FL MC 1000 SC(ST)

Fiber optic converter to convert 10/100Base-Tx to multi-mode fiberglass



Data sheet
3384_en_B

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1 Description

Basic media converter capability with low installed cost allows a high level of immunity to interference and long transmission range in industrial applications by converting the 10/100Base-Tx Ethernet interface to fiber optics (100 Mbps according to FX standard). The FL MC 1000… is ideal for general industrial applications.

The RJ45 port offers an auto crossing function, which means it is not necessary to make a distinction between 1:1 and crossover cables.

2 Features

- 10/100Base-Tx
- 0 to 60°C ambient temperature operating range
- Auto crossing simplifies cabling
- Link fault pass through diagnostics
- Layer 1 security for the RJ45 port
- Individual LEDs at each port indicate communication activity and data rate
- SC-duplex and ST connections
- Mounts on NS 35 DIN rail

Make sure you always use the latest documentation.
It can be downloaded at phoenixcontact.net/product/XXXXXXX.

This document is valid for all products listed in the “Ordering data” on page 2.

3 Ordering data

Products

Description	Type	Order No.	Pcs./Pkt.
Fiber optic converter, LC connection (1310 nm), for converting 10/100Base-Tx to multi-mode fiberglass	FL MC 1000 SC	2891320	1
Fiber optic converter, LC connection (1310 nm), for converting 10/100Base-Tx to multi-mode fiberglass	FL MC 1000 ST	2891321	1

Accessories

Description	Type	Order No.	Pcs./Pkt.
Universal end clamp	E/NS 35 N	0800886	50
PCB connector, nominal current: 12 A, rated voltage (III/2): 320 V, nominal cross section: 2.5 mm², number of positions: 3, pitch: 5 mm, connection method: Screw connection with tension sleeve, color: green, contact surface: Tin	MSTB 2,5/ 3-ST	1754465	1
Surge protection in accordance with Class EA (CAT6A), for Gigabit Ethernet (up to 10 Gbps), token ring, FDDI/CDDI, ISDN, and DS1. Suitable for Power over Ethernet (PoE+) “Mode A” and “Mode B”. RJ45 attachment plug with separate grounding cable and ground connection snap-on foot for NS 35 DIN rails.	DT-LAN-CAT.6+	2881007	1
Dust protection caps for RJ45 socket	FL RJ45 PROTECT CAP	2832991	10
Patch cable, CAT5, assembled, 0.5 m	FL CAT5 PATCH 0,5	2832263	1
Patch cable, CAT5, assembled, 1.0m	FL CAT5 PATCH 1,0	2832276	1
Patch cable, CAT5, assembled, 2.0 m	FL CAT5 PATCH 2,0	2832289	1
Patch cable, degree of protection: IP20, number of positions: 8, 10 Gbps, CAT6A, cable outlet: straight	NBC-R4AC-R4AC-IE8A/…/…	1411854	1
Patch cable, CAT6A, 4-pair, shielded, connection not crossed (line), assembled at both ends with RJ45/IP20 connectors, outer sheath material: PUR, length: 2.0 m	NBC-R4AC/10G-10G-R4A/10G-94F/2,0	1408360	1
Patch cable, CAT6A, 4-pair, shielded, connection not crossed (line), assembled at both ends with RJ45/IP20 connectors, outer sheath material: PUR, length: 3.0 m	NBC-R4AC/10G-10G-R4A/10G-94F/3,0	1408365	1
PROFINET patch cable, shielded, star-quad, 22 AWG stranded (7-wire), green, straight RJ45 male connector/IP20 to straight RJ45 male connector/IP20, length: 1.0 m	NBC-R4AC/1,0-93B/R4AC	1408968	1
PROFINET patch cable, shielded, star quad, 22 AWG stranded (7-wire), green, straight RJ45 plug/IP20, to straight RJ45 plug/IP20, length: 2 m	NBC-R4AC/2,0-93B/R4AC	1408969	1
PROFINET patch cable, shielded, star quad, 22 AWG stranded (7-wire), green, straight RJ45 plug/IP20 to straight RJ45 plug/IP20, length: 5 m	NBC-R4AC/5,0-93B/R4AC	1408970	1
	FOC-LC:PA-SC:PA-OM2:D01/1	1115607	
	FOC-LC:PA-SC:PA-OM2:D01/2	1115605	
Multi-mode OM2 duplex jumper, SC-SC, UPC polishing, length 1 m	FOC-SC:PA-SC:PA-OM2:D01/1	1115536	1

Accessories

Description	Type	Order No.	Pcs./Pkt.
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 2m	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

4 Technical data

General data	
Function	Converter, Ethernet 10/100Base-Tx to fiber optic; conforms to standard IEEE 802.3
Housing dimensions (width x height x depth)	28 x 110 x 70 mm
Weight, without connectors	315 g
Operating temperature	0°C … 60°C
Storage temperature	0°C … 70°C
Degree of protection	IP20, DIN 40050, IEC 60529
Protection class	Class 3 VDE 0106; IEC 60536
Humidity (operation and storage)	5% to 95%, no condensation
Air pressure (operation)	66 kPa … 108 kPa, 4850 m above sea level
Air pressure (storage)	66 kPa … 108 kPa, 4850 m above sea level
Mounting	NS 35 (EN 60715)
Preferred mounting position	Perpendicular to a standard mounting rail
Connection to protective earth ground	Snapped onto a grounded mounting rail
Latency	4 µs

Supply voltage (U_S)	
Connection type	Removable, screw-clamp connector
Wire size (solid/stranded/AWG)	0.2 … 2.5 mm^2 / 0.2 … 2.5 mm^2 / 24 … 12 AWG
Recommended PE wire size	2.5 mm^2
Nominal power supply	24 V DC, 48 V DC
Permissible ripple	3.6 V_{pp} within the permissible voltage range
Permissible voltage range	12 V DC … 57 V DC
Current consumption, typical	73 mA @ 24 V DC
Inrush current at 48 V DC	8 A (1.8 ms)
Test voltage	500 V AC for one minute
Protection against polarity reversal	Present

Interfaces	
Properties of RJ45 port	
Total number of RJ45 Ethernet interfaces	1
Connection format	RJ45 female
Connection medium	Twisted-pair cable with a conductor cross section of 0.14 mm^2 to 0.22 mm^2
Cable impedance	100 Ω
Transmission speed	10/100 Mbps
Maximum network segment length	100 m
MDI/MDIx switchover	Automatic (auto MDI/MDIX)
Properties of fiber optic port	
Total number of FO ports	1
Connection format	SC, ST
Wavelength	1310 nm
Transmission speed	100 Mbps
Transmission length	8 km with F-G 62.5/125 0.7 dB/km F1000 3.3 km with F-G 62.5/125 2.6 dB/km F600 9.6 km with F-G 50/125 0.7 dB/km F1200 5.3 km with F-G 62.5/125 1.6 dB/km F800 2 km with HCS GI fiber with F-GK 200/230

Mechanical tests	
Vibration resistance according to IEC 60068-2	10 … 150 Hz, 5g
Shock test according to IEC 60068-2-24, operating	30g, 11 ms
Free fall according to IEC 60068-2-32	100 cm

Conformance
IEC 61000-6.2

Approvals	
General	CE ROHS WEEE 2002/96/EC
Hazard location $_{C}UL_{US}$	Class I, Div. 2, Groups A, B, C, D

5 Dimensions

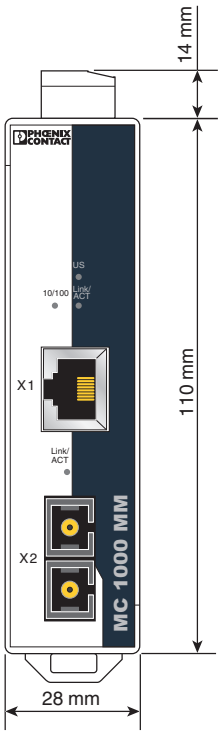


Figure 1 Housing dimensions

6 Overview

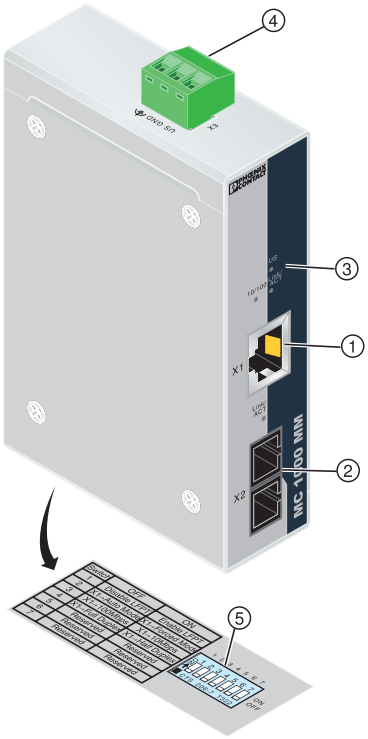


Figure 2 Connectors and LEDs

1 RJ45 port
2 Fiber optic port
3 LEDs
4 Power connector
5 DIP switch

6.1 Diagnostic and status indicators

US	On	Supply voltage (U_S) in the tolerance range
	Off	Supply voltage (U_S) too low
LNK/ACT	On	Indicates an electrical link
	Flashing	Data transmission is in process
10/100 (RJ45 port only)	On	Port is operating at 100 Mbps
	Off	Port is operating at 10 Mbps

LNK/ACT LED:

ON: indicates an electrical link

Flashing: indicates network traffic (at high data rates the blinking is in a constant rate)

7 Installation

CAUTION:

Only qualified personnel may start up and operate this device. Qualified personnel are persons authorized to start up, ground and mark devices, systems and equipment according to the standards of safety technology.

NOTE:

The FL MC 1000 SC(ST) module is designed for SELV and PELV operation according to IEC 61140/EN 61140.

Install the module on a clean NS 35 rail. To avoid contact resistance use only clean, corrosion-free rails that meet the EN 60715 standard. End clamps can be mounted on both sides of the module to stop the modules from slipping on the rail.

NOTE:

Connect the mounting rail to protective earth ground using a grounding terminal block. The modules are grounded when they are snapped onto the rail. Connect protective earth ground with low impedance.

7.1 Assembly

1. Place the module onto the rail from above. The upper holding keyway must be hooked onto the top edge of the rail.
2. Push the module from the front towards the mounting surface.
3. Once the module has been snapped on properly, check that it is fixed securely on the rail.

7.2 Removal

1. Insert a suitable tool (e.g., screwdriver) into the arresting latch and pull it down.
2. Pull the module slightly away from the mounting surface.
3. Lift the module from the rail.

7.3 Power connection

The device is designed for SELV and PELV operation at +24 V DC according to IEC 61140/EN 61140. Only SELV and PELV according to the defined standards may be used for supply purposes.

Snapping the device onto a grounded rail connects it to the rail ground potential.

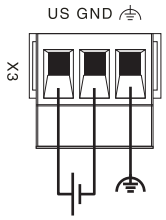


Figure 3 Power connection

Use power conductors between 0.2 - 2.5 mm² (24 - 12 AWG). Torque connection screws to 0.5 - 0.6 Nm (5 - 7 lb-in.).

7.4 Ethernet interface

The FL MC 1000… has one Ethernet port on the front in RJ45 format to which a twisted-pair cable with an impedance of 100 Ω can be connected. The data transmission speed is 10/100 Mbps. This port has an auto crossing function: it is not necessary to make a distinction between 1:1 or crossover Ethernet cables.

- Connect the twisted-pair cable to the RJ45 connector.
- Ensure the connection is secure by gently pulling it.

7.5 Fiber optic interface

WARNING:

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.

NOTE:

Do not remove dust protection caps until just before the plug-in connectors are connected. They prevent contamination of the transmit and receive elements.

NOTE:

Observe the cable manufacturer's technical data when handling the various fiber optic cables.

In order for the communication path to be immune to interference, the permissible values for bending radius, tensile force and pressure force must not be exceeded.

- Connect the fiber optic cable to the SC-duplex or ST plug-in connector for the transmit and receive channel. Make sure the keying is in the correct position.
- Ensure the connection is secure by gently pulling it.

8 Configuration

A seven-position DIP switch on the bottom surface of the FL MC 1000… allows configuration of operating characteristics.

Switch	OFF	ON
1	Disable LFPT	Enable LFPT
2	X1→Auto Mode	X1→Forced Mode
3	X1→100Mbps	X1→10Mbps
4	X1→Full Duplex	X1→Half Duplex
5	Reserved	Reserved
6	Reserved	Reserved
7	Reserved	Reserved

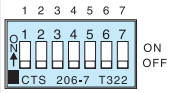


Figure 4 DIP switch

8.1 Link fault pass through (DIP 1)

Link fault pass through is a function that allows diagnostics from one port to pass through to the other port.

The link status of the RJ45 port is always forwarded to the fiber optic port. However, link fault pass through from the fiber optic port to the RJ45 port is selectable (via DIP 1). When link fault pass through is disabled, devices may not be able to detect that the fiber optic network connection is interrupted. The connected device either doesn't know it is not communicating (diagnostics cannot be generated) or it continually attempts to re-establish communication, increasing the network load and application response time.

When enabled, a link loss at the fiber optic port is forwarded to the RJ45 port so both ports of the converter are disabled.

Link fault pass through should only be used when two media converters are connected in series.

DIP 1 can be used to enable link fault pass through (LFPT), which allows faults to propagate globally through the system, or stay local to each link segment.

DIP	Position	Function
1	On	LFPT enabled (global): in the event of a fault, the entire connection is disabled.
	Off	LFPT disabled (local): in the event of a fault, only the interrupted part is disabled. This is useful during startup and in the event of an error.

8.2 Data transfer and configuration (DIP 2, 3 and 4)

DIP	Position	Function
2	Off	Auto-negotiation mode
	On	Forced mode (RJ45 port set by DIP switches 3 and 4)
3	Off	Transfer rate set to 100 Mbps
	On	Transfer rate set to 10 Mbps
4	Off	Full duplex
	On	Half duplex

DIP switch positions 5, 6 and 7 are reserved for future use.

8.3 Security frames

The RJ45 port accepts security frames. FL PLUG GUARD… security frames lock the RJ45 cable in place, reducing the chance of an unauthorized change or network access.