

# SIEMENS

## SIMATIC NET

### PROFIBUS Optical Bus Terminal (OBT)

#### Operating Instructions

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## 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.

<b>⚠ DANGER</b>
indicates that death or severe personal injury <b>will</b> result if proper precautions are not taken.
<b>⚠ WARNING</b>
indicates that death or severe personal injury <b>may</b> result if proper precautions are not taken.
<b>⚠ CAUTION</b>
with a safety alert symbol, indicates that minor personal injury can result if proper precautions are not taken.
<b>CAUTION</b>
without a safety alert symbol, indicates that property damage can result if proper precautions are not taken.
<b>NOTICE</b>
indicates that an unintended result or situation can occur if the corresponding information is not taken into account.

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 for the specific task, 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:

<b>⚠ WARNING</b>
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 adhered to. The information in the relevant documentation must be observed.

### Trademarks

All names identified by ® are registered trademarks of the 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.

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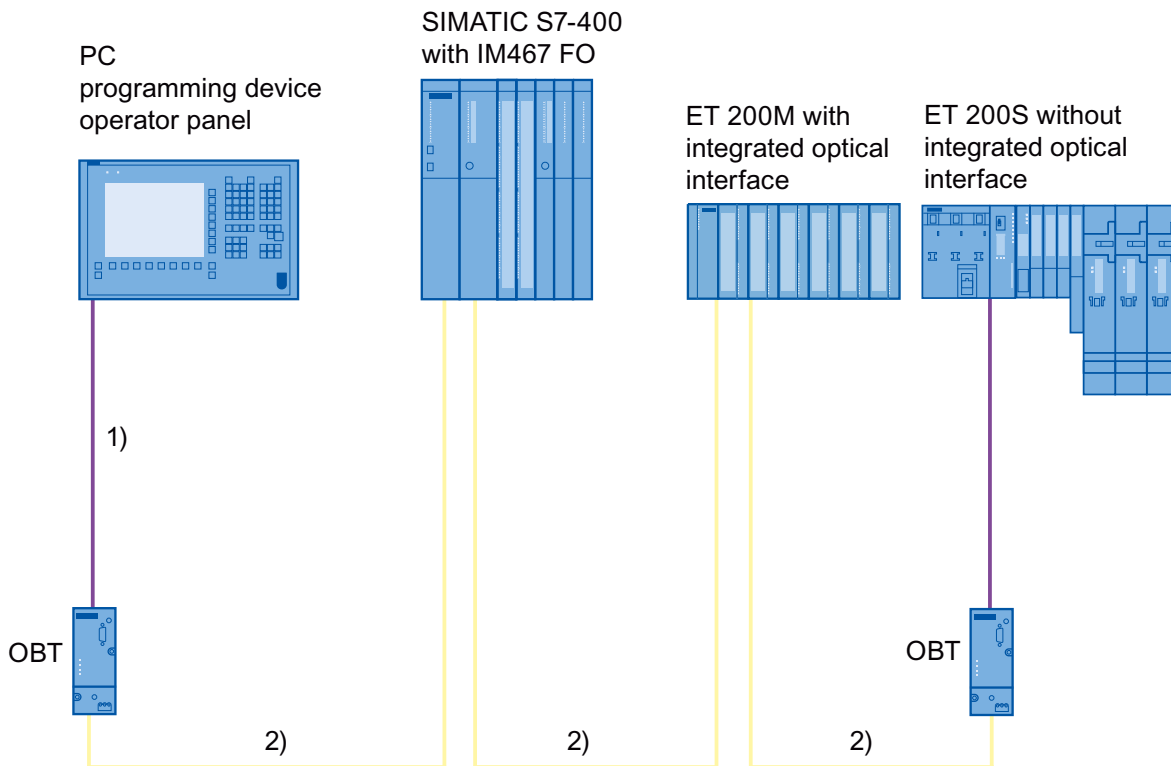
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# Introduction

# 1

The PROFIBUS OBT (Optical Bus Terminal) is a network component used in optical PROFIBUS DP fieldbus networks. It allows the connection of either a single device without an integrated optical interface or an RS-485 segment to the optical PROFIBUS DP. The following figure shows an example of a configuration.



- 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 bus nodes takes the form of an optical bus with two-fiber plastic fiber-optic cables (plastic fiber-optic cables are also known as POF, Polymer Optical Fiber) or PCF fiber-optic cables (PCF = Polymer Cladded Fiber, synonymous with HCS1 fiber-optic cable). Since fiber-optic cables (FO cable) are completely insensitive to EMC interference, complex grounding concepts and protection measures are unnecessary. This also applies to the laying of a equipotential bonding cables. Due to be opto-electronic conversion, there is automatically electrical isolation so that potential differences as can occur in extensive plants are no longer noticed.

1) HCS is a registered trademark of Spectran Speciality Optics and stands for "Hard Polymer Cladded Silica Fiber".

### **Sensitivity**

Just as the FO cable is insensitive to EMC interference, an FO cable also emits no electromagnetic waves into its environment. Sensitive electronic devices located in the vicinity of the fiber-optic cable therefore need no additional protection or suppression measures.

### **Power supply**

The OBT requires an operating power supply of 24 VDC that is connected via two screw terminals.

### **Operating state**

LEDs signal the current operating state and any problems affecting operation.

### **Mechanical construction**

The mechanical construction consists of a compact plastic housing that can be mounted either on a DIN rail or any flat surface.

## Components of the product

### Supplied

- 1 x PROFIBUS OBT
- 1 x Compact operating instructions C79000-Z8964-C122

### Not supplied

- Plastic fiber-optic cables, sold in meters
- Assembly tool for fiber-optic cable connectors
- Operating Instructions for the PROFIBUS OBT
- Fiber-optic cable connectors





## Functional description

The OBT is a repeater with 3 channels.

### 3.1 Interfaces

The OBT has the following interfaces for connection of PROFIBUS DP segments:

- Channel 1 (CH1) is an electrical RS-485 interface. It is designed as a 9-pin D-sub female connector. A PROFIBUS DP node or a PC, PG, OP or an RS-485 segment can be connected to the OBT via this channel. The copper segment should be kept as short as possible since this can couple in disturbances into the optical PROFIBUS DP.
- Channel 2 (CH2) and channel 3 (CH3) are optical interfaces. These are designed as duplex female connectors. The end a two-fiber plastic or PCF fiber-optic cable fitted with two simplex male connectors is connected to each of these duplex female connectors.

The OBT also has a 3-pin terminal for connection of the 24 V power supply and, if necessary, a ground cable.

### 3.2 Opto-electrical signal conversion and signal regeneration

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

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

- output on channel 1 as an electrical signal
- they are then converted into an optical signal again and output on the other optical channel.

There is no echo on the receive channel; in other words, received signals are not sent back on the same channel.

The OBT regenerates the signals in amplitude and time. This makes it possible to cascade up to 126 modules in an optical bus. The cascading depth is simply limited by the monitoring times of the connected devices.

The latency per OBT is 6 bit times.

### 3.3 Supported FO fiber types

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

Table 3- 1 Achievable FO cable distance between the two devices on optical PROFIBUS DP

Fiber type	Link length between 2 devices
Plastic FO cable 980/1000 µm with 2 fibers and max. max. 200 dB/km cable attenuation	0.1 to 50 meters
PCF FO cable 200/230 µm with 2 fibers and max. max. 10 dB/km cable attenuation	0 to 300 meters

The specified link length between the devices assumes that the partner devices use the same optical components as the OBT. This is, for example, the case with the IM 153–2 FO and IM 467 FO.

The transmission speed is not dependent on the fiber type used or the cable length. This can be up to 12 Mbps.

The following accessories are available:

- Plastic fiber-optic cable (sold in meters), connectors/polishing set and the assembly tool for plastic fiber-optic cable  
The plastic fiber-optic cables do not have connectors fitted. The plastic simplex connectors can be fitted easily on site with the available tools.
- PCF FO cable (preassembled)  
PCF cables with 4 PCF simplex connectors fitted are available in fixed lengths.

### 3.4 Displays

The OBT has 4 LEDs to display the operating state.

#### L+ 24 V (green)

- not lit: Power supply missing or internal power supply is defective or short-circuited
- flashes: Power supply present, transmission speed not yet set
- lit green: Transmission speed set, power supply functioning correctly

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

- not lit: Data is not being received
- lit yellow: Data is being received

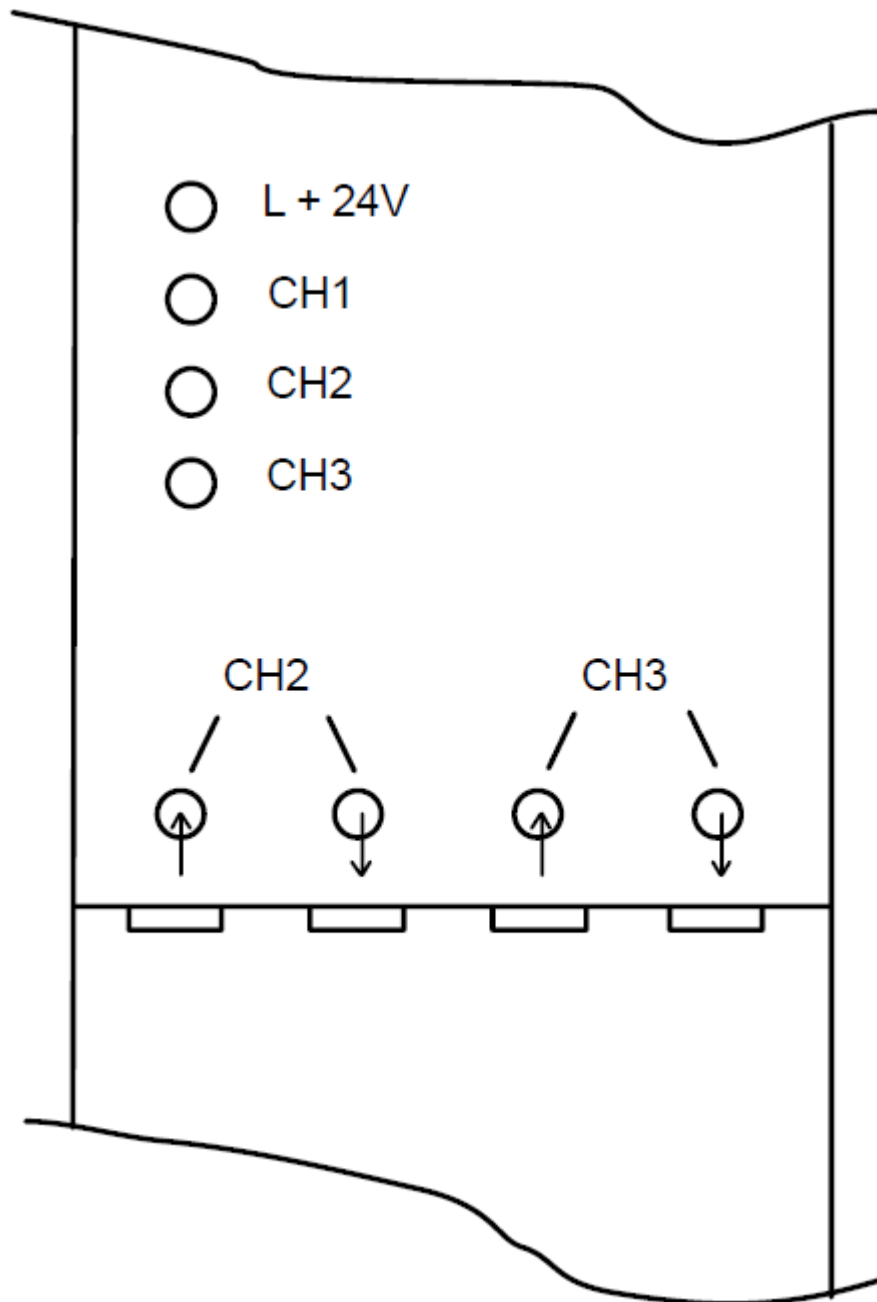


Figure 3-1 LEDs on the front panel

### 3.5 Operator controls

The OBT itself does not have any controls. The only point to remember is that the PROFIBUS connecting cable connected to channel 1 (does not ship with product) needs to be terminated at both ends.



## Network topology

### 4.1 Optical bus

Along with other SIMATIC devices such as the IM 153–2 FO or IM 467 FO, OBTs are connected to optical PROFIBUS DP to form an optical bus.

PROFIBUS DP bus nodes with an RS-485 interface are connected to channel 1 of the OBT via bus connectors and a PROFIBUS bus cable. The bus segment must be terminated at both ends.

The OBT can be used at any point on the optical bus. If it is used at the start or end, the unused optical channel must remain closed with the rubber plug. This prevents contamination of the optical elements and disturbances caused by incident light.

The connection on an optical bus is made using two-fiber plastic FO cable (max length 50 m) or PCF FO cable (max. length 300 m). The FO cables have two simplex connectors fitted at both ends.

The FO connection between two devices is established by the optical transmitter of one device being connected to the optical receiver of the other device via a fiber, while the optical receiver of the first device is connected to the optical transmitter of the other (crossover cable).

If an OBT or a fiber-optic cable fails, the network is split into two separate networks. Depending on the location of the problem, devices are no longer accessible.

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#### Note

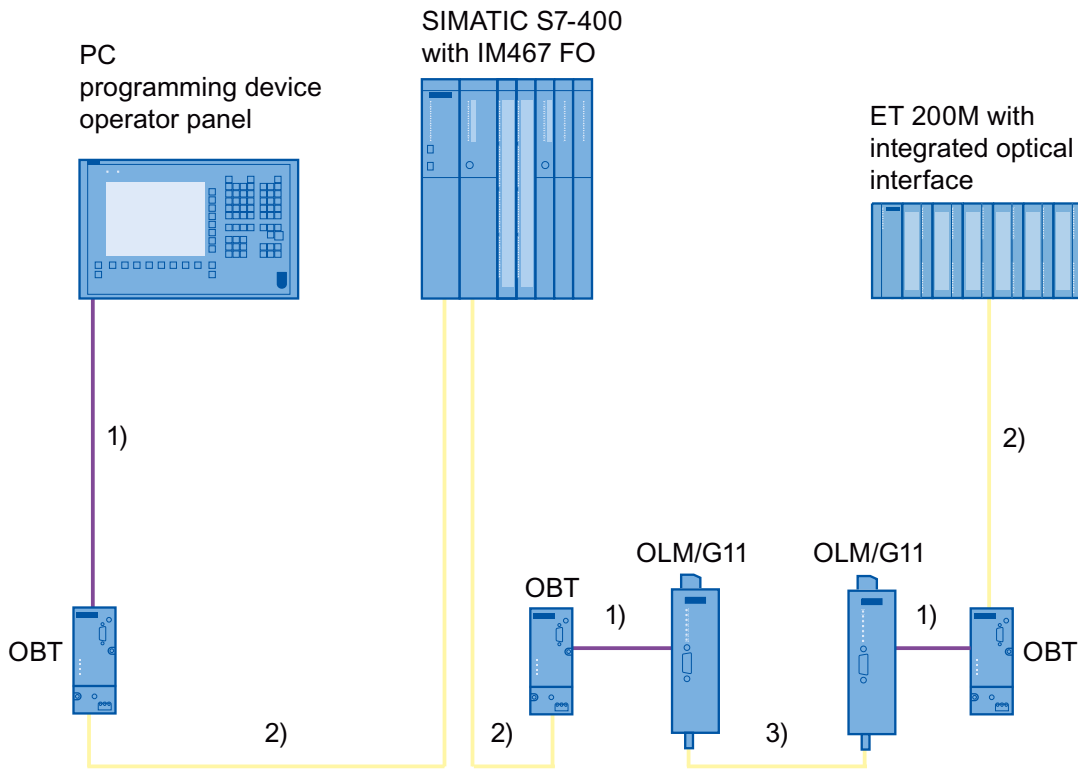
If problems are detected on the electrical interface, there is a segmentation, in other words, the frames are not forwarded. The segmentation is canceled when the problem has been eliminated. In this case, it is assumed that a minimum number of error-free frames were received on the electrical channel. The segmentation is also canceled when no frames are received for at least 1 second. In this case, it is assumed that unplugging the PROFIBUS connector caused problems and that there are no more nodes on the electrical channel.

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The OBT does not support the establishment of single-fiber rings or redundant ring structures.

## 4.2 Integration of long FO cable runs

The maximum permitted length of PCF FO cable with the OBT is 300 m. If longer FO links or other FO cable types, for example glass graded index fibers or monomode fibers are necessary, they can be used by combining OBTs with OLMs (Optical Link Module). In this situation, the OBT is connected electrically with the OLM (OBT/CH 1 to OLM/CH 1) and the OLM is connected to the long FO cable link. At the end of the FO cable link, the combination is reversed with a second OLM/OBT pair.



- 1) PROFIBUS cable (terminated at both ends)
- 2) Plastic FO cable or PCF FO cable with two fibers
- 3) FO cable for longer distances

Figure 4-1 Example of covering longer FO links with OBTs and OLMs

The maximum permitted transmission speed and the type and maximum length of the FO cable link is decided by the OLM type.

## 4.3 Integrating RS-485 segments

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

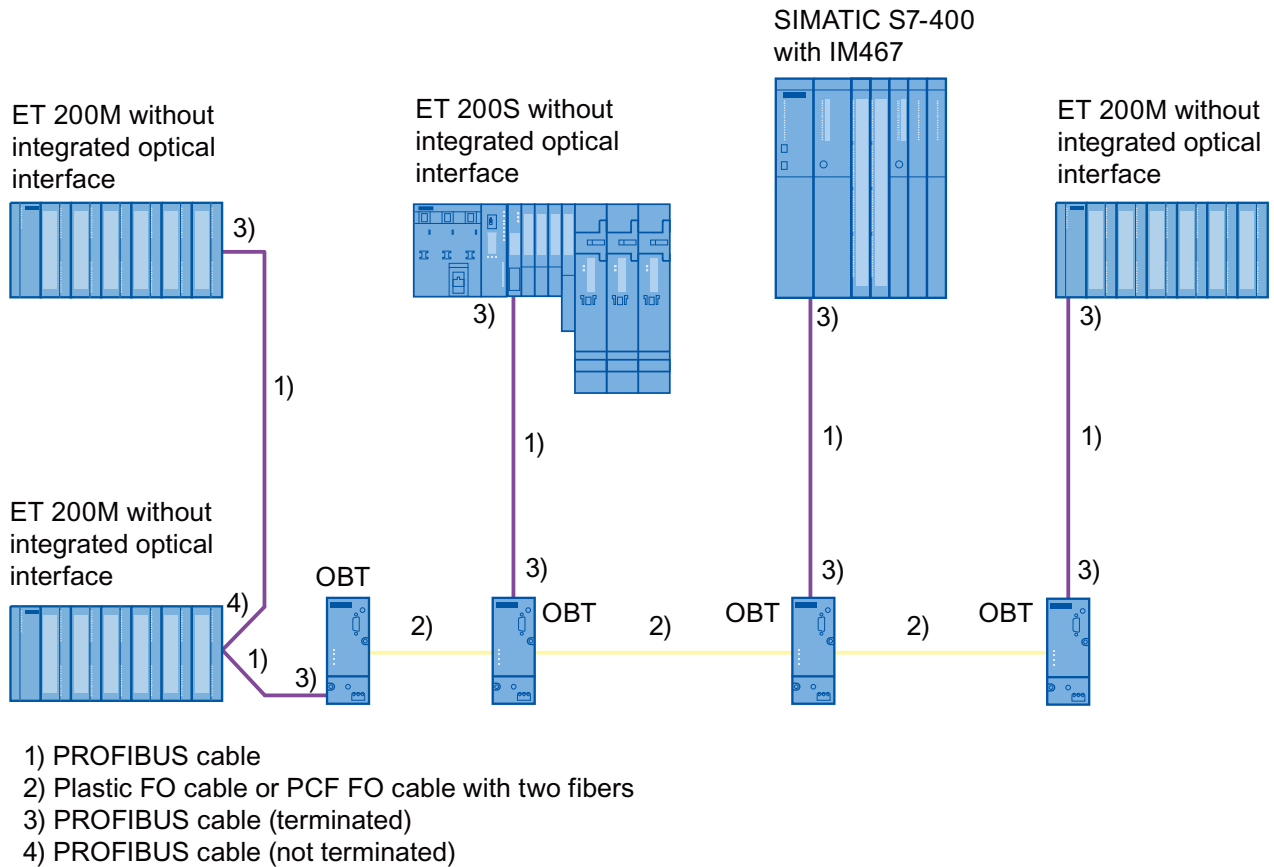


Figure 4-2 Example of the integration of RS-485 segments





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**Note**

Use the PROFIBUS OBT only as intended in these Operating Instructions.

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**Note**

Pay particular attention to all warnings and notices relevant to safety.

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**Note**

Operate the PROFIBUS OBT only with safety extra-low voltage complying with IEC 950 / EN 60 950/VDE 0805 of maximum +28.8 V (typically +24 V). The power source must meet the requirements of NEC Class 2 according to the UL/CSA approval.

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**Note**

Never look directly into the opening of the optical transmission diode. The emitted light beam could endanger your eyes.

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**Note**

Never connect the PROFIBUS OBT to a 100 V - 240 V power supply.

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**Note**

Install the device so that the climatic limit values in the technical specifications are adhered to.

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**Note**

The RS-485 channel CH1 of the PROFIBUS OBT is isolated from the 24 V input. This isolation relates to functionality and is not a safety measure.

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**Note**

Make sure that the PROFIBUS OBT is adequately grounded by connecting the DIN rail or mounting plate to local ground with low resistance and inductance. When securing the module to a mounting plate, run a cable from the grounding terminal of the OBT to the nearest possible ground, keeping the cable as short as possible.

The shield of the PROFIBUS cable must be contacted. To do this, strip the insulation from the end of the PROFIBUS cable and connect the shield to functional earth.

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**Note**

Only use bus cables approved for PROFIBUS as the RS-485 bus cable.

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**Note**

The OBT housing must not be opened.

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## 5.1 Procedure for commissioning

Commissioning the PROFIBUS OBT involves the following steps:

- Mounting the PROFIBUS OBT;
- Connecting the power supply;
- Connecting the optical bus cables;
- Connecting the electrical RS-485 bus cable.

## 5.2 Installation

### Mounting the PROFIBUS OBT

The PROFIBUS OBTs can be mounted either on a 35 mm DIN rail with a height of 15 mm according to DIN 50 022 - 35 x 15 or directly on a flat surface.

1. Install the device so that the climatic limit values in the technical specifications are adhered to.
2. Make sure that there is adequate space to connect the bus and power supply cables.
3. Mount the modules only on a rail or mounting plate that is grounded with low resistance and inductance. When securing the module to a mounting plate, run a cable from the grounding terminal of the OBT to the nearest possible ground, keeping the cable as short as possible.

### Mounting on a DIN rail

Fit the upper catch of the module over the DIN rail and push in the lower part of the module as shown in Figure 5-1 until it clicks in place.

To remove the module, pull down the locking lever.

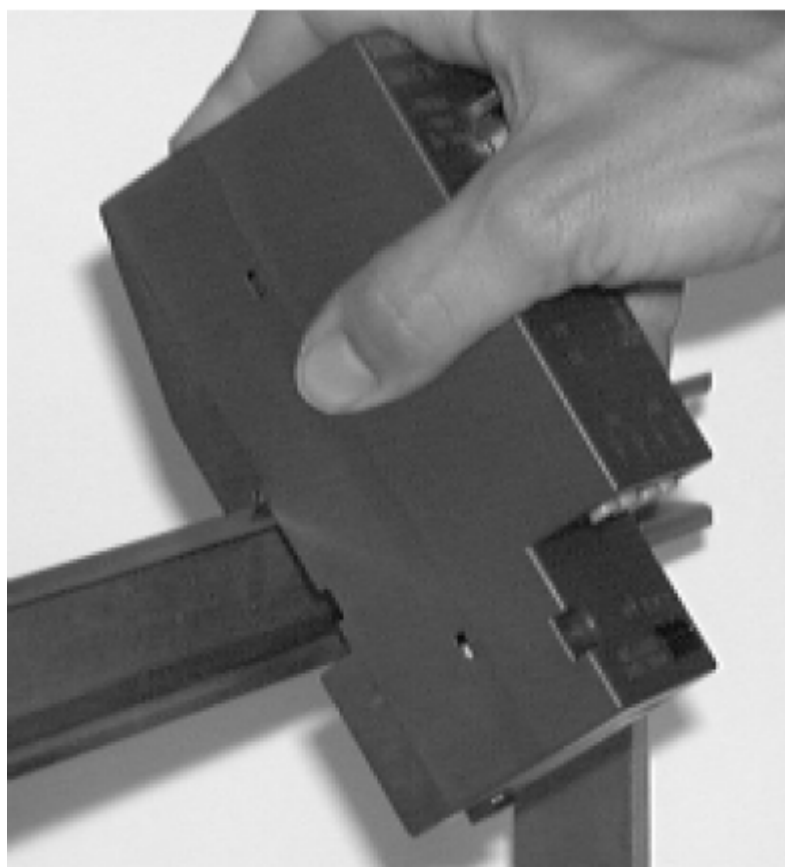


Figure 5-1 Mounting a module on a DIN rail

### Mounting on a mounting plate

The PROFIBUS OBTs have two holes. These allow mounting on any flat surface, for example on the mounting plate of a cabinet.

Drill two holes in the mounting plate as shown in the drilling template in Figure 5-2.

Secure the module with two machine screws (for example M3 x 75 and M3 x 55).

Make sure that there is a reliable electrical connection between the terminal  $\perp$  of the module housing and the grounded mounting plate using a grounding cable of at least 2.5 mm<sup>2</sup>.

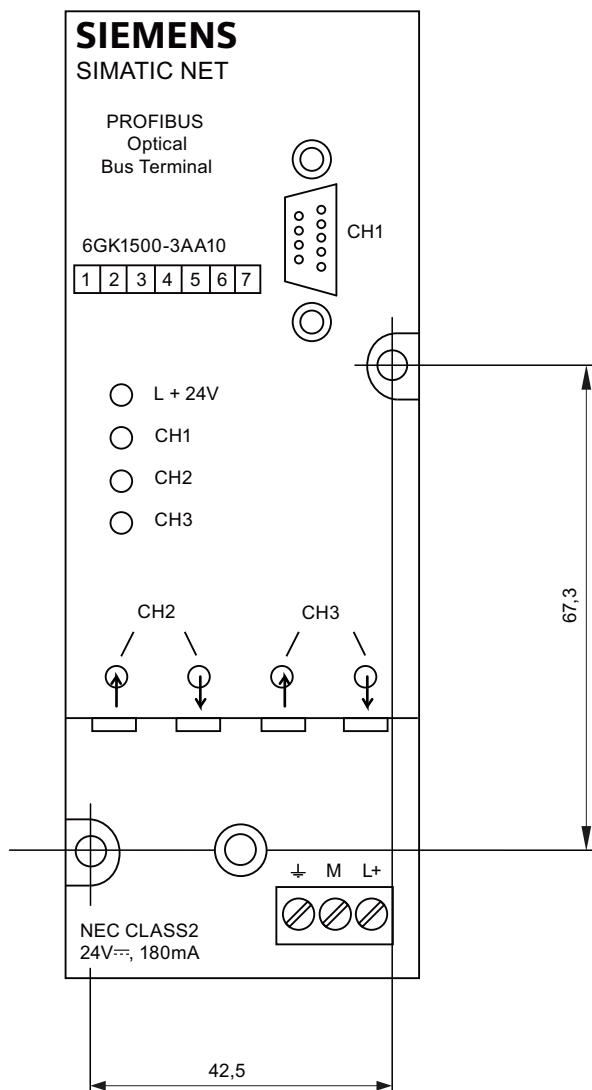


Figure 5-2 Mounting a module on a mounting plate

### Instructions for assembling plastic fiber-optic cable (with photos)

You will find detailed instructions (with photos) on fitting connectors to plastic fiber-optic cables on the Internet

<http://support.automation.siemens.com/WW/view/en/10805878>

### Connecting the operating power supply

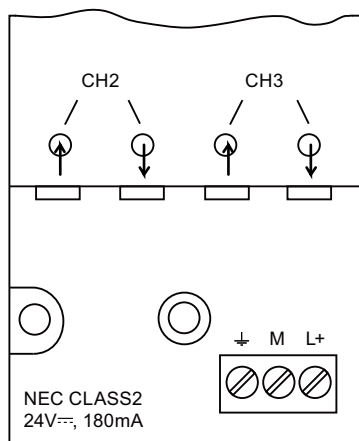


Figure 5-3 Pin assignment of the 3-pin terminal block – grounding terminal  $\perp$  and power supply M, L+

1. Supply the PROFIBUS OBT only with a stabilized safety extra-low voltage complying with IEC 950 / EN 60 950/VDE 0805 of nominally 24 V (minimum 19.2 V and maximum 28.8 V). The power source must meet the requirements of NEC Class 2 according to the UL/CSA approval.
2. If the PROFIBUS OBT is not mounted on a grounded DIN rail, run a grounding cable with a cross-section of 2.5 mm<sup>2</sup> from the terminal  $\perp$  to the nearest ground keeping the cable as short as possible.

### Connecting the optical bus cables

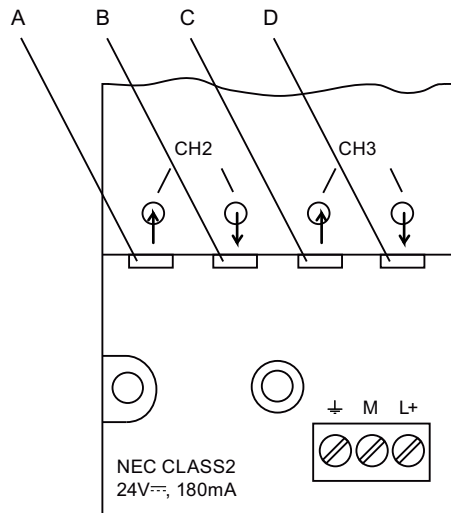


Figure 5-4 View of the module from the side with the optical channels CH2 and CH3

A = CH2, optical receiver

B = CH2, optical transmitter

C = CH3, optical receiver

D = CH3, optical transmitter

Connect the individual PROFIBUS OBTs using a duplex fiber-optic cable fitted with two pairs of simplex connectors.

Make sure that an optical input is connected to an optical output (crossover connection).

Provide adequate strain relief for the fiber-optic cable and remember the minimum bend radii of the FO cable.

Close unused FO cable sockets with the supplied plastic plugs. Incident light from the surroundings can cause disturbances on the PROFIBUS network particularly, if the surroundings are very bright.

Remember the minimum and maximum length of the FO cable and the permitted fiber types listed in Table 1 and in the technical specifications.

Make sure that no dust gets into the optical components. Dust in the optical components can make them unusable.

The fiber of the FO cable must be flush with the surface of the connector.

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**Note**

If the fiber juts out beyond the surface of the connector, the connector must not be inserted in the socket. Otherwise there is a risk of destroying the optical components.

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**Connecting the electrical RS-485 cable**

Channel CH1 is used to connect a single PROFIBUS DP end device or an RS-485 segment. CH1 is designed as an electrical RS-485 interface with a 9-pin D-sub female connector.

1. As the RS-485 bus cable, use only shielded and twisted SIMATIC NET two-wire cables for PROFIBUS.
2. Do not connect any RS-485 bus cables that are laid entirely or partly outdoors. Otherwise, lightning strikes in the surroundings could destroy the PROFIBUS OBTs. If you have bus connections that leave the building, use fiber-optic cables whenever possible.
3. Disconnect the RS-485 bus cable from the OBT if you have not connected a node to the other end of the cable. Coupling in interference can cause disturbances on PROFIBUS.

**See also**

<http://support.automation.siemens.com/WW/view/en/10805878>





## Help with problems during operation

### 6.1 Help with problems during operation

LED display	Possible cause of problems
L+ 24 V LED not lit	<ul style="list-style-type: none"> <li>• Power supply failed</li> <li>• OBT defective</li> </ul>
L+ 24 V LED flashes	<ul style="list-style-type: none"> <li>• The transmission speed could not be set</li> </ul>
CH1 LED not lit	<ul style="list-style-type: none"> <li>• One or more wires of the RS-485 bus cable is interrupted</li> <li>• Wires A and B of the RS-485 bus cable had been swapped over</li> <li>• Connected PROFIBUS node is defective or is not transmitting</li> <li>• PROFIBUS node or RS-485 segment is not connected or connected or PROFIBUS node is not turned on</li> </ul>
CH1 LED lit PROFIBUS nodes are, however, signaling problems on the bus	<ul style="list-style-type: none"> <li>• Wires A and B of the RS-485 bus cable had been swapped over</li> <li>• Short circuit on the RS-485 bus cable</li> <li>• Interruption of one of the two wires of the RS-485 bus cable and A or B connected to wrong terminal</li> <li>• Missing or incorrect termination</li> </ul>
CH2, CH3 LED not lit	<ul style="list-style-type: none"> <li>• Send and receive FO cable connected to wrong socket</li> <li>• Interruption of the receive FO cable to the partner module</li> <li>• No partner module connected or connected partner module is not turned on</li> <li>• Connected partner module is defective (not transmitting)</li> </ul>
CH2, CH3 LED lit PROFIBUS nodes are, however, signaling problems on the bus	<ul style="list-style-type: none"> <li>• FO cable connector is loose (bad contact)</li> <li>• FO cable link to the neighboring module is too long</li> <li>• Interruption of the receive FO cable with extraneous light entering</li> </ul>

If no LED indicates an error and you are still experiencing problems in communication (for example an acknowledgement is not received, unexpected frames), you should check the monitoring times set on the PROFIBUS nodes (for example the slot time). You will find details in the description of your PROFIBUS end devices and your configuration software.



## Technical data

Table 7- 1 Technical specifications

<b>General</b>		
Operating voltage (safety extra-low voltage, SELV or to NEC Class 2)	24 V= (19.2 V to 28.8 V)	
Current consumption at 24 V input	max. 180 mA	
Bleed resistance between terminal M and terminal $\perp$	11 Mohms	
Transmission speed	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	
Setting the transmission speed	performed automatically	
Operating mode	optical bus	
Bit error rate	<10 <sup>-9</sup>	
Input channel 1 to 3		
Bit length	0.7 to 1.3 tBit	
jitter	-0.03 to +0.03 tBit	
Output channel 1 to 3		
Bit length	0.99 to 1.01 tBit	
jitter	-0.003 to +0.003 tBit	
Signal latency (any input/output)	≤ 6 tBit	
Cascading depth optical bus	limited only by latency	
<b>Electrical channel</b>		
Input/output signal	RS-485 level	
Input dielectric strength	-7 V to +12 V	
Minimum current at 5 V (for terminators)	10 mA	
Electrical isolation to 24 V input	Isolation due to functionality, not safety!	
<b>Optical channel</b>		
Optical source	LED	
Injectable optical power	$P_{T(min)}$	$P_{T(max)}$
– with plastic fiber 980/1000	– 5.9 dBm	+0.5 dBm
– with PCF fiber 200/230	– 16 dBm	-1.5 dBm
Sensitivity of receiver	$P_{R(min)}$	$P_{R(max)}$
– with plastic fiber 980/1000	-20 dBm	0 dBm
– with PCF fiber 200/230	-22 dBm	-2 dBm
Wavelength	640 nm to 660 nm	

<b>Optical channel</b>	
Permitted FO cable attenuation (with link power margin)	
– with plastic fiber 980/1000	13 dB
– with PCF fiber 200/230	3 dB
Link distance with 3 dB link power margin	
– with plastic fiber 980/1000 with max. 200 dB/km cable attenuation	0.1 m to 50 m
– with PCF fiber 200/230 with max. 10 dB/km cable attenuation	0 m to 300 m
Fiber optic connectors	Simplex / duplex

<b>Electromagnetic compatibility (EMC)</b>	
Emission	Limit class A (EN 55022)
Immunity against static discharge	On shield connector and housing parts: $\pm 6$ kV contact discharge (IEC 61000-4-2)
Immunity against RF radiation	10 V/m at 80% amplitude modulation with 1 kHz, 80 MHz – 1 GHz (ENV 50140; IEC 61000-4-3) 10 V/m with 50% load factor at 900 MHz (to ENV 50 204) 10 V/m at 80% amplitude modulation with 1 kHz, 10kHz – 80 MHz (ENV 50141)
Immunity to conducted disturbances (burst)	On power supply cables and shielded RS-485 bus cables: $\pm 2$ kV (IEC 61000-4-4)
Immunity to conducted disturbances (surge)	On power supply cables: $\pm 1$ kV symmetrical and $+2$ kV asymmetrical On shielded RS485 bus cables: $\pm 2$ kV asymmetrical (IEC 61000-4-5)

<b>Safety</b>	
VDE regulation	VDE 0806 = EN60950 and IEC 60950-1
UL/CSA approval	complying with UL 60950-1, CSA C22.2 No. 60950-00

<b>Climatic environmental conditions</b>	
Ambient temperature	0 °C to +60 °C (IEC 60068-2-1, IEC 60068-2-2)
Storage temperature	-40 °C to +70 °C (IEC 60068-2-1, IEC 60068-2-2)

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**Climatic environmental conditions**

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Relative humidity	< 95% (no condensation) (IEC 60068-2-30)
Fast change of temperature during operation	0 °C to +60 °C; exposure time 3 h; temperature change 3 K/min.; 5 cycles (IEC 60068-2-14)

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**Mechanical environmental conditions**

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Oscillation in operation	10 to 58 Hz, 0.075 mm excursion 58 to 150 Hz, 10 m/s <sup>2</sup> (1g) acceleration (IEC 60068-2-6)
Oscillation during transportation	5 to 9 Hz, 3.5 mm excursion 9 to 500 Hz, 10 m/s <sup>2</sup> (1g) acceleration (IEC 60068-2-6)
Degree of protection (with external fuse ≤ 8 A)	IP30
Weight	400 g
Dimensions	50.5 x 138 x 78 mm
Housing material	Noryl anthracite

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## Approvals and certificates

### 8.1 Notes on the CE mark

**Product name:**

Optical Bus Terminal PROFIBUS OBT, order no.: 6GK1500-3AA10

**EU Directive EMC 2004/108/EEC**

The above product meets the requirements of the EC Directive:2004/108/EEC "Electromagnetic Compatibility" in an industrial environment.

Area of application	Requirements	
	Emissions	Immunity
Industry	EN 61000-6-4:2007	EN 61000-6-2:2005

**Declaration of conformity**

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

Siemens Aktiengesellschaft  
 Industry Automation Sensors and Communication, Industrial Communication (I IA SC IC)  
 Postfach 4848  
 D-90026 Nuernberg

**Installation guidelines**

The product meets the requirements if you adhere to the installation guidelines included in Optical Bus Terminal PROFIBUS OBT documentation during installation and operation.

The accessible radiation power of the transmit LEDs used complies with Class 1 according to EN 60825-1:2007 or IEC 60825-1:2007 incl. Amendment 1:1997 LED Class 1

The accessible radiation powers after opening the FO cable deliberately or accidentally correspond to degree of danger 1 according to EN 60825-2:2007 or 60825-2:2007

**Notes for the manufacturers of machines**

Communications processors are not machines in the sense of the EC Machinery Directive 2006/42/EEC. There is therefore no declaration of conformity relating to the current version of the EC Machinery Directive 2006/42/EEC for these products.

If the products are part of the equipment of a machine, they must be included in the declaration of conformity procedure by the manufacturer of the machine.

### Explosion protection directive (ATEX)

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

 <b>WARNING</b>
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When using (installing) SIMATIC NET products in hazardous area zone 2, make absolutely sure that the associated conditions are adhered to. You will find information on this on the Manual Collection DVD.
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#### ATEX code:

II 3 G Ex nA II T4 KEMA 07 ATEX 0145X

The product meets the requirements of the standards

- EN 60079-15 : 2005 (electrical apparatus for potentially explosive atmospheres; Type of protection "n")
- and EN 60079-0:2006

### FM approval

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 / T4 and  
Non Incendive / Class I / Zone 2 / Group IIC / T4

### cULus Approval for Information Technology Equipment

cULus Listed I. T. E.

Underwriters Laboratories Inc. complying with

- UL 60950-1 (Information Technology Equipment)
- CSA C22.2 No. 60950-1-03

### cULus Approval Hazardous Location

cULus Listed I. T. E. FOR HAZ. LOC.

Underwriters Laboratories Inc. complying with

- UL 60950-1 (Information Technology Equipment)
- CSA C22.2 No. 213-M1987
- UL 1604 and 2279-15 (Hazardous Location)

Approved for use in

Cl. 1, Div. 2, GP. A, B, C, D, T4

Cl. 1, Zone 2, GP. IIC T4