PSI-MOS-PROFIB/FO 1300...

FO converter for PROFIBUS up to 12 Mbps

Data sheet
103240_en_06

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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.

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.

You can combine devices with the different transmission technologies polymer, PCF, and fiberglass freely within a joining station.

Possible distances:

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

Features

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

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/2708559

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3 Ordering data

Description	Type	Item no.	Pcs./Pkt.
Fiber optic converter with integrated optical diagnostics, alarm contact, for PROFIBUS up to 12 Mbps, termination device with one fiber optic interface (SC-Duplex), 1300 nm, for fiberglass cable	PSI-MOS-PROFIB/FO1300 E	2708559	1
Fiber optic converter with integrated optical diagnostics, alarm contact, for PROFIBUS up to 12 Mbps, T-coupler with two fiber optic interfaces (SC-Duplex), 1300 nm, for fiberglass cable	PSI-MOS-PROFIB/FO1300 T	2708892	1

Accessories	Type	Item no.	Pcs./Pkt.
Multi-mode OM2 duplex jumper, LC-SC, UPC polishing, length 1 m	FOC-LC:PA-SC:PA-OM2:D01/1	1115607	1
Multi-mode OM2 duplex jumper, LC-SC, UPC polishing, length 2 m	FOC-LC:PA-SC:PA-OM2:D01/2	1115605	1
Multi-mode OM2 duplex jumper, SC-SC, UPC polishing, length 1 m	FOC-SC:PA-SC:PA-OM2:D01/1	1115536	1
Multi-mode OM2 duplex jumper, SC-SC, UPC polishing, length 2 m	FOC-SC:PA-SC:PA-OM2:D01/2	1115535	1
Multi-mode OM2 duplex jumper, ST-SC, UPC polishing, length 1 m	FOC-ST:PA-SC:PA-OM2:D01/1	1115574	1
Multi-mode OM2 duplex jumper, ST-SC, UPC polishing, length 2 m	FOC-ST:PA-SC:PA-OM2:D01/2	1115573	1
Multi-mode OM4 duplex jumper, LC-SC, UPC polishing, length 1 m	FOC-LC:PA-SC:PA-OM4:D01/1	1115601	1
Multi-mode OM4 duplex jumper, LC-SC, UPC polishing, length 2 m	FOC-LC:PA-SC:PA-OM4:D01/2	1115600	1
Multi-mode OM4 duplex jumper, SC-SC, UPC polishing, length 1 m	FOC-SC:PA-SC:PA-OM4:D01/1	1115424	1
Multi-mode OM4 duplex jumper, SC-SC, UPC polishing, length 2 m	FOC-SC:PA-SC:PA-OM4:D01/2	1115423	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 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: 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
Single-mode OS2 duplex jumper, SC-SC, UPC polishing, length 1 m	FOC-SC:PA-SC:PA-OS2:D01/1	1115550	1

Accessories	Type	Item no.	Pcs./Pkt.
Single-mode OS2 duplex jumper, SC-SC, UPC polishing, length 2 m	FOC-SC:PA-SC:PA-OS2:D01/2	1115548	1
Single-mode OS2 duplex jumper, ST-SC, UPC polishing, length 1 m	FOC-ST:PA-SC:PA-OS2:D01/1	1115582	1
Single-mode OS2 duplex jumper, ST-SC, UPC polishing, length 2 m	FOC-ST:PA-SC:PA-OS2:D01/2	1115581	1
Single-mode OS2 duplex jumper, LC-SC, UPC polishing, length 1 m	FOC-LC:PA-SC:PA-OS2:D01/1	1115618	1
Single-mode OS2 duplex jumper, LC-SC, UPC polishing, length 2 m	FOC-LC:PA-SC:PA-OS2:D01/2	1115617	1
Robust GOF installation cable for assembly (IP20 heads only) for installation in stationary systems and machines, aramid strain-relief elements, with individual elements made from FRNC material, halogen-free, ozone and UV resistant, with a polyurethane (PUR) outer sheath	FOC-GDM-RUGGED-1016/IP20/...	2901558	1
Highly rugged GOF round cable (IP20 heads only) for assembly and for outdoor installation with integrated moisture barrier as well as rodent-proof scrim. Individual elements made from highly flexible FRNC material. The wire is ozone and UV resistant with a very rugged polyethylene outer sheath.	FOC-GDO-1017/IP20/...	2901559	1
Fiberglass cable, duplex 50/125 µm, by the meter, without connector, for outdoor installation	PSM-LWL-GDO- 50/125	2799432	1
Fiber glass cable, duplex 50 µm/125 µm, by the meter, without male connector, for installation in stationary systems and machines	PSM-LWL-GDM-RUGGED-50/125	2799322	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

Accessories	Type	Item no.	Pcs./Pkt.
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
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
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

4 Technical data

Supply	PSI-MOS-PROFIB/FO1300 E	PSI-MOS-PROFIB/FO1300 T
Supply voltage range	18 V DC ... 32 V DC (via pluggable COMBICON screw terminal block)	18 V DC ... 32 V DC (via pluggable COMBICON screw terminal block)
Nominal supply voltage	24 V DC (in acc. with UL)	24 V DC (in acc. with UL)
Typical current consumption	55 mA (24 V DC)	85 mA (24 V DC)
Max. current consumption	90 mA	145 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 DC ±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	
Transmission protocol	Protocol-transparent to the RS-485 interface
Connection method	SC duplex
Wavelength	1300 nm
Transmission length incl. 3 dB system reserve	
With F-G 50/125 0.7 dB/km at 1300 nm	25 km
with F-G 62.5/125 0.8 dB/km at 1300 nm	22 km
With F-E 9/125 0,4 dB/km at 1300 nm	45 km
Transmit capacity, minimum	
50/125 µm, multimode fiberglass	-3.4 dBm
62.5/125 µm, multimode fiberglass	-4.7 dBm
9/125 µm, singlemode fiberglass	-5.5 dBm
Minimum receiver sensitivity	
Multi mode	-25.5 dBm
Singlemode	-26.5 dBm
Overrange receiver	
	0 dBm

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 105 mm x 106 mm
Material	
Housing	PA 6.6-FR
Color	
Housing	gray (7042)
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 acc. 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/FO1300 E	PSI-MOS-PROFIB/FO1300 T
SN 29500 standard, temperature 25°C, operating cycle 21%	849 Years	614 Years
SN 29500 standard, temperature 40°C, operating cycle 34.25%	392 Years	272 Years
SN 29500 standard, temperature 40°C, operating cycle 100%	163 Years	113 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	II 3 G Ex ec IIC T4 Gc UL 21 ATEX 2550X Please follow the special installation instructions in the documentation!
IECEx	Ex ec IIC T4 Gc IECEx ULD 21.00013X
UL, USA/Canada	Class I, Zone 2, AEx ec IIC T4 Gc Ex ec IIC T4 Gc X Class I, Div. 2, Groups A, B, C, D
Corrosive gas test	ISA-S71.04-1985 G3 Harsh Group A

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 category 3 product is designed for installation in zone 2 potentially explosive areas. It satisfies the requirements of the following standards:
  - EN/IEC 60079-0, EN/IEC 60079-7
  - 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 Ex Zone 2 and the conditions at the installation location may be connected to the circuits in Zone 2.
- 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.

IND. CONT. EQ. ALSO
LISTED PROC. CONT. EQ.
FOR HAZ. LOC. E238705/E199827
In: 24 V DC ⎓ max. 2 A
Out: 30 V AC / 60 V DC, 0.46 A
-20°C ≤ Ta ≤ +60°C
Cl. I, Zn. 2, AEx ec IIC T4 Gc
Ex ec IIC T4 Gc X
Cl. I, Div. 2, Grps. A, B, C, and D

A) THIS EQUIPMENT IS SUITABLE FOR USE IN CLASS I, ZONE 2, AEx ec IIC T4 Gc; Ex ec IIC T4 Gc X OR NON-HAZARDOUS LOCATIONS ONLY.

B) WARNING - EXPLOSION HAZARD - DO NOT DISCONNECT EQUIPMENT UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NON-HAZARDOUS.

C) The equipment shall be installed in a tool removable enclosure that provides a minimum ingress protection of IP54 in accordance with UL 60079-0 and CSA 60079-0.

D) The equipment shall only be used in an area of at least pollution degree 2, as defined in IEC 60664-1.

E) Transient protection shall be provided that is set at a level not exceeding 140 % of the peak rated voltage value at the supply terminals to the equipment.

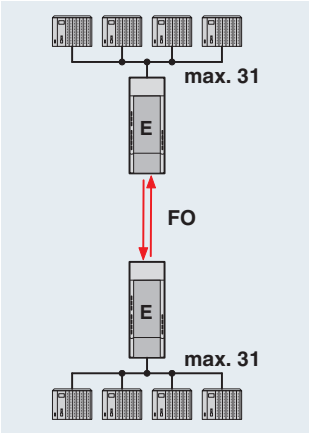
Use conductors suitable for minimum 84°C.
Strip off length: 7 mm, only one wire per terminal

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**)

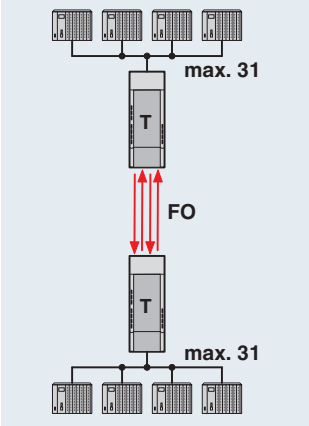
Figure 1 Point-to-point connection



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

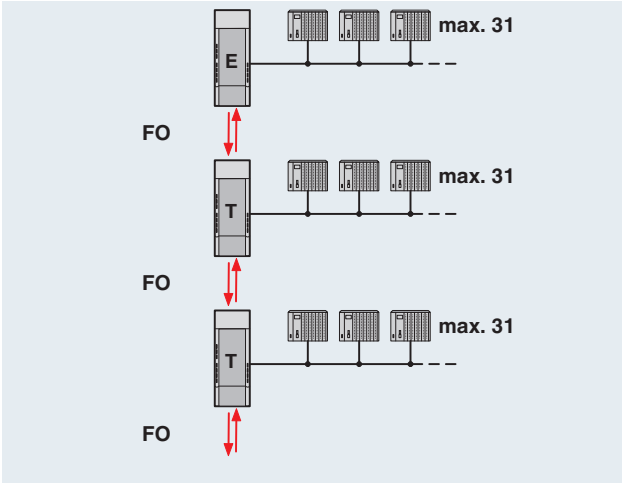
Redundancy

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.

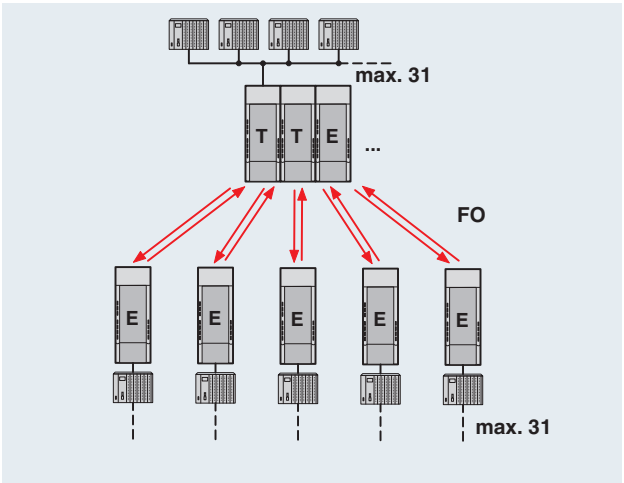
Figure 3 Line structure



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.

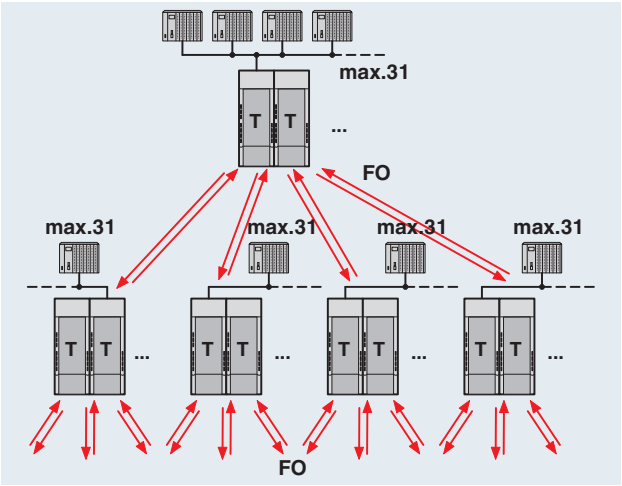
Figure 4 Star structure



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.

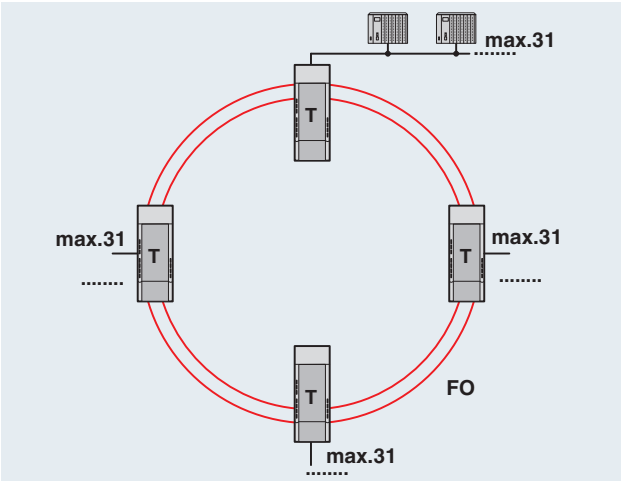
Figure 5 Tree structure



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

PSI-MOS-PROFIB/FO 660...

Designation	Item No.	Device type	Wave length	Type of fiber	Connection
PSI-MOS-PROFIB/FO 660 E	2708290	End device	660 nm	Polymer, PCF	FSMA
PSI-MOS-PROFIB/FO 660 T	2708287	T-coupler			

Possible distances:
– 70 m using polymer fiber cables
– 400 m using PCF fibers

PSI-MOS-PROFIB/FO 850...

Designation	Item No.	Device type	Wave length	Type of fiber	Connection
PSI-MOS-PROFIB/FO 850 E	2708274	End device	850 nm	Fiberglass, PCF	B-FOC (ST®)
PSI-MOS-PROFIB/FO 850 T	2708261	T-coupler			

Possible distances:
– 800 m using PCF fibers
– 3300 m using multimode fiberglass cables

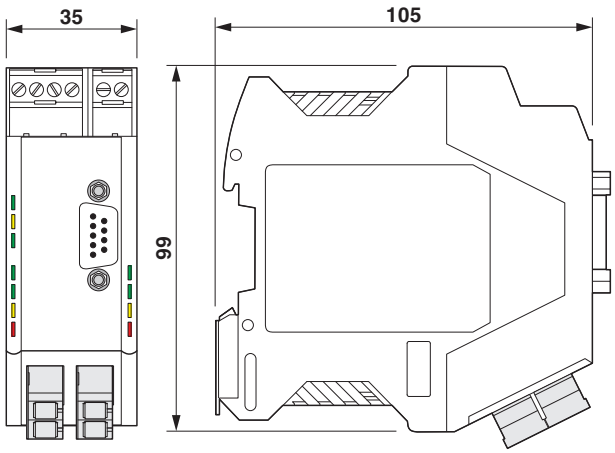
7 Transport and unpacking

- 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

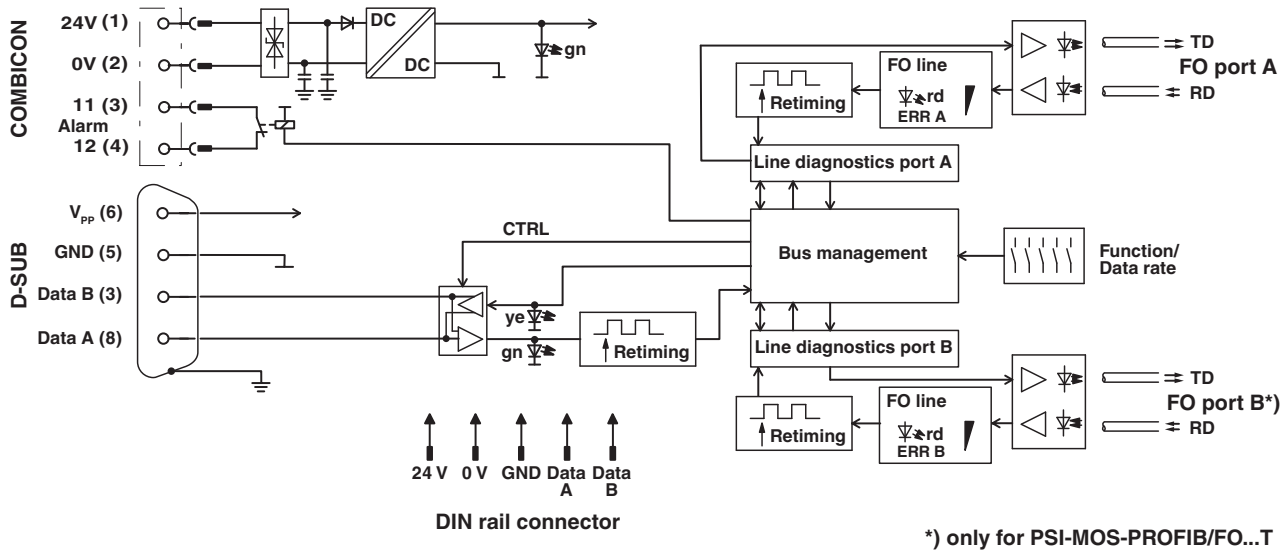
8.1 Dimensions

Figure 7 Housing dimensions



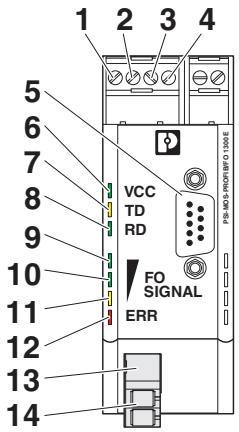
8.2 Basic circuit diagram

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



8.3 Function elements

Figure 9 Function elements



1	24 V DC supply voltage		
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.

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 Idle setting

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, you must take this into account in mixed operation with third-party devices.

For PSI-MOS, the idle setting is specified as “Light on” (corresponds to “Logic 1”).

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

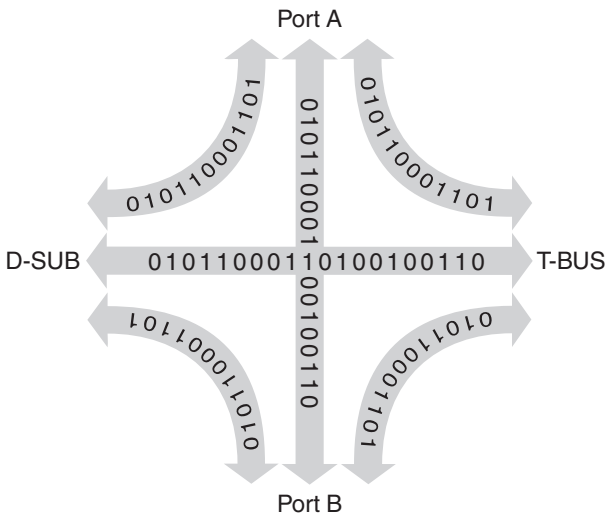
8.6 Interfaces

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

– Electrical interface (D-SUB)
– DIN rail 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
– Adjustment of the transmission power for operating with multimode fiberglass

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

9.1 Setting the DIP switches

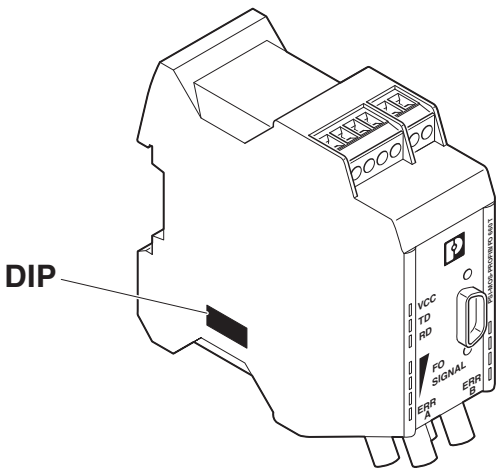
NOTE: Electrostatic discharge!

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 Position of 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	n. c.	n. c.
6	n. c.	n. c.
7*	Redundancy	-
8*	End	Next
9	Fiber Control	-
10	Multimode	Singlemode

*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.

NOTE: Malfunction

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

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

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 Redundancy (DIP 7)

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.

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

This means that there are no restrictions regarding the ring length, the number of devices, and the maximum data rate.

9.4 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.

9.5 Fiber Control (DIP 9)

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 9 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.

9.6 Adjust transmission power (DIP 10)

The transmission power can be adjusted for operation on multimode fiberglass cables. If you are not sure which type of fiberglass is used in your project, contact your cable supplier.

– DIP 10 = ON: multimode fiberglass cable, 50/125 µm or 62.5/125 µm

– DIP 10 = OFF: singlemode fiberglass cable, 9/125 µm (default setting)

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.

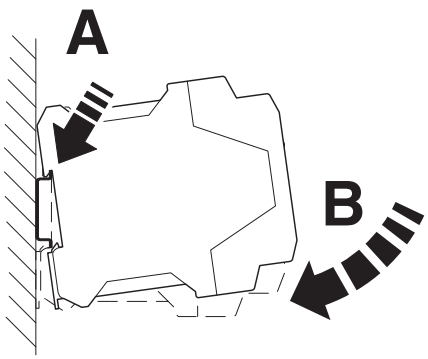
NOTE: Malfunction

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 12 Mounting on a DIN rail

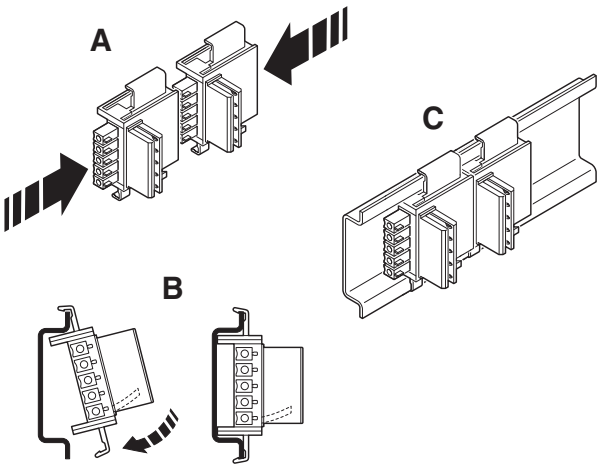


- To avoid contact resistance, only use clean, corrosion-free 35 mm DIN rails according to DIN EN 60715.
- Install an end bracket next to the left-hand device to prevent the devices from slipping.
- Place the device onto the DIN rail from above. Push the device from the front toward the mounting surface 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 13 Combined assembly



The DIN rail 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.

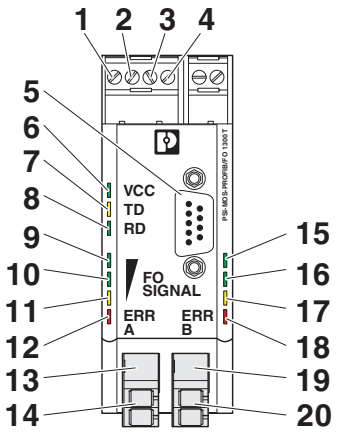
10.3 Removal

- 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.

10.4 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.



1 24 V DC supply voltage

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.

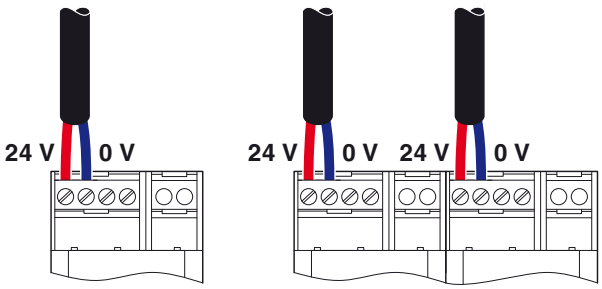
A joining station must not consist of more than ten devices.

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 14 Individual or redundant supply



System power supply

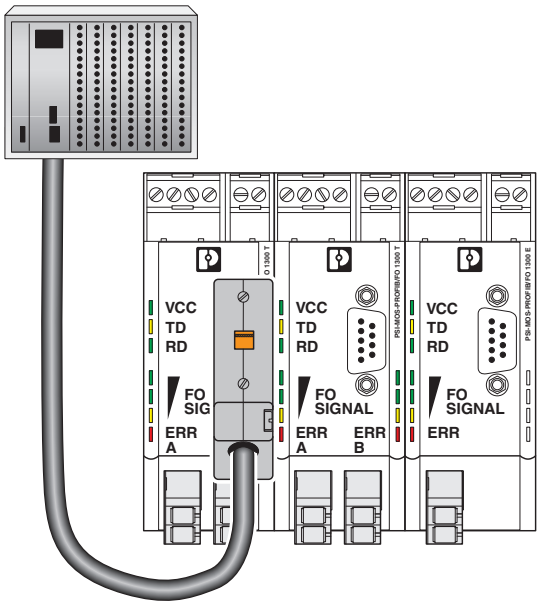
Alternatively, you can connect the joining station to a system power supply.

- 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 connector, Item No. 2713645

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

11 PROFIBUS interface

Figure 15 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 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)).

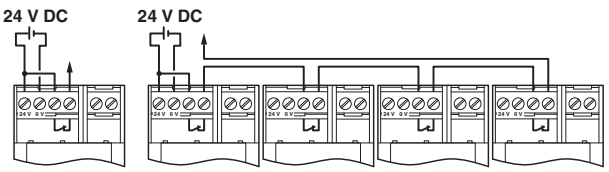
The switch contact opens on the relevant device in the event of the following:

– 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 16 Individual and group message



13 Fiber optic interface (FO port)

WARNING: Risk of eye injury

The light can cause damage to eyes.

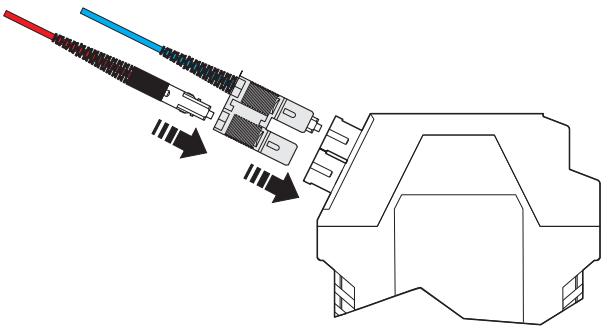
– During operation, do not look directly into the transmitter diodes or use optical aids to look into the fiberglass. The infrared light is not visible.

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.

Figure 17 Connect SC duplex plug

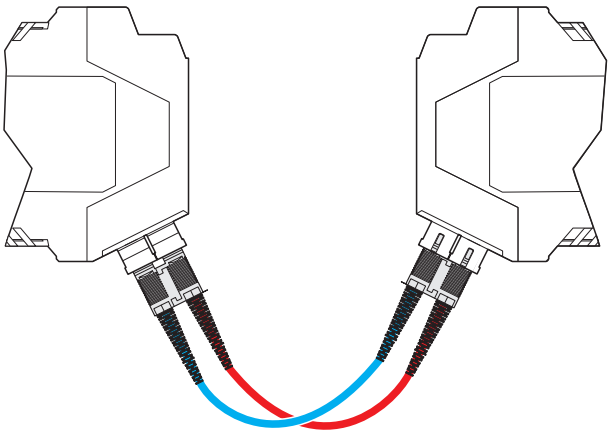


- Remove the dust protection cap.
- Plug the SC duplex plug into the corresponding socket until the I/O plug snaps in with a click.

Coupling devices

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

Figure 18 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.

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

14.1 Configuring the network parameters

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

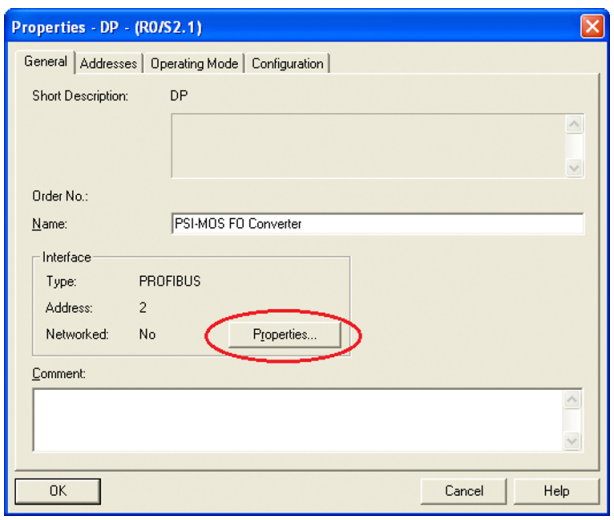
Tslot_Init =	Minimum slot time in bit periods
a, b =	Length parameter (see table)
L =	Network coverage in km
N =	Number of PSI-MOS devices

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

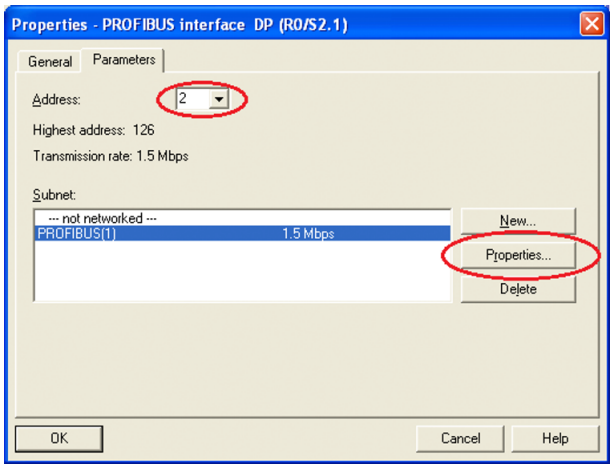
Example

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

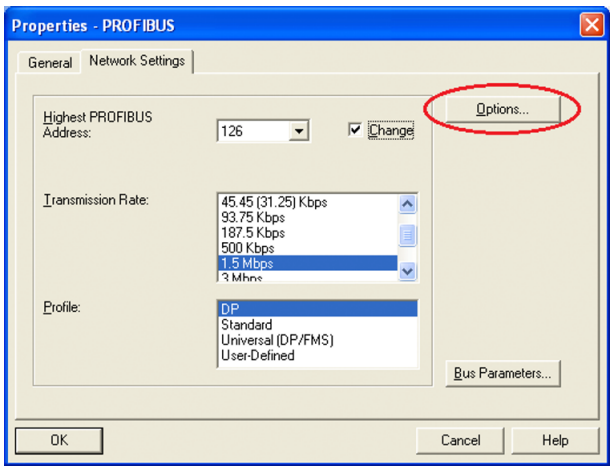
- Open the “Properties-DP” dialog box and click on “Properties”.



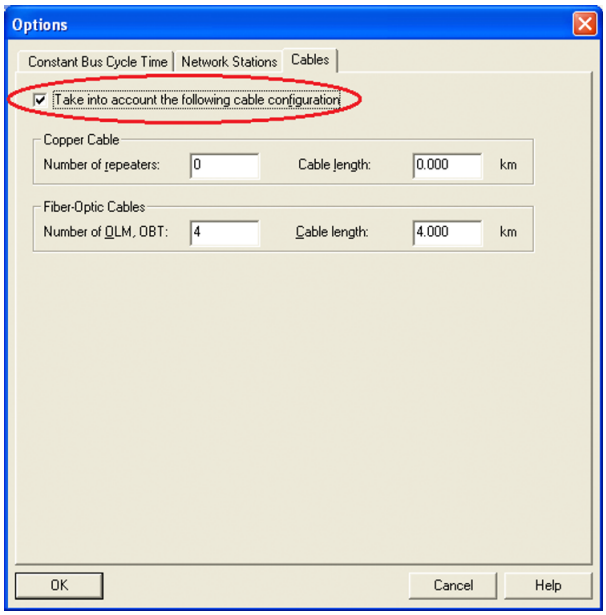
- Select a subnetwork and click on “Properties”.



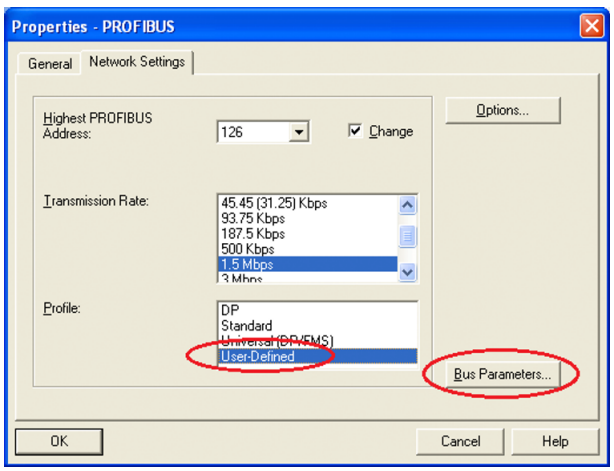
- Switch to the “Network Settings” tab.
- Increase the highest PROFIBUS address (HSA) by 1.
- Click on “Options”.



- 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”.



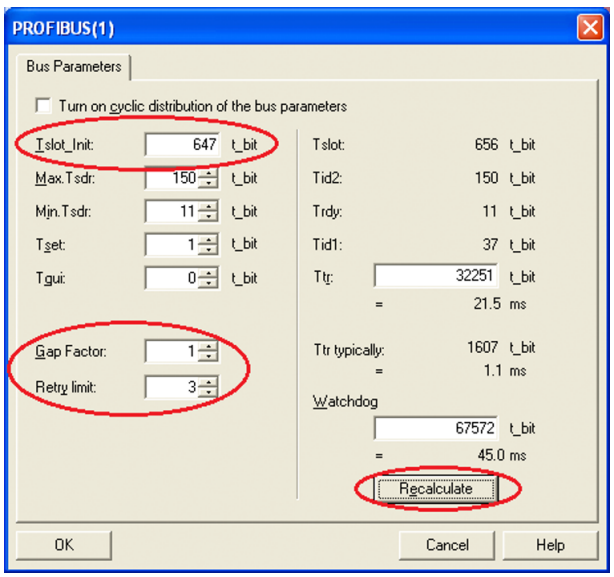
Example calculation

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.

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.