

SIMATIC NET

PROFIBUS Optical Bus Terminal (OBT)

Manual

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Safety Guidelines

This manual contains notices which you should observe to ensure your own personal safety, as well as to protect the product and connected equipment. These notices are highlighted in the manual by a warning triangle and are marked as follows according to the level of danger:



Danger

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



Warning

indicates that death, severe personal injury or substantial property damage **can** result if proper precautions are not taken.



Caution

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

Note

draws your attention to particularly important information on the product, handling the product, or to a particular part of the documentation.

Qualified Personnel

Only **qualified personnel** should be allowed to install and work on this equipment. Qualified persons are defined as persons who are authorized to commission, to ground, and to tag circuits, equipment, and systems in accordance with established safety practices and standards.

Correct Usage

Note the following:



Warning

This device and its components may only be used for the applications described in the catalog or the technical description, and only in connection with devices or components from other manufacturers which have been approved or recommended by Siemens.

This product can only function correctly and safely if it is transported, stored, set up, and installed correctly, and operated and maintained as recommended.

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Bereich Automatisierungstechnik
Geschäftsgebiet Industrie-Automatisierung
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Disclaimer of Liability

We have checked the contents of this manual for agreement with the hardware and software described. Since deviations cannot be precluded entirely, we cannot guarantee full agreement. However, the data in this manual are reviewed regularly and any necessary corrections included in subsequent editions. Suggestions for improvement are welcomed.

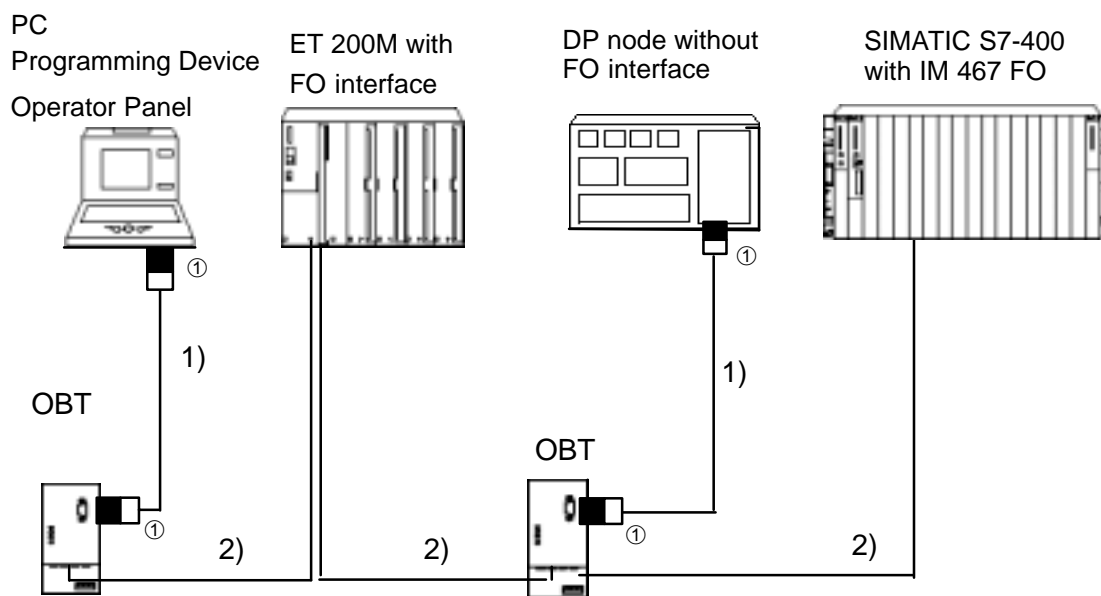
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Introduction

The PROFIBUS OBT (Optical Bus Terminal) is a network component for use in optical PROFIBUS DP fieldbus networks. It allows the attachment of a single device without an integrated optical interface to the optical PROFIBUS DP. The following figure illustrates a typical configuration.



- ① Terminating resistor activated
- 1) PROFIBUS cable (terminated at both ends)
- 2) Plastic FO cable or PCF FO cable with two fibers

Figure 1-1 Example of an Optical PROFIBUS DP Configuration

Connections

The connection between the individual nodes takes the form of an optical bus with two-fiber plastic FO cables (plastic fiber-optic cables are also known as POF, Polymer Optical Fiber) or PCF FO cables (PCF = Polymer Cladded Fiber, corresponds to HCS™¹⁾ fiber-optic cable). Since fiber-optic cables are completely insensitive to electromagnetic disturbance, no grounding concept whatsoever is necessary. For the same reason, equipotential bonding is also not necessary. The optoelectronic conversion provides automatic isolation so that differences in potential as can occur in extensive systems have no effect.

¹⁾ HCS™ is a registered trademark of Ensign-Bickford Optics Company and stands for "Hard Polymer Cladded Silica Fiber".

Sensitivity

Just as fiber-optic cable is insensitive to electromagnetic noise, a fiber-optic cable emits no electromagnetic noise into the environment. Sensitive electronic devices close to the fiber-optic cable therefore need no additional protection or noise suppression.

Power Supply

The OBT requires an operating power supply of 24 V direct voltage that is connected via two terminal screws.

Operating Mode

LEDs signal the current mode and any problems in operation.

Mechanical Design

The optical bus terminal consists of a compact plastic casing which can be installed either on a standard rail or on any flat surface.

The SIMATIC NET PROFIBUS OBT Product

2

Supplied

1 x PROFIBUS OBT

1 x order form for the PROFIBUS OBT operating instructions

Not supplied

- Plastic fiber-optic cable, can be purchased by the meter
- Tools for connecting fiber-optic cables
- PROFIBUS OBT operating instructions
- Fiber-optic cable connectors

Functional Description

The OBT is a repeater with 3 channels.

3.1 Interfaces

The OBT has the following interfaces for attachment to PROFIBUS DP segments:

- Channel 1 (CH1) is an electrical RS-485 interface. This is implemented as a 9-pin D SUB female connector. A single PROFIBUS DP node can be connected via this channel or a PC, PG or OP can be connected to the OBT. The maximum permitted segment length is 100 m. The copper segment should, however, be kept as short as possible since disturbances can be coupled into the optical PROFIBUS DP from this segment.
- Channel 2 (CH2) and channel 3 (CH3) are optical interfaces. They are designed as duplex sockets. The end of a two-fiber plastic or PCF fiber-optic cable with two simplex connectors is connected to each of these duplex sockets.

The OBT also has a block with three terminals for connecting the 24 V power supply and, if necessary, a grounding conductor.

3.2 Optoelectric Signal Conversion and Signal Regeneration

The OBT converts the RS-485 level signal received at channel 1 into an optical signal level that is then output via channel 2 and channel 3.

Signals received in channel 2 or 3 are converted to electrical signals and

- output on channel 1 as an electrical signal
- changed back to an optical signal and then output again on the other optical channel.

The receive channels have no echo, in other words received signals are not sent back on the same channel.

The OBT regenerates the signals in amplitude and time. This allows up to 126 modules to be cascaded in an optical bus. The cascading depth is limited solely by the monitoring times of the attached devices.

The propagation delay per OBT is 6 bit times.

3.3 Automatic Transmission Rate Detection

The OBT supports all PROFIBUS transmission rates (12 Mbps , 6 Mbps, 3 Mbps, 1.5 Mbps, 500 Kbps and 187.5 Kbps, 93.75 Kbps, 45.45 Kbps, 19.2 Kbps, 9.6 Kbps).

The transmission rate is detected automatically. No settings are necessary.

3.4 Supported FO Fiber Types

The OBT supports the fiber types listed in the table below:

Table 3-1 Distance Covered by Fiber-optic Cable between Two Devices on the Optical PROFIBUS DP

Fiber Type	Distance Between Two Devices
Plastic FO 980/1000 μm with 2 fibers and max. 200 dB/km cable attenuation	0.1 m to 50 m
PCF FO 200/230 μm with 2 fibers and max. 10 dB/km cable attenuation	0 m to 300 m

The specified distances between the devices assume that the partner devices use the same optical components as the OBT. This is, for example, the case with the IM 153-2 FO, IM 467 FO and OLM 12M.

The transmission rate is independent of the type of fiber used and the cable length. It can be up to 12 Mbps.

The following accessories are available:

- Plastic FO cable (sold in meters), connectors, polishing set and tools for connecting plastic FO cables
The plastic fiber-optic cables are supplied with connectors. The plastic simplex connectors can be fitted with the available tools on site.
- PCF FO cable (with connectors)
PCF cables in fixed lengths are available with 4 simplex connectors already fitted.

3.5 Displays

The OBT has 4 LEDs for displaying the various states.

L+ 24V (green)

- Unlit: No power supply or internal power supply is defective or short-circuited
- Flashes: Power supply present; Transmission rate not yet set
- Lit green: Transmission rate set, power supply O.K.

CH1, CH2 , CH3 (channel 1 to 3, yellow)

- Unlit: No data being received
- Lit yellow: Data being received

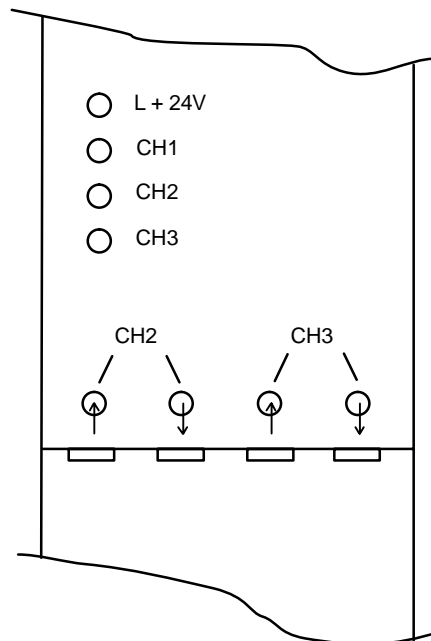


Figure 3-1 LED Displays on the Front Panel

3.6 Operator Controls

The OBT itself does not have operator controls. Care must simply be taken that the PROFIBUS connecting cable (not supplied) attached to Channel 1 is terminated at both ends.

Network Topology

4.1 Optical Bus

The OBT is operated in conjunction with other SIMATIC devices, for example the IM 153-2 FO or IM 467 FO on the optical PROFIBUS DP in the form of an optical bus.

Individual PROFIBUS DP nodes with an RS-485 interface are connected to channel 1 of the OBT via a maximum 100 m long PROFIBUS cable with bus connectors fitted at both ends. The terminating resistors on the bus connectors must be activated. An active or passive PROFIBUS DP node can be connected.

The OBT can be included at any point in the optical bus. If it is included at the start or end, the unused optical channel must be closed with the rubber plug supplied. This prevents contamination of the optical elements and disturbances caused by light entering the module.

The connection forming the optical bus is a two-fiber plastic FO cable (maximum length 50 m) or PCF FO cable (maximum length 300 m). The fiber-optic cables have two simplex connectors at each end.

The fiber-optic connection between two devices is established by connecting the optical sender of one device with one fiber to the optical receiver of the other device and the optical receiver of the one device to the optical sender of the other device (cross-over connection).

If an OBT or a fiber-optic cable fails, the entire network becomes two subnets. Depending on the location of the problem, individual devices may no longer be accessible.

The OBT does not support the creation of single-fiber rings, of monitored optical busses or redundant ring structures.

4.2 Using Long Fiber Optic Sections

The maximum permitted length of PCF FO cables with the OBT is 300 m. If longer distances are required with fiber-optic cables, then other fiber-optic types such as graded glass fibers or monomode fibers are necessary and these can be used in a combination of OBT with OLM (Optical Link Module). The OBT is then connected electrically to the OLM (for example OBT/CH 1 to OLM/CH 1) and the OLM is attached to the long fiber-optic section. At the other end of the fiber-optic section, the arrangement is reversed by another OLM/OBT pair.

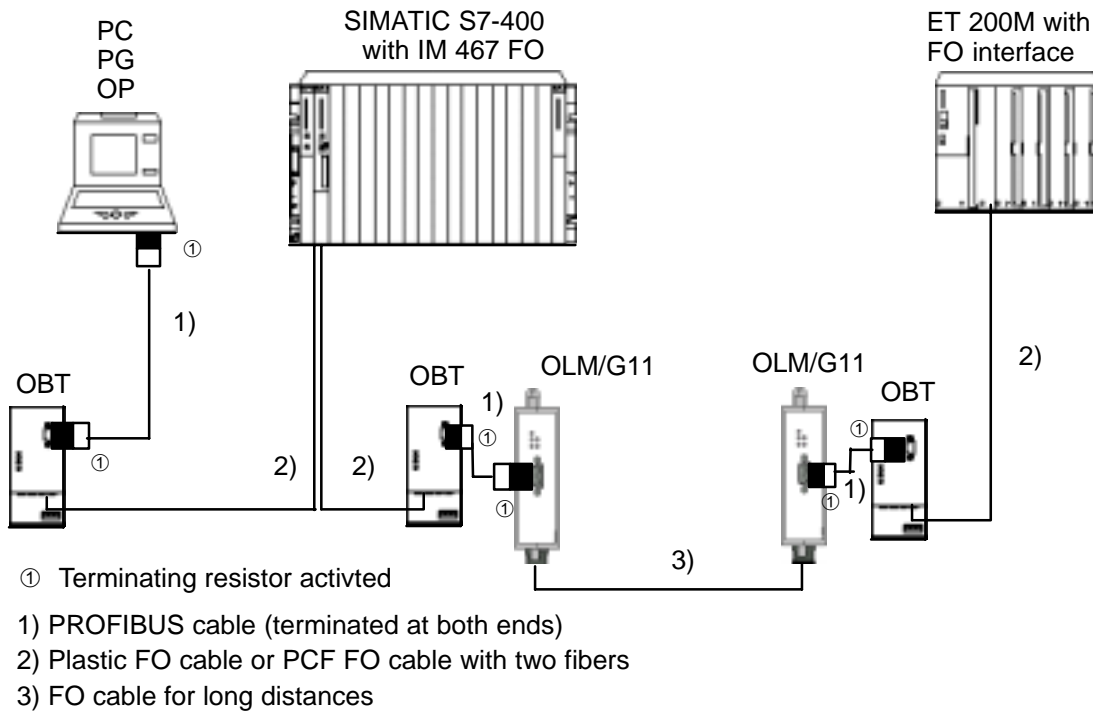
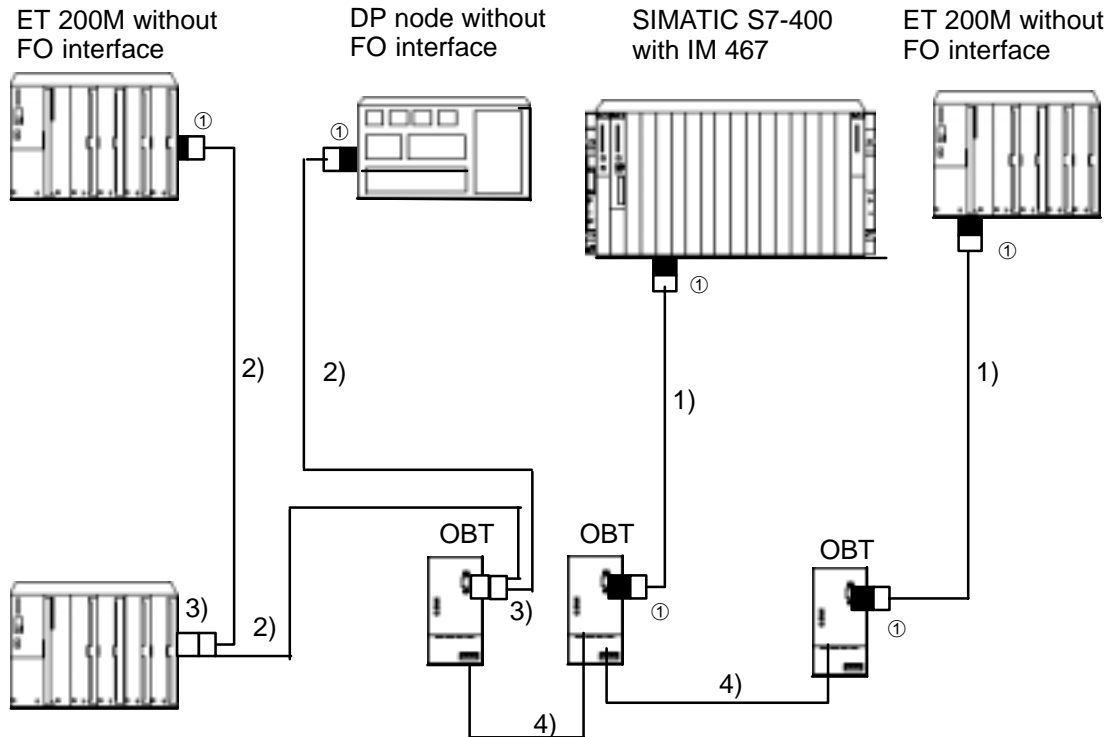


Figure 4-1 Example of Including Long Fiber-optic Segments with OBT and OLM

The maximum permitted transmission rate and the type and maximum length of the fiber-optic segment are determined by the OLM type.

4.3 Attaching RS-485 Segments

The OBT allows the attachment of a PROFIBUS-RS 485-segment.



① Terminating resistor activated

- 1) PROFIBUS cable
(terminated at both ends)
- 2) PROFIBUS cable
- 3) PROFIBUS connector (not terminated)
- 4) Plastic FO or PCF FO with two fibers

Figure 4-2 Example of Attaching RS-485 Segments

Installation and Startup

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Note

Use the PROFIBUS OBT only as described in this manual.

Note

Pay particular attention to all warnings and safety-related instructions.

Note

The PROFIBUS OBT must only be operated with a safety extra-low voltage (SELV) complying with IEC 950/ EN 60 950/ VDE 0805 with a maximum of +32 V (typically +24 V). The power source must comply with the regulations of NEC class 2 according to the UL/CSA approval.

Note

Do not look directly into the opening of the optical transmitter diode. The emitted light could injure your eyes.

**Danger**

Never connect the PROFIBUS OBT to a power supply of 110 V - 240 V.

Note

Select the installation location so that the climatic limit values listed in the technical specifications can be adhered to.

Note

The RS-485 channel CH1 of the PROFIBUS OBT is electrically isolated from the 24V input. This isolation is required for correct functioning and is not a safety measure.

Note

Make sure that the PROFIBUS OBT is adequately grounded by connecting the rail or mounting plate to local ground with low resistance and low inductance.

Note

As the RS-485 cable, use only LAN cables approved for PROFIBUS.

Note

Do not open the OBT casing.

5.1 Procedure for Installation

Installation of the PROFIBUS OBT involves the following steps:

- Installing the PROFIBUS OBT
- Connecting the power supply
- Connecting the optical cables
- Attaching the electrical RS-485 LAN cable.

5.2 Installation

Installing the PROFIBUS OBT

PROFIBUS OBT can be installed either on a 35 mm standard rail with a height of 15 mm in compliance with DIN EN 50 022 - 35 x 15 or directly on a level surface.

- Select the installation location so that the climatic limit values listed in the technical specifications can be adhered to.
- Make sure there is enough space for connecting the bus and power supply cables.
- Install the modules only on a low-resistance and low-inductance grounded standard rail or mounting plate. If you secure the modules on a mounting plate, make sure that as short a cable as possible leads from the ground terminal of the OBT to the nearest possible ground point.

Installation on a Standard rail

- Fit the upper catch of the module onto the standard rail and push in the lower part of the module as shown in Figure 5-1 until it audibly clicks into position.
- The module is removed by pulling down the locking bar.

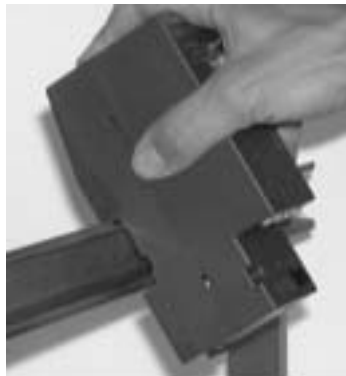


Figure 5-1 Installation of a Module on a Standard Rail

Installation on a Mounting Plate

PROFIBUS OBTs have two holes drilled in them. This allows them to be installed on any flat surface, for example on the mounting plate of a cubicle.

- Drill two holes in the mounting plate as shown in the drill template in Figure 5-2.
- Secure the modules with machine screws (for example M3 x 75 and M3 x 55).
- Use a grounding conductor with at least 2.5 mm² to establish a reliable electrical connection between the PE terminal of the module casing and the grounded mounting plate.

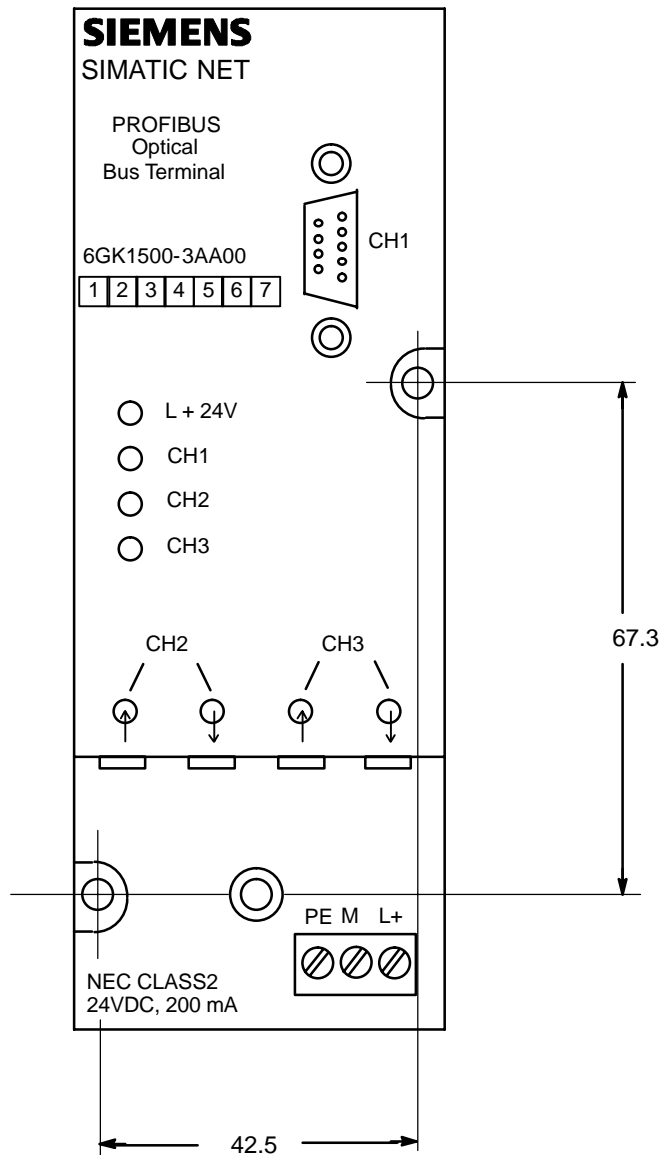


Figure 5-2 Installing a Module on a Mounting Plate

Instructions for Connecting Plastic Fiber-Optic Cables (with photos)

You can download a detailed instruction brochure with photos illustrating how to connector plastic fiber-optic cables from the Internet:

- German: <http://www.ad.siemens.de/csi/net>
- English: http://www.ad.siemens.de/csi_e/net

Select SEARCH on this page and enter the number 574203 in the Entry ID box and start the search.

Connecting the Power Supply

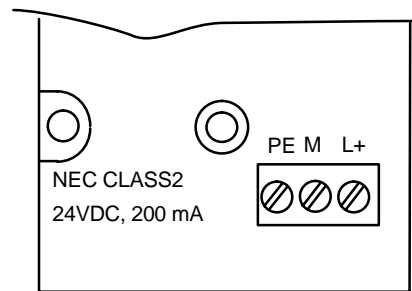


Figure 5-3 Layout of the Terminal Block - Ground Terminal PE and Power Supply Terminals M, L+

- The power supply for the PROFIBUS OB module must be a stabilized safety extra-low voltage complying with IEC 950 / VDE 0805, minimum +18 V and maximum +32 V (typically +24 V). The power source must meet the specifications of NEC class 2 to comply with the UL/CSA approval. The unit is intended to be installed on the load side of the class 2 or class 3 power source as defined by the National Electric Code (NEC), Article 725-2

The module must be wired correctly according to the National Electrical code (NEC) complying with NEC Article 725-52, 725-54, 725-61 and 725-71.

- If the PROFIBUS OB module is not installed on a grounded rail, a grounding conductor with a cross-section of 2.5 mm² should be connected from the PE terminal to the nearest possible ground point.

Connecting the Optical Cables



Figure 5-4 View of the Module from Below with the Optical Channels CH2 and CH3

A = CH2, optical receiver

B = CH2, optical sender

C = CH3, optical receiver

D = CH3, optical sender

- Connect the individual PROFIBUS OBTs using a duplex FO cable, fitted with two pairs of simplex connectors.
- Make sure that in each case an optical input is connected to an optical output (crossover).
- Make sure that there is reliable strain relief for the FO cable and do not bend the cable beyond the minimum bending radius.
- Close unused FO sockets with the plastic plugs provided. Extraneous light, particularly when it is extremely bright can cause disturbances on the PROFIBUS network.
- Remember the minimum and maximum length of the FO cable and the permitted fiber types specified in Table 1 and in the technical specifications.
- You should also make sure that no dust can enter the optical components. Dust in optical components can make them unusable.
- The fibers of the cable must be flush with the front surface of the connector.

Note

If the fiber protrudes beyond the surface of the connector, the connector must not be inserted into the socket otherwise the optical components can be permanently damaged.

Connecting the Electrical RS-485 Cable

Channel CH1 is used to connect a single PROFIBUS DP DTE. CH1 is designed as an electrical RS 485 interface with a 9-pin sub D female connector. The maximum cable length between the OBT and DTE is 100 m. Since this involves a point-to-point connection, the terminating resistors in the PROFIBUS connectors must be activated at both ends of the cable.

Use only SIMATIC NET shielded Twisted Pair cables as the RS 485 cable for PROFIBUS.

Do not connect RS 485 cables when all or part of the cable is outside a building. Lightning in the area can otherwise destroy the PROFIBUS OBTs. If connections exit the building, use FO cables whenever possible!

Remove the RS 485 cable from the OBT if there is no node connected to the other end of the cable. Noise can lead to problems on the PROFIBUS network.

6

Troubleshooting

Table 6-1

LED Display	Possible Cause of Problem
L+ 24V LED not lit	<ul style="list-style-type: none">- Power outage- OBT defective
L+ 24V LED flashing	<ul style="list-style-type: none">- The transmission rate could not be set
CH1 LED not lit	<ul style="list-style-type: none">- Break on one or more wires of the RS-485 LAN cable- Wires A and B of the RS-485 LAN cable connected to wrong terminals- Attached PROFIBUS node is defective or not sending- PROFIBUS node not attached or attached node is not turned on
CH1 LED lit But PROFIBUS nodes signaling bus problems	<ul style="list-style-type: none">- Wires A and B of the RS-485 LAN cable connected to wrong terminals- Short-circuit on the RS-485 LAN cable- Break on one of the wires of the RS-485 LAN cable and wires A and B connected to wrong terminals- No or wrong termination
CH2, CH3 LED not lit	<ul style="list-style-type: none">- Send and receive FO cords swapped over- Break on FO cord receiving receiving from partner module- No partner module connected or partner module is not turned on- Attached partner module is defective (not sending)
CH2, CH3 LED lit But PROFIBUS nodes signaling bus problems	<ul style="list-style-type: none">- FO connector is loose- FO cable distance to next module too long- Receive FO cord interrupted and disturbance caused by extraneous light

If none of the LEDs indicates a problem and you still encounter communication problems (for example no confirmation, unexpected frames), check the monitoring times set on the PROFIBUS nodes (such as the Slot Time).

For more detailed information on these parameter settings, refer to the description of your PROFIBUS DTEs and the configuration software.

7

Technical Specifications

Table 7-1 Technical Specifications

Technical Specifications							
Power supply (safety extra-low voltage with reliable isolation, SELV or complying with NEC Class 2)	24 VDC (18 V to 32 V)						
Power consumption at 24 V input	max. 200 mA						
Transmission rate	12 Mbps, 6 Mbps, 3 Mbps, 1.5 Mbps, 500 Kbps, 187.5 Kbps, 93.75 Kbps, 45.45 Kbps, 19.2 Kbps, 9.6 Kbps						
Transmission rate setting	made automatically						
Mode	optical bus						
Bit error rate	$<10^{-9}$						
Input channel 1 to channel 3 Bit length Jitter	0.7 to 1.3 tBit -0.03 to +0.03 tBit						
Output channel 1 to 3 Bit length Jitter	0.99 to 1.01 tBit -0.003 to +0.003 tBit						
Signal delay time (any input/output)	≤ 6 tBit						
Cascading depth of optical bus	limited only by signal run time						
Electrical channel							
Input/output signal	RS-485 level						
Input dielectric strength	-7 V to +12 V						
Minimum current at 5V (for terminating resistors)	10 mA						
Electrical isolation from 24V input	Isolation due to function; not safety-related!						
Optical channels							
Optical source	LED						
Coupled optical power - in plastic fiber 980/1000 - in PCF fiber 200/230	<table border="0"> <tr> <td>$P_{T(\min)}$</td> <td>$P_{T(\max)}$</td> </tr> <tr> <td>- 5.9 dBm</td> <td>+0.5 dBm</td> </tr> <tr> <td>- 16 dBm</td> <td>-1.5 dBm</td> </tr> </table>	$P_{T(\min)}$	$P_{T(\max)}$	- 5.9 dBm	+0.5 dBm	- 16 dBm	-1.5 dBm
$P_{T(\min)}$	$P_{T(\max)}$						
- 5.9 dBm	+0.5 dBm						
- 16 dBm	-1.5 dBm						
Receiver sensitivity - with plastic fiber 980/1000 - with PCF fiber 200/230	<table border="0"> <tr> <td>$P_{R(\min)}$</td> <td>$P_{R(\max)}$</td> </tr> <tr> <td>-20 dBm</td> <td>0 dBm</td> </tr> <tr> <td>-22 dBm</td> <td>-2 dBm</td> </tr> </table>	$P_{R(\min)}$	$P_{R(\max)}$	-20 dBm	0 dBm	-22 dBm	-2 dBm
$P_{R(\min)}$	$P_{R(\max)}$						
-20 dBm	0 dBm						
-22 dBm	-2 dBm						

Wavelength	640 nm to 660 nm
Permitted FO cable attenuation (with link power margin) - for plastic fiber 980/1000 - for PCF fiber 200/230	13 dB 3 dB
Transmission distance with 3dB link power margin - with plastic fiber 980/1000 with max. 200 dB/km cable attenuation - for PCF fiber 200/230 with max. 10 dB/km cable attenuation	0.1m to 50m 0 m to 300m
FO connector	Simplex / duplex

Electromagnetic compatibility (EMC)	
Noise emission	Limit class A (EN 55022)
Immunity to static discharge	On shield connection and casing: ± 6 kV contact discharge (IEC 1000-4-2)
Immunity to high frequency interference	10 V/m at 80% amplitude modulation at 1kHz, 80MHz - 1GHz (ENV 50140; IEC 61000-4-3) 10V/m at 50% on time at 900MHz (ENV 50 204) 10 V/m at 80% amplitude modulation at 1kHz, 10kHz - 80MHz (ENV 50141)
Immunity to conducted interference (burst)	On power supply cables and shielded RS 485 LAN cables: ± 2 kV (IEC 61000-4-4)
Immunity to conducted interference (surge)	On power supply cables: ± 1 kV balanced On shielded RS 485 LAN cables: ± 2 kV unbalanced (IEC 61000-4-5)
Safety	
VDE requirements	VDE 0806=EN60950 and IEC950
UL/CSA approval	complying with UL1950/CSA950
Climatic conditions	
Ambient temperature	0 °C to +60 °C (IEC 68-2-1, IEC 68-2-2)
Storage temperature	-40 °C to +70 °C (IEC 68-2-14)

Relative humidity	< 95% (no condensation) (IEC 68-2-30)
Mechanical conditions	
Vibration during operation	10 to 58 Hz, 0.075 mm deflection 58 to 150 Hz, 10m/s ² (1g) acceleration (IEC 68-2-6)
Vibration during transportation	5 to 9 Hz, 3.5 mm deflection 9 to 500 Hz, 10m/s ² (1g) acceleration
Type of protection (with external fusing ≤ 8A)	IP 30
Weight	400 g
Dimensions	50.5 x 138 x 78 mm
Casing material	Noryle anthracite

Notes on the CE Label

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Product Name:

Optical Bus Terminal PROFIBUS OBT,

Order no.: 6GK1500-3AA00

EU Directive EMC 89/336/EEC



The product listed above meets the requirements of the EU directive 89/336/EEC "Electromagnetic Compatibility" in an industrial environment.

Area of application	Requirements	
	Noise emission	Noise immunity
Industrial	EN 50081-2 : 1993	EN 50082-2 : 1995

Conformity Certificates

The EU conformity certificates are available for the relevant authorities according to the EU directive and are kept at the following address:

Siemens Aktiengesellschaft
 Bereich Automatisierungstechnik
 Industrielle Kommunikation (A&D PT2)
 Postfach 4848
 D-90327 Nürnberg
 Germany

Installation Instructions

The product meets the requirements above when it is installed and operated according to the instructions in the Optical Bus Terminal PROFIBUS OBT documentation.

The accessible radiated power of the transmitting LEDs used complies with class 1 EN 60825-1:1994 + A11:1996 or IEC 60825-1:1993 incl. amendment 1:1997 LED class 1

The accessible radiated power if the fiber cable is opened accidentally or deliberately corresponds to degree of danger 1 in compliance with EN 60825-2:1994 or 60825-2:1993

Information for Manufacturers of Machines

The product remains a component according to article 4(2) of the EU directive on machines 89/392/EEC.

According to the directive on machines, we are obliged to point out that this product is intended solely for installation in a machine. Before the final product can be put into operation, it must be tested for compliance with the directive 89/392/EEC.

Notes for Australia



SIMATIC NET OBT meets the requirements of AS/NZS 2064 (Class A) standard.

References

- /1/ Wrobel, Christoph (Herausgeber):
"Optische Übertragungstechnik in industrieller Praxis", Hüthig Buch Verlag GmbH, Heidelberg 1994
 - /2/ G. Mahlke, P Gössig:
"Lichtwellenleiterkabel: Grundlagen, Kabeltechnik"
3. Auflage, Berlin 1992
- SIMATIC NET PROFIBUS is based on the following standards and directives
- /3/ EN 50170-1-2: 1996
General Purpose Field Communication System
Volume 2 : Physical Layer Specification and Service Definition
- PROFIBUS Users Organization:
- /4/ PROFIBUS Implementation Instructions for DIN 19245 Draft
Part 3
Version 1.0 dated 14.12.1995
 - /5/ EIA Standard RS-485 (April 1983):
"Standard for electrical characteristics of generators
and receivers for use in balanced digital multipoint systems"
 - /6/ SIMATIC NET Manual for PROFIBUS Networks
SIEMENS AG order number: 6GK19705AC10-0BA0
 - /7/ SIMATIC NET Industrial Communication Catalog IK10
SIEMENS AG
Bereich Automatisierungstechnik
Geschäftszweig Industrielle Kommunikation SIMATIC NET
Postfach 4848
D-90327 Nürnberg
Germany
 - 8/ SIMATIC NET Product Information Installation Instructions for
SIMATIC NET PROFIBUS
Plastic Fiber Optic with Simplex Connectors
These instructions can be downloaded from the Internet
- German: <http://www.ad.siemens.de/csi/net>
- English: http://www.ad.siemens.de/csi_e/net
Select SEARCH on this page and
enter the number "574203" in the "Entry ID" box
and start the search.
 - /9/ SIMATIC NET Description and Operating Instructions OLM 12M
SIEMENS AG order number: 6ZB5530-3AB00-0BA0

Abbreviations

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10

DIN	Deutsche Industrie Norm (German industrial standard)
ESD	Electrostatic discharge
EN	European standard
EMC	Electromagnetic compatibility
FO	Fiber-optic
IEEE	Institute of Electrical and Electronic Engineers
ISO/OSI	International Standards Organization / Open System Interconnection
HCS™	HCS™ is a registered trademark of Ensign-Bickford Optics Company and stands for "Hard Polymer Cladded Silica Fiber". In these instructions, only the general term PCF is used.
LAN	Local Area Network
LED	Light Emitting Diode
OBT	Optical Bus Terminal
OLM	Optical Link Module
PCF	Polymer Cladded Fiber, synonymous with HCS™ fiber
POF	Polymer Optical Fiber; synonymous with plastic FO cable
PROFIBUS DP	PROFIBUS Distributed I/Os
SELV	Safety extra-low voltage
UL	Underwriter Laboratories
VDE	Verein Deutscher Elektroingenieure (association of German electrical and electronics engineers)

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