SIEMENS

SIMATIC NET

Network components/PROFIBUS Optical link module

Operating Instructions

02/2015

C79000-G8976-C270-05

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.

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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.

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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.

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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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Table of contents

Introduction

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Purpose of the Operating Instructions

These operating instructions support you when commissioning PROFIBUS OLM devices (Optical Link Modules).

Validity of the Operating Instructions

These operating instructions apply to the following devices:

- SIMATIC NET OLM / P11 V4.1
- SIMATIC NET OLM / P12 V4.1
- SIMATIC NET OLM / P22 V4.1
- SIMATIC NET OLM / G11 V4.0
- SIMATIC NET OLM / G12 V4.0
- SIMATIC NET OLM / G22 V4.0
- SIMATIC NET OLM / G12-EEC V4.0
- SIMATIC NET OLM / G11-1300 V4.0
- SIMATIC NET OLM / G12-1300 V4.0

Audience

These Operating Instructions are intended for personnel involved in the commissioning of PROFIBUS networks with the link modules of the OLM series.

Finding information

To help you to find the information you require more quickly, the manual includes not only the table of contents but also the following aids:

- Abbreviations/acronyms
- Index

Further documentation

You will find more information on other SIMATIC NET products that you can use with the OLM devices in the “SIMATIC NET PROFIBUS networks SIEMENS AG” manual.

Order numbers

- C79000-G8900-C124-03 German
- C79000-G8976-C124-03 English
- C79000-G8977-C124-03 French
- C79000-G8972-C124-03 Italian

SIMATIC NET manuals

You will find SIMATIC NET manuals on the Internet pages of Siemens Industry Online Support:

- Using the search function:
  link to Siemens Industry Online Support
  Enter the entry ID of the relevant manual as the search term.
- Using the navigation panel on the left-hand side in the area "Industrial Communication":
  link to the "Industrial Communication" area
  Go to the required product group and make the following settings:
  "Entry list" tab, entry type "Manuals / Operating instructions"

SIMATIC NET glossary

Explanations of many of the specialist terms used in this documentation can be found in the SIMATIC NET glossary.

You will find the SIMATIC NET glossary here:

- SIMATIC NET Manual Collection or product DVD

  The DVD ships with certain SIMATIC NET products.
- On the Internet under the following entry ID:

  50305045 (http://support.automation.siemens.com/WW/view/en/50305045)

Unpacking and checking

WARNING

Do not use any parts that show evidence of damage

If you use damaged parts, there is no guarantee that the device will function according to the specification.

If you use damaged parts, this can lead to the following problems:

- Injury to persons
- Loss of the approvals
- Violation of the EMC regulations
- Damage to the device and other components

Use only undamaged parts.

1. Make sure that the package is complete.
2. Check all the parts for transport damage.

Security information

Siemens provides products and solutions with industrial security functions that support the secure operation of plants, solutions, machines, equipment and/or networks. They are important components in a holistic industrial security concept. With this in mind, Siemens' products and solutions undergo continuous development. Siemens recommends strongly that you regularly check for product updates.

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To stay informed about product updates as they occur, sign up for a product-specific newsletter. For more information, visit http://support.automation.siemens.com.

Description of the device

2

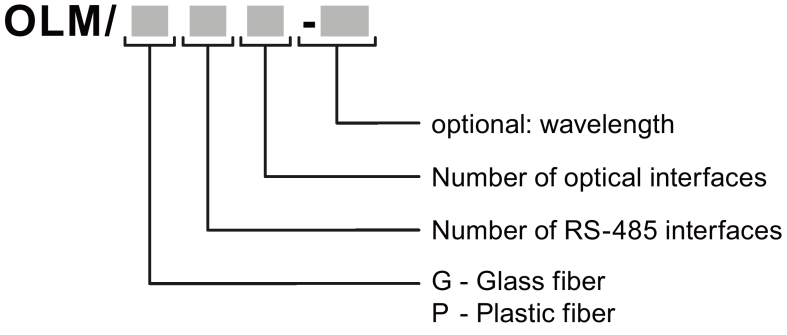
2.1 Product overview

Article numbers

Device	Article number
SIMATIC NET OLM / P11 V4.1	6GK1 503-2CA01
SIMATIC NET OLM / P12 V4.1	6GK1 503-3CA01
SIMATIC NET OLM / P22 V4.1	6GK1 503-4CA01
SIMATIC NET OLM / G11 V4.0	6GK1 503-2CB00
SIMATIC NET OLM / G12 V4.0	6GK1 503-3CB00
SIMATIC NET OLM / G22 V4.0	6GK1 503-4CB00
SIMATIC NET OLM / G12-EEC V4.0	6GK1 503-3CD00
SIMATIC NET OLM / G11-1300 V4.0	6GK1 503-2CC00
SIMATIC NET OLM / G12-1300 V4.0	6GK1 503-3CC00

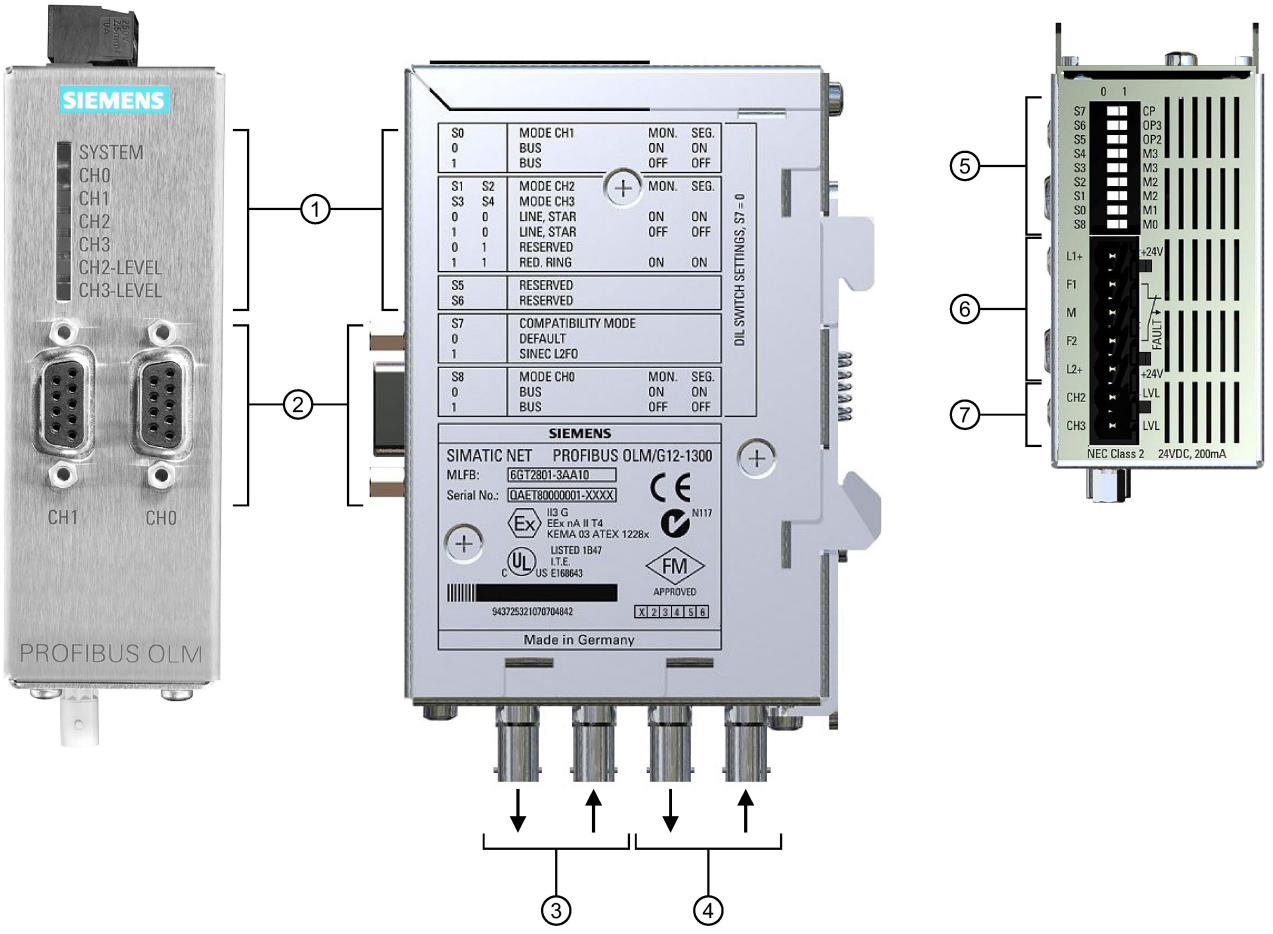
Type designation

The type designation of an OLM is made up of several parts that have the following meaning:



2.2 Device view of an OLM

The following figure shows a PROFIBUS OLM with all interfaces, display elements and setting options.



① LED display
② Channel 1/0 (RS-485)
③ Channel 2 (optical)
- Transmitter (left)
- Receiver (right)

④ Channel 3 (optical)
- Transmitter (left)
- Receiver (right)

⑤ DIL switch for setting the modes
⑥ Operating voltage L1+/M/L2+
Signaling contact F1/F2
⑦ Sockets for measuring the levels of the optical interfaces

Figure 2-1 View from the front, side and top

2.3 Properties and functions

Device design

Every module has two (OLM P11, G11), three (OLM P12, G12) or four (OLM P22, G22) independent channels (ports) that consist of a transmitter and a receiver part.
The power supply voltage for operation is 24 VDC. To increase operational reliability, a redundant power supply is possible.

Channels

Electrical channels

The electrical channel is designed as a 9-pin D-sub female connector. An RS-485 bus segment complying with the PROFIBUS standard EN 50170 /2/ can be connected to this channel.

Optical channels

The fiber-optic cables are connected via BFOC/2.5 connectors.
Seven multicolor LEDs indicate the current operating mode and any disruptions as well as the level ratios on the optical interfaces.

The following table shows the various connection options of the modules and the maximum possible optical ranges of the individual channels.

		P11	P12	P22	G11	G12 G12-EEC	G22	G11-1300	G12-1300
Number of channels	Electrical	1	1	2	1	1	2	1	1
	Optical	1	2	2	1	2	2	1	2
Usable fiber types	Plastic FO cable 980/1000 µm	80 m	80 m	80 m	-	-	-	-	-
	PCF FO cable fiber (HCS®FO cable) 200/230 µm	400 m	400 m	400 m	-	-	-	-	-
	Quartz glass FO cable[1] 10/125 µm	-	-	-	-	-	-	15 km	15 km
	Quartz glass FO cable[2] 50/125 µm	-	-	-	3 km	3 km	3 km	-	-
	Quartz glass FO cable[2] 62.5/125 µm	-	-	-	3 km	3 km	3 km	-	-

Number of electrical and optical ports per module, usable fiber types as well as the maximum achievable fiber-optic cable distances between two modules. For the precise conditions of use, refer to the section "Technical specifications".

1 Single mode fiber

2 Multimode fiber

Note

BFOC

BFOC stands for Bayonet Fiber Optic Connector. This connector type is functionally compatible with ST® connectors. ST is a registered trademark of the AT&T company.

Note

PCF

PFC stands for Polymer Cladded Fiber and is synonymous with HCS®. HCS® is a trademark of the Ensign-Bickford Optics Company.

Basic functions

There is a measurement output available for every channel at which the optical input level can be measured with a commercially available voltmeter.

The various error and disruption messages of the OLM are available as a group signal via a signaling contact for further processing. The signaling contact is a relay with floating contacts.

The individual modes as well as error/fault messages are displayed by several multicolor LEDs on the front panel of the device, refer to the section "LED display (Page 13)".

The mechanical construction consists of a compact, stable metal housing that can be mounted either on a DIN rail or on a mounting plate.

The modules are configured using switches that are easily accessible from the outside.

The PROFIBUS OLMs comply with the standard EN 50170 /2/ and with the technical guideline "Optical transmission technology for PROFIBUS" published by the PROFIBUS User Organization PNO.

OLM / G12 and OLM / G12-EEC have the same function. They only differ in the specification of the ambient climatic conditions: While the OLM / G12 is suitable for use in the standard temperature range from 0 °C to 60 °C, the OLM / G12-EEC (extended environmental conditions) can be used in the extended temperature range of -25 °C to +60 °C and in up to 100% humidity (condensing).

2.4 Area of application

PROFIBUS OLMs are designed for use in optical PROFIBUS fieldbus networks. They allow the conversion of electrical PROFIBUS interfaces (RS-485 level) into optical PROFIBUS interfaces and vice versa.
The modules can be integrated in existing PROFIBUS fieldbus networks with the known advantages of optical transmission technology. A complete PROFIBUS fieldbus network can also be set up with modules in a linear bus, star or ring topology as well as any combination of these topologies.
To increase the reliability of the fieldbus network, the redundant ring is supported.

2.5 LED display

2.5.1 Overview

The following figure shows the arrangement of the LEDs.

2.5.2 "SYSTEM" LED

LED color	LED status	Meaning	Signaling contact
-	Off	• Power supply failed (total failure, in other words with a redundant power supply failure of both supply voltages) • Power supply connected incorrectly • Module fault	Signals
Green	Lit	The transmission speed was detected and the power supply is okay	Does not signal

LED color	LED status	Meaning	Signaling contact
Red	Flashing	Transmission rate not yet detected because: • There is no transmitting bus node • There is no connection to a partner module that is transmitting frames • Send and receive FO cable swapped over • Transmission rate does not correspond to the PROFIBUS standard • There is only one single active bus node connected that is only transmitting tokens to itself. After activating a second bus node, the display must change (token frames alone are not enough to set the transmission rate). • The connected RS-485 segment is only terminated at one end • No connection to the master – FO cable interrupted – Problem on the RS-485 interface (bus short-circuit)	Does not signal
Red/green	Flashing	Transmission rate detected but: • The slot time of the network could not yet be detected (network parameter HSA set too low, there is no transmitting bus node) • One optical channel is set to the "redundant optical ring" mode but the second one is not (this mode must always be set on both optical channels) • The slot time of the network is set too low	Does not signal

2.5.3 LED "CH1"/"CH0" - electrical

LED color	LED status	Meaning	Signaling contact
-	Off	Bus node is not connected, because: • Connected bus node is not turned on • Interruption[1] of one or both wires of the RS-485 bus cable • Short-circuit[1] or ground fault of the wires of the RS-485 bus cable	Does not signal
Yellow	Lit	Signals are being received on the RS-485 bus cable.	Does not signal
Red	Flashing/lit	Sporadic disturbances because of • Inadequate shielding of the RS-485 bus cable • Open bus cable, this means the RS-485 bus cable is only connected to the module at one end • RS-485 segment is not terminated or only at one end • Pulling/plugging an RS-485 bus terminal or terminating plug Permanent disturbance due to: • Wires A and B of the RS-485 bus cable have been swapped over • Short-circuit[1] on the RS-485 bus cable • Transmission time exceeded due to a bus node in a bus segment connected to channel 1 or 0	Signals
		Permanent disturbance due to: • Module and another bus node connected over channel 1 or 0, transmit at the same time (e.g. because of duplicate address assignment or slot time set too low or when canceling segmentation in the optical bus, see section "Bus topology (Page 52)") • RS-485 driver of the module is faulty (e.g. following a lightning strike)	Does not signal

[1] Depends on the cable length between the RS-485 interface and the problem and on the baud rate. It can vary from one example to another.

2.5.4 LED "CH2"/"CH3" - optical

Mode "bus with fiber-optic link monitoring and "redundant optical ring"

LED color	LED status	Meaning	Signaling contact
-	Off	Transmission rate not yet detected - "System" LED flashes red • There is no transmitting bus node • Send and receive FO cable swapped over • No partner module connected or partner module is not turned on • Connected partner module fault	Does not signal
		Transmission rate has been detected - "System" LED lit green • If the "redundant optical ring" mode is set, the optical channel operates as a standby channel. There is no problem in the OLM or on the fiber-optic cable. • If one of the modes "bus with fiber-optic link monitoring ..." is set, no PROFIBUS frames are received on the optical channel. There is no problem in the OLM or on the fiber-optic cable.	
Yellow	Lit	PROFIBUS frames are being received on the optical channel.	Does not signal
Yellow	Flashing	Transmission rate has been detected - "System" LED lit green or flashes red/green • There is no transmitting bus node (fiber-optic cable link is okay)	Does not signal
Red	Lit	• Send and receive FO cable swapped over • No partner module connected or partner module is not turned on • Connected partner module fault • Transmission time exceeded by the connected partner module • Interrupted FO cable • FO cable section to partner module longer than allowed • Fiber-optic cable connector has a loose contact • FO cable fiber is loose in the FO cable plug • If the channel LED of the two OLMs involved continues to be lit red even after eliminating a FO cable problem in the redundant optical ring, check that the setting of the HSA parameter as described in the section "Ring topology (Page 57)" is correct	Signals

LED color	LED status	Meaning	Signaling contact
Red/yellow	Flashing	• Periodically occurring problem (see above), loose contact in a FO cable connector • FO cable fiber is loose in the FO cable plug • There is only one single active bus node connected that is only transmitting tokens to itself. After connecting a second node, there should no longer be an error display	Signals
Red/yellow/off	Flashing	A periodically changing color (red - yellow - off) at the port LED in conjunction with a green port level LED indicates overdrive of this channel. To counteract this, the transmit power can be reduced, refer to the section "Reducing optical transmit power (Page 26)".	Signals

Mode "bus without fiber-optic link monitoring"

LED color	LED status	Meaning	Signaling contact
-	Off	• There is no transmitting bus node • Send and receive FO cable swapped over • No partner module connected or partner module is not turned on • Connected partner module fault	Does not signal
Yellow	Lit	PROFIBUS frames are being received on the optical channel.	Does not signal

2.5.5 LED "CH2-LEVEL"/"CH3-LEVEL"

LED color	LED status	Meaning	Signaling contact
Green	Lit	Receive level adequate, normal operation	Not relevant
Yellow	Lit	Receive level critical, link power margin reduced	
Red	Lit	• Receive level inadequate, function not guaranteed • Channel not used, no FO cable connected	

NOTICE

Mode: LED lit green

If the display of the port level is green in conjunction with a periodically changing color (red - yellow - off), the relevant port LED, this points to overdrive of this channel. To counteract this, the transmit power can be reduced, refer to the section "Reducing optical transmit power (Page 26)".

Commissioning

3

Preparation

1. Unpack the OLM and its accessories
2. Check that the consignment is complete and that there has been no damage during transportation.
3. Allow the device to acclimatize for a time to avoid condensation after storage in cold surroundings.
4. Select the network topology to suit your situation.

Commissioning the OLM

1. Check the DIL switches and if necessary change the setting.
2. Mount the module.
3. Connect the power supply and if required the signaling contact.
4. Connect the electrical RS-485 bus cables with the bus connector assembled.

   Note

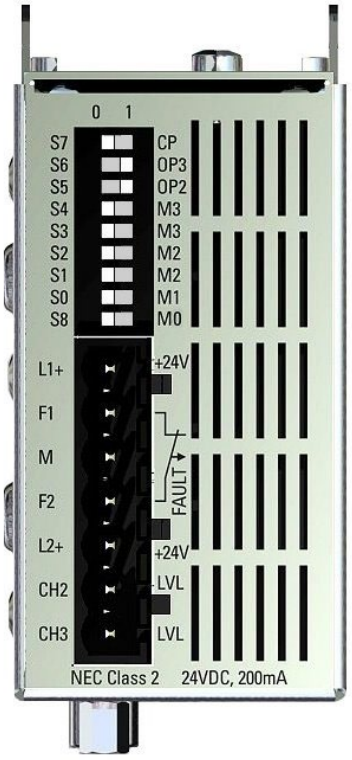
   Make sure that the terminating resistors are activated in the connectors at the end of the bus.

5. Connect the optical bus cables.

Factory setting

The figure shows the factory setting of the DIL switches:

- Switches S0, S1, S2, S3, S4, S7 and S8 in position "0"
- Switch S5 and S6 in position "1"



Operator control (hardware) 4

Note

The OLM must be turned off when you switch over the mode.

To achieve this, for example unplug the 5-terminal block.

Note

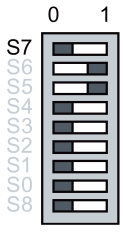
Use only the DIP switch settings described in this section. If you use other DIP switch settings, the correct operation of the OLMs is not guaranteed.

4.1 Setting compatibility

With the S7 DIL switch, you enable or disable functional compatibility with devices of the previous generation SINEC L2FO OLM / P3, -P4, -S3, -S4, S3-1300 and S4-1300.

The factory setting for S7 is position 0 (compatibility turned off).

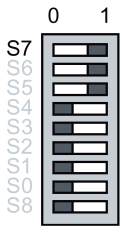
DIL switch S7 (compatibility) in position 0



Compatibility with SINEC L2FO OLM / P3, -P4, -S3, -S4, -S3-1300, -S4-1300 is turned off.

To interconnect OLM V3 and OLM V4, the S7 switch must be in position 0 because these devices are compatible with each other.

DIL switch S7 (compatibility) in position 1



Compatibility with SINEC L2FO OLM / P3, -P4, -S3, -S4, -S3-1300, -S4-1300 is turned on.

If the DIL switch S7 is set to position 1, the functional compatibility with SINEC L2 optical link modules SINEC L2FO OLM / P3, OLM / P4, OLM / S3, OLM / S4, OLM / S3-1300 and OLM / S4-1300 is turned on. This mode is required when these modules are used in a mixed configuration with OLM V4.

Switch the S7 switch to position 1 only when the PROFIBUS OLM is used as a replacement or expansion device in existing networks with SINEC L2FO OLMs and a direct optical link is required.

The following table shows the meaning of the individual DIL switches for the compatibility mode (S7=1).

SINEC L2FO **OLM / P3 and OLM / P4**			**SINEC L2FO** **OLM / S3 and OLM / S4**			**SINEC L2FO** **OLM / S3-1300 and OLM / S4-1300**		
S6 0 1	/P4: Output Power CH4 Standard High	/P3: Reserved	**S6** 0 1	/P4: Output Power CH4 Standard High	/P3: Reserved	**S6**	Reserved	
S5 0 1	Output Power CH3 Standard High		**S5** 0 1	Output Power CH3 Standard High		**S5**	Reserved	
S4	Reserved		**S4**	Reserved		**S4**	Reserved	
S3	Reserved		**S3** 0 1	Distance Extended Standard		**S3** 0 1	Distance Extended Standard	
S2 0 1	Redundancy Off On		**S2** 0 1	/S4: Redundancy Off On	/S3: Reserved	**S2** 0 1	/S4-1300: Redundancy Off On	/S3-1300: Reserved
S1 0 1	Mode Linear bus/ring Linear bus	Monitor On Off	**S1** 0 1	Mode Linear bus/ring Linear bus	Monitor On Off	**S1** 0 1	Mode Linear bus/ring Linear bus	Monitor On Off
S0	Reserved		**S0**	Reserved		**S0**	Reserved	
S8	Reserved		**S8**	Reserved		**S8**	Reserved	

4.2 Setting the operating mode

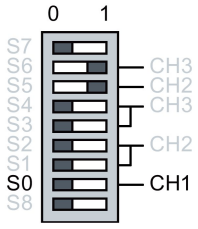
4.2.1 Setting the mode of the electrical channel (CH1)

Note

The following information applies only to the default setting of S7 (S7 = 0); in other words, compatibility turned off.

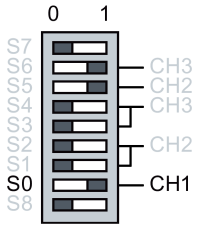
With the DIL switch S0, you set the mode of the electrical channel CH1.

Mode "electrical channel with segment monitoring"



CH1 is set to this mode when S0 is in position 0.

Mode "electrical channel without segment monitoring"



CH1 is set to this mode when S0 is in position 1.

Note

Set this mode only in the star segment of a star topology.

4.2.2 Setting the mode of the electrical channel (CH0)

Note

The following information applies only to the default setting of S7 (S7 = 0); in other words, compatibility turned off.

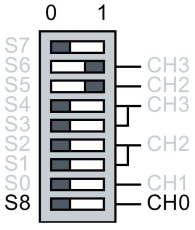
Note

OLM / P22 and OLM / G22 only

With the DIL switch S8, you set the mode of the electrical channel CH0.

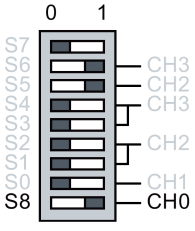
For an OLM with only one electrical interface, S8 has no function.

Mode "electrical channel with segment monitoring"



CH0 is set to this mode when S8 is in position 0.

Mode "electrical channel without segment monitoring"



CH0 is set to this mode when S8 is in position 1.

Note

Set this mode only in the star segment of a star topology.

4.2.3 Setting the mode of the optical channels (CH2/CH3)

Note

The following information applies only to the default setting of S7 (S7 = 0); in other words, compatibility turned off.

With the DIL switches S1 and S2, you set the mode of the optical channel CH2.

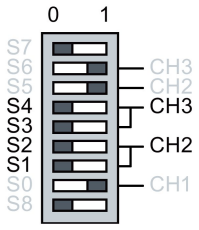
With the DIL switches S3 and S4, you set the mode of the optical channel CH3.

For an OLM with only one optical interface, S3 and S4 have no function.

The mode can be set separately for each optical channel. Combinations of the modes "bus with fiber-optic link monitoring and segmentation" and "bus without fiber-optic link monitoring" are possible.

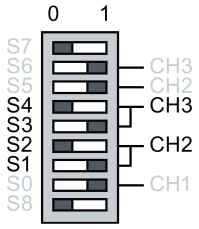
Always set the same mode for the two optical channels connected together via the fiber-optic cable. When operating with devices that do not provide fiber-optic link monitoring, this mode cannot be used and must be disabled on the OLM.

Mode "bus with fiber-optic link monitoring and segmentation"



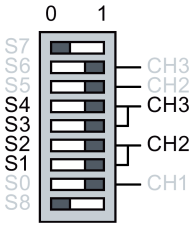
CH2 is set to this mode when S1 and S2 are in position 0.
CH3 is set to this mode when S3 and S4 are in position 0.

Mode "bus without fiber-optic link monitoring"



CH2 is set to this mode when S1 is in position 1 and S2 is in position 0.
CH3 is set to this mode when S3 is in position 1 and S4 is in position 0.

Mode "redundant optical ring"



CH2 is set to this mode when S1 and S2 are in position 1.
CH3 is set to this mode when S3 and S4 are in position 1.

Note

Always set the "redundant optical ring" mode on both optical channels of a module.

4.3 Reducing optical transmit power

Note

With OLM / P11 or OLM / G11, S6 has no function.

With the DIL switch S5, you set the transmit power of CH2.

With the DIL switch S6, you set the transmit power of CH3.

With OLM / P11, OLM / P12 and OLM / P22

OLM / P11, OLM / P12 and OLM / P22 have a high optical transmit power.

Optical overdrive may occur if these modules are connected together as follows:

- With short cable lengths (0 to 50 m) between them
- With OLM V3
- With non-OLM devices via plastic fiber-optic cable

In this case, the optical transmit power can be reduced by approx. 60% (3.8 dB).

Compare the paragraph Optical channels in the section "Technical data (Page 71)".

With OLM / G11, OLM / G12, OLM / G12 EEC and OLM / G22

The OLM / G11, G12, G12 EEC and G22 have a high optical transmit power.

Optical overdrive may occur if these modules are connected via multimode fiber-optic cable as follows:

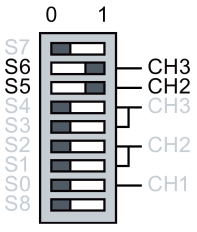
- With cable lengths up 1000 m between them
- With OLM V3

In this case, the optical transmit power can be reduced by approx. 70% (4.5 dB) as of product version 04 with OLM / G11, G12, G12 EEC and OLM / G22.

Compare the paragraph Optical channels in the section "Technical data (Page 71)".

The valid product version (rev) is marked with an "X" on the type plate.

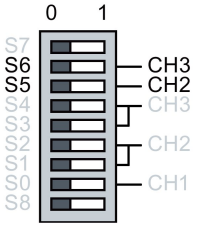
Overdrive does not occur



Leave S5 in position 1 (default) if the fiber-optic link on CH2 works correctly in this position.

Leave S6 in position 1 (default) if the fiber-optic link on CH3 works correctly in this position.

Overdrive occurs



Set S5 to position 0 (reduced) if overdrive occurs on CH2.

Set S6 to position 0 (reduced) if overdrive occurs on CH3.

Note

Detecting overdrive

From the LEDs, you can recognize when overdrive occurs, refer to the section "LED display (Page 13)".

Fibers used

PCF fiber

If you use PCF fibers, set the transmit power "Default" (S5 or S6 in position 1).

If you use PCF fibers S 200/230, neither a minimum cable length nor an attenuator is necessary.

Plastic fiber S 980/1000

If you operate OLM / P11 V4, OLM / P12 V4 or OLM / P22 V4 along with the devices OBT, IM151-1 FO, CP 5613 FO/CP 5614 FO, IM 467 FO, CP 342-5 FO or IM 153-2 FO and use plastic fibers S 980/1000, note the following:

1. To connect the devices, use optical fibers with a minimum length of 30 m, refer to the following graphic.

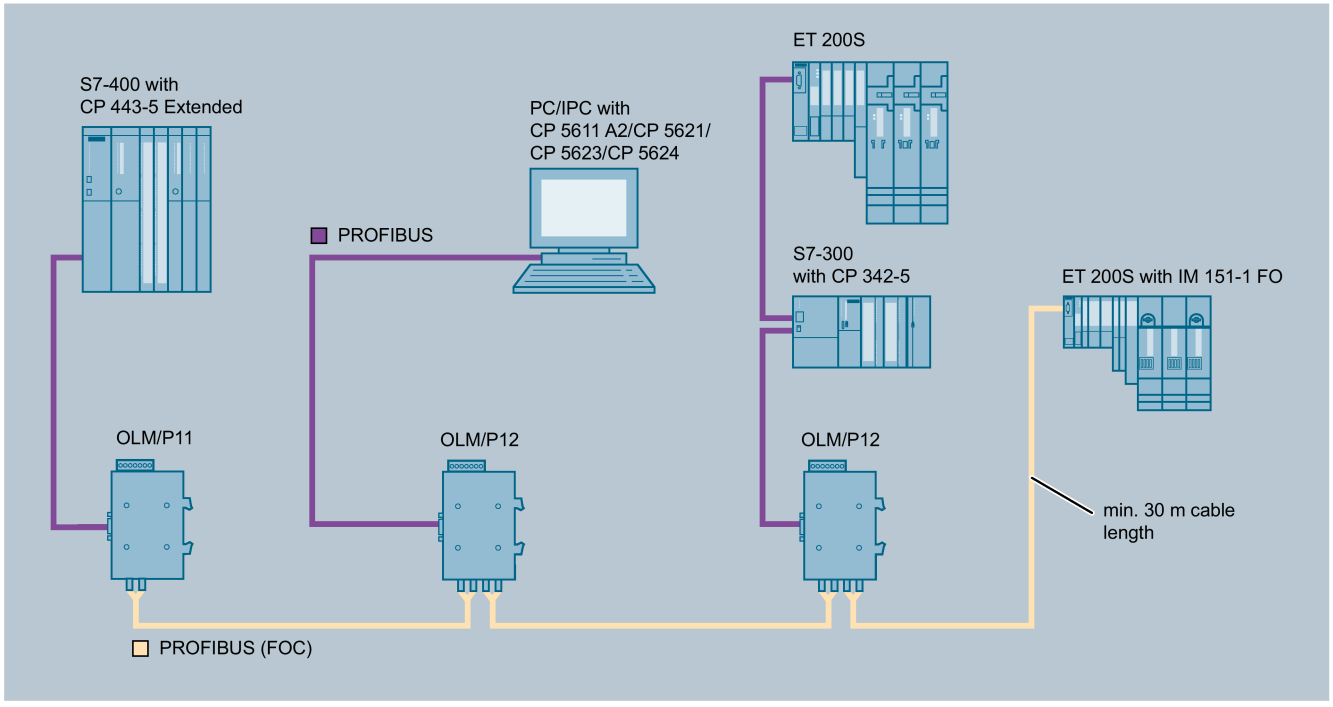


Figure 4-1 Minimum cable length when using plastic fiber S 980/1000 without fixed attenuators

As an alternative, you can use a fixed attenuator with an attenuation value between 5 dB and 15 dB.

1. Insert the fixed attenuator in the receive cable of the OLM.
2. Set the corresponding transmit level switch (S5 or S6) to "reduced".

4.4 DIL switches S5 / S6 with OLM / G11-1300 and OLM / G12-1300

In OLM V4 devices for glass fiber-optic cable (1300 nm), the DIL switches S5 and S6 do not have a function (reduction of optical transmit power not possible).

Nevertheless, if the OLM V4 is used along with OLM V3 G11-1300 and G12-1300 devices, the DIL switches S6 and S5 of the OLM V3 must be set to "0" to avoid interference due to the internal design of the OLM V3 devices.

4.5 Mixed operation OLM V4 with OLM V2 (SINEC L2FO)

If OLM V4 modules are used along with OLM V2 (SINEC L2FO) modules, the bus terminating resistors for the second RS-485 port must be activated on the OLM V2 if this port is not used. To do this, turn on DIL switches S3 and S4 (termination).

Optical channels of the OLM / P V2 connected to optical channels of an OLM / P V4.1 must be operated with a higher transmit power. To do this, set the DIL switch of the channels involved on the OLM / P V2 to "1": S5 for channel 3 and S6 for channel 4. Set the transmit power of the OLM / P V4.1 according to the cable length being used, see Section "Reducing optical transmit power (Page 26)".

Mounting

5

⚠ WARNING

If a device is operated in an ambient temperature of more than 50 °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 50 °C.

⚠ WARNING

The device may only be operated in an environment with pollution degree 1 or 2 (see IEC 60664-1).

⚠ 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.

Safety notices for use according to ATEX and IECEx

If you use the device under ATEX or IECEx 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 EC Directive 94/9 (ATEX95) or the conditions of IECEx, this enclosure or cabinet must meet the requirements of at least IP54 in compliance with EN 60529.

5.1 Installation guide

Electromagnetic compatibility

Electromagnetic compatibility (EMC) includes all questions of electrical, magnetic and electromagnetic immunity and emission. To avoid interference affecting electrical systems, these effects must be reduced to a minimum. The essential limiting measures include the configuration, correct connection of bus cables and the suppression of switching inductances; refer to the notes in the sections "Installation" and "Connecting optical cables".

Suppressing switching inductances

Connecting switching inductances to suppressors

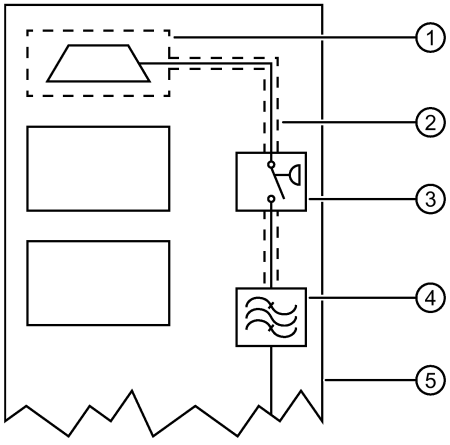
Some switching inductances, e.g. in relays and fans, create interference voltages that are a multiple of the connected operating voltage. These interference voltages can influence electronic devices. Limit the interference voltages cause by inductors at the emission source by connecting suppression circuits (diode or RC circuit).

Only use suppressors that are intended for use with your relay or fan.

Suppressing cabinet lighting

Use filament bulbs for the cabinet lighting, for example LINESTRA lamps.

Avoid the use of fluorescent lamps since they cause interference. If you cannot avoid using fluorescent lamps, the measures described in the figure below will be necessary.



① Screen grip over lamp
② Shielded cable
③ Switch encapsulated in metal
④ Network filter or shielded network cable
⑤ Control cabinet

Figure 5-1 Measures for interference suppression of fluorescent lamps in a cabinet

Positioning of devices and cables

Reducing interference by maintaining clearance

A both simple and effective way of reducing disturbing influences is to maintain clearances between the culprit and victim device or cable. Inductive and capacitive disturbances decrease with the square of the distance between the elements involved. This means that doubling the distance reduces the effect of the disturbance by a factor 4. If placement considerations are taken into account in the planning of a building or a cubicle, these measures can usually be implemented very cheaply.

Note the following:

- Keep a minimum distance of 15 cm between an OLM and a load switching element (e.g. contactor, relay, temperature controller, switch, etc.). Measure this minimum clearance between the outside edges of the components and in all directions around an OLM.
- Do not lay the power supply lines (24 VDC) of the OLM in the same cable duct as power lines (load circuits). Twist the cables +24 VDC and GND with each other.
- Recommendations on the arrangement of devices and lines with the aim of achieving the lowest mutual influence possible can be found in the standard EN 50174-2.
- In the following situations, set the retry value of the PROFIBUS master to 4:
  - For applications in environments with heavy electromagnetic interference
  - For use in shipbuilding

Handling bus cable shields

Note the following points about cable shields:

- Use shielded SIMATIC NET PROFIBUS cables throughout your system. The shields of these cables have an adequate shield density to meet the legal requirements regarding noise emission and immunity.
- Always contact the shields of bus cables at both ends. The legal requirements for noise emission and noise immunity in your system (CE marking) can only be achieved when the shields make contact at both ends.
- Secure the shield of the bus cable to the connector housing or the cable clamps.
- If cables are installed permanently, it is advisable to remove the insulation of the shielded cable and to establish contact on the shield/PE conductor bar.

Note

If there is a potential difference between the grounding points, an illegally high compensating current can flow through the shield grounded at both ends.

To rectify the problem, do not, under any circumstances, open the shield of the bus cable.

The following solution is permitted:

Install an extra bonding cable parallel to the bus cable that takes over the shield current.

Contacting shields

Note the following points when contacting cable shields:

- Secure the braided shield with metal cable clamps.
- The clamps must make good and largearea contact with the shield.
- Contact SIMATIC NET PROFIBUS cables only using the braided copper shield and not the aluminum foil shield. The foil shield is applied on one side to a plastic foil to increase tearing strength and is therefore non-conductive.
- The shields of all cables entering the cabinet from outside must be secured as close as possible to the point of entry and should make largearea contact with cabinet ground.
- Make sure that you do not damage the braided shields of the cables when you remove the cable jacket. To allow good contact between grounding elements, tin-plated or galvanically stabilized surfaces are ideal. With galvanized surfaces, the necessary contact should be achieved using suitable screws. Painted or varnished surfaces should be avoided at the contact points.
- Shield clamps or contacts must not be used as strain relief. The contact with the shielding bar could be impaired or be broken altogether.

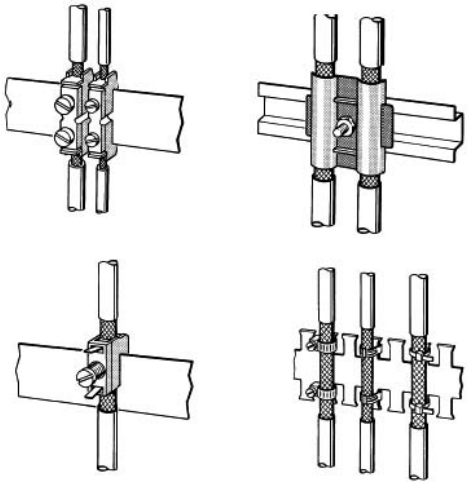


Figure 5-2 Securing shielded cables with cable clamps and ties

Optical power budget, aging and environmental conditions

When using OLM V4 devices, make sure that they are not exposed to high temperatures for no good reason. The aging of the devices increases radically in high temperatures. The same applies to the connected fiber-optic cables. These age faster under the influence of temperature and high humidity. The aging effect caused by humidity applies in particular to plastic FO cables.

The described aging of devices and FO cables is counteracted by the link power margin. This is obtained from the difference between the receiver sensitivity and the minimum input optical power (see section "Technical data (Page 71)") along with the cable attenuation that results from the maximum coverable distance.

Example:

OLM G12, wavelength 860 nm, fiber 62.5/200 µm

P_{Send} = 13 dBm

P_{Recv} = 28 dBm

Optical power budget	= 28 dBm - 13 dBm = **15 dBm**
Max. cable length	= 3 km
Attenuation	= 3.5 dB/km @ 860 nm
Max. cable loss	= 3.5 dB/km * 3 km = **10.5 dB**

Link power margin	= optical power budget - max. cable loss
	= 15 dBm - 10.5 dBm = **4.5 dBm**

This link power margin must not be used by the user, because this may well lead to functional disruptions on the optical interface.

You should also remember that the maximum cable lengths are only valid for uncut cables. If optical couplers are used in the configured system, their coupling loss must be added to the cable loss.

5.2 Types of installation

Types of installation

You have the following options for the module:

- On a DIN rail
- With a mounting plate on a flat surface (wall mounting)

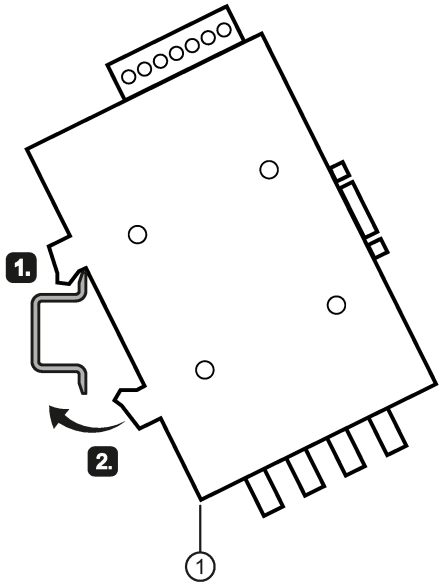
Requirements

Note the following before you mount a module:

- Install the device so that the climatic and mechanical limit values in the technical specifications are adhered to.
- Make sure that there is adequate space to connect the bus and power supply cables.
- Connect the fiber-optic cables before mounting the modules.
  This makes it easier to fit the fiber-optic cable.
- Mount the modules only on a rail or mounting plate that is grounded with low resistance and inductance.
  Beyond this, no other grounding measures are required.

5.3 Mounting on DIN rails

Mounting



① Locking slide

Figure 5-3 Mounting a module on a DIN rail

To install the module on a 35 mm DIN rail complying with DIN EN 60715, follow the steps below:

1. Fit the upper securing hooks of the module onto the top of rail ①.
2. Push the module down against rail until it locks in place ②.

Removal

To remove the module from a DIN rail, follow the steps below:

1. Pull the locking slide on the bottom of the module downwards.
2. Pull the lower part of the device away from the DIN rail.

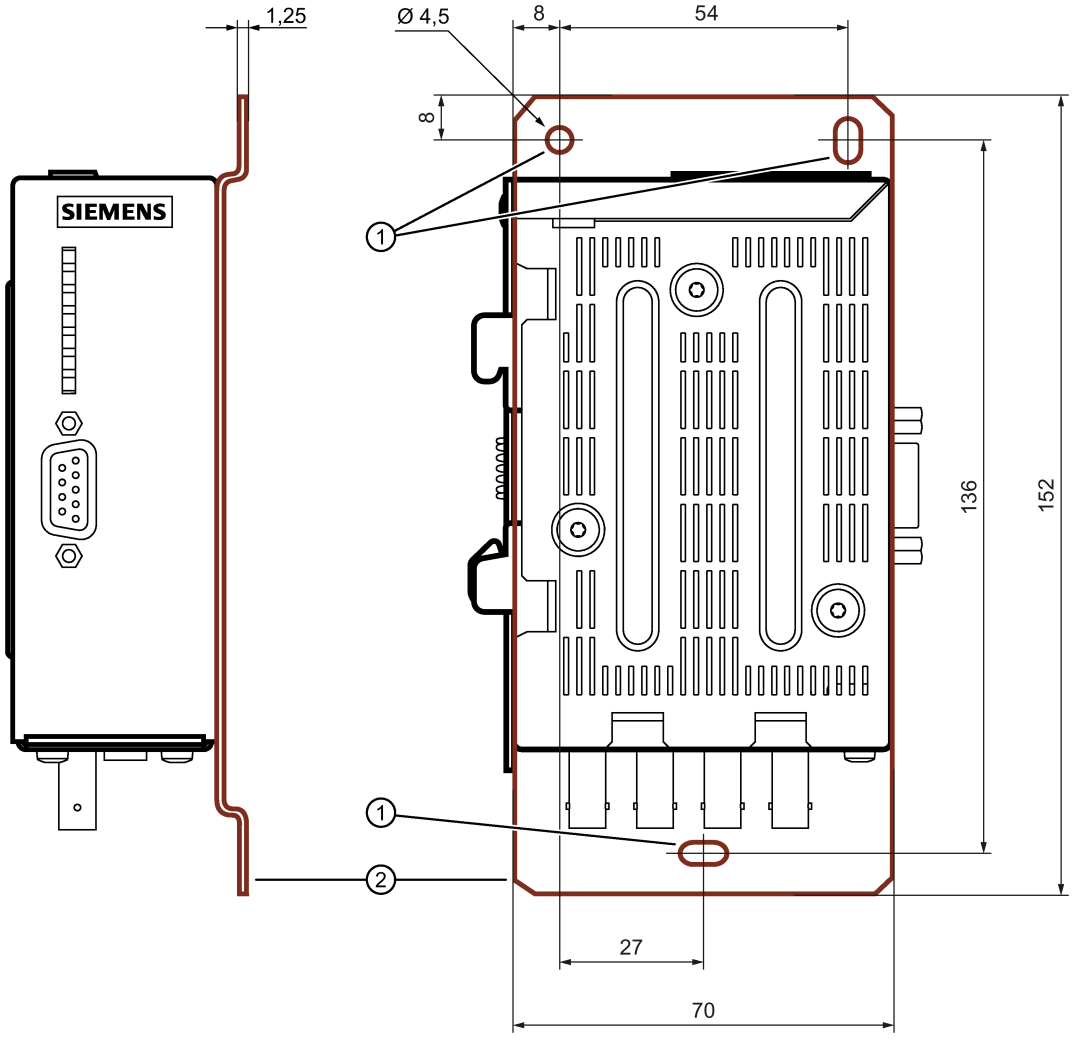
5.4 Wall mounting

Mounting

To mount the module on a wall, follow the steps below:

1. Unscrew the 3 screws on the right side of the OLM (the side with the type label).
2. Use these 3 screws to secure the mounting plate (MLFB: 6GK1503-8AA00).
3. Secure the OLM to the wall or a cabinet plate.

The mounting plate must provide low-resistance and low-inductance grounding.



① Holes for wall mounting
② Mounting plate with OLM fitted

Figure 5-4 Mounting a module using a mounting plate

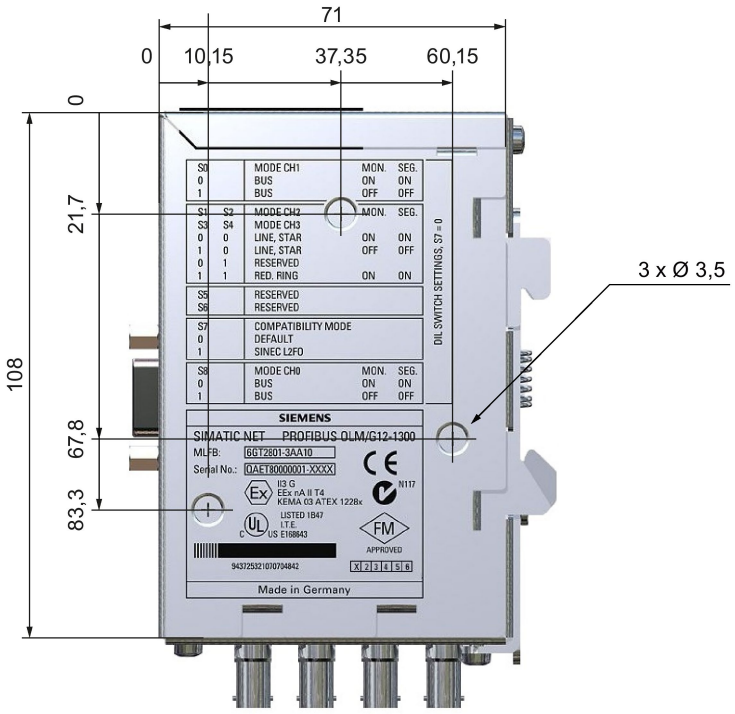


Figure 5-5 Drilling diagram for the mounting plate

Connection

6

⚠ 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.

Note

If the device is supplied over long 24 V power supply lines or networks, measures are necessary to prevent interference by strong electromagnetic pulses on the supply lines. These can result, for example, due to lightning strikes or switching of large inductive loads. One of the tests used to attest the immunity of the device to electromagnetic interference is the "surge immunity test" according to EN 61000-4-5. This test requires overvoltage protection for the power supply lines. For example, the following protective element is suitable:

Dehn Blitzductor BVT AVD 24V Art. No. 918 422

Manufacturer: DEHN+SÖHNE GmbH+Co.KG Hans Dehn Str.1 Postfach 1640 D-92306 Neumarkt, Germany

Note

Under sensible foreseeable circumstances, the accessible optical radiated power of the components used represents no danger and meets the requirements for class 1 according to IEC 60825-1 Ed.1.2:2001-08. Nevertheless, avoid looking directly into the transmitter or into the end of a fiber-optic cable.

⚠ WARNING

EXPLOSION HAZARD

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

⚠ WARNING

EXPLOSION HAZARD

DO NOT OPEN WHEN ENERGIZED.

Safety notices for use according to ATEX and IECEx

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

⚠ WARNING

EXPLOSION HAZARD

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

⚠ 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).

⚠ 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 50 °C, only use cables with admitted maximum operating temperature of at least 80 °C.

General notes on use in hazardous areas according to UL-HazLoc and FM

⚠ WARNING

EXPLOSION HAZARD

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

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.

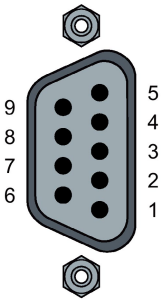
6.1 Electrical RS-485 bus cables

Note

NOTICE
Damage Do not connect any RS-485 bus cables that are laid entirely or partly outdoors. Otherwise, lightning strikes in the vicinity can destroy the modules. If you have bus connections that leave the building, use FO cables.

- Only use shielded twisted pair for the RS-485 bus cables as described in the manual "SIMATIC NET PROFIBUS Networks". Do not exceed the segment lengths specified there.
- Connect the RS-485 bus segment using a PROFIBUS connector. If the module is at the beginning or at the end of a bus segment, this connector must have an active bus terminator.
- Screw all PROFIBUS bus connectors of the network securely to the RS-485 interfaces.
- Disruptions can occur in the optical and electrical network as a result of
  - Plugging or pulling the bus connector
  - Loosely connected bus connectors
  - Bus wires not being securely crewed inside the connectors
- Connect or remove the RS-485 bus connector quickly and without tilting or twisting the connector.
- Disconnect the RS-485 bus cable from the OLM when there is no device at the other end or when there is no power supplied to it. Otherwise the open cable acts like an antenna and is susceptible to interference.
- To minimize disturbances, keep to the following order when connecting an RS-485 bus cable to a PROFIBUS OLM when the network is active:
  - Plug the RS-485 bus connector into the relevant device (e.g. the programming device) and secure it with the screws.
  - Plug the RS-485 bus connector into the PROFIBUS OLM quickly and without tilting or twisting the connector and screw it tight.
  - Carry out these steps in the reverse order to disconnect a device from the network.
- Make sure that the bus segment connected to the RS-485 port is terminated at both ends. Only use a connecting cable that is terminated at both ends to connect a single device.
- If temperatures in excess of 70 °C can occur on the cables or at their insertion points or the temperature at cable branching points can exceed 80 °C, special measures must be taken.
- For ambient temperatures of 50 °C to 60 °C, cables with a temperature rating for at least 80 °C should be used.

Information on RS-485 bus cables



- The modules are equipped with one or two electrical ports with the RS-485 level.
- They are designed as a 9-pin D-sub female connector with screw locking mechanism (inner thread UNC 4-40).
- The RS-485 interfaces are galvanically connected to the housing.
- The pin assignment corresponds to the PROFIBUS standard assignment.
  - A short-circuit proof 5 V output for the supply of external pull-up/pull-down resistances is available at pin 6.

    The resistances must have a power loss of at least 0.25 W.
  - The RS-485 bus cables RxD/TxD, N and RxD/TxD, P are galvanically isolated from the 24 V supply voltage within the SELV limits (functional isolation).

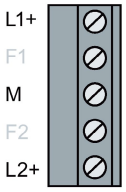
Pin	Assignment
3	RxD/TxD, P
8	RxD/TxD, N
5	Ground
6	+5 V output
4	RTS
1	Not used
2	
7	
9	

Note on compatibility

In the OLM V3 modules, pin 2 was additionally connected to ground and pin 1 to the shield. This does not conform to the relevant standard EN 50170 /2/. This presents no problem, when cables complying with the PROFIBUS standard are used.

When installing the module in an existing cabling system, check the pin assignment. If necessary, change the pin assignment.

6.2 Operating power supply

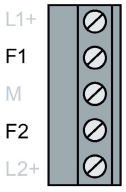


Information on the power supply

- The terminal block can be removed from the device to allow cables to be connected.
- Supply the module only with a stabilized safety extra-low voltage according to IEC 60950 / EN 60950-1 / VDE 0805 of 24 VDC (max. 32 VDC).
- The power source must meet the requirements of NEC Class 2 according to the UL/CSA approval. This can be supplied via the 5-terminal block on the top of the module.
- To increase the operational reliability, the module can be supplied redundantly via the terminals L2+/+24 V DC and M. If the regular supply voltage fails, the module automatically switches to the redundant power supply. There is no load distribution between the individual power supplies. The signaling contact does not indicate the failure of one of the 24 V supplies. To monitor the power supply, the supplies and the signaling contact must be connected to an input module.
- Catches on the terminal block ensure a secure connection to the device and avoid polarity reversal.

6.3 Signaling contact

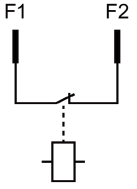
Information on the signaling contact



- The terminal block can be removed from the device to allow cables to be connected.
- A relay with floating contacts is available for the signaling contact on the 5-terminal block on the top of the module.
- Limit values for the signaling contact:
  - Maximum switching voltage 50 VDC; 30 VAC
  - Maximum switching current 1.0 A
- The voltage connected to the relay must be a safety extra-low voltage according to IEC 60950-1 / EN 60950-1 / VDE 0805 and must meet the requirements of NEC, Class 2 in accordance with the UL/CSA approval.
- Terminal assignment of the 5-terminal block:
  - Terminal F1
  - Terminal F2

NOTICE
Damage due to voltage being too high
Please make absolutely sure that the terminals of the 5-terminal block are connected correctly. Make sure there is adequate electrical insulation of the connecting cables to the signaling contacts, especially if you are using voltages higher than 32 V.
Connecting up incorrectly can lead to the destruction of the modules.

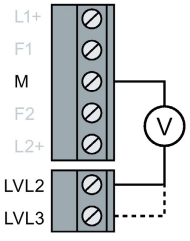
Signaling faults/errors



- The signaling contact signals problems in the network and on the modules.
- If a problem occurs, the contact is opened.
  This means that a total power outage is also signaled.
- The problems indicated by the signaling contact are listed in the section "LED display (Page 13)".

6.4 Optical channels

Information on optical channels

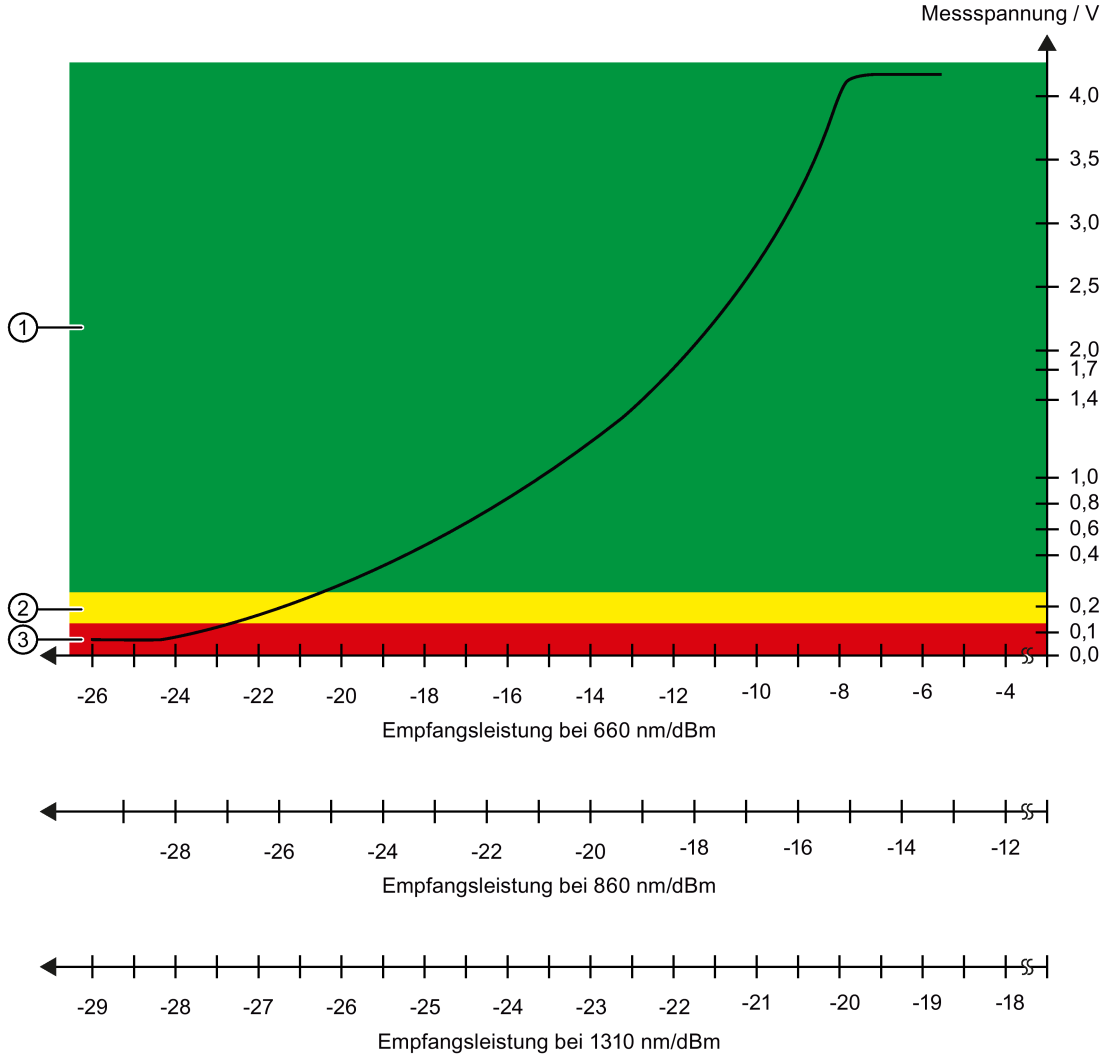


- You can measure the receive level of the two optical channels CH2 and CH3 using a normal commercially available voltmeter attached to measurement sockets.
- The voltmeter can be connected and disconnected while the device is operating.
- The OLM is protected against a short circuit at the measurement sockets; data transmission is not influenced.
- You can also read in the receive level of the two optical channels via floating, high resistance analog inputs on a PLC.
- This allows you to do the following:
  - To document the incoming optical power, for example for later measurements (aging, damage)
  - To run a good/bad check (limit value).

Measuring the receive level

1. Measure the level with a high-resistance, ungrounded voltmeter.
2. Do not connect the ground connector to the housing; otherwise the data traffic could be disturbed.
3. To meet the EMC requirements, the length of the connected measuring cables must not exceed 3 m.

The quality of the bus traffic can be estimated based on the receive levels in the following diagram:



① Normal operation, level adequate
② Optical link power margin reduced
③ Function not guaranteed

Figure 6-1 Relationship between measured output voltage and signal quality

For a valid measurement, the partner OLM at the other end of the FO cable must send normal PROFIBUS frames. This can be recognized based on the LED display of the partner OLM, see section "LED display (Page 13)".

The output voltages at the measurement sockets are influenced by the following factors:

- Strength of the transmit power of the partner OLM
- Ambient temperature of the optical transmitter and receiver
- Attenuation of the transmission line
- Transmission rate used

The measurement sockets are therefore not intended as a substitute for a calibrated level measuring device with a calibrated light source. The value obtained only serves to classify the received optical signals in 3 classes:

- Good (normal operation, green ①): 5 V > U > 240 mV
- Critical (optical link margin reduced, yellow ②): 120 mV ≤ U ≤ 240 mV
- Bad (functionality not guaranteed, red ③): U < 120 mV

Measure the level with a commercially available, high-resistance, ungrounded voltmeter. The internal resistance of the measurement sockets is approx. 30 kΩ. A connection from the measurement sockets or from reference potential to the OLM housing is not permitted.

Note

When an OLM of the SINEC L2FO series is connected, the OLM V4 LED level indicator has no meaning. The measurement sockets cannot be used.

6.5 Connecting optical cables

Figure 6-2 View of the module from below with optical channels 2 and 3 (device with two optical channels)

Follow the steps below to connect the optical cables:

1. Connect the single modules via a two-core fiber-optic cable with BFOC/2.5 connectors.
2. Note the following:
   - The end faces of the optical connectors must be free of any contamination.
   - One optical input and one optical output must be interconnected (“crossover connection“). The BFOC sockets of a channel that belong together are marked on the lower part of the front panel.
   - The optical connector is securely locked to the BFOC socket. The bayonet connector must be locked home.
   - The tip of the BFOC connector must be inserted completely into the FO cable socket when using single mode fiber-optic cables. If necessary, push the connector into the socket using anti-kink sleeve to make reliable contact.
3. Provide adequate strain relief for the fiber-optic cable and remember the minimum bend radii of the FO cable, see note below.

4. Close unused BFOC sockets with the supplied protective caps.
   - An unused optical channel should be set to the “bus without fiber-optic link monitoring“ mode so that it does not cause a broken fiber-optic cable signal.
   - Incident light from the surroundings can cause disturbances on the network particularly, if the surroundings are very bright.
   - Dust entering the optical components can make them unusable.
5. Keep to the maximum length of the fiber-optic cables and the possible fiber types, See "Properties and functions (Page 11)" and "Technical data (Page 71)".
6. Test the quality of the link using the measurement socket after installing the optical network. The measured values must be in the permitted range as can be found in section "Optical channels (Page 46)".

Note

No plastic fiber-optic cable may be connected to an OLM that uses glass fiber-optic cable and vice versa.

Note

The laying of fiber-optic cables requires special measures.

Avoid mechanical stress such as traction, pressure or kinking.

The cable manufacturers specify minimum bending radii for fiber-optic cables both during installation and operation. The bending radii and the requirements when laying cables depend largely on the cable type used and must therefore be checked in the instructions in the relevant data sheets. Ignoring these requirements may lead to higher attenuation values and, in the worst case (extreme bending etc.), to destruction of the fiber-optic cable.

Planning/configuring 7

7.1 Network topologies

7.1.1 Possible network topologies

The following network topologies can be implemented with the PROFIBUS OLM:

- Point-to-point connection
- Bus topology
- Star topology
- Redundant optical ring

Combinations of these basic types are also possible. To set up the fiber-optic links of these network topologies, cables with two optical fibers are used.

If a high degree of availability is required of the fieldbus network, this can be increased by using a redundant network configuration, for example to allow continued communication if a cable is broken.

7.1.2 Installation guide

Note the following guidelines:

- Single end devices or complete PROFIBUS segments with a maximum of 31 nodes can be connected to the electrical interface of the PROFIBUS OLM.
- In areas subject to heavy noise, use only fiber-optic cables to avoid EMC problems affecting the entire network.
- Only connect **OLMs of the same wavelength** to each other optically:
  - OLM / P11, OLM / P12 and OLM / P22 with each other
  - OLM / G11, OLM / G12 and OLM / G22 and OLM / G12 EEC with each other
  - OLM / G11-1300 and OLM / G12-1300 with each other
- Set optical channels connected via fiber-optic cables to the same mode.
- Changing from one OLM type to another is only possible via the RS-485 interface.
- In the network topologies described below, the OLM / G12-EEC can be used everywhere where an OLM / G12 can be used.
- For the electrical connection of the OLMs only the supplied connectors may be used. When using existing connectors (e.g. from OLM V3) correct contact is not guaranteed due to different pin diameters.

7.1.3 Bus topology

In a bus (linear) structure, the individual PROFIBUS OLMs are connected by two-fiber cables.
At the beginning and at the end of a line, modules with one optical channel are adequate, in between modules with two optical channels are necessary.

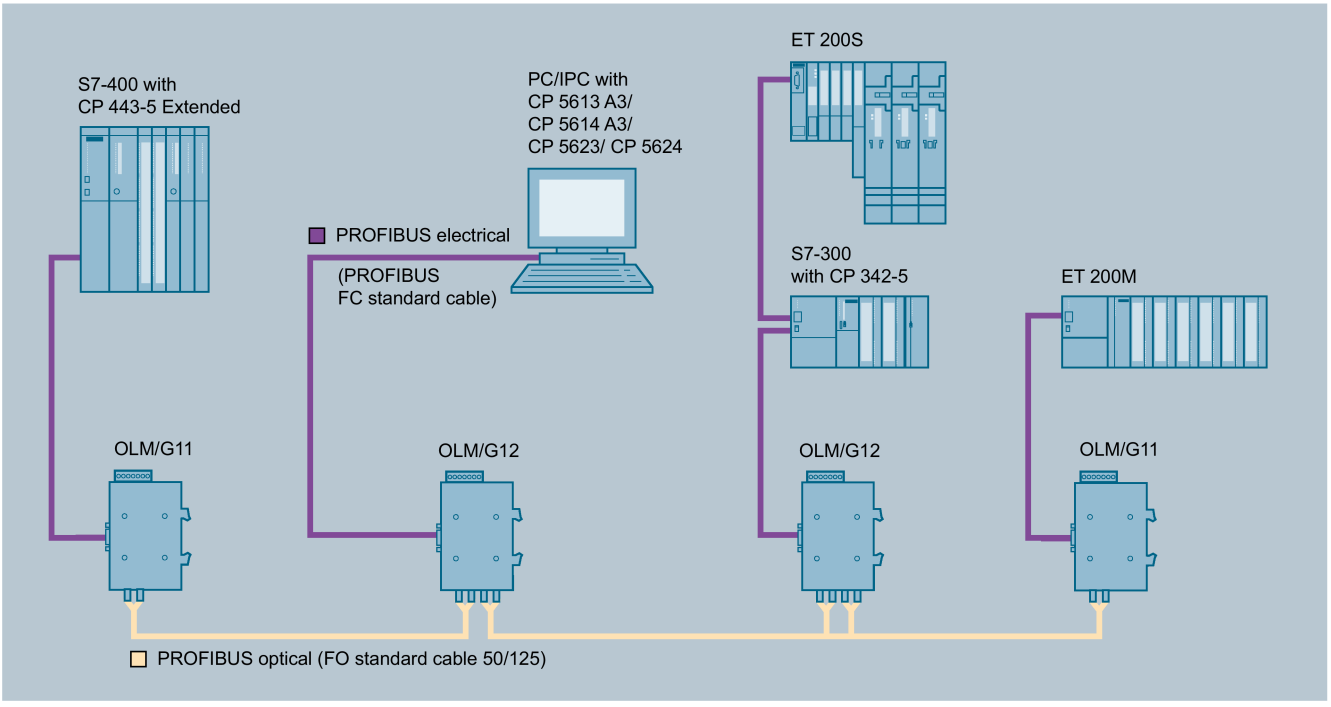


Figure 7-1 Network structure with an optical bus topology

Note

When using the OLM / P22 or OLM / G22, a further end device or bus segment can be connected to CH0.

To establish individual point-to-point connections, you can use two modules each with one optical channel.

The bus topology can be implemented with and without fiber-optic link monitoring. Use of fiber-optic link monitoring is recommended in homogeneous OLM networks (factory default).

Please note that for correct operation, the following conditions must be kept to when configuring the network:

- The parameter MIN TSDR described in the PROFIBUS standard EN 50170 /2/ must be set to a value ≥ 11 on all end devices. This is usually the case but should be checked if permanent communication problems occur.
- Choose bus node addresses as low as possible when configuring your network, to reduce master timeouts that may occur due to disruptions.

You will find information on changing the setting in the documentation supplied by the manufacturer of your end device.

Bus topology with fiber-optic link monitoring and segmentation

Use this mode especially when you want a disrupted fiber-optic cable segment to be separated from the rest of the network, see section "Setting the mode of the electrical channel (CH1) (Page 23)" or "Setting the mode of the electrical channel (CH0) (Page 24)".

Only use this mode, if you only connect PROFIBUS OLM V4 or V3/V4 to each other.

Monitoring mechanisms

- Send echo: yes
- Monitor echo: yes
- Suppress echo: yes
- Monitor: yes
- Segmentation: yes

In this mode, the individual fiber-optic links are monitored by the two connected modules.

Occurrence of a disruption

If a module fails or a fiber-optic cable breaks or disturbances are detected on the optical transmission line, the fiber-optic link between the two OLMs is interrupted (segmented). The PROFIBUS network is separated into two (sub)networks each remaining functional on its own.

The problem is signaled as follows:

- The channel LEDs change to red.
- The signaling contacts of the two OLMs connected to the disturbed fiber-optic link are activated.

Eliminating a disruption

The segmentation is canceled automatically as soon as both modules recognize that the segmented fieldbus (sub)network is no longer disrupted based on test frames that they send out automatically.

Note

If a problem occurs in networks with several active bus nodes, two logical token rings are formed. As a result, temporary network disturbances may occur due to double tokens or frame collisions when the full network is restored.

Note

If modules with two optical channels are used at the end of a line, the unused optical channel must be set to the mode “bus without fiber-optic link monitoring”, so that it does not cause a broken fiber-optic cable signal, see section "Setting the mode of the electrical channel (CH1) (Page 23)" or "Setting the mode of the electrical channel (CH0) (Page 24)".

Note

Protect the optical channels that are not connected against external light and pollution by protective caps.

Bus topology without fiber-optic link monitoring

Use this mode when you connect a PROFIBUS OLM with a different fiber-optic component according to the PROFIBUS guideline (optical/electrical converter), which does not send a frame echo and does not expect or tolerate a frame echo.

Monitoring mechanisms

- Send echo: no
- Monitor echo: no
- Suppress echo: no
- Monitor: no
- Segmentation: no

In this mode, there is no monitoring of the individual fiber-optic links.

7.1.4 Star topology

Several modules are grouped together to form an active PROFIBUS star coupler. Further modules are connected to this via two-core fiber-optic cables. The modules of the star coupler are interconnected via the electrical channel (electrical star segment). All OLM types for different fiber-optic cables (plastic, PCF, glass) can be combined via the electrical star segment.

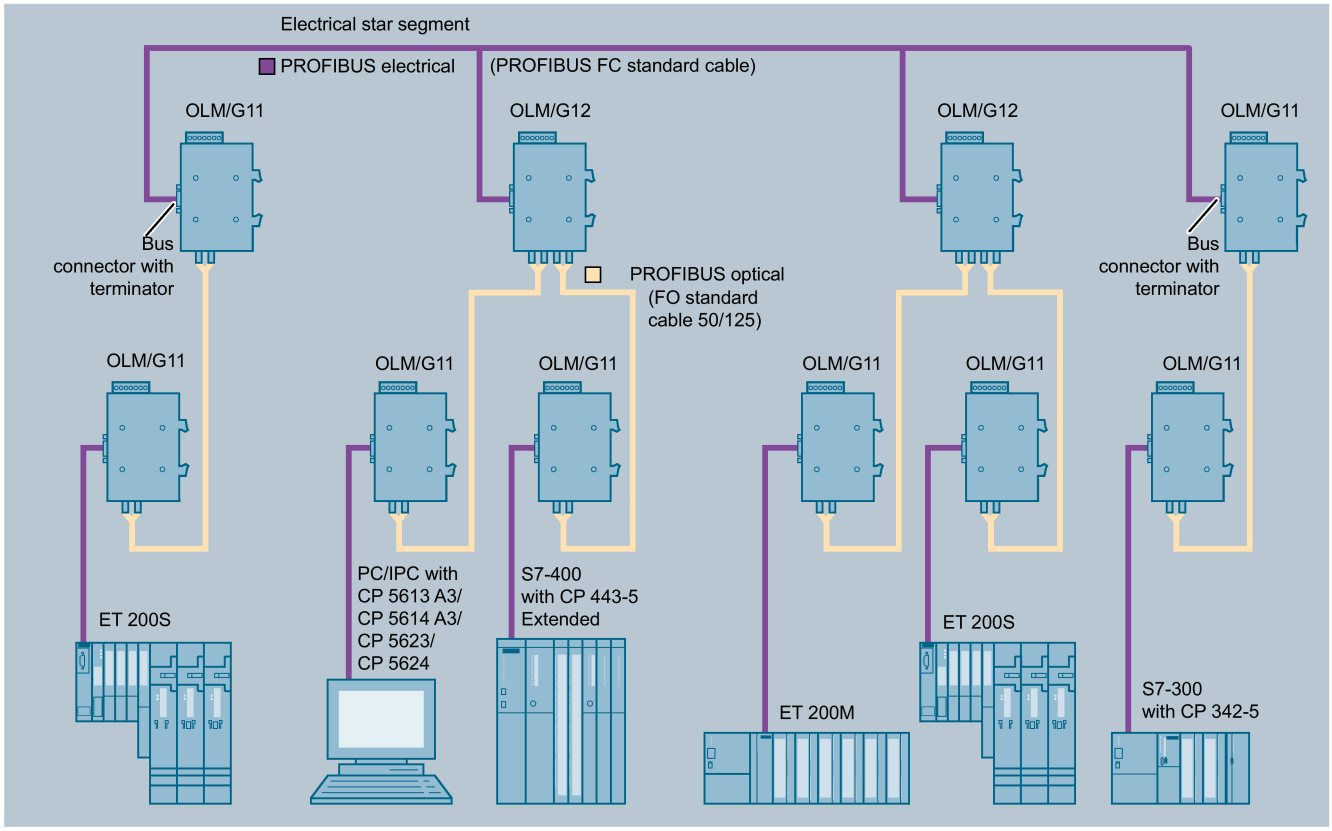


Figure 7-2 Network structure with an optical star topology

Note the following guidelines:

- CH1 / CH0 must be set to “Monitor off” (S0/S8 = 1) on all OLMs connected to the electrical star segment. This disables the segmentation function of the RS-485 channel of this OLM to achieve high availability of the electrical star.
- Make sure that the electrical star segment is carefully wired. Keep its span as small as possible to avoid interference in the electrical star segment that can spread to the whole network. You can achieve this by positioning the OLMs in the star segment directly next to each other on a DIN rail.
- Switch on the terminating resistors (see section "Electrical RS-485 bus cables (Page 43)") in the bus connectors at the two ends of the electrical star segment.
- If possible do not connect any bus nodes to the electrical star segment.

To set up an active PROFIBUS star coupler, modules with one or two optical channels can be used. To connect an end device or an RS-485 bus segment to an active star coupler, modules with one optical channel are adequate.

When the monitoring is active on the optical channels, the fiber-optic links are monitored by the connected OLMs.

Note

Unused optical channels you intend to use later to expand the network cause a broken fiber-optic cable signal if the monitoring is active. You can avoid this error message by setting unused channels to the mode “bus without fiber-optic link monitoring”.

Note

Protect the optical channels that are not connected against external light and pollution by protective caps.

7.1.5 Ring topology

7.1.5.1 Redundant optical ring

This network topology is a special form of the bus topology. "Closing" the optical bus achieves high operational reliability in the network. A redundant optical ring can only be implemented using modules with two optical channels.

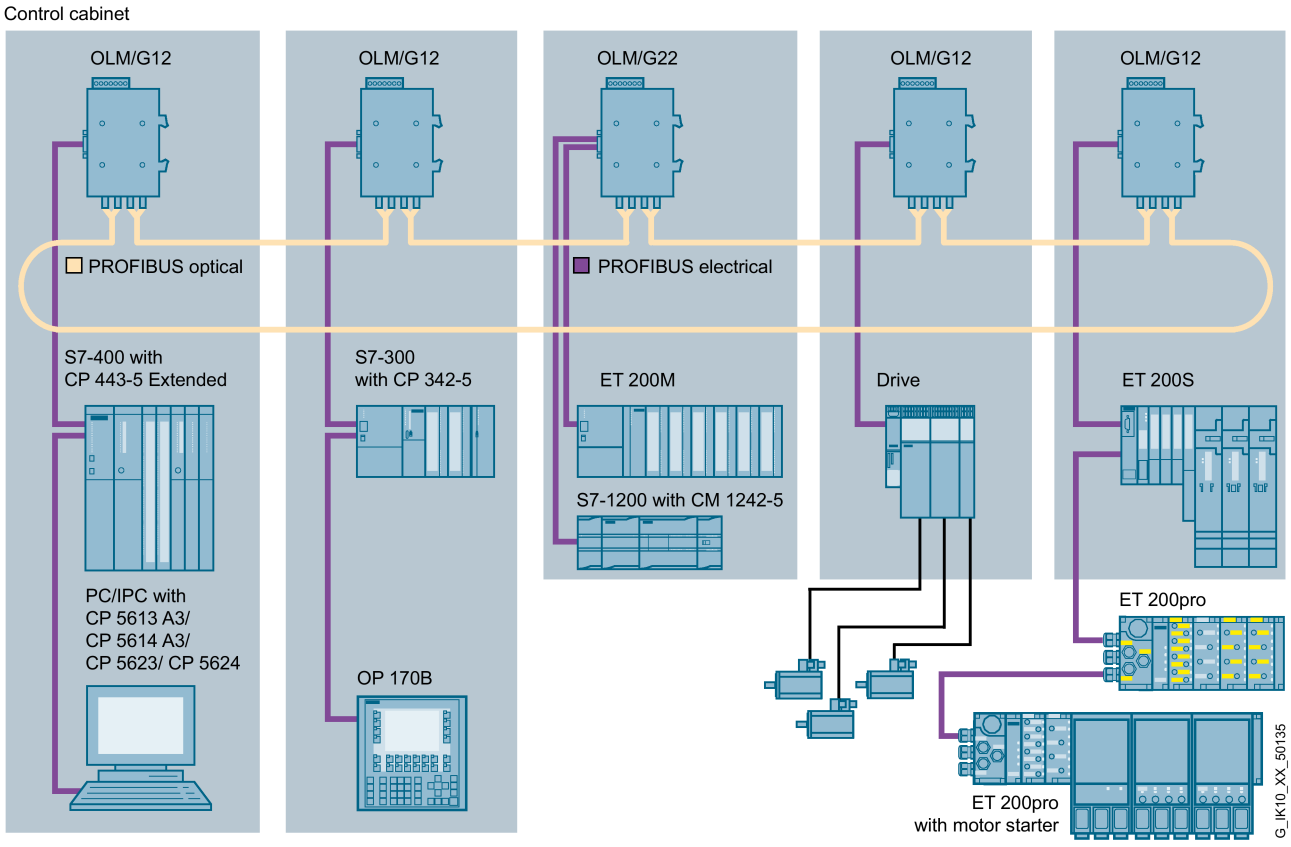


Figure 7-3 Network structure in a redundant optical ring topology

Monitoring mechanisms

- Send echo: yes
- Monitor echo: yes
- Suppress echo: yes
- Segmentation: yes

The interruption of one or both fiber-optic cables between the modules is detected by the OLM and the ring becomes an optical bus.

If one module fails, only the end devices connected to this module or the RS-485 segment are disconnected from the ring. The rest of the network itself remains functional as a bus.

The problem is indicated by the LEDs of the two OLMs connected to the disrupted fiber-optic link and by the signaling contacts of these OLMs. The segmentation is canceled automatically as soon as both modules recognize that the segmented fieldbus (sub)network is no longer disrupted based on test frames that they send out automatically. The bus is once again closed to form a ring.

Requirements for correct operation

- Only use this mode, if you only connect PROFIBUS OLMs with at least version V3 to each other. Both optical channels must be set to the “redundant optical ring” mode on all PROFIBUS OLMs. All modules within a ring must be connected to each other via fiber-optic cables. There must be no RS-485 bus cable within the ring.
- The MIN TSDR parameter described in the PROFIBUS standard EN 50170 /2/ must be set to a value ≥ 11 on all end devices. This is usually the case but should be checked if permanent communication problems occur.
- Choose bus node addresses as low as possible when configuring your network to reduce master timeouts that may occur due to disruptions.
- If a fault occurs requiring a failover (for example a wire break), there is a failover time during which correct data transmission is not possible. To ensure a "bumpless" failover for the application, it is advisable to set the number of frame retries on the PROFIBUS master to at least 3. To allow a “bumpless" return from the optical bus to the optical ring after the fault has been eliminated, there must be no frame on the network at the failback time. This status occurs when the master sends a GAP query to an address lower than the HSA. The master tries to address this device cyclically and waits for a reply at the longest until the configured slot time has elapsed (“GAP query”). The OLM recognizes this status and closes the optical bus in the middle of this query sequence to form the optical ring again. This results in the **following two important configuration requirements** for the redundant optical ring:
  - The value of the HSA (Highest Station Address) parameter must be set on all end devices so that there is at least one address in the network between bus address 0 and the value of HSA that is not used by a node; in other words, there is at least one address gap. You can create this address gap simply by increasing the value of the HSA parameter to one higher than the highest node address in the network.

    Note

    If this condition is not or is no longer satisfied, the optical bus will no longer close to form a redundant optical ring following segmentation. The disruption message (LED and signaling contact) of the two OLMs affected is not canceled even after the problem has been eliminated.

  - The slot time must be set to about twice the value compared with a not redundant network. For more information, refer to the section "Configuration". You will find information on changing the setting in the documentation supplied with your end device or with the configuration software.

NOTICE
Functional disruption due to incorrect transmission medium **No** plastic fiber-optic cable may be connected to an OLM that uses glass fiber-optic cable and vice versa.

7.1.5.2 Redundant optical ring with two OLMs

Setting up a redundant optical ring with two PROFIBUS OLMs can be seen as special case of the redundant optical ring and can be implemented with the following two configurations.

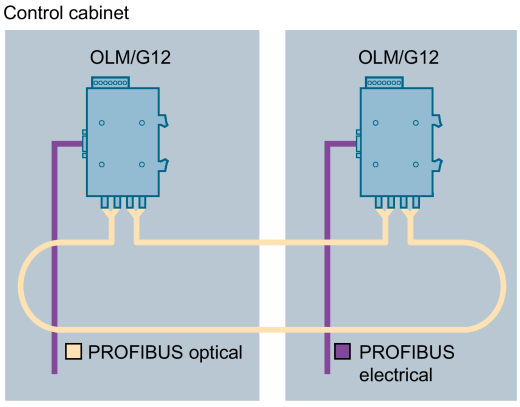


Figure 7-4 Configuration 1

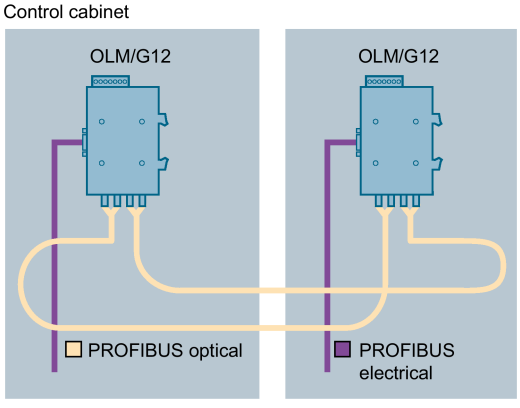


Figure 7-5 Configuration 2

How the LEDs react in the redundant optical ring

A frame received by any channel is passed on to all other channels. If the frame was received on an optical channel, it will also be sent back to the sender on the same channel as an echo and therefore serves as a monitoring frame to test the fiber-optic link between the OLMs.
The OLM recognizes whether a received frame is an echo or a frame that was forwarded. In the case of an echo frame, the channel LED stays off, whereas in the case of a forwarded frame it will light up yellow. In networks with more than two OLMs, echo frames and forwarded frames will alternate quickly. Due to the extended display-time of at least 300 ms, all channel LEDs are lit yellow continuously.
The channel LEDs may react differently in the redundant optical ring only if the following conditions are met:

1. The redundant optical ring consists of exactly two OLMs and the two fiber-optic links are of different length (difference > approx. 2 m).

Under these conditions, the receiving OLM will always receive a sent frame first on the channel with the shorter fiber-optic link. This channel signals this with a lit yellow channel LED. The frame on the other optical channel is interpreted as an “echo frame”, the channel LED stays unlit. Since the fiber-optic cable lengths represent static variables, the display reaction is also static.

Configuration 1 (FOC1 < FOC2) , LED display:

1. Situation, no FO cable interruption:

	OLM 1	OLM 2
System LED	Lit green	Lit green
CH1/0 LED	Lit yellow	Lit yellow
CH2 LED	Lit yellow	Not lit
CH3 LED	Not lit	Lit yellow

2. Problem, FOC1 interrupted:

	OLM 1	OLM 2
System LED	Lit green	Lit green
CH1/0 LED	Lit yellow	Lit yellow
CH2 LED	Lit red	Lit yellow
CH3 LED	Lit yellow	Lit red

3. Problem, FOC2 interrupted

	OLM 1	OLM 2
System LED	Lit green	Lit green
CH1/0 LED	Lit yellow	Lit yellow
CH2 LED	Lit yellow	Lit red
CH3 LED	Lit red	Lit yellow

Configuration 2 (FOC1 < FOC2) , LED display:

1. Situation, no FO cable interruption:

	OLM 1	OLM 2
System LED	Lit green	Lit green
CH1/0 LED	Lit yellow	Lit yellow
CH2 LED	Lit yellow	Lit yellow
CH3 LED	Not lit	Not lit

2. Problem, FOC1 interrupted:

	OLM 1	OLM 2
System LED	Lit green	Lit green
CH1/0 LED	Lit yellow	Lit yellow
CH2 LED	Lit red	Lit red
CH3 LED	Lit yellow	Lit yellow

3. Problem, FOC2 interrupted:

	OLM 1	OLM 2
System LED	Lit green	Lit green
CH1/0 LED	Lit yellow	Lit yellow
CH2 LED	Lit yellow	Lit yellow
CH3 LED	Lit red	Lit red

2. The redundant optical ring consists of exactly two OLMs and both fiber-optic cable connections are of exactly the same length.

Under these circumstances, the receiving OLM receives a frame on both of the optical channels at the same time. To handle this case, the OLM prioritizes the two optical channels. By definition, the frame on one optical channel will then be taken as an echo (channel LED = off) and the frame on the other optical channel will then be taken as a forwarded frame (channel LED = yellow).
Due to the effect of jitter and the resulting sampling differences between the two optical input channels, it is possible that one or the other optical channel receives a frame first. Due to the extended display time of at least 300 ms. all channel LEDs are then lit yellow continuously.

Configuration 1/2 (FOC1 = FOC2) , LED display

1. Situation, no FO cable interruption:

	OLM 1	OLM 2
System LED	Lit green	Lit green
CH1/0 LED (continuous, flashing, flickering)	Lit yellow	Lit yellow

CH2 LED (continuous, flashing, flickering)	Lit yellow	Lit yellow
CH3 LED (continuous, flashing, flickering)	Lit yellow	Lit yellow

2. Problem, FOC1 interrupted:
see above

3. Problem, FOC2 interrupted:
see above

The following applies generally:

Regardless of whether a channel LED is lit or not, all optical channels are monitored continuously in the redundant optical ring. If a channel LED is not lit, the frames circulating on this channel are used to monitor the transmission line. The productive communication is via the channel with the LED lit yellow.

Without exception, problems are indicated by a channel LED lit red and by the signaling contact. We recommend that you connect the signaling contact for reliable monitoring of the OLM.

7.2 Configuration

Due to the delays caused by cables and network components and the monitoring mechanisms in the network components, the PROFIBUS network parameter "Slot Time" must be adapted to the network span, the network topology and the data rate.

7.2.1 Configuring optical bus and star topology

The PROFIBUS network is configured, for example, in SIMATIC STEP 7 (V5 or higher), SIMATIC STEP 7 Professional (V12 or higher) or COM PROFIBUS (V5). You enter the number of OLMs and overall cable length in a configuration screen. The configuration tools then check whether the slot time can be retained in the chosen communication profile. If the limit is exceeded due to the extra delays caused by OLMs and fiber-optic cables, a warning message is displayed and the parameters are adapted.

7.2.2 Configuring redundant optical rings

The following configuration requirements must be met in the redundant optical ring (see section "Ring topology (Page 57)" for details):

- One unused address lower than the HSA (1)
- Increased retry value to at least the value 3 (2)
- Checked and adapted slot time (3)

To set the parameters in (2) and (3), use the user-specific profile of the configuration tool. The following section describes how to calculate the slot time.

Calculating the slot time

Calculate the slot time according to the following formula:

Slot time = a + (b * $Length_{FOC}$) + (c * Number $_{OLM}$)

Slot time	Monitoring time in bit times
$Length_{FOC}$	Sum of all fiber-optic cables (segment lengths) in the network. The lengths must be specified in km.
$Number_{OLM}$	Number of PROFIBUS OLMs in the network

Factors a, b and c

The factors a, b and c depend on the transmission speed.

Note

Remember the minimum slot times for OLM / G11-1300 and OLM / G12-1300.

You will find the factors a, b and c in the following tables:

Data rate	a	b	c
12 Mbps	1651	240	28
6 Mbps	951	120	24
3 Mbps	551	60	24
1.5 Mbps	351	30	24
500 kbps	251	10	24
187.5 kbps	171	3.75	24
93.75 kbps	171	1.875	24
45.45 kbps	851	0.909	24
19.2 kbps	171	0.384	24
9.6 kbps	171	0.192	24

Constants for calculating the slot time with the DP standard (redundant optical ring)

Data rate	a	b	c
12 Mbps	1651	240	28
6 Mbps	951	120	24
3 Mbps	551	60	24
1.5 Mbps	2011	30	24
500 kbps	771	10	24
187.5 kbps	771	3.75	24
93.75 kbps	451	1.875	24
45.45 kbps	851	0.909	24
19.2 kbps	181	0.384	24
9.6 kbps	171	0.192	24

Constants for calculating the slot time with DP/FMS ("Universal") and DP with S5-95U (redundant optical ring)

Minimum slot times for OLM / G11-1300 and OLM / G12-1300

With OLM / G11-1300 and OLM / G12-1300, the minimum slot times must be kept to as shown in the following table at data rates of 12 Mbps, 6 Mbps, 3 Mbps and 1.5 Mbps:

Data rate	Minimum slot time
12 Mbps	3800 t_{Bit}
6 Mbps	2,000 t_{Bit}
3 Mbps	1,000 t_{Bit}
1.5 Mbps	530 t_{Bit}

If the calculated slot time is shorter than the minimum slot time, use the minimum slot time from the table above as the configured slot time.

The slot time calculation takes into account only the optical network and the attachment of nodes to the OLM in each case via a maximum 20 m long RS485 bus segment. Longer RS-485 bus segments must be included by adding them to the $Length_{FOC}$.

Note

If the slot time is configured with a value that is too low, this can lead to malfunctions and error displays on the OLM. The system LED flashes red/green.

Service and maintenance

8

8.1 Cleaning

If it becomes necessary to clean the device, this must be done with a dry, lint-free cloth. Do not use water or solvent! If liquids get into the device, it must be take out of operation.

When cleaning the device, make sure that no dirt enters the optical transmission path or gets onto the optical components. This means either that the fiber-optic cables remain connected or you fit the supplied protective caps.

⚠ WARNING

Impairment of the sealing of components due to chemicals

Sealing materials can be damaged if they are exposed to certain chemicals. The following components are affected:

- Relay, type 835NL-1A-B-SE, manufactured by Song Chuan Precision Co. Ltd

  Sealing material: Epoxy adhesive, type ECCOBOND from Emerson & Cuming
- Relay, type JZC-32FA-005-HSL2, manufactured by Xiamen Hongfa Electroacustic Co. Ltd.

  Sealing material: Epoxy adhesive , type 6060RP from Well-TA Chemical Company

If there is a risk that the device could come into contact with chemicals that can damage the sealing materials mentioned above, send the device to the manufacturer regularly to be checked.

8.2 Maintenance

The OLMs V4 are maintenance-free. It is also not possible to make any calibrations on the OLM V4. There are no elements whatsoever inside the OLM V4 housing that need to be activated by engineers or users. For this reason, never open the housing of the OLM. The only controls are the DIL switches are accessible from the outside.

The devices have a resettable fuse (PTC). **If the fuse triggers (all LEDs are off despite correctly applied power supply), the device should be disconnected from the power supply for approximately 30 minutes before turning it on again.**

If solvents or chemicals are used in the vicinity, the user should periodically inspect the visible plastic parts of the OLM V4 (DIL switches). If there are any signs of changes, the OLM V4 should be replaced.

If any other fault develops, please send the device to your SIEMENS service center for repair. Repairs on-site are not possible.

	Phone	**Fax**
Technical support	+49 (0)911 895-7222	+49 (0)911 895-7223
Field Service	+49 (0)911 895-7444	+49 (0)911 895-7445
Spare parts / repair	+49 (0)911 895-7448	+49 (0)911 895-7449

Troubleshooting/FAQs

9

This section will help you to localize the problem after an error is signaled (LED or signaling contact). Refer to the description of the LED displays in section "LED display (Page 13)".

Error display of the System LED

See description of the LED displays in the section "LED display (Page 13)".

Error display of the "CH1"/"CH0" LEDs

Check whether

- the DIL switch S0 (CH1) or S8 (CH0) is in position 1 when the OLM is in the electrical star segment of a star topology, see section "Star topology (Page 55)"
- the problem remains after removing the RS-485 connector.

  Still there: Device defective[1] Replace the OLM.

  Gone: The error is in the RS-485 bus segment.

  Check

  – all RS-485 connectors as described in section "Electrical RS-485 bus cables (Page 43)"
  – the setup and the shielding of the RS-485 bus segment
  – the RS-485 bus segment using the PROFIBUS bus monitor
  – the configuration of all bus nodes

[1]Does not apply if the monomaster of a PROFIBUS network is connected to the RS-485 bus segment to be tested. In this case, replace the suspect OLM with another OLM from the network and then carry out the test mentioned above.
If the error moves with the OLM, the device is defective. Replace the OLM.
If the problem does not move with the OLM, the disturbance originates in the RS-485 bus segment. Take measures as described above.

Error display of the "CH2"/"CH3" LEDs

1. Check whether
   - only modules of the same type are connected to each other optically (see "Network topologies (Page 51)").
   - the optical fiber is permitted for the module type being used and does not exceed the permitted length, refer to the table in the section "Properties and functions (Page 11)".
   - the optical channels connected via fiber-optic cables are set to the same mode, see section "Operator control (hardware) (Page 21)".
   - the ends of the fiber-optic cables and the optical transmission and receiving components are clean.
   - the fiber-optic cable connectors are connected completely and correctly
   - the requirements were met when connecting and laying the optical bus cables, see section "Connecting optical cables (Page 49)".
2. Identify the optical receive level, see section "Optical channels (Page 46)":
   - Check the fiber-optic cable attenuation with an optical level meter if the level is in the range "function not guaranteed" or "optical link power margin reduced". If the attenuation is too high, replace the fiber-optic cable. If the attenuation is within the valid range, one of the two OLMs of the problem segment is defective. First, replace the OLM that supplies the transmit signal for the measurement mentioned above. If the problem remains, replace the other OLM instead. If there is no optical level meter at hand, you can still get an idea of where the problem lies simply by swapping over **both** fiber-optic cables on **both** OLMs: If the problem moves with the cables, the fiber is almost certainly faulty, if it does not, the problem is in one of the OLMs.
   - If the level is in the "normal operation" range, first check the transmitting OLM, as described above, and then , if necessary, the receiving OLM.
   - If the level of both OLMs of the disturbed fiber-optic cable segment is within the range “optical link power margin reduced” or “normal operation”, one of the two OLMs of the disturbed fiber-optic segment is defective. Once again, in this case replace one OLM of the disturbed fiber-optic segment first. If the problem remains, replace the other OLM instead.

Level display lit yellow or red

For active interfaces see previous section "Error display of the "CH2"/"CH3" LEDs".

The level display cannot normally be deactivated. If you want to have the (correctly) displayed red level of an unused optical interface changed to green, a "short circuit" must be arranged from the transmitter to the receiver of the channel involved using a suitable fiber-optic cable. At the same time, the monitoring for this channel must be active. This means for channel 2, the S1 and S2 switches are turned off and for channel 3, the S3 and S4 switches. The channel display (yellow LED) remains off and the corresponding level LED is green.

Technical data

10

Properties		Device type		
		OLM P11 V4.1 **OLM P12 V4.1** **OLM P22 V4.1**	**OLM G11 V4.0** **OLM G12 V4.0** **OLM G22 V4.0** **OLM G12-EEC V4.0**	**OLM G11-1300 V4.0** **OLM G12-1300 V4.0**
Power supply				
Operating voltage		24 VDC safety extra-low voltage Permitted voltage range 18..32 VDC NEC Class 2		
Current consumption		Max. 200 mA		
Output voltage for bus termination RS-485 (D-sub female connector, pin 6)		5 VDC+5/-10%		
Signaling contact				
Function		Floating contact, opens if error/ fault occurs		
Power		CE: Max. 50 VDC/30 VAC safety extra-low voltage cULus: Max. 30 VDC/30 VAC safety extra-low voltage		
Current		Max. 1.0 A		
Signal transmission				
Transmission speed		9.6; 19.2; 45.45; 93.75; 187.5; 500 kbps 1.5; 3; 6; 12 Mbps		
Transmission speed setting		Automatic		
Bit error rate		$<10^{-9}$		
Signal delay time (any input/output)		≤ 6.5 t_{Bit}		
Retimer				
Input (all channels)	Signal distortion	± 30%		
	Bit length	± 0,12%		
Output (all channels) - average bit length		± 0,01%		
Status signaling				
Device		LED "System", red/green together with signaling contact		
Electrical channels		LED yellow/red		
Optical channels		LED yellow/red		
Optical level		Level display with green/yellow/red LED		

Properties		Device type		
		OLM P11 V4.1 OLM P12 V4.1 OLM P22 V4.1	OLM G11 V4.0 OLM G12 V4.0 OLM G22 V4.0 OLM G12-EEC V4.0	OLM G11-1300 V4.0 OLM G12-1300 V4.0
Safety				
IEC standard		IEC 60950 (corresponds to EN 60950 and VDE 0805)		
UL approval		According to type plate		
CSA approval		According to type plate		
C-Tick approval		According to type plate		
FM approval		According to type plate		
Ex (hazardous area) approval		According to type plate		
Electrical channels				
Type		RS-485		
Input dielectric strength		-7 V to +12 V		
Optical channels				
Wavelength		660 nm	860 nm	1310 nm
Launchable optical power				
In glass fiber E 10/125 (9/125)		-	-	-19 dBm
In glass fiber G 50/125	Transmit power "reduced"[1]	-	-20.5 dBm	-
	Transmit power "Default"	-	-16 dBm	-
In glass fiber G 62.5/125	Transmit power "reduced"[1]	-	-17.5 dBm	-
	Transmit power "Default"	-	-13 dBm	-
IN PCF fiber S 200/230	Transmit power "reduced"	-	-	-
	Transmit power "Default"	-17 dBm	-	-
In plastic fiber S 980/1000	Transmit power "reduced"	-9.5 dBm	-	-
	Transmit power "Default"	-5 dBm	-	-
Sensitivity of receiver		-23 dBm	-28 dBm	-29 dBm
Overdrive limit receiver (typical)		-7 dBm	-11 dBm	-14 dBm

Properties		Device type		
		OLM P11 V4.1 **OLM P12 V4.1** **OLM P22 V4.1**	**OLM G11 V4.0** **OLM G12 V4.0** **OLM G22 V4.0** **OLM G12-EEC V4.0**	**OLM G11-1300 V4.0** **OLM G12-1300 V4.0**
Coverable distance[2]				
With glass fiber E 10/125 (9/125) (0.5 dB/km)		-	-	0 to 15 km
With glass fiber G 50/125 (3 dB/km @ 860 nm, 1 dB/km @ 1310 nm)	Transmit power "reduced"[1]	-	0 to 1 km	-
	Transmit power "Default"	-	0.5 to 3 km	-
With glass fiber G 62.5/125 (3.5 dB/km @ 860 nm, 1 dB/km @ 1310 nm)	Transmit power "reduced"[1]	-	0 to 1 km	-
	Transmit power "Default"	-	0.5 to 3 km	-
With PCF fiber S 200/230 (10 dB/km)	Transmit power "reduced"	-	-	-
	Transmit power "Default"	0 to 400 m	-	-
In plastic fiber S 980/1000 (0.2 dB/m)	Transmit power "reduced"	0 to 50 m	-	-
	Transmit power "Default"	30 to 80 m	-	-
Plug-in cable		BFOC/2.5		
Electromagnetic compatibility				
Radiated emission		EN 55022, limit class A		
Conducted emission		EN 55022, limit class A		
Electrostatic discharge (ESD)		EN 61000-4-2, ± 6 kV contact discharge		
Radiated RF		EN 61000-4-3, 10 V/m 80 MHz..1 GHz		
Conducted RF		EN 61000-4-6, 10 V 10 kHz .. 80 MHz		
Burst		EN 61000-4-4, ± 2 kV on power supply, signaling contact and RS-485		
Surge (with Blitzductor)		EN 61000-4-5, On power supply cables On RS-485 bus cables		 ±1 kV balanced ±2 kV unbalanced ±2 kV unbalanced
Voltage interruptions		EN 61000-4-11		
Voltage dips		Voltage reduction by >95% for 5 s Voltage reduction by 30% for 10 s Voltage reduction by 60% for 100 ms and 1000 ms		

Properties	Device type		
	OLM P11 V4.1 OLM P12 V4.1 OLM P22 V4.1	OLM G11 V4.0 OLM G12 V4.0 OLM G22 V4.0 OLM G12-EEC V4.0	OLM G11-1300 V4.0 OLM G12-1300 V4.0
Climatic environmental conditions			
Ambient temperature during operation	-25 °C to +60 °C for OLM G12-EEC 0 °C to +60 °C for all other OLMs		
Storage and transportation temperature	-40 °C to +70 °C		
Relative humidity	Max. 100%, condensing for OLM G12-EEC <95%, non-condensing for all other OLMs		
Mechanical environmental conditions			
Oscillation in operation	10 to 58 Hz, 0.075 mm deflection 58 to 150 Hz, 1 g acceleration		
Oscillation during transportation	5 Hz to 9 Hz, 3.5 mm deflection 9 Hz to 500 Hz, 1 g acceleration		
Vibration during operation	40 m/s²		
Shock in operation	150 m/s², 10 ms		
Shock packed	250 m/s², 6 ms		
Free fall unpacked	10 cm		
Free fall packed	30 cm in product packaging 1 m in shipping packaging		
Miscellaneous information			
Degree of protection	IP40		
Dimensions	39.5 x 112 x 74.5 mm		
Housing material	Stainless steel, 1.4016		
Ground	approx. 340 g		
Silicone	The device is free of silicone.		
MTBF at 40 °C	145.96 years (P11) 108.02 years (P12) 99.85 years (P22)	157.87 years (G11) 118.16 years (G12/EEC) 108.69 years (G22)	157.24 years (G11-1300) 117.69 years (G12-1300)
MTBF at 60 °C	68.65 years (P11) 51.32 years (P12) 46.98 years (P22)	73.95 years (G11) 56.05 years (G12/EEC) 50.96 years (G22)	73.82 years (G11-1300) 55.94 years (G12-1300)

[1] The switch setting "Reduced" is valid for OLM / **G11**, **G12, G22** and **G12 EEC** as of product version (rev) **04**. The valid product version is on the type plate marked by "X".

[2] The following distances between two OLMs must not be exceeded regardless of the optical power budget.

Note

The resistance to ground (RTG) for operation of an ungrounded PROFIBUS OLM V4.0 is 830 kohm.

The resistance to ground (RTG) for operation of an ungrounded PROFIBUS OLM V4.1 is 990 kohm.

Dimension drawings

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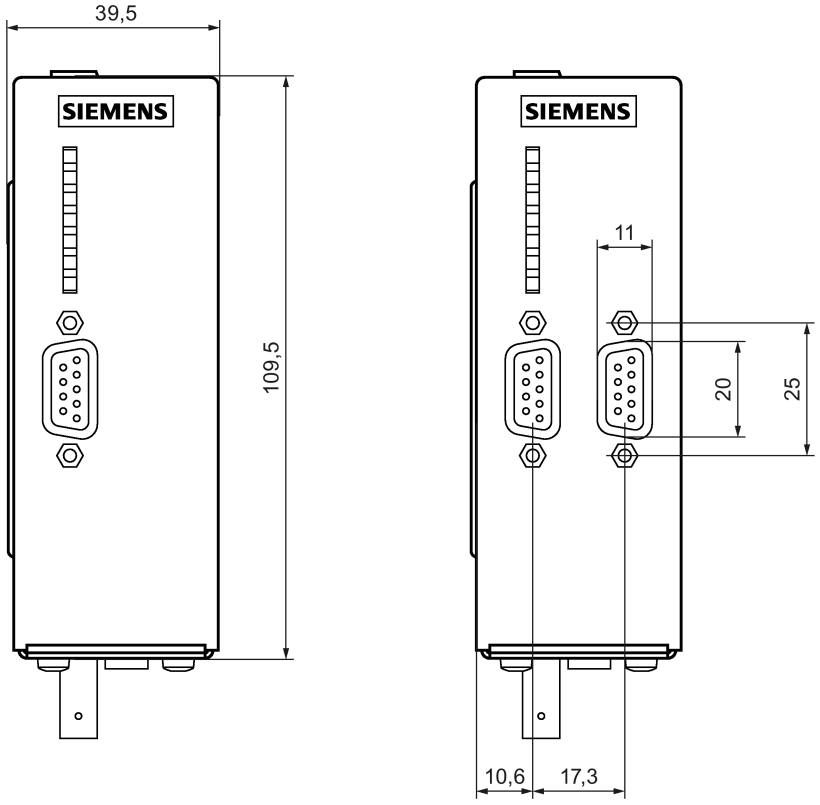
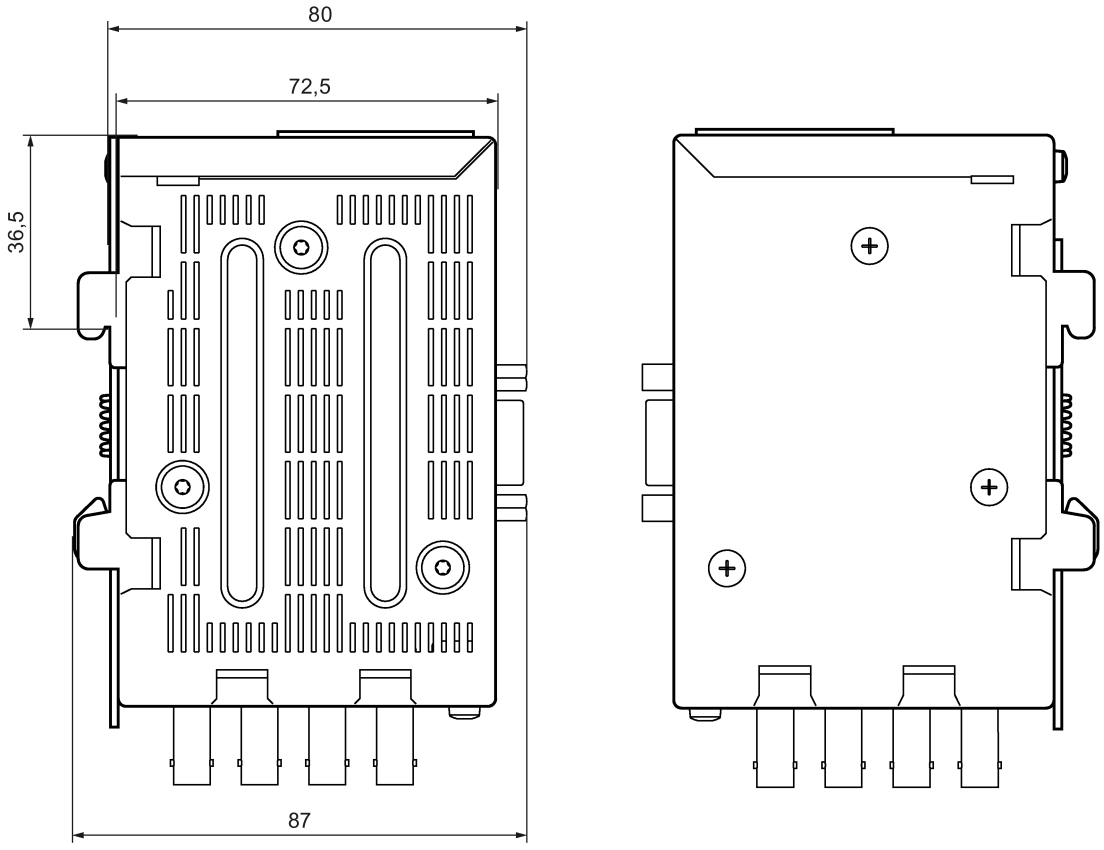
Note

Dimensions are specified in mm.

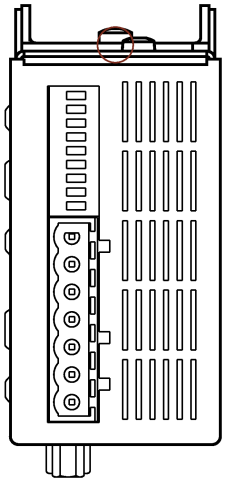
Front view



Side view (left and right)



From above



Approvals

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CE conformity

The products

SIMATIC NET PB OLM/P11 V4.1
SIMATIC NET PB OLM/P12 V4.1
SIMATIC NET PB OLM/P22 V4.1
SIMATIC NET PB OLM/G11 V4.0
SIMATIC NET PB OLM/G12 V4.0
SIMATIC NET PB OLM/G12-EEC V4.0
SIMATIC NET PB OLM/G22 V4.0
SIMATIC NET PB OLM/G11-1300 V4.0
SIMATIC NET PB OLM/G12-1300 V4.0

in the version put into circulation by Siemens AG conform to the regulations of the following European directives:

- 2004/108/EC
  of the European Parliament and of the Council on the approximation of the laws of the Member States relating to electromagnetic compatibility and repealing Directive 89/336/EEC.
- 2011/65/EC
  directive of the European Parliament and of the Council dated 8, June 2011 on the restriction the use of certain hazardous substances in electrical and electronic equipment.

Conformity with the basic requirements of the directives is attested by adherence to the following standards:

- EN 61000-6-2:2005
  Electromagnetic compatibility (EMC) - immunity for industrial areas
- EN 61000-6-4:2007
  Electromagnetic compatibility (EMC) - emission for industrial areas
- EN 50581:2012
  Technical documentation for the assessment electrical and electronic products with respect restriction of hazardous substances

Devices connected to the system must meet the relevant safety regulations.

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

Siemens Aktiengesellschaft
Division Process Industries and Drives
Postfach 4848
D-90026 Nürnberg

You will find EC declaration of conformity for these products on the Internet pages of Siemens Industry Online Support (http://support.automation.siemens.com/WW/view/en/33118389/134200).

This declaration certifies compliance with the directives named above, but does not guarantee any specific properties.

Note

The specified approvals apply only when the corresponding mark is printed on the product.

ATEX

⚠ WARNING

Special conditions for use in hazardous areas

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".

You will find this document on the Internet under the URL:

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

Enter the document identification number `C79000-G8999-C234` as the search term.

The SIMATIC NET products meet the requirements of the EC directive

94/9/EC
directive of the European Parliament and the Council on the approximation of the laws of the Member States concerning equipment and protective systems intended for use in potentially explosive atmospheres.

Conformity with the basic requirements of the directives is attested by adherence to the following standards:

- EN 60079-0
  Explosive atmospheres - Part 0: Equipment - General requirements
- EN 60079-15
  Explosive atmospheres - Part 15: Equipment protection by type of protection "n"

All the devices except PB OLM/G11-1300 V4.0 and PB OLM/G12-1300 V4.0 also meet the requirements of the following standard:

- EN 60079-28
  Explosive atmospheres - Part 28: Protection of devices and transmission systems operating with optical radiation

The following ATEX classifications apply to the individual products:

Product	ATEX classification
SIMATIC NET PB OLM/P11 V4.1 SIMATIC NET PB OLM/P12 V4.1 SIMATIC NET PB OLM/P22 V4.1 SIMATIC NET PB OLM/G11 V4.0 SIMATIC NET PB OLM/G12 V4.0 SIMATIC NET PB OLM/G12-EEC V4.0 SIMATIC NET PB OLM/G22 V4.0	II 3 (2) G Ex nA [op is Gb] IIC T4 Gc DEKRA 11ATEX0060X
SIMATIC NET PB OLM/G11-1300 V4.0 SIMATIC NET PB OLM/G12-1300 V4.0	II 3 G Ex nA IIC T4 Gc KEMA 07ATEX0145 X

IECEx

The SIMATIC NET products meet the requirements of explosion protection according to IECEx.

The products meet the requirements of the following standards:

- IEC 60079-15
  Explosive atmospheres - Part 15: Equipment protection by type of protection "n"
- IEC 60079-0
  Explosive atmospheres - Part 0: Equipment - General requirements

The current versions of the standards can be seen in the EU Declaration of Conformity.

All the devices except PB OLM/G11-1300 V4.0 and PB OLM/G12-1300 V4.0 also meet the requirements of the following standard:

- IEC 60079-28
  Explosive atmospheres - Part 28: Protection of equipment and transmission systems using with optical radiation

The following IECEx classifications apply to the individual products:

Product	IECEx classification
SIMATIC NET PB OLM/P11 V4.1 SIMATIC NET PB OLM/P12 V4.1 SIMATIC NET PB OLM/P22 V4.1 SIMATIC NET PB OLM/G11 V4.0 SIMATIC NET PB OLM/G12 V4.0 SIMATIC NET PB OLM/G12-EEC V4.0 SIMATIC NET PB OLM/G22 V4.0	Ex nA [op is Gb] IIC T4 Gc DEK 14.0026X
SIMATIC NET PB OLM/G11-1300 V4.0 SIMATIC NET PB OLM/G12-1300 V4.0	Ex nA IIC T4 Gc DEK 14.0025X

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

cULus

c(UL)us Listed

Industrial Control Equipment E85972
Information Technology Equipment FOR HAZ.LOC. E240480
CL. 1, DIV. 2 GP. A, B, C, D, T4
CL. 1, Zone2, GP. IIC, T4
CL. 1, Zone2, AEx nC IIC, T4

Underwriters Laboratories Inc. complying with

- Standard No. ANSI/ISA 12.12.01-2000
  Nonincendive Electrical Equipment for use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations
- Standard No. CAN/CSA C22.2 No. 213-M1987, 1st Ed.
  Nonincendive Electrical Equipment for Use in Class I, Division 2 Hazardous Locations

RCM

The products meet the requirements of the AS/NZS CISPR11:2011 standard.

KC (Korean Standard)

The products meet the requirements of the "Korean Standard".

Marking for the customs union

EAC (Eurasian Conformity)

Customs union of Russia, Belarus and Kazakhstan

Declaration of the conformity according to the technical regulations of the customs union (TR CU)

Shipbuilding approvals

Various shipbuilding approvals were granted for the devices. The corresponding certificates are available on the Internet under the following URL:

http://support.automation.siemens.com

1. Select the required product in the left-hand window
2. Make the following settings in the "Entry list" tab:
   - Entry type: "Certificates"
   - Certificate Type: "Shipping Approval"
   - Approval office: "all" or a specific selection
3. After clicking the "Go" button, the available certificates are displayed.

If the devices contain laser sources (see type plate) they comply with the FDA and IEC requirements (see type plate):

Figure 12-1 FDA and IEC approvals

CAUTION

Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

Appendix A

A.1 Abbreviations/acronyms

BFOC	Bayonet Fiber Optic Connector
DIN	Deutsches Institut für Normung (German standardization institute)
EEC	Extended Environmental Conditions
EIA	Electronic Industries Association
EN	Europäische Norm (European standard)
EMC	Electromagnetic compatibility
HCS®	Hard Polymer Cladded Silica Fiber (registered trademark of Ensign-Bickford)
HSA	Highest Station Address
IEC	International Electrotechnical Commission
LED	Light Emitting Diode
FOC	Fiber-optic cable
OBT	Optical bus terminal
OLM	Optical link module
PCF	Polymer Cladded Fiber (synonymous with HCS®)
PNO	PROFIBUS User Organization
SELV	Safety extra-low voltage
TSDR MIN	Min. Station Delay Responder
UL	Underwriters Laboratories
VDE	German association for electrical, electronic and information technologies

A.2 Literature

- SIMATIC NET PROFIBUS Networks SIEMENS AG, order numbers, see section "Introduction (Page 5)", subsection "Further Literature"
- EN 50170-1-2 1996: "General Purpose Field Communication System“, Volume 2 "Physical Layer Specification and Service Definition"
- DIN 19245: "Measurement, open loop and closed-loop control; PROFIBUS Part 3; Process Field Bus; Distributed Peripheral I/O (DP)"
- EIA standard RS–85 (April 1983): "Standard for electrical characteristics of generators"

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