-reference_ sampling time	Diagr. ref.
K592 (a) **K593 (b)**	Position reference value 95	H455	SETPNT.PR560.X15_T5	[C2.3]

A double-word quantity requires two connectors, (a) and (b). The most significant word is deposited in connector (a) and the least significant word in connector (b).

If double-word quantities are ´connected-up´, only the connector number (a) is specified as source.

Connector number	Value/description	Source parameter	Cross-reference_ sampling time	Diagr. Ref.
K000 **K001**	Fixed value 0% or 0000h		INPUT.FP3000.X1_T5	[A10.2]
K002 **K003**	Fixed value 100%		INPUT.FP3000.X3_T5	[A10.2]
K004	Fixed value FFFFh		INPUT.FP3000.X5_T5	[A10.2]
K005	Fixed value 1 as presetting for data sets		INPUT.FP3000.X6_T5	[A10.2]
K009	System error word, SIMADYN D		INPUT.I5040.X_T5	[A1.4]
K010	1st receive word from the CU		INPUT.K1100.X1_T1	[A1.4]
K011	2nd receive word from the CU		INPUT.K1100.X2_T1	[A1.4]
K012	3rd receive word from the CU		INPUT.K1100.X3_T1	[A1.4]
K013	4th receive word from the CU		INPUT.K1100.X4_T1	[A1.4]
K014	5th receive word from the CU		INPUT.K1100.X5_T1	[A1.4]
K015	6th receive word from the CU		INPUT.K1100.X6_T1	[A1.4]
K016	7th receive word from the CU		INPUT.K1100.X7_T1	[A1.4]
K017	8th receive word from the CU		INPUT.K1100.X8_T1	[A1.4]
K018	9th receive word from the CU		INPUT.K1100.X9_T1	[A1.4]
K019	10th receive word from the CU		INPUT.K1100.X10_T1	[A1.4]
K020	11th receive word from the CU		INPUT.K1100.X11_T1	[A1.4]
K021	12th receive word from the CU		INPUT.K1100.X12_T1	[A1.4]
K022	13th receive word from the CU		INPUT.K1100.X13_T1	[A1.4]
K023	14th receive word from the CU		INPUT.K1100.X14_T1	[A1.4]
K024	15th receive word from the CU		INPUT.K1100.X15_T1	[A1.4]
K025	16th receive word from the CU		INPUT.K1100.X16_T1	[A1.4]
K026	1st receive word from the CB		INPUT.K2100.X1_T2	[A3.3]
K027	2nd receive word from the CB		INPUT.K2100.X2_T2	[A3.3]
K028	3rd receive word from the CB		INPUT.K2100.X3_T2	[A3.3]
K029	4th receive word from the CB		INPUT.K2100.X4_T2	[A3.3]
K030	5th receive word from the CB		INPUT.K2100.X5_T2	[A3.3]
K031	6th receive word from the CB		INPUT.K2100.X6_T2	[A3.3]
K032	7th receive word from the CB		INPUT.K2100.X7_T2	[A3.3]
K033	8th receive word from the CB		INPUT.K2100.X8_T2	[A3.3]
K034	9th receive word from the CB		INPUT.K2100.X9_T2	[A3.3]
K035	10th receive word from the CB		INPUT.K2100.X10_T2	[A3.3]
K040	1st receive word from peer-to-peer		INPUT.K2110.X1_T2	[A3.3]
K041	2nd receive word from peer-to-peer		INPUT.K2110.X2_T2	[A3.3]
K042	3rd receive word from peer-to-peer		INPUT.K2110.X3_T2	[A3.3]
K043	4th receive word from peer-to-peer		INPUT.K2110.X4_T2	[A3.3]
K044	5th receive word from peer-to-peer		INPUT.K2110.X5_T2	[A3.3]

Connector number	Value/description	Source parameter	Cross-reference_ sampling time	Diagr. Ref.
K045	Status word, binary inputs		INPUT.BI2040.X_T2	[A4.4]
K046	Analog input 1		INPUT.AI2040.X_T2	[A5.4]
K047	Analog input 2		INPUT.AI2140.X_T2	[A5.4]
K048	Analog input 3		INPUT.AI3040.X_T3	[A5.4]
K049	Analog input 4		INPUT.AI3140.X_T3	[A5.4]
K050	Analog input 5		INPUT.AI4040.X_T4	[A5.4]
K051	Analog input 6		INPUT.AI4140.X_T4	[A5.4]
K052	Analog input 7		INPUT.AI5040.X_T5	[A5.4]
K053	Control lines, thumbwheel switch		INPUT.TW3170.X_T3	[A9.7]
K054	Refer. value from the thumbwheel switch		INPUT.TW3180.X_T3	[A9.7]
K055	Reference value from byte-serial data input		INPUT.BS3030.X_T3	[A9.7]
K060	Speed actual value, pulse encoder 1		INPUT.PG2110.X_T2	[A6.8]
K061	Speed actual value, pulse encoder 2		INPUT.PG2210.X_T2	[A7.7]
K062 **K063**	Position actual value, pulse encoder 1		INPUT.PG1010.X_T1	[A6.8]
K064 **K065**	Position actual value, pulse encoder 2		INPUT.PG1050.X_T1	[A7.7]
K066 **K067**	Position act. value from the dual port RAM		INPUT.R1310.X_T1	[A8.2]
K070 **K071**	Position actual value for the control		INPUT.PG1495.X_T1	[A8.7]
K072 **K073**	Position actual value, normalized		INPUT.PG2410.X_T2	[A8.7]
K074 **K075**	Position actual value, scaled		INPUT.PG2430.X_T2	[A8.7]
K077	Position actual value, scaled (Word)		INPUT.PG2460.X_T2	[A8.7]
K079	Status word, input/output Bit 0: Zero pulse, pulse encoder 1 identified Bit 1: Zero pulse, pulse encoder 2 identified Bit 2: Velocity actual value > 0 (V>0) Bit 3: Velocity actual value = 0 (V=0) Bit 4: Velocity actual value < 0 (V<0) Bit 5: Traver. direction, pulse encoder 1 (0=pos., 1=neg.) Bit 6: Traver. direction, pulse encoder 2 (0=pos., 1=neg.) Bit 7: Not used Bit 8: Not used Bit 9: System error, T300 Bit 10: Send to CU ok. Bit 11: Send to CB ok. Bit 12: Send to peer-to-peer ok. Bit 13: Receive from CU ok. Bit 14: Receive from CB ok. Bit 15: Receive from peer-to-peer ok.		INPUT.STAT20.X_T3	[A10.8]

Connector number	Value/description	Source parameter	Cross-reference_ sampling time	Diagr. Ref.
K080	Power-down conditions Bit 0: Drive is faulted (T300 identification) Bit 1: Drive is faulted (status word from the CU) Bit 2: Electrical OFF (OFF2) present Bit 3 to bit 7: Not used Bit 8: Off after inching Bit 9: Off for standard stop (OFF1) Bit 10: Off for fast stop (OFF3) Bit 11: No checkback signal, drive converter Bits 12 to 15: Not used		CONTRL.CC3605.X_T3	[B1.7]
K081	Diagnostics word, power-down Bit 0: Drive is faulted (T300 identification) Bit 1: Drive is faulted (status word from the CU) Bit 2: Electrical OFF (OFF2) present Bit 3 to bit 7: Not used Bit 8: Off after inching Bit 9: Off for standard stop (OFF1) Bit 10: Off for fast stop (OFF3) Bit 11: No checkback signal, drive converter Bits 12 to 15: Not used		CONTRL.CD3530.X_T3	[B1.7]
K082	Control word 1 at CU Bit 0: On/ no stop (OFF1) Bit 1: No electrical off (OFF2) Bit 2: No fast stop (OFF3) Bit 3: Inverter enable Bit 4: Ramp-function generator enable Bit 5: No ramp-function generator stop Bit 6: Setpoint enable (reference value enable) Bit 7: Fault acknowledgement Bit 8: Inching 1 Bit 9: Inching 2 Bit 10: Control from the PLC Bit 11: Clockwise rotating field Bit 12: Counter-clockwise rotating field Bit 13: Motorized potentiometer, raise Bit 14: Motorized potentiometer, lower Bit 15: No fault, external 1		CONTRL.CE3220.X_T3	[A2.8]
K083	Control word 2 at CU Bit 0: Reference value data set, bit 0 Bit 1: Reference value data set, bit 1 Bit 2: Motor data set, bit 0 Bit 3: Motor data set, bit 1 Bit 4: Fixed setpoint, bit 0 Bit 5: Fixed setpoint, bit 1 Bit 6: Synchronizing enable Bit 7: Restart-on-the-fly enable Bit 8: Droop enable Bit 9: Controller enable Bit 10: No fault, external 2 Bit 11: Slave drive Bit 12: No alarm, external 1 Bit 13: No alarm, external 2 Bit 14: Select reserve setting Bit 15: Main contactor checkback signal		CONTRL.CE3520.X_T3	[A2.8]

Connector number	Value/description	Source parameter	Cross-reference_ sampling time	Diagr. Ref.
K084	Fault word Bit 0: Communications error with CB [F116] Bit 1: Communications error with CU [F117] Bit 2: Communications error, peer-to-peer [F118] Bit 3: User error 1 [F119] Bit 4: User error 2 [F120] Bit 5: Tracking error outside the tolerance [F121] Bit 6: Overspeed, positive [F122] Bit 7: Overspeed, negative [F123] Bit 8: Drive stalled [F124] Bit 9: Pulse encoder fault [F125] Bit 10: Emergency limit switch A3 actuated [F126] Bit 11: Emergency limit switch B3 actuated [F127] Bit 12: Referencing error [F128] Bit 13: Reference point incorrectly/not identified [F129] Bit 14: Overflow, position actual value [F130] Bit 15: Loading error, absolute encoder [F131]		CONTRL.F4940.X_T4	[B4.7]
K085	Alarm word Bit 0: Communications error with CB [A097] Bit 1: Communications error with CU [A098] Bit 2: Communications error, peer-to-peer [A099] Bit 3: User error 1 [A100] Bit 4: User error 2 [A101] Bit 5: Tracking error outside the tolerance [A102] Bit 6: Overspeed, positive [A103] Bit 7: Overspeed, negative [A104] Bit 8: Drive stalled [A105] Bit 9: Pulse encoder fault [A106] Bit 10: Emergency limit switch A3 actuated [A107] Bit 11: Emergency limit switch B3 actuated [A108] Bit 12: Referencing error [A109] Bit 13: Reference point incorrectly/not identified [A110] Bit 14: Overflow, position actual value [A111] Bit 15: Loading error, absolute encoder [A112]		CONTRL.F4990.X_T4	[B4.7]
K089	Status word, control Bit 0 to bit 2: Not used Bit 3: Braking Bit 4: No braking Bit 5: Velocity actual value = 0 (V=0) Bit 6: Drive powered-up Bit 7: Drive not powered-up Bit 8: Drive not ready Bit 9: Internal inverter enable Bit 10: Internal setpoint enable Bit 11: Not used Bit 12: Drive faulted Bit 13: Open holding/operating brake Bit 14: Close holding/operating brake Bit 15: Close brake at n=0		CONTRL.ST3910.X_T3	[B5.5]

Connector number	Value/description	Source parameter	Cross-reference_ sampling time	Diagr. Ref.
K091	Status word 1, referencing control Bit 0: Enable reference point (zero pulse) sensing Bit 1: Referencing with shutdown active Bit 2: Flying referencing active Bit 3: Referencing mode active Bit 4: Drive has referenced Bit 5: Drive has not referenced Bit 6: Crawl to the reference point Bit 7: Approach path greater than the min. approach path Bit 8: Approach path less than the min. approach path Bit 9: Referencing direction B→A Bit 10: Referencing direction A→B Bit 11: Referencing direction o.k. Bit 12: Referencing direction not o.k. Bit 13: Hardware limit switch A2 reached Bit 14: Hardware limit switch B2 reached Bit 15: Referencing error		REFCTL.PS3910.X_T3	[B9.3]
K092	Status word 2, referencing control Bit 0: Error, reference point not/ incorrectly identified Bit 1: Hardware limit switch A2 actuated Bit 2: Hardware limit switch B2 actuated Bit 3: Reference point range ok. Bits 4 to 6: Not used Bit 7: TR absolute encoder load required Bit 8: TR absolute encoder load active Bit 9: TR absolute encoder has referenced Bit 10: TR absolute encoder load input Bit 11: not used Bit 12: TR absolute encoder, start load error Bit 13: TR absolute encoder, load error Bit 14: TR absolute encoder, max. load time exceeded Bit 15: not used		REFCTL.PS3960.X_T3	[B10.8]
K100 **K101**	Scaling, closed-loop position control Integer number, which corresponds to 100% position value	H350	SETPNT.SCALK.X_T5	[C1.3]
K102 **K103**	Position, reference point scaled	H351	SETPNT.REFPK.X_T5	[C1.3]
K104 **K105**	Position, reference point normalized Position of the reference point as a percent of the total distance	H351	SETPNT.REFP2K.X_T5	[C1.3]
K106 **K107**	Diameter correction factor Factor with which the speed- and position values are multiplied.	H352	SETPNT.DMK.X_T5	[C1.5]
K120 **K121**	Position reference value, scaled		SETPNT.PR2440.X_T2	[C3.4]
K122 **K123**	Position reference value, normalized		SETPNT.PR2510.X_T2	[C3.4]
K129	Status word, setpoint conditioning Bit 0: Software limit A1 violated Bit 1: Software limit B1 violated		SETPNT.ST3110.X_T3	
K130 **K131**	Position limit value X		SETPNT.PLX340.X_T3	[C4.4]
K132 **K133**	Position limit value Y		SETPNT.PLY340.X_T3	[C4.8]

Connector number	Value/description	Source parameter	Cross-reference_ sampling time	Diagr. Ref.
K134 **K135**	Position limit value Z		SETPNT.PLZ340.X_T3	[C4.4]
K136 **K137**	Software limit switch A1		SETPNT.SWA340.X_T3	[C5.4]
K138 **K139**	Software limit switch B1		SETPNT.SWB340.X_T3	[C5.8]
K140	Maximum velocity		SETPNT.VMX380.X_T3	[C5.4]
K141	KP factor, speed controller		SETPNT.KPV350.X_T3	[C6.7]
K142 **K143**	Drive play, scaled		SETPNT.PY370.X_T3	[C5.8]
K144 **K145**	Ramp-up time, pos. ramp-function generator		SETPNT.TU340.X_T3	[C6.4]
K146 **K147**	Rounding-off time constant, position RFG		SETPNT.TR340.X_T3	[C7.4]
K148 **K149**	Ramp-down time, position RFG		SETPNT.TD340.X_T3	[C6.4]
K152	Down ramp A2		SETPNT.TDA340.X_T3	[C7.4]
K153	Down ramp B2		SETPNT.TDB340.X_T3	[C7.8]
K200	Acceleration setpoint from the position ramp-function generator		POSREG.RB1340.X_T1	[D2.8]
K201	Velocity setpoint from the position ramp-function generator		POSREG.RB1430.X_T1	[D2.8]
K202 **K203**	Position reference value from the position ramp-function generator		POSREG.RB1550.X_T1	[D2.8]
K204	Supplementary torque at CU		POSREG.P1320.X_T1	[D3.8]
K205	Control error, position controller		POSREG.P1510.X_T1	[D3.3]
K206	Position controller output		POSREG.P1520.X_T1	[D3.5]
K208	Position reference value - actual value difference		POSREG.P3155.X_T3	[D5.2]
K220	Speed setpoint at CU		POSREG.P1770.X_T1	[D3.8]
K221	Status word, position control Bit 0: tracking error outside tolerance Bit 1: tracking error within tolerance Bit 2: Velocity setpoint > actual value Bit 3: Velocity setpoint = actual value Bit 4: Velocity setpoint < actual value Bit 5: Position reference value > actual value Bit 6: Position reference value = actual value Bit 7: Position reference value < actual value Bit 8: Enable position control Bit 9: Speed-controlled operation Bit 10: Position controller at the upper limit Bit 11: Position controller at the lower limit Bit 12 : **Drive has positioned** Bits 13 to 15: Not used		POSREG.PS3110.X_T3	[D5.8]
K249 **K250**	Motorized potentiometer output		AUXIL.M4600.X_T4	[E1.5]

Connector number	Value/description	Source parameter	Cross-reference_ sampling time	Diagr. Ref.
K255	Status word, special functions Bits 0 to 4: Not used Bit 5: EEPROM is empty Bit 6: MOP : Output = input Bit 7: MOP at the upper limit Bit 8: MOP at the lower limit Bit 9 to bit 15: Not used		AUXIL.SC4480.X_T4	[E3.8]
K256	Status word, limit value monitor 1 Bit 0: Position actual value > position limit value X Bit 1: Position actual value = position limit value X Bit 2: Position actual value < position limit value X Bit 3: Position actual value > position limit value Y Bit 4: Position actual value = position limit value Y Bit 6: Position actual value < position limit value Y Bit 7: Position actual value > position limit value Z Bit 8: Position actual value = position limit value Z Bit 9: Position actual value < position limit value Z Bit 10: Input value 1 > input value 2 GWM 1 Bit 11: Input value 1 = input value 2 GWM 1 Bit 12: Input value 1 < input value 2 GWM 1 Bit 13 to bit 15: Not used		AUXIL.LM3910.X_T3	[E2.4]
K257	Status word, limit value monitor 2 Bit 0: Input value 1 > input value 2 GWM A Bit 1: Input value 1 = input value 2 GWM A Bit 2: Input value 1 < input value 2 GWM A Bit 3: Input value 1 > input value 2 GWM B Bit 4: Input value 1 = input value 2 GWM B Bit 6: Input value 1 < input value 2 GWM B Bit 7: Input value 1 > input value 2 GWM C Bit 8: Input value 1 = input value 2 GWM C Bit 9: Input value 1 < input value 2 GWM C Bit 10: Input value 1 > input value 2 GWM D Bit 11: Input value 1 = input value 2 GWM D Bit 12: Input value 1 < input value 2 GWM D Bit 13 to bit 15: Not used		AUXIL.LM3960.X_T3	[E2.8]
K258	Freely-definable status word Bit 0: Status bit 0 to bit 15: Status bit 15		AUXIL.ST3190.X_T3	[E3.4]
K259	Freely-definable status word, inverted Bit 0: Status bit 0 to bit 15: Status bit 15		AUXIL.ST3194.X_T3	[E3.4]
K260 **K261**	Output, free adder, single-word quantity		RANDOM.FB3015.X_T3	
K262 **K263**	Output, free adder, double-word quantity		RANDOM.FB3035.X_T3	
K264 **K265**	Output, free subtractor, single-word quantity		RANDOM.FB3055.X_T3	
K266 **K267**	Output, free subtractor, double-word quantity		RANDOM.FB3075.X_T3	
K268 **K269**	Output, free divider, single-word quantity		RANDOM.FB3095.X_T3	
K270 **K271**	Output, free divider, double-word quantity		RANDOM.FB3115.X_T3	

Connector number	Value/description	Source parameter	Cross-reference_ sampling time	Diagr. Ref.
K272 **K273**	Output, free multiplier, single-word quantity		RANDOM.FB3135.X_T3	
K274 **K275**	Output, free multiplier, double-word quantity		RANDOM.FB3155.X_T3	
K276 **K277**	Output, free inverter, single-word quantity		RANDOM.FB3170.X_T3	
K278 **K279**	Output, free inverter, double-word quantity		RANDOM.FB3185.X_T3	
K280 **K281**	Out., free changeover switch, word quantity		RANDOM.FB3220.X_T3	
K282 **K283**	Out., free changeover sw., double-w. quant.		RANDOM.FB3245.X_T3	
K284 **K285**	Output, free limiter, single-word quantity		RANDOM.FB3270.X_T3	
K286 **K287**	Output, free limiter, double-word quantity		RANDOM.FB3295.X_T3	
K288 **K289**	Output, free double-word-> word converter		RANDOM.FB3340.X_T3	
K290 **K291**	Output, free double word→word converter		RANDOM.FB3355.X_T3	
K292 **K293**	Output, free word→double-word converter		RANDOM.FB3370.X_T3	
K294 **K295**	Output, free word→double-word converter		RANDOM.FB3385.X_T3	
K296 **K297**	Output, free filter, single-word quantity		RANDOM.FB3405.X_T3	
K298 **K299**	Output, free filter, double-word quantity		RANDOM.FB3425.X_T3	
K300 **K301**	Output, free maximum evaluation, word		RANDOM.FB3445.X_T3	
K302 **K303**	Output, free max. evaluation, double-word		RANDOM.FB3465.X_T3	
K304 **K305**	Output, free minimum evaluation, word		RANDOM.FB3485.X_T3	
K306 **K307**	Output, free min. evaluation, double-word		RANDOM.FB3505.X_T3	
K308 **K309**	Output, free absolute value generation, word		RANDOM.FB3520.X_T3	
K310 **K311**	Output, free abs. val. generat., double-word		RANDOM.FB3535.X_T3	
K312 **K313**	Output, free XOR logic gate		RANDOM.FB3555.X_T3	
K314 **K315**	Output, free AND logic gate		RANDOM.FB3575.X_T3	

Connector number	Value/description	Source parameter	Cross-reference_ sampling time	Diagr. Ref.
K316 **K317**	Output, free OR logic gate		RANDOM.FB3595.X_T3	
K318 **K319**	Output, free flash function		RANDOM.FB3625.X_T3	
K320 **K321**	Status word, free functions		RANDOM.FB3905.X_T3	
K330	Fixed setpoint 1, integer word quantity	H660	SETPNT.FSP500.X1_T5	[C1.2]
K331	Fixed setpoint 2, integer word quantity	H661	SETPNT.FSP500.X2_T5	[C1.2]
K332	Fixed setpoint 3, integer word quantity	H662	SETPNT.FSP500.X3_T5	[C1.2]
K333	Fixed setpoint 4, integer word quantity	H663	SETPNT.FSP500.X4_T5	[C1.2]
K334	Fixed setpoint 5, integer word quantity	H664	SETPNT.FSP500.X5_T5	[C1.2]
K335	Fixed setpoint 6, integer word quantity	H665	SETPNT.FSP500.X6_T5	[C1.2]
K336	Fixed setpoint 7, integer word quantity	H666	SETPNT.FSP500.X7_T5	[C1.2]
K337	Fixed setpoint 8, integer word quantity	H667	SETPNT.FSP500.X8_T5	[C1.2]
K338	Fixed setpoint 1, word % quantity	H668	SETPNT.FSP500.X9_T5	[C1.3]
K339	Fixed setpoint 2, word % quantity	H669	SETPNT.FSP500.X10_T5	[C1.3]
K340	Fixed setpoint 3, word % quantity	H670	SETPNT.FSP500.X11_T5	[C1.3]
K341	Fixed setpoint 4, word % quantity	H671	SETPNT.FSP500.X12_T5	[C1.3]
K342	Fixed setpoint 5, word % quantity	H672	SETPNT.FSP500.X13_T5	[C1.3]
K343	Fixed setpoint 6, word % quantity	H673	SETPNT.FSP500.X14_T5	[C1.3]
K344	Fixed setpoint 7, word % quantity	H674	SETPNT.FSP500.X15_T5	[C1.3]
K345	Fixed setpoint 8, word % quantity	H675	SETPNT.FSP500.X16_T5	[C1.3]
K346	Fixed Setpoint 1, hex word quantity	H676	SETPNT.FSP510.X1_T5	[C1.5]
K347	Fixed Setpoint 2, hex word quantity	H677	SETPNT.FSP510.X2_T5	[C1.5]
K348	Fixed setpoint 3, hex word quantity	H678	SETPNT.FSP510.X3_T5	[C1.5]
K349	Fixed setpoint 4, hex word quantity	H679	SETPNT.FSP510.X4_T5	[C1.5]
K350	Fixed setpoint 5, hex word quantity	H680	SETPNT.FSP510.X5_T5	[C1.5]
K351	Fixed setpoint 6, hex word quantity	H681	SETPNT.FSP510.X6_T5	[C1.5]
K352	Fixed setpoint 7, hex word quantity	H682	SETPNT.FSP510.X7_T5	[C1.5]
K353	Fixed setpoint 8, hex word quantity	H683	SETPNT.FSP510.X8_T5	[C1.5]
K354 **K355**	Fixed setpoint 1, double-word integer quant.	H684	SETPNT.FSP520.X1_T5	[C1.6]
K356 **K357**	Fixed setpoint 2, double-word integer quant.	H685	SETPNT.FSP510.X2_T5	[C1.6]
K358 **K359**	Fixed setpoint 3, double-word integer quant.	H686	SETPNT.FSP510.X3_T5	[C1.6]
K360 **K361**	Fixed setpoint 4, double-word integer quant.	H687	SETPNT.FSP510.X4_T5	[C1.6]
K362 **K363**	Fixed setpoint 5, double-word integer quant.	H688	SETPNT.FSP510.X5_T5	[C1.6]

Connector number	Value/description	Source parameter	Cross-reference_ sampling time	Diagr. Ref.
K364 **K365**	Fixed setpoint 6, double-word integer quant.	H689	SETPNT.FSP510.X6_T5	[C1.6]
K366 **K367**	Fixed setpoint. 7, double-word integer quant.	H690	SETPNT.FSP510.X7_T5	[C1.6]
K368 **K369**	Fixed setpoint 8, double-word integer quant.	H691	SETPNT.FSP510.X8_T5	[C1.6]
K370 **K371**	Fixed setpoint 1, double-word % quantity	H692	SETPNT.FSP510.X9_T5	[C1.7]
K372 **K373**	Fixed setpoint 2, double-word % quantity	H693	SETPNT.FSP510.X10_T5	[C1.7]
K374 **K375**	Fixed setpoint 3, double-word % quantity	H694	SETPNT.FSP510.X11_T5	[C1.7]
K376 **K377**	Fixed setpoint 4, double-word % quantity	H695	SETPNT.FSP510.X12_T5	[C1.7]
K378 **K379**	Fixed setpoint 5, double-word % quantity	H696	SETPNT.FSP510.X13_T5	[C1.7]
K380 **K381**	Fixed setpoint 6, double-word % quantity	H697	SETPNT.FSP510.X14_T5	[C1.7]
K382 **K383**	Fixed setpoint 7, double-word % quantity	H698	SETPNT.FSP510.X15_T5	[C1.7]
K384 **K385**	Fixed setpoint 8, double-word % quantity	H699	SETPNT.FSP510.X16_T5	[C1.7]
K400 **K401**	Variable position reference value	H360	SETPNT.PR2010.X_T2	[C2.3]
K402 **K403**	Position reference value 1	H361	SETPNT.PR510.X1_T5	[C2.3]
K404 **K405**	Position reference value 2	H362	SETPNT.PR510.X2_T5	[C2.3]
K406 **K407**	Position reference value 3	H363	SETPNT.PR510.X3_T5	[C2.3]
K408 **K409**	Position reference value 4	H364	SETPNT.PR510.X4_T5	[C2.3]
K410 **K411**	Position reference value 5	H365	SETPNT.PR510.X5_T5	[C2.3]
K412 **K413**	Position reference value 6	H366	SETPNT.PR510.X6_T5	[C2.3]
K414 **K415**	Position reference value 7	H367	SETPNT.PR510.X7_T5	[C2.3]
K416 **K417**	Position reference value 8	H368	SETPNT.PR510.X8_T5	[C2.3]
K418 **K419**	Position reference value 9	H369	SETPNT.PR510.X9_T5	[C2.3]
K420 **K421**	Position reference value 10	H370	SETPNT.PR510.X10_T5	[C2.3]

Connector number	Value/description	Source parameter	Cross-reference_ sampling time	Diagr. Ref.
K422 **K423**	Position reference value 11	H371	SETPNT.PR510.X11_T5	[C2.3]
K424 **K425**	Position reference value 12	H372	SETPNT.PR510.X12_T5	[C2.3]
K426 **K427**	Position reference value 13	H373	SETPNT.PR510.X13_T5	[C2.3]
K428 **K429**	Position reference value 14	H374	SETPNT.PR510.X14_T5	[C2.3]
K430 **K431**	Position reference value 15	H375	SETPNT.PR510.X15_T5	[C2.3]
K432 **K433**	Position reference value 16	H376	SETPNT.PR510.X16_T5	[C2.3]
K434 **K435**	Position reference value 17	H377	SETPNT.PR520.X1_T5	[C2.3]
K436 **K437**	Position reference value 18	H378	SETPNT.PR520.X2_T5	[C2.3]
K438 **K439**	Position reference value 19	H379	SETPNT.PR520.X3_T5	[C2.3]
K440 **K441**	Position reference value 20	H380	SETPNT.PR520.X4_T5	[C2.3]
K442 **K443**	Position reference value 21	H381	SETPNT.PR520.X5_T5	[C2.3]
K444 **K445**	Position reference value 22	H382	SETPNT.PR520.X6_T5	[C2.3]
K446 **K447**	Position reference value 23	H383	SETPNT.PR520.X7_T5	[C2.3]
K448 **K449**	Position reference value 24	H384	SETPNT.PR520.X8_T5	[C2.3]
K450 **K451**	Position reference value 25	H385	SETPNT.PR520.X9_T5	[C2.3]
K452 **K453**	Position reference value 26	H386	SETPNT.PR520.X10_T5	[C2.3]
K454 **K455**	Position reference value 27	H387	SETPNT.PR520.X11_T5	[C2.3]
K456 **K457**	Position reference value 28	H388	SETPNT.PR520.X12_T5	[C2.3]
K458 **K459**	Position reference value 29	H389	SETPNT.PR520.X13_T5	[C2.3]
K460 **K461**	Position reference value 30	H390	SETPNT.PR520.X14_T5	[C2.3]
K462 **K463**	Position reference value 31	H391	SETPNT.PR520.X15_T5	[C2.3]
K464 **K465**	Position reference value 32	H392	SETPNT.PR520.X16_T5	[C2.3]

Connector number	Value/description	Source parameter	Cross-reference_ sampling time	Diagr. Ref.
K466 **K467**	Position reference value 33	H393	SETPNT.PR530.X1_T5	[C2.3]
K468 **K469**	Position reference value 34	H394	SETPNT.PR530.X2_T5	[C2.3]
K470 **K471**	Position reference value 35	H395	SETPNT.PR530.X3_T5	[C2.3]
K472 **K473**	Position reference value 36	H396	SETPNT.PR530.X4_T5	[C2.3]
K474 **K475**	Position reference value 37	H397	SETPNT.PR530.X5_T5	[C2.3]
K476 **K477**	Position reference value 38	H398	SETPNT.PR530.X6_T5	[C2.3]
K478 **K479**	Position reference value 39	H399	SETPNT.PR530.X7_T5	[C2.3]
K480 **K481**	Position reference value 40	H400	SETPNT.PR530.X8_T5	[C2.3]
K482 **K483**	Position reference value 41	H401	SETPNT.PR530.X9_T5	[C2.3]
K484 **K485**	Position reference value 42	H402	SETPNT.PR530.X10_T5	[C2.3]
K486 **K487**	Position reference value 43	H403	SETPNT.PR530.X11_T5	[C2.3]
K488 **K489**	Position reference value 44	H404	SETPNT.PR530.X12_T5	[C2.3]
K490 **K491**	Position reference value 45	H405	SETPNT.PR530.X13_T5	[C2.3]
K492 **K493**	Position reference value 46	H406	SETPNT.PR530.X14_T5	[C2.3]
K494 **K495**	Position reference value 47	H407	SETPNT.PR530.X15_T5	[C2.3]
K496 **K497**	Position reference value 48	H408	SETPNT.PR530.X16_T5	[C2.3]
K498 **K499**	Position reference value 49	H409	SETPNT.PR540.X1_T5	[C2.3]
K500 **K501**	Position reference value 50	H410	SETPNT.PR540.X2_T5	[C2.3]
K502 **K503**	Position reference value 51	H411	SETPNT.PR540.X3_T5	[C2.3]
K504 **K505**	Position reference value 52	H412	SETPNT.PR540.X4_T5	[C2.3]
K506 **K507**	Position reference value 53	H413	SETPNT.PR540.X5_T5	[C2.3]
K508 **K509**	Position reference value 54	H414	SETPNT.PR540.X6_T5	[C2.3]

Connector number	Value/description	Source parameter	Cross-reference_ sampling time	Diagr. Ref.
K510 **K511**	Position reference value 55	H415	SETPNT.PR540.X7_T5	[C2.3]
K512 **K513**	Position reference value 56	H416	SETPNT.PR540.X8_T5	[C2.3]
K514 **K515**	Position reference value 57	H417	SETPNT.PR540.X9_T5	[C2.3]
K516 **K517**	Position reference value 58	H418	SETPNT.PR540.X10_T5	[C2.3]
K518 **K519**	Position reference value 59	H419	SETPNT.PR540.X11_T5	[C2.3]
K520 **K521**	Position reference value 60	H420	SETPNT.PR540.X12_T5	[C2.3]
K522 **K523**	Position reference value 61	H421	SETPNT.PR540.X13_T5	[C2.3]
K524 **K525**	Position reference value 62	H422	SETPNT.PR540.X14_T5	[C2.3]
K526 **K527**	Position reference value 63	H423	SETPNT.PR540.X15_T5	[C2.3]
K528 **K529**	Position reference value 64	H424	SETPNT.PR540.X16_T5	[C2.3]
K530 **K531**	Position reference value 65	H425	SETPNT.PR550.X1_T5	[C2.3]
K532 **K533**	Position reference value 66	H426	SETPNT.PR550.X2_T5	[C2.3]
K534 **K535**	Position reference value 67	H427	SETPNT.PR550.X3_T5	[C2.3]
K536 **K537**	Position reference value 68	H428	SETPNT.PR550.X4_T5	[C2.3]
K538 **K539**	Position reference value 69	H429	SETPNT.PR550.X5_T5	[C2.3]
K540 **K541**	Position reference value 70	H430	SETPNT.PR550.X6_T5	[C2.3]
K542 **K543**	Position reference value 71	H431	SETPNT.PR550.X7_T5	[C2.3]
K544 **K545**	Position reference value 72	H432	SETPNT.PR550.X8_T5	[C2.3]
K546 **K547**	Position reference value 73	H433	SETPNT.PR550.X9_T5	[C2.3]
K548 **K549**	Position reference value 74	H434	SETPNT.PR550.X10_T5	[C2.3]
K552 **K553**	Position reference value 75	H435	SETPNT.PR550.X11_T5	[C2.3]
K554 **K555**	Position reference value 76	H436	SETPNT.PR550.X12_T5	[C2.3]

Connector number	Value/description	Source parameter	Cross-reference_ sampling time	Diagr. Ref.
K556 **K557**	Position reference value 77	H437	SETPNT.PR550.X13_T5	[C2.3]
K558 **K559**	Position reference value 78	H438	SETPNT.PR550.X14_T5	[C2.3]
K560 **K561**	Position reference value 79	H439	SETPNT.PR550.X15_T5	[C2.3]
K562 **K563**	Position reference value 80	H440	SETPNT.PR550.X16_T5	[C2.3]
K564 **K565**	Position reference value 81	H441	SETPNT.PR560.X1_T5	[C2.3]
K566 **K567**	Position reference value 82	H442	SETPNT.PR560.X2_T5	[C2.3]
K568 **K569**	Position reference value 83	H443	SETPNT.PR560.X3_T5	[C2.3]
K570 **K571**	Position reference value 84	H444	SETPNT.PR560.X4_T5	[C2.3]
K572 **K573**	Position reference value 85	H445	SETPNT.PR560.X5_T5	[C2.3]
K574 **K575**	Position reference value 86	H446	SETPNT.PR560.X6_T5	[C2.3]
K576 **K577**	Position reference value 87	H447	SETPNT.PR560.X7_T5	[C2.3]
K578 **K579**	Position reference value 88	H448	SETPNT.PR560.X8_T5	[C2.3]
K580 **K581**	Position reference value 89	H449	SETPNT.PR560.X9_T5	[C2.3]
K582 **K583**	Position reference value 90	H450	SETPNT.PR560.X10_T5	[C2.3]
K584 **K585**	Position reference value 91	H451	SETPNT.PR560.X11_T5	[C2.3]
K586 **K587**	Position reference value 92	H452	SETPNT.PR560.X12_T5	[C2.3]
K588 **K589**	Position reference value 93	H453	SETPNT.PR560.X13_T5	[C2.3]
K590 **K591**	Position reference value 94	H454	SETPNT.PR560.X14_T5	[C2.3]
K592 **K593**	Position reference value 95	H455	SETPNT.PR560.X15_T5	[C2.3]
K594 **K595**	Position reference value 96	H456	SETPNT.PR560.X16_T5	[C2.3]
K596 **K597**	Position reference value 97	H457	SETPNT.PR570.X1_T5	[C2.3]
K598 **K599**	Position reference value 98	H458	SETPNT.PR570.X2_T5	[C2.3]

Connector number	Value/description	Source parameter	Cross-reference_ sampling time	Diagr. Ref.
K600 **K601**	Position reference value 99	H459	SETPNT.PR570.X3_T5	[C2.3]
K602 **K603**	Position reference value 100	H460	SETPNT.PR570.X4_T5	[C2.3]
K604 to **K699**	Not used			
K700 **K701**	Position limit value X, variable	H500	SETPNT.PLX305.X_T3	[C4.3]
K702 **K703**	Position limit value X 1	H501	SETPNT.PLX510.X1_T5	[C4.3]
K704 **K705**	Position limit value X 2	H502	SETPNT.PLX510.X2_T5	[C4.3]
K706 **K707**	Position limit value X 3	H503	SETPNT.PLX510.X3_T5	[C4.3]
K708 **K709**	Position limit value X 4	H504	SETPNT.PLX510.X4_T5	[C4.3]
K710 **K711**	Position limit value X 5	H505	SETPNT.PLX510.X5_T5	[C4.3]
K712 **K713**	Position limit value X 6	H506	SETPNT.PLX510.X6_T5	[C4.3]
K720 **K721**	Position limit value Y, variable	H510	SETPNT.PLY305.X_T3	[C4.8]
K722 **K723**	Position limit value Y 1	H511	SETPNT.PLY510.X1_T5	[C4.8]
K724 **K725**	Position limit value Y 2	H512	SETPNT.PLY510.X2_T5	[C4.8]
K726 **K727**	Position limit value Y 3	H513	SETPNT.PLY510.X3_T5	[C4.8]
K728 **K729**	Position limit value Y 4	H514	SETPNT.PLY510.X4_T5	[C4.8]
K730 **K731**	Position limit value Y 5	H515	SETPNT.PLY510.X5_T5	[C4.8]
K732 **K733**	Position limit value Y 6	H516	SETPNT.PLX510.X6_T5	[C4.8]
K734 to **K739**	Not used			
K740 **K741**	Position limit value Z, variable	H520	SETPNT.PLZ305.X_T5	[C4.4]
K742 **K743**	Position limit value Z 1	H521	SETPNT.PLZ510.X1_T5	[C4.4]
K744 **K745**	Position limit value Z 2	H522	SETPNT.PLZ510.X2_T5	[C4.4]
K746 **K747**	Position limit value Z 3	H523	SETPNT.PLZ510.X3_T5	[C4.4]

Connector number	Value/description	Source parameter	Cross-reference_ sampling time	Diagr. Ref.
K748 K749	Position limit value Z 4	H524	SETPNT.PLZ510.X4_T5	[C4.4]
K750 K751	Position limit value Z 5	H525	SETPNT.PLZ510.X5_T5	[C4.4]
K752 K753	Position limit value Z 6	H526	SETPNT.PLZ510.X6_T5	[C4.4]
K760 K761	Software limit switch A1, variable	H530	SETPNT.SWA305.X_T3	[C5.3]
K762 K763	Software limit switch A1 1	H531	SETPNT.SWA510.X1_T5	[C5.3]
K764 K765	Software limit switch A1 2	H532	SETPNT.SWA510.X2_T5	[C5.3]
K766 K767	Software limit switch A1 3	H533	SETPNT.SWA510.X3_T5	[C5.3]
K768 K769	Software limit switch A1 4	H534	SETPNT.SWA510.X4_T5	[C5.3]
K770 K771	Software limit switch A1 5	H535	SETPNT.SWA510.X5_T5	[C5.3]
K772 K773	Software limit switch A1 6	H536	SETPNT.SWA510.X6_T5	[C5.3]
K780 K781	Software limit switch B1, variable	H540	SETPNT.SWB305.X_T3	[C5.7]
K782 K783	Software limit switch B1 1	H541	SETPNT.SWB510.X1_T5	[C5.7]
K784 K785	Software limit switch B1 2	H542	SETPNT.SWB510.X2_T5	[C5.7]
K786 K787	Software limit switch B1 3	H543	SETPNT.SWB510.X3_T5	[C5.7]
K788 K789	Software limit switch B1 4	H544	SETPNT.SWB510.X4_T5	[C5.7]
K790 K791	Software limit switch B1 5	H545	SETPNT.SWB510.X5_T5	[C5.7]
K792 K793	Software limit switch B1 6	H546	SETPNT.SWB510.X6_T5	[C5.7]
K800	Maximum velocity, variable	H550	SETPNT.VMX305.X_T3	[C5.4]
K801	Maximum velocity 1	H551	SETPNT.VMX510.X1_T5	[C5.4]
K802	Maximum velocity 2	H552	SETPNT.VMX510.X2_T5	[C5.4]
K803	Maximum velocity 3	H553	SETPNT.VMX510.X3_T5	[C5.4]
K804	Maximum velocity 4	H554	SETPNT.VMX510.X4_T5	[C5.4]
K805	Maximum velocity 5	H555	SETPNT.VMX510.X5_T5	[C5.4]
K806	Maximum velocity 6	H556	SETPNT.VMX510.X6_T5	[C5.4]
K807 to K809	Not used			

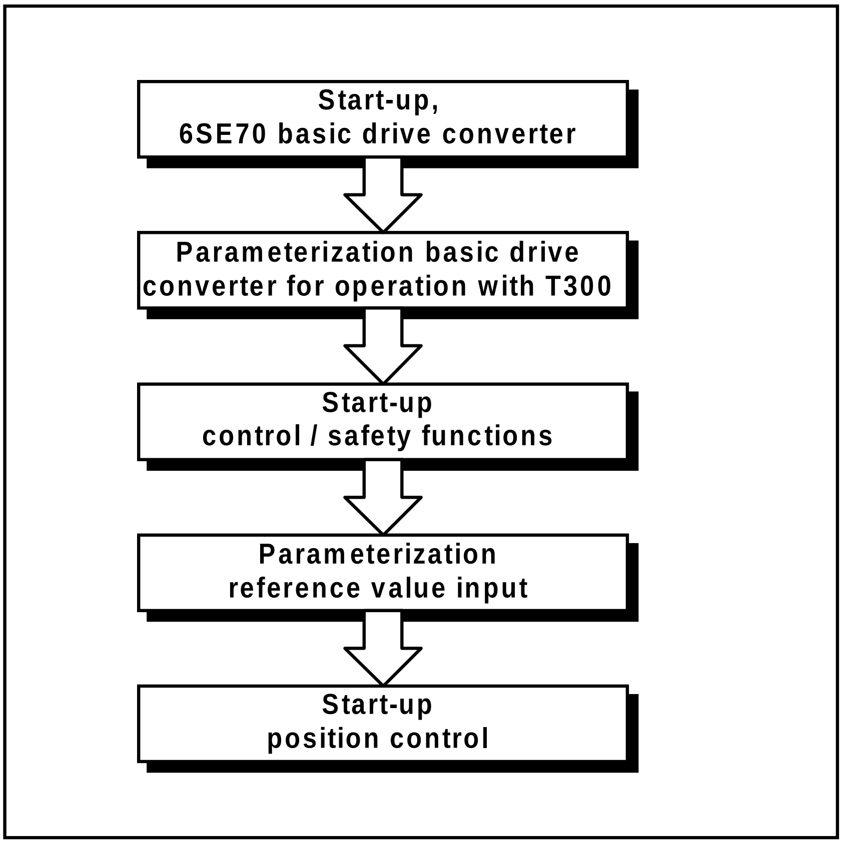
Connector number	Value/description	Source parameter	Cross-reference_ sampling time	Diagr. Ref.
K810	KP speed controller, variable	H570	SETPNT.KPV305.X_T3	[C6.7]
K811	KP speed controller 1	H571	SETPNT.KPV510.X1_T5	[C6.7]
K812	KP speed controller 2	H572	SETPNT.KPV510.X2_T5	[C6.7]
K813	KP speed controller 3	H573	SETPNT.KPV510.X3_T5	[C6.7]
K814	KP speed controller 4	H574	SETPNT.KPV510.X4_T5	[C6.7]
K815	KP speed controller 5	H575	SETPNT.KPV510.X5_T5	[C6.7]
K816	KP speed controller 6	H576	SETPNT.KPV510.X6_T5	[C6.7]
K820	Play, variable	H590	SETPNT.PY305.X_T3	[C5.8]
K821	Play 1	H591	SETPNT.PY510.X1_T5	[C5.8]
K822	Play 2	H592	SETPNT.PY510.X2_T5	[C5.8]
K823	Play 3	H593	SETPNT.PY510.X3_T5	[C5.8]
K824	Play 4	H594	SETPNT.PY510.X4_T5	[C5.8]
K825	Play 5	H595	SETPNT.PY510.X5_T5	[C5.8]
K826	Play 6	H596	SETPNT.PY510.X6_T5	[C5.8]
K830 **K831**	Ramp-up time, pos. RFG, var.	H600	SETPNT.TU305.X_T3	[C6.4]
K832 **K833**	Ramp-up time, pos. ramp-function gen. 1	H601	SETPNT.TU510.X1_T5	[C6.4]
K834 **K835**	Ramp-up time, pos. ramp-function gen. 2	H602	SETPNT.TU510.X2_T5	[C6.4]
K836 **K837**	Ramp-up time, pos. ramp-function gen. 3	H603	SETPNT.TU510.X3_T5	[C6.4]
K838 **K839**	Ramp-up time, pos. ramp-function gen. 4	H604	SETPNT.TU510.X4_T5	[C6.4]
K849 **K841**	Ramp-up time, pos. ramp-function gen. 5	H605	SETPNT.TU510.X5_T5	[C6.4]
K842 **K843**	Ramp-up time, pos. ramp-function gen. 6	H606	SETPNT.TU510.X6_T5	[C6.4]
K850	Rounding-off time constant, pos. RFG, var.	H610	SETPNT.TR305.X_T3	[C7.4]
K851	Rounding-off time constant, pos. RFG 1	H611	SETPNT.TR510.X1_T5	[C7.4]
K852	Rounding-off time constant, pos. RFG 2	H612	SETPNT.TR510.X2_T5	[C7.4]
K853	Rounding-off time constant, pos. RFG 3	H613	SETPNT.TR510.X3_T5	[C7.4]
K854	Rounding-off time constant, pos. RFG 4	H614	SETPNT.TR510.X4_T5	[C7.4]
K855	Rounding-off time constant, pos. RFG 5	H615	SETPNT.TR510.X5_T5	[C7.4]
K856	Rounding-off time constant, pos. RFG 6	H616	SETPNT.TR510.X6_T5	[C7.4]
K890 **K891**	Ramp-down time, position RFG, var.	H620	SETPNT.TD305.X_T3	[C6.8]
K892 **K893**	Ramp-down time, position RFG 1	H621	SETPNT.TD510.X1_T5	[C6.8]
K894 **K895**	Ramp-down time, position RFG 2	H622	SETPNT.TD510.X2_T5	[C6.8]

Connector number	Value/description	Source parameter	Cross-reference_ sampling time	Diagr. Ref.
K896 **K897**	Ramp-down time, position RFG 3	H623	SETPNT.TD510.X3_T5	[C6.8]
K898 **K899**	Ramp-down time, position RFG 4	H624	SETPNT.TD510.X4_T5	[C6.8]
K900 **K901**	Ramp-down time, position RFG 5	H625	SETPNT.TD510.X5_T5	[C6.8]
K902 **K903**	Ramp-down time, position RFG 6	H626	SETPNT.TD510.X6_T5	[C6.8]
K920	Down ramp A2, variable	H640	SETPNT.TDA305.X_T3	[C7.4]
K921	Down ramp A2 1	H641	SETPNT.TDA510.X1_T5	[C7.4]
K922	Down ramp A2 2	H642	SETPNT.TDA510.X2_T5	[C7.4]
K923	Down ramp A2 3	H643	SETPNT.TDA510.X3_T5	[C7.4]
K924	Down ramp A2 4	H644	SETPNT.TDA510.X4_T5	[C7.4]
K925	Down ramp A2 5	H645	SETPNT.TDA510.X5_T5	[C7.4]
K926	Down ramp A2 6	H646	SETPNT.TDA510.X6_T5	[C7.4]
K930	Down ramp B2, variable	H650	SETPNT.TDB305.X_T3	[C7.8]
K931	Down ramp B2 1	H651	SETPNT.TDB510.X1_T5	[C7.8]
K932	Down ramp B2 2	H652	SETPNT.TDB510.X2_T5	[C7.8]
K933	Down ramp B2 3	H653	SETPNT.TDB510.X3_T5	[C7.8]
K934	Down ramp B2 4	H654	SETPNT.TDB510.X4_T5	[C7.8]
K935	Down ramp B2 5	H655	SETPNT.TDB510.X5_T5	[C7.8]
K936	Down ramp B2 6	H656	SETPNT.TDB510.X6_T5	[C7.8]

Connector number	Value/description	Source parameter	Cross-reference_ sampling time	Diagr. Ref.

6 Start-up

The start-up procedure is as follows:



NOTE

- These Start-up Instructions assume that the basic drive converter is commissioned, starting from the factory setting - (CU2: With pulse encoder, P163=4; CUVC: With pulse encoder P100=4) without T300 (and, if available, without CB1/CBP).
- **All of the parameters in Section 6.1.1 (and if required, in 6.1.1.2.1) must be entered.**
- **Further, Section 6.2 and onwards must be observed.** Among other things, the setting and optimization of the control is described. The closed-loop positioning control will not work satisfactorily if this section is not carefully observed.

6.1 Start-up, basic drive converter

The basic drive converter must be commissioned in accordance with the start-up instructions. If in doubt, the factory setting of the basic drive converter should be established.

Warning
The motor can rotate during the following commissioning phases of the basic drive converter:
Motor identification for CUVC For motor identification at standstill (P115=2), the motor aligns itself (max ± ¼ motor revolution). The motor rotor can be locked to stop it rotating.
No-load measurement for CUVC The no-load measurement (P115=4) for the linear axis cannot be made when the drive is coupled to a load.
n/f controller optimization for SIMOVERT VC The n/f controller optimization (P115=5), for a linear axis cannot be made when the drive is coupled to the load.
The complete motor identification cannot be executed.
Motor identification for CU2 For motor identification at standstill (P052=7), the motor aligns itself (max ± ¼ motor revolution). The motor rotor can be locked to stop it rotating.
No-load measurement for CU2 The no-load measurement (P052=9) for the linear axis cannot be made when the drive is coupled to a load.
n/f controller optimization for CU2 The n/f controller optimization (P052=10), for a linear axis cannot be made when the drive is coupled to the load.
The complete motor identification cannot be executed.
Motor identification for CU3 For motor identification (power-up after a new motor has been selected or P330=1) the motor aligns itself. The motor rotor can be locked to stop it rotating.

The following points should be observed, which deviate or are supplementary to the basic drive converter Instruction Manual:

Hardware configuration
In practice, it has been shown that it is practical to first commission the basic drive converter without option boards (T300, CB). Only after the basic drive has been completely parameterized and optimized, and before parameters are input, in Section 6.1.1 onwards, the option modules are enabled and inserted.

CU2,CU3: To realize this, the hardware setting function (P052=4) is re-selected, and parameters P090 and P091 and the bus address (P918), if required, set.

CUVC,CUMC: The bus address (P918), if required, has to be set.

Acknowledge or suppress faults/error messages which occur after the T300 logs-on (e.g. F116, F118); refer to Section 1.8.

Controller optimization
The speed controller in the basic drive converter should be optimized according to the absolute optimum. More detailed information is provided in the Section *optimizing the control*.

Safety functions
Before a drive with a linear axis is powered up, the following safety functions should be parameterized:

The **emergency limit switches** must be directly connected to the basic drive converter, and parameterized as fast stop.

An **emergency pushbutton** must be located close to the work place, so that the drive can be quickly shutdown if incorrect entries are made during the start-up phase.

Warning
Before commissioning the positioning, all of the safety functions must be parameterized and tested. Safety functions are: - emergency stop (emergency off) switch - emergency limit switch - mechanical brake - and, if available, hardware limit switch.

6.1.1 Parameterizing the basic drive converter for positioning

The following parameters set the setpoint/reference value conditioning, open-loop control and communications for positioning. It is important that the basic drive converter optimization runs have been completed, as specific parameters in the following list would otherwise be changed.

For operation with T300, only the Bico data set 1 or the basic setting is relevant. Thus, the following parameters refer to index 001.

The following parameters define the signals, which are sent from the T300 to the basic drive converter.

The parameterization of the drive converters with CUVC and CUMC is handled in Section 6.1.1.1, and the drive converters with CU2 and CU3 in Section 6.1.1.2.

6.1.1.1 Parameterization for basic drives with CUVC and CUMC

Note:
The parameters, designated with X, are of no significance for CUMC.

Parameter		Significance	Designation	Setting	Factory setting
P232		Source, controller adaption	kadap	3008	0 (4)
P443		Source, main setpoint	n*	3002	58
P506	X	Source, supplementary torque setpoint	Madd	3005	0
P507	X	Supplementary torque setpoint Kp		100%	100%
P554		Source, *OFF1*	STW1.0	3100	0
P555		Source 1, *OFF2*	STW1.1	3101	1
P557		Source 3, *OFF2*	STW1.1	5	1
P558		Source 1, *OFF3*	STW1.2	3102	1
P561		Source, *inverter enable*	STW1.3	3103	1
P562		Source, *RFG enable*	STW1.4	3104	1
P563		Source, *no RFG stop*	STW1.5	3105	1
P564		Source, *setpoint enable*	STW1.6	3106	1
P565		Source 1, *acknowledge*	STW1.7	3107	0
P567		Source 3, *acknowledge*	STW1.7	0	0
P568		Source, *inching 1*	STW1.8	3108	0
P569		Source, *inching 2*	STW1.9	3109	0
P571		Source, *clockwise rotating field*	STW1.11	3111	1
P572		Source, *counter-clockwise rotat. field*	STW1.12	3112	1
P573		Source, *raise motorized potentiometer*	STW1.13	3113	0
P574		Source, *lower motorized potentiometer*	STW1.14	3114	0
P575		Source, *no fault 1 external*	STW1.15	3115	1
P576		Source, *setpoint data set, bit 0*	STW2.0	3004	0
P577		Source, *setpoint data set, bit 1*	STW2.1	3401	0
P578	X	Source, *motor data set, bit 0*	STW2.2	3402	0
P579	X	Source, *motor data set, bit 1*	STW2.3	3403	0
P580		Source, *fixed setpoint, bit 0*	STW2.4	3404	0
P581		Source, *fixed setpoint, bit 1*	STW2.5	3405	0
P582	X	Source, *synchronizing enable*	STW2.6	3406	0
P583		Source, *restart-on-the-fly enable*	STW2.7	3407	0
P584		Source, *droop enable*	STW2.8	3408	0
P585		Source, *controller enable*	STW2.9	3409	1
P586		Source, *no fault 2 external*	STW2.10	3410	1
P587		Source, *master/slave changeover*	STW2.11	3411	0
P588		Source, *no alarm 1 external*	STW2.12	3412	1
P589		Source, *no alarm 2 external*	STW2.13	3413	1
P590		Source, *BICO data setting*	STW2.14	3414	0

Data from the basic drive converter to T300

P734.001		Source, *stat. word 1, basic dr. conv.*		32	32
P734.002		Sour., *speed act. val., basic dr. conv.*		148 for VC 91 for MC	0
P734.003		-		0	0
P734.004		Source, *status word 2, basic dr. conv.*		33	0
P734.005		Source, *torque setp., basic dr. conv.*		165	0
P734.006		Source, *torque act. val., bas. dr. conv.*	(3)	900 for CUVC 184 for CUMC	0

Only for CUMC, if the position actual value from the dual port RAM is to be used

P734.007		Source, position actual value		90	0

The following parameters should be checked for the following settings.

Par.		**Description**	**Setting**
P100 1)		Select open-loop/closed-loop contr. type	4 (closed-loop speed control with pulse encoder)
P259	X	Max. regenerative active power	-100 % (-10 % if no regener. feedback)
P471		Pre-control, n/f controller	0.0 % (no pre-control)
P375		Select ground-fault test	0 (not ground-fault test)
P352 2) P353		Rated frequency (= frequency or speed for setpoint input 100%)	x.xx Hz for VC (P352) xxxx RPM for MC (P353)
P452		Max. frequency (speed), clockwise rotating field	110%
P453		Maximum frequency (speed), counter-clockwise rotating field	-110%
P455	X	Suppression frequency	0.00 % (no suppression frequency)
P456	X	Suppression bandwidth	0.00 %
P457	X	Minimum frequency	0.00 % (inactive)
P462		Ramp-up time	0
P463	X	Ramp-up time units	0
P464		Ramp-down time	0
P465	X	Ramp-down time units	0
P466	X	OFF3 ramp-down time	Set to the required time.
P469		Initial rounding-off	0 sec
P470	X	Final rounding-off	0 sec
P354		Rated torque	x.xx Nm (corresp. to 100% setpoint)
P492	X	Torque limit, positive	xxx.xx %
P498	X	Torque limit, negative	-xxx.xx %
P505	X	Supplementary torque setpoint, fixed	0.0 %
P792		Setp.- act. value differ. for stalled motor	10 %
P794		Time, setpoint- actual value deviation	3 sec
P805	X	Time, motor stalled/blocked	2 sec

These parameters should only be set for the CUMC:

Parameter	Significance	Designation	Setting
P262	Source, supplementary torque setpoint	Madd	3005
P263	Torque limit, positive		xxx.xx %
P264	Torque limit, negative		-xxx.xx%

1) If the base unit as an exception (**only** valid for VC unit) is to be operated in the frequency control mode, parameter P100 = 3 must be entered.

2) Example for P352, CUVC:
Motor rated speed (shaft speed at 100% speed setpoint value, corresponding to 100% of r447 or r229): 2759 revolutions/min
Motor data: 4 pole machine: 50Hz corresponding to 1500r/min, without slip
Parameter value to be entered: P352 = 2759r/min x 50Hz / 1500r /min = 91.97Hz.
Example for P353, CUMC:
Motor rated speed: 1778r/min (corresponding to 100% of r461 or r229)
Parameter value to be entered: P353 = 1778r/min.

3) For CUMC, instead of the torque actual value, the actual value of the torque-generating current ISQ (act) = K184 should be used.
Therefore the following is valid: P734.06 = 184

4) Refere to section 3.6.9

This then completes the necessary basic drive converter settings.

Note:
The error channel is also enabled when the technology board is enabled. Thus, from now on, technology board errors will result in an error/fault message (F116 to F131). The existing technology faults/errors can be read in d039, and suppressed using H280.
Example: Suppressing errors, communications CB (bit 0), peer-to-peer (bit 2) with H280=FFFAh

Caution:
As long as the faults/errors are not suppressed, operating status 004 cannot be exited.

The technology board function settings are described in the section 6.2.

6.1.1.2 Parameterization for basic drives with CU2 and CU3

Note:
The parameters, designated with X, are of no significance for CU3.
For further information about CU3 units please refer to section 6.1.1.2.1.

Parameter		Significance	Designation	Setting	Factory setting
P226	X	Source, controller adaption	kadap	3008	1001
P443		Source, main setpoint	n^*	3002	1002
P506		Source, supplementary torque setpoint	Madd	3005	0
P507		Supplementary torque setpoint Kp		25%	100%
P554		Source, *OFF1*	STW1.0	3001	1010
P555		Source 1, *OFF2*	STW1.1	3001	1
P557		Source 3, *OFF2*	STW1.1	1010	1
P558		Source 1, *OFF3*	STW1.2	3001	1
P561		Source, *inverter enable*	STW1.3	3001	1
P562		Source, *RFG enable*	STW1.4	3001	1
P563		Source, *no RFG stop*	STW1.5	3001	1
P564		Source, *setpoint enable*	STW1.6	3001	1
P565		Source 1, *acknowledge*	STW1.7	3001	0
P567		Source 3, *acknowledge*	STW1.7	0	2001
P568		Source, *inching 1*	STW1.8	3001	0
P569		Source, *inching 2*	STW1.9	3001	0
P571		Source, *clockwise rotating field*	STW1.11	3001	1
P572		Source, *counter-clockwise rotat. field*	STW1.12	3001	1
P573		Source, *raise motorized potentiometer*	STW1.13	3001	1010
P574		Source, *lower motorized potentiometer*	STW1.14	3001	1010
P575		Source, *no fault 1 external*	STW1.15	3001	1
P576		Source, *setpoint data set, bit 0*	STW2.0	3004	0
P577		Source, *setpoint data set, bit 1*	STW2.1	3004	0
P578		Source, *motor data set, bit 0*	STW2.2	3004	0
P579	X	Source, *motor data set, bit 1*	STW2.3	3004	0
P580		Source, *fixed setpoint, bit 0*	STW2.4	3004	0
P581		Source, *fixed setpoint, bit 1*	STW2.5	3004	0
P582	X	Source, *synchronizing enable*	STW2.6	3004	0
P583		Source, *restart-on-the-fly enable*	STW2.7	3004	0
P584		Source, *droop enable*	STW2.8	3004	0
P585		Source, *controller enable*	STW2.9	3004	1
P586		Source, *no fault 2 external*	STW2.10	3004	1
P587		Source, *master/slave changeover*	STW2.11	3004	0
P588		Source, *no alarm 1 external*	STW2.12	3004	1
P589		Source, *no alarm 2 external*	STW2.13	3004	1
P590		Source, *basic/reserve setting*	STW2.14	3004	1005

Data from the basic drive converter to T300

P694.001		Source, *stat. word 1, basic dr. conv.*		968	968
P694.002		Sour., *speed act. val., basic dr. conv.*		214 for VC 219 for SC	0
P694.003		-		0	0
P694.004		Source, *status word 2, basic dr. conv.*		553	0
P694.005		Source, *torque setp., basic dr. conv.*		237 for VC 007 for SC	0
P694.006		Source, *torque act. val., bas. dr. conv.*		007	0

Only for SIMOVERT SC, if the position actual value from the dual port RAM is to be used

P694.007		Source, position actual value		214	0

The following parameters should be checked for the following settings.

Par.		**Description**	**Setting**
P163 1)		Select open-loop/closed-loop contr. type	4 (closed-loop speed control with pulse encoder)
P190	X	Select smooth starting	0 (no smooth starting)
P233	X	Max. regenerative active power	-100 % (-10 % if no regener. feedback)
P243	X	Pre-control, n/f controller	0.0 % (no pre-control)
P308 2)		Sampling time	**with SC only, sw-verion ≥ 1.2:** 1.2
P354		Select ground-fault test	0 (not ground-fault test)
P420 3)		Rated frequency (= frequency or speed for setpoint input 100%)	x.xx Hz for VC xxxx RPM for SC
P452		Max. frequency (speed), clockwise rotating field	1.1 x P420 x.xx Hz for VC ; xxxx RPM for SC
P453		Maximum frequency (speed), counter-clockwise rotating field	-(1.1 x P420) x.xx Hz for VC ; xxxx RPM for SC
P455	X	Suppression frequency	0.00 Hz (no suppression frequency)
P456	X	Suppression bandwidth	0.00 Hz
P457	X	Minimum frequency	0.00 Hz (inactive)
P462		Ramp-up time	0
P463	X	Ramp-up time units	0
P464		Ramp-down time	0
P465	X	Ramp-down time units	0
P466	X	OFF3 ramp-down time	Set to the required time.
P469	X	Initial rounding-off	0 %
P470	X	Final rounding-off	0 %
P485		Rated torque	100.00 % (corresp. to 100% setpoint)
P492		Torque limit, positive	xxx.xx %
P498		Torque limit, negative	-xxx.xx %
P505		Supplementary torque setpoint, fixed	0.0 %
P517		Setp.- act. value differ. for stalled motor	5 Hz
P518		Time, setpoint- actual value deviation	3 sec
P520	X	Time, motor stalled/blocked	2 sec

1) If the base unit as an exception (**only** valid for VC unit) is to be operated in the frequency control mode, parameter P163 = 3 must be entered.
2) The parameter may only be entered when P52 = 5, drive system settings, see Converter Operating Instructions.
3) Example for P420, VC:
   Motor rated speed (shaft speed at 100% speed setpoint value, corresponding to 100% of r447 or r223): 2759 revolutions/min
   Motor data: 4 pole machine: 50Hz corresponding to 1500r/min, without slip
   Parameter value to be entered: P420 = 2759r/min x 50Hz / 1500r /min = 91.97Hz.

   Example for P420, SC:
   Motor rated speed: 1778r/min (corresponding to 100% of r447 or r223)
   Parameter value to be entered: P420 = 1778r/min.

This then completes the necessary basic drive converter settings.

Now, the technology board, and if available, the communications board must be logged-on. In this case, the hardware setting (P052=4) is selected in the basic drive converter, and the appropriate boards entered in parameter P090 and P091.

Note:
The error channel is also enabled when the technology board is enabled. Thus, from now on, technology board errors will result in an error/fault message (F116 to F131). The existing technology faults/errors can be read in d039, and suppressed using H280.
Example: Suppressing errors, communications CB (bit 0), peer-to-peer (bit 2) with H280=FFFAh

Caution:
As long as the faults/errors are not suppressed, operating status 004 cannot be exited.

The technology board function settings are now described in the following section.

6.1.1.2.1 Use of the technology controller as a speed controller together with SIMOVERT SC

Note:
- It is only advisable to follow this section when no satisfactory results can be achieved by following the standard parameterization given in section 6.1.1.
- When using a technology controller as a speed controller for positioning applications, software version ≥1.2 for the base unit is required.

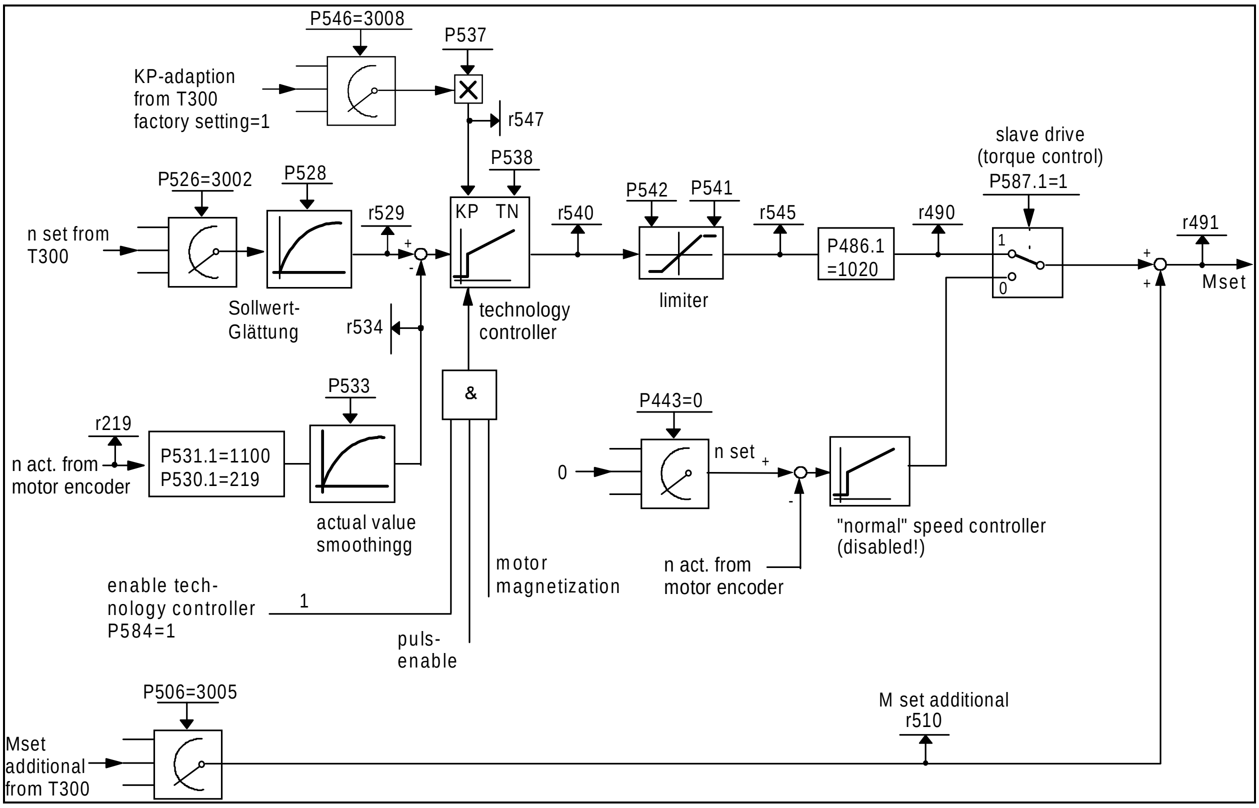
Examples of attainable improvemnets
- Approach to the set point position:
  the approach to the set point position is fast, continuous and without (mentionable) overshoot.
- High frequency oscillations:
  oscillations/noises in the several 100Hz range can be avoided

Examples of what the following parameterization could require
- Actual value smoothing is required, e.g. in the case of high frequency oscillations/noises
  Applications where the drive is coupled to the load a toothed belt, elastic coupling or similar methods.
- KP adaption is required, e.g. in the case of unsmooth running of the drive:
  a very low speed (<0.5 to 2% of the rated speed) has been selected and the drive speed controller loop cannot be satisfactorily optimized.
- The driven load has a large moment of inertia, which leads to a unexact/non-continuous approach to the required position
  load moment of inertia > (5 to 30) x moment of inertia of the motor shaft

The following parameters are to be entered in addition to the parameters given in section 6.1.1.
The parameters marked with a **!** deviate from those given in section 6.1.1.

Par.	Δ	**Description**	**Einstellung/ Bemerkung**
P226	**!**	Source, controller adaption	0
P546		tech. controller adaption, kp	3008
P443	**!**	Source, main setpoint	0
P308		Sampling time	1.2/ nur bei SW-Stand ≥ 1.2
P486		output tech. controller is torque setpoint	1020
P526		Source, speed setpoint	3002
P530		speed actual value	219
P531		source, speed actual value	1100
P541		technology controller output limitation 1	P541 = P492
P542		technology controller output limitation 2	P542 = P498
P584	**!**	source, enable technology controller	1
P587		slave drive	1/ setting causes P163=5

Use of the technology controller as a speed controller together with SIMOVERT SC, overview.
Only the elements, required in this application are shown.



6.2 Commissioning the positioning

For the subsequent parameterization, it is assumed, that the MS380 factory settings have been made and exist.

6.2.1 Preparatory parameterization

The following parameters must be set before the position control can be switched-in:

Parameterization, pulse encoder sensing

H150	Hardware mode, pulse encoder 1	Standard case: H150 = 0060 (all pulse encoder signals from the LBA). The limit frequency filter is set to 126 kHz. Leave sufficient margin to the max. pulse encoder frequency (20-50%), Note: If the limiting filter frequency is too low, this results in an erroneous and non-reproducible position actual value measurement.
H151	Pulses per revolution, pulse encoder 1	Input according to the pulse encoder type plate For CUMC, CU3: Refer to 3.3.10.1
H152	Rated motor speed, pulse encoder 1	Motor speed for the rated syst. frequency (CUVC, CUMC:P353; CU2,CU3:P420) For CU3, a negative value must be entered.
H153	Normalization, position actual value 1	**Linear axis:** Number of quadrupled pulses for the nominal length. For better transparency, it should always be normalized to ´even´ values, e. g. 20m **Rotary axis:** Number of quadrupled pulses for one revolution of the rotary axis

Note:
After the pulse encoder data has been entered, the unit must be powered-down and up again.

Parameterization, setpoint/reference value generation

H720	Integration time of the position control	$\mathrm{Ti} = \frac{\mathrm{Nominal\_length}}{\mathrm{Rated\_velocity}}$ **Caution:** The value must be entered in [ms]. Or also $Ti = \frac{[H153]}{4 \cdot [H151] \cdot [H152]} \cdot 60000ms$
H350	Scaling, position-control	The value defines which integer value corresponds to the normalized position in H153. The value should be as high as the required accuracy of the data input, with the decimal point excluded. Example: The path is normalized so that the pulse number in H153 corresponds to 20m. If the reference value input is to be accurate to 1mm, the following scaling must be entered: H350=**20**000
H351	Reference point position	The reference point position is the distance between the mechanical endstop A and the reference point.
H531 to H534	Software limit switch A1	Traverse limit in the direction B→A. The value in H531 is switched-through as pre-setting.

H541 to H536	Software limit switch B1	Traverse limit in the direction A→B. The value in H541 is switched-through as pre-setting.
H601 to H606	Ramp-up time, position ramp-function generator	The time in H601 is switched-through as pre-setting.
H611 to H616	Rounding-off time constant, pos. RFG	The time in H611 is switched-through as pre-setting. The rounding-off time constant is the same for ramp-up and ramp-down.
H621 to H626	Ramp-down time, position ramp-function generator	The time in H621 is switched-through as pre-setting.
H641 to H646	Down ramp A2	The time must be set, so that the drive still stops in front of the mechanical endstop when hardware limit switch A2 is passed. The time in H641 is switched-through as pre-setting.
H651 to H656	Down ramp B2	Setting instructions as for H641. The time in H651 is switched-through as pre-setting.
H760	Ramp-up time, speed-controlled mode	
H761	Ramp-down time, speed-controlled mode	
H722	Normalization, acceleration	The lowest occurring ramp-up or ramp-down time of the position ramp-function generator is entered.

6.2.2 Open-loop control commissioning

The parameterization of the control signals is now described. This is sub-divided into control signals which must be parameterized (designated with a **!** in the short parameter list) and signals which can be parameterized if required.

Signals, which are not required for the application, can be supplied with a fixed value. In this case, parameterization should be realized as follows:

Fixed 1 signal
A fixed 1 signal is generated, by entering connector K004 for the signal source, and 0001h in the mask.

Fixed 0 signal
A fixed 0 signal is generated, by entering connector K000 for the signal source, and 0000h in the mask.

The following functions must be parameterized

H200/ H201	Power-on	The power-on command can be coupled with the standard stop, if the same source is specified for both commands.
H202/ H203	Standard stop (OFF1)	The *standard stop* signal switches the main setpoint to zero, and the drive decelerates along the ramp-function generator ramp to standstill; the drive is then powered-down.
H204/ H205	Electrical off (OFF2)	Electrical off (OFF2) causes the drive to be immediately switched into a torque-free condition.
H206/ H207	Fast stop (OFF3)	The setpoint is instantaneously switched to zero for a *fast stop*, and the drive is decelerated along the torque limit.

For the following functions, it should be checked as to whether they are required.

H214/ H215	Inching 1, speed-controlled	
H216/ H217	Inching 2, speed-controlled	
H224/ H225	Inching 1, position-controlled	
H224/ H226	Inching 2, position-controlled	
H212/ H213	Fault/error acknowledgement	Faults/errors can always be acknowledged via the P key of the PMU
H218/ H219	Operating mode, speed control 1	To rotate the drive with constant velocity
H220/ H221	Operating mode, speed control 2	To rotate the drive with constant velocity
H222/ H223	Operating mode, speed control 3	To rotate the drive with constant velocity which can be entered via connector
H280	Masking, error/fault messages	Suppressing irrelevant fault/error messages (e. g. peer-to-peer)
H700/ H701	External enable, position control 1	

Note:
After the control has been parameterized, all control functions should be tested.

6.2.3 Commissioning the open-loop referencing control

For the open-loop referencing control, the limit switches, traversing velocities as well as the operating modes must be defined.

H228/ H229	Hardware limit switch A2	
H230/ H231	Hardware limit switch B2	
H300/ H301	Referencing with shutdown	
H302/ H303	Flying referencing	
H304/ H305	Automatic post referencing	
H330	V set for referencing direction A→B	
H332	V set for referencing direction B→A	

Further, the hardware reference point position must be entered. The position of the hardware reference point is the distance between the software reference point and the geometrical position of the hardware reference point. All setpoint inputs refer to the software reference point. In practice, it is recommended that the mechanical endstop in traversing direction A is defined as the software reference point (zero). The reference point position is then the distance between the mechanical endstop A and the reference point. This distance can be measured.

H351	Reference point position	Distance between the mechanical endstop and the reference point.

6.3 Optimizing the closed-loop control

Closed-loop control optimization is subsequently briefly described.

The following parameters must be determined when optimizing the closed-loop control:

6.3.1 Optimizing with CUVC, CUMC

	CUVC / CUMC
Speed controller	**P223** speed act. value smoothing **P235** KP proportional gain **P240** integral action time Tn
Position controller	**H729** position actual value smoothing (only in exceptional cases) **H734** proportional gain KP **H735** integral action time Tn (only in exceptional cases)
Pre-control	**H722** normalization, acceleration **H738** torque pre-control **H740** speed setpoint smoothing **H730** pos. reference value smoothing

6.3.2 Optimizing with CU2, CU3

	SIMOVERT CU2	**CU3, section 6.1.1.2, standard**	**CU3, sect. 6.1.1.2.1, special case**
Speed controller	**P221** speed act. value smoothing **P225** KP proportional gain **P229** integral action time Tn	**P230** speed controller gain **P231** dynamic perform. factor **P242** starting time	**P533** speed act. smoothing **P537** KP proportional gain **P538** integral action time Tn
Position controller	**H729** position actual value smoothing (only in exceptional cases) **H734** proportional gain KP **H735** integral action time Tn (only in exceptional cases)		
Pre-control	**H722** normalization, acceleration **H738** torque pre-control **H740** speed setpoint smoothing **H730** pos. reference value smoothing	Only required in exceptional cases, then the same setting as for VC.	

6.3.3 Optimizing the closed-loop speed control

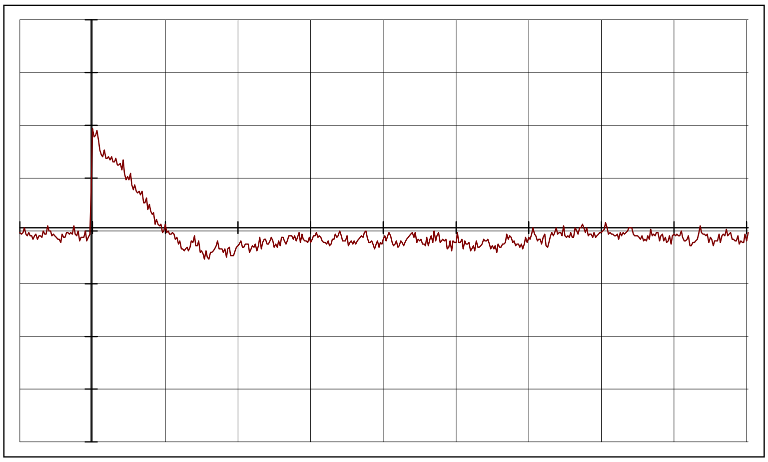
The optimization of a real drive unit is subsequently described. In this case, the motor is connected to the load through a gearbox which manifests play and elasticity.

The following parameters were determined:

CUVC: **P223**, CU2: **P221** speed actual value smoothing Tgl
CUVC: **P235**, CU2: **P225** proportional gain KP
CUVC: **P240**, CU2: **P229** integral action time Tn

In the following diagram, the speed controller control error (CUVC: K152, CU2: r224) is output at analog output 1. A setpoint step of 1% is connected at the speed controller input to optimize the control loop.

The speed controller must be set according to the absolute optimum.
The result should be as follows:



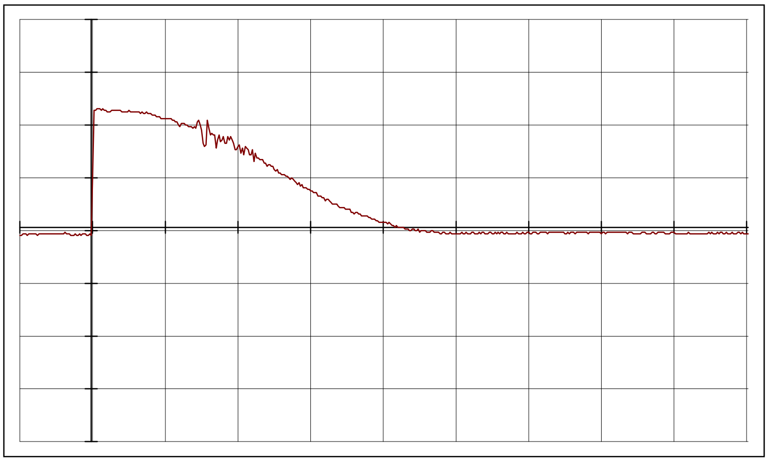
Datei:nregopt.bin, window 12/12, trace: 50mV/div 100ms/div title: KP=70, TN=0.5s, Tgl=24ms [opt]

6.3.4 Optimizing the closed-loop position control

The position controller is optimized after the speed controller has been optimized. A step is entered at the position controller input (H728). The position controller (K205) error signal is output at analog output 1. The position controller should be optimized, so that the drive does not overshoot.

The following parameters were determined
H734 proportional gain KP

The position controller optimization result should be as follows:



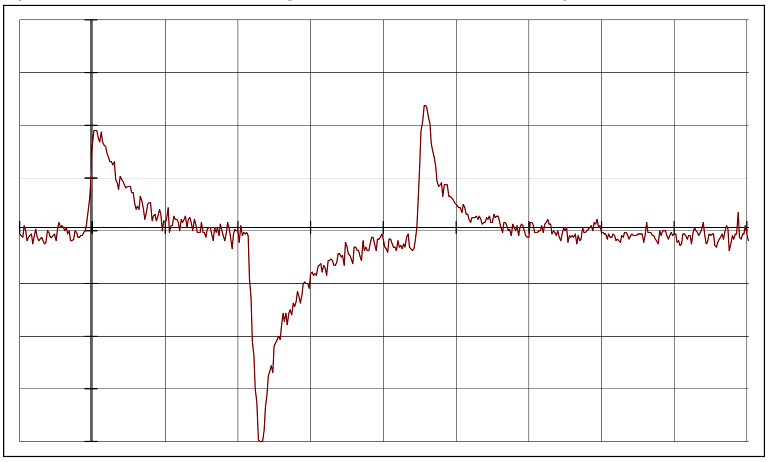
Datei:pregopt.bin, window 5/5, trace: 200mV/div 100ms/div, title: KP=13

In some cases, it may be practical to smooth the position actual value (H729), e. g. for a high moment of inertia ratio between the load and the motor with a high drive play on the motor side, and position actual value measurement via the motor pulse encoder.

6.3.5 Adjusting inertia compensation

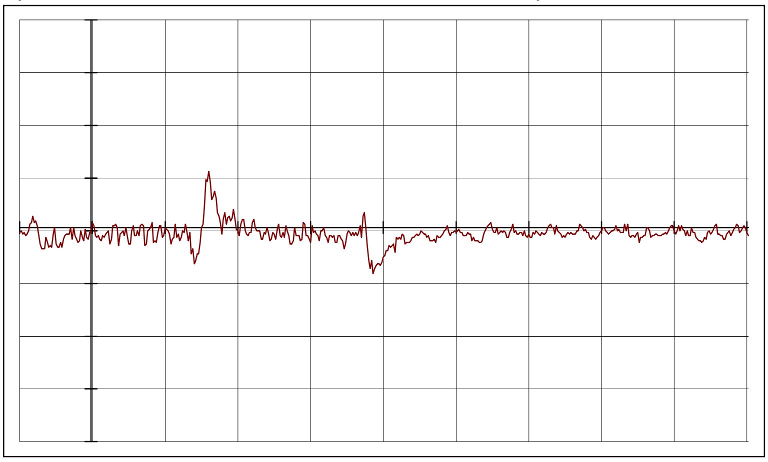
The importance of the inertia compensation can be clearly seen using the following diagrams. The error signal of the speed controller during traversing is illustrated.

Speed controller error signal without inertia compensation



Datei:posregop.bin, window 1/5, trace: 50mV/div 1s/div title: YE n-controller

Speed controller control error with inertia compensation



Datei:posregop.bin, window 2/5, trace: 50mV/div 1s/div title: M-COMP, YE n-controller

It can be clearly seen, that significantly lower error signals occur in the speed control loop.

Inertia compensation should be set as follows:

Acceleration must be normalized before inertia compensation is adjusted. To realized this, the shortest ramp-up and ramp-down time should be entered in parameter H722.

Method A CUVC,CU2:
The basic drive converter parameter r007 (torque actual value) is monitored during acceleration and deceleration. In this case, the time in H722 should be set as the ramp-up and ramp-down time of the position ramp-function generator. The average value of the accelerating torque during ramp-up and ramp-down provides the factor for inertia compensation, i. e. the value for parameter H738.

Method B:
The speed controller (CUVC, CUMC: K152; CU2,CU3: r224) error signal is displayed on an oscilloscope. The inertia compensation H738 is increased until the error signal when traversing, is a minimum.

Setting the inertia compensation for variable moments of inertia.
For applications with variable moments of inertia, the *automatic load measurement* function can be used. In this case, the moment of inertia is automatically determined at each traversing sequence. H738 is set with the lowest moment of inertia according to method A or B. Then, 100% is entered in H772. If load changes are only to be partially taken into account, a value less than 100% can be entered in H772.

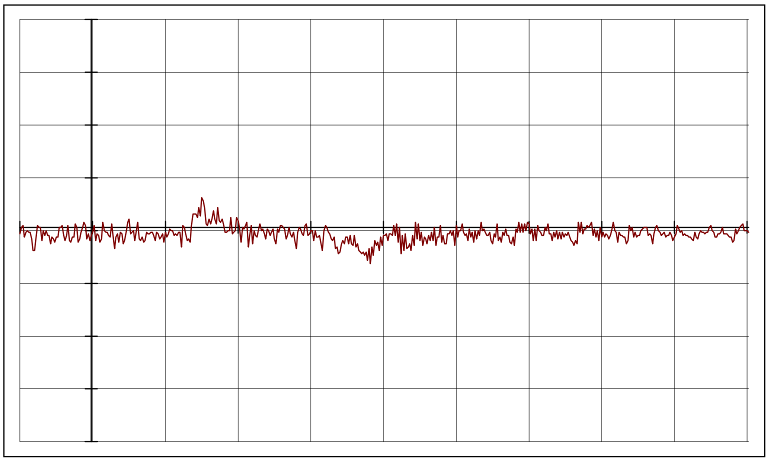
6.3.6 Adjusting the setpoint smoothing

As the feedback loop signals are always delayed at the controller, then the corresponding setpoints/reference values must also be entered with delay. If all of the pre-controls and setpoint/reference value smoothing factors are correctly set, the controllers must only equalize the fault quantities.

Note:
Precise setting for the setpoint smoothing functions is only necessary for extremely fast applications. Essentially, the approach characteristics at the destination are influenced. The full positioning accuracy is available, even when the smoothing factors are not set.

6.3.6.1 Setpoint smoothing for the speed controller

The influence of the setpoint smoothing for the speed controller is now shown:



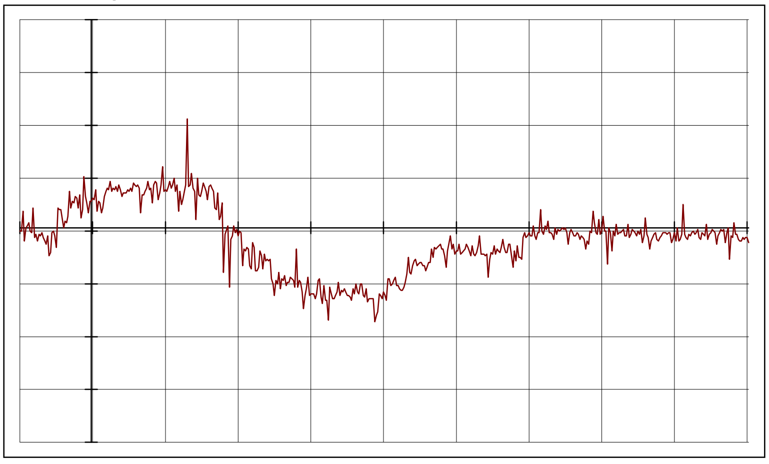
Datei:posregop.bin, window 3/5, trace: 50mV/div 1s/div title: M-COMP, setpoint comparison, YE n-controller

Speed control errors can still be further improved over the setting with inertia compensation.

Setting the speed controller setpoint smoothing
The speed controller setpoint smoothing must be as high as the equivalent time constant of the torque control loop plus the selected actual value smoothing in P223 (CUVC, CUMC) and P221+P216 (CU2).

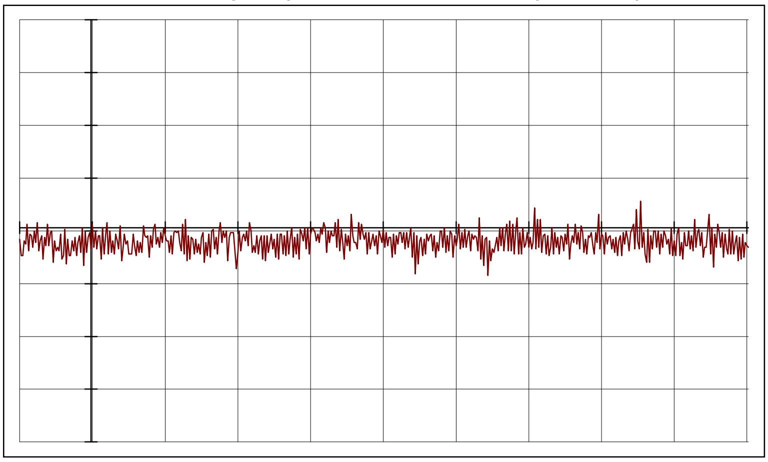
6.3.6.2 Setpoint smoothing for the position controller

The control error of a position controller is illustrated for a traversing sequence without reference value smoothing:



Datei:posregop.bin, window 4/5, trace: 10mV/div 1s/div title: YE pos-controller

The same traversing sequence with a correctly set setpoint smoothing:



Datei:posregop.bin, window 5/5, trace: 10mV/div 1s/div title: Sollwertgl. 15ms, YE pos-controller

Setting the setpoint smoothing for the position controller

The setpoint smoothing value to be set for the position controller can only be calculated theoretically with difficulty, as it corresponds to the equivalent time constant of the speed control loop. The time constant can only be theoretically calculated.
In practice, the position controller control error is output on an oscilloscope via an analog output. The setpoint smoothing value is increased until the error signal is a minimum.

NOTE
After start-up has been completed, enter all of the changed parameters into the parameter list,Section 9. Always have this parameter list as well as the software- version identification (d002) on hand if you have any questions at a later date

6.4 Free function blocks CUVC, CUMC

Free blocks can be used in SIMOVERT MASTERDRIVES CUVC and CUMC, to realise additional function (logic functions with logic blocks, calculation with numeric function blocs...).

To enable function blocks to carry out processing, a time slot (sampling time) must be assigned to each function block. Depending on the number and frequency of the blocks to be processed, the microprocessor system of the units has a varying degree of utilization.

The visualization parameter r829 has to be selected after enabling function blocks for displaying the free calculating time. The reserve of the microprocessor system in the basic unit should not be lower

than 5 - 10%.

If this is not the case, please make shure all the enabled function blocs are really necessary, or if

some function blocs may be assigned to different time slots.

7 SIMADYN D functions

7.1 STRUC G graphics

7.1.1 Sheet structure

The structure of a STRUC G function diagram is shown in Fig. 7.1

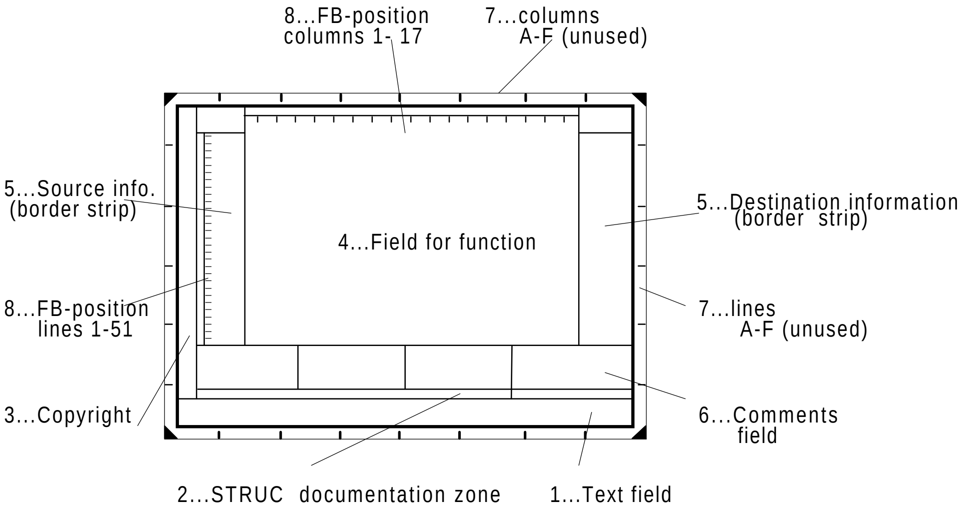


Fig. 7.1 STRUC G function diagram

Explanation:

1 Text field
The text field is structured according to DIN 6771, Part 5.

2 STRUC documentation line
Information regarding the version, libraries and configuring levels are entered here.

3 Copyright and additional documentation information

4 Character field for function blocks
This is the actual function diagram. The function blocks are located in this field, arranged using position numbers (refer to Point 8 below), and displayed with the connections and constants. The sheet comments are also placed here.

5 Source- and destination information
Function package connections ($ signals) with source- and destination-function package names are specified in this field where the system ID, page number and column number are specified. Further, cross-references for communication- and hardware assignments are also provided here.

6 Comments field
Plain text comments, blocks, connectors or the signals on the border panel are entered here. Connector attributes are also entered (,MIN=...,MAX=...,SCAL=..., etc.).

7 Sheet lines and columns
The sheet is sub-divided into 8 columns (1-8), which is taken into account when generating cross-references. The lines (vertically, A-F) are not used.

8 FB position lines and columns
as character field, it has 17 columns and 51 lines. These allow function blocks to be positioned.

7.1.2 Block structure

There is a graphic function symbol for every function block (FB), which is used to document the FB and the user-specific features. In addition to the input- and output signal connections, there are also signal values specified and some of the connector attributes, which are significant for the sequence and embedding the function block in the function package (FP).

A function block with STRUC G is illustrated in Fig. 7.2.

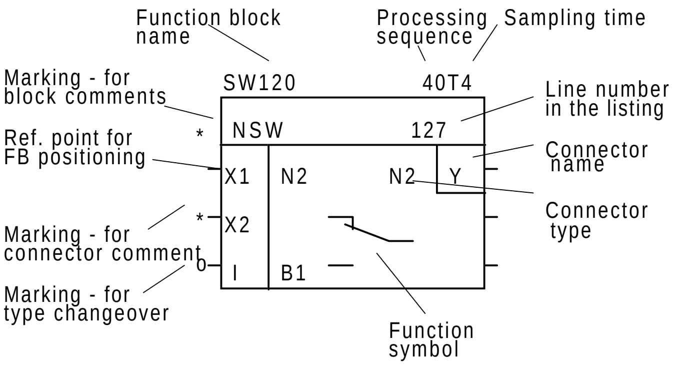


Fig. 7.2 STRUC G function block (example)

7.1.3 STRUC connectors

The STRUC connectors are used to supply the FB with input information and output the results to other function blocks or peripheral boards. The connectors are identified in the FB mask via the connector name and connector type.

A connector is supplied with a signal connection or constant, and optionally, also, with a signal ID, attributes and comment. As not all of this information can be located in the graphics section, some information is located in the comments field below the graphic field. A star at the connector indicates that this information is available.

7.1.4 Cross-references

Generally, connections between FBs are shown as a line. If space is restricted, a letter (A-Z) is assigned so that a connection can be identified. The line is continued at another position on the same sheet (connection on the sheet).

For connections over several sheets (global connections), within the same FP, the block name, connector name, sheet number and sheet column number are specified as source/destination information. If there is insufficient space in the graphics field, or if there are several cross-references, then the entry is made in the border panel (source/destination information field):

B420.QS / 3.1 ....FB name.connector name/sheet number.sheet column number

External connections (from one FP to another) are completely referenced with their symbolic names ($*name*) in the source/destination information field. Further, the following are also specified: The bus data transport sampling time with bus access time, source/destination processor(s), source/destination function package(s) with system IDs as well as sheet- and sheet column number(s):

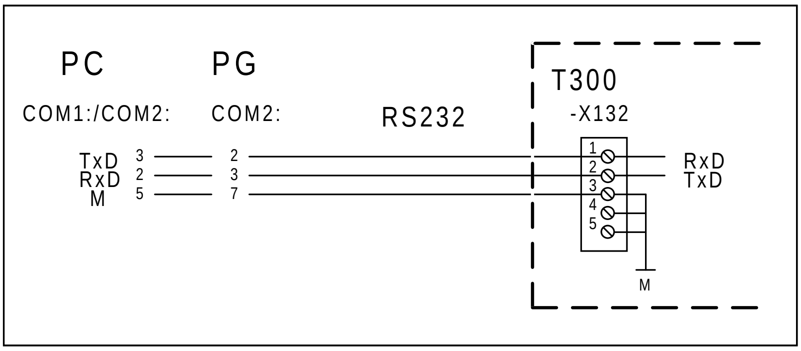
$NREG PN T2C .... Signal name, processor-local access, bus access and data transport time
=.W30/3.1 ....System ID/sheet number.sheet column number

7.2 Symbolic monitor

7.2.1 Prerequisites

The standard software package includes a monitor program which allows all of the technological parameters, and each connector of all the function blocks to be accessed. It uses the technology board serial interface.

A suitable connecting cable is illustrated in the following diagram. Plug-in screw terminals („Minicombicon“ type) are used to establish the connection at the T300.



A conventional computer (PC) or a programming unit (PG) can be used as terminal. The connection is established via the drive converter serial interface. The specified assignment can be used for a PC-AT, otherwise it can be taken from the Manual.

The so-called IBS (start-up) program (PCP/M on the PG730/750 or with emulator under DOS), Telemaster Service (DOS) or SIMOVIS SIMADYN Service (DOS) are suitable terminal programs.

7.2.2 Operator control

Every connector can be addressed via a so-called path name. This path name consists of the processor number (in this case, always 1), the function package names, function block names and connector names:

#FP-fpname.fbname.conname

As an example, the following path name belongs to connector QS of block BI230 in the INPUT function package:

1FP-INPUT.BI230.QS

The path name is also specified for every technological parameter, in the parameter list.

7.3 SIMADYN D value ranges and normalization

SIMADYN D connector types are only interesting, if the connector is accessed via the symbolic monitor.

If the parameter is accessed via a communications board, USS protocol or the drive converter operator control panel, then the MASTER DRIVE parameter types are valid.

7.3.1 Proportional types

	HEX format V2	Standard format N2	Integer format I2	Ordinal format O2	E format E2
Significance	16-bit word	% quantity	Integer numbers	Integer number, only positive	Extended signal
Value range	0000h...FFFFh	-200%...199.99%	-32768...32767	0...32767	-256.00...255.99
Resolution	0001h	0.0061%	1	1	0.0078125

V2 quantities are mainly masks to suppress or enable individual signals of a status word. The N2 format is used for process quantities such as setpoints and actual values. I2 and O2 are integer quantities, such as, for example, rated speeds and encoder pulse numbers, shifts by binary positions etc. The E2 quantity is used exclusively for gains.

7.3.2 Time-dependent types

Time-dependent parameters are fractions or multiples of the sampling time. The 5 time levels *T1*, *T2*, *T3*, *T4* and *T5* of the system define the ranges of the time-dependent parameters; they cannot be changed and are permanently assigned the following values:

Time level	**Sampling time**
T1	5.0 [ms]
T2	20.0 [ms]
T3	40.0 [ms]
T4	160.0 [ms]
T5	320.0 [ms]

7.3.2.1 Time-proportional types

Time-proportional types implement times or time factors, which are proportional to the hexadecimal value or the standardized quantity. However, negative values are not permissible here. A negative value entry is rejected.

The assignment of the types is shown in the following table; the hex and standard quantity N2 types are also included for a better understanding:

HEX format V2	Standard format N2	D format D2	T format T2
0000h	0.0000%	0.000000xTA	0xTA
0001h	0.0061%	0.000061xTA	1xTA
0002h	0.0122%	0.000122xTA	2xTA
...	...	...	...
4000h	100.0000%	1.000000xTA	16384xTA
...	...	...	...
7FFFh	199.9939%	1.999939xTA	32767xTA

7.3.2.2 Time-reciprocal type

The reciprocal type is used when entering time constants for filters (PT1) or integration times, ramp-up and ramp-down times etc. A special feature worth noting is that high values at the connector result in low times and vice versa.

HEX format V2	Standard format N2	Reciprocal format R2
0000h	0.0000%	1.000000xTA
0001h	0.0061%	16384xTA
0002h	0.0122%	8192xTA
...	...	...
3FFEh	99.9878%	1.000122xTA
3FFFh	99.9939%	1.000061xTA
4000h	100.0000%	1.000000xTA
...	...	...
7FFFh	199.9939%	1.999939xTA

When entered via the operator control panel, a time is always entered. This is also signaled back. Knowledge regarding the internal notation is not necessary, but explains the different stages/levels for the R2 type.

8 Application/self-study example

Introduction

This example should provide the user of the MS380 positioning control software package

- support when configuring and commissioning his drive and
- to help him understand the positioning functionality using an experimental set-up.

A linear axis as well as a rotary axis with parameterization, the necessary control signals and required control sequence are fully described in two examples.

The examples have been selected so that they can be easily understood using a simple experimental set-up.

It is recommended that the examples are worked through, and at the same time, the function diagrams (refer to Section 3.9) are studied and the signal routing is entered there for the particular application.

We would like to point out, that the examples here do not represent a brief overview of this Manual, but are only intended to help the user acquaint himself with this standard software package.

Note:
Information in square brackets refers to the function diagrams.
Example: [C2]: Reference is made to Sheet C2.
Explanations to the parameters, refer to the parameter list and relevant text part.

The examples are structured as follows:

- loop schematic
- connection diagram
- information on the equipment used
- switching sequence for all of the connected control signals
- parameterization and start-up

8.1 Linear axis

8.1.1 Loop schematic

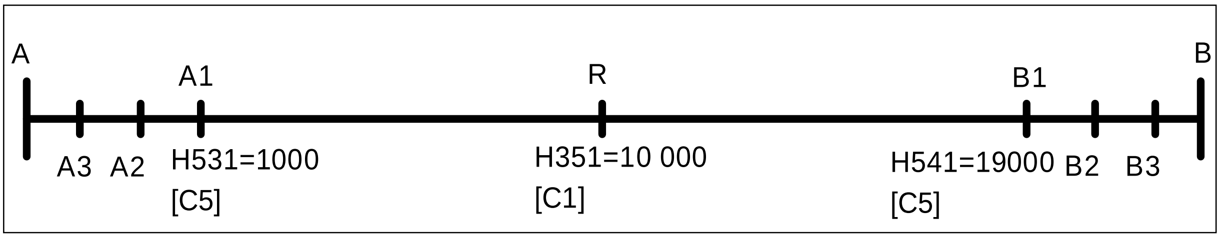


Fig. 1: Loop schematic, example of a linear axis

Explanation to Fig. 1:

A3, B3:	Emergency limit switch
A2, B2:	Hardware limit switch
A1, B1:	Software limit switch
R:	Hardware reference point
A, B:	Mechanical end of the traversing path
A:	Zero point

- the numerical values are scaled position data, refer to H350. The loop from A to B is 20 000 units long.
- loop A2 - B2 is traversed when referencing. In addition, there is the braking distance between A2, A3 and B2, B3 when the drive brakes after passing A2 or B2. It is not permissible that A3 and B3 are reached.
- actual positioning operation is **only** possible between A1 and B1. Reference values which extend beyond this range, are rejected, and an appropriate status message is output (visualization parameter d069, bits 0 and 1). The drive stays at the old position until a reference value, located within the range A1 - B1 is entered.

8.1.2 Connecting-up example

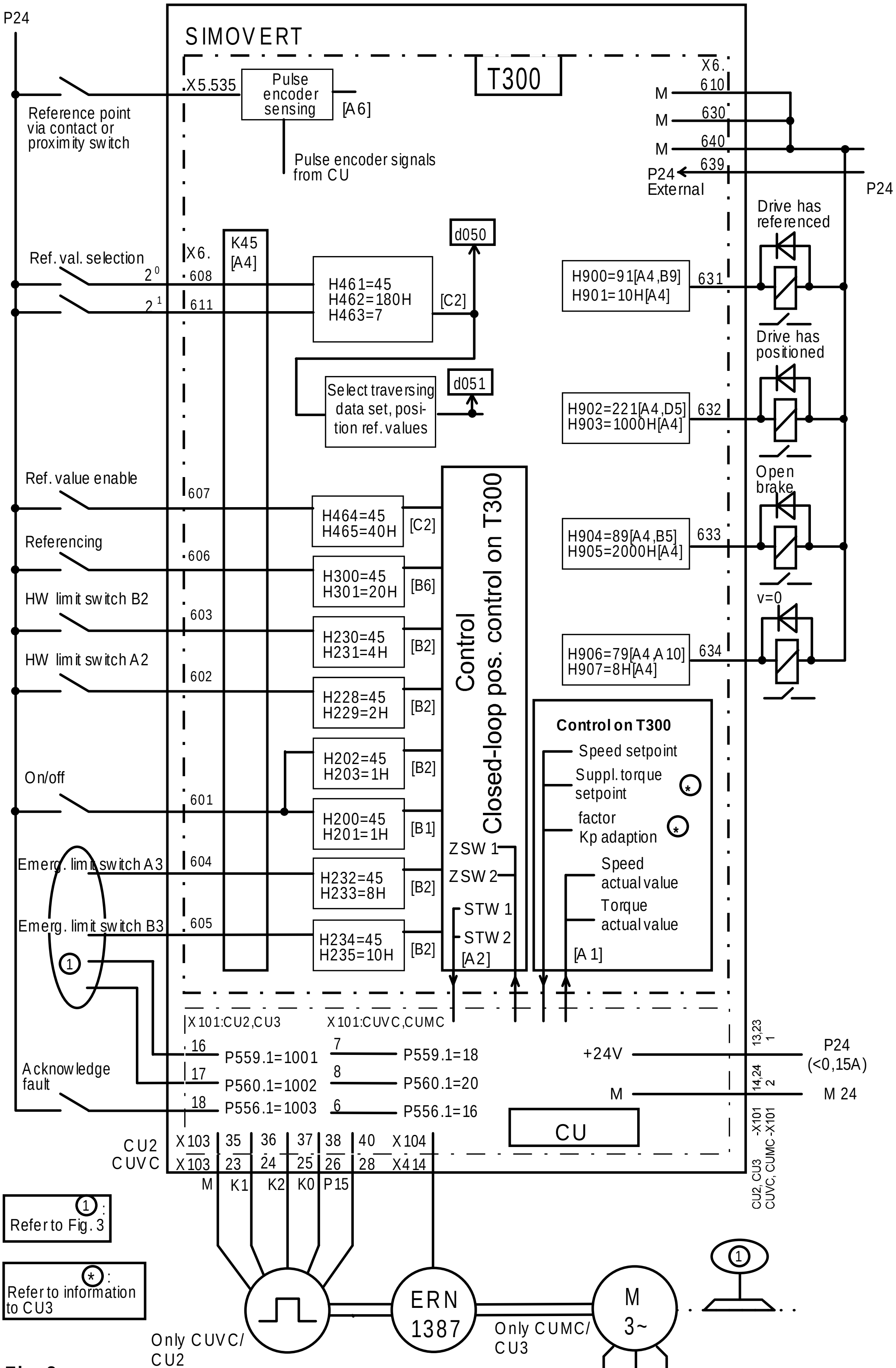


Fig. 2
Connecting-up diagram for an example of a linear axis

Connecting-up example, emergency limit switch, emergency off and fast stop

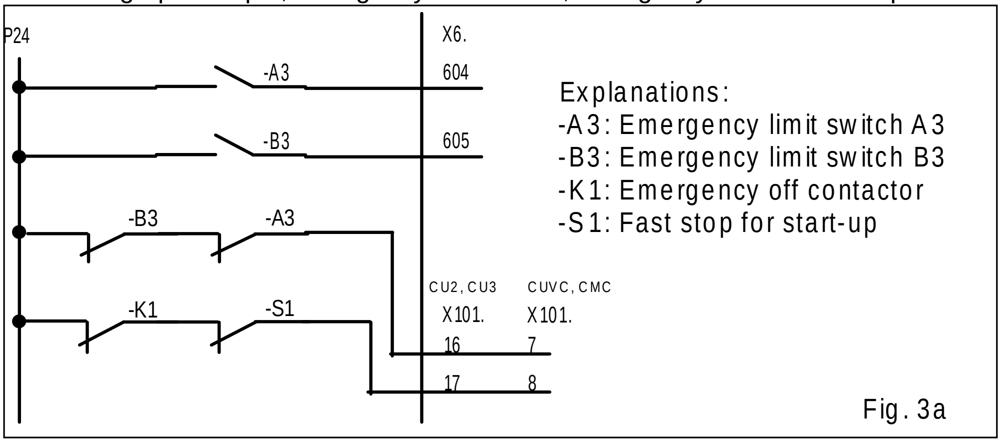


Fig. 3a

Connecting-up example, brake control

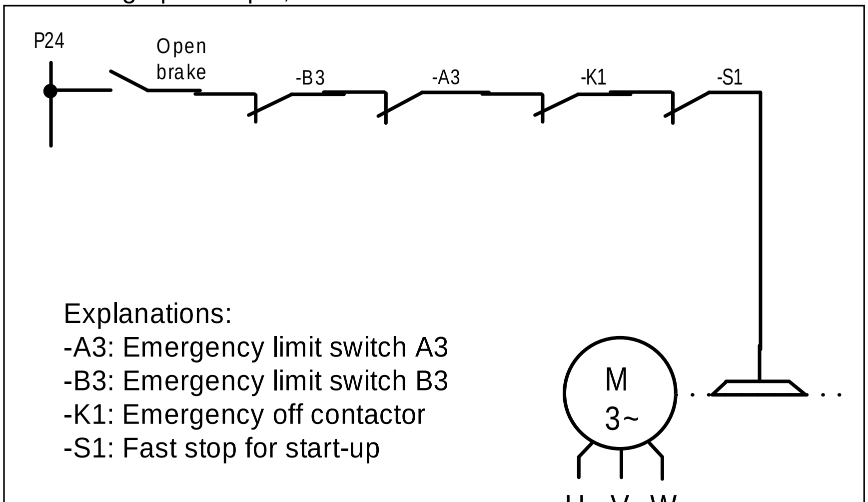


Fig. 3b

- functions which are not required, can be omitted by using the appropriate parameterization.
  Example: Emergency limit switches A3, B3 are **not** required: H232=0; H233=0; H234=0, H235=0. Use Fast stop (off3) terminal X101.16, and X101.7 (P559=1).
- Fig. 2 is also valid for CU3, CUMC as well as for CU2, CUVC.
- for outputs which are not connected to loads (without contactor coils etc.), the supply voltage to control the inputs can be taken from the basic drive converter.
- please refer to the relevant Instruction Manual when connecting-up the power section and motor.
- ⊛ : Information to CU3:
  Kp adaption function factor: See section 6.1.2.
  Supplementary torque setpoint: Generally not required for CU3.
- for the linear axis the reference signal is taken from a switch. When the encoder zero pulse is used, H150 should be appropriately parameterized. In conjunction with a resolver on the motor, it is practical that the reference signal is only taken from a switch.

8.1.3 Equipment used in this particular example

This example can be tried out with any type VC and MC/SC drive converter/inverter as well as any suitable motor.

- drive converter: 6SE7021 8EB10, input voltage 380 to 460V, I_n=17,5A.
- motor: 1LA5106-4AA60; 400V; 5,2A; 1420RPM; cosφ=0.82, pulse encoder: 1XP8001-1/1024.

8.1.4 Switching sequences

Note:

- fault/error messages must be acknowledged and the on/off command must be withdrawn. Only then is the unit ready to be powered-up again.
- when using OFF2/ OFF3, these signals must be available again before OFF1/ ON (on/ off, X6.601) are input. In the example, OFF 3 is used via terminals X101.16, 17 (CU2,CU3) and X101.7,8 (CUVC,CUMC).
- not all of the possible signal combinations have been shown. Additional signal combinations can be taken from the function diagram.

The switching sequences for the signals used in the example are subsequently listed.

8.1.4.1 Referencing with subsequent shutdown

The control signal characteristics when referencing are shown, as an example, in Fig. 4.

Prerequisites, which are not shown:

- the motion sequence when referencing can be taken from Section 3.5.
- by withdrawing the on/ off command, the referencing motion can be terminated at any time, also by withdrawing referencing.

Potential fault/error causes:

- the reference point was not found when passing A2 and B2. The drive shuts down, fault F128 is displayed. Bit 15 of d045 is set.

Control signal characteristics when referencing in the example.

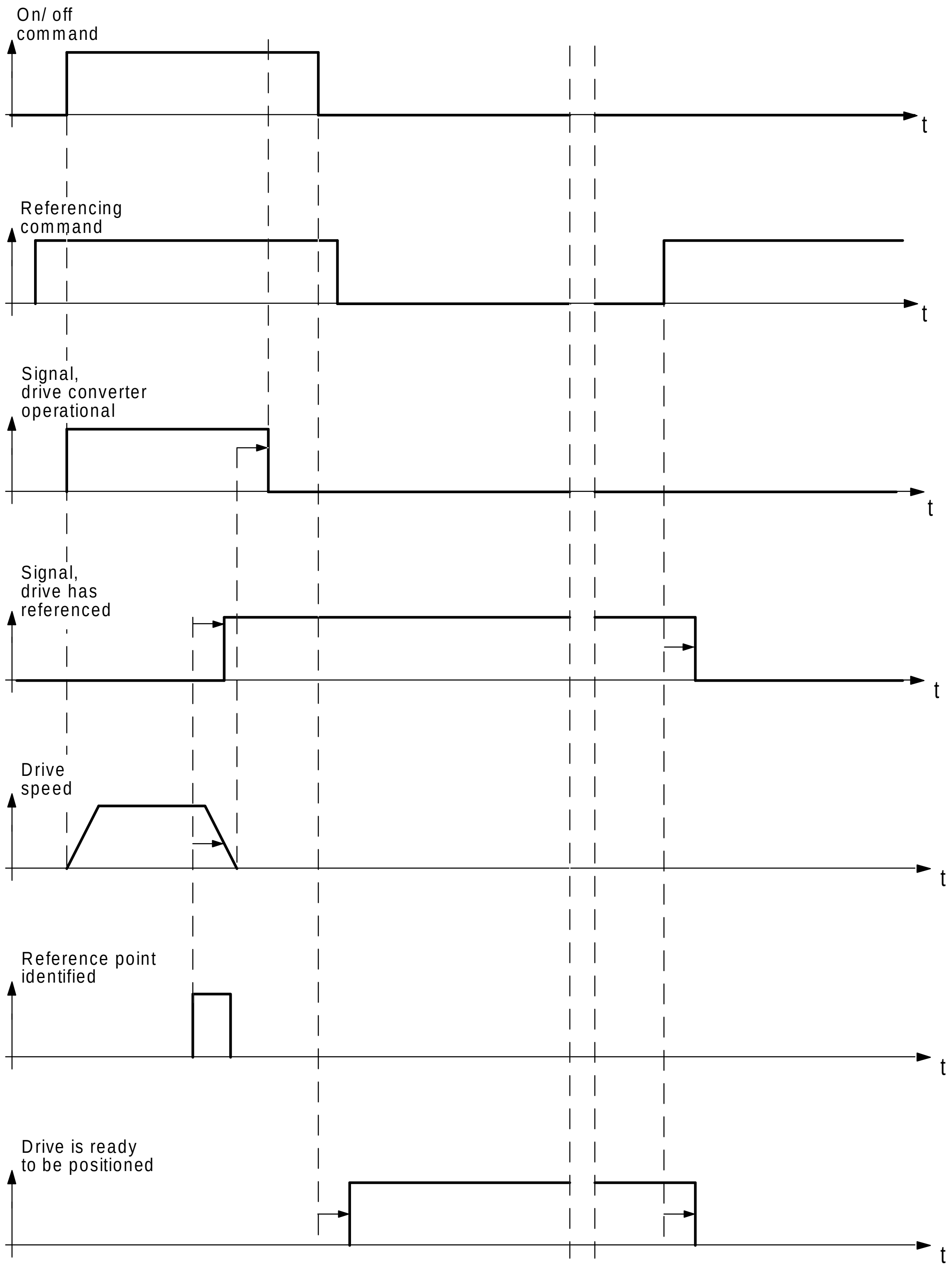


Fig. 4: Control signal characteristics when referencing in the example

8.1.4.2 Positioning operation, illustrated in Fig. 5.

The control signal characteristics when positioning is illustrated, as example, in Fig. 5.

Prerequisites, which are not shown:

- terminals X101.16, 17 (CU2,CU3) and X101.7, 8 (CUVC,CUMC): H signal present.
  terminals X6.604, 605: Low signal present.
- no fault condition.
- the control is ready for positioning.

Potential fault/error causes:

- position reference value input is greater than the limits specified by A1, B1; refer to d069, bits 0 and 1.
- drive has not referenced, and is not ready for positioning; refer to Fig. 4

Information:

- immediately after the on/ off command, the drive moves to the position displayed in d052, if referencing was previously carried-out.
- if the position reference value was not enabled directly after referencing when the on/ off command is entered, the drive moves to the position which corresponds to the software limit A1.
- when the on/ off command is withdrawn, the drive is shutdown, speed-controlled (ramp-down time H760), function diagram [D4]. When on/ off is again given, the interrupted positioning travel is continued if the drive is otherwise unchanged.

Signal characteristics when positioning, example.

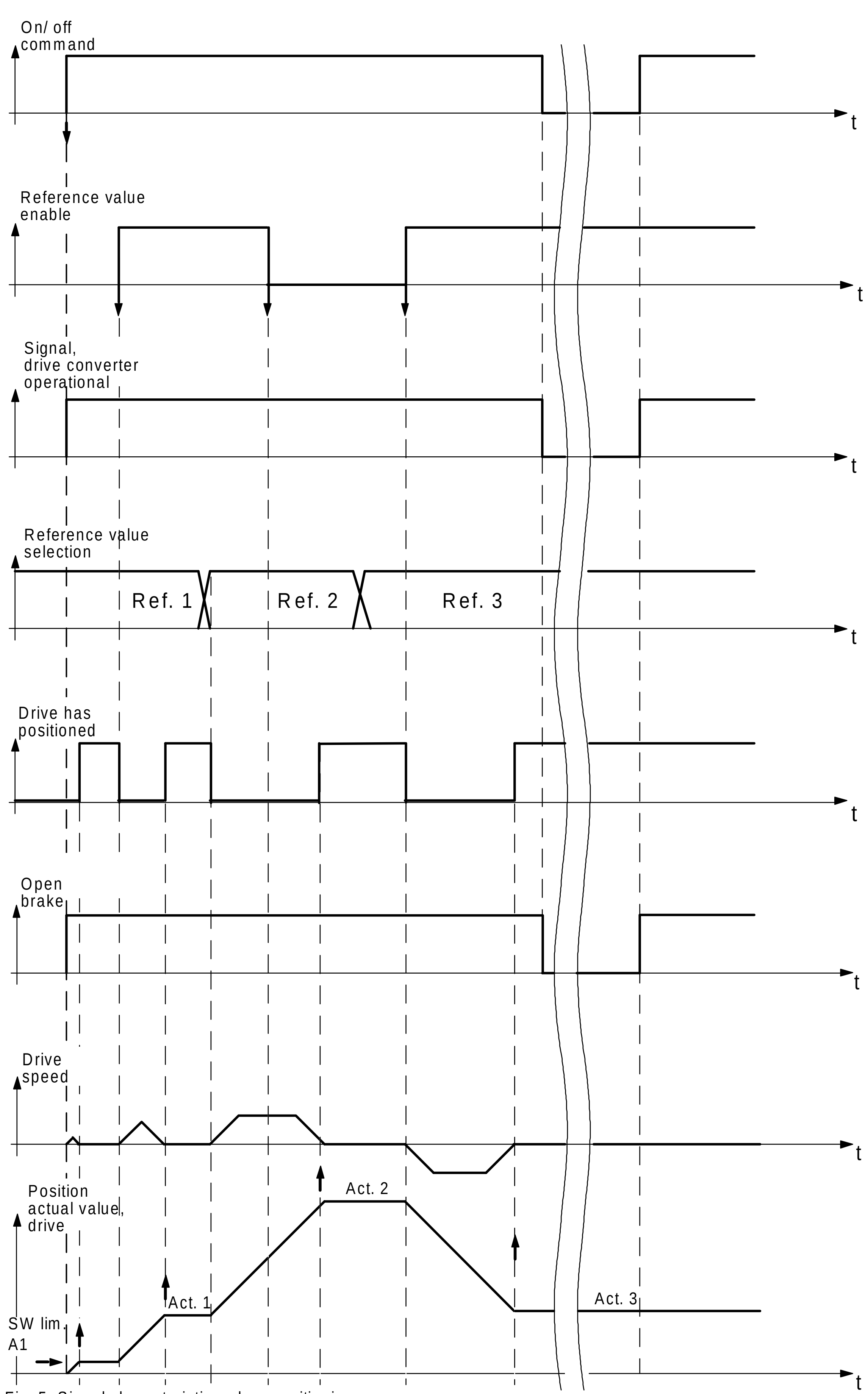


Fig. 5: Signal characteristics when positioning

8.1.5 Parameterization and start-up

- the procedure at start-up is the same as in Section 6.
  After T300 logs-on, H280 should be set to FFFA, and only then can operating status 4, hardware setting, be exited.

- **parameterization, basic drive converter:**
  Parameterization and start-up, basic drive converter, refer to Section 6.1.
  Supplementary information for this example:
  General parameters: P352 (CUVC) / P420 (CU2)=50Hz; P452=60Hz; P453=-60Hz; P466=1s; P492=100%; P498=-100%.
  Note: P352 (CUVC) / P420 (CU2), P452, P453 refer to the machine used here.
  Open-loop control: P566.1=1003 (CU2, CU3) and P566.1=16 (CUVC, CUMC).
  Controller optimization, deviates from the motor identification at standstill P235 (CUVC) and P225 (CU2)=4.83.
  Entries regarding the motor and pulse encoder corresponding to the basic drive converter Instruction Manual.

- **parameterizing T300 with MS380:**
  The subsequently described parameterization refers to the example.
  Refer to Section 6.3 when commissioning T300.
  Comment: The list was generated using SIMOVIS, and was transferred into text file with just a minimum of layout changes. We recommend that the print-out is made with a non-proportional font.
  Procedure:
  Generate a comparison file from the file with the factory settings and file with modified parameters.
  Generate a file which can be printed.

  Refer to the SIMOVIS Instruction Manual for additional information.

List of the modified parameters for the example:

```
---------------------------------------------------------------------------
SIEMENS  List of download parameters                      Date: 15.04.1996
file:    LA1504V.T1D
         Note: This list can include parameters
               which are not provided in the parameter list
         Par No. Ind           Value  Dimension  Parameter name
---------------------------------------------------------------------------
         01150   000           1044H             HW_MODE_PG1     ____
         01152   000            1500             NOM_RPM_PG1     ____
         01153   000           32768             NOM_LENGTH_PG1  ____
         01200   000              45             SRC_DRIVE_ON    ____
         01201   000           0001H             MSK_DRIVE_ON    ____
         01202   000              45             SRC_DRIVE_STOP  ____
         01203   000           0001H             MSK_DRIVE_STOP  ____
         01204   000               4             SRC_DRV_EL-OFF  ____
         01205   000           0001H             MSK_DRV_EL-OFF  ____
         01206   000               4             SRC_DRV_FSTSTP  ____
         01207   000           0001H             MSK_DRV_FSTSTP  ____
         01228   000              45             SRC_SWITCH_A2   ____
         01229   000           0002H             MSK_SWITCH_A2   ____
         01230   000              45             SRC_SWITCH_B2   ____
         01231   000           0004H             MSK_SWITCH_B2   ____
         01232   000              45             SRC_SWITCH_A3   ____
         01233   000           0008H             MSK_SWITCH_A3   ____
         01234   000              45             SRC_SWITCH_B3   ____
         01235   000           0010H             MSK_SWITCH_B3   ____
         01240   000               1             EN_MEC_BRK      ____
         01280   000           FFFAH             MSK_EN_FAULTS   ____
         01300   000              45             SRC_MODE_REF_STP____
         01301   000           0020H             MSK_MODE_REF_STP____
         01304   000               0             SRC_REF_ALWAYS  ____
         01350   000           20000             SCAL_POSREG     ____
         01351   000           10000             POSITION_REFPNT ____
         01360   000             354             SRC_PREF_VAR    ____
         01361   000            2500             PREF_1          ____
         01362   000           10000             PREF_2          ____
         01363   000           15000             PREF_3          ____
         01461   000              45             SRC_SEL_PREF    ____
         01462   000           0180H             MSK_SEL_PREF    ____
         01463   000               7             SHIFT_SEL_PREF  ____
         01464   000              45             SRC_EN_PREF     ____
         01465   000           0040H             MSK_EN_PREF     ____
         01531   000            1000             SW_SWITCH_A1_1  ____
         01541   000           19000             SW_SWITCH_B1_1  ____
         01601   000         199.999  ms         TU_PRAMP_1      ____
         01611   000          20.000  ms         TR_PRAMP_1      ____
         01621   000         199.999  ms         TD_PRAMP_1      ____
         01641   000          99.993  ms         TD_RAMP_A2_1    ____
         01651   000          99.993  ms         TD_RAMP_B2_1    ____
         01684   000            1000             REF_FIX_INTDW_1 ____
         01720   000         315.000  ms         INT_TIME_PRAMP  ____
         01722   000         199.999  ms         SCL_ACCELERATION____
         01732   000          20.001  %          POSREG_LU       ____
         01733   000         -20.001  %          POSREG_LL       ____
         01734   000           8.000             POSREG_KP       ____
         01738   000         100.000  %          ACCEL_COMP      ____
         01742   000               2             LIM_POSITION_OK ____
         01743   000               0             HY_POSITION_OK  ____
         01744   000             0.0  ms         DELAY_POS_OK    ____
         01760   000         199.987  ms         TD_VRAMP        ____
         01761   000         199.987  ms         TU_VRAMP        ____
===========================================================================
                                 Page:    1
===========================================================================
```

```
---------------------------------------------------------------------------
SIEMENS  List of download parameters                      Date: 15.04.1996
file:    LA1504V.T1D
         Note: This list can include parameters
               which are not provided in the parameter list
         Par No. Ind           Value  Dimension Parameter name
---------------------------------------------------------------------------
         01851   000              70           SRC_DSP_PSCAL   ____
         01900   000              91           SRC_BQ1         ____
         01901   000           0010H           MSK_BQ1         ____
         01902   000             221           SRC_BQ2         ____
         01903   000           1000H           MSK_BQ2         ____
         01904   000              89           SRC_BQ3         ____
         01905   000           2000H           MSK_BQ3         ____
         01906   000              79           SRC_BQ4         ____
         01907   000           0008H           MSK_BQ4         ____

===========================================================================
                                 Page:    2
===========================================================================
```

Note:
The drive converter must be powered-down after parameters have been entered, so that the initialization parameters can be accepted.

8.2 Example of a basic roll feed

A roll feed involves an endlessly rotating rotary axis, which continues to rotate through a specific angle, which can be set, when a control signal edge is received. This means that material is still transported (e.g. sheet steel, cardboard, wire). An example of such a mechanical layout is provided in Section 1.6.3 and in the following diagram.

The roll feed function requires an edge-controlled control signal for "inching" to move this feed length (in addition to the usual on commands). The software identifies counter overflows down to accuracy of an increment, and they are therefore unimportant for the user. The feed length can be permanently parameterized or, for example changed via PROFIBUS-DP. The feed length can be changed at any time with the roll stationary.

8.2.1 System schematic

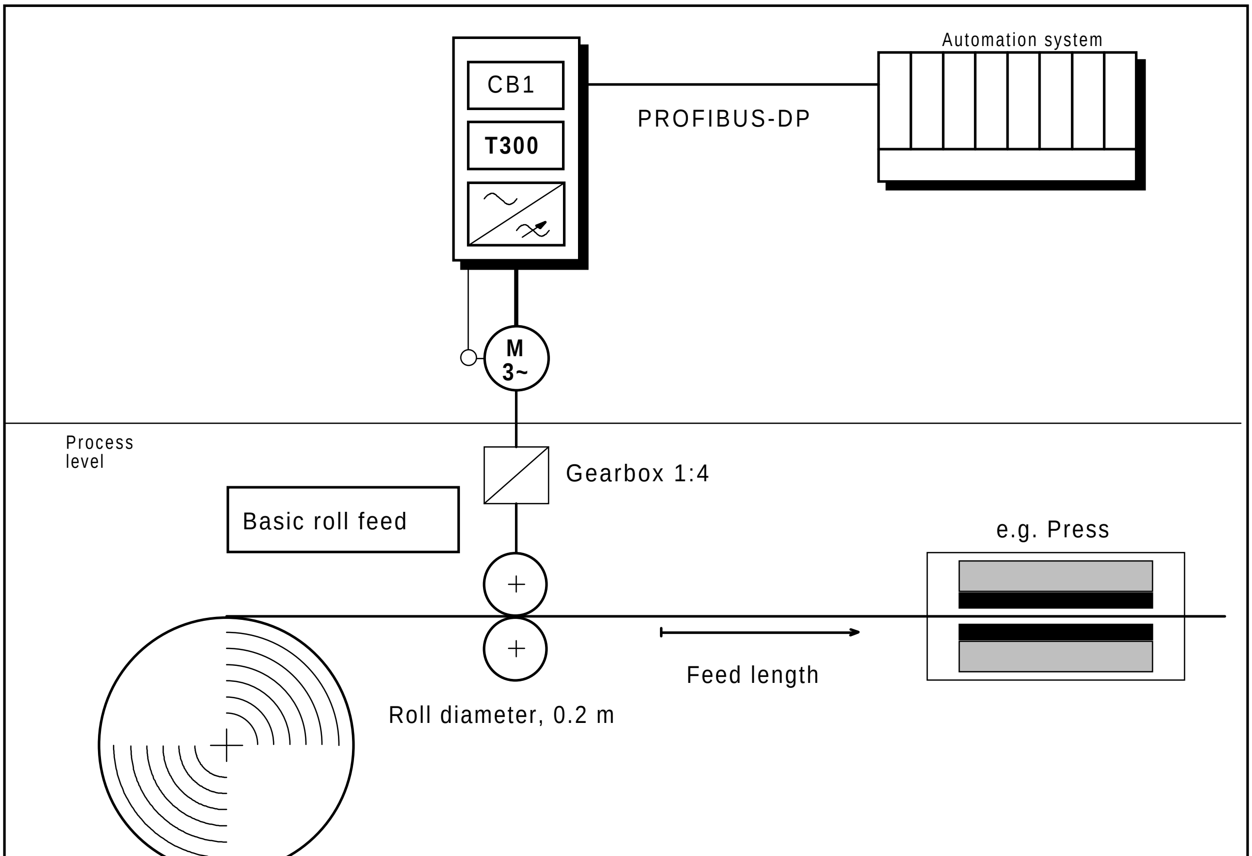


Fig. 1

Note
- This example can only be quickly and smoothly commissioned if Section 6, Start-up is carefully observed and followed.
- Square brackets in the text refer to the block diagram, Section 3.9.

Comments:

- The example includes the complete parameterization of the basic roll feed with instructions for configuring and start-up.
- In this example, signals are also received via PROFIBUS. The user can connect, for example, binary signals to the T300 instead of transmitting them via the bus. The OFF3 command (fast stop) can also be directly connected at the basic drive converter.
- After this example has been worked-through, the user can configure a basic roll feed and commission it.

8.2.2 Setpoints and actual values as well as control- and status signal, PROFIBUS telegram structure

PROFIBUS telegram structure:

Automation system → Drive			Drive → Automation system		
Word	Description	Parameter-ization	Word	Description	Parameter-ization
1	Control word	refer below	1	Status word 1 from the CU	H961=10
2	Feed length, high word	H360=27	2	Position actual value, high word	H962=74
3	Feed length, low word		3	Position actual value, low word	H963=75
4	Not used		4	Positioning status word, refer below	H964=258
5	Not used		5	Not used	
6	Not used		6	Not used	

Assignment, control word:

Bit	Control word	Parameterization
0	On/no stop (OFF1)	H200=26, H201=1; H202=26,, H203=1
1	No elec. off (OFF2)	H204=26, H205=2
2	No fast stop (OFF3)	H206=26, H207=4
3	Not used	
4	Not used	
5	Not used	
6	Enable feed length (position reference value)	H464=26, H465=40
7	Error acknowledgment	H212=26, H213=80
8	Inching 1	H214=26, H215=100
9	Inching 2	H216=26, H217=200
10	Control from the automation system, always = 1!	
11	Not used	
12	Inching	H472=26, H473=1000
13	Not used	
14	Not used	
15	Not used	

Assignment of the positioning status word with bit 0 to 6.
The positioning status word is generated using the freely-definable status word [E3].

Bit	Positioning status word [source]	Parameterization, freely-definable status word	Binary outputs	
			Terminal	Parameterization
0	Drive has positioned [D5]	H860=221, H861=1000	X6.631	H900=221, H901=1000
1	Speed-controlled operation (Inching 1 or 2) [D5]	H862=221, H863=200	X6.632	H902=221, H903=200
2	Position control (roll feed) enabled [D5]	H864=221, H865=100	X6.633	H904=221, H905=100
3	Following error > tolerance [D5]	H866=221, H867=1	X6.634	H906=221, H907=1
4	Speed actual value = 0 [A10]	H868=79, H869=8	X6.635	H908=79, H909=8
5	Drive converter operational [A1]	H870=10, H871=4	X6.636	H910=10, H911=4
6	Drive converter ready to power-up	H872=10, H873=1	X6.637	H912=10, H913=1

The status bits of the positioning status word are connected in parallel to the binary outputs.

24 V may only be connected to terminals X6:639 (P24) and X6.640 (M) when the binary outputs of the T300 are used. In this case, the current drain is approximately 80 mA. This voltage can also be taken from the basic drive converter.

8.2.3 Drive converters used in this example

- drive converter 6SE7016-1EA20, line supply voltage 380 to 460V, rated output current 6,1A.
- motor: 1LA5106-4AA60; 400V; 5,2A; 1420 RPM; cosφ=0.82 with pulse encoder 1XP8001-1, 1024 pulses/revolution.

Comments:

- in the example, the rated system speed is 1500 RPM with P352/P420 = 50 Hz and H152 = 1500 RPM.
- we would like to point out, that this example can be tried with any type VC, MC and SC drive converter/inverter and any suitable motor.

8.2.4 Switching sequences

Notes:

- fault/error messages must be acknowledged and the on/no stop command (inching 1 and inching 2) must be removed. Only then can the drive converter be powered-up again.
- when using OFF2/ OFF3, these signals must be present before OFF1/ ON is issued.
- not all of the possible signal combinations are shown. Please refer to the function diagram, Section 3.3 for additional signal combinations.
- the switching sequences are based on the parameterization, described in Section 8.2.5.
- the rounding-off for speed-up and -down ramps are not shown in the diagrams.

The switching sequences for the signals used in the example of the roll feed, are subsequently specified.

Switching sequence, speed-control inching 1 and 2

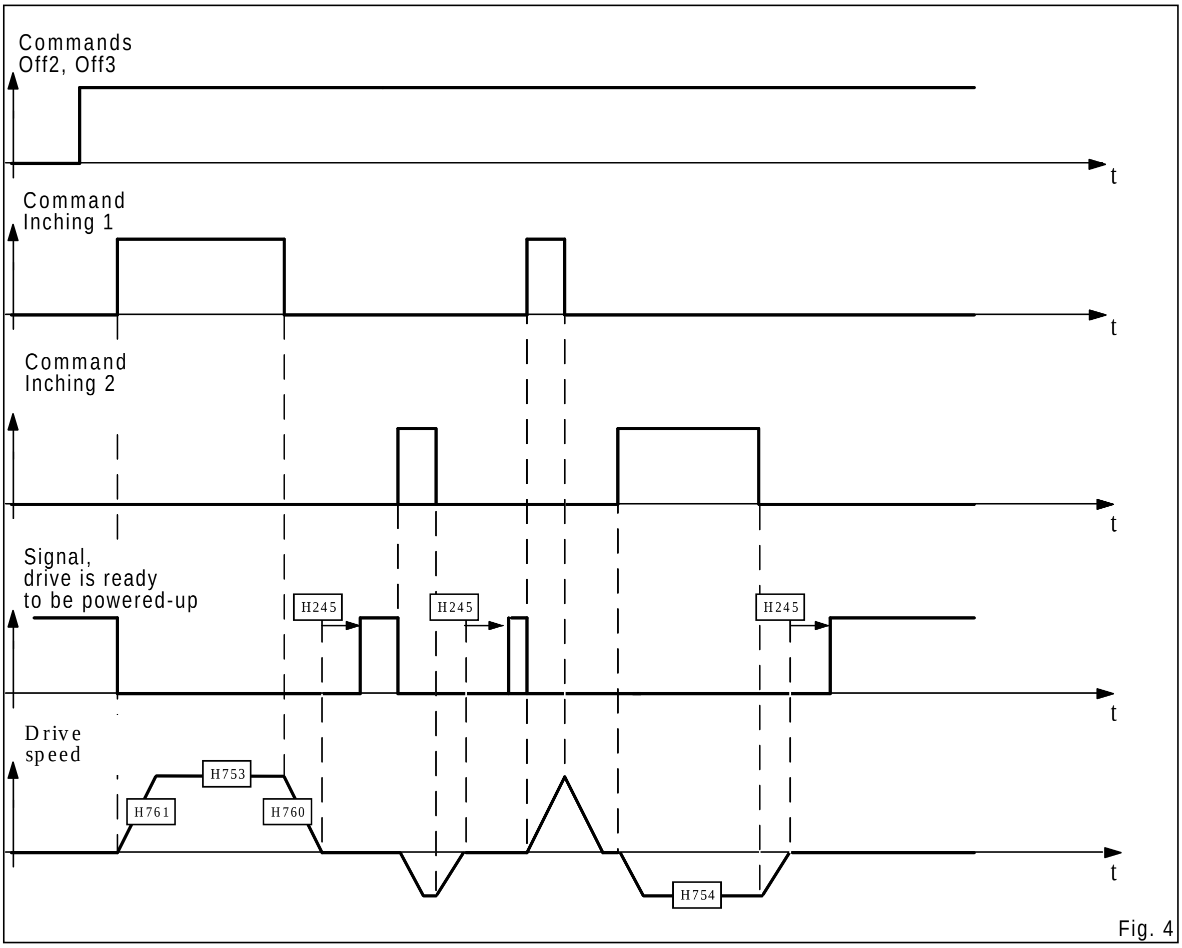


Fig. 8.2.4.1, Inching

Switching sequence, basic roll feed

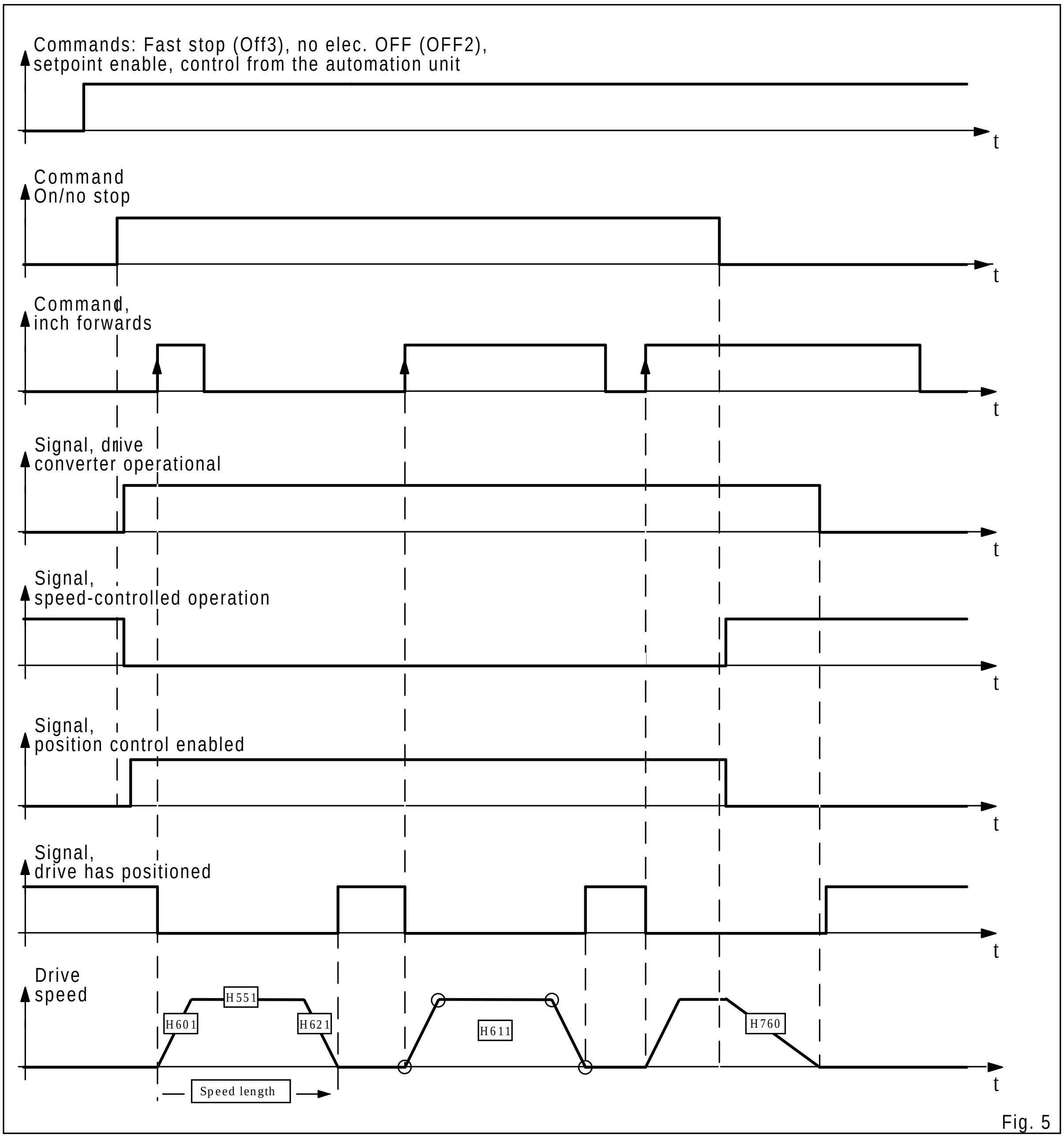


Fig. 8.2.4.2, Basic roll feed

Note
The edge for the inch forwards command should only be issued when the position reached signal is present.

8.2.5 Complete parameterization

It is assumed that you are completely knowledgeable about Section 6.

Here is an explanation of the most important parameters:

- H153:
  We recommend that the maximum count range of the pulse encoder sensing is fully utilized:
  H153 = 1 073 741 824 (= 2 to the power of 30).
- H719/ H720, integration time:
  Integration time =(1000 ms / s) x H153 / [(4 x H151) x (H152 / 60s)] = 10 485 760 ms
  The integration time is: 2^{H714} x H720
  No values > 1 500 000 can be entered in H720. ⇒H720 = 10 485 760 / 8 = 1 310 720.
  H720 = 1 310 720
  H719 = 3 (2^3 = 8).
- H350
  If the feed setpoint is entered in increments, the same value should be entered into H350 as in H153.
- H541, software limit switch B1
  H541 = H153.
- H731, H734, controller optimization
  Due to the large count range, a high kp of the position controller must be set. In this example,
  kp = H731 x H734 = 2^{12} x 100 = 409 600.

The complete list of changed parameters for the example "basic roll feed" is subsequently provided, starting from the factory setting. A brief description of how this list can be generated from SIMOVIS is briefly explained in Section 8.1.5.

```
-------------------------------------------------------------------
SIEMENS  List of download parameters               Datum: 27.08.1997
File:    WVS.T3D
         Note: This list can include parameters,
               which are not in the parameter list
         Par-No Ind            Value  Dimension parameter designation
-------------------------------------------------------------------
         01135  000                0           EN_SAV_PG1      ____
         01152  000             1500           NOM_RPM_PG1     ____
         01153  000       1073741824           NOM_LENGTH_PG1  ____
         01200  000               26           SRC_DRIVE_ON    ____
         01201  000            0001H           MSK_DRIVE_ON    ____
         01202  000               26           SRC_DRIVE_STOP  ____
         01203  000            0001H           MSK_DRIVE_STOP  ____
         01204  000               26           SRC_DRV_EL-OFF  ____
         01205  000            0002H           MSK_DRV_EL-OFF  ____
         01206  000               26           SRC_DRV_FSTSTP  ____
         01207  000            0004H           MSK_DRV_FSTSTP  ____
         01212  000               26           SRC_FAULT_ACK   ____
         01213  000            0080H           MSK_FAULT_ACK   ____
         01214  000               26           SRC_JOG1V       ____
         01215  000            0100H           MSK_JOG1V       ____
         01216  000               26           SRC_JOG2V       ____
         01217  000            0200H           MSK_JOG2V       ____
         01280  000            FFFBH           MSK_EN_FAULTS   ____
         01304  000                0           SRC_REF_ALWAYS  ____
         01350  000       1073741824           SCAL_POSREG     ____
         01353  000                1           MODE_RNDX       ____
         01360  000               27           SRC_PREF_VAR    ____
         01461  000                0           SRC_SEL_PREF    ____
         01464  000               26           SRC_EN_PREF     ____
         01465  000            0040H           MSK_EN_PREF     ____
         01468  000                4           SRC_MOD_RELPOS  ____
         01469  000            0001H           MSK_MOD_RELPOS  ____
         01471  000            0001H           MSK_DIR_RELPOS  ____
         01472  000               26           SRC_MOVE_RELPOS ____
         01473  000            1000H           MSK_MOVE_RELPOS ____
         01474  000                0           KEEP_MEM_RELPOS ____
         01541  000       1073741824           SW_SWITCH_B1_1  ____
         01601  000          100.000  ms       TU_PRAMP_1      ____
         01621  000          100.000  ms       TD_PRAMP_1      ____
         01702  000                4           SRC_EN_PC_X2    ____
         01703  000            0001H           MSK_EN_PC_X2    ____
         01706  000                4           SRC_DIRECT_RNDX ____
         01707  000            0001H           MSK_DIRECT_RNDX ____
         01719  000                3           EXP_FACTOR_TI   ____
         01720  000      1310720.000  ms       INT_TIME_PRAMP  ____
         01731  000               12           KP1_POSREG      ____
         01734  000          100.000           POSREG_KP       ____
         01742  000                4           LIM_POSITION_OK ____
         01743  000                1           HY_POSITION_OK  ____
         01753  000            4.999  %        V_REF_JOG1V     ____
         01760  000         1000.549  ms       TD_VRAMP        ____
         01761  000         1000.549  ms       TU_VRAMP        ____
         01848  000              258           SRC_DSP_V2      ____
         01860  000              221           SRC_STW_BIT0    ____
         01861  000            1000H           MSK_STW_BIT0    ____
         01862  000              221           SRC_STW_BIT1    ____
         01863  000            0200H           MSK_STW_BIT1    ____
         01864  000              221           SRC_STW_BIT2    ____
         01865  000            0100H           MSK_STW_BIT2    ____
===================================================================
                                 Page:    1
```

```
--------------------------------------------------------------------
SIEMENS  List of download parameters               Datum: 27.08.1997
File:    WVS.T3D
         Note: This list can include parameters,
               which are not in the parameter list
         Par-No Ind            Value  Dimension parameter designation
--------------------------------------------------------------------
         01866  000              221            SRC_STW_BIT3    ____
         01867  000            0001H            MSK_STW_BIT3    ____
         01868  000               79            SRC_STW_BIT4    ____
         01869  000            0008H            MSK_STW_BIT4    ____
         01870  000               10            SRC_STW_BIT5    ____
         01871  000            0004H            MSK_STW_BIT5    ____
         01872  000               10            SRC_STW_BIT6    ____
         01873  000            0001H            MSK_STW_BIT6    ____
         01900  000              221            SRC_BQ1         ____
         01901  000            1000H            MSK_BQ1         ____
         01902  000              221            SRC_BQ2         ____
         01903  000            0200H            MSK_BQ2         ____
         01904  000              221            SRC_BQ3         ____
         01905  000            0100H            MSK_BQ3         ____
         01906  000              221            SRC_BQ4         ____
         01907  000            0001H            MSK_BQ4         ____
         01908  000               79            SRC_BQ5         ____
         01909  000            0008H            MSK_BQ5         ____
         01910  000               10            SRC_BQ6         ____
         01911  000            0004H            MSK_BQ6         ____
         01912  000               10            SRC_BQ7         ____
         01913  000            0001H            MSK_BQ7         ____
         01961  000               10            SRC_CB_WORD_1   ____
         01962  000               74            SRC_CB_WORD_2   ____
         01963  000               75            SRC_CB_WORD_3   ____
         01964  000              258            SRC_CB_WORD_4   ____
====================================================================
                                 Page:     2
====================================================================
```

8.2.6 Brief start-up instructions

Warning

The relevant safety regulations of the Machinery Directive (DIN EN 954/1) and Safety of Machines (DIN EN 1037) against unexpected starting must be observed. For example, it should be noted that the drive, under fault conditions, can rotate in the opposite direction to the required material web direction, or excessive feed lengths can occur.

The safety devices used must conform to the safety regulations and include, for example, limit switches or opto-barriers, which can act on the following equipment:

- Mechanical brake
- Electrical equipment to disconnect the line- or motor-side supply voltage
- Safety off, if available

Further, the following should be observed:

- The switch for the stop function must be able to be reached, and for example, act on the above mentioned equipment. The effectiveness of this switch must be guaranteed and checked before start-up (commissioning)!
- All warning information of Section 6 must be followed as long as they involve the roll feed.

- Start-up should be executed as described in Section 6.
- **Especially all parameters, which are in the parameter lists of Section 6.1.1, must be completely entered, depending on the drive converter type!**
- Further, Section 6.2 is valid, as long as it involves this application. As it involves in this case a rotary axis, generally there are no limit switches which directly involve the closed-loop position control.
- Finally, enter parameters of Section 8.2.5, complete parameterization.
- After the T300 has been parameterized, power-down the drive converter and power-up again. This is also true, if an initialization parameter was changed; refer to the parameter list and function diagrams.

8.2.7 Possible faults/errors and counter-measures

- Faults from F116 to F131 involve the T300, the remaining faults, the basic drive.
- General fault messages:
  Refer to Section 1.8.
  Check whether the parameterization is complete and correct.
- Tracking error F121, possible causes:
  Incorrect controller optimization (H719, H720; H731, H734) or
  a new feed length is entered and transferred during operation, or the drive cannot follow the setpoint.
  For example, this can be due to accelerating times which are too short (H601, H621) or
  the drive is blocked, or cannot freely move.
  During inching forwards, re-enter the "inch forwards" command.
- Drive incorrectly positioned:
  Error in the actual value sensing, e.g. noise due to poorly routed encoder cables or
  feed length > 0.5 x (4 x H153)
- The drive cannot be commissioned or behaves erratically:
  Check the parameterization of the basic drive converter and T300 with positioning control.
  If required, establish the factory setting for the basic drive converter and T300 and re-parameterize.
- Drive moves briefly at power-on ("on/no stop" command):
  Enter the setpoint enable (bit 6, control word)
- The operating mode cannot be selected:
  Only change the operating mode (inching, on/no stop for positioning) in the status "drive converter ready to be powered-up).

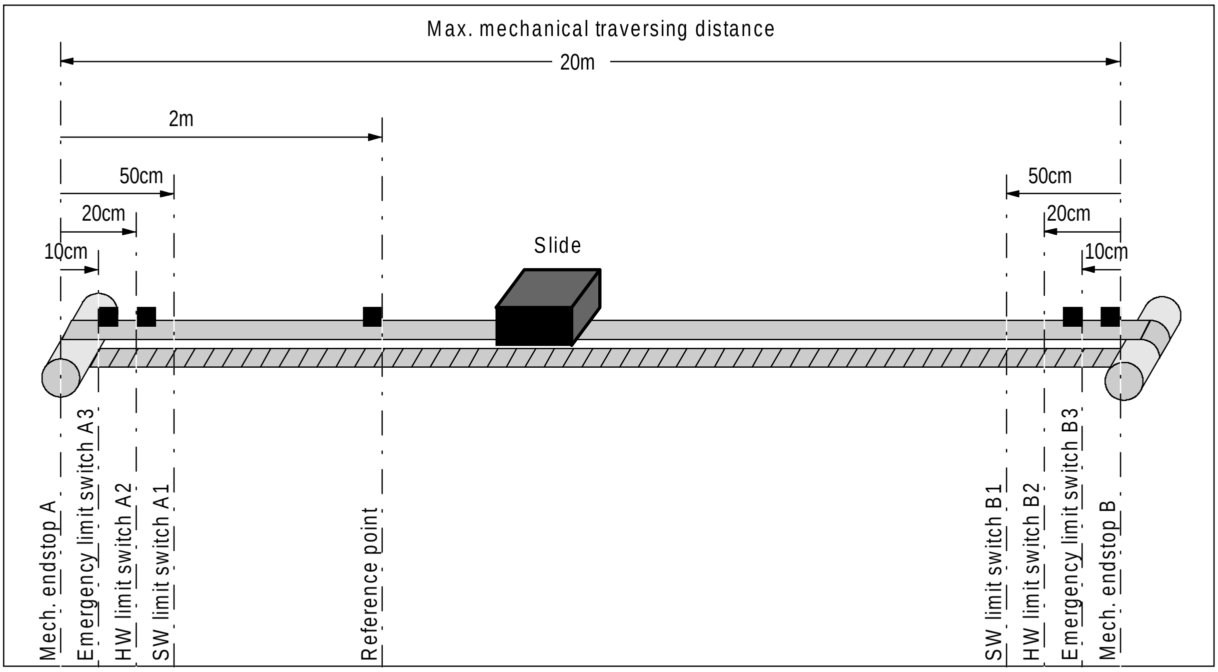
8.3 Software example with communications

The use of the positioning software package for an actual example will now follow.

8.3.1 System configuration

The following configuration is assumed in the example:

A slide is moved using toothed belts. The complete traversing distance is 20m. The motor is coupled to the drive roll through a 1:10 gearbox. The reference value is entered from the automation system via PROFIBUS. Reference values should be entered with a 0.1mm resolution. Power-on, standard stop, fast stop, inching as well as fault acknowledgement should be realized via PROFIBUS. The assignment of these control signals in the control word should be oriented to the control word assignment of the basic drive converter.



Technical data:

Pulse encoder:.......................... 1024 pulses per revolution
Gearbox:.................................. 1:10
Drive roll diameter:.................... 300 mm
Total traversing distance:.......... 20 m (= nominal length)
Max. traversing velocity .... 4 m/s
Max. acceleration...................... 2 m/s^2

8.3.2 Parameterization

The unit parameterization is now listed. The procedure is oriented to the Start-up Guide.

Step 1: Defining the binary inputs

In the first step, it is defined as to which signals are directly connected to the technology board via the SE300 interface board. These are all fast signals, and signals which are irrelevant for the automation system.
In the software example, the limit switches are directly connected to binary inputs 1 to 4. The reference signal is directly connected to the pulse encoder input (instantaneous input). The binary input assignment is shown in the overview on Sheet 2.

Step 2: Defining the telegram data transfer

The PROFIBUS profile should be PPO type 4. With this PPO type, 6 process data can be transferred in both directions. The PROFIBUS telegram should be structured as follows:

Automation → drive	
Word	Description
1	Control word
2	Position ref. value, high word
3	Position ref. value, low word
4	
5	
6	

Drive → automation	
Word	Description
1	Status word
2	Position act. value, high word
3	Position act. value, low word
4	
5	
6	

The control word from the automation system to the drive should be assigned as follows.

Bit	Description
0	On/ no stop (OFF1)
1	No electrical off (OFF2)
2	No fast stop (OFF3)
3	
4	
5	
6	Reference value enable
7	Fault/error acknowledgement
8	Inching 1
9	Request flying referencing
10	Control from PLC
11	
12	
13	
14	
15	

The status word from the drive to the automation system should be assigned as follows

Bit	Description
0	
1	
2	Operation
3	Fault/error
4	Drive has positioned
5	Drive has referenced
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	

Step 3: Parameterization of the safety functions

The emergency limit switches must be directly connected to the basic drive converter.

P559	EMERGENCY limit switch A3	CUVC, CUMC: Value 0018 = Binary input 5 CU2, CU3: Value 1001 = Binary input 1 to Value 1005 = Binary input 5
P560	EMERGENCY limit switch B3	CUVC, CUMC: Value 0020 = Binary input 6 CU2, CU3: Value 1001 = Binary input 1 to Value 1005 = Binary input 5

Step 4: Parameterization, pulse encoder sensing

H150	HW mode, pulse encoder 1	H150=0040 (tracks A, B from the CU via LBA)
H151	Pulses per revolution, pulse encoder 1	H151=1024
H152	Rated speed, pulse encoder 1	$n = \frac{4 \cdot \frac{m}{s}}{\pi \cdot 0.3 \cdot m} \cdot 10 \cdot 60 \cdot \frac{s}{min} = 2546.47 \cdot \frac{1}{min}$ H152=2546
H153	Normalization, position actual value 1	$\text{Pulse} = \frac{20 \cdot m}{\pi \cdot 0.3 \cdot m} \cdot 1024 \cdot 4 \cdot 10 = 869198.19$ H152=869198

Step 5: Parameterization, reference value generation

H720	Integration time of the position control	$Ti = \frac{Nominal\_length}{Rated\_velocity} = \frac{20 \cdot m}{4 \cdot \frac{m}{s}} = 5 \cdot s$ H720=5000ms
H350	Scaling, position control	H350=**20**0000
H351	Reference point position	H351=**2**0000
H360	Source, variable position reference value	H360=27 (CB receive word 2) Position ref. value, high word in K027 Position ref. value, low word in K028
H531	Software limit switch A1	H531=5000
H541	Software limit switch B1	H541=**19**5000
H601	Ramp-up time, position ramp-function generator	$Tu = \frac{4 \cdot \frac{m}{s}}{2 \cdot \frac{m}{s^2}} = 2 \cdot s$ H601=2000[ms]
H611	Rounding-off time constant, pos. RFG	H611=100[ms]
H621	Ramp-down time, position ramp-function generator	Same setting as for H601 H621=2000[ms]
H641	Down ramp A2	$T_A = \frac{2 \cdot 0.2 \cdot m}{4 \cdot \frac{m}{s}} = 0.1 \cdot s$ H641=100[ms]
H651	Down ramp B2	H651=100[ms]
H760	Ramp-up time, speed-controlled mode	H760=5000[ms]
H761	Ramp-down time, speed-controlled mode	H761=5000[ms]
H722	Normalization, acceleration	H722=2000[ms] (=lowest ramp-up/ramp-down time)

Step 6: Parameterization, open-loop control

H200/ H201	Power-up	H200=26 (CB receive word 1) H201=0001h (bit 0)
H202/ H203	Standard stop (OFF1)	H202=26 (CB receive word 1) H203=0001h (bit 0)
H204/ H205	Electrical off (OFF2)	H204=26 (CB receive word 1) H205=0002h (bit 1)
H206/ H207	Fast stop (OFF3)	H206=26 (CB receive word 1) H207=0004h (bit 2)
H212/ H213	Fault acknowledgement	H214=26 (CB receive word 1) H215=0080h (bit 7)
H214/ H215	Inching 1, speed-controlled	H214=26 (CB receive word 1) H215=0100h (bit 8)

Step 7: Parameterization, referencing control

H228/ H229	Hardware limit switch A2	H228=45 (binary inputs) H229=0002h (input 2)
H230/ H231	Hardware limit switch B2	H228=45 (binary inputs) H229=0008h (input 4)
H302/ H303	Flying referencing	H302=26 (CB receive word 1) H303=0200h (bit 9)
H330	V set for the referencing direction A→B	H330=2%
H332	V set for the referencing direction B→A	H332=-2%

Step 8: Parameterization, checkback signals

H864/ H865	Freely-definable status word, bit 2	H864=10 (status word 1 from CU) H865=0004h (operating checkback signal)
H866/ H867	Freely-definable status word, bit 3	H866=10 (status word 1 from CU) H867=0008h (drive faulted)
H868/ H869	Freely-definable status word, bit 4	H868=221 (status word, position control) H869=1000h (drive has positioned)
H870/ H871	Freely-definable status word, bit 5	H870=91 (status word, referencing control) H871=0010h (drive has referenced)
H961	Send word 1 to CB	H961=258 (freely-definable status word)
H962	Send word 2 to CB	H962=074 (position actual value, high word)
H963	Send word 3 to CB	H963=074 (position actual value, low word)

8.4 Connecting a pulse-serial absolute value encoder to the pulse encoder input

8.4.1 Reason for the application

When using pulse-serial absolute value encoders, the reference motion required for conventional pulse encoders is no longer required. The encoder can be connected to the T300, and is supported by the standard positioning software package positioning.

8.4.2 Mode of operation when the reference motion is replaced

- The pulse-serial absolute encoder sends, when requested by a control command, a number of pulses corresponding to its actual position. The pulses have the so-called data load frequency and are hooked-up to the position actual value counter of the T300. After the pulses have been transmitted, the actual position is available for the closed-loop position control.
- Controlling the send/receive process:
  T300 generates the required control sequence.This normally occurs when the power supply is switched on (Standard case, H320 = 0). The pulse transmit process may also be started at any time by the use of an external command, providing that the inverter inhibit command is valid and v =0 (zero speed).
- Characteristics as for „standard“ positioning operation:
  The positioning command operates the same as for a standard pulse encoder.

8.4.3 Location, additional measuring systems which can be connected, dimension drawing

Can be used as

- mounted encoder on the machine (preferred operating mode) or
- encoder mounted on the motor
- pulse-serial linear encoders are also supported by the T300/ MS380.
- Dimension drawing, refer to Section 11, Appendix A.

Note:
Refer to Section 8.4.10 for the possibilities of mounting the encoders onto Siemens motors

8.4.4 Features of the incremental-serial absolute value encoder

Data according to TR-Electronic, Status 1/97. If in doubt, the data of TR-Electronic are valid.

- Encoder type: CE-65-M with push-pull output, 11 to 27V, Item No.: 110-01336. The number ma change if customer parameterization via TR-Electronic is carried out.
  Refer to the order data for information about the manufacturer.
- Max. 1024 pulses/revolution (÷4096 steps/revolution.), max. 4096 revolutions can be stored, which corresponds to a max. 24 bit resolution
  Factory setting: 1024 pulses/revolution (corresponds to 4096 steps), 4096 revolutions
- Counting direction is the clockwise direction/counter-clockwise direction (clockwise-/counter-clockwise rotation); this can be set
  Factory setting: Increasing in the clockwise direction.
- Preset 1 and preset 2:
  Factory setting: Preset value 1 = 0. Preset value 2: 2 .
  When actuating the binary signal from preset 1 or 2, the encoder has the absolute position of the preset value.
  Binary signals, preset 1, 2: The polarity of the edge and response delay can be set.
  Factory setting: The preset value is transferred with the rising edge after a delay time has expired.
  Delay time: Factory setting: 50ms, this can be set from 10 to 255ms.
- Operating voltage 11 to 27V, power consumption 2W (approximately corresponds to 140mA at 15V and 90mA at 24V) plus the current corresponding to the current requirements of the outputs (max. approx. 200mA corresponding to the cable length and maximum frequency).

- Output voltage at K1, K2 is approximately the same as the operating voltage; output current per channel, 100mA.
- Current requirements of the control inputs <5mA at 24V.
- Data load output, max. output current ≤100mA
- Operating speed <3000 RPM
- Max. output frequency = data load frequency
- The data load frequency can be set between 2kHz and 115kHz.
  Factory setting: 14.9kHz
- Max. angular acceleration: 10^4 rad/s^2

8.4.5 Ordering and engineering information

8.4.5.1 General ordering information

- The encoders should be ordered from TR-Electronic GmbH, Eglishalde 6, D-78647 Trossingen, Tel: ++49-7425/228-0, Fax: -33.
- Additional technical data and options for the encoder types and linear encoder, should also be inquired from TR-Electronic.
- Encoder parameterization
  Refer to Section 8.4.5.2 for the quantities which must be parameterized
  - * When appropriately ordered, TR-Electronic will parameterize the encoder.
  - * A handheld device (PT-100) as well as a PC program (EPROG) to parameterize the encoder is available for the user. An interface adapter is required when using EPROG with a PC/ PG.
- A clamp for CE-65-M, may be required when mounting
- Encoder power supply 15V, ±5%, 1A. A 24V power supply may also be used if the cable length does not exceed 50m and a low output frequency (<25kHz) is used. The power for the encoder should not be taken from the general 24V cabinet power supply.

8.4.5.2 Ordering and configuring the encoder

- Encoder type: As specified.
- Parameterization:
  The following encoder parameters must be adapted to the particular application and specified when ordering if you do not intend to parameterize the encoder yourself (refer to 8.4.5.1).

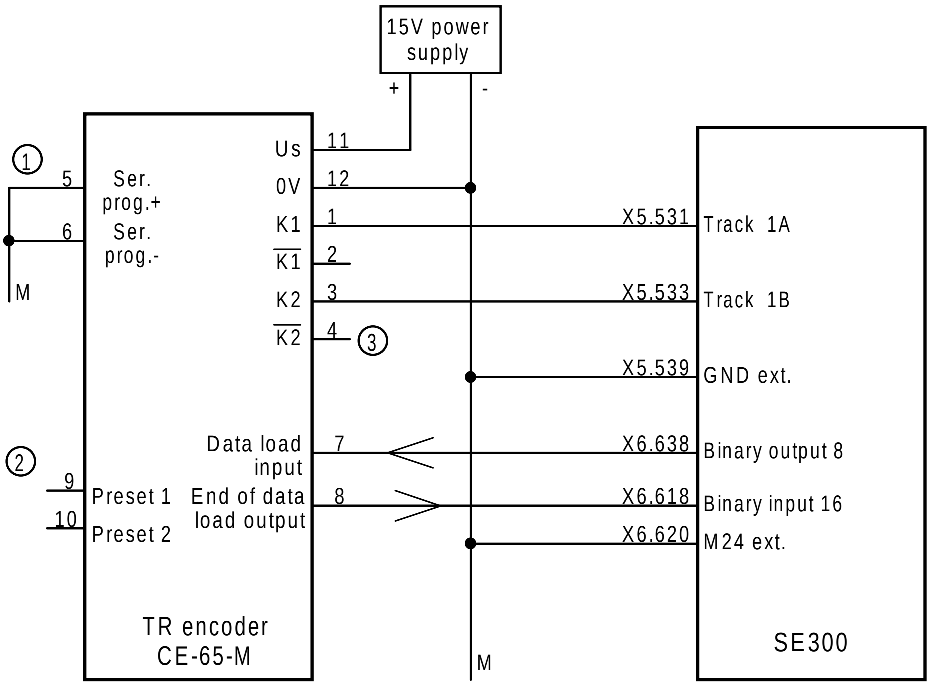
Parameter	Linear axis	Rotary axis
Data load frequency **1)**	**>** (max. encoder speed [RPM]) x (pulses/revolution)	**>** (max. encoder speed [RPM]) x (pulses/revolution)
Pulses/revolution	Generally adaption is not required	Generally adaption is not required
Number of encoder revolutions	Adaption is not required	Observe Section 8.4.7!
Counting direction	Observe Section 8.4.7!	Adaption is not required
Preset values 1 and 2	Generally adaption is not required	Generally adaptions not required

1)

Caution
Data load frequency (factory setting 14.9 kHz) must always be greater than the product of (max. encoder speed [RPM]) x (pulses/revolution). (when used as encoder at the motor shaft: 870 revolutions/min correspond to 14.9kHz**!**)

8.4.6 Connection example:

8.4.6.1 Connection diagram CE-65-M to SE300/ T300



Circled numbers: Refer to the text

Fig. 8.4.6.1: Connecting TR encoders at the SE300 terminal block

Explanation of the numbers in circles:

1 The connection is only required if the encoder is to be parameterized/programmed. The connections must afterwards be connected to ground or not connected in the encoder connector.

2 Inputs to set the encoder zero point, refer to Section 8.4.9. If the inputs are not used, do not connect them to the encoder connector, connect them to ground in the cabinet, or inhibit them using the EPROG programming software. This is also valid if the preset inputs are used for start-up.

3 The inverted tracks are not evaluated.

8.4.6.2 Parameterization of the connection example:

Assumptions:

The connection example is based on the following assumptions:

- The pulse-serial encoder is used as mounted encoder. This means that the motor-related encoder only supplies the drive converter (VC or SC).
- Pulse encoder evaluation 1, function diagram [A6] is used

Parameter list to Fig. 8.4.6.1

Parameter	Value	Explanation
H150	X0XX	Pulse encoder signals come from X5.531, 533 [A6]
H335	1	Positioning using the TR encoder
H336	45	End of data load output, TR encoder read-in via binary input X6.618 (H336/ H337) [A4, B11]
H337	8000h	Masking, binary input 16
H351	0	Refer to Section 8.4.9
H914	92	Data load input of the TR encoder is supplied via X6.638 (H914/ H915) [A4, B11]: Status word 2, referencing control, connector K092 is the source for binary output 8.
H915	0400h	Masking, status bit TR encoder, data load input

Note:

With the connection example and parameterization described in this section, the absolute value present in the TR encoder is automatically transferred to the T300 after the board powers-up. The process is implemented using a control unit provided on the T300.

The data load sequence can be initiated at any time using the command „referencing with the TR encoder“ function diagram [B11], parameter H338/ H339 when the inverter is inhibited and the drive is at a standstill.

Comment:
This connection example can be seamlessly integrated into the example under Section 8.1. The following parameters should be set differently from those in the example:
H300 = 0, H301 = 0h (no referencing with shutdown).

Only if the following is required:

H338 = 45, H339 = 1000h, this means that the TR encoder can be initiated at any time via terminal X6.612. Refer to the information and function diagram [A4] and [B11].

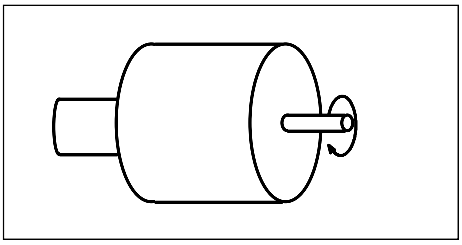
Note:
It goes without saying that the hardware/emergency limit switches can be/must be connected.

8.4.7 Additional configuring instructions

Instructions regarding the following are provided in this section:

- Direction of rotation / count direction
- Number of encoder revolutions
- Maximum travel length.

To define the direction of rotation / count direction:



Direction of rotation / count direction, encoder shaft:
This is valid when viewing the encoder shaft end.
Illustrated: Clockwise direction of rotation.

Linear axis

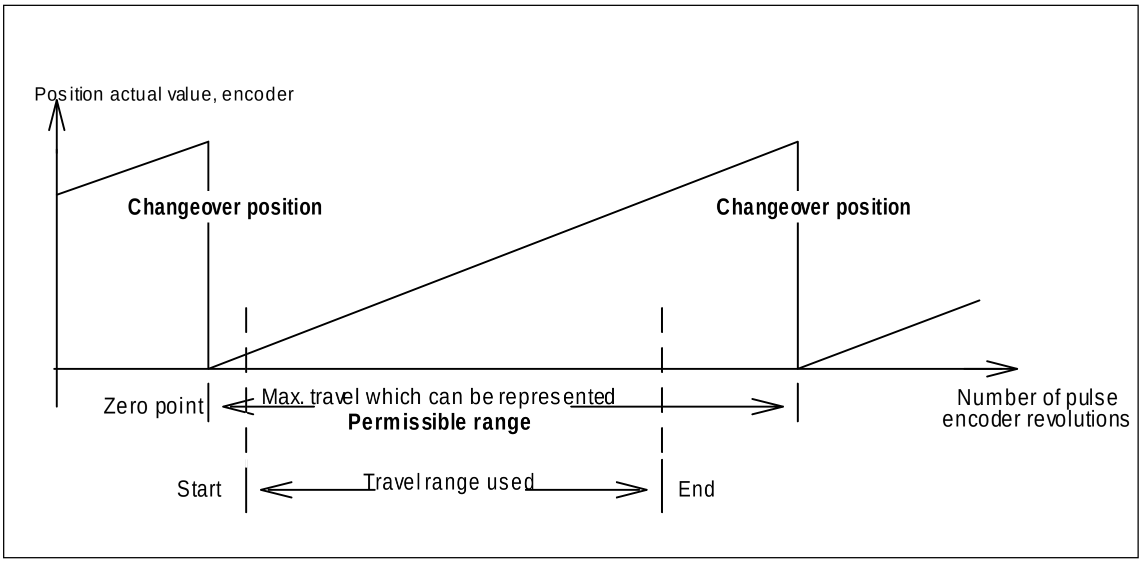


Fig. 8.4.7.1: Traversing travel

Conditions for use:

- The longest possible travel must be able to be represented by the encoder. This is in practice generally the case.

- The positioning drive must move within the represented travel range and must not reach the limits.

- Locate the encoder zero point, so that under no circumstances the „changeover position“ (of the zero transition) is reached between the position actual value of the encoder = 0 and = max. This is also valid for the zero points set with preset, refer to Section 8.4.8.

- If the encoder rotates from the start of travel with the lowest position actual value to the traversing travel end with the highest position actual value with a **clockwise direction or rotation**, then the **count direction is in the clockwise sense** (factory setting, clockwise direction of rotation) (refer to the note below).

- If the encoder rotates from the start of travel with the lowest position actual value to the end of travel with highest position actual value with a **counter-clockwise direction of rotation**, the **count direction must be ordered for the counter-clockwise sense** (counter-clockwise direction of rotation) (refer to the note below).

Note
The direction of rotation/count direction must be adapted to the system requirements. There are 2 possibilities: - Encoder, if required, is parameterized for counter-clockwise. - Mechanically mount the encoder, so that the position actual value increases when rotating clockwise.

Rotary axis

Note
The number of encoder revolutions must be adapted to the system requirements.

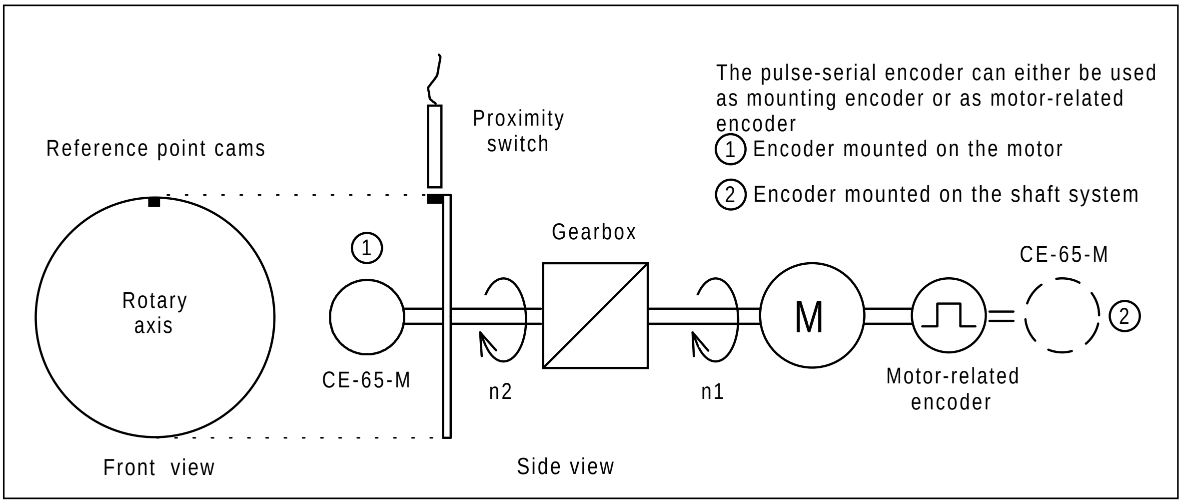


Fig. 8.4.7.2: Rotary axis

Precautions:

- The proximity switch is required in spite of the fact that an incremental absolute value encoder is used, independent of whether the encoder is directly mounted on the motor or directly on the rotary axis.

- Encoder mounted on the motor:
  The n2 / n1 ratio must be an integer number which assumes that there is an appropriate gearbox.
  The following is valid: Number of encoder revolutions = n2 / n1.

- Encoder directly (1:1) mounted on the rotary axis:
  Number of encoder revolutions = 1.

Information regarding reference cam with proximity switch:
The reference cam with proximity switch is not required if the motor-related encoder and TR encoder are directly coupled (1:1 speed ratio), and the motor-related encoder outputs a zero pulse every revolution.

8.4.8 Setting the encoder zero point

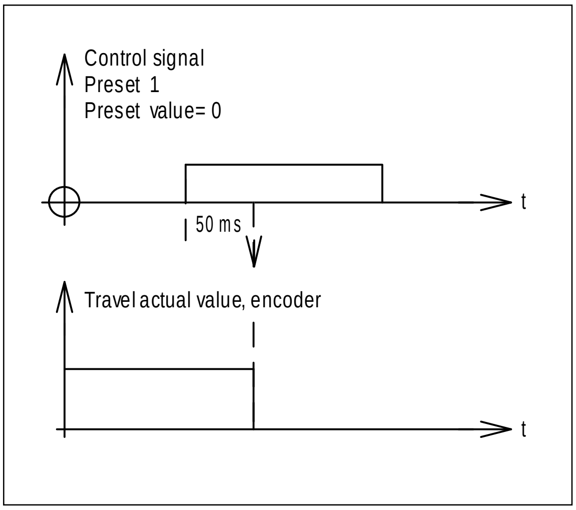


Fig. 8.4.9: Influence of the preset signal

Using the preset signal, the encoder can be set to a specific absolute value, in this case zero.

It is therefore no longer necessary to search for and set the absolute encoder zero point. Procedure when adjusting the encoder, examples:

Note for commissioning:

Following the Preset 1 command, it is recommended to turn the encoder in a clockwise direction (if ordered so, otherwise counter-clockwise) approximatly one revolution and then start the pulse transmission process / data output process using either a binary signal (see parameter H338 / H339, Function plan [B11]) or removing the unit power supply and reconnecting. This method allows the functionality of the transmission process / data output process to be easily tested.

The data load / transmission process may be more easily understood if the position actual value is set to zero via Parameters H131 / H132 (Reset) Function plan [A6] before the transmission process is started. Setting the position actual value to zero externally before starting the transmission process in order to understand the process is only a suggestion and is not absolutely necessary.

<u>Case 1:</u>	The encoder, connected with the part to be positioned, can be moved to the zero point of the travel range.
Step 1	Move the positioning drive to the zero point of the travel range.
Step 2	Actuate preset 1, whereby the preset value corresponds to factory setting 0.
Step 3	Move the encoder away from the zero point, observe the count direction (direction of rotation), refer to Section 8.4.7
Step 4	For mechanical reversals, ensure that the zero point for the linear axis is never reached during positioning, refer to Section 8.4.7.
Step 5	Output the „reference TR encoder“ command, function diagram [B11]. With the drive inhibited, check whether the loaded position coincides with the drive position. Read-out the information at visualization parameter d22 when using pulse encoder evaluation 1 [function diagram A6].

Case 2:	The encoder can, when connected with the part to be positioned, not be moved to the zero point of the traversing travel.
Step 1	Move the positioning drive as close as possible to the zero point.
Step 2	De-couple the encoder and rotate it (count), until the zero point is approximately reached.
Step 3	Depress preset 1, whereby the preset value corresponds to factory setting 0.
Step 4	Rotate the encoder back through the counted rotations and couple it back to the system.
Step 5	Output the „reference TR encoder“ command, function diagram [B11]. With the drive inhibited, check as to whether the loaded position approximately coincides with the drive position. Read this data at visualization parameter d22 when using pulse encoder evaluation 1 [function diagram A6], also refer to 8.4.9, Reference value offset input.

Case 3:	The EPROG program is available. The encoder is coupled.
Step 1	Determine the drive position.
Step 2	Enter the appropriate position, using EPROG as preset value 1, referred to the travel zero point.
Step 3	Actuate preset 1
Step 4	Output the „reference TR encoder“ command, function diagram [B11]. With the drive inhibited, check as to whether the loaded position coincides with the drive position. Read-out the data at visualization parameter d22 when using pulse encoder evaluation 1 [function diagram A6].

Caution
After the preset value has been entered, as shown in Fig. 8.4.6.1, preset 1 and 2 should be left open, connected to ground in the cabinet, or inhibited using the EPROG programming software. **Never** connect to T300 outputs or a PLC.

8.4.9 Entering a setpoint offset

Using parameter H351=position hardware reference point, the reference input can be precisely adjusted, even if the pulse serial absolute value encoder is not precisely adjusted when referred to the travel zero point. The position actual value is set to this value when data load is started. This value is then added to the pulse encoder count status, and may also have negative values.

Caution
After the encoder has been set, move the drive to the minimum and maximum travel limits and check whether the position actual values measured there (visualization parameter d22), coincide with the mechanical measured travel, after the „reference TR encoder“ command has been output, function diagram [B11].

8.4.10 Possibilities of mouting the encoder to the motor

Note
The possibility of mounting a CE-65-M encoder to the motor must be clarified as quickly as possible, as a CE 65-M encoder can neither be mounted on every motor nor on every speed encoder, especially for SIMOVERT SC!

Note
The encoder must be mounted so that it doesn't exert a torque at the encoder shaft.

The department indicated below can mount the TR encoders to the Siemens motors listed in the table. Also inquire with that department if motors and third-party motors are not specified.

Motor	Encoder mounted as standard	Used for
1LA5, 1LA6, with cast iron cowl	Motor is shipped without an encoder. CE-65-M can be directly mounted. The encoder is only connected to the CU2 board.	VC
1PH6	Resolver or ROD 323	VC
1FK6, 1FT6	Resolver	SC

Note
TR encoders cannot be mounted onto motors with ERN 1387 encoders.

The following department can mount the encoders:

Siemens AG

Maschineninstandhaltung ANL/ VREG/ MTW/ TD1

Im Schiffelland 10

D-66386 St. Ingbert

For information contact:

Herr Dörr and Herr Hansicker

Tel: ++49/6894-891-207, Fax: ++49/6894-891-212

8.4.11 Parameterizing the encoder via PC/PG, connection diagram

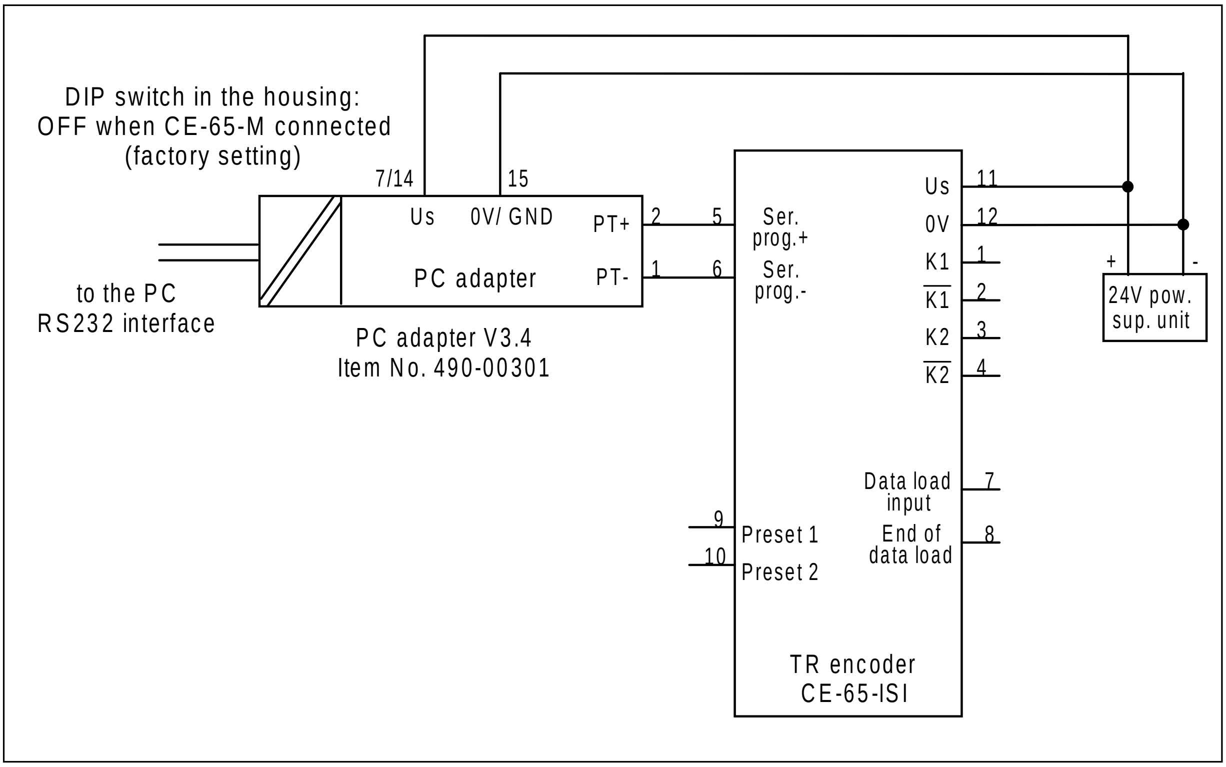


Fig. 8.4.13: Connecting an encoder to the PC/ PG to parameterize it using EPROG

Instructions for parameterization using EPROG :

- EPROG can only run under MS-DOS®, Version ≥ 3.0,
  It cannot run under Windows 3.1 and Windows 95
- Free main memory > 450kB.

9 Short parameter list / logbook

The logbook must be completed after commissioning has ended. Always keep the logbook ready for any inquiries/questions. Complete entries are important for maintenance/service, and could be important for warranty cases.

Installation location:			Drive:	
	Date	Name	Department	Signature
Start-up setting				
Start-up setting change				
Software release, positioning software package:				

Parameter No.		Designation	Factory setting	Start-up value	Change after start-up
H100		Mask, enable system error bits	0429h		
H101		Length, receive telegram, peer-to-peer	5		
H102		Mask, invert binary inputs	0000h		
H104		Mask, simulation, control word from CB	0000h		
H110		Gain, analog output 1	50%		
H111		Offset, analog input 1	0%		
H112		Smoothing, analog input 1	10[ms]		
H113		Gain, analog input 2	50%		
H114		Offset, analog input 2	0%		
H115		Smoothing, analog input 2	10[ms]		
H116		Gain, analog input 3	50%		
H117		Offset, analog input 3	0%		
H118		Smoothing, analog input 3	40[ms]		
H119		Gain, analog input 4	50%		
H120		Offset, analog input 4	0%		
H121		Smoothing, analog input 4	40[ms]		
H122		Gain, analog input 5	50%		
H123		Offset, analog input 5	0%		
H124		Smoothing, analog input 5	160[ms]		
H125		Gain, analog input 6	50%		
H126		Offset, analog input 6	0%		
H127		Smoothing, analog input 6	160[ms]		

Parameter No.		Designation	Factory setting	Start-up value	Change after start-up
H128		Gain, analog input 7	50%		
H129		Offset, analog input 7	0%		
H130		Smoothing, analog input 7	320[ms]		
H131		Source, reset position actual value 1	0		
H132		Mask, reset position actual value 1	0000h		
H133		Source, set position actual value 1	0		
H134		Mask, set position actual value 1	0000h		
H135		Enable transfer, P act 1 from NOVRAM	1		
H136		Source, reset position actual value 2	4		
H137		Mask, reset position actual value 2	0001h		
H138		Source, set position actual value 2	0		
H139		Mask, set position actual value 2	0000h		
H140		Enable transfer, P act 2 from NOVRAM	1		
H141		Source, zero pulse evaluation 2 enable	4		
H142		Mask, zero pulse evaluation 2 enable	0001h		
H150		Hardware mode, pulse encoder 1	1064h		
H151		Pulses per revolution, pulse encoder 1	1024		
H152		Rated speed, pulse encoder 1	3000		
H153		Normalization, position actual value 1	4096000		
H154		Control word, pulse encoder 1	0000h		
H155		Hardware mode, pulse encoder 2	1004h		
H156		Pulses per revolution, pulse encoder 2	1024		
H157		Rated speed, pulse encoder 2	3000		
H158		Normalization, position actual value 2	1073741824		
H159		Control word, pulse encoder 2	0000h		
H162		Smoothing, speed actual value 1	10[ms]		
H163		Smoothing, speed actual value 2	10[ms]		
H164		Source, internal speed actual value	60		
H165		Tolerance limit, zero velocity signal	0.5%		
H166		Hysteresis, zero velocity signal	0.1%		
H167		Source, position actual value from dual port RAM	0		
H168		Source, pos. actual value for the closed-loop control	62		
H169		Source, position setting value, pulse encoder 1	0		
H170		Source, position setting value, pulse encoder 2	0		
H180		Source, hibyte bit enable, byte-serial	0		
H181		Mask, hibyte bit enable, byte-serial	0000h		
H182		Setting time, byte-serial	40[ms]		
H183		Number of positions, thumbwheel switch	4		

Parameter No.		Designation	Factory setting	Start-up value	Change after start-up
H184		Normalization factor, thumbwheel switch	100		
H185		BCD coding, thumbwheel switch	1		
H186		With sign, thumbwheel switch	0		
H187		Source, bit 0 from the thumbwheel switch	0		
H188		Mask, bit 0 from the thumbwheel switch	0000h		
H189		Source, bit 1 from the thumbwheel switch	0		
H190		Mask, bit 1 from the thumbwheel switch	0000h		
H191		Source, bit 2 from the thumbwheel switch	0		
H192		Mask, bit 2 from the thumbwheel switch	0000h		
H193		Source, bit 3 from the thumbwheel switch	0		
H194		Mask, bit 3 from the thumbwheel switch	0000h		
H195		Source, data transfer bit, thumbwheel switch	0		
H196		Mask, data transfer bit, thumbwheel switch	0000h		
H200		Source, on	0		
H201		Mask, on	0000h		
H202		Source, no standard stop	0		
H203		Mask, no standard stop	0000h		
H204		Source, no electrical off	0		
H205		Mask, no electrical off	0000h		
H206		Source, no fast stop	0		
H207		Mask, no fast stop	0000h		
H208		Source, inverter enable	4		
H209		Mask, inverter enable	0001h		
H210		Source, setpoint enable	4		
H211		Mask, setpoint enable	0001h		
H212		Source, fault/error acknowledgement	0		
H213		Mask, fault/error acknowledgement	0000h		
H214		Source, inching 1, speed-controlled	0		
H215		Mask, inching 1, speed-controlled	0000h		
H216		Source, inching 2, speed-controlled	0		
H217		Mask, inching 2, speed-controlled	0000h		
H218		Source, speed control 1	0		
H219		Mask, speed control 1	0000h		
H220		Source, speed control 2	0		
H221		Mask, speed control 2	0000h		
H222		Source, speed control 3	0		
H223		Mask, speed control 3	0000h		
H224		Source, inching 1, position-controlled	0		

Parameter No.		Designation	Factory setting	Start-up value	Change after start-up
H225		Mask, inching 1, position-controlled	0000h		
H226		Source, inching 2, position-controlled	0		
H227		Mask, inching 2, position-controlled	0000h		
H228		Source, hardware limit switch A2	0		
H229		Mask, hardware limit switch A2	0000h		
H230		Source, hardware limit switch B2	0		
H231		Mask, hardware limit switch B2	0000h		
H232		Source, hardware limit switch A3	0		
H233		Mask, hardware limit switch A3	0000h		
H234		Source, emergency limit switch B3	0		
H235		Mask, emergency limit switch B3	0000h		
H236		Enable stop after passing hardware limit switch	1		
H240		Enable control, holding/operating brake	0		
H241		Mask, control bits, immediately close brake	0700h		
H242		Mask, control bits, close brake at v=0	080Fh		
H243		Time, open holding brake	0[ms]		
H244		Time, close holding brake	0[ms]		
H245		Time for inching	3 000[ms]		
H246		Toler. time, checkback signal error, drive converter	1000[ms]		
H250		Source, bypass control word 1 at CU	0		
H251		Mask, bypass control word 1 at CU	0000h		
H253		Source, bypass control word 2 at CU	0		
H254		Mask, bypass control word 2 at CU	0000h		
H260		Tolerance time, communications with CB	160[ms]		
H261		Tolerance time, communications with CU	160[ms]		
H262		Source, user error 1	4		
H263		Mask, user error 1	0001h		
H264		Tolerance time, user error 1	1000[ms]		
H265		Source, user error 2	4		
H266		Mask, user error 2	0001h		
H267		Tolerance time, user error 2	960[ms]		
H268		Tolerance time, peer-to-peer communications	160[ms]		
H269		Overspeed error threshold	120%		
H270		Threshold pulse encoder fault	10%		
H271		Tolerance time, pulse encoder fault	960[ms]		
H272		Threshold, speed act. value for anti-stall protection	0.5%		
H273		Threshold, speed setpoint for anti-stall protection	1%		
H274		Threshold, torque act. value for anti-stall protection	80%		

Parameter No.		Designation	Factory setting	Start-up value	Change after start-up
H275		Tolerance time for anti-stall protection	960[ms]		
H280		Masking, fault/error signals	FFFFh		
H281		Masking, alarms	0000h		
H300		Source, referencing with shutdown	0		
H301		Mask, referencing with shutdown	0000h		
H302		Source, flying referencing	0		
H303		Mask, flying referencing	0000h		
H304		Source, automatic post-referencing	4		
H305		Mask, automatic post-referencing	0001h		
H308		Source, pre-contact to the reference point	0		
H309		Mask, pre-contact to the reference point	0000h		
H310		Source, start direction when referencing	0		
H311		Mask, start direction when referencing	0000h		
H312		Minimum approach path when referencing	0		
H320		Reset referencing signal at each power-up	0		
H322		Tolerance range, reference point	0		
H330		V set, referencing direction A->B	10%		
H331		V set, referencing direction A->B slow	5%		
H332		V set, referencing direction B->A	-10%		
H333		V set, referencing direction B->A slow	-5%		
H335		TR-encoder enable	0		
H336		Source TR-encoder download complete output	0		
H337		TR-encoder download complete mask	0000h		
H338		TR-encoder reference source	0		
H339		TR-encoder reference mask	0000h		
H340		Waiting time download process TR-encoder	1 000 ms		
H341		Maximum downloading time TR-encoder	600 000 ms		
H350		Scaling, closed-loop position control	100 000		
H351		Position of the hardware reference point	0		
H352		Correction factor	100%		
H353		Rotary axis mode	0		
H359		Source, position setpoint, variable word quantity	0		
H360		Source, position setpoint, variable	0		
H361		Position reference value 1	0		
H362		Position reference value 2	0		
H363		Position reference value 3	0		
H364		Position reference value 4	0		
H365		Position reference value 5	0		

Parameter No.		Designation	Factory setting	Start-up value	Change after start-up
H366		Position reference value 6	0		
H367		Position reference value 7	0		
H368		Position reference value 8	0		
H369		Position reference value 9	0		
H370		Position reference value 10	0		
H371		Position reference value 11	0		
H372		Position reference value 12	0		
H373		Position reference value 13	0		
H374		Position reference value 14	0		
H375		Position reference value 15	0		
H376		Position reference value 16	0		
H377		Position reference value 17	0		
H378		Position reference value 18	0		
H379		Position reference value 19	0		
H380		Position reference value 20	0		
H381		Position reference value 21	0		
H382		Position reference value 22	0		
H383		Position reference value 23	0		
H384		Position reference value 24	0		
H385		Position reference value 25	0		
H386		Position reference value 26	0		
H387		Position reference value 27	0		
H388		Position reference value 28	0		
H389		Position reference value 29	0		
H390		Position reference value 30	0		
H391		Position reference value 31	0		
H392		Position reference value 32	0		
H393		Position reference value 33	0		
H394		Position reference value 34	0		
H395		Position reference value 35	0		
H396		Position reference value 36	0		
H397		Position reference value 37	0		
H398		Position reference value 38	0		
H399		Position reference value 39	0		
H400		Position reference value 40	0		
H401		Position reference value 41	0		
H402		Position reference value 42	0		
H403		Position reference value 43	0		

Parameter No.		Designation	Factory setting	Start-up value	Change after start-up
H404		Position reference value 44	0		
H405		Position reference value 45	0		
H406		Position reference value 46	0		
H407		Position reference value 47	0		
H408		Position reference value 48	0		
H409		Position reference value 49	0		
H410		Position reference value 50	0		
H411		Position reference value 51	0		
H412		Position reference value 52	0		
H413		Position reference value 53	0		
H414		Position reference value 54	0		
H415		Position reference value 55	0		
H416		Position reference value 56	0		
H417		Position reference value 57	0		
H418		Position reference value 58	0		
H419		Position reference value 59	0		
H420		Position reference value 60	0		
H421		Position reference value 61	0		
H422		Position reference value 62	0		
H423		Position reference value 63	0		
H424		Position reference value 64	0		
H425		Position reference value 65	0		
H426		Position reference value 66	0		
H427		Position reference value 67	0		
H428		Position reference value 68	0		
H429		Position reference value 69	0		
H430		Position reference value 70	0		
H431		Position reference value 71	0		
H432		Position reference value 72	0		
H433		Position reference value 73	0		
H434		Position reference value 74	0		
H435		Position reference value 75	0		
H436		Position reference value 76	0		
H437		Position reference value 77	0		
H438		Position reference value 78	0		
H439		Position reference value 79	0		
H440		Position reference value 80	0		
H441		Position reference value 81	0		

Parameter No.		Designation	Factory setting	Start-up value	Change after start-up
H442		Position reference value 82	0		
H443		Position reference value 83	0		
H444		Position reference value 84	0		
H445		Position reference value 85	0		
H446		Position reference value 86	0		
H447		Position reference value 87	0		
H448		Position reference value 88	0		
H449		Position reference value 89	0		
H450		Position reference value 90	0		
H451		Position reference value 91	0		
H452		Position reference value 92	0		
H453		Position reference value 93	0		
H454		Position reference value 94	0		
H455		Position reference value 95	0		
H456		Position reference value 96	0		
H457		Position reference value 97	0		
H458		Position reference value 98	0		
H459		Position reference value 99	0		
H460		Position reference value 100	0		
H461		Source, select data set, position reference value	5		
H462		Mask, select data set, position reference value	FFFFh		
H463		Shift position reference value selection bits to right	0		
H464		Source, enable position reference value from DB	4		
H465		Mask, enable position reference value from DB	0001h		
H466		Reference value, inching 1, position-controlled	0		
H467		Reference value, inching 2, position-controlled	0		
H468		Source, relative positioning mode	0		
H469		Mask, relative positioning mode	0000h		
H470		Source, relative positioning traverse direction	0		
H471		Mask, relative positioning traverse direction	0000h		
H472		Source, advance for relative positioning	0		
H473		Mask, advance for relative positioning	0000h		
H474		Behavior of the position reference value memory at power-on	1		
H500		Source, variable position limit value X	0		
H501		Position limit value X 1	0		
H502		Position limit value X 2	0		
H503		Position limit value X 3	0		

Parameter No.		Designation	Factory setting	Start-up value	Change after start-up
H504		Position limit value X 4	0		
H505		Position limit value X 5	0		
H506		Position limit value X 6	0		
H507		Source, position limit value X selection	5		
H508		Mask, position limit value selection	FFFFh		
H509		Shift position limit value X selection bits to right	0		
H510		Source, position limit value Y, variable	0		
H511		Position limit value Y 1	0		
H512		Position limit value Y 2	0		
H513		Position limit value Y 3	0		
H514		Position limit value Y 4	0		
H515		Position limit value Y 5	0		
H516		Position limit value Y 6	0		
H517		Source, select position limit value Y	5		
H518		Mask, select position limit value Y	FFFFh		
H519		Shift position limit value Y selection bits to right	0		
H520		Source, position limit value Z, variable	0		
H521		Position limit value Z 1	0		
H522		Position limit value Z 2	0		
H523		Position limit value Z 3	0		
H524		Position limit value Z 4	0		
H525		Position limit value Z 5	0		
H526		Position limit value Z 6	0		
H527		Source, select position limit value Z	5		
H528		Mask, select position limit value Z	FFFFh		
H529		Shift position limit value Z select bits to the right	0		
H530		Source, software limit switch A1 variable	0		
H531		Software limit switch A1	0		
H532		Software limit switch A2	0		
H533		Software limit switch A3	0		
H534		Software limit switch A4	0		
H535		Software limit switch A5	0		
H536		Software limit switch A6	0		
H537		Source, select software limit switch A1	5		
H538		Mask, select software limit switch A1	FFFFh		
H539		Shift software limit switch A1 selection bit to the right	0		
H540		Source, software limit switch B1 variable	0		

Parameter No.	Designation	Factory setting	Start-up value	Change after start-up
H541	Software limit switch B1	100 000		
H542	Software limit switch B1	0		
H543	Software limit switch B1	0		
H544	Software limit switch B1	0		
H545	Software limit switch B1	0		
H546	Software limit switch B1	0		
H547	Source, select software limit switch B1	5		
H548	Mask, select software limit switch B1	FFFFh		
H549	Shift SW limit switch B1 selection bits to the right	0		
H550	Source, maximum velocity, variable	0		
H551	Maximum velocity 1	100%		
H552	Maximum velocity 2	0%		
H553	Maximum velocity 3	0%		
H554	Maximum velocity 4	0%		
H555	Maximum velocity 5	0%		
H556	Maximum velocity 6	0%		
H557	Source, select maximum velocity	5		
H558	Mask, select maximum velocity	FFFFh		
H559	Shift maximum velocity selection bits to the right.	0		
H560	Source, adaption factor, maximum velocity	0		
H561	Source, enable adaption factor, maximum velocity	0		
H562	Mask, enable adaption factor, maximum velocity	0000h		
H570	Source, speed controller KP factor, variable	0		
H571	KP factor 1, speed controller	1		
H572	KP factor 2, speed controller	1		
H573	KP factor 3, speed controller	1		
H574	KP factor 4, speed controller	1		
H575	KP factor 5, speed controller	1		
H576	KP factor 6, speed controller	1		
H577	Source, select speed controller KP factor	5		
H578	Mask, select speed controller KP factor	FFFFh		
H579	Shift KP factor selection bits to the right	0		
H580	Source, speed controller KP adaption	0		
H581	Starting point, speed controller KP adaption	0%		
H582	KP factor, starting point speed controller KP adaption.	100%		
H583	End point, speed controller KP adaption	100%		
H584	KP factor, end point speed controller KP adaption	100%		

Parameter No.		Designation	Factory setting	Start-up value	Change after start-up
H590		Source, drive play, variable	0		
H591		Drive play 1	0		
H592		Drive play 2	0		
H593		Drive play 3	0		
H594		Drive play 4	0		
H595		Drive play 5	0		
H596		Drive play 6	0		
H597		Source, drive play selection	5		
H598		Mask, drive play selection	FFFFh		
H599		Shift drive play selection bits to the right	0		
H600		Source, position RFG ramp-up time, variable	0		
H601		Ramp-up time, position RFG 1	10 000[ms]		
H602		Ramp-up time, position RFG 2	10 000[ms]		
H603		Ramp-up time, position RFG 3	10 000[ms]		
H604		Ramp-up time, position RFG 4	10 000[ms]		
H605		Ramp-up time, position RFG 5	10 000[ms]		
H606		Ramp-up time, position RFG 6	10 000[ms]		
H607		Source, select ramp-up time, pos. RFG	5		
H608		Mask, select ramp-up time, pos. RFG	FFFFh		
H609		Shift ramp-up time selection bits to the right	0		
H610		Source, ramp-up rounding-off time, variable	0		
H611		Rounding-up time constant, pos.RFG 1	100[ms]		
H612		Rounding-up time constant, pos. RFG 2	100[ms]		
H613		Rounding-up time constant, pos. RFG 3	100[ms]		
H614		Rounding-up time constant, pos. RFG 4	100[ms]		
H615		Rounding-up time constant, pos. RFG 5	100[ms]		
H616		Rounding-up time constant, pos. RFG 6	100[ms]		
H617 to H619		No used			
H620		Source, ramp-down, position RFG, variable	0		
H621		Ramp-down, position RFG 1	10 000[ms]		
H622		Ramp-down, position RFG 2	10 000[ms]		
H623		Ramp-down, position RFG 3	10 000[ms]		
H624		Ramp-down, position RFG 4	10 000[ms]		
H625		Ramp-down, position RFG 5	10 000[ms]		
H626		Ramp-down, position RFG 6	10 000[ms]		
H627		Source, ramp-down selection, pos. RFG	0		
H628		Mask, ramp-down selection, pos. RFG	FFFFh		

Parameter No.		Designation	Factory setting	Start-up value	Change after start-up
H629		Shift ramp-down time selection bits to the right	0		
H640		Down ramp, hardware limit switch A, variable	0		
H641		Down ramp, hardware limit switch A2 1	1000[ms]		
H642		Down ramp, hardware limit switch A2 2	1000[ms]		
H643		Down ramp, hardware limit switch A2 3	1000[ms]		
H644		Down ramp, hardware limit switch A2 4	1000[ms]		
H645		Down ramp, hardware limit switch A2 5	1000[ms]		
H646		Down ramp, hardware limit switch A2 6	1000[ms]		
H647		Source, select down ramp A2	5		
H648		Mask, select down ramp A2	FFFFh		
H649		Shift down ramp A2 selection bits to the right	0		
H650		Down ramp, hardware limit switch B2, variable	0		
H651		Down ramp, hardware limit switch B2 1	1000[ms]		
H652		Down ramp, hardware limit switch B2 2	1000[ms]		
H653		Down ramp, hardware limit switch B2 3	1000[ms]		
H654		Down ramp, hardware limit switch B2 4	1000[ms]		
H655		Down ramp, hardware limit switch B2 5	1000[ms]		
H656		Down ramp, hardware limit switch B2 6	1000[ms]		
H657		Source, select down ramp B2	5		
H658		Mask, select down ramp B2	FFFFh		
H659		Shift down ramp B2 selection bits to the right	0		
H660		Fixed setpoint 1 integer word quantity	0		
H661		Fixed setpoint 2 integer word quantity	0		
H662		Fixed setpoint 3 integer word quantity	0		
H663		Fixed setpoint 4 integer word quantity	0		
H664		Fixed setpoint 5 integer word quantity	0		
H665		Fixed setpoint 6 integer word quantity	0		
H666		Fixed setpoint 7 integer word quantity	0		
H667		Fixed setpoint 8 integer word quantity	0		
H668		Fixed setpoint 1 % quantity word	0		
H669		Fixed setpoint 2 % quantity word	0		
H670		Fixed setpoint 3 % quantity word	0		
H671		Fixed setpoint 4 % quantity word	0		
H672		Fixed setpoint 5 % quantity word	0		
H673		Fixed setpoint 6 % quantity word	0		
H674		Fixed setpoint 7 % quantity word	0		
H675		Fixed setpoint 8 % quantity word	0		
H676		Fixed setpoint 1, hex quantity word	0		

Parameter No.		Designation	Factory setting	Start-up value	Change after start-up
H677		Fixed setpoint 2, hex quantity word	0		
H678		Fixed setpoint 3, hex quantity word	0		
H679		Fixed setpoint 4, hex quantity word	0		
H680		Fixed setpoint 5, hex quantity word	0		
H681		Fixed setpoint 6, hex quantity word	0		
H682		Fixed setpoint 7, hex quantity word	0		
H683		Fixed setpoint 8, hex quantity word	0		
H684		Fixed setpoint 1, integer quantity, double word	0		
H685		Fixed setpoint 2, integer quantity, double word	0		
H686		Fixed setpoint 3, integer quantity, double word	0		
H687		Fixed setpoint 4, integer quantity, double word	0		
H688		Fixed setpoint 5, integer quantity, double word	0		
H689		Fixed setpoint 6, integer quantity, double word	0		
H690		Fixed setpoint 7, integer quantity, double word	0		
H691		Fixed setpoint 8, integer quantity, double word	0		
H692		Fixed setpoint 1 %, quantity, double word	0%		
H693		Fixed setpoint 2 %, quantity, double word	0%		
H694		Fixed setpoint 3 %, quantity, double word	0%		
H695		Fixed setpoint 4 %, quantity, double word	0%		
H696		Fixed setpoint 5 %, quantity, double word	0%		
H697		Fixed setpoint 6 %, quantity, double word	0%		
H698		Fixed setpoint 7 %, quantity, double word	0%		
H699		Fixed setpoint 8 %, quantity, double word	0%		
H700		Source, external enable, position control 1	4		
H701		Mask, external enable, position control 1	0001h		
H702		Source, external enable, position control 2	91		
H703		Mask, external enable, position control 2	10h		
H704		Source, reverse traversing direction, rotary axis	0		
H705		Mask, reverse traversing direction, rotary axis	0000h		
H706		Source, direct traversing direction, rotary axis	0		
H707		Mask, direct traversing direction, rotary axis	0000h		
H710		Starting point, for ramp-function generator tracking	10%		
H711		Amplifier, RFG tracking controller	0		
H719		Range changeover integration time position control	0		
H720		Integration time, position control	20000[ms]		
H721		Deadtime compensation, position ramp-function generator	10[ms]		
H722		Normalization, acceleration	10[ms]		

Parameter No.		Designation	Factory setting	Start-up value	Change after start-up
H728		Step change for position controller optimization	0%		
H729		Smoothing, position actual value (only up to V1.3)	5[ms]		
H730		Smoothing, position reference value	5[ms]		
H731		Pre-amplification, control error signal, position controller	0		
H732		Upper limit, position controller outputs	10%		
H733		Lower limit, position controller outputs	-10%		
H734		Proportional gain, position controller	1		
H735		Integral action time, position controller	1000[ms]		
H736		Mode, closed-loop current control, position controller	0		
H737		Mode, position controller, P- /PI controller	1		
H738		Inertia compensation, position control	0%		
H740		Smoothing, velocity setpoint	5[ms]		
H741		Tolerance limit for control error	5%		
H742		Tolerance limit signal, drive has positioned	100		
H743		Hysteresis, drive has positioned signal	10		
H744		Delay time, drive has positioned signal	120[ms]		
H745		Delay time, tracking error	120[ms]		
H746		Source, load equalization for hoisting units	0		
H750		V set for velocity control 1 mode	5%		
H751		V set for velocity control 2 mode	5%		
H752		Source, V set for velocity control 3 mode	0		
H753		V set for inching 1, speed-controlled	1%		
H754		V set for inching 2, speed-controlled	-1%		
H760		Ramp-down, speed-controlled modes	10 000[ms]		
H761		Ramp-up time, speed controlled modes	10 000[ms]		
H762		Tolerance limit, limit value monitor (LVM) velocity setpoint = actual value	1%		
H763		Hysteresis, LVM velocity setpoint = actual value	0.5%		
H764		Frictional torque at 5% velocity	0%		
H765		Frictional torque at 10% velocity	0%		
H766		Frictional torque at 20% velocity	0%		
H767		Frictional torque at 40% velocity	0%		
H768		Frictional torque at 60% velocity	0%		
H769		Frictional torque at 80% velocity	0%		
H770		Frictional torque at 100% velocity	0%		
H771		Limit, automatic inertia compensation enable	0%		
H772		Influence range, automatic inertia compensation	0%		

Parameter No.		Designation	Factory setting	Start-up value	Change after start-up
H780		Source, motorized potentiometer input, double word	0		
H781		Source, motorized potentiometer input, word	0		
H782		Source, motorized potentiometer setting value, double word	0		
H783		Source, motorized potentiometer setting value, word	0		
H784		Source, set motorized potentiometer	0		
H785		Mask, set motorized potentiometer	0000h		
H786		Source, raise motorized potentiometer	0		
H787		Mask, raise motorized potentiometer	0000h		
H788		Source, lower motorized potentiometer	0		
H789		Mask, lower motorized potentiometer	0000h		
H790		Source, MOP mode, ramp-function generator	0		
H791		Mask, MOP mode, ramp-function generator	0000h		
H792		Ramp time, MOP standard setting	60 000[ms]		
H793		Ramp time, MOP fixed setting	25 000[ms]		
H794		Upper limit, motorized potentiometer	120%		
H795		Lower limit, motorized potentiometer	120%		
H796		Influence range, motorized potentiometer	0%		
H820		Tolerance limit, limit value monitor X	100		
H821		Hystereis, limit value monitor X	10		
H822		Tolerance limit, limit value monitor Y	100		
H823		Hystereis, limit value monitor Y	10		
H824		Tolerance limit, limit value monitor Z	100		
H825		Hysteresis, limit value monitor Z	10		
H826		Source, input free limit value monitor, double word	0		
H827		Source, comparison value, free limit value monitor double word	0		
H828		Tolerance limit, free LVM double word	100		
H829		Hystereis, free LVM A	10		
H830		Source, input free LVM A	0		
H831		Source, comparison value, free LVM A	0		
H832		Tolerance limit, free LVM A	0%		
H833		Hysteresis, free LVM A	0%		
H834		Source, input free LVM B	0		
H835		Source, comparison value, free LVM B	0		
H836		Tolerance limit, free LVM B	0%		
H837		Hysteresis, free LVM B	0%		
H838		Source, input free LVM C	0		
H839		Source, comparison value, free LVM C	0		

Parameter No.		Designation	Factory setting	Start-up value	Change after start-up
H840		Tolerance limit, free LVM C	0%		
H841		Hysteresis, free LVM C	0%		
H842		Source, input free LVM D	0		
H843		Source, comparison value, free LVM D	0		
H844		Tolerance limit, free LVM D	0%		
H845		Hysteresis, free LVM D	0%		
H846		Source, display parameter % quantity, word	0		
H847		Source, display parameter % quantity, double word	0		
H848		Source, display parameter, word HEX quantity	0		
H849		Source, display parameter, word integer quantity	0		
H850		Source, display parameter, double word integer quantity	0		
H851		Source, display par. position ref. values, scaled	0		
H860		Source, bit 0, free status word	0		
H861		Mask, bit 0 free status word	0000h		
H862		Source, bit 1 free status word	0		
H863		Mask, bit 1 free status word	0000h		
H864		Source, bit 2 free status word	0		
H865		Mask, bit 2 free status word	0000h		
H866		Source, bit 3 free status word	0		
H867		Mask, bit 3 free status word	0000h		
H868		Source, bit 4 free status word	0		
H869		Mask, bit 4 free status word	0000h		
H870		Source, bit 5 free status word	0		
H871		Mask, bit 5 free status word	0000h		
H872		Source, bit 6 free status word	0		
H873		Mask, bit 6 free status word	0000h		
H874		Source, bit 7 free status word	0		
H875		Mask, bit 7 free status word	0000h		
H876		Source, bit 8 free status word	0		
H877		Mask, bit 8 free status word	0000h		
H878		Source, bit 9 free status word	0		
H879		Mask, bit 9 free status word	0000h		
H880		Source, bit 10 free status word	0		
H881		Mask, bit 10 free status word	0000h		
H882		Source, bit 11 free status word	0		
H883		Mask, bit 11 free status word	0000h		
H884		Source, bit 12 free status word	0		

Parameter No.		Designation	Factory setting	Start-up value	Change after start-up
H885		Mask, bit 12 free status word	0000h		
H886		Source, bit 13 free status word	0		
H887		Mask, bit 13 free status word	0000h		
H888		Source, bit 14 free status word	0		
H889		Mask, bit 14 free status word	0000h		
H890		Source, bit 15 free status word	0		
H891		Mask, bit 15 free status word	0000h		
H892		Source, NOVRAM memory word 1	0		
H900		Source, binary output 1	0		
H901		Mask, binary output 1	0000h		
H902		Source, binary output 2	0		
H903		Mask, binary output 2	0000h		
H904		Source, binary output 3	0		
H905		Mask, binary output 3	0000h		
H906		Source, binary output 4	0		
H907		Mask, binary output 4	0000h		
H908		Source, binary output 5	0		
H909		Mask, binary output 5	0000h		
H910		Source, binary output 6	0		
H911		Mask, binary output 6	0000h		
H912		Source, binary output 7	0		
H913		Mask, binary output 7	0000h		
H914		Source, binary output 8	0		
H915		Mask, binary output 8	0000h		
H916		Mask, invert binary outputs	0000h		
H920		Source, analog output 1	0		
H921		Select absolute value, analog output 1	0		
H922		Smoothing, analog output 1	10[ms]		
H923		Offset, analog output 1	0%		
H924		Gain, analog output 1	2		
H925		Source, analog output 2	0		
H926		Select absolute value, analog output 2	0		
H927		Smoothing, analog output 2	10[ms]		
H928		Offset, analog output 2	0%		
H929		Gain, analog output 2	2		
H930		Source, analog output 3	0		
H931		Select absolute value, analog output 3	0		
H932		Smoothing, analog output 3	40[ms]		

Parameter No.		Designation	Factory setting	Start-up value	Change after start-up
H933		Offset analog output 3	0%		
H934		Gain, analog output 3	2		
H935		Source, analog output 4	0		
H936		Select absolute value, analog output 4	0		
H937		Smoothing, analog output 4	40[ms]		
H938		Offset analog output 4	0%		
H939		Gain, analog output 4	2		
H941		Source, word 1 to peer-to-peer	0		
H942		Source, word 2 to peer-to-peer	0		
H943		Source, word 3 to peer-to-peer	0		
H944		Source, word 4 to peer-to-peer	0		
H945		Source, word 5 to peer-to-peer	0		
H946		Length, send telegram to peer-to-peer	5		
H951		Source, send word 1 to CU	82		
H952		Source, send word 2 to CU	220		
H953		Source, send word 3 to CU	0		
H954		Source, send word 4 to CU	83		
H955		Source, send word 5 to CU	204		
H956		Source, send word 6 to CU	0		
H957		Source, send word 7 to CU	0		
H958		Source, send word 8 to CU	141		
H961		Source, send word 1 to CB	0		
H962		Source, send word 2 to CB	0		
H963		Source, send word 3 to CB	0		
H964		Source, send word 4 to CB	0		
H965		Source, send word 5 to CB	0		
H966		Source, send word 6 to CB	0		
H967		Source, send word 7 to CB	0		
H968		Source, send word 8 to CB	0		
H969		Source, send word 9 to CB	0		
H970		Source, send word 10 to CB	0		
H997		Drive identification	0		
H998		Establish factory setting	0		
H999		Baud rate for peer-to-peer coupling	8		

	0	1	2	3	4	5	6	7	8	9
H10_										
H11_										
H12_										
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H14_										
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H87_										
H88_										
H89_										
H90_										
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H92_										
H93_										
H99_										

10 Index

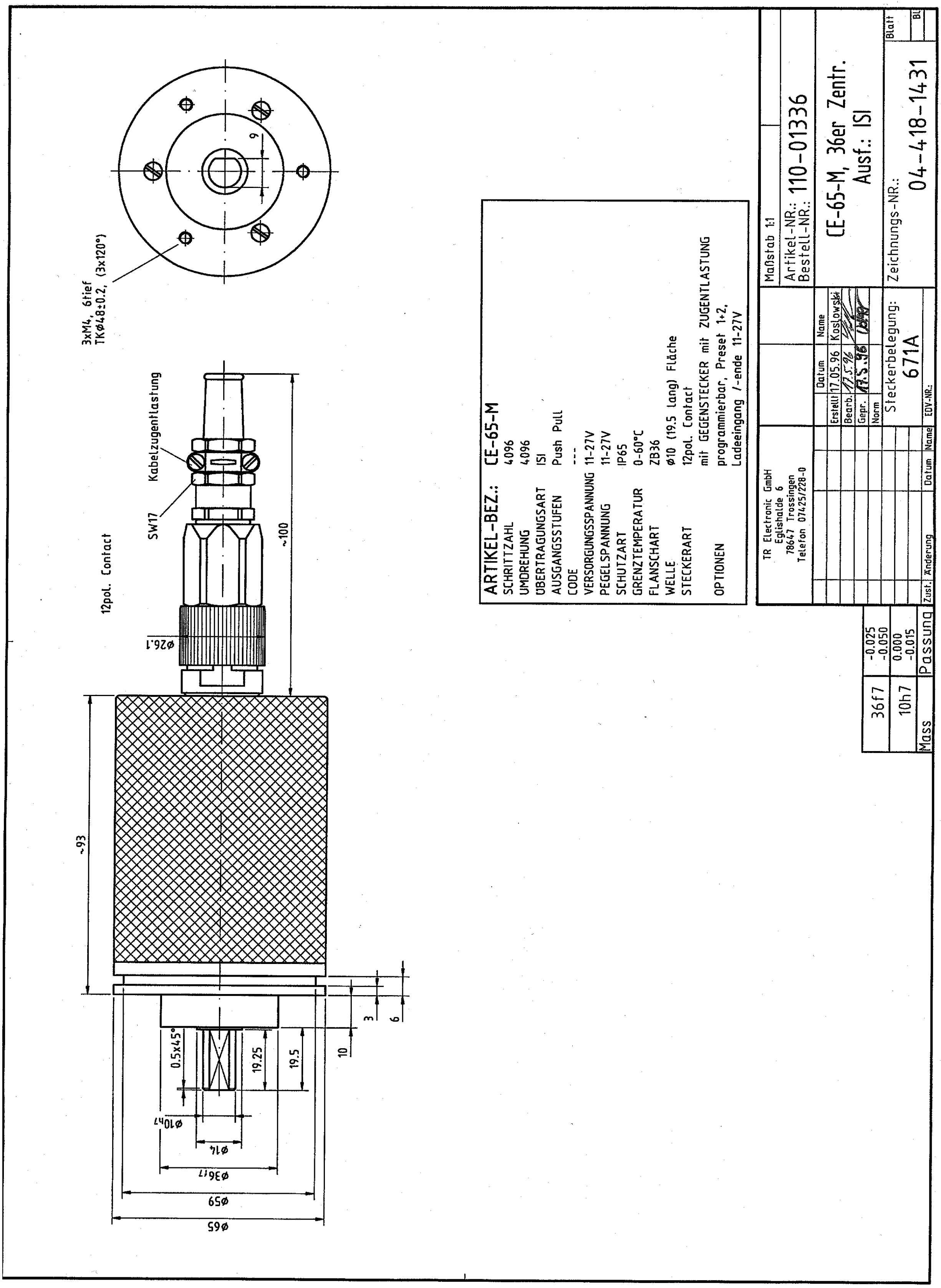
—T—

—V—

—W—

11 Appendix

11.1 Appendix A: Dimension Drawing of the TR-Electronic Absolut Value Encoder



11.2 Appendix B: SIMADYN D STRUC-G Function plans

Die STRUC G Pläne sind aus der Betriebsanleitung „Positionierung MS380“
zu entnehmen.
Bestell-Nr: 6SE7080-0CX84-8AH1

STRUC G function diagrams - refere to the manual „Positioning MS380“.
Order-No: 6SE7087-6CX84-8AH1

To SIEMENS AG A&D MC Frauenauracherstr. 80 91056 Erlangen Code word: "Standard software Copy to: ZN/LG .... Mrs./Mr.	From Contact person Telephone	Received
Your reference and your letter from	Our reference	City and date

Problem / Fault profil: Standard Positioning software package

Standard Positioning software package:

Software version: ....

Configuring (software?) ....

Technological module:

Type: ....

Release: ....

Interface module:

Type: ....

Release: ....

Software version: ....

Protocol used: ....

Basic drive:

Type: ....

Release: ....

Software version: ....

Problem / fault profile:
(use the reverse side or a separate sheet)

The problem / fault occured under the following conditions:

Urgently required for a precise fault / error diagnostics:
- completed parameter list of the technological module, attached
- completed parameter list of the basic drive, attached

Continuation Problem / fault profile:
(use the reverse side or a separate sheet)

The following editions have been published so far:

Edition	Internal Item Number
09.97	477 407.4088.76
08.98	477 407.4188.76
04.99	477 407.4188.76

Version 04.99 consists of the following chapters:

Chapter		Changes	Pages	Version date
0	Definitions		4	08.98
1	Overview	reviewed edition	28	04.99
2	T300 technology board	Page: 7, 8	8	04.99
3	Function description	Page: 3, 4	52	04.99
	Function diagrams	Sheet: A2, D2, D5	48	04.99
4	Parameters list	Page: 54, 73	74	04.99
5	Connectors	reviewed edition	24	04.99
6	Start-up	Page: 20	20	04.99
7	SIMADYN D functions	Page: 3	6	04.99
8	Application/self-study example	Page: 3, 9	38	04.99
9	Short parameter list / logbook	Page: 2, 14	20	04.99
10	Index	reviewed edition	4	04.99
11	Appendix		2	08.98
	STRUC G function plans		180	08.98

Group: Automation and Drives (A&D)
Division: Variable-Speed Drive Systems
Postfach 3269, D-91050 Erlangen

Siemens Aktiengesellschaft

Subject to change

Order Number: 6SE7087-6CX84-8AH1