PSI-MOS-PROFIB/FO...

FO converter for PROFIBUS up to 12 Mbps



Data sheet
101972_en_16

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1 Description

The **PSI-MOS-PROFIB/FO...** FO converters convert copper-bound PROFIBUS DP interfaces to fiber optics. You can also use the devices in MPI networks (not in ring structures).

As a result of the simple and interference-free networking via fiber optics, bus cable short circuits only affect the actual potential segment concerned. This increases overall availability and improves flexibility in terms of the bus topology.

This prevents the negative effects of equipotential bonding currents and electromagnetic interference on the bus cables.

The PSI-MOS-PROFIB/FO...E termination devices convert a PROFIBUS interface to an FO cable. They are ideal for point-to-point connections.

PSI-MOS-PROFIB/FO...T T-couplers convert to two fiber-optic cables. This can be used to create redundant bus topologies for increased system availability.

In addition, you can create modular joining stations from both device versions. You can combine devices with the different transmission technologies polymer, PCF, and fiberglass freely within a joining station.

Features

- Can be combined with the PSI copper repeater in a modular way using DIN rail connectors
- Supply voltage and data signals routed through the DIN rail connectors
- Connections can be plugged in via a COMBICON screw terminal block
- Automatic data rate detection or fixed data rate setting via DIP switches
- Redundant power supply
- High-quality electrical isolation between all interfaces (PROFIBUS // fiber optic ports // power supply // DIN rail connector)
- Approved for use in zone 2
- Integrated optical diagnostics for continuous monitoring of FO paths
- Intrinsically safe fiber optic interface (Ex op is) for direct connection to devices in zone 1
- Floating switch contact for advance warning of critical FO paths
- Suitable for all data rates up to 12 Mbps
- Bit retiming for any cascading depth
- Shipbuilding approval in accordance with DNV GL

Observe these notes

WARNING: Explosion hazard when used in potentially explosive areas

The device is a category 3 item of electrical equipment. Follow the instructions provided here during installation and observe the safety notes.

Make sure you always use the latest documentation.

It can be downloaded at: phoenixcontact.com/product/2708290

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3 Ordering data

Description	Type	Item no.	Pcs./Pkt.
FO converter with integrated optical diagnostics, alarm contact, for PROFIBUS up to 12 Mbps, terminal device with one FO interface (FSMA), 660 nm, for polymer/PCF fiber cable	PSI-MOS-PROFIB/FO 660 E	2708290	1
FO converter with integrated optical diagnostics, alarm contact, for PROFIBUS up to 12 Mbps, T-coupler with two FO interfaces (FSMA), 660 nm, for polymer/PCF fiber cable	PSI-MOS-PROFIB/FO 660 T	2708287	1
FO converter with integrated optical diagnostics, alarm contact, for PROFIBUS up to 12 Mbps, terminal device with one FO interface (BFOC), 850 nm, for PCF/fiber-glass cable (multimode)	PSI-MOS-PROFIB/FO 850 E	2708274	1
FO converter with integrated optical diagnostics, alarm contact, for PROFIBUS up to 12 Mbps, T-coupler with two FO interfaces (BFOC), 850 nm, for PCF/fiberglass cable (multimode)	PSI-MOS-PROFIB/FO 850 T	2708261	1
FO converter with integrated optical diagnostics, coated PCB, alarm contact, for PROFIBUS up to 12 Mbps, T-coupler with two FO interfaces (BFOC), 850 nm, for PCF or fiberglass cable (multimode)	PSI-MOS-PROFIB/FO 850 E-SO	2708711	1
FO converter with integrated optical diagnostics, coated PCB, alarm contact, for PROFIBUS up to 12 Mbps, T-coupler with two FO interfaces (BFOC), 850 nm, for PCF or fiberglass cable (multimode)	PSI-MOS-PROFIB/FO 850 T-SO	2708614	1

The PSI-MOS-PROFIB/FO ... -SO versions have a coated PCB for increased resistance to salt-laden atmospheres.

Accessories	Type	Item no.	Pcs./Pkt.
FO connectors, degree of protection: IP20, number of positions: 2, MM, material: Metal, cable outlet: straight	PSM-SET-FSMA/4-KT	2799720	1
FO connectors, degree of protection: IP20, number of positions: 4, MM, material: Metal, connection method: Cable connection, cable outlet: straight	PSM-SET-FSMA/4-HCS	2799487	1
PROFINET polymer fiber cable, duplex 980 µm/ 1000 µm, heavy-weight design, for installation in stationary systems and machines, by the meter, without male connector	FL FOC PN-B-980/1000	2313397	1
Polymer fiber cable, duplex 980µm/1000µm, heavy-weight version for installation in stationary systems and machines, by the meter without male connector	PSM-LWL-RUGGED-980/ 1000	2744322	1
PROFINET polymer fiber cable, duplex, 980/1000 µm, heavy-weight highly flexible design, for flexible cable conduit applications, by the meter, without connector	FL FOC PN-C-FLEX-980/1000	2313407	1

Accessories	Type	Item no.	Pcs./Pkt.
PCF cable, duplex 200 µm/230 µm, by the meter without male connector, for installation in stationary systems and machines	PSM-LWL-HCS-RUGGED-200/230	2799885	1
PCF cable, duplex 200/230 µm, by the meter, without connector, for outdoor installation	PSM-LWL-HCSO-200/230	2799445	1
Primary-switched power supply, QUINT POWER, screw connection, DIN rail mounting, supply of devices possible via the TBUS DIN rail connector, protective coating, input: single-phase, output: 24 V DC/2.5 A	QUINT4-SYS-PS/1AC/24DC/2.5/SC	2904614	1
DIN rail bus connector, color: light gray, nominal current: 8 A (parallel contacts), rated voltage (III/2): 125 V, number of positions: 5, product range: TBUS5-17,5.., pitch: 3.81 mm, mounting: DIN rail mounting, locking: without, mounting method: without, type of packaging: packed in cardboard, Item with gold-plated contacts, bus connectors for connecting with electronics housings, 5 parallel contacts	ME 17,5 TBUS 1,5/ 5-ST-3,81 KMGY	2713645	50
Polymer fiber DIY case, consisting of: Stripping knife, stripping pliers, polishing wheels for F-SMA and SC-RJ quick mounting connectors, polishing pad and emery paper	PSM-POF-KONFTOOL	2744131	1
PCF assembly kit for F-SMA quick mounting connectors, including stripping blade, stripping pliers, aramide yarn scissors, fiber stripper, microscope, fiber cleaving tool for standard HCS fibers, four F-SMA connectors for standard PCF fibers, and documentation	PSM-HCS-KONFTOOL	2799526	1
Polymer fiber polishing set, for F-SMA quick mounting connectors	PSM-SET-FSMA-POLISH	2799348	1
Fiber optic measuring case, consisting of an optical power meter, F-SMA, B-FOC adapters, reference fibers and operating instructions	PSM-FO-POWERMETER	2799539	1
Coupling; set consisting of 2 couplings for connecting F-SMA plugs	PSM-SET-FSMA-LINK/2	2799416	1
D-SUB connector, 9-pos., pin, 35° cable outlet, bus system: PROFIBUS DP up to 12 Mbps, termination resistor can be switched on via slide switch, pin assignment: 3, 5, 6, 8; screw connection terminal blocks	SUBCON-PLUS-PROFIB/SC2	2708232	1
D-SUB connector, 9-pos., pin, 35° cable outlet, bus system: PROFIBUS DP up to 12 Mbps with PG D-SUB socket for connecting a programming device, termination resistor can be switched on via slide switch, pin assignment: 3, 5, 6, 8; screw connection terminal blocks	SUBCON-PLUS-PROFIB/PG/SC2	2708245	1
D-SUB connector, 9-pos., male connector, axial version with two cable entries, bus system: PROFIBUS DP up to 12 Mbps, termination resistor can be switched on via slide switch, pin assignment: 3, 5, 6, 8; screw connection terminal blocks	SUBCON-PLUS-PROFIB/AX/SC	2744380	1
Screwdriver, slot-headed, VDE insulated, size: 0.4 x 2.5 x 80 mm, 2-component grip, with non-slip grip	SZS 0,4X2,5 VDE	1205037	10

Accessories	Type	Item no.	Pcs./Pkt.
Quick stripping tool for PROFIBUS cable, type Fast Connect	PSM-STRIP-FC/PROFIB	2744623	1
Passive RS-485 T-distributor, fitted with one 9-pin D-SUB pin strip and two 9-pin D-SUB socket strips	PSM PTK	2760623	1
Passive RS-485 T-distributor, fitted with one 9-pin D-SUB pin strip and five 9-pin D-SUB socket strips	PSM PTK-4	2799364	1
Modular repeater for electrical isolation and range increase for PROFIBUS up to 12 Mbps, 4-way isolation, rail-mountable, supply 24 V DC	PSI-REP-PROFIBUS/12MB	2708863	1
Repeater, for potential separation and range increase in RS-485 2-wire bus systems, 3-way isolation, rail-mountable	PSM-ME-RS485/RS485-P	2744429	1
By the meter, Bus system cable, PROFIBUS (12 Mbps), shielded, PVC FR VI/PVC, violet, 2-wire (1x2xAWG22/1), color single wire: red, green, cable length: Free entry (1.0 ... 1000.0 m)	PSM-CABLE-PROFIB/FC	2744652	1
Active termination resistor for PROFIBUS and RS-485 bus systems, redundant power supply, routing of the supply voltage via DIN rail connector, electrical isolation, switchable termination, integrated programming interface	PSI-TERMINATOR-PB-TBUS	2702636	1
D-SUB connector, 9-pos., pin, 90° cable outlet, bus system: PROFIBUS DP up to 12 Mbps with PG D-SUB socket for connecting a programming device, termination resistor can be switched on via slide switch, pin assignment: 3, 5, 6, 8; screw connection terminal blocks	SUBCON-PLUS-PROFIB/90/PG/SC	2313708	1
D-SUB connector, 9-pos., pin, 90° cable outlet, bus system: PROFIBUS DP up to 12 Mbps with PG D-SUB socket for connecting a programming device, termination resistor can be switched on via slide switch, pin assignment: 3, 5, 6, 8; IDC terminal block connection	SUBCON-PLUS-PROFIB/90/PG/IDC	2313685	1
D-SUB connector, 9-pos., pin, assignment: 3, 5, 6, 8; two M12 cable entries (B-coded), axial. Bus system: PROFIBUS DP up to 12 Mbps. Termination resistor via separate M12 terminator.	SUBCON-PLUS-PROFIB/AX/M12	2902321	1
D-SUB plug, 9-pos., pin, assignment: 3, 5, 6, 8; two 90° cable entries M12 (B-coded). Bus system: PROFIBUS DP up to 12 Mbps. Termination resistor via separate M12 terminator. Long version; S7-compatible.	SUBCON-PLUS-PROFIB/90X/M12	2902729	1
D-SUB plug, 9-pos., pin, assignment: 3, 5, 6, 8; two 90° M12 cable glands (B-coded). Bus system: PROFIBUS DP up to 12 Mbps. Termination resistor via separate M12 terminator.	SUBCON-PLUS-PROFIB/90/M12	2902318	1

Accessories	Type	Item no.	Pcs./Pkt.
D-SUB plug, 9-pos., pin, assignment: 3, 5, 6, 8; two 35° cable entries M12 (B-coded). Bus system: PROFIBUS DP up to 12 Mbps. Termination resistor via separate M12 terminator.	SUBCON-PLUS-PROFIB/35/M12	2902320	1
rugged PCF installation cable for inner areas with highly tear-proof aramid strain-relief elements. Individual elements made from highly flexible FRNC material. The cable is halogen-free, ozone and UV resistant and has a rugged polyurethane (PUR) outer sheath.	FOC-HCS-RUGGED-1014/...	1402191	1

You will find additional accessories at phoenixcontact.com/product/<item_number>.

4 Technical data

Supply	PSI-MOS-PROFIB/FO 660...	PSI-MOS-PROFIB/FO 850...
Supply voltage range	18 V DC ... 30 V DC (via pluggable COMBICON screw terminal block)	18 V DC ... 30 V DC (via pluggable COMBICON screw terminal block)
Nominal supply voltage	24 V DC	24 V DC
Typical current consumption	100 mA (24 V DC)	120 mA (24 V DC)
Max. current consumption	130 mA	130 mA
	≤ 2 A (For operation in a joining station, via the DIN rail connector)	≤ 2 A (For operation in a joining station, via the DIN rail connector)
Electrical isolation	VCC // RS-485	VCC // RS-485
Test voltage data interface/power supply	1.5 kV_{rms} (50 Hz, 1 min.)	1.5 kV_{rms} (50 Hz, 1 min.)
Connection method	COMBICON plug-in screw terminal block	COMBICON plug-in screw terminal block
Tightening torque	0.56 Nm ... 0.79 Nm	0.56 Nm ... 0.79 Nm
Stripping length	7.00 mm	7.00 mm
Conductor cross-section		
flexible	0.2 mm² ... 2.5 mm²	0.2 mm² ... 2.5 mm²
flexible AWG	24 ... 14	24 ... 14
rigid	0.2 mm² ... 2.5 mm²	0.2 mm² ... 2.5 mm²
rigid AWG	24 ... 14	24 ... 14

PROFIBUS acc. to IEC 61158, RS-485 2-wire, half duplex, automatic control	
Operating mode	Semi-duplex
Connection method	D-SUB-9 female connector
Output nominal voltage	5 V ±0.25 (50 mA)
Tightening torque	0.4 Nm
Data format/encoding	UART (11 Bit, NRZ)
Data direction switching	Automatic control
Serial transmission speed	≤ 12 Mbps
Transmission length	≤ 1200 m (depending on the data rate, with shielded, twisted pair data cable)
Transmission medium	2-wire twisted pair, shielded

FO interface	PSI-MOS-PROFIB/FO 660...	PSI-MOS-PROFIB/FO 850...
Transmission protocol	Protocol-transparent to the RS-485 interface	Protocol-transparent to the RS-485 interface
Connection method	F-SMA	B-FOC (ST®)
Wavelength	660 nm	850 nm
Transmission length incl. 3 dB system reserve	70 m (F-P 980/1000 230 dB/km with quick mounting connector)	2600 m (with F-G 50/125 2.5 dB/km)
	400 m (F-K 200/230 10 dB/km with quick mounting connector)	3300 m (with F-G 62,5/125 3.0 dB/km)
	-	800 m (F-K 200/230 10 dB/km with quick mounting connector)
Transmission length	min. 1 m (with F-K 200/230, 8 dB/km)	min. 1 m (with F-K 200/230, 8 dB/km)
Transmit capacity, minimum	-3 dBm (980/1000 µm)	-4.2 dBm (200/230 µm)
	-15.4 dBm (200/230 µm)	-17.8 dBm (50/125 µm)
	-	-14.6 dBm (62,5/125 µm)
Minimum receiver sensitivity	-30 dBm	-30 dBm (50/125 µm)
Overrange receiver	-3 dBm (980/1000 µm)	-3 dBm (200/230 µm)

Relay output	
Number of outputs	1
Maximum switching voltage	60 V DC (Resistive Load, General Load) 30 V AC (Resistive load) 42 V AC (peak, resistive load)
Limiting continuous current	0.46 A

General data	
Degree of protection	IP20
Mounting type	DIN rail mounting
Dimensions (W/H/D)	35 mm x 99 mm x 106 mm
Material	
Housing	PA 6.6-FR
Color	
Housing	green
Vibration resistance in accordance with EN 60068-2-6/ IEC 60068-2-6	5g, 10...150 Hz, 2.5 h, in XYZ direction
Shock in accordance with EN 60068-2-27/IEC 60068-2-27	15g, 11 ms period, half-sine shock pulse
Free fall in accordance with IEC 60068-2-32	1 m
Bit distortion, input	± 35 % (permitted)
Bit distortion, output	< 6.25 %
Bit delay	< 1 bit (DIP 7 = OFF, standard operation)
	11 bit (DIP 7 = ON, redundancy operation)
Noise emission according to	EN 55011
Noise immunity according to	EN 61000-6-2:2005
Electromagnetic compatibility	Conformance with EMC Directive 2014/30/EU
Free from substances that could impair the application of coating	VDMA 24364:2018-05

MTTF (mean time to failure)	PSI-MOS-PROFIB/FO 660 E	PSI-MOS-PROFIB/FO 660 T	PSI-MOS-PROFIB/FO 850 E	PSI-MOS-PROFIB/FO 850 T
SN 29500 standard, temperature 25°C, operating cycle 21%	1014 Years	213 Years	247 Years	212 Years
SN 29500 standard, temperature 40°C, operating cycle 34.25%	452 Years	150 Years	200 Years	150 Years
SN 29500 standard, temperature 40°C, operating cycle 100%	187 Years	86 Years	130 Years	86 Years

Ambient conditions	
Ambient temperature	
Operation	-20 °C ... 60 °C
Storage/transport	-40 °C ... 85 °C
Humidity	
Operation	30 % ... 95 % (non-condensing)
Altitude	≤ 5000 m (For restrictions, see the manufacturer's declaration for altitude operation) ≤ 2000 m (Hazardous locations)

Conformance/Approvals	
CE	CE-compliant
ATEX	Ⓔx II 3(2)G Ex ec nC [op is Gb] IIC T4 Gc II(2)D [Ex op is Db] IIIC UL 24 ATEX 3196X Please follow the special installation instructions in the documentation!
IECEx	Ex ec nC [op is Gb] IIC T4 Gc [Ex op is Db] IIIC IECEx ULD 24.0008X
UL, USA/Canada	Class I, Zone 2, AEx nc IIC T5 Class I, Zone 2, Ex nC nL IIC T5 X Class I, Div. 2, Groups A, B, C, D
Corrosive gas test	ISA-S71.04-1985 G3 Harsh Group A
Shipbuilding	DNV GL
Temperature	B
Humidity	A
Vibration	A
EMC	B
Enclosure	Required protection according to the Rules shall be provided upon installation on board

Conformance with EMC Directive 2014/30/EU		
Immunity in accordance with EN 61000-6-2		
Electrostatic discharge	EN 61000-4-2	
	Contact discharge	± 6 kV
	Discharge in air	± 8 kV
	Comments	Criterion B
Electromagnetic HF field	EN 61000-4-3	
	Field intensity	10 V/m
	Comments	Criterion A
Fast transients (burst)	EN 61000-4-4	
	Input	± 2 kV
	Signal	± 2 kV
	Comments	Criterion B
Surge current loads (surge)	EN 61000-4-5	
	Input	± 0.5 kV
	Signal	± 1 kV
	Comments	Criterion B
Conducted interference	EN 61000-4-6	
	Voltage	10 V
	Comments	Criterion A

Criterion A	Normal operating behavior within the specified limits.
Criterion B	Temporary impairment to operational behavior that is corrected by the device itself.

Emitted interference in acc. with EN 61000-6-4	
Interference emission	EN 55011 Class A, industrial applications

5 Safety regulations and installation notes

WARNING:

Observe the following safety notes when using the FO converter.

- The product is an item of Ex associated devices (category 2) with “inherently safe optical radiation” type of protection and can be installed in zone 2 potentially explosive areas as a category 3 device.
- The product satisfies the requirements of the following standards:
  - EN/IEC 60079-0, EN/IEC 60079-7, EN/IEC 60079-15, EN/IEC 60079-28
  - Comprehensive details are to be found in the EU Declaration of Conformity which is enclosed and also available on our website in the latest version.
- Installation, operation, and maintenance may only be carried out by qualified electricians. Follow the installation instructions as described.
- When installing and operating the device, the applicable regulations and safety directives (including national safety directives), as well as general technical regulations, must be observed. The safety-relevant data is listed in this document.
- Observe the specified conditions for use in potentially explosive areas! Also observe the requirements of EN/IEC 60079-14.
- The product must not be opened or modified apart from the configuration of the DIP switches. Do not repair the product yourself; replace it with an equivalent product. Repairs may only be carried out by the manufacturer. The manufacturer is not liable for damage resulting from failure to comply.
- Do not subject the product to mechanical and/or thermal stress that exceeds the specified limits.
- The product must be stopped and immediately removed from the Ex area if it is damaged, has been subjected to an impermissible load, stored incorrectly, or if it malfunctions.
- The device is designed exclusively for operation with SELV/PELV from a Class ES1 “electrical energy source” in accordance with EN/IEC 62368-1 and VDE 0868-1. The device may only be connected to devices that meet the requirements of class ES1 in accordance with EN/IEC 62368-1.

5.1 Installation in Zone 2

WARNING: Explosion hazard when used in potentially explosive areas

Please make sure that the following notes and instructions are observed.

- Use in potentially explosive areas is not permitted in China.
- Install the device in such a way that a degree of protection of at least IP54 is achieved in accordance with EN/IEC 60529. To this end, a suitable, approved housing that meets the requirements of EN/IEC 60079-0 should be used.
- Only devices that are designed for operation in the specific Ex zone and for the specific conditions at the installation location may be connected to circuits in potentially explosive areas.
- In potentially explosive areas, only connect and disconnect cables and plug-in connections (e.g., connector, SD card, DIN rail connector, etc.) when the power is disconnected.
- For safe operation, lockable plug-in connections (e.g., connector, SD card, DIN rail connector, etc.) must be fully inserted and have a functional interlock (e.g., locking clip, screw connection, etc.).
- Insert the interlock. Repair any damaged plug-in connections immediately.
- Only connect one cable per terminal point.
- Use the device in an environment that does not exceed pollution degree 2 in accordance with EN/IEC 60664-1.
- Use transient protection so that short-term surge voltages do not exceed 119 V.
- The switches of the device that can be accessed may only be actuated when the power supply to the device is disconnected or when it has been ensured that there is no potentially explosive atmosphere present.
- The product is not designed for use in potentially dust-explosive atmospheres.

5.2 UL note



WARNING: Explosion hazard when used in potentially explosive areas
Please make sure that the following notes and instructions are observed.

PROCESS CONTROL EQUIPMENT FOR HAZARDOUS LOCATIONS 31ZN

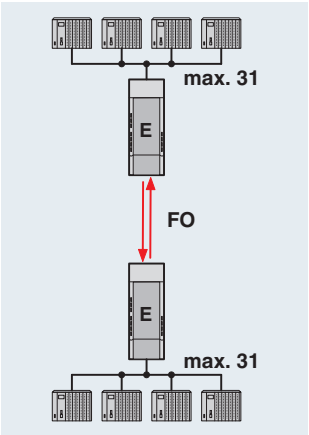
A) This equipment is suitable for use in Class I, Zone 2, AEx nC IIC T5, Ex nC nL IIC T5 X; and Class I, Division 2, Groups A, B, C and D or non-hazardous locations only.
B) WARNING - EXPLOSION HAZARD - substitution of components may impair suitability for Class I, Zone 2/Division 2.
C) WARNING - EXPLOSION HAZARD - do not disconnect equipment unless power has been switched off or the area is known to be non-hazardous.
D) This device must be installed in an enclosure rated IP54 and used in an area of not more than pollution degree 2.

6 Network structures

The PSI-MOS-PROFIB/FO... system can be used to create network structures that are tailored to the relevant application. To create the illustrated network structures, you will need:

– T-couplers (PSI-MOS-PROFIB/FO...**T**)
– Termination devices (PSI-MOS-PROFIB/FO...**E**)

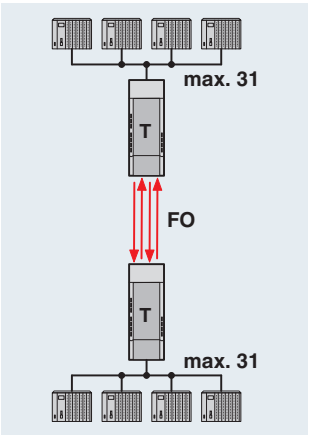
Figure 1 Point-to-point connection



Two termination devices can be used to easily convert a data link from copper cable to fiber optics.

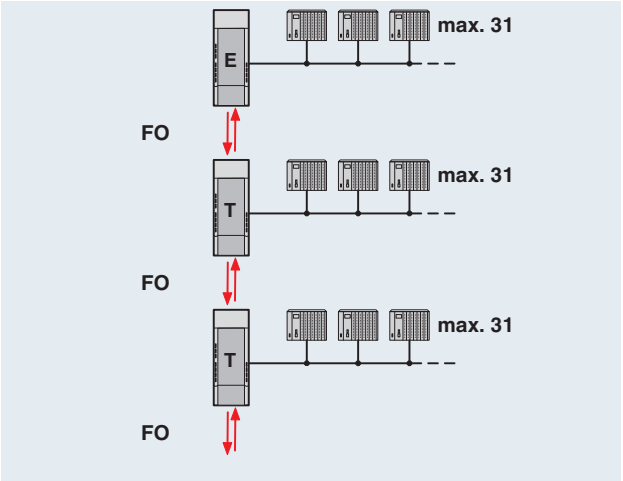
Redundancy

Figure 2 Redundant point-to-point connection



For increased availability, the point-to-point connection can also be designed redundantly. To do so, you will need two T-couplers.

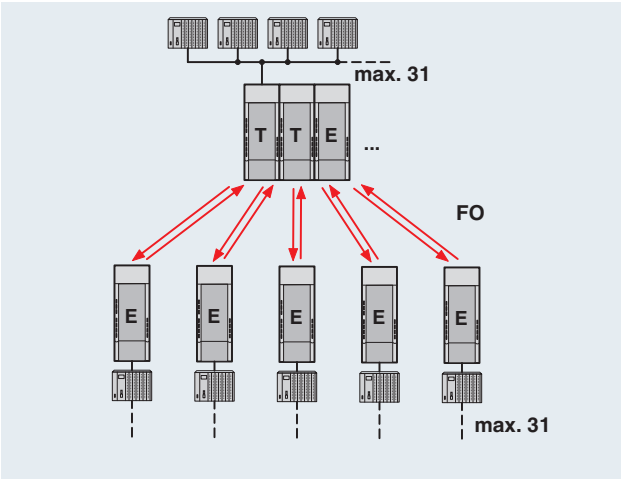
Figure 3 Line structure



You can network several devices to form a line structure.

– Termination devices are used at the beginning and end of the fiber optic path.
– T-couplers with two fiber optic ports are used along the line.

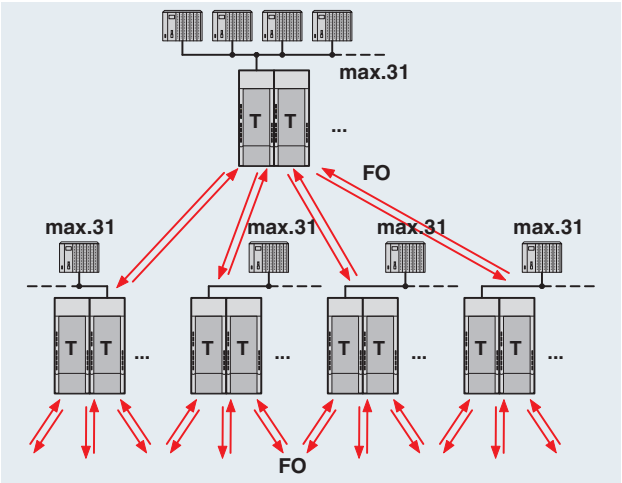
Figure 4 Star structure



You can also network the devices in a star structure. To do so, connect several T-couplers and termination devices to an active star coupler.

You can interconnect up to ten devices for each star coupler. Cross-wiring for the RS-485 data and the power supply is provided by the DIN rail connector.

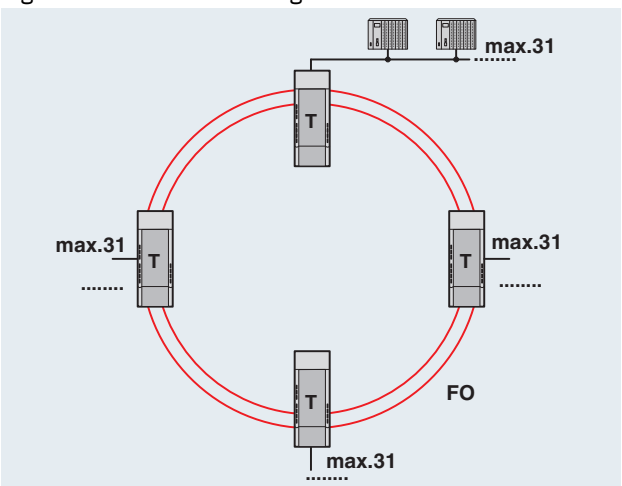
Figure 5 Tree structure



Line and star structures can be cascaded to create complex tree structures, including in a redundant version if required.

The maximum number of devices that can be cascaded is only limited by the timing response of the bus system used due to the bit retiming of the FO converter.

Figure 6 Redundant ring structure



If a system has increased requirements in terms of transmission reliability and availability, redundant ring structures can be created. If a fiber-optic subsection in the redundant ring breaks down (broken fiber), all the other devices can still be accessed.

In MPI networks, redundant ring structures cannot be created.

In the redundant ring, mixed operation of PSI-MOS with FO interfaces from other manufacturers is not permitted.

6.1 Other FO converters in the PSI-MOS system

Designation	Item No.	Device type	Wave length	Type of fiber	Connection
PSI-MOS-PROFIB/FO1300 E	2708559	End device	1300 nm	Fiberglass	SC duplex
PSI-MOS-PROFIB/FO1300 T	2708892	T-coupler			

Possible distances:

– 25 km using multimode fiberglass cables
– 45 km with singlemode fiberglass cable

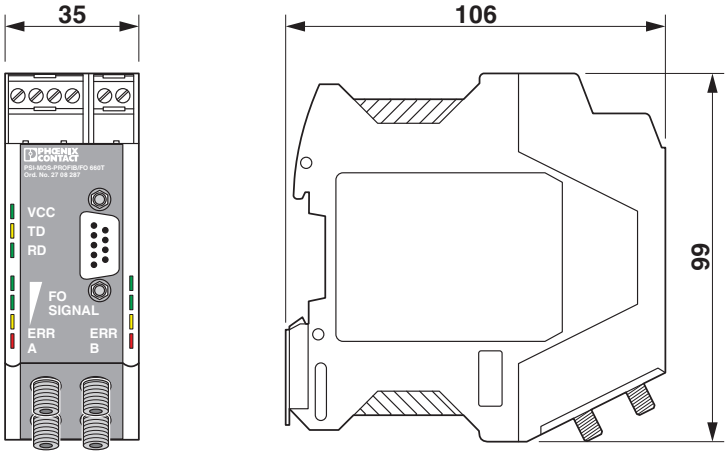
7 Transport and unpacking

- Check the delivery for visible damage caused by transportation.
- Submit claims for any transport damage immediately. Inform Phoenix Contact or your supplier as well as the shipping company without delay.
- Read the entire packing slip carefully.
- Retain the packing slip.
- Keep the packaging for a possible later transport.

8 Product description

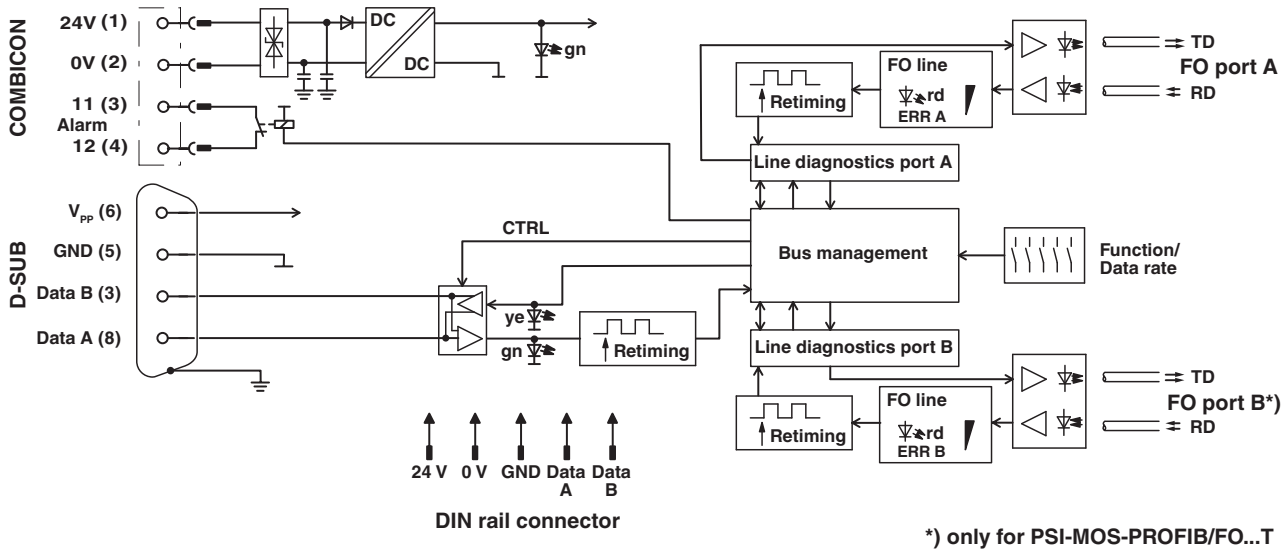
8.1 Dimensions

Figure 7 Housing dimensions



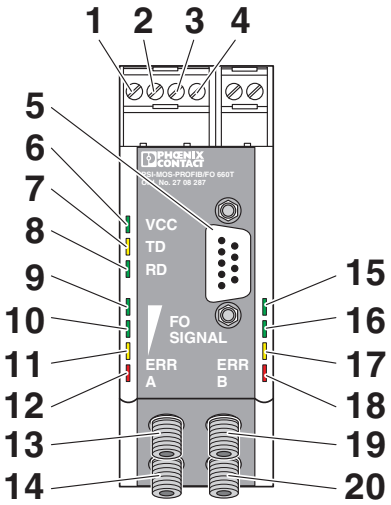
8.2 Basic circuit diagram

Figure 8 *) only with PSI-MOS.../FO...T



8.3 Function elements

Figure 9 Function elements



1	Supply voltage 24 V DC		
2	0 V DC supply voltage		
3	N/C contact	Connection 11	
4	N/C contact	Connection 12	
5	D-SUB 9	PROFIBUS interface	
6	LED	VCC	Supply voltage
7	LED	TD	Dynamic transmit data to D-SUB
8	LED	RD	Dynamic receive data to D-SUB
9	LED	Port A	FO signal
10	LED	Port A	FO signal
11	LED	Port A	FO signal
12	LED	Port A	ERR
13	FO transmitter		Port A
14	FO receiver		Port A
Port B only with PSI-MOS...T T-couplers			
15	LED	Port B	FO signal
16	LED	Port B	FO signal
17	LED	Port B	FO signal
18	LED	Port B	ERR
19	FO transmitter		Port B
20	FO receiver		Port B

8.4 Diagnostics and status indicators

LED	Color	Status	Meaning
VCC	Green	On	Transmission speed detected or set
		Flashing (1 Hz)	No valid transmission speed detected (autobaud setting)
TD	Yellow		Data is sent to the PROFIBUS interface (D-SUB 9).
RD	Green		Data is received at the PROFIBUS interface (D-SUB 9).

LED indicators of the FO interface

The quality of the path is determined using the incoming optical power P_{opt} and displayed using the LED bar graph.

In the default setting, DIP 6 is set to OFF (inverse). In the rest period between transmitting data (idle state), the transmitters switch to permanent light to enable continuous fiber-optic diagnostics.

LED		Receive signal	Optical power P_{opt}
FO signal	Green	Receiving power is very good	Significantly greater than system reserve
	Green	Receiving power is good	Still greater than system reserve
	Yellow	Receiving power is critical	P_{opt} has reached the system reserve.
ERR	Red	Receiving power is insufficient, broken fiber	P_{opt} has sapped the system reserve, broken fiber

As soon as the system reserve is reached, only the yellow LED remains lit. At the same time the alarm relay drops out and opens the switching output. Data communication is still possible.

To prevent any risk of data corruption, the affected FO port is already switched off when the LED goes to yellow in “Redundant ring” operating mode.

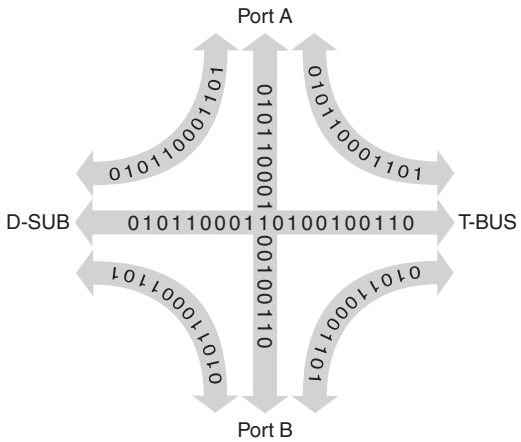
8.5 Interfaces

The devices have three or four interfaces for the PROFIBUS signal:

– Electrical interface (D-SUB)
– DIN rail bus connector
– FO port A
– FO port B (only with PSI-MOS...T T-couplers)

All interfaces communicate with one another with equal rights. If a signal is present at one of the interfaces, this signal is also available to all other interfaces.

Figure 10 Communication between the interfaces



9 Configuration

You only need to change the default settings in the following cases:

– Operation with fixed data rate (default setting: automatic data rate detection)
– Operation in a redundant ring
– Operation of a T-coupler with only one fiber-optic port, switch off fiber-optic port B
– Direct connection to fiber-optic interfaces from third-party suppliers
– Mixed operation of PSI-MOS with the old PSM-EG series. Usually, you must adjust the differing idle settings of the two series.
– Mixed operation of PSI-MOS with 8-pos. and 10-pos. DIP switches. Devices with 10-pos. DIP switches have been supplied since April 2006.

In all other cases, you can operate the devices using the default settings.

9.1 Setting the DIP switches

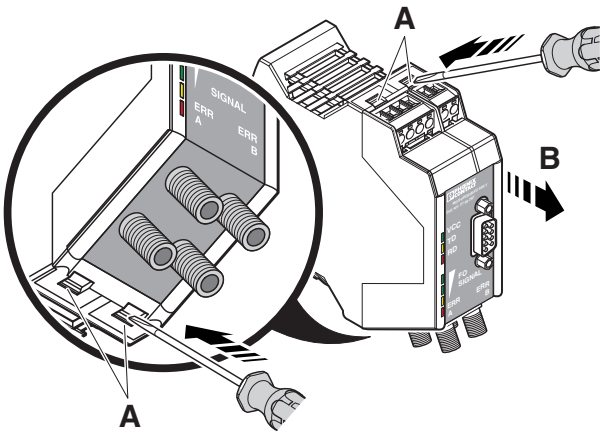
NOTE: Electrostatic discharge!

Electrostatic discharge can damage or destroy components.

– When handling the device, observe the necessary safety precautions against electrostatic discharge (ESD) in accordance with EN 61340-5-1 and IEC 61340-5-1.

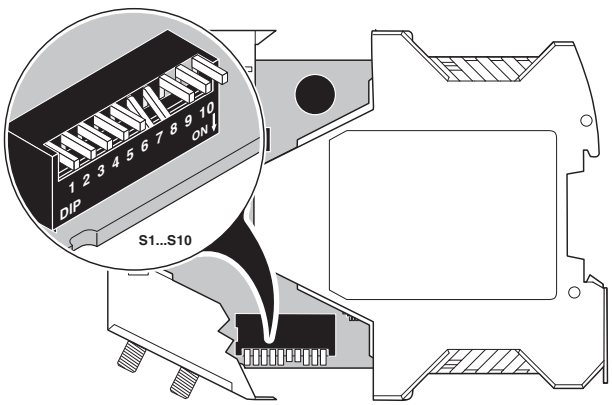
Only select the mode of operation when the power is disconnected! The change is activated after renewed power up.

Figure 11 Opening the housing



- Disengage the housing cover with a screwdriver (A).
- Carefully pull the PCB out of the housing as far as possible.

Figure 12 DIP switches



At delivery, all DIP switches are in the "OFF" position.

DIP	ON	OFF (default setting)
1	Data rate (see table below)	
2		
3		
4		
5	Mixed	-
6	Norm	Inverse
7*	Redundancy	-
8*	End	Next
9	Compatibility	-
10	Fiber Control	-

*No function for PSI-MOS...E termination devices

9.2 Setting the data rate (DIP 1...4)

The devices are equipped with automatic data rate detection. If necessary, you can specify a fixed data rate. This considerably decreases the initialization time.

- Set the transmission speed using the DIP switches.

ON = •	DIP 1	DIP 2	DIP 3	DIP 4
Data rate [kbps]				
Autobaud				
12000				•
6000			•	
3000			•	•
1500		•		
500		•		•
187.5		•	•	
93.75		•	•	•
45.45	•			
19.2	•			•
9.6	•		•	

9.3 Echo evaluation (DIP 5)

It is useful to use echo evaluation for the mixed operation of PSI-MOS and older series PSM-EG devices.

PSM-EG devices do not offer the permanent diagnostics provided by the PSI-MOS; they only have echo evaluation.

Additional information about the configuration of devices in mixed operation can be found in Section 9.9 Mixed operation of PSI-MOS and PSM-EG.

If you switch DIP 6 to ON (norm), the echo evaluation (DIP 5 = OFF) is available as diagnostics.

Echo evaluation (DIP 5 = OFF) is used to detect broken fibers for the devices. During the idle phase, the fiber optics between directly connected devices are monitored for broken fibers.

If there is a fiber break, the following occurs:

– The affected fiber is disabled.
– The Error LED is set.
– The switching output is activated.

If you switch the echo evaluation off (DIP 5 = ON), fiber-optic diagnostics are not available.

If the default setting for DIP 6 = OFF (inverse) is used, echo evaluation is switched off. The integrated diagnostics constantly evaluate the received signal and detect a broken fiber if one is present.

DIP 6		DIP 5		Meaning
OFF	Inverse	Any		Continuous fiber-optic diagnostics, broken fiber detection disabled
ON	Norm	OFF	-	Continuous fiber-optic diagnostics disabled, broken fiber detection active
		ON	Mixed	Continuous fiber-optic diagnostics and broken fiber detection disabled. Diagnostics are no longer available.

In a redundant ring (DIP 7 = ON), echo evaluation is always available, regardless of DIP 5 and 6.

You must always switch off the echo evaluation in the following cases:

– Operation with data rates more than 1.5 Mbps, since a broken fiber could be detected with long FO fibers and cable times.
– Direct connection to fiber-optic interfaces from third-party suppliers

9.4 Connection to fiber-optic interfaces from third-party suppliers (DIP 5, 6)

During the idle phase, fiber-optic interfaces return to an idle setting defined by the manufacturer.

This idle setting may vary for different manufacturers and devices. As fiber-optic interfaces can only be operated together if they have the same idle setting, this should be set in mixed operation with third-party devices using the DIP switches.

- Deactivate the echo evaluation. To do so, set DIP 5 to ON.
- Check the idle setting for the third-party interface:
  – Logic 1 = Light off
  – Logic 1 = Light on
- If necessary, adjust the idle setting of PSI-MOS using DIP 6:

DIP 6		Meaning
OFF	Inverse	Logic 1 = Light on
ON	Norm	Logic 1 = Light off

In the DIP 6 = OFF position, continuous measurement of the received optical power is available. The reception quality is displayed by means of a 4-level bar graph (FO signal). The echo evaluation is automatically shut off.

In the DIP 6 = ON position, continuous measurement of the received optical power is **not** available. The bar graph is switched off. If echo evaluation is also switched off (DIP 5 = ON), this broken fiber detection is not available either. In this setting, the PSI-MOS devices do not have any diagnostics of the fiber-optic path.

If DIP 6 =ON: The FO diagnostics are **not** available via the LED bar graph.

The LED bar graph can light up at high transmission speeds or flash at low transmission speeds. This display does **not** correspond to continuous evaluation of the optical power.

For mixed operation with devices of other manufacturers, observe the receiver sensitivity and overrange limits of the fiber-optic interfaces.

In the redundant ring, mixed operation of PSI-MOS with FO interfaces from other manufacturers is not permitted.

9.5 Redundancy (DIP 7, 9)

The redundancy function is only intended for use in the redundant ring network structure.

– For path structures (point-to-point, linear, star, etc.), switch off the redundancy function (DIP 7 = OFF).

When you activate the redundancy function, the corresponding FO port is switched off automatically as soon as the receive quality reaches “System reserve reached” (only the yellow and red LEDs are lit). This enables you to prevent any data corruption.

When the fiber-optic ports are switched off, the red ERR LED lights up on the affected port for both termination devices. In the redundant ring, data communication continues via the second fiber-optic port after the first fiber-optic port is switched off.

For path structures, activating the redundancy function results in the affected fiber-optic port being switched off in the event of a weak fiber-optic signal (yellow LED). This causes the subsequent part of the network to fail.

Extended redundancy management

To eliminate the ring length limits and the limited data rate of maximum 1.5 Mbps, an extended redundancy management has been integrated in PSI-MOS. The expanded redundancy management is only used for T-couplers. A redundant ring is not possible for termination devices.

The redundancy management solution is based on the parameterization of a non-existent device in STEP 7®.

The result is that the ring length is no longer limited.

To ensure compatibility with PSI-MOS devices that use the old redundancy management solution, DIP 9 (compatibility) has been added.

– Devices with 10-pos. switch series: extended redundancy management
– Devices with 8-pos. switch series: old redundancy management

- If you use both PSI-MOS series in a redundant ring, set DIP 7 and DIP 9 to ON.

ON = •	DIP 7	DIP 9
8-pos.	•	Not available
10-pos.	•	•

- Set the remaining DIP switches according to your application.

9.6 Activate extended redundancy management (DIP 7, 9)

If DIP 9 is left set to OFF and DIP 7 is set to ON, the following functions are available in the redundant ring:

– Increase maximum data rate from 1.5 Mbps to 12 Mbps
– No restrictions for ring length
– No restrictions for the number of devices

9.7 Switch off FO port B (DIP 8)

If you do not use port B with PSI-MOS...T T-couplers, you have to switch it off. Otherwise the red ERR LED will light up.

- Set DIP 8 to ON.

9.8 Fiber Control (DIP 10)

If you operate the devices in a redundant ring (DIP 7 = ON), DIP 10 is without function.

If you wish to interrupt the transmission of telegrams between two PSI-MOS devices in **both** directions of the fiber-optic path in the event of a failure of **one** optical fiber, activate the Fiber Control function.

- Set DIP 10 to ON.

If a fiber break is detected, the PSI-MOS device will switch the optical transmitter to permanent light. Telegrams will no longer be transmitted on any of the two optical fibers.

As soon as the received optical power is sufficient, the device automatically resends all telegrams received.

Activate this function on all PSI-MOS devices that are connected directly to each other via fiber-optic paths.

9.9 Mixed operation of PSI-MOS and PSM-EG

Mixed operation of PSI-MOS with the older PSM-EG series is generally possible. Observe the following notes:

Configuring

The settings for the DIP switches are dependent on the application.

- Set the same idle setting on all devices in the system.
- On PSI-MOS device with 10-pos. DIP switches: Switch DIP 9 to ON.

Diagnostics in mixed operation

In mixed operation, you must set the evaluation of the diagnostics with the DIP switches.

Usually, PSM-EG and PSI-MOS devices are only combined in the case of exchange or replacement. Therefore, the following is based on a given setting of the PSM-EG devices.

PSM-EG: DIP 6 = OFF

On PSM-EG devices, the idle setting is “light off”.

- In PSI-MOS, set DIP 6 to ON.

↪ The diagnostics are limited to the detection of broken fibers. The FO signal on the PSI-MOS devices is no longer available.

PSM-EG: DIP 6 = ON

On the PSM-EG, the idle setting is “light off”.

- In PSI-MOS, set DIP 6 to OFF.

PSM-EG: DIP 7 = ON

On PSM-EG, the broken fiber detection is activated.

- In PSI-MOS, set DIP 5 to OFF.

PSM-EG: DIP 7 = OFF

On PSM-EG, the broken fiber detection is deactivated.

- In PSI-MOS, set DIP 5 to ON.



If broken fiber detection is deactivated and the idle setting is defined as “Light off”, diagnostics are not available for the fiber-optic path.

Overload or underload of the fiber-optic interfaces

In rare cases, usually in the case of very short fiber-optic connections of just a few meters, the PSI-MOS devices may overload in mixed operation.

- To increase the attenuation of the path, use a patch cable with fiber-optic coupling.

Maximum ranges in mixed operation

Type of fiber	Wave length	Maximum range
Glass 50/125	850 nm	1600 m
Glass 62.5/125	850 nm	2200 m
PCF	Not permissible for PSM-EG	
POF	660 nm	70 m

9.10 Overview table of the DIP switches

• = ON X = any position						FO diagnostics	Switch off for FO ports	Echo evaluation	Limitations	Operating mode	Third-party connection, mixed operation
5	6	7	8	9	10						
X			X			Continuous	No	No	No	Line, star, tree	Third-party coupler without echo evaluation with “Light on” idle setting
			X	•		Continuous	No	Activated	Path length	Line, star, tree	Third-party coupler with echo evaluation and “Light on” idle setting
	•		X	X		No	No	Activated	Path length, depending on the transmission speed	Line, star, “light off” idle setting	-
•	•		X	X		No	No	No	No	Line, star, “light off” idle setting	Third-party coupler without echo evaluation with “Light off” idle setting
X	X	•				Continuous	Yes, at low receiving power	Cannot be switched off*	No	Redundancy standard operating mode, with fiber-optic diagnostics, path monitoring, and extended redundancy management	-
X	X	•		•		Continuous	No		Ring length		Mixed operation with PSI-MOS of different generations
X			X		•	Continuous	During a fiber break, telegrams will no longer be transmitted	No	No	Line, star, tree	-

If DIP 7 = ON and DIP 8 = OFF: automatic “Light on” idle setting and echo evaluation
If DIP 7 = ON and DIP 8 = ON (end): DIP 7 has no function

10 Installation

WARNING: Explosion hazard when used in potentially explosive areas

Only mount and remove devices when the power supply is disconnected.

CAUTION: Electric shock

The device is designed exclusively for operation with SELV/PELV from a Class ES1 “electrical energy source” in accordance with EN/IEC 62368-1 and VDE 0868-1.

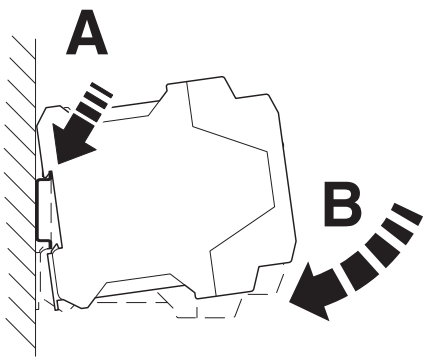
NOTE: Malfunction

Use a grounding terminal block to connect the DIN rail to protective earth ground. The devices are grounded when they are snapped onto the DIN rail (installation according to PELV).
This ensures that the shielding is effective. Connect protective earth ground with low impedance.

The product can be snapped onto all 35 mm DIN rails in accordance with EN/IEC 60715.

10.1 Mounting as single device

Figure 13 Mounting on a DIN rail

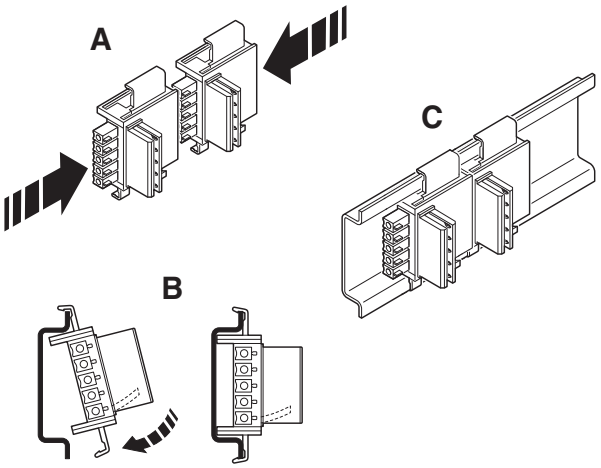


- To avoid contact resistance, only use clean, corrosion-free 35 mm DIN rails according to DIN EN 60715.
- Install an end bracket next to the left-hand device to prevent the devices from slipping.
- Place the device onto the DIN rail from above. Push the device from the front toward the mounting surface until it audibly engages.
- Snap the other devices that are to be contacted onto the DIN rail next to one another.

10.2 Combined mounting

In this case, it is vital to observe the mounting direction of the module and DIN rail connector: snap-on foot at the bottom and connector on the left!

Figure 14 Combined assembly



The DIN rail bus connector bridges the supply voltage and the communication.

Only connect the following devices together via the DIN rail connector:

– PSI-MOS-PROFIB...
– PSI-REP-PROFIBUS/12MB
– PSI-MODEM-SHDSL/ETH
– QUINT4-SYS-PS/1AC/24DC/2.5/SC, Item No. 2904614

The pin assignment may differ for other devices.

A joining station must not consist of more than ten devices.

- To form a joining station, connect the DIN rail connectors (item no. 2713645, 2 pieces per device) together.
- Push the connected DIN rail connectors into the DIN rail.
- Place the device onto the DIN rail from above. Push the device from the front toward the mounting surface until it audibly engages.

10.3 Installation in potentially explosive areas

WARNING: Explosion hazard when used in potentially explosive areas

Observe the safety notes in the 5 Safety regulations and installation notes section.

Areas with a danger of gas explosions

The devices are suitable for use in zone 2. Devices that are installed in zone 1 can be connected to the fiber optic interface. The fiber optic interface is an associated item of equipment with protection type [Ex op is].

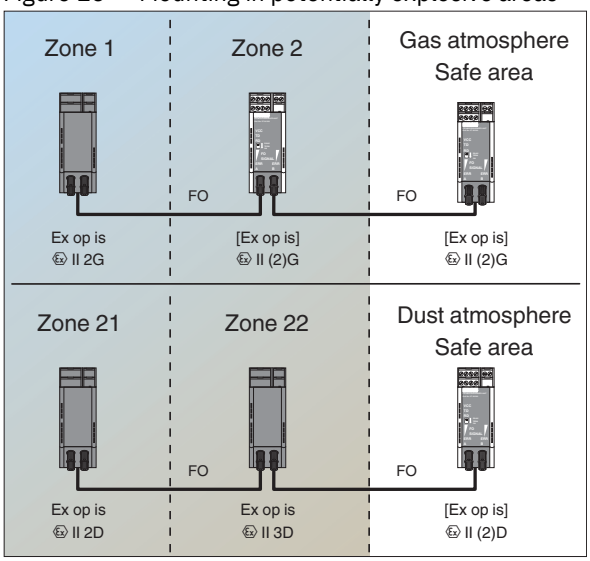
Areas with a danger of dust explosions

The device is not designed for use in potentially dust-explosive atmospheres.

If dust is present, install the device in suitable, approved housing.

When installed outside of areas with a danger of dust explosions, devices installed in zone 22 or 21 can also be connected to the fiber optic interface.

Figure 15 Mounting in potentially explosive areas



10.4 Removal

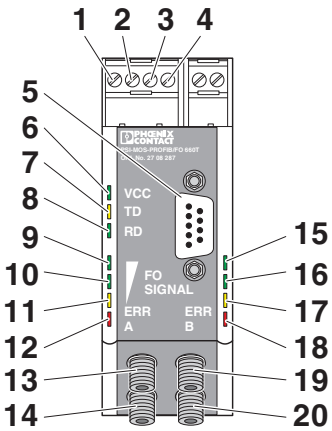
- Push down the locking tab with a screwdriver, needle-nose pliers or similar.
- Slightly pull the bottom edge of the device away from the mounting surface.
- Pull the device away from the DIN rail.
- When removing a complete joining station, also remove the DIN rail connectors.

10.5 Power supply voltage

CAUTION: Electric shock

The device is designed exclusively for operation with SELV/PELV from a Class ES1 “electrical energy source” in accordance with EN/IEC 62368-1 and VDE 0868-1.

Figure 16 Function elements



1 Supply voltage 24 V DC
2 0 V DC supply voltage

Single device

- Supply voltage to the device via terminal blocks **1** (24 V) and **2** (0 V).

Joining station

NOTE: device damage

The maximum current load in a joining station must not exceed 2 A.

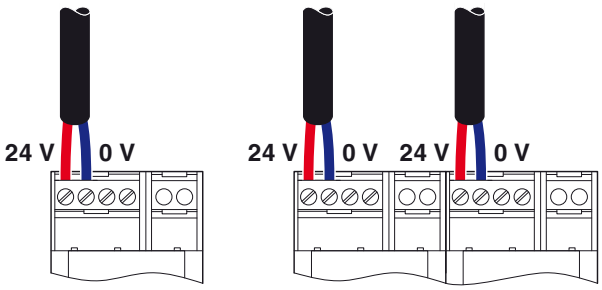
A joining station must not consist of more than ten devices.

If you operate the devices in a joining station, the supply voltage must only be supplied to the first device.

The remaining devices are supplied via the DIN rail connector.

A second power supply unit can be used to create a redundant supply concept.

Figure 17 Individual or redundant supply



System power supply

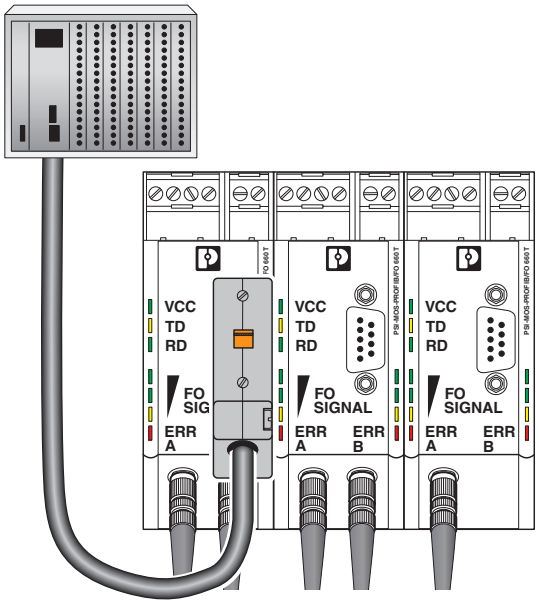
Alternatively, you can connect the joining station to a system power supply.

- Connect the system power supply with one DIN rail connector to the left of the joining station.
  - QUINT4-SYS-PS/1AC/24DC/2.5/SC, Item No. 2904614
  - DIN rail bus connector, Item No. 2713645

Refer to the user documentation for the power supply at www.phoenixcontact.com/product/2904614.

11 PROFIBUS interface

Figure 18 PROFIBUS interface



- Use a suitable plug connector (e.g., SUBCON-PLUS-PROFIB/SC2, Item No.: 2708232) for connecting to the D-SUB of the device.
- If the device is used at the beginning or the end of an electrical PROFIBUS segment, activate the termination in the connector plug.

NOTE: Malfunction

The maximum length of the RS-485 cables depends on the transmission speed. Do not exceed the following maximum values.

Data rate [kbps]	Range [m]
187.5	1000
500	400
1500	200
12000	100

Pin	Signal	Meaning
3	RxD / TxD-P	Receive/transmit data - positive, B cable
5	DGND	Data transmission potential (reference potential to VP)
6	VP	5 V auxiliary voltage output (P5V), max. 50 mA
8	RxD / TxD-N	Receive/transmit data – negative A cable

12 Fiber optic interface (FO port)

WARNING: Risk of eye injury

The light can cause damage to eyes.

– During operation, do not look directly into the transmitter diodes or use optical aids to look into the fiberglass. The infrared light is not visible.

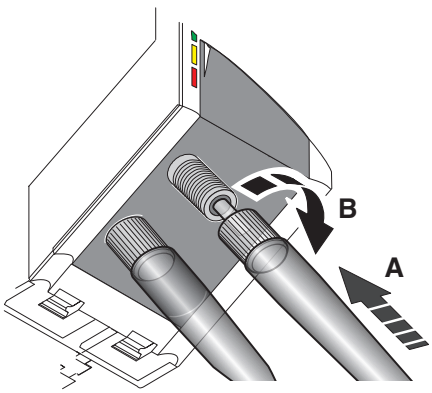
Avoid contamination.

– Do not remove the dust protection caps until just before the connectors are connected.

When using fiber optics, observe the fiber optic installation guidelines, DB GB IBS SYS FOC ASSEMBLY, Item No. 9423439.

F-SMA connection (PSI-MOS...660...)

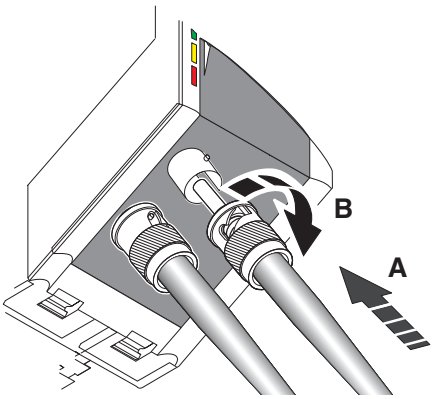
Figure 19 Connect F-SMA plug



- Insert the fiber optics cable into the F-SMA connector of the transmit and receive channel (A).
- Turn the union nut clockwise by hand to tighten (B).

B-FOC-(ST®) connection (PSI-MOS...850...)

Figure 20 Connect B-FOC (ST®) plug

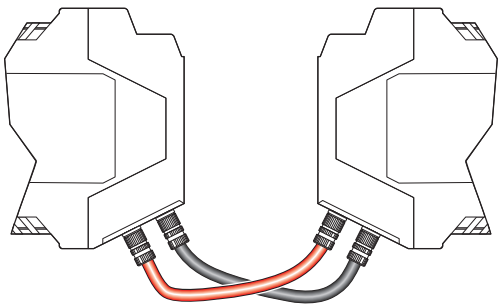


- Connect the FO cable to the B-FOC (ST®) connector for the transmit and receive channel. Push the connector spring mechanism downwards (A).
- Secure the connection with a quarter turn to the right (B).

Coupling devices

Due to the integrated optical diagnostics, there is no need to measure the path.

Figure 21 Crossed cables



When connecting two FO converters, note the signal direction of the fiber optics.

– Fiber connection “TD” (transmitter) at device 1

– Fiber connection “RD” (receiver) at device 2

Please note the transmit and receive channel crossover!

Never connect the PSI-MOS.../FO 660..., PSI-MOS.../FO 850... and PSI-MOS.../FO 1300... device types to each other via fiber optic cables! The device types have different operating wavelengths.

13 Switching output

NOTE: device damage

The maximum capacity of the relay contact is 60 V DC/42 V AC (peak), 0.46 A.

The device is equipped with a floating switching output for error diagnostics (terminals **3** (11) and **4** (12)).

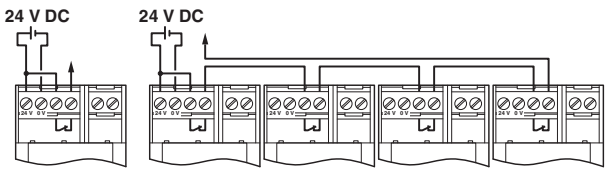
The switch contact opens on the relevant device in the event of the following:

– Supply voltage failure
– Interruption of the fiber optic interface detected
– System reserve of the fiber optic path not reached

The switching output is an N/C contact. It can be connected to a local digital input, e.g., on a PLC, for error detection.

When mounted in a topology, the individual switching outputs can be connected to separate input points or the individual contacts can be looped through to generate a group message.

Figure 22 Individual and group message



14 Configuration notes

Data cables and network components lead to signal delays. You must therefore adjust the network parameters using suitable configuration software, such as SIMATIC STEP 7®.

- Also take into account the maximum network expansion.

The following specifications aid you in the calculation of the required network parameters. These depend on the network structure and the PSI-MOS devices used.

The configuration of network parameters is described using a practical example with STEP 7® software.

The following data is required for configuration:

– Total number of PSI-MOS devices (referred to as "OLM" in STEP 7®)
– Total length of all fiber-optic cables

In the following section, you will find the configuration of devices with 10-pos. DIP switches. Then, the devices with 8-pos. DIP switches are described.

14.1 Devices with 10-pos. DIP switches

14.1.1 Line, star, tree

Use the following formula:

Tslot_Init = a + b x L + 2 x N

Tslot_Init =	Minimum slot time in bit periods
a, b =	Length parameter (see table)
L =	Network coverage in km
N =	Number of PSI-MOS devices

Data rate [kbps]	a		b
	DP	DP / FMS	
12000	811	811	120
6000	461	461	60
3000	261	261	30
1500	161	991	15
500	111	371	5
187.5	71	371	1.875
93.75	71	211	0.9375
45.45	411	411	0.4545
19.2	71	76	0.192
9.6	71	71	0.096

14.1.2 Redundant ring

Use the following formula:

Tslot_Init = a + b x L + 44 x N

Tslot_Init =	Minimum slot time in bit periods
a, b =	Length parameter (see table)
L =	Network coverage in km
N =	Number of PSI-MOS devices

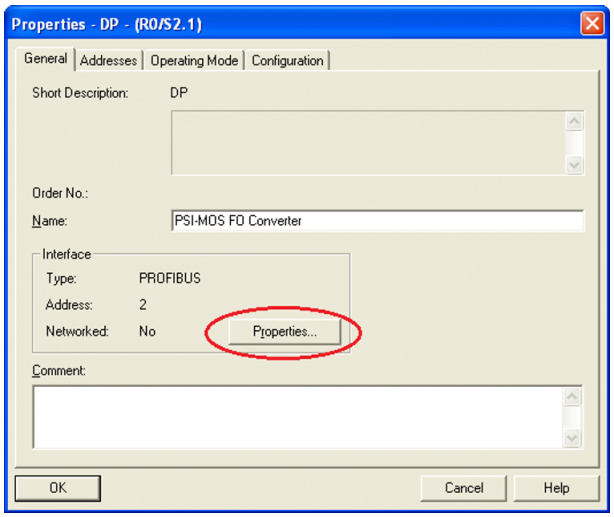
Data rate [kbps]	a		b
	DP	DP / FMS	
12000	1651	1651	240
6000	951	951	120
3000	551	551	60
1500	351	2011	30
500	251	771	10
187.5	171	771	3.75
93.75	171	451	1.875
45.45	851	851	0.909
19.2	171	181	0.384
9.6	171	171	0.192

Example

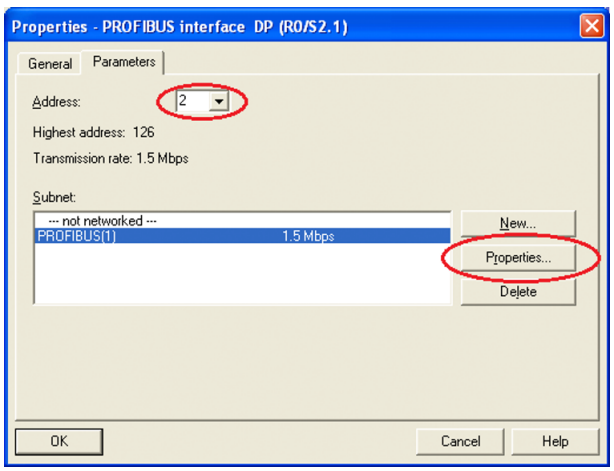
– PROFIBUS DP network with 1.5 Mbps
– Number of FO converters in the ring: 4
– Total length of all fiber-optic cables: 4 km

Configuring the network parameters

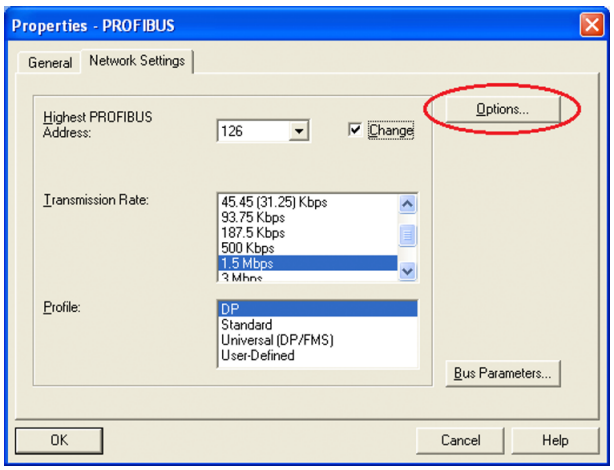
- Open the “Properties-DP” dialog box and click on “Properties”.



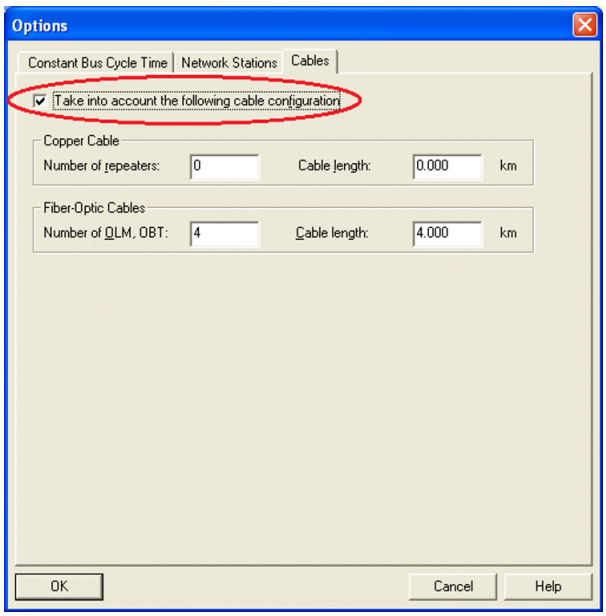
- Select a subnetwork and click on “Properties”.



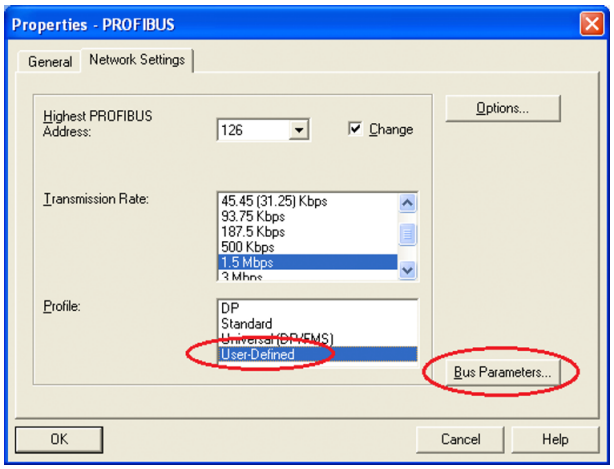
- Switch to the “Network Settings” tab.
- Increase the highest PROFIBUS address (HSA) by 1.
- Click on “Options”.



- Switch to the “Cables” tab.
- Activate the “Take into account the following cable configuration” checkbox.
- Enter the number of PSI-MOS devices (OLM) used.
- Enter the total length of all fiber-optic cables.
- Close all dialog boxes with “OK”.



- Switch to the “Network Settings” tab and activate the “User-Defined” profile.
- Click on “Bus Parameters”.



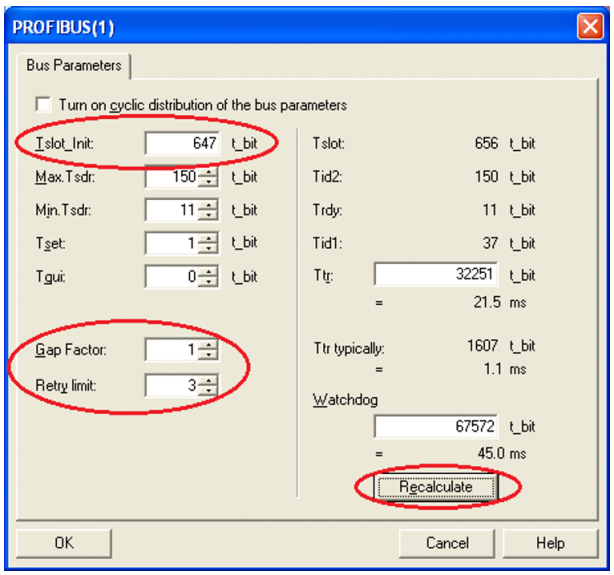
Example calculation

The calculation of the slot time only takes into account the optical network and the electrical connection of bus users over an RS-485 bus segment with a length of maximum 20 meters.

Longer RS-485 bus segments must also be included in the calculation. They are added to the total fiber-optic cable length.

Tslot_Init = a + b x L + 44 x N

Tslot_Init = 351 + 30 x 4 + 44 x 4 = 647



- Enter the calculated value “Tslot_init” and click on “Recalculate”.
- Change the “Gap Factor” to “1” and the “Retry Limit” to “3”.
- Confirm all dialog boxes with “OK” and load the parameterization to the controller.

Retry limit (number of repeated messages)

In a redundant ring, when an error is detected (e.g., fiber break), PSI-MOS devices require a switch-over time. During this time, no correct data transmission is possible.

- For error-free bridging, set the retry limit in the PROFIBUS controller to at least 3.

If a fiber-optic cable is interrupted during a message transmission, the message is destroyed. It can no longer be evaluated by the receiver. The PSI-MOS device detects the path fault that has occurred on the basis of missing telegrams.
Up to two telegrams in a row can be destroyed or not transmitted at all. Then, the redundancy controller detects the cable break. It then guarantees a return to stable message transmission.

14.2 Devices with 8-pos. DIP switches

The following configuration instructions are also valid for the mixed operation of PSI-MOS devices with 8- and 10-pos. DIP switches.

– In this case, set DIP 9 to ON (compatibility).

14.2.1 Line, star, tree

Use the following formula:

Tslot_Init = a + b x L + 2 x N

Tslot_Init =	Minimum slot time in bit periods
a, b =	Length parameter (see table)
L =	Network coverage in km
N =	Number of PSI-MOS devices

Data rate [kbps]	a		b
	DP	DP / FMS	
12000	811	811	120
6000	461	461	60
3000	261	261	30
1500	161	991	15
500	111	371	5
187.5	71	371	1.875
93.75	71	211	0.9375
45.45	411	411	0.4545
19.2	71	76	0.192
9.6	71	71	0.096

14.2.2 Redundant ring

Use the following formula:

Tslot_Init = a + b x L + 4 x N

Tslot_Init =	Minimum slot time in bit periods
a, b =	Length parameter (see table)
L =	Network coverage in km
N =	Number of PSI-MOS devices

Data rate [kbps]	a		b
	DP	DP / FMS	
1500	311	1971	30
500	211	731	10
187.5	131	731	3.75
93.75	131	411	1.875
45.45	811	811	0.909
19.2	131	141	0.384
9.6	131	131	0.192

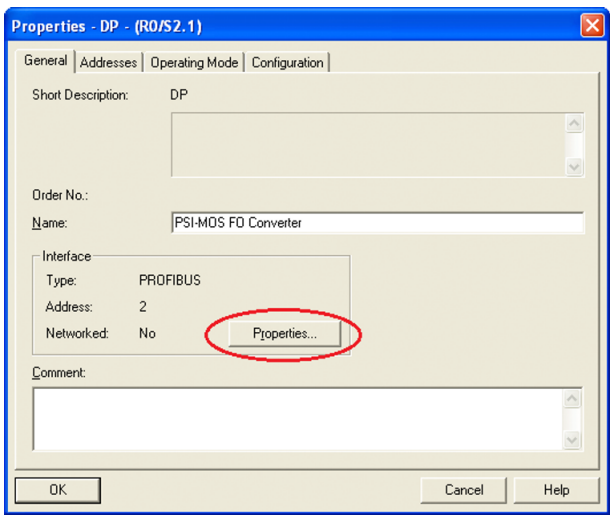
For PSI-MOS devices with an 8-pos. DIP switch, the maximum data rate in a redundant ring is 1.5 Mbps.

Example

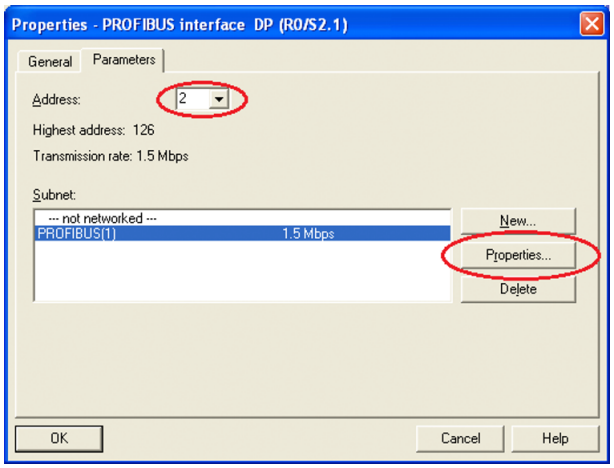
– PROFIBUS DP network with 1.5 Mbps
– Number of FO converters in the ring: 4
– Total length of all fiber-optic cables: 4 km

Configuring the network parameters

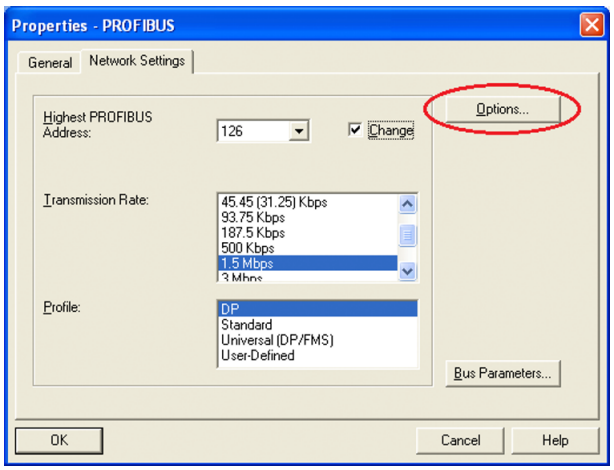
- Open the “Properties-DP” dialog box and click on “Properties”.



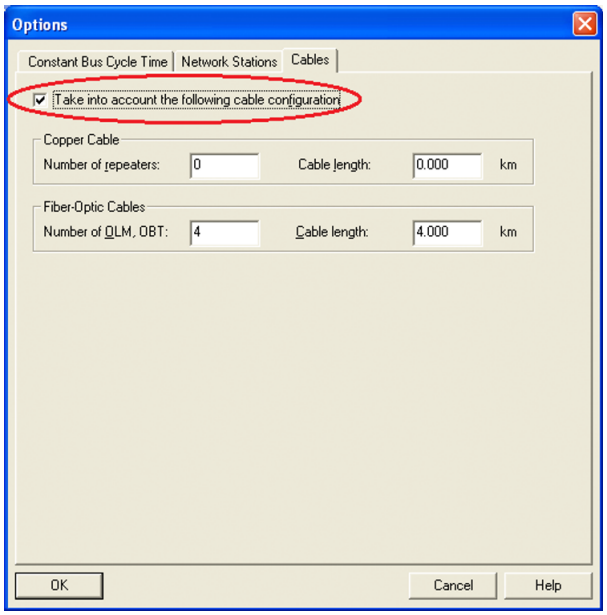
- Select a subnetwork and click on “Properties”.



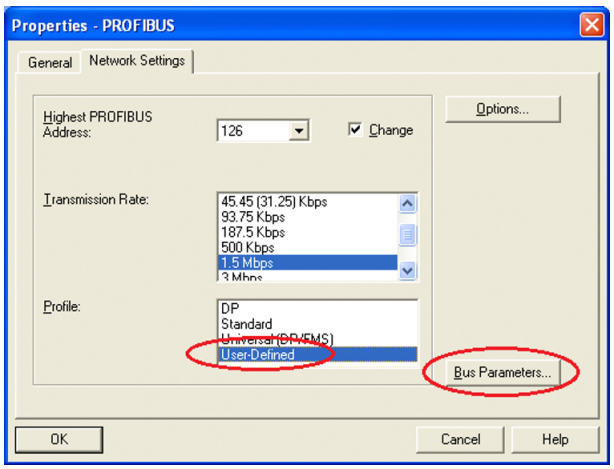
- Switch to the “Network Settings” tab and click on “Options”.



- Switch to the “Cables” tab.
- Activate the “Take into account the following cable configuration” checkbox.
- Enter the number of PSI-MOS devices (OLM) used.
- Enter the total length of all fiber-optic cables.
- Close all dialog boxes with “OK”.



- Switch to the “Network Settings” tab and activate the “User-Defined” profile.
- Click on “Bus Parameters”.



Example calculation

The calculation of the slot time only takes into account the optical network and the electrical connection of bus users over an RS-485 bus segment with a length of maximum 20 meters.

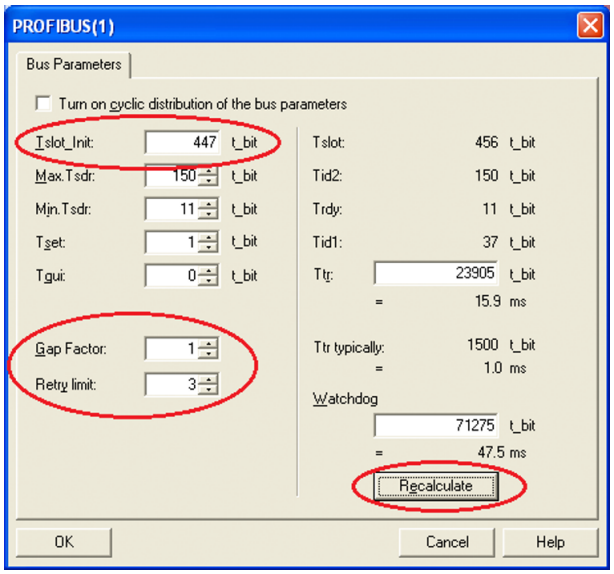
Longer RS-485 bus segments must also be included in the calculation. They are added to the total fiber-optic cable length.

When automatic data rate detection is activated, the maximum slot time (Tslot) of the PROFIBUS must be 100 ms.

- If the slot time is greater, you must set the data rate used on the devices.

Tslot_Init = a + b x L + 4 x N

Tslot_Init = 311 + 30 x 4 + 4 x 4 = 447



- Enter the calculated value “Tslot_init” and click on “Recalculate”.
- Change the “Gap Factor” to “1” and the “Retry Limit” to “3”.
- Confirm all dialog boxes with “OK” and load the parameterization to the controller.

Maximum ring length for devices with 8-pos. DIP switches

For all PSI-MOS devices with an 8-pos. DIP switch, there must be at least three devices in the redundant ring.

- For PSI-MOS devices with an 8-pos. DIP switch, please observe the ring lengths in the following table.
- For PSI-MOS devices with 10-pos. DIP switches, note the setting of DIP 9 (compatibility).
  - DIP 9 = OFF: No restrictions for ring length
  - DIP 9 = ON: The maximum ring lengths in the following table apply.

Number of PSI-MOS	Data rate [kbps]						
	9.6	19.2	45.45	93.75	187.5	500	1500
2	Not permitted						
3	9.9	9.9	9.9	9.9	9.9	9.9	5.2
4	13.2	13.2	13.2	13.2	13.2	13.2	5.07
6	19,8	19,8	19,8	19,8	19,8	**14.4**	4.8
8	26.4	26.4	26.4	26.4	26.4	13.6	4.53
10	33	33	33	33	33	12.8	4.27
12	39.6	39.6	39.6	39.6	32	12	4
14	46.2	46.2	46.2	46.2	29.87	11.2	3.73
16	52.8	52.8	52.8	52.8	27.73	10.4	3.47
18	59.4	59.4	59.4	51.2	25.6	9.6	3.2
20	66	66	66	46.93	23.47	8.8	2.93
22	72.6	72.6	72.6	42.67	21.33	8	2.67
24	79.2	79.2	79.2	38.4	19.2	7.2	2.4
26	85.8	85.8	70.41	34.13	17.07	6.4	2.13
28	92.4	92.4	61.61	29.87	14.93	5.6	1.87
30	99	99	52.81	25.6	12.8	4.8	1.6
32	105.6	104.17	44	21.33	10.67	4	1.33

Length information = maximum ring length in kilometers

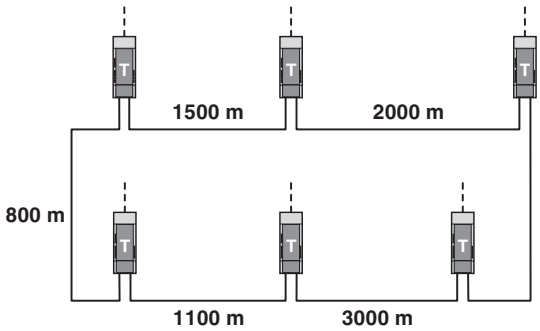
Example

– Number of FO converters in the ring: 6
– Data rate: 500 Kbps
– Permitted total length according to table: **14.4 km**
– Installed total length FO: 9.98 km ✓
– PSI-MOS devices with 8-pos. DIP switches

Required slot time

Tslot_Init = 211 + 10 x 9.98 + 4 x 6 = **335 Bit**

Figure 23 Example of a ring installation



15 Disposal

The symbol with the crossed-out trash can indicates that this item must be collected and disposed of separately. Phoenix Contact or our service partners will take the item back for free disposal. For information on the available disposal options, visit www.phoenixcontact.com.