SIEMENS

SIMATIC NET

Network components 12M bus terminal

Operating Instructions

07/2013

C79000-G8976-C333-01

Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

⚠DANGER

indicates that death or severe personal injury **will** result if proper precautions are not taken.

⚠WARNING

indicates that death or severe personal injury **may** result if proper precautions are not taken.

⚠CAUTION

indicates that minor personal injury can result if proper precautions are not taken.

NOTICE

indicates that property damage can result if proper precautions are not taken.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

⚠WARNING

Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

Trademarks

All names identified by ® are registered trademarks of Siemens AG. The remaining trademarks in this publication may be trademarks whose use by third parties for their own purposes could violate the rights of the owner.

Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

Siemens AG
Industry Sector
Postfach 48 48
90026 NÜRNBERG
GERMANY

Order number: C79000-G8976-C333
℗ 08/2013 Technical data subject to change

Preface

Documentation

You will find information on the use of this product in the following sources:

- in the product documentation
- in the SIMATIC NET PROFIBUS Networks manual
  The manual is available on the Internet pages of Siemens Industry Online Support under the following entry ID:
  35222591 (http://support.automation.siemens.com/WW/view/en/35222591)
- in the SIMATIC NET Industrial Communication catalog IK PI

  You can request the catalog and additional information from your Siemens representative.

Contact person

If you cannot find the answer to a technical question about the use of this product in the sources quoted, contact your Siemens representative in the agencies or offices responsible for your area.

The addresses are listed:

- in our catalog IK PI
- on the Internet pages of Siemens Industry Online Support (http://support.automation.siemens.com)

Frequently asked questions

Our customer support on the Internet provides useful information and answers to frequently asked questions. Here you will find information about the entire product spectrum in the area Support > FAQs (Frequently Asked Questions): http://www.automation.siemens.com/.

Hotline

Our hotline is also available to deal with problems:

- Phone

  0911-895-7222

  (from abroad +49-911-895-7222)
- Telefax

  0911-895-7223

  (from abroad +49-911-895-7223)
- E-mail

  support.automation@siemens.com

Table of contents

Introduction

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1.1 Included in shipment

- 12M bus terminal order no. 6GK1 500-0AA10

1.2 Description of the product

Function

The 12M bus terminal is used to attach data terminal equipment (DTE) with an RS-485 interface to a bus cable.

Note

A maximum of 32 12M bus terminals can be connected to one bus segment.

If other components, such as repeaters are connected to a bus segment, this reduces the maximum number of 12M bus terminals that can be connected.

Operator controls

The bus terminal consists of the following elements and controls:

- 1 terminal block with 6 terminals for wires with a cross-sectional area of ≤ 1.5 mm²

  With this terminal block you can connect the incoming and outgoing bus cable and, if necessary, Protective Earth (PE).

- Screw down clamps for shield contact
- 2 switches:
  - right-hand switch ("Termination")

    With the right-hand switch, you can terminate the end of an incoming, electrical segment (A1, B1) with the characteristic impedance (switch on). At the same time, the outgoing, electrical segment (A2, B2) is interrupted.

  - left-hand switch

    With the left-hand switch you can set the range of the transmission speed 9.6 kbps... 1.5 Mbps and 3 Mbps...12 Mbps.

- A 1.5 m long spur line with a 9-pin D-sub male connector

  You can connect a DTE directly to this spur line.

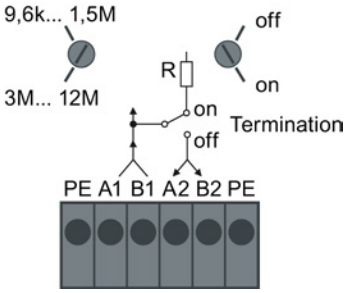

Figure 1-1 Operator controls

Terminal block

Short name	Meaning
PE	Protective earth connected to the cable shield and DIN rail
A1	Signal line A of the incoming segment side
B1	Signal line B of the incoming segment side
A2	Signal line of the outgoing segment side
B2	Signal line of the outgoing segment side
PE	Protective earth connected to the cable shield and DIN rail

Terminal block

The following is recommended for PROFIBUS:

- Terminal A - green wire
- Terminal B - red wire

Termination

Activate the termination on the first and last node of the bus segment.

If termination is activated (termination on), the connection between the incoming (A1, B1) and outgoing (A2, B2) segment is interrupted. If the wrong bus terminating resistors are activated, it is no longer possible to access stations downstream from the bus terminal. When a segment is put into operation, there must therefore be no bus terminating resistors activated that are not located at the start or end of the network.

D-sub male connector

The D-sub male connector is plugged into the D-sub female connector of the DTE and secured by screws. The 12M bus terminal requires a current of 90 mA with a voltage of 5 V supplied by the DTE between pins 5 (M5) and 6 (P5) of the D-sub male connector.

Pin no.	Short name	Meaning
1	PE	Protective earth, connected to the cable shield
2	nc	
3	B (RxD/TxD-P)	Signal line B
4	nc	
5	M5 (DGND)	Chassis connection of the 5 volt supply
6	P5 (VP)	+ 5 volt connection, 90 mA required
7	nc	
8	A (RxD/TxD-N)	Signal line A
9	nc	
Casing	PE	Protective earth, connected to the cable shield

D-sub male connector pinout

The impedance of the PROFIBUS interface when receiving must be ≥ 10 kilohms (according to the EIA standard RS-485). The spur line must not be terminated.

Segment length and transmission speed

Transmission speed	maximum segment length
9.6 - 187.6 kbps	800 m
500 kbps	400 m
1.5 Mbps	200 m
3 - 12 Mbps	100 m

Permitted segment lengths

Bus cable for PROFIBUS, standard type (see catalog IK PI).

Note

Restriction when using the 12M bus terminal at 500 kbps

This restriction only affects segments longer than 80 m.

If the 12M bus terminal is used at a transmission rate of 500 kbps along with several RS-485 bus terminals with a spur line length of 3.0 m, a minimum distance of 5 m of PROFIBUS cable must be maintained between two RS-485 bus terminals.

You can locate 12M bus terminals anywhere in the segment; there is no minimum distance between them that needs to be kept to. You can also arrange a 12M bus terminal between two RS-485 bus terminals with 3.0 m spur lines if you make sure that the PROFIBUS cable between two RS-485 bus terminals has a total length of at least 5 m.

1.3 Compatible devices

Table 1- 1 Connectable devices that can supply 90 mA at 5V.

Name	Master slave	Comments	BT12M can be used
SIMATIC S5			
IM 308-C	M + S		yes
CP 5431 FMS/DP	M		yes
S5-95U/DP	M + S		yes
SIMATIC S7-200			
CPU 215-DP	S		yes
CP 242-8	S		yes
SIMATIC S7-300			
CP 342-5	M + S		yes
CP 343-5	M		yes
CPU 313/314/315/316	M		yes
CPU 315-2 DP	M + S		yes
SIMATIC S7-400			
CP 342-5	M + S		yes
CP 413-2 DP	M		yes
CPU 414-2 DP	M		yes
PC modules			
CP 5412A2	M		yes
CP 5411	M		yes
CP 5611	M		yes
CP 5613	M		yes
Distributed I/O			
ET 200M	S	via IM 153	yes
ET 200U	S	via IM 318-C	yes
ET 200B	S	all versions	yes
Miscellaneous			
RS-485 repeater	-		yes
OLM-V3	-		yes
DP/RS485	S	DP interface module for line circuit breaker 3WN6 (only 0..60 °)	yes
DP/AS-i Link IP20	S	AS-i connection to PROFIBUS DP, degree of protection IP20	yes
TI			
SIMATIC 505-FIM	M	Slave SIMATIC 505-6870 PROFIBUS-DP RBC Master complete SIMATIC 505 series	yes

Installation

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2.1 Important notes on using the device

Read the safety notices

Note the following safety notices. These relate to the entire working life of the device.

Safety notices on use in hazardous areas

General safety notices relating to protection against explosion

⚠ WARNING

If a device is operated in an ambient temperature of more than 60 °C, the temperature of the device housing may be higher than 70 °C. The device must therefore be installed so that it is only accessible to service personnel or users that are aware of the reason for restricted access and the required safety measures at an ambient temperature higher than 60 °C.

⚠ WARNING

EXPLOSION HAZARD

DO NOT OPEN WHEN ENERGIZED.

⚠ WARNING

EXPLOSION HAZARD

SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I, DIVISION 2 OR ZONE 2.

⚠ WARNING

When used in hazardous environments corresponding to Class I, Division 2 or Class I, Zone 2, the device must be installed in a cabinet or a suitable enclosure.

WARNING

The equipment is designed for operation with Safety Extra-Low Voltage (SELV) by a Limited Power Source (LPS).

This means that only SELV / LPS complying with IEC 60950-1 / EN 60950-1 / VDE 0805-1 must be connected to the power supply terminals. The power supply unit for the equipment power supply must comply with NEC Class 2, as described by the National Electrical Code (r) (ANSI / NFPA 70).

If the equipment is connected to a redundant power supply (two separate power supplies), both must meet these requirements.

WARNING

EXPLOSION HAZARD

DO NOT CONNECT OR DISCONNECT EQUIPMENT WHEN A FLAMMABLE OR COMBUSTIBLE ATMOSPHERE IS PRESENT.

Safety notices when using the device according to ATEX

If you use the device under ATEX conditions you must also keep to the following safety notices in addition to the general safety notices for protection against explosion:

WARNING

To comply with EU Directive 94/9 (ATEX95), this enclosure must meet the requirements of at least IP54 in compliance with EN 60529.

WARNING

If the cable or conduit entry point exceeds 70 °C or the branching point of conductors exceeds 80 °C, special precautions must be taken. If the equipment is operated in an air ambient in excess of 60 °C, only use cables with admitted maximum operating temperature of at least 80 °C.

WARNING

Take measures to prevent transient voltage surges of more than 40% of the rated voltage. This is the case if you only operate devices with SELV (safety extra-low voltage).

Safety notices when using the device according to Hazardous Locations (HazLoc)

If you use the device under HazLoc conditions you must also keep to the following safety notices in addition to the general safety notices for protection against explosion:

This equipment is suitable for use in Class I, Division 2, Groups A, B, C and D or non-hazardous locations only.

This equipment is suitable for use in Class I, Zone 2, Group IIC or non-hazardous locations only.

⚠ WARNING
EXPLOSION HAZARD DO NOT DISCONNECT WHILE CIRCUIT IS LIVE UNLESS AREA IS KNOWN TO BE NON-HAZARDOUS.

2.2 Mounting and attaching the bus cable(s)

Installation

Types of installation

The 12M bus terminal can be mounted in three different ways:

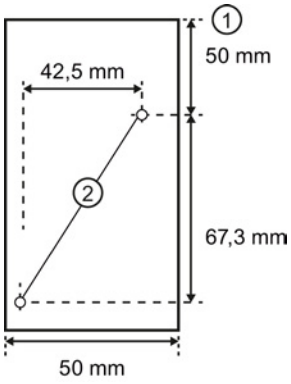
- By snapping it on to a 35 mm DIN rail according to DIN EN50022-35x7.5
- By screwing it to a mounting plate (refer to the section "Drilling template") using two cheese head screws.
- Wall mounting (brick, concrete). You require 2 type 5 plugs, 2 half-round wood screws DIN 96, size 3.5 , L70 and two washers DIN 125-4.3.

Note

Please make sure that the 12M bus terminal is accessible for maintenance and installation work even during operation.

Drilling template

The following figure shows the drilling template for screw fastening.



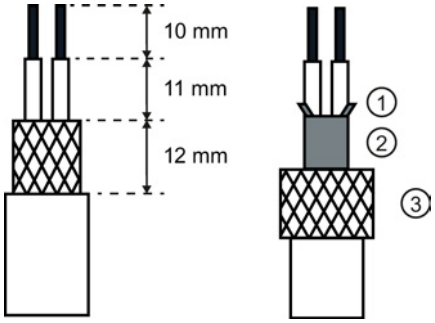
① Top edge of the 12M bus terminal
② M4 thread or 4.2 mm hole

Figure 2-1 Drilling template for the 12M bus terminal

Connecting up

Follow the steps below to connect the bus cable:

1. Open the bus cable at the point at which the bus terminal will be inserted.
2. Strip approximately 33 mm of the outer jacket. Make sure that the braided shield is not damaged when you strip the jacket.
3. Shorten the braided shield and foil shield to a length of approximately 12 mm (the foil shield can be left somewhat longer) and shorten the two fillers to a length of approximately 12 mm.



① Filler
② Foil shield
③ Fold back braided shield over the cable jacket

4. Fold back the braid shield over the cable jacket.
5. Strip approximately 10 mm from the end of the wires.
6. Fit the bus cable to the terminal so that the braided shield is lying directly under the cable clamp.
7. Screw the ends of the wires to the appropriate terminals (if the cores are stranded, for example, the trailing cable, 0.25 mm^2 wireend ferrules complying with DIN 46228 must be used).
8. If the bus terminal is at the start or end of a segment, the integrated terminator must be activated (switch set to Termination on).

Note

The shield clamps are used solely to contact the shields and are not suitable as strainrelief clamps. This means that the bus cables must be secured as close as possible to the 12M bus terminals to provide mechanical strain relief.

Note

If the terminating resistor is activated (permitted only at the segment ends), the terminal pair A1, B1 must be used (A2, B2 are disconnected from the segment).

During operation of the bus terminal in the segment, it requires 5 V to be supplied by the DTE. The DTE must therefore be turned on and the D-sub male connector inserted and secured by screws! Due to the necessary termination at the start and end of the segment, the DTE connected there must not be turned off.

Note

The same wires (green or red) must always be connected to the same terminal A or B in all bus terminals (and with all bus connectors) and be uniform throughout the segment.

Note

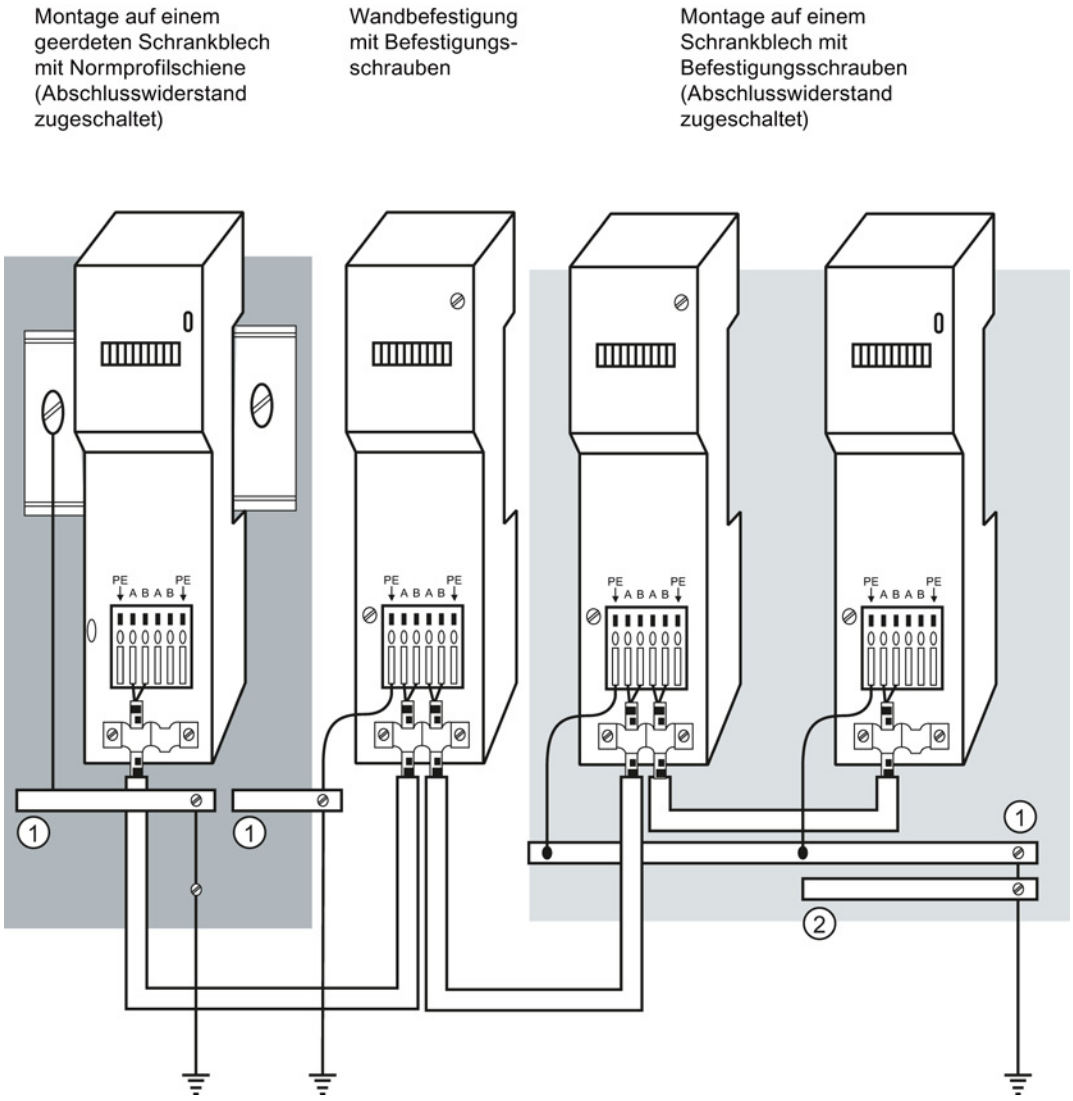
The 12M bus terminal may only be plugged into a PROFIBUS interface when the power is off.

The following scheme is recommended for a PROFIBUS LAN:

- Connector A: green wire
- Connector B: red wire

2.3 Grounding measures

If the 12M bus terminal is mounted on a DIN rail, the shield clamp makes largearea contact with the rail via an internal spring. To connect the cable shield with local ground, a connection between the DIN rail to local earth is adequate (this should be kept as short as possible).



① Grounding bar
② Shield clamp rail

Figure 2-2 Ways of installing and grounding the 12M bus terminal

Note

The grounding bar and local ground must be connected together with Cu wire with an adequate cross-sectional area over the shortest distance possible.

Note

The DIN rail must have a good conducting surface.

Note

If you mount the bus terminal on a wall, connect at least one PE terminal to local ground. This connection should be over the shortest possible distance.

Technical specifications

3

Technical specifications of the 12M bus terminal	
Connector to the DTE	9pin D-sub male connector
Transmission speed	9.6 kbps ... 12 Mbps
Supply voltage	5 VDC +/- 5 % Safety extra-low voltage (SELV) to EN 60950
Current consumption	90 mA at 5 V
Total power loss	0.45 W
Weighting factor *)	0.1 in operation at 1.5 Mbps along with RS485 bus terminal.

*) You will find more information on the weighting factor in the "SIMATIC NET PROFIBUS Network" manual on the Internet pages of Siemens Industry Online Support under the following entry ID: 35222591 (http://support.automation.siemens.com/WW/view/en/35222591).

Electromagnetic compatibility	
Emission	
Limit class	B complying with EN 55022=CISPR 22
Noise immunity on signal lines	+/- 2 kV (acc. to IEC 801-5 / IEC 1000-4-5, surge) +/- 2 kV (acc. to IEC 801-4 / IEC 1000-4-4, burst)
Immunity to static discharge	+/- 6 kV, contact discharge (acc. to IEC 801-2; ESD / IEC 1000-4-2)
Immunity to RF interference	10 V/m with 80 % amplitude modulation with 1 kHz, 80 MHz - 1 GHz (acc. to IEC 801-3 / ENV 50140) 10 V/m 50 % load factor at 900 MHz (acc. to ENV 50204) 10 V with 80 % amplitude modulation at 1 kHz 10 kHz - 80 MHz (acc. to IEC 801-6 / ENV50141)

Climatic conditions	
Operating temperature	0 ... 60 °C
Storage/transportation temperature	-40 ... 70 °C
Relative humidity	max. 95 % at +25 °C no condensation

Mechanical conditions	
Vibration	tested to DIN IEC 68-2-6
Operation	10 ... 58 Hz; amplitude 0.075 mm
	58 ... 500 Hz; acceleration 9.8 m/s^2
Shock	tested to DIN IEC 68-2-27
Operation	Half-sine: 100 m/s^2, 16 ms

Construction	
Dimensions (W x H x D)	50 x 135 x 47 mm
Spur line length	1.5 m
Weight (incl. 1.5 m spur line)	approx. 350 g
Degree of protection	IP20
Approval marks	CE, UL, c(UL)us

Approvals

4

The SIMATIC NET products described in these Operating Instructions have the approvals listed below.

Note

Issued approvals on the type plate of the device

The specified approvals apply only when the corresponding mark is printed on the product. You can check which of the following approvals have been granted for your product by the markings on the type plate.

Certificates for shipbuilding and national approvals

The device certificates for shipbuilding and special national approvals can be found on the pages of Siemens Automation Customer Support under the following entry ID: 57337426 (http://support.automation.siemens.com/WW/view/en/57337426).

Under this entry, go to the required product and select the following settings: "Entry list" tab > entry type "Certificates".

Standards and test specifications

The device meets the following standards and test specifications. The test criteria for the module are based on these standards and test specifications.

IEC 61131–2

The devices described in this manual fulfill the requirements and criteria of the IEC 61131-2 standard (Programmable controllers, Part 2: equipment requirements and tests).

CE mark

The devices described in this manual fulfill the requirements and protection goals of the following EC directives and meet the harmonized European standards (EN) that have been published for programmable logic controllers in the official journals of the European Union:

- 2004/108/EEC "Electromagnetic Compatibility" (EMC Directive)
- 94/9/EC "Equipment and protective systems intended for use in potentially explosive atmospheres" (Explosion Protection Directive)

The EC Declarations of Conformity are available for the responsible authorities according to the above-mentioned EC Directive at the following address:

- Siemens Aktiengesellschaft
  Industry Automation
  Industrielle Kommunikation SIMATIC NET
  Postfach 4848
  D-90327 Nürnberg

EMC directive (electromagnetic compatibility)

The SIMATIC NET products described in these operating instructions meet the requirements of EC directive 2004/108/EC "Electromagnetic Compatibility" for the following areas of application:

Field of application	Requirements	
	Emission	Immunity to interference
Industry	EN 61000-6-4 : 2007	EN 61000-6-2 : 2005

WARNING

Personal injury and property damage can occur

The installation of expansions that are not approved for SIMATIC NET products or their target systems may violate the requirements and regulations for safety and electromagnetic compatibility.

Only use expansions that are approved for the system.

- **Keep to the installation guidelines**
  The product meets the requirements if you adhere to the installation and safety instructions contained in this documentation and in the following documentation when installing and operating the product.
- **You can always find the latest documentation on the Internet**
  The current descriptions of the currently available products can always be found on the Internet under the specified entry IDs/Internet pages:
  - SIMATIC NET Industrial Ethernet Network manual

    ID = 27069465 (http://support.automation.siemens.com/WW/view/en/27069465)
  - EMC Installation Guideline, Planning Guide

    ID = 60612658 (http://support.automation.siemens.com/WW/view/en/60612658)
  - **Working on the product**
    To protect the product from electrostatic discharge, personnel must first discharge any electrostatic charge from their body before touching the product.

    Note

    The product was tested with a device that also complies with the standards listed above.
    If the product is operated with a device that does not meet these standards, there is no guarantee that the corresponding values will be adhered to.

C-TICK

The product meets the requirements of the AS/NZS 2064 standard (Class A).

ATEX (explosion protection directive)

⚠ WARNING

When using SIMATIC NET products in hazardous area zone 2, make absolutely sure that the associated conditions in the following document are adhered to:

"Use of subassemblies/modules in a Zone 2 Hazardous Area".

This document can be found on the CD that ships with the device or on the Internet at the following URL:

`http://support.automation.siemens.com/WW/`

> Product Support > Industrial Communication

Enter the document identification number `A5E00352937` as the search term.

SIMATIC NET products meet the requirements of the EC directive:94/9/EC "Equipment and Protective Devices for Use in Potentially Explosive Atmospheres".

ATEX classification:

II 3 G Ex nA IIC T3...T6 Gc

KEMA 07ATEX0145 X

The products meet the requirements of the following standards:

- EN 60079-15: 2010 (electrical apparatus for potentially explosive atmospheres; Type of protection "n")
- EN 60079-0: 2009 (Explosive atmospheres - Part 0: Equipment - General requirements)

You will find the temperature class on the type plate on the module.

FM

The product meets the requirements of the standards:

- Factory Mutual Approval Standard Class Number 3611
- FM Hazardous (Classified) Location Electrical Equipment:
  Non Incendive / Class I / Division 2 / Groups A,B,C,D / T3...T6 und
  Non Incendive / Class I / Zone 2 / Group IIC / T3...T6

You will find the temperature class on the type plate on the module.

cULus approval for industrial control equipment

cULus Listed IND. CONT. EQ.

Underwriters Laboratories Inc. complying with

- UL 508
- CSA C22.2 No. 142-M1987

Report no. E85972

cULus Approval, Hazardous Location

cULus Listed 7RA9 IND. CONT. EQ. FOR HAZ. LOC.

Underwriters Laboratories Inc. complying with

- UL 508 (Industrial Control Equipment)
- CSA C22.2 No. 142 (Process Control Equipment)
- ANSI ISA 12.12.01, CSA C22.2 No. 213-M1987 (Hazardous Location)

APPROVED for Use in

- Cl. 1, Div. 2, GP. A, B, C, D T3...T6
- Cl. 1, Zone 2, GP. IIC T3...T6

You will find the temperature class on the type plate on the module.

WARNING

Explosion hazard

Do not disconnect while circuit is live unless area is known to be non hazardous.

Substitution of components may impair suitability for Class I, Division 2.

Note

This equipment is suitable for use in Class I, Division 2, Group A, B, C, D or non-hazardous locations only.

Note

This plant has to be mounted according to the NEC (National Electrical Code) stipulations.

When used in environments according to class I, division 2 (see above), the bus terminals must be mounted in an enclosure.

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