PSI-MOS-DNET/FO 850 E



FO converter for CAN-based systems (termination device)

Data sheet
105584_en_10

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1 Description

The **PSI-MOS-DNET/FO 850 E** FO converter enables the conversion from CAN-based systems to fiber optics. The device supports the DeviceNet™ and CANopen® protocols.

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-DNET/FO 850 E** termination device is ideal for point-to-point connections. In conjunction with the **PSI-MOS-DNET/FO 850 T** T-coupler, branch lines and star and tree structures can be established.

Features

- Data rates of up to 1 Mbps
- Supply voltage and data signals routed through the DIN rail connectors
- Can be combined with PSI-MOS FO converters in a modular way thanks to DIN rail connectors
- Automatic data rate detection or fixed data rate setting via DIP switches
- Integrated optical diagnostics for continuous monitoring of FO paths
- High-quality electrical isolation between all interfaces (DeviceNet // fiber optic ports // power supply // DIN rail connector)
- Connections can be plugged in via a COMBICON screw terminal block
- Redundant power supply possible by means of optional system power supply unit
- Floating switch contact for advance warning of critical FO paths
- Cascadable star and tree structures can be created using bit retiming.

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/2313999

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3 Ordering data

Description	Type	Item no.	Pcs./Pkt.
Fiber optic converter with integrated optical diagnostics, for DeviceNet™, CAN, CANopen® up to 1000 kbps, termination device, interfaces: 1 x CAN, 1 x Alarm, 1 x FO (B-FOC), 850 nm, for PCF/fiberglass (multi-mode)	PSI-MOS-DNET/FO 850 E	2313999	1

Accessories	Type	Item no.	Pcs./Pkt.
Fiber optic converter with integrated optical diagnostics, for DeviceNet™, CAN, CANopen® up to 1000 kbps, T-coupler, interfaces: 1 x CAN, 1 x Alarm, 2 x FO (B-FOC), 850 nm, for PCF/fiberglass (multi-mode)	PSI-MOS-DNET/FO 850 T	2313986	1
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
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
Fiberglass cable, duplex 50/125 µm, by the meter, without connector, for outdoor installation	PSM-LWL-GDO- 50/125	2799432	1
HCS assembly kit for B-FOC(ST) quick mounting connectors, including stripping blade, stripping pliers, aramide yarn scissors, fiber stripper, microscope, fiber cleaving tool for standard HCS and HCS GI fibers, four B-FOC(ST) connectors for standard HCS fiber, and documentation	PSM-HCS-KONFTOOL/B-FOC	2708465	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
FO coupling, degree of protection: IP20, number of positions: 1, material: Metal, connection method: Coupling, cable outlet: straight, color: silver/matt, Ethernet	FOC-ADAPTER:ST/ST-MM	1208099	2
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
FO connectors, degree of protection: IP20, number of positions: 4, MM, material: Metal, connection method: Cable connection, cable outlet: straight	PSM-SET-B-FOC/4-HCS	2708481	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 for DIN rail mounting. Universal for TBUS housing. Gold-plated contacts, 5-pos.	ME 17,5 TBUS 1,5/ 5-ST-3,81 GN	2709561	10

Accessories	Type	Item no.	Pcs./Pkt.
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
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 OM2 duplex jumper, ST-ST, UPC polishing, length 1 m	FOC-ST:PA-ST:PA-OM2:D01/1	1115560	1
Multi-mode OM2 duplex jumper, ST-ST, UPC polishing, length 2 m	FOC-ST:PA-ST:PA-OM2:D01/2	1115557	1
Multi-mode OM2 duplex jumper, LC-ST, UPC polishing, length 1 m	FOC-LC:PA-ST:PA-OM2:D01/1	1115588	1
Multi-mode OM2 duplex jumper, LC-ST, UPC polishing, length 2 m	FOC-LC:PA-ST:PA-OM2:D01/2	1115587	1
Multi-mode OM1 duplex jumper, LC-ST, UPC polishing, length 1 m	FOC-LC:PA-ST:PA-OM1:D01/1	1146499	1
Multi-mode OM1 duplex jumper, LC-ST, UPC polishing, length 2 m	FOC-LC:PA-ST:PA-OM1:D01/2	1146508	1
Multi-mode OM1 duplex jumper, ST-ST, UPC polishing, length 1 m	FOC-ST:PA-ST:PA-OM1:D01/1	1146501	1
Multi-mode OM1 duplex jumper, ST-ST, UPC polishing, length 2 m	FOC-ST:PA-ST:PA-OM1:D01/2	1146509	1
By the meter, Bus system cable, CANopen®, DeviceNet™, shielded, PUR halogen-free, red lilac RAL 4001, 4-wire (2xAWG24/19+2xAWG22/19), color single wire: red-black, blue-white, cable length: Free entry (0.5 ... 400 m)	SAC-5P-920/...	1511504	1
D-SUB connector, 9-pos., socket, with Pg-D-SUB pin, assignment: 2, 3, 5, 7; 9; two M12 cable entries (A-coded) under 90°. Bus system: CAN, CANopen®. Termination resistor via separate M12 terminator.	SUBCON-PLUS-CAN/90/PG/M12	2902322	1
D-SUB connector, 9-pos., socket, assignment: 2, 3, 5, 7, 9; two M12 cable entries (A-coded) under 90°. Bus system: CAN, CANopen®. Termination resistor via separate M12 terminator.	SUBCON-PLUS-CAN/90/M12	2902323	1
D-SUB connector, 9-pos., socket, with Pg-D-SUB pin, assignment: 2, 3, 5, 7; 9; two M12 cable entries (A-coded) under 35°. Bus system: CAN, CANopen®. Termination resistor via separate M12 terminator.	SUBCON-PLUS-CAN/35/PG/M12	2902324	1
D-SUB connector, 9-pos., socket, assignment: 2, 3, 5, 7, 9; two M12 cable entries (A-coded) under 35°. Bus system: CAN, CANopen®. Termination resistor via separate M12 terminator.	SUBCON-PLUS-CAN/35/M12	2902325	1

Accessories	Type	Item no.	Pcs./Pkt.
D-SUB connector, 9-pos. socket, assignment: 2, 3, 5, 7, 9; two M12 cable entries (A-coded), axial. Bus system: CAN, CANopen®. Termination resistor via separate M12 terminator.	SUBCON-PLUS-CAN/AX/M12	2902326	1
D-SUB connector, 9-pos. socket, two 35° cable outlets to one terminal block row, bus system: CAN, CANopen®, SafetyBUS p up to 1 Mbps, termination resistor can be switched on via slide switch, pin assignment: 2, 3, 7; screw connection terminal blocks	SUBCON-PLUS-CAN	2744694	1
D-SUB connector, 9-pos. socket, 35° cable outlet, bus system: CAN, CANopen®, SafetyBUS p up to 1 Mbps with PG D-SUB socket for connecting a programming device, termination resistor can be switched on via slide switch, pin assignment: 2, 3, 7, 9; screw terminal blocks	SUBCON-PLUS-CAN/PG	2708119	1
D-SUB connector, 9-pos. female connector, axial version with two cable entries, bus system: CAN, CANopen, SafetyBUS p; pin assignment: 2, 3, 7; screw connection terminal blocks	SUBCON-PLUS-CAN/AX	2306566	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

4 Technical data

Supply	
Supply voltage range	11 V DC … 30 V DC (via pluggable COMBICON screw terminal block)
Nominal supply voltage	24 V DC
Typical current consumption	130 mA (24 V DC)
Max. current consumption	≤ 2 A (For operation in a joining station, via the DIN rail connector)
Electrical isolation	VCC // CAN
Test voltage data interface/power supply	1.5 kV_{rms} (50 Hz, 1 min.)
Tightening torque	0.56 Nm … 0.79 Nm
CAN interface, in accordance with ISO/IS 11898 for DeviceNet™, CAN, CANopen®	
Number of ports	2 (CAN_High / CAN_Low)
Operating mode	Semi-duplex
Transmission method	CSMA/CA
Connection method	COMBICON plug-in screw terminal block
Tightening torque	0.56 Nm … 0.79 Nm
Stripping length	7 mm
Conductor cross-section	
flexible	0.2 mm² … 2.5 mm²
flexible AWG	24 … 14
rigid	0.2 mm² … 2.5 mm²
rigid AWG	24 … 14
Data format/encoding	Bit stuffing, NRZ
Termination resistor	124 Ω Integrated and ready to be switched
Transmission speed	≤ 1 Mbps (Configurable via DIP switches)
Transmission length	≤ 5000 m (Dependent on the data rate and the protocol used)
Transmission medium	2-wire twisted pair, shielded
Number of bus devices	
per potential segment	≤ 64
DeviceNet™, can be addressed logically	≤ 63
CANopen®, can be addressed logically	≤ 128
Status and diagnostic indicators	LEDs: VCC (supply voltage), NET (Mod/Net status), FO signal (fiber optic signal quality), ERR (broken fiber, fiber optic)

FO interface	
Transmission protocol	Protocol transparent for CAN interface
Connection method	B-FOC (ST®)
Wavelength	850 nm
Transmission length	
with F-G 50/125 2.5 dB/km	3500 m
with F-G 62,5/125 3.0 dB/km	3900 m
F-K 200/230 8 dB/km with quick mounting connector	1800 m
Transmit capacity, minimum	
50/125 µm	-17.6 dBm
62,5/125 µm	-14.6 dBm
200/230 µm	-4 dBm
Minimum receiver sensitivity	
50/125 µm	-29 dBm
62,5/125 µm	-29 dBm
200/230 µm	-28.1 dBm

Relay output	
Number of outputs	1
Contact switching type	N/O contact
Minimum switching voltage	11 V DC
Maximum switching voltage	30 V DC
Limiting continuous current	500 mA

General data	
Degree of protection	IP20
Mounting type	DIN rail mounting
Assembly note	The product can be snapped onto all 35 mm DIN rails in accordance with EN/IEC 60715.
Dimensions (W/H/D)	35 mm x 102 mm x 119 mm
Material	
Housing	PA 6.6-FR
Color	
Housing	green (6021)
Vibration resistance in acc. with EN 60068-2-6/IEC 60068-2-6	5g, 10...150 Hz, 2.5 h, in XYZ direction
Shock in acc. with EN 60068-2-27/IEC 60068-2-27	15g, 11 ms period, half-sine shock pulse
Bit distortion, input	± 35 % (permitted)
Bit distortion, output	< 6.25 %
Bit delay in standard operation	≤ 1 bit (configurable)
Noise emission according to	EN 55011
Noise immunity according to	EN 61000-6-2
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)	
SN 29500 standard, temperature 25°C, operating cycle 21%	831 Years
SN 29500 standard, temperature 40°C, operating cycle 34.25%	378 Years
SN 29500 standard, temperature 40°C, operating cycle 100%	155 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)
Conformance/Approvals	
CE	CE-compliant
ATEX	Ⓔx II 3 G Ex ec IIC T4 Gc PxCIF10ATEX2313986X Please follow the special installation instructions in the documentation!
UL, USA/Canada	508 Listed
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 category 3 product is designed for installation in zone 2 potentially explosive areas. It satisfies the requirements of the following standards:
  - EN 60079-0, EN 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 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 60529. To this end, use a suitable, approved housing that meets the requirements of EN 60079-0.
- 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 open the product and connect and disconnect cables and plug-in connections (e.g., connector, SD card, DIN rail connector) 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.
- The product is not designed for use in potentially dust-explosive atmospheres.

5.2 UL note

c UL us LISTED

INDUSTRIAL CONTROL EQUIPMENT 11AE

Wire Range: 24-14 AWG

Torque: 5-7 (Lbs-Ins)

Environmental designation: "Open Type Device"

"Pollution Degree 2 Installation Environment"

5.3 Protection against tampering

- To ensure IT and OT security, operate the device only in areas that are exclusively accessible to authorized persons.
- Install the device in a lockable control cabinet.
- Lock the control cabinet.

6 User documentation

- Read the user documentation prior to installation and commissioning.
- You can find the full user documentation on the Internet at ”phoenixcontact.com/qr/xxx“.
  Replace “xxx” with the item number of the product.
- Alternatively, you can also scan the QR code on the packaging label.

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.
- Keep the packaging for a possible later transport.

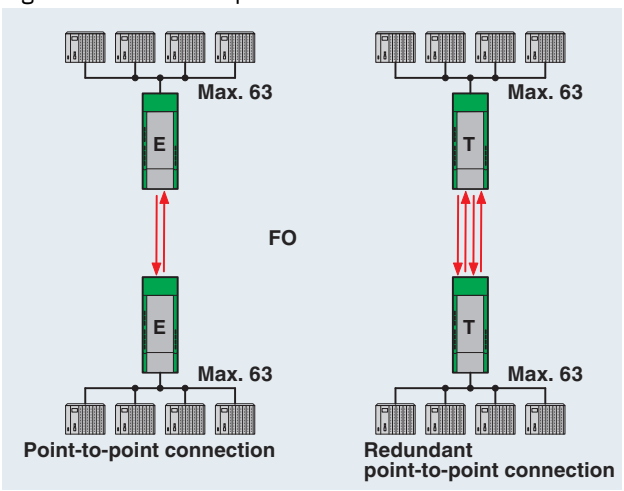
8 Network structures

The PSI-MOS-DNET/FO 850 ... 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-coupler (PSI-MOS-DNET/FO 850 **T**)
– Termination devices (PSI-MOS-DNET/FO 850 **E**)

Please note that in each potential segment the electrical port of the FO converter must be considered as a device.

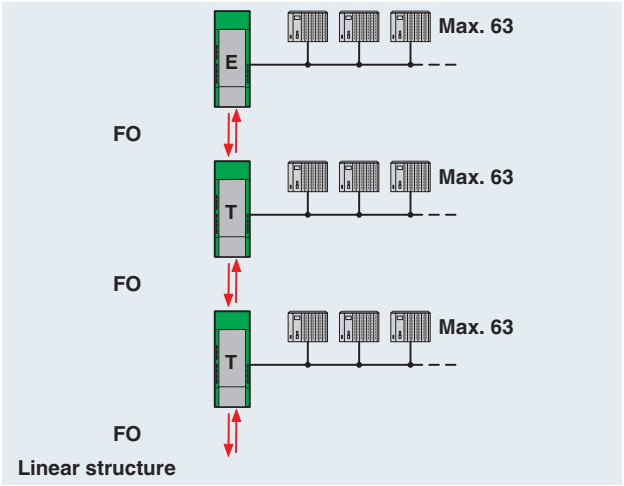
Figure 1 Point-to-point connection



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

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

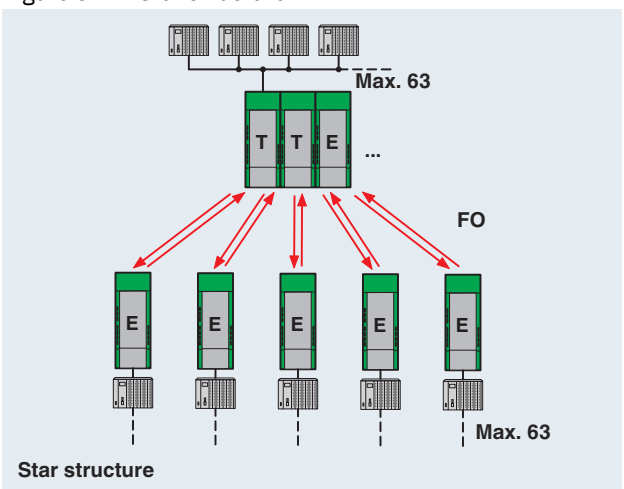
Figure 2 Line structure



You can network several CAN 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.

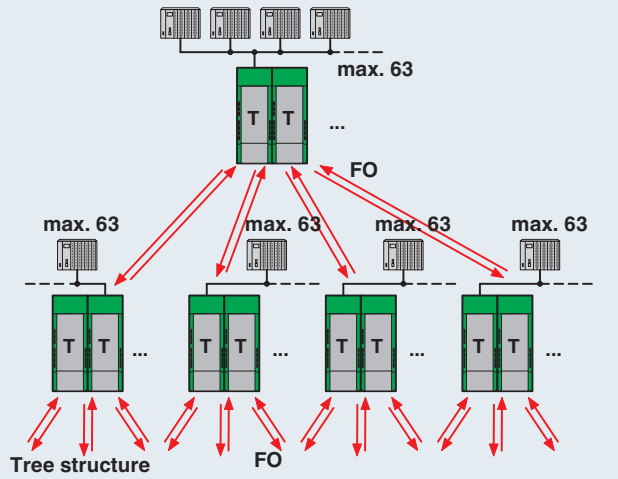
Figure 3 Star structure



CAN devices can also be networked in a star structure. To do so, connect several T-couplers and termination devices to an active star coupler.

Up to ten devices can be connected to each star coupler. Cross-wiring for the CAN data and the power supply is provided by the DIN rail connector.

Figure 4 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.

9 Product description

Figure 5 Housing dimensions

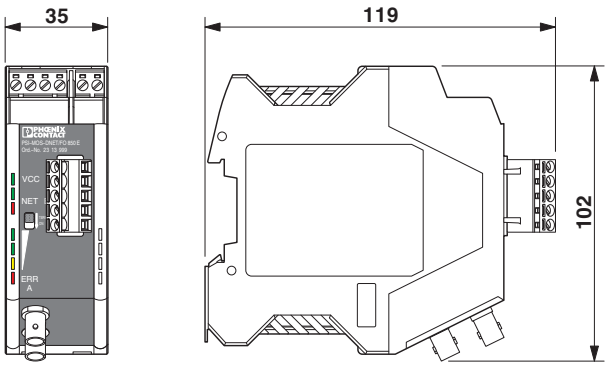


Figure 6 Basic circuit diagram

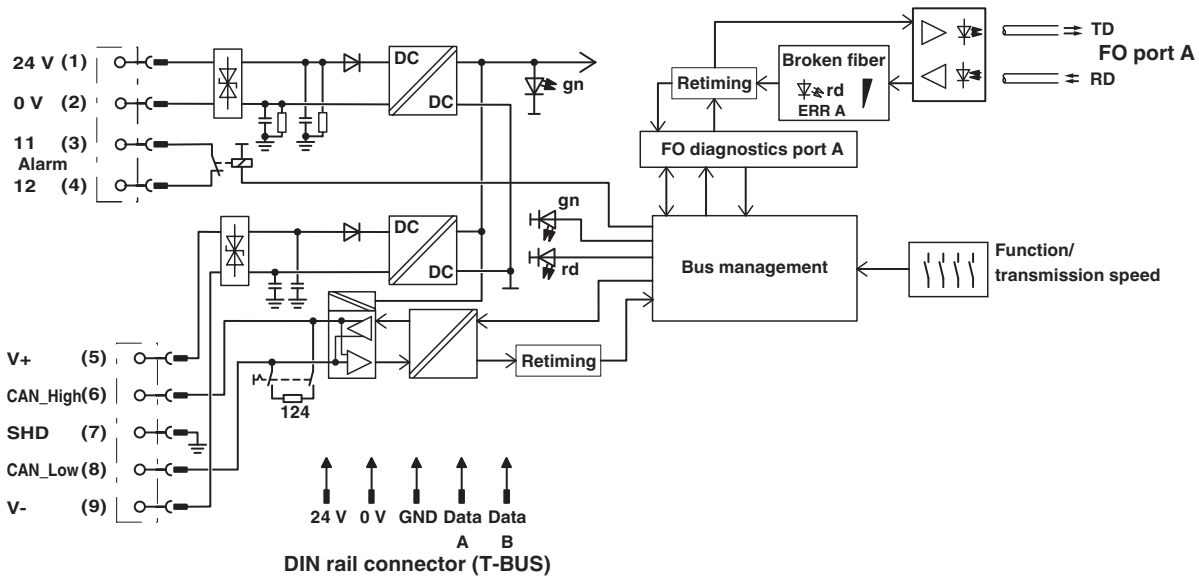
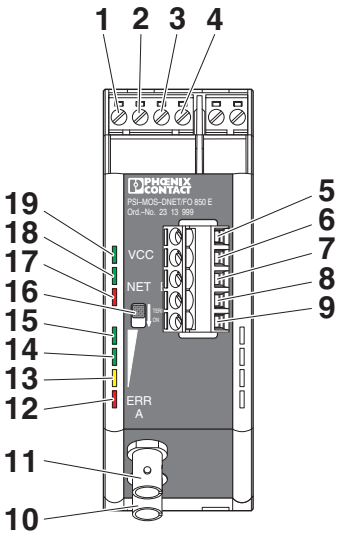


Figure 7 Function elements



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	CAN_V+	24 V DC	
6	CAN_H	CAN_High: Data signal	
7	CAN_SHLD	Cable shield	
8	CAN_L	CAN_Low: Inverted data signal	
9	CAN_V-	GND	
10	FO receiver	Port A	
11	FO transmitter	Port A	
12	LED	Port A	ERR
13	LED	Port A	FO signal
14	LED	Port A	FO signal
15	LED	Port A	FO signal
16	Switch	Termination resistor	
17	LED	NET	Red
18	LED	NET	Green
19	LED	VCC	

9.1 Diagnostics and status indicators

LED indicator of the copper interface

One green and one red LED indicate the status of the copper interface.

If the device does not behave as expected, use the following table to check the meaning of the status indicators.

NET		Meaning	Switching output	Corrective
green LED	**red LED**			
Off	Off	no supply voltage	Activated	Check the connected supply voltage.
On	Off	Device ready to operate, connection present, telegrams are being detected reliably	Not activated	Device is operating correctly.
Flashing	Off	Device ready to operate, no connection (e.g. data rate not detected)	Activated	Check connected data cables to ensure the connection and polarity are correct. Check the data rate set via the DIP switches. Check the connected master and its bus parameters (e.g. data rate).
On	Flashing	Temporary error, CAN diagnostics indicate sporadically damaged telegrams	Not activated	Check connected data cables to ensure the connection and polarity are correct. Check the network termination. Check the connected master and its bus parameters (e.g. timing). Check the network and supply voltage for coupled interference
Off	On	Critical error (bus OFF), telegram traffic no longer supported, port faulty	Activated	

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.

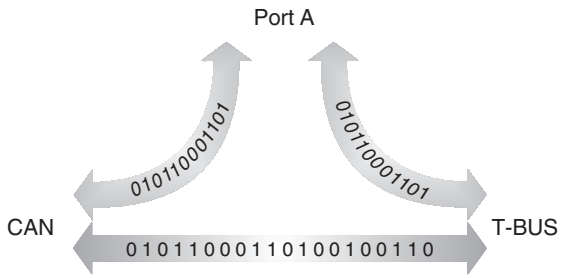
9.2 Interfaces

The device has three interfaces for the bus signal:

– Electrical interface (COMBICON)
– FO port A
– DIN rail bus connector

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 8 Communication between the interfaces



10 Configuration

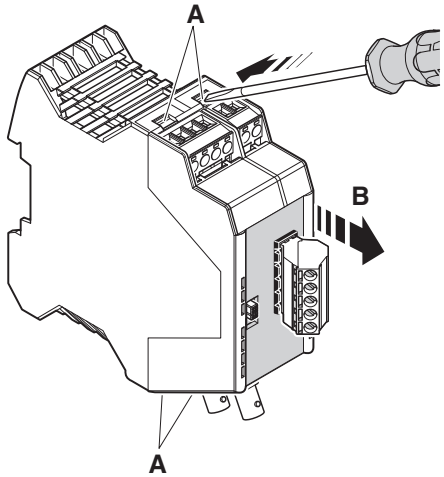
NOTE: Electrostatic discharge!

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.

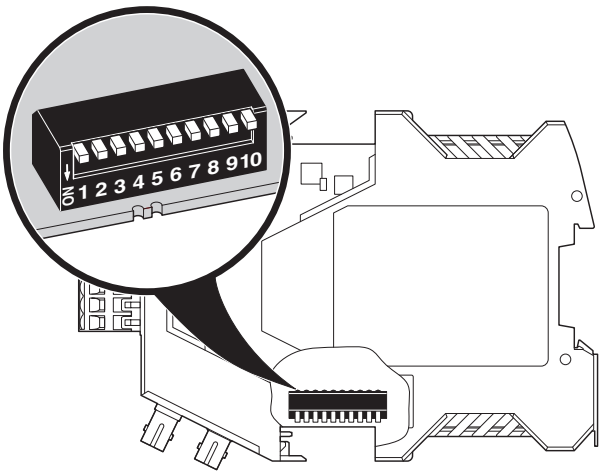
Figure 9 Opening the housing



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

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

Figure 10 DIP switches



DIP	ON	OFF (default setting)
1	Data rate (see table below)	
2		
3		
4		
5	Fast	Extended
6	Not used	
7	Not used	
8	PCF fiber	Fiberglass
9	Not used	
10	Not used	

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

- Set the transmission speed using the DIP switches.

ON = •	DIP 1	DIP 2	DIP 3	DIP 4
Data rate [kbps]				
Autobaud				
1000	•			
800		•	•	•
500		•	•	
250		•		•
125		•		
50			•	•
20			•	
10				•

10.2 Change operating mode (DIP 5)

In a joining station, all the devices must be set to the same operating mode.

CAN-based bus systems are usually configured to form a line structure. Use shielded 2-wire cables for transmission.

The bus devices are passively connected to the main bus cable. You must terminate the cables by installing termination resistors on the ends.

The total expansion is limited due to the CSMA/CA procedure and the data rate used. This limitation also applies when the network is implemented with fiber optics (default setting "Fast").

However, if you select the "Extended" operating mode, you can circumvent the limitation of the fiber optic paths.

Extended

DIP 5 = OFF

The limitation of the network expansion only applies to the individual copper segments in the "Extended" operating mode. The lengths of the FO cables do not need to be taken into consideration during configuration.

This operating mode is suitable for physically extensive networks with moderate response times.

Internal bus management is activated, bit retiming is available. The bit delay in the device has a telegram runtime (between 44 - 108 bits, depending on the type of telegram).

Data rate [kbps]	Maximum length of copper segment [m]		Maximum FO cascading (number of paths)
	DeviceNet™	CANopen®	
10	-	5000 (with repeaters)	60
20	-	2500 (with repeaters)	30
50	-	1000	12
125	500	500	6
250	250	250	3
500	100	100	1
800	-	50	1

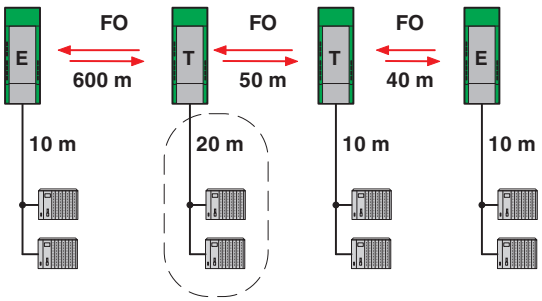
At the lowest data rate, the maximum expansion for a copper segment without repeater is 1,000 m.

Also note the following parameters:

- You can operate a maximum of 64 CAN devices per copper segment.
- The maximum length of a fiber optic path from converter to converter is:
  - 1,800 m with PCF fibers
  - 3,900 m with fiberglass

Example "Extended"

Figure 11 Example calculation



CANopen®, 125 kbps

A maximum copper segment of 500 meters is permitted for the selected data rate of 125 kbps. In our example, the maximum length is 20 meters. This configuration is OK.

Fast

Fast (DIP 5 = ON): Internal bus management is deactivated. When the bit delay is <1 bit, both in the stand-alone device and in a joining station (modular star coupler), the total size of the network becomes reduced across all segments. Only electrical isolation and signal amplification occurs between the ports.

This operating mode is suitable for small networks with fast response times.

Data rate [kbps]	Maximum network expansion in m		Maximum FO cascading (number of paths)
	DeviceNet™	CANopen®	
10	-	5000 (with repeaters)	60
20	-	2500 (with repeaters)	30
50	-	1000	12
125	500	500	6
250	250	250	3
500	100	100	1
800	-	50	1

At the lowest data rate, the maximum expansion for a copper segment without repeater is 1,000 m.

Also note the following parameters:

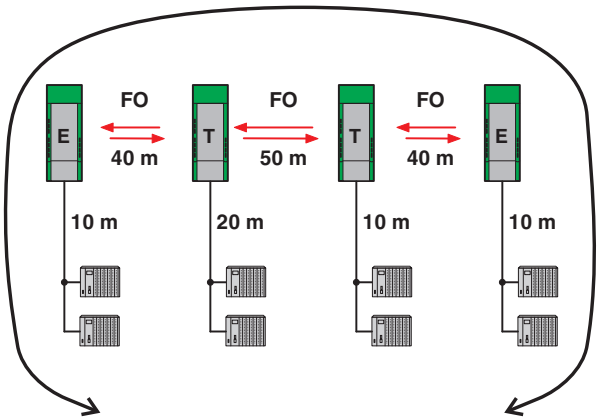
– You can operate a maximum of 64 CAN devices per copper segment.
– The maximum length of a fiber optic path from converter to converter is:
  – 1,800 m with PCF fibers
  – 3,900 m with fiberglass

You must note the signal delay of the FO converter when configuring the network. The maximum transmission distance is reduced by 48 meters per FO segment used.

- Start by considering the communication line with the largest signal delay in the network.
  This "critical line" is usually the longest or the one containing the greatest number of FO converters.
- Determine the total length of all copper and fiber optic segments $L_{Cable, total}$ and the number of planned fiber optic segments n_{FO} in this line.
  Note the maximum cascadability of fiber optic segments depending on the data rate.
- Calculate the effective total length $L_{eff, total}$ of the critical line.
  Add 48 m per planned fiber optic segment to the cable length $L_{Cable, total}$. This delay is caused by signal runtimes in the FO converters.
  $L_{eff, total} = L_{Cable, total} + n_{FO} * 48\ m$
- Finally, compare the effective total length $L_{eff, total}$ with the maximum network expansion for your data rate.
  If the effective total length is less, the CSMA/CA mechanism is functioning correctly.

Example "Fast"

Figure 12 Example calculation



CANopen®, 125 kbps

$L_{eff, total}$ = 20 m + 130 m + 3 * 48 m = 294 m

A maximum network expansion of 500 meters is permitted for the selected data rate of 125 kbps. This configuration is OK.

10.3 Setting the FO fiber type (DIP 8)

You can use multimode fiberglass (DIP 8 = OFF) or PCF fiber (DIP 8 = ON).

10.4 Termination resistor

If the device is used at the beginning or end of a copper segment, the integrated termination resistor must be activated.

- Set the slide switch on the front of the device to “ON”.

10.5 Mixed operation of different FO converters

As a rule, the PSI-MOS-DNET/FO 850... FO converter and devices from the older PSI-MOS-DNET CAN/FO 850... series can be used together.

The following conditions must be met:

– Max. data rate 800 kbps
– Only “Fast” mode is supported
– No redundancy operation
– Possible distances:
  – PCF fibers: 1800 m
  – Fiberglass 50/125: 2800 m
  – Fiberglass 62.5/125: 3600 m

11 Mounting

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: device damage

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

NOTE: Malfunction

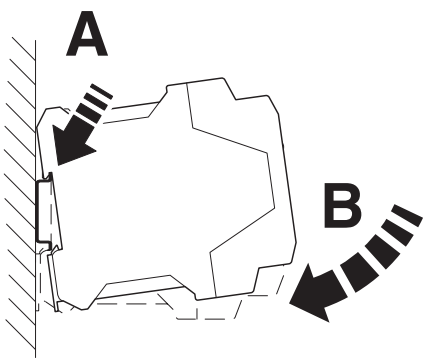
Use a grounding terminal block to connect the DIN rail to protective earth ground. The devices are grounded when they are snapped onto the DIN rail (installation according to PELV).
This ensures that the shielding is effective. Connect protective earth ground with low impedance.

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

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

11.1 Mounting as single device

Figure 13 Mounting on a DIN rail

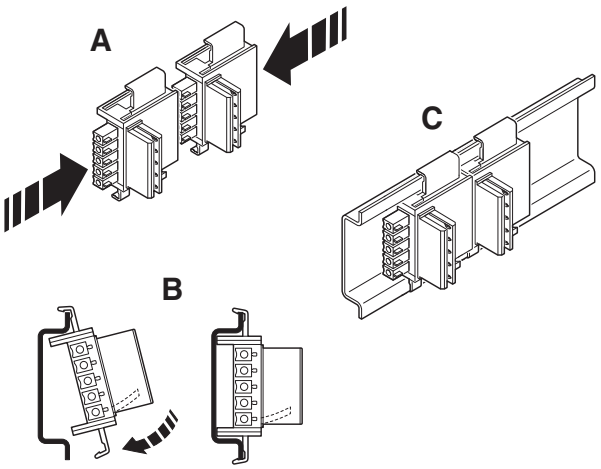


- To avoid contact resistance, only use clean, corrosion-free 35 mm DIN rails according to DIN EN 60715.
- Install an end bracket next to the left-hand device to prevent the devices from slipping.
- Place the device onto the DIN rail from above. Push the device from the front toward the mounting surface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

11.2 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-DNET...
– PSI-REP-DNET CAN
– 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.

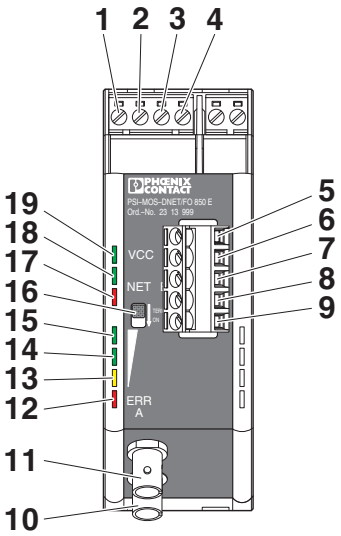
- To form a joining station, connect the DIN rail connectors (item no. 2709561, 2 pieces per device) together.
- Push the connected DIN rail connectors into the DIN rail.
- Place the device onto the DIN rail from above. Push the device from the front toward the mounting surface until it audibly engages.

11.3 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.

11.4 Power supply voltage

The device is operated using a 24 V DC SELV.



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.

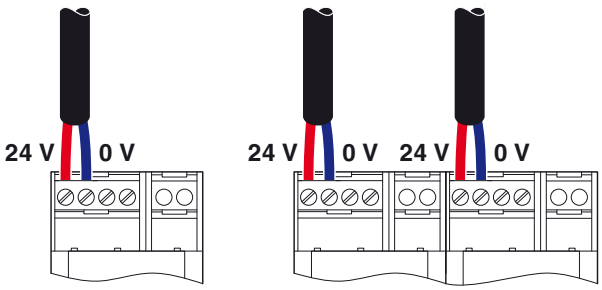
A joining station must not consist of more than ten devices.

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 15 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

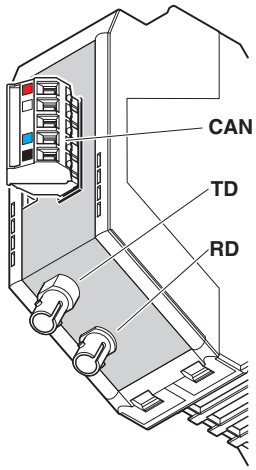
Refer to the user documentation for the power supply at www.phoenixcontact.com/product/2904614.

12 CAN interface

NOTE: Interference

Use shielded twisted pair data cables. Connect the cable shielding at both ends of the transmission path.

Figure 16 CAN interface



- Connect the bus cable to the COMBICON connection of the device.
- If the device is at the start or end of a CAN segment, the termination resistors must be activated. To do this, set the slide switch on the front of the device to “ON”.

Pin	Color	Signal	Meaning
1	Black	V-	GND
2	Blue	CAN_L	CAN_Low: Inverted data signal
3	Clear	SHD	Cable shield
4	White	CAN_H	CAN_High: Data signal
5	Red	V+	24 V DC

Optional supply via the CAN interface

Alternatively, the device can also be supplied via the data cable (pin V+/V-). However, only the device that is connected directly is supplied. Devices that are connected via the DIN rail connector are not supplied.

- Use a hybrid cable. Then you can transmit data and a supply voltage. An additional power supply via terminals **1** and **2** is not necessary.

13 Fiber optic interface (FO port)

WARNING: Risk of eye injury

The light can cause damage to eyes.

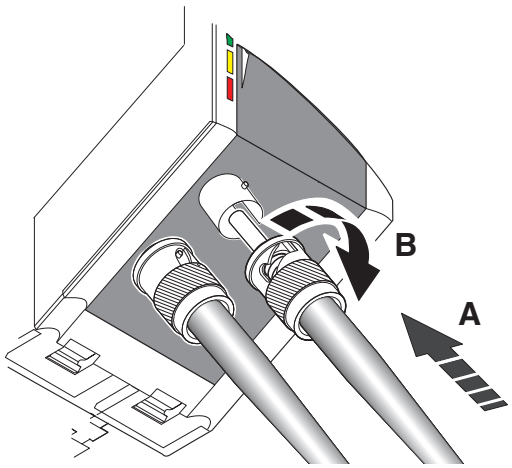
– During operation, do not look directly into the transmitter diodes or use optical aids to look into the fiberglass. The infrared light is not visible.

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.

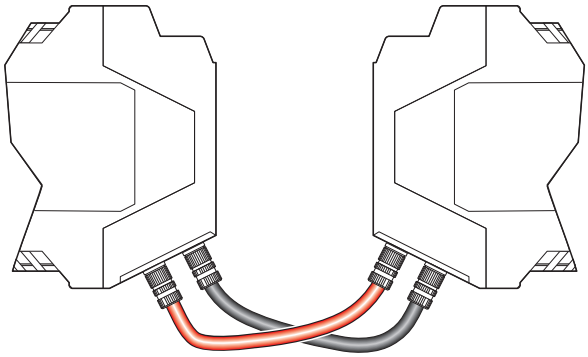
Figure 17 Connect B-FOC (ST®) plug



- 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).

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!

14 Switching output

NOTE: device damage

The maximum load capacity of the relay contact is 0.5 A at 11 ... 30 V DC!

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

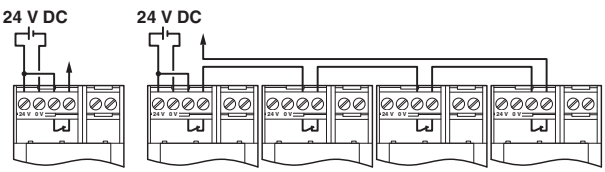
The switch contact opens on the relevant device in the event of the following:

– 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 19 Individual and group message



Alternatively, the power supply for the data cable can be used to supply the switching output. To do this, connect pin V+ of the CAN interface to connection 11 of the switching output.

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.

– Before disposal: set all DIP switches to “off” to protect your data.