

ETHERNET CABLING SYSTEM

Quick Reference Guide

ETHERNET TRANSCEIVER 10 Mbps TP/FL

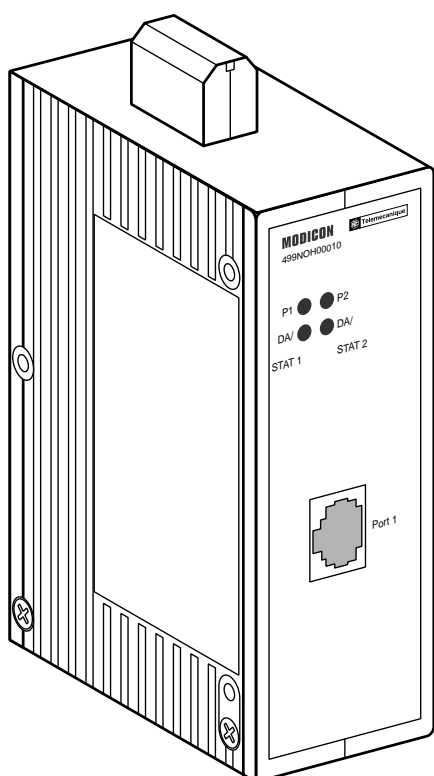
ETHERNET Transceiver

Media converter 10BASE-T/10BASE-FL for

ISO/DIN Rail

Order No.

499NTR10010



The media converter Ethernet transceiver 10 Mbps TP/FL enables media transition from 10BASE-T (twisted pair cabling) to 10BASE-FL (fiber optic).

The module conforms to the specifications of IEEE 802.3 and ISO/IEC 8802-3.

The media converter has a twisted pair (TP) interface (RJ45 socket) and an optical interface (BFOC). Through TP port, other TP components can be attached (Ethernet Hub 10 Mbps 4TP, 10 Mbps 3TP/2FL,...). The FL port offers connection to optical network (Ethernet Hub 10 Mbps 3TP/2FL,...).

Monitoring LEDs for:

- Power,
- RxData,
- Link status.

Link status monitoring can be disabled.

Operation in industrial areas.

Mounting on ISO/DIN rail.

Low current consumption.

Compact construction.

You will find a detailed description for construction of a local area network in network design and network installation in the "Transparent Factory User and Planning Guide" (Order no. 490USE13300).

We have checked that the contents of the technical publication agree with the hardware and software described. However, it is not possible to rule out deviations completely, so we are unable to guarantee complete agreement. However, the details in the technical publication are checked regularly. Any corrections which prove necessary are contained in subsequent editions.

We are grateful for suggestions for improvement.

We reserve the right to make technical modifications.

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Note

We would point out that the content of these operating instructions is not part of, nor is it intended to amend an earlier or existing agreement, permit or legal relationship. All obligations on Schneider Automation arise from the respective purchasing agreement which also contains the full warranty conditions

which have sole applicability. These contractual warranty conditions are neither extended nor restricted by comments in these operating instructions.

We would furthermore point out that for reasons of simplicity, these operating instructions cannot

describe every conceivable problem associated with the use of this equipment. Should you require further information or should particular problems occur which are not treated in sufficient detail in the operating instructions, you can request the necessary information from your Schneider Electric regional sales office.

General

Electricity is used to operate this equipment. Comply in every detail with the safety requirements specified in the operating instructions regarding the voltages to apply!



Warning

If warning notices are ignored, severe injury and/or material damage may occur.

Only appropriately qualified staff should work on or near this equipment. Such staff must be thoroughly acquainted with all the warnings and maintenance

measures contained in these operating instructions.

The proper and safe operation of this equipment assumes proper transport, appropriate storage and assembly and careful operation and maintenance.

Staff qualification requirements

Qualified staff within the meaning of these operating instructions or the warning notes are persons familiar with setting up, assembling, starting up and operating this product and who have appropriate qualifications to cover their

activities, such as:

- training or instruction/entitlement to switch circuits and equipment/systems on and off, ground them and identify them in accordance with current safety standards;

- training or instruction in accordance with current safety standards in looking after and using appropriate safety equipment;
- first aid training.

Safety guidelines



Warning

Ethernet Transceiver 10 Mbps TP/FL units are designed for operation with safe extra-low voltage. Accordingly, only safe extra-low voltages (SELV) conforming to IEC950/EN60950/VDE0805 may be connected to the supply voltage connections.

1. Functional description

1.1 GENERAL FUNCTIONS

Signal regeneration

The Transceiver 10 Mbps TP/FL processes the signal shape and amplitude of the data received.

- the TP line is interrupted or short-circuited,
- Transceiver 10 Mbps TP/FL hardware error.

1.2 SPECIFIC FUNCTIONS OF THE TP INTERFACE

Link control

The Transceiver 10 Mbps TP/FL monitors the connected TP line segments for short-circuit or interrupt using idle signals during frame pauses in accordance with IEEE standard 802.3 10BASE-T. The Transceiver 10 Mbps TP/FL does not transmit any data over a TP segment from which it does not receive an idle signal.

Note: A non-occupied interface is assessed as a line interrupt. The TP line to terminal device which is switched off is likewise assessed as a line interrupt as the de-energised transceiver cannot transmit idle signals.

Auto polarity exchange

If the reception line pair is incorrectly connected (RD+ and RD- switched) polarity is automatically reversed.

1.3 SPECIFIC FUNCTIONS OF THE F/O INTERFACE

Link control

The Transceiver 10 Mbps TP/FL monitors the connected F/O lines for interrupts using idle signals during frame pauses in accordance with IEEE standard 802.3 10BASE-FL. The Transceiver 10 Mbps TP/FL does not transmit data to an F/O line from which it is not receiving an idle signal.

Low Light Detection: If the optical input power decreases below the low light threshold the transmit and receive path will be disabled for data and the idle signal will be transmitted.

1.4 DISPLAY ELEMENTS

Equipment status

The 4 LEDs on top provide information about the status which affects the function of the entire Transceiver 10 Mbps TP/FL.

P1 - Power 1 (green LED)

- lit: supply voltage 1 present
- not lit:
 - supply voltage 1 not present,
 - hardware fault in Transceiver 10 Mbps TP/FL

P2 - Power 2 (green LED)

- lit: supply voltage 2 present
- not lit:
 - supply voltage 2 not present,
 - hardware fault in Transceiver 10 Mbps TP/FL

Port status

These groups of LEDs display port-related information.

DA STAT 1 - Data and Link status TP-Port (Port 1) (green/yellow LED)

- lit yellow: Transceiver 10 Mbps TP/FL receives data on the TP interface
- Depending on the network load the LED can lit short up to continuously.

- lit green:

- Transceiver 10 Mbps TP/FL receiving idle signals from the TP segment,
- the attached TP segment works properly
- not lit: Transceiver 10 Mbps TP/FL not receiving idle signals from TP segment,
- the assigned TP port is not attached,
- the attached device is switched off,

DA STAT 2 - Data and link status of F/O port (Port 2) (green/yellow LED)

- lit yellow: Transceiver 10 Mbps TP/FL receiving data from F/O segment
- Depending on the network load the illumination of the LED can vary between flickering and continuous illumination.

- lit green:

- Transceiver 10 Mbps TP/FL receiving idle signals from the F/O segment,
- the attached F/O segment works properly
- not lit: Transceiver 10 Mbps TP/FL not receiving idle signals from F/O segment,
- the assigned F/O port is not attached,
- the attached device is switched off,
- Low Light Detection
- the receive F/O line is interrupted,
- Transceiver 10 Mbps TP/FL not receiving data at the interface,
- Transceiver 10 Mbps TP/FL hardware error.

Data transmission

- If the Transceiver 10 Mbps TP/FL does not receive anything at the TP port nothing will be transmitted at the F/O port, not even idle signals.
- If the Transceiver 10 Mbps TP/FL does not receive anything at the F/O port nothing will be transmitted at the TP port, not even idle signals.

The Transceiver 10 Mbps TP/FL supports half duplex (HDX) and full duplex (FDX) connections. It is not necessary to change the configuration.

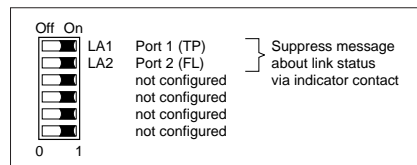


Fig. 1: 6-pin DIP switch

1.5 CONTROLS

6-pin DIP switch

Using the 6-pin DIP switch on the top of the Transceiver 10 Mbps TP/FL housing

- the message about the link status can be suppressed by the indicator contact on a port-by-port basis. Using switch LA1, the message about the link status of the TP port (port 1) is suppressed, using switch LA2, the message about the link status of the F/O port (port 2) is suppressed. Factory setting: switch position 1 (ON), i.e. message not suppressed, the indicator contact passes the faulty link status.

1.6 INTERFACES

TP connection

One 8 pole RJ45 socket enables an independent TP segment to be connected. The housing of the socket is electrically connected to the front panel. So it is also connected to the housing of the Transceiver 10 Mbps TP/FL.

- Pin configuration of the RJ45 socket:

- TD+: Pin 3, TD-: Pin 6
- RD+: Pin 1, RD-: Pin 2
- remaining pins: not configured.

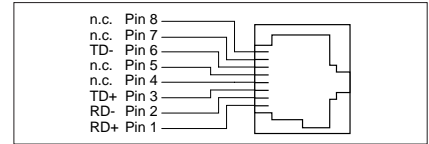


Fig. 2: Pin configuration TP interface

F/O connection

One optical port conforming to 10BASE-FL (BFOC/2.5 (ST) sockets) enables terminal devices or optical network components to be connected.

5-pin terminal block

The supply voltage and the indicator contact are connected via a 5-pin terminal block with screw locking mechanism.



Warning

The Transceiver 10 Mbps TP/FL device is designed for operation with SELV. Only safe extra-low voltages to IEC950/EN60950/VDE0805 may therefore be connected to the supply voltage connections and to the indicator contact.

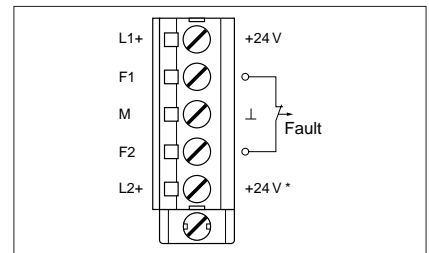


Fig. 3: Pin configuration of 5-pin terminal block

- Voltage supply: The voltage supply can be connected to be redundant. Both inputs are decoupled. There is no load distribution. With redundant supply, the power pack supplies the Transceiver 10 Mbps TP/FL alone with the higher output voltage. The supply voltage is electrically isolated from the housing.

- Indicator contact: Contact interrupt indicates the following by means of a volt-free indicator contact (relay contact, closed circuit):

- the failure of at least one of the two supply voltages.
 - a permanent fault in the transceiver (internal 5 V DC voltage, supply voltage 1 or 2 not within the permissible range).
 - the faulty link status of the TP port (port 1), if the setting of DIP switch LA1 is "ON".
 - the faulty link status of the F/O port (port 2), if the setting of DIP switch LA2 is "ON".
- The indication of the link state can be masked on a port-by-port basis using the DIP switches LA1 and LA2.

The indicator contact is closed,

- if the power supply is OK.
- if the setting of DIP switch LA1 is "ON" and the link status of port 1 is OK (or if the setting of DIP switch LA1 is "OFF").
- if the setting of DIP switch LA2 is "ON" and the link status of port 2 is OK (or if the setting of DIP switch LA2 is "OFF").

Note: In the case of the voltage supply being routed without redundancy, the Transceiver 10 Mbps TP/FL indicates the failure of a supply voltage. You can prevent this message by feeding in the supply voltage through both inputs.

2. Configuration

2.1 CONNECTING TO EXISTING NETWORKS

Terminal devices, Quantum or Premium PLC, can be attached by interference insensitive F/O lines in the industrial ETHERNET area.

Via the Transceiver 10 Mbps TP/FL terminal devices can be tied to existing ETHERNET networks with:

- Ethernet hub 10 Mbps 4TP,
- Ethernet hub 10 Mbps 3TP/2FL,
- Ethernet Switch 10/100 Mbps 7TX,
- Ethernet Switch 10/100 Mbps 5TX/2FX.

Hints on calculating the maximum network expansion can be found in the "Ethernet Reference Manual".

The maximum number of cascaded Transceiver 10 Mbps TP/FL between terminal devices or repeaters is two.

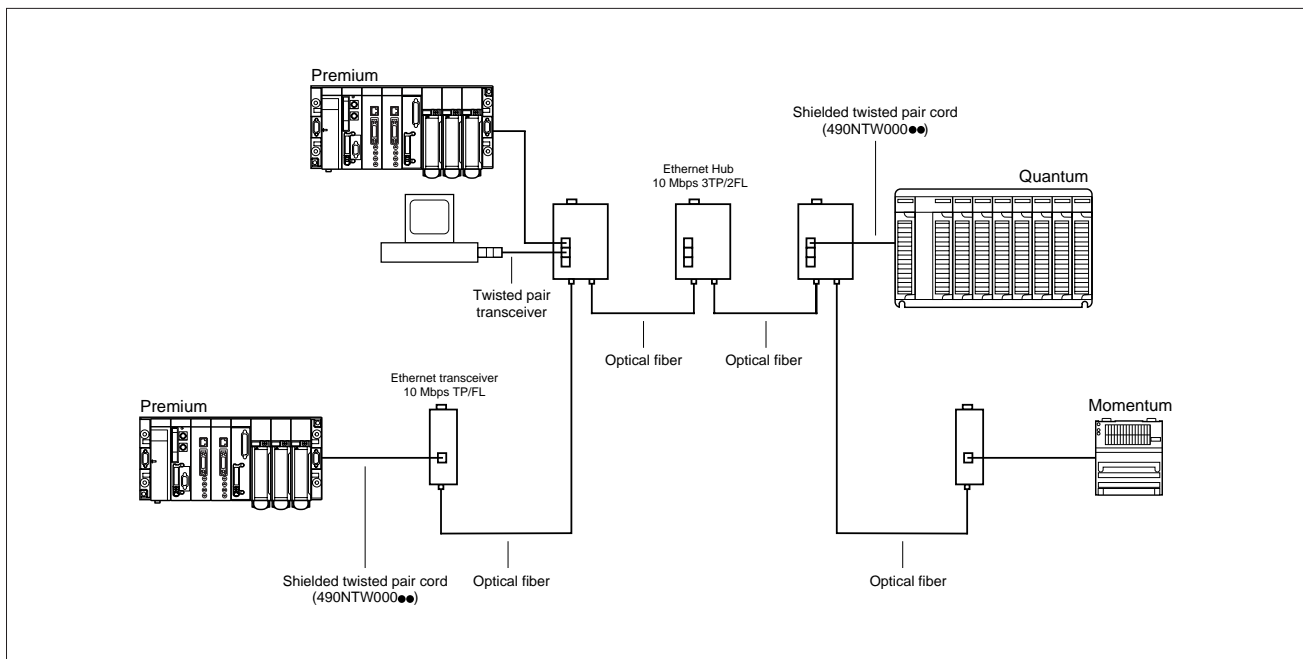
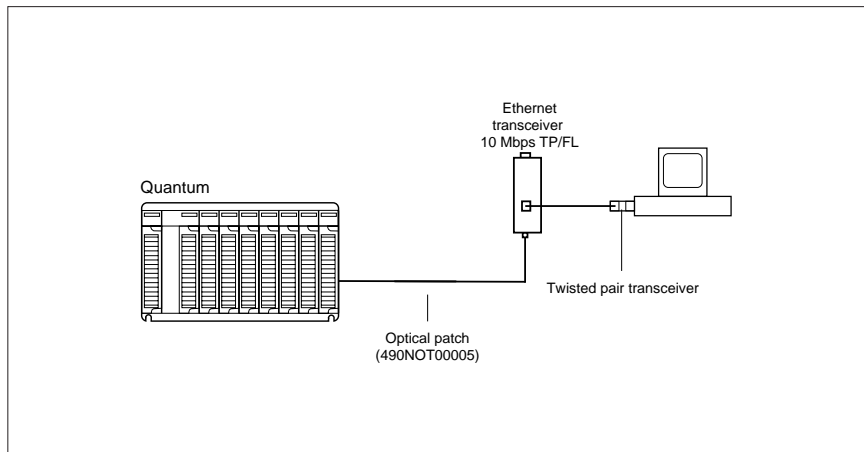
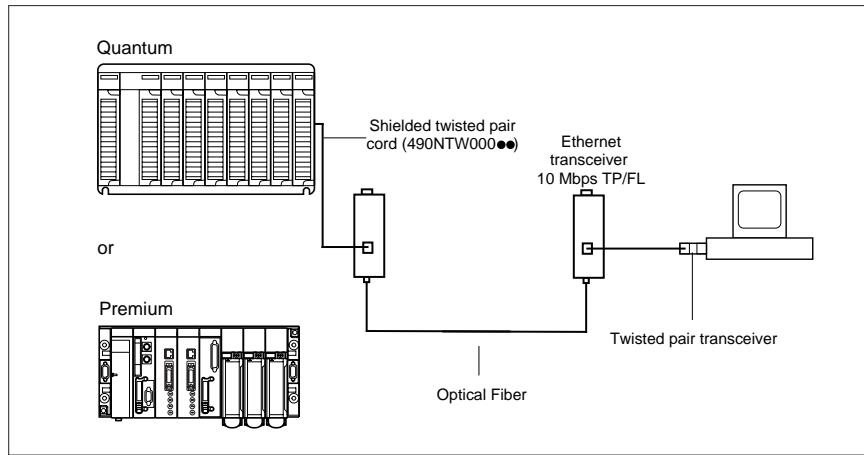


Fig. 4: Possibilities of Configuration

3. Assembly, startup procedure and dismantling

3.1 UNPACKING, CHECKING

- Check whether the package was delivered complete (see scope of delivery).
- Check the individual parts for transport damage.



Warning

Use only undamaged parts!

3.2 ASSEMBLY

The equipment is delivered in a ready-to-operate condition. The following procedure is appropriate for assembly:

- Check whether the switch pre-setting suits your requirements.
- Pull the terminal block off the Transceiver 10 Mbps TP/FL and wire up the supply voltage and indicator lines.
- Fit the Transceiver 10 Mbps TP/FL on a 35 mm ISO/DIN rail to DIN EN 50 022.
- Suspend the upper snap-in hook of the Transceiver 10 Mbps TP/FL on the ISO/DIN rail, insert a screwdriver horizontally under the housing into the locking slide, pull this downwards (see. Fig. 6, dismantling) and press the bottom of the module onto the ISO/ DIN rail until it locks in position (Fig. 5).
- Fit the signal lines.

Notes:

- The housing of the Transceiver 10 Mbps TP/FL is grounded via the ISO/DIN rail. There is no separate ground connection.
- The screws in the lateral half-shells of the housing must not be undone under any circumstances.
- The shielding ground of the twisted pair lines which can be connected is electrically connected to the housing.

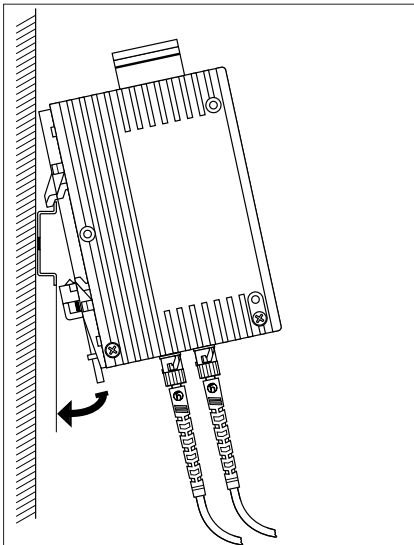


Fig. 5: Assembling Transceiver 10 Mbps TP/FL

3.3 STARTUP PROCEDURE

You start up the Transceiver 10 Mbps TP/FL by connecting the supply voltage via the 5-pin terminal block. Lock the terminal block with the locking screw at the side.

LWL-Connection

For an F/O segment the Transceiver 10 Mbps TP/FL has one port with two BFOC sockets, one to transmit and one to receive data.

The maximum length of an attached F/O segment is:

- 2600 m at 50/125 μ m fiber type,
- 3100 m at 62,5/125 μ m fiber type.

Line attenuation:

According to IEEE 802.3 10BASE-T, the line attenuation of a single cable segment may not exceed 11.5 dB at frequencies between 5 and 10 MHz ($Z_L = 100 \Omega$). This value comprises

- the attenuation of the twisted pair cable,
- plug connector attenuation, and
- reflection losses caused by mismatching of the various components in the simple cable segment, e.g. patches in which twisted pair cables are connected together with different characteristic wave impedances at the coupling point which are however within the tolerances.

3.4 DISMANTLING

To take the Transceiver 10 Mbps TP/FL off the ISO/DIN rail, insert a screwdriver horizontally under the housing into the locking slide, pull it downwards and tilt the Transceiver 10 Mbps TP/FL upwards (Fig. 6).

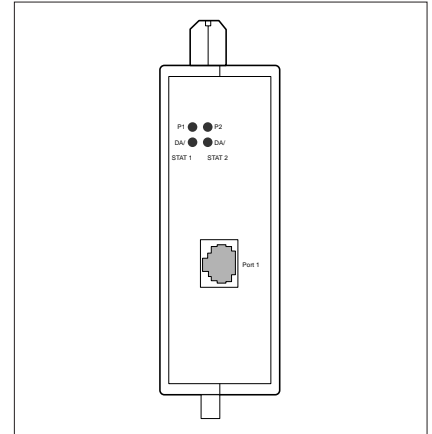


Fig. 6: Dismantling

4. Technical data

General data

Operating voltage	DC 18 to 32 V safe extra-low voltage (SELV) (redundant inputs decoupled)	
Current consumption	typ. 80 mA at 24 VDC max. 100 mA at 24 VDC	
Overload current protection at input	non-replaceable thermal fuse	
Dimensions W x H x D	40 mm x 134 mm x 80 mm	1.7 in x 5.28 in x 3.35 in
Weight	520 g	1.15 lb
Ambient temperature	0 °C to + 60 °C	32 °F to + 140 °F
Storage temperature	- 40 °C to + 80 °C	-40 °F to + 176 °F
Humidity	10% to 95% (non condensing)	
Protection class	IP 30	
Laser protection	Class 1 conform to EN 60825	
Radio interference level	EN 55022 Class B	
Interference immunity	EN 61000-6-2:1999	
Agency Approval	IEC 61131-2, Marine (Germanisher Lloyd)	

Network size

Transition	TP port ↔ F/O port	
Propagation equivalent	50 m	(164 ft)
Variability value	1 BT	(1 BT = 100 ns)

F/O port

Optical output power		
Graded-index fiber 50/125 µm (average)	min. -22.0 dBm	max. -16.2 dBm
Graded-index fiber 62.5/125 µm (average)	min. -19.0 dBm	max. -12.4 dBm
Optical input power	min. -33.0 dBm	

TP line length (TP port ↔ TP port)

Length of a twisted pair segment	max. 100 m	(328 ft)
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F/O line length (example)

50/125 µm fiber	max. 2.600 m	(8530 ft)
62.5/125 µm fiber	max. 3.100 m	(10170 ft)

Scope of delivery

Ethernet Transceiver 10 Mbps TP/FL incl. terminal block for supply voltage Quick reference guide	
Order number	Ethernet Transceiver 10 Mbps TP/FL 499NTR10010

Accessories

Ethernet SFTP cat5RJ45 cords	490NTW000●●
Ethernet SFTP cat5RJ45 crossed cords	490NTC000●●
Ethernet MTRJ/ST 5 m optical patch	490NOT00005
Note: The optical patch is made up of two 62.5/12.5 multi mode glass fibers, used for 1300 nano-meter wavelengths.	
Transparent Factory User and Planning Guide	490USE13300
Transparent Factory Network Design and Cabling Guide	490USE13400



Notes on CE identification

The devices comply with the regulations of the following European directive:

89/336/EEC

Council Directive on the harmonisation of the legal regulations of member states on electromagnetic compatibility (amended by Directives 91/263/EEC, 92/31/EEC and 93/68/EEC).

Area used	Requirements for emitted interference	interference immunity
Industrial	EN 50081-2: 1993 EN 55022 Class A: 1998	EN 61000-6-2:1999

The product can be used in the residential sphere (residential sphere, business and trade sphere and small companies) and in the industrial sphere.

The precondition for compliance with EMC limit values is strict adherence to the construction guidelines specified in this description and operating instructions.



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