FL MC EF WDM ...

Ethernet FO converter for bidirectional data transmission via a single optical fiber (SC simplex)

Data sheet
104915_en_03

1 Description

The **FL MC EF WDM...** media converters enable full duplex communication via a single glass fiber thanks to WDM (wavelength division multiplex) technology. A 10/100Base-T(X) Ethernet interface is converted into an optical fiber. Both devices use 1310 nm and 1550 nm wavelengths to transmit and receive. Devices A and B are used as a set.

Transmission via a single fiber provides many advantages. You save on optical fibers and plugs. Double the bandwidth can be achieved with the existing cabling. WDM media converters are particularly suitable for rotating applications with optical rotary transformers, such as wind turbine generators.

Features

- Full duplex transmission via a single optical fiber
- 10/100Base-T(X) auto negotiation
- Auto MDI/MDIx switchover
- Operating mode and speed can be set manually
- Link fault pass through (LFP)
- Far End Fault signaling (FEF)
- SC simplex connection
- Redundant power supply possible
- Extended temperature range of -40°C ... +65°C
- Mounting on a 35 mm DIN rail

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 from the product at phoenixcontact.net/product/2902660.

For data transmission, you always require a type A device and a type B device for the remote station!

This document is valid for the products listed in the “Ordering data”.

2 Table of contents

3 Ordering data

Description	Type	Order No.	Pcs./Pkt.
FO converter (replacement device A), for full duplex transmission from 10/100Base-T(X) to individual simplex fiberglass with WDM (wavelength division multiplex) technology, SC simplex fiber optic connection (1310/1550 nm). Device set (type A and type B) required for operation.	FL MC EF WDM-A SC	2902658	1
FO converter (replacement device B), for full duplex transmission from 10/100Base-T(X) to individual simplex fiberglass with WDM (wavelength division multiplex) technology, SC simplex fiber optic connection (1550/1310 nm). Device set (type A and type B) required for operation.	FL MC EF WDM-B SC	2902659	1
FO converter set, consisting of type A devices and type B devices, for full duplex transmission from 10/100Base-T(X) to individual simplex fiberglass with WDM (wavelength division multiplex) technology. SC simplex fiber optic connection (1550/1310 nm).	FL MC EF WDM-SET SC	2902660	1

Accessories	Type	Order No.	Pcs./Pkt.
CAT5-SF/UTP cable (J-02YS(ST)C HP 2 x 2 x 24 AWG), heavy-duty installation cable, 2 x 2 x 0.22 mm², solid conductor, shielded, outer sheath: 7.8 mm diameter, inner sheath: 5.75 mm ± 0.15 mm diameter	FL CAT5 HEAVY	2744814	1
CAT5-SF/UTP cable (J-LI02YS(ST)C H 2 x 2 x 26 AWG), light-duty, flexible installation cable 2 x 2 x 0.14 mm², stranded, shielded, outer sheath: 5.75 mm ± 0.15 mm diameter	FL CAT5 FLEX	2744830	1
Crimping pliers, for assembling the RJ45 plugs FL PLUG RJ45..., for assembly on site	FL CRIMPTOOL	2744869	1
Plug component, Nominal current: 8 A, Nominal current (Ex): 8 A, Nominal voltage (Ex): 125 V, Number of positions: 5, Pitch: 3.81 mm, Articles with gold-plated contacts, bus connectors for connecting with electronic housings	ME 22,5 TBUS 1,5/ 5-ST-3,81 GN	2707437	50
Primary-switched MINI POWER supply for DIN rail mounting, input: 1-phase, output: 24 V DC/1.5 A	MINI-SYS-PS-100-240AC/24DC/1.5	2866983	1
DIN rail connector for DIN rail mounting. Universal for TBUS housing. Gold-plated contacts, 5-pos. Header, Nominal current: 8 A, Number of positions: 5, Pitch: 3.81 mm, Articles with gold-plated contacts, bus connectors for connecting with electronic housings	ME 17,5 TBUS 1,5/ 5-ST-3,81 GN	2709561	10
Assembled fiber optic cable, break-out cable, fiberglass multi-mode 50/125 µm, connector: LC/SC duplex, degree of protection: IP20, for installation in cable ducts or control cabinets, length: 1 m	FL MM PATCH 1,0 LC-SC	2989161	1
Assembled fiber optic cable, break-out cable, fiberglass multi-mode 50/125 µm, connector: LC/SC duplex, degree of protection: IP20, for installation in cable ducts or control cabinets, length: 2 m	FL MM PATCH 2,0 LC-SC	2989268	1
Assembled FO cable, break out cable, multi-mode fiberglass 50/125 µm, plug: LC / SC-Duplex, protection type: IP20, for installation in cable ducts or control cabinets, length: 5 m	FL MM PATCH 5,0 LC-SC	2901800	1
Assembled FO cable, break out cable, multi-mode fiberglass 50/125 µm, connector: SC Duplex / SC-Duplex, protection type: IP20, for installation in cable ducts or control cabinets, length: 1 m	FL MM PATCH 1,0 SC-SC	2901805	1
Assembled FO cable, break out cable, multi-mode fiberglass 50/125 µm, connector: SC Duplex / SC-Duplex, protection type: IP20, for installation in cable ducts or control cabinets, length: 2 m	FL MM PATCH 2,0 SC-SC	2901807	1
Assembled FO cable, break out cable, multi-mode fiberglass 50/125 µm, connector: SC Duplex / SC-Duplex, protection type: IP20, for installation in cable ducts or control cabinets, length: 5 m	FL MM PATCH 5,0 SC-SC	2901808	1
Assembled FO cable, break out cable, multi-mode fiberglass 50/125 µm, connector: SC Duplex / B-FOC, protection type: IP20, for installation in cable ducts or control cabinets, length: 1 m	FL MM PATCH 1,0 SC-ST	2901809	1
Assembled FO cable, break out cable, multi-mode fiberglass 50/125 µm, connector: SC Duplex / B-FOC (ST), protection type: IP20, for installation in cable ducts or control cabinets, length: 2 m	FL MM PATCH 2,0 SC-ST	2901810	1

Accessories	Type	Order No.	Pcs./Pkt.
Assembled FO cable, break out cable, multi-mode fiberglass 50/125 µm, connector: SC Duplex / B-FOC (ST), protection type: IP20, for installation in cable ducts or control cabinets, length: 5 m	FL MM PATCH 5,0 SC-ST	2901811	1
Assembled FO cable, break out cable, multi-mode fiberglass 50/125 µm, connector: SC Duplex / B-FOC (ST), protection type: IP20, for installation in cable ducts or control cabinets, length: 1 m	FL MM PATCH 1,0 SC-SCRJ	2901812	1
Assembled FO cable, break out cable, multi-mode fiberglass 50/125 µm, connector: SC Duplex / SC-RJ, protection type: IP20, for installation in cable ducts or control cabinets, length: 2 m	FL MM PATCH 2,0 SC-SCRJ	2901813	1
Assembled FO cable, break out cable, multi-mode fiberglass 50/125 µm, connector: SC Duplex / B-FOC (ST), protection type: IP20, for installation in cable ducts or control cabinets, length: 5 m	FL MM PATCH 5,0 SC-SCRJ	2901814	1
Rugged GOF installation cable (IP20 heads only) for inner areas with highly tear-proof aramid strain-relief elements. Individual elements consist of highly flexible FRNC material. The cable is halogen-free, ozone and UV resistant and has a rugged polyurethane (PUR) outer sheath.	FOC-GDM-RUGGED-1016/IP20/...	2901558	1
Rugged GOF installation cable for inner areas with highly tear-proof aramid strain-relief elements. Individual elements consist of highly flexible FRNC material. The cable is halogen-free, ozone and UV resistant and has a rugged polyurethane (PUR) outer sheath.	FOC-GDM-RUGGED-1016/...	1402193	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
Highly rugged GOF round cable 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/...	1402194	1
Fiberglass cable, duplex 50/125 µm, by the meter, without connector, for outdoor installation	PSM-LWL-GDO- 50/125	2799432	1
Fiberglass cable, duplex 50/125 µm, by the meter, without connector, for indoor installation	PSM-LWL-GDM-RUGGED- 50/125	2799322	1
Assembled fiber optic cable, break-out cable, fiberglass single mode 9/125 µm, connector: LC/SC duplex, degree of protection: IP20, for installation in cable ducts or control cabinets, length: 1 m	FL SM PATCH 1,0 LC-SC	2989190	1
Assembled fiber optic cable, break-out cable, fiberglass single mode 9/125 µm, connector: LC/SC duplex, degree of protection: IP20, for installation in cable ducts or control cabinets, length: 2 m	FL SM PATCH 2,0 LC-SC	2989297	1
Assembled FO cable, break out cable, single mode fiberglass 9/125 µm, connector: LC / SC Duplex, protection type: IP20, for installation in cable ducts or control cabinets, length: 5 m	FL SM PATCH 5,0 LC-SC	2901827	1
Assembled FO cable, break out cable, single mode fiberglass 9/125 µm, connector: SC Duplex / SC Duplex, protection type: IP20, for installation in cable ducts or control cabinets, length: 1 m	FL SM PATCH 1,0 SC-SC	2901829	1
Assembled FO cable, break out cable, single mode fiberglass 9/125 µm, connector: SC Duplex / SC Duplex, protection type: IP20, for installation in cable ducts or control cabinets, length: 2 m	FL SM PATCH 2,0 SC-SC	2901830	1
Assembled FO cable, break out cable, single mode fiberglass 9/125 µm, connector: SC Duplex / SC Duplex protection type: IP20, for installation in cable ducts or control cabinets, length: 5 m	FL SM PATCH 5,0 SC-SC	2901831	1
Assembled FO cable, break out cable, single mode fiberglass 9/125 µm, connector: SC Duplex / B-FOC (ST), protection type: IP20, for installation in cable ducts or control cabinets, length: 1 m	FL SM PATCH 1,0 SC-ST	2901832	1
Assembled FO cable, break out cable, single mode fiberglass 9/125 µm, connector: SC Duplex / B-FOC (ST), protection type: IP20, for installation in cable ducts or control cabinets, length: 2 m	FL SM PATCH 2,0 SC-ST	2901833	1
Assembled FO cable, break out cable, single mode fiberglass 9/125 µm, connector: SC Duplex / B-FOC (ST), protection type: IP20, for installation in cable ducts or control cabinets, length: 5 m	FL SM PATCH 5,0 SC-ST	2901834	1

Accessories	Type	Order No.	Pcs./Pkt.
RJ45 connector, IP20, CAT5e, 8-pos., with QUICKON fast connection technology, for 26 ... 23 AWG 1-wire and 7-wire conductors, for 4.5 mm ... 8.0 mm cable diameter, labeling: TIA 568 B, color: gray RJ45 connector, Degree of protection: IP20, Number of positions: 8, CAT5 (IEC 11801:2002), Material: PA, Connection method: IDC fast connection, Cable exit: straight	VS-08-RJ45-5-Q/IP20	1656725	1
Patch cable, CAT5, assembled, 0.5 m	FL CAT5 PATCH 0,5	2832263	10
Patch cable, CAT5, assembled, 1.0 m	FL CAT5 PATCH 1,0	2832276	10
Patch cable, CAT5, assembled, 2.0 m	FL CAT5 PATCH 2,0	2832289	10
Patch cable, CAT5, assembled, 3.0 m	FL CAT5 PATCH 3,0	2832292	10

4 Technical data

Supply	
Supply voltage range	18 V DC ... 30 V DC (Screw connection) 18 V DC ... 30 V DC (as an alternative or redundant, via backplane bus contact and system current supply)
Typical current consumption	< 110 mA (24 V DC)
Protective circuit	Protection against polarity reversal
Electrical isolation	VCC // FE // Ethernet
Test voltage data interface/power supply	1.5 kV_{rms} (50 Hz, 1 min.)
Torque	0.56 Nm ... 0.79 Nm

Ethernet interface, 10/100BASE-T(X) in acc. with IEEE 802.3u	
Connection method	RJ45 socket, shielded
Conductor cross section	0.2 mm^2 ... 2.5 mm^2 (24 AWG ... 14 AWG)
Transmission speed	10/100 MBit/s
Transmission length	100 m (twisted pair, shielded)
Transmission medium	Copper
Auto-negotiation modes	Auto
Link through	Link fault pass through
MDI-/MDI-X switchover	Auto-MDI(X)
Signal LEDs	Activity, link status, 10/100 Mbps

FO interface	
Data rate	100 Mbps
Connection method	SC simplex
Wavelength	1310 nm 1550 nm
Laser protection	Class 1 according to DIN EN 60825-1
Transmission length incl. 3 dB system reserve	38 km (with F-E 9/125 0.36 dB/km) 34 km (with F-E 9/125 0.4 dB/km) 28 km (with F-E 9/125 0.5 dB/km) 21 km (with F-G 62,5/125 0,7 dB/km F 1000) 5.5 km (with F-G 62.5/125 2.6 dB/km F 600) 21 km (with F-G 50/125 0,7 dB/km F 1200) 9 km (with F-G 50/125 1,6 dB/km F 800)
Transmit capacity, minimum	≥ -14 dBm ((9/125 µm) dynamic in link mode (average))
Transmit capacity, maximum	≤ -8 dBm ((9/125 µm) dynamic in link mode (average))
Minimum receiver sensitivity	-31 dBm (dynamic in link mode (average))
Overrange receiver	-3 dBm (dynamic in link mode (average))
Signal LEDs	Far end fault (red LED), link status (yellow LED)

General data

Basic functions	Store-and-forward media converter
Degree of protection	IP20
Dimensions (W/H/D)	22.5 mm x 99 mm x 114.5 mm
Housing material	PA 6.6-FR green
Free fall in acc. with IEC 60068-2-32	1 m
Vibration resistance in acc. with EN 60068-2-6/IEC 60068-2-6	5g, 150 Hz, 2.5 h, in XYZ direction
Shock in acc. with EN 60068-2-27/IEC 60068-2-27	25g, 11 ms period, half-sine shock pulse
MTTF (mean time to failure) SN 29500 standard, temperature 25°C, operating cycle 21 % (5 days a week, 8 hours a day)	1400 Years
MTTF (mean time to failure) SN 29500 standard, temperature 40 °C, operating cycle 34.25 % (5 days a week, 12 hours a day)	599 Years
MTTF (mean time to failure) SN 29500 standard, temperature 40°C, operating cycle 100 % (7 days a week, 24 hours a day)	101 Years
Electromagnetic compatibility	Conformance with EMC Directive 2004/108/EC

Ambient conditions

Ambient temperature (operation)	-40 °C ... 65 °C
Ambient temperature (storage/transport)	-40 °C ... 85 °C
Permissible humidity (operation)	30 % ... 95 % (non-condensing)
Permissible humidity (storage/transport)	30 % ... 95 % (non-condensing)
Altitude	5000 m (For restrictions see manufacturer's declaration) 2000 m (With UL approval)

Approvals / Certificates

Conformance	CE-compliant
Free from substances that could impair the application of coating	according to P-VW 3.10.7 57 65 0 VW-AUDI-Seat central standard
ATEX Please follow the special installation instructions in the documentation!	Ⓔx II 3 G Ex nA IIC T4 Gc X
UL, USA / Canada	cULus listed UL 508 Class I, Zone 2, AEx nA IIC T4 Class I, Zone 2, Ex nA IIC T4 Gc X Class I, Div. 2, Groups A, B, C, D
Standards/regulations	EN 60950-1
Shipbuilding approval	DNV

Conformance with EMC Directive 2004/108/EC		
Noise immunity according to EN 61000-6-2		
Electrostatic discharge	EN 61000-4-2	
	Contact discharge	± 6 kV (Test Level 3)
	Discharge in air	± 8 kV (Test Level 3)
	Comments	Criterion B
Electromagnetic HF field	EN 61000-4-3	
	Frequency range	80 MHz ... 3 GHz (Test Level 3)
	Field intensity	10 V/m
	Comments	Criterion A
Fast transients (burst)	EN 61000-4-4	
	Input	± 2 kV (Test Level 3)
	Signal	± 2 kV (Test Level 3)
	Comments	Criterion B
Surge current loads (surge)	EN 61000-4-5	
	Input	± 0.5 kV (DC supply)
	Signal	± 1 kV (Data line, asymmetrical)
	Comments	Criterion B
Conducted interference	EN 61000-4-6	
	Frequency range	0.15 MHz ... 80 MHz
	Voltage	10 V
	Comments	Criterion A

Emitted interference in acc. with EN 61000-6-4	
Noise emission	EN 55022 Class A, industrial applications

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

4.1 UL Notes

INDUSTRIAL CONTROL EQUIPMENT 11AE

Wire Range: 24-14 AWG

Torque: 5-7 (Lbs-Ins)

Environmental designation: "Open Type Device"

"Pollution Degree 2 Installation Environment"

PROCESS CONTROL EQUIPMENT FOR HAZARDOUS LOCATIONS 31ZN

A This equipment is suitable for use in Class I, Zone 2, AEx nA IIC T4; Ex nA IIC T4 Gc X or Class I, Division 2, Groups A, B, C, D or non-hazardous locations only.

B Provision shall be made to prevent transient disturbances of more than 140 % of the rated supply voltage.

C The device must be installed in a Class I, Zone 2 certified overall enclosure rated IP54 with tool-accessible only cover or door and in pollution degree 2 environment only.

D Unit shall be supplied by Limited Energy circuit according to clause 9.4 of UL 61010-1 3rd edition of Limited Power Source according to clause 2.5 of UL 60950-1 or NEC Class 2.

E Conductor temperature rating must be 72°C or higher.

F Maximum relative humidity 80 % for temperatures up to 31°C decreasing linearly to 50 % relative humidity at 40°C.

5 Safety regulations and installation notes

5.1 Installation and operation

CAUTION:

Observe the following safety notes when using the FO converter.

- The category 3 device is suitable for installation in potentially explosive area zone 2. It fulfills the requirements of EN 60079-0:2009 and EN 60079-15:2010.
- 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 technical data is provided in the package slip and on the certificates (conformity assessment, additional approvals where applicable).
- The device must not be opened or modified apart from the configuration of the DIP switches. Do not repair the device yourself but replace it with an equivalent device. Repairs may only be carried out by the manufacturer. The manufacturer is not liable for damage resulting from a failure to comply.
- The IP20 protection (IEC 60529/EN 60529) of the device is intended for use in a clean and dry environment. The device must not be subject to mechanical strain and/or thermal loads, which exceed the limits described.
- The device is not designed for use in atmospheres with a danger of dust explosions.
- If dust is present, it is necessary to install into a suitable approved housing, whereby the surface temperature of the housing must be taken into consideration.
- The switches of the device that can be accessed may only be actuated when the power supply to the device is disconnected.

5.2 Safety regulations for installation in potentially explosive areas

WARNING: Explosion hazard when used in potentially explosive areas

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

- Observe the specified conditions for use in potentially explosive areas.
- At the time of installation, use an approved housing (minimum protection IP54), which meets the requirements of EN 60079-15. Within this context, observe the requirements of IEC 60079-14/EN 60079-14.
- In zone 2, only connect devices to the supply and signal circuits that are suitable for operation in the Ex zone 2 and the conditions at the installation location.
- In potentially explosive areas, terminals may only be snapped onto or off the DIN rail connector and wires may only be connected or disconnected when the power is switched off.
- The device must be stopped and immediately removed from the Ex area if it is damaged, was subject to an impermissible load, stored incorrectly or if it malfunctions.
- For reliable operation, the RJ connection must be equipped with a fully functional locking clip. Repair any damaged plugs immediately.

6 Structure

6.1 Dimensions

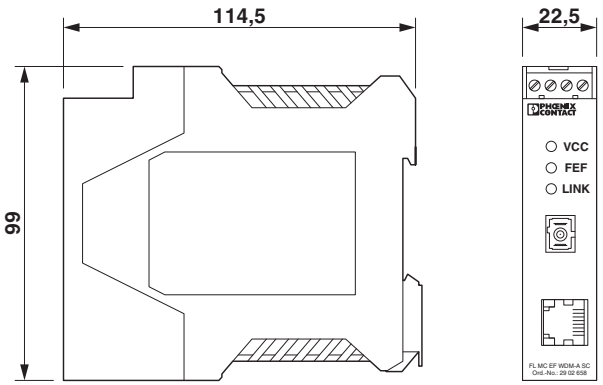


Figure 1 Housing dimensions

6.2 Block diagram

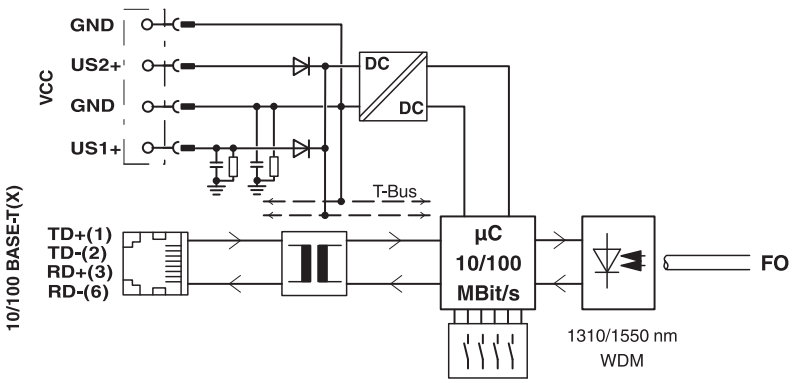


Figure 2 Block diagram

6.3 Function elements

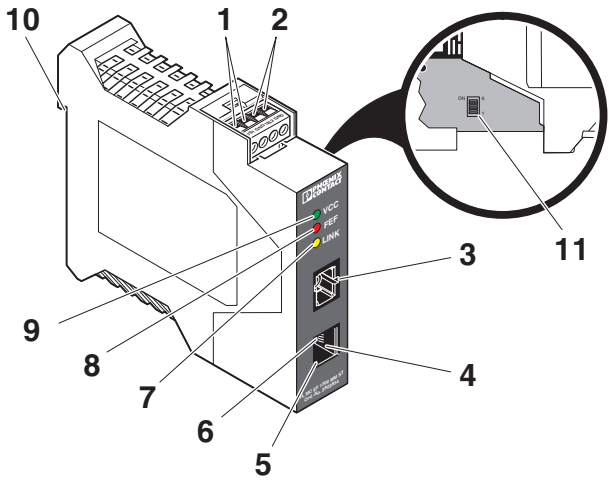


Figure 3 Function elements

1 24 V DC supply voltage
2 24 V DC supply voltage, (Redundancy)
3 Fiber optic (FO-) interface, SC simplex
4 RJ45 Ethernet port, 10/100 Base-T(X)
5 LED Link/Activity/10/100
6 LED HD/FD
7 LED LINK
8 LED FEF
9 LED VCC
10 Functional earth ground
11 DIP switch

6.4 Diagnostics and status indicators

Ethernet interface (TP port)

5	Link/Activity/10/100			
		Yellow	ON	10 Mbps link
			Flashing	10 Mbps link - active data transmission
		Green	ON	100 Mbps link
			Flashing	100 Mbps link - active data transmission
6	HD/FD	Green	OFF	Half duplex transmission
			ON	Full duplex transmission

Fiber optics interface (FO port)

7	LINK	Yellow	ON	Fiber optics link available, no data communication
			Flashing	Data transmission at FO port
8	FEF	Red	ON	Far end fault has occurred. Remote station reports: "no light".

Supply voltage

9	VCC	Green	ON	Supply voltage OK

Far End Fault signal (FEF)

If the copper connection is interrupted at one of the FO converters, data communication for both FO converters in both the optical and copper segment is disabled by the link fault pass through function. In this case, all Link LEDs go out. However, in order that error diagnostics can be carried out, the red FEF LED lights up on the FO converter where the copper segment is interrupted.

7 Configuration via DIP switches

NOTE: electrostatic discharge!

The device contains components that can be damaged or destroyed by electrostatic discharge. When handling the device, observe the necessary safety precautions against electrostatic discharge (ESD) according to 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.

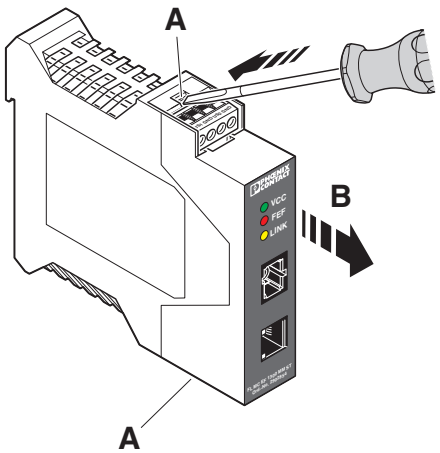


Figure 4 Opening the housing

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

By default, all DIP switches are in the “OFF” position. The copper side of the device operates in “Auto negotiation” mode.

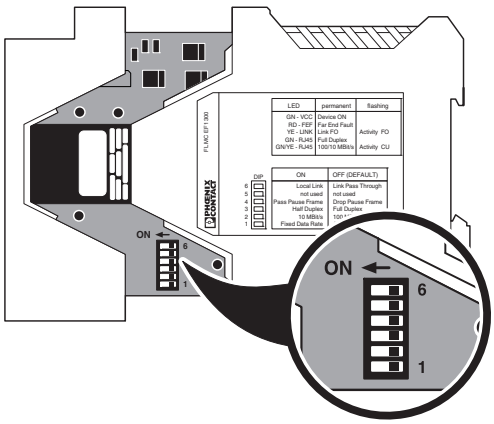


Figure 5 DIP switches

DIP	ON	OFF (default setting)
6	LFP deactivated (local)	LFP activated (global)
5	Not used	
4	Pass pause frame	Drop pause frame
3	Half duplex transmission	Full duplex transmission
2	10 Mbps	100 Mbps
1	Fixed transmission speed on the copper side	Auto negotiation

7.1 Setting data transmission (DIP 1, DIP 2, and DIP 3)

DIP 1 = OFF: the connected end devices negotiate 10/100 Mbps transmission speed and half/full transmission mode directly. The entire path behaves like a directly connected copper cable.

DIP 1 = ON: you set the transmission speed and mode manually with DIP switches 2 and 3.

DIP 1	OFF	Auto negotiation		
DIP 1	ON	**DIP 2**	OFF	100 Mbps
			ON	10 Mbps
		DIP 3	OFF	Full duplex transmission
			ON	Half duplex transmission

If DIP switch 1 is in the “OFF” position, the position of DIP switch 2 and 3 is not queried.

7.2 Pause frame (DIP 4)

A pause frame signal can request an Ethernet device to temporarily interrupt data transmission. This avoids overloading the partner when, for example, communication takes place with different transmission speeds.

DIP 4 = OFF: the device does not respond to an incoming pause frame signal. It is also not forwarded. A pause frame signal cannot be generated by the device itself.

The transmission of pause frame signals is negotiated in sections.

DIP 4 = ON: the device responds to pause frame signals or forwards them. A pause frame signal can be generated by the device itself.

7.3 Link fault pass through (DIP 6)

The LFP (link fault pass through) function provides permanent connection monitoring. The link on the fiber optic connection switches off if the connection is lost on the copper side of a FO converter. The FO converter on the other side registers the aborted link via the fiber optic path and likewise interrupts the connection for its twisted pair segment.

The entire connection over the optical path is therefore as transparent as it would be were communication purely copper-based. Both sides of the network connection can therefore detect a lost link immediately and respond accordingly. In the event of an error, this keeps the network load low and ensures that redundancy mechanisms can be activated.

DIP 6 = OFF: the LFP function is activated.
In the event of a fault, the entire connection is disabled (global).

DIP 6 = ON: the LFP function is deactivated.
In the event of a fault, only the interrupted segment is disabled (local). This is useful during startup and in the event of an error.

8 Assembly

CAUTION: Electric shock

The device is only intended for operation with SELV according to IEC 60950/EN 60950/ VDE 0805.

NOTE: Malfunction

Connect the DIN rail to protective earth ground using a grounding terminal block. 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.

8.1 Mounting on a DIN rail

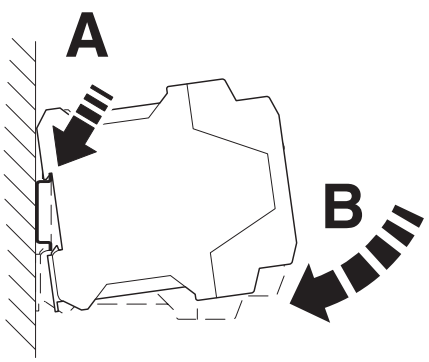


Figure 6 Mounting on a DIN rail

- 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 module 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.

8.2 Combined assembly

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

Observe the snap-in direction of the device and DIN rail connector: snap-on foot below and plug on the left.

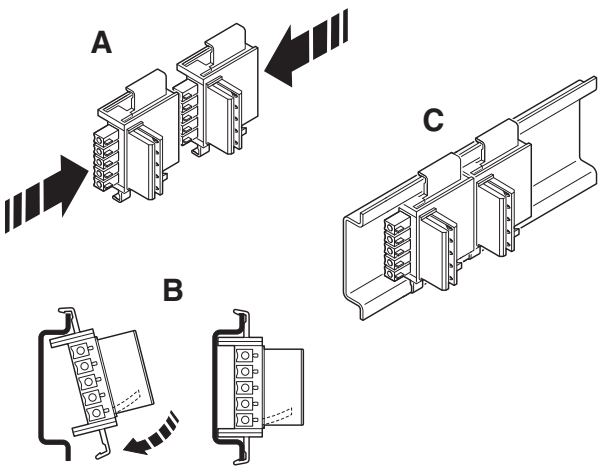


Figure 7 Combined assembly

The DIN rail connector is used to bridge the power supply and communication.

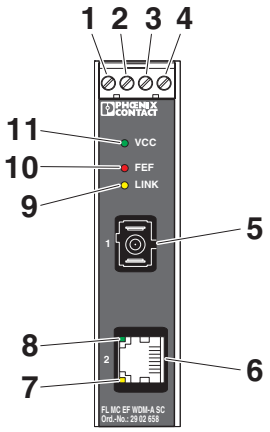
- Connect the DIN rail connectors (TBUS) (Order No. 2707437, 1 pc. per device) together for a connection station.
- Push the connected DIN rail connectors into the DIN rail.
- Place the device onto the DIN rail from above. Push the module from the front toward the mounting surface until it audibly engages.

8.3 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.

9 Supply voltage

The device is operated using a 24 V DC SELV.



1	24 V DC supply voltage	
2	0 V DC supply voltage	
3	24 V DC supply voltage	(Redundancy)
4	0 V DC supply voltage	(Redundancy)

9.1 Operation as a single device

- Supply voltage to the device via terminal blocks **1** (24 V) and **2** (0 V).
- Optional: connect an additional power supply unit to terminal blocks 3 and 4 to provide a redundant power supply.

9.2 Combined operation with a system power supply

- Connect a system power supply to two DIN rail connectors on the left of the group. (MINI-SYS-PS-100-240AC/24DC/1.5, Order No. 2866983 or MINI-PS100-240AC/24DC/1.5/EX, Order No. 2866653 and two DIN rail connectors, Order No. 2709561)
- A second power supply unit can be used to create a redundant supply concept.

10 Twisted pair interface (TP port)

NOTE: Interference

Only use shielded twisted pair cables and corresponding shielded RJ45 connectors.

One Ethernet interface in RJ45 format is on the front of the device, which can only be connected to twisted pair cables with an impedance of 100 Ω.

The data transmission speed is 10/100 Mbps

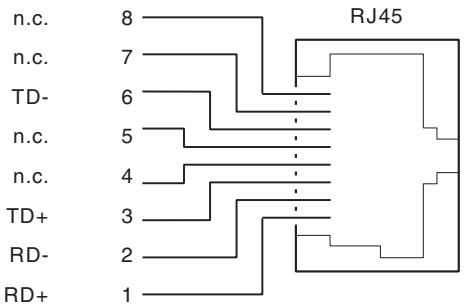


Figure 8 Pin assignment

- Push the Ethernet cable with the crimped RJ45 plug into the TP interface until the plug engages with a click. Observe the plug coding.

11 Fiber optic interface (FO port)

WARNING: Risk of eye injury

During operation, do not look directly into transmitter diodes or use visual aids to look into the glass fibers. The infrared light is not visible.

Avoid contamination.

Remove the dust protection caps just before the connectors are connected!

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

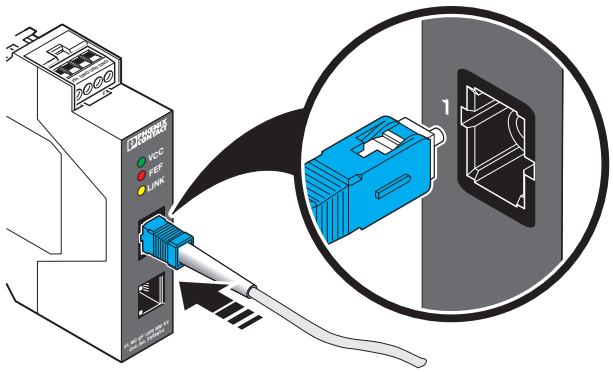


Figure 9 Connect SC simplex plug

- Remove the dust protection cap.
- Insert the fiber optics cable into the SC simplex connector of the transmit and receive channel. Make sure that the coding is in the correct position.
- Ensure the connector is secure by gently pulling it.

12 Error localization

12.1 Normal operation

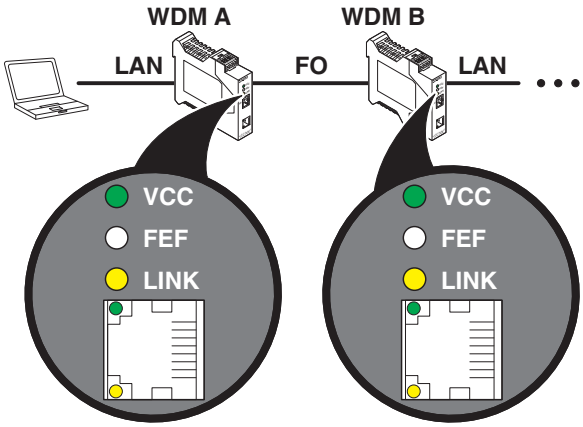


Figure 10 Diagnostics indicators in normal operation

12.2 Fault on the copper cable

The diagnostics indicator depends on DIP 6.

LFP activated, global (DIP 6 = OFF, default setting)

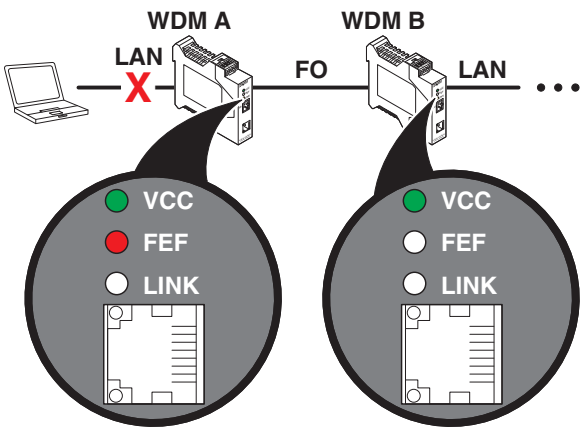


Figure 11 LAN fault with LFP activated, global

DIP 6 = OFF: by default, all Link LEDs go out in the event of a fault in a twisted pair segment.

The red FEF LED indicates the FO converter where the twisted pair segment failed.

LFP deactivated, local (DIP 6 = ON)

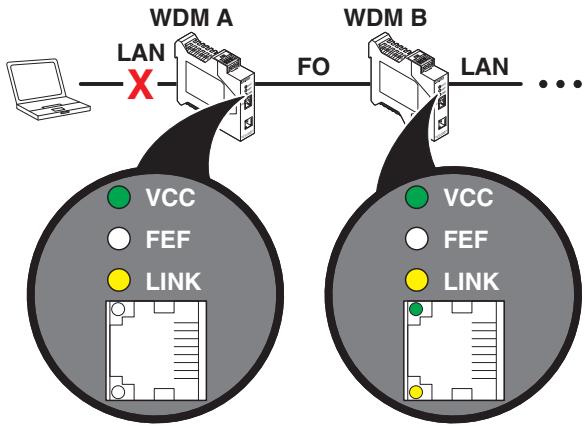


Figure 12 LAN fault with LFP deactivated, local

DIP 6 = ON: in the “LFP deactivated, local” setting, only the Link LEDs of the corresponding port go out in the event of a fault in a twisted pair segment. The Link LEDs at the copper port on the other media converter and for the fiber optic connection are on. The “LFP deactivated, local” setting therefore enables more precise diagnostics.

12.3 Fault on the fiber optic cable

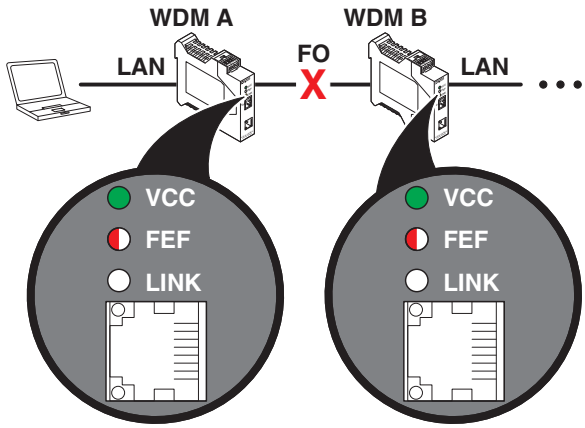


Figure 13 Fiber optic fault

In the case of FL MC EF WDM... FO converters, only one glass fiber is used to transmit and receive. Therefore, in the event that the fiber optic connection is lost, it may not be easy to detect which FO converter was the first to stop receiving data.

In this case, the FEF LED cannot be used to determine whether and at which FO converter the fiber optic connection is interrupted.