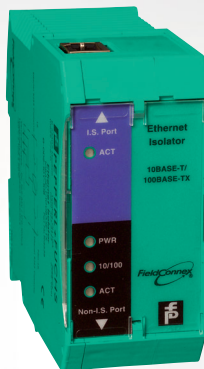


Ethernet Isolator EI-0D2-10Y-10B-LT

Manual



With regard to the supply of products, the current issue of the following document is applicable: The General Terms of Delivery for Products and Services of the Electrical Industry, published by the Central Association of the Electrical Industry (Zentralverband Elektrotechnik und Elektroindustrie (ZVEI) e.V.) in its most recent version as well as the supplementary clause: "Expanded reservation of proprietorship"

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1 Safety

1.1 General

Responsibility for planning, assembly, commissioning, operation, maintenance, and dismantling lies with the plant operator.

Installation and commissioning of all devices may be performed only by trained and qualified personnel.

Protection of operating personnel and the system is not ensured if the product is not used in accordance with its intended use.

Observe the applicable laws and regulations regarding the intended use of the device. The devices are only approved for proper use for the intended purpose. Improper use will void any warranty and liability claims.

The corresponding datasheets, declarations of conformity, and/or EC-type examination certificates form an integral part of this document. The data sheet contains the electronic data of the EC-type-examination certificate.

These documents can be found at www.pepperl-fuchs.com or contact your local Pepperl+Fuchs representative.

1.2 Symbols Used

Safety-Relevant Symbols



Danger!

This symbol indicates an imminent danger.

Non-observance will result in personal injury or death.



Warning!

This symbol indicates a possible fault or danger.

Non-observance may cause personal injury or serious property damage.



Caution!

This symbol indicates a possible fault.

Non-observance could interrupt the device and any connected systems and plants, or result in their complete failure.

Informative Symbols



Note

This symbol brings important information to your attention.



Action

1. This symbol indicates a paragraph with instructions. You are prompted to perform an action or a sequence of actions.

1.3 Declaration of Conformity

All products were developed and manufactured under observance of the applicable European standards and guidelines.



Note

A declaration of conformity can be requested from the manufacturer.

The product manufacturer, Pepperl+Fuchs GmbH, 68307 Mannheim, has a certified quality assurance system that conforms to ISO 9001.



1.4 Intended Use

The Ethernet Isolator is used to generate a galvanically isolated intrinsically safe Ethernet signal from a non-intrinsically safe Ethernet signal. It may be used to lead a standard Ethernet cable through a hazardous Zone 0 or Zone 1 area. For bridging the intrinsically Ethernet line through a hazardous area one Ethernet Isolator has to be used at each end.

The device is designed for mounting on a 35 mm DIN mounting rail according to EN 60715.

The device is constructed to satisfy the IP20 protection classification and must be protected accordingly from adverse environmental such as water spray or dirt exceeding the pollution severity level 2.

1.4.1 Marking

The modules are product-specifically marked with:

EI-0D2-10Y-10B-LT

Pepperl+Fuchs SE

68301 Mannheim/Germany

Ethernet Isolator

EI-0D2-10Y-10B

PTB 07 ATEX 2025 X



II (1) GD [Ex ia] IIB



II 3 (1GD) G Ex nA [ia IIB] II T4

1.5 Improper Use

The device not intended to be used for series connections of more than 2 Ethernet Isolators.

1.6 Installation and Commissioning

1.6.1 Requirements for installation within Zone 2

The device must be mounted for installation in the hazardous area in category 3G / Zone 2 in a housing which corresponds at least to protection class IP 54 per EN 60529 and which is suitable for this type of installation.

The connection and disconnection of non-power-limited circuits carrying current is permitted only during installation or maintenance, or for purposes of repair.

Devices being operated in connection with hazardous areas may not be changed or manipulated. If there is a defect, the product must always be replaced with an original part.

If the device has already been operated in general electrical installations, the device may subsequently no longer be installed in electrical installations used in combination with hazardous areas.

To provide a sufficient heat dissipation, mount the devices with a separation distance.

Keep half the distance of the device width to adjacent devices on each side of the device.

1.6.2 Installation in Connection with Intrinsically Safe Power Circuits

The EU-type examination certificate should be observed as first concern. It is especially important to observe the "special conditions for safe use" as far as contained in the certificate.

The intrinsically safe circuits of the devices (blue marking on the devices) may be routed into explosion-hazardous areas. Special care must be taken to ensure the safe separation from all non-intrinsically safe circuits.

The installation of the intrinsically safe circuits has to be conducted in accordance with the relevant installation regulations particularly EN 60079-14 / IEC 60079-14.

Connect only devices that are approved by EU-type examination certificate of the Ethernet Isolator for this kind of use, to the intrinsically safe port of the Ethernet Isolator.

If the device has already been operated in general electrical installations, the device may subsequently no longer be installed in electrical installations used in combination with hazardous areas.

1.6.3 Intrinsically Safe Wiring and Cable Parameter

Only Ethernet cables meeting the requirements of the EU-type examination certificate must be connected to the intrinsically safe port of the Ethernet Isolator.

Special care must be taken of the inductance / resistance-ratio (H/Ω) of the Ethernet cable used. The resulting value is an indicator for the stored energy within the cable (see chapter 2.4).

The length of the intrinsically safe cable between the 2 Ethernet Isolators may not exceed 100 m.

The shield contact of the intrinsically safe port is connected to the shield contact of the non-intrinsically safe port and the power supply connection inside the Ethernet Isolator.

1.7 Repair

The device must not be repaired, changed, or manipulated. In case of failure, always replace the device with an original device.

1.8 Delivery, Transport, and Storage

Check the packaging and contents for damage.

Check if you have received every item and if the items received are the ones you ordered.

Keep the original packaging. Always store and transport the device in the original packaging.

Always store the device in a clean and dry location. Observe the permissible storage temperature (see datasheet).

1.9 Disposal

The devices and the packaging material must be disposed of in accordance with the current applicable statutes and regulations in the respective country.

The devices do not contain any batteries that require separate disposal.

2 Product Specifications

2.1 Function

The Ethernet Isolator may be installed within the non-explosion-hazardous area and the Zone 2 hazardous area. As an associated apparatus it is certified to lead intrinsically safe instrumentation into Zone 0 and Zone 1 hazardous areas. It is a 1:1 data connector with automatic speed detection. Data is passed through without buffering.

The Ethernet Isolator can be used for any Ethernet-based application. This includes current and future PROFINET and FOUNDATION Fieldbus HSE installations. This intrinsically safe solution is well suited for:

- Mobile machinery and equipment in harsh environments
- Assemblies that are often removed, replaced or reworked
- In situations where cable breakage is a risk

The intrinsically safe energy limitation eliminates any need for protected installation. Intrinsically safe Ethernet can be connected and disconnected during normal plant operation without requiring a hot work permit.

The galvanic isolation eliminates the need for equipotential bonding between the safe area and the hazardous area. Significant cost savings are realized through reduced installation material and effort.

The internal design of the Ethernet Isolator includes a galvanically isolating fiber optic bridge and a voltage and current limiting circuit. Additionally it follows the stringent requirements for energy-efficient design. Low heat dissipation leads to reduced cooling requirements and if necessary highest packing density in the installation cabinet or equipment.

2.2 Typical Applications

The figure below (→ see Figure 2.1 on page 9) shows the typical usage of Ethernet Isolators within an Ethernet network. Using standard Ethernet cable (for cable parameters see chapter 2.4) and hardware, an up to 100 m long intrinsically safe connection can be established to connect the hazardous area and the network in the safe area. It is also a fast and easy way to bridge the Ethernet network through a Zone 0 or Zone 1 hazardous area. One Ethernet Isolator is required at each end of the intrinsically safe line.

The Ethernet Isolator requires a 24 VDC power supply.

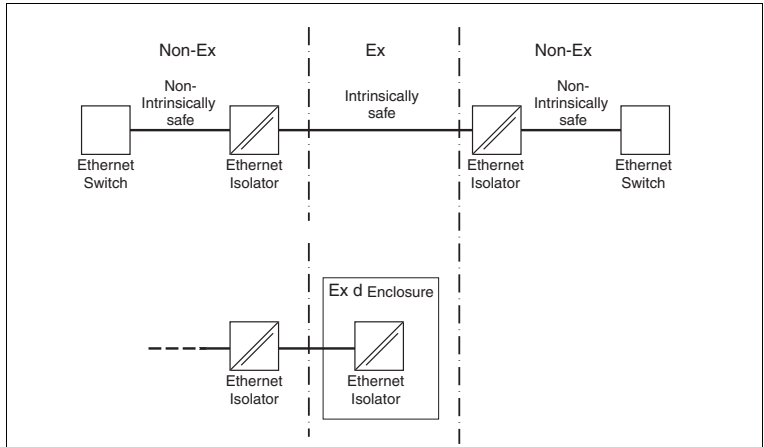
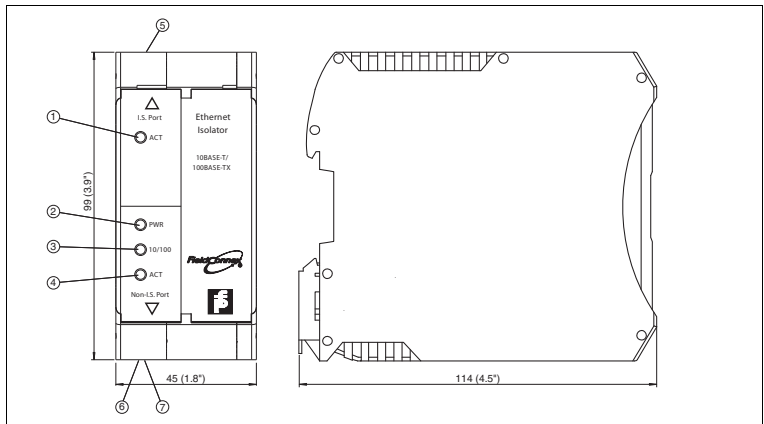


Figure 2.1 Application Examples

2.3 Component Overview and Dimensions



- 1 LED "Communication active intrinsically safe port"
- 2 LED "Power"
- 3 LED "Transfer rate"
- 4 LED "Communication active non-intrinsically safe port"
- 5 Intrinsically safe female connector
- 6 Non-intrinsically safe female connector
- 7 Power supply connection

All dimensions in millimeters (mm) and inch (") without tolerance indication

2.4 Technical Data EI-0D2-10Y-10B-LT

Supply

Rated voltage	19.2 ... 35 V DC
Rated current	150 ... 100 mA
Power loss	3 W

Ethernet Interface

Intrinsically safe port	10 BASE-T/100 BASE-TX
Non-intrinsically safe port	10 BASE-T/100 BASE-TX
Connection type	2 x RJ-45 , IEC 60603-7
Connector pinout	female connector ; TIA/EIA-568-B
Transfer rate	10/100 Mbit/s , Auto-Negotiation
Operating mode	Half/Full Duplex
Cabel type	CAT5e S/FTP AWG 24, Installation cable, L/R ratio max. 10 $\mu\text{H}/\Omega$ of all strand combinations
Total cable length	typ. 200 m/20 °C
Number of isolators	max. 2 in series connection

Ambient conditions

Ambient temperature	-40 ... 60 °C (-40 ... 140 °F)
Storage temperature	-40 ... 85 °C (-40 ... 185 °F)
Relative humidity	≤ 95 % non-condensing
Shock resistance	15 g 11 ms
Vibration resistance	1 g 10 ... 150 Hz
Pollution Degree	max. 2, according to IEC 60664

Mechanical specifications

Connection type	Terminals
Core cross-section	up to 2.5 mm ²
Housing material	Polyamide PA 66
Protection degree	IP20 according to EN 60529
Mass	195 g
Mounting	DIN rail mounting

3 Installation and Commissioning

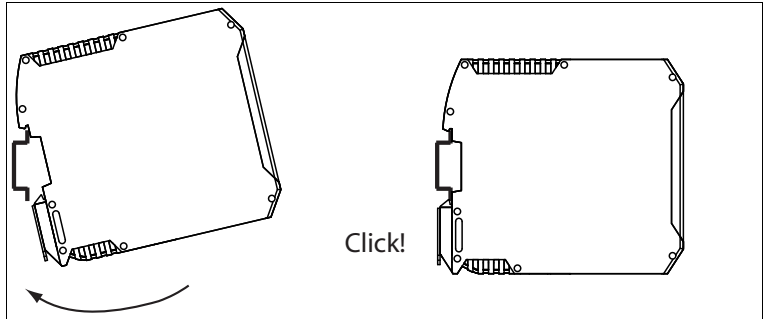
3.1 Mounting

Read the chapter on Safety and, in particular, the section on Installation and Commissioning (see chapter 1.6) before installing the device.



DIN-Rail Mounting of the Ethernet Isolator

1. Snap the device onto the DIN rail as follows:



3.2 Power Supply and Ethernet Wiring

Information on Auto-Crossover Function

The Ethernet Isolator does not support auto-crossover functionality. Therefore, connection problems can occur if the Ethernet Isolator is installed between 2 devices with activated auto-crossover function. In general, the deactivation of the auto-crossover function at 1 device solves the problem. In certain cases, you have to switch-off auto-crossover at both sides.

To prevent those connection problems, Pepperl+Fuchs recommends a fixed setting of the transfer polarity.

Information on Signal Attenuation

Because of derating effects at raising ambient temperatures, the maximum possible Ethernet cable length may be reduced by 0.3 m 0.4 m per each °C, depending on the cable quality and signal attenuation. For more information, refer to the specifications of the cable manufacturer.



Warning!

Risk of short circuit

Working on live parts can cause injuries and can compromise the function and the electrical safety of the device.

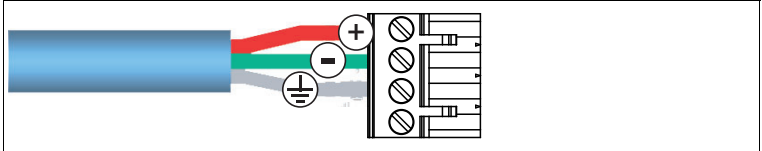
- Before working on the device, always disconnect the supply voltage.
- Connect the device to the supply voltage only after completion of the work.



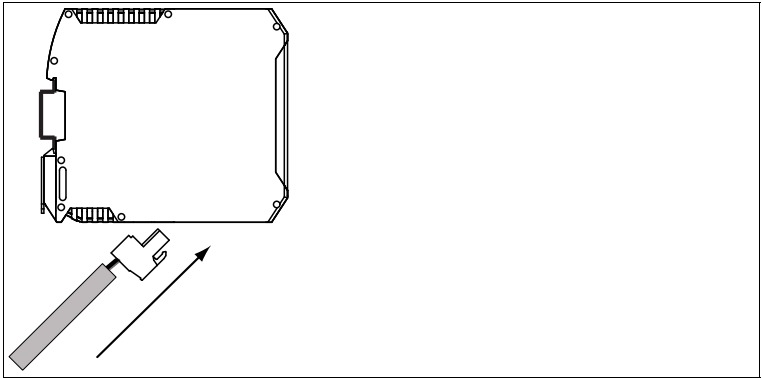
Power Supply Wiring

Connect the power supply to the Ethernet Isolator as follows.

1. Remove the power supply connector plug from the bottom side of the Ethernet Isolator.
2. Plug and screw the wires to the connector plug as follows:



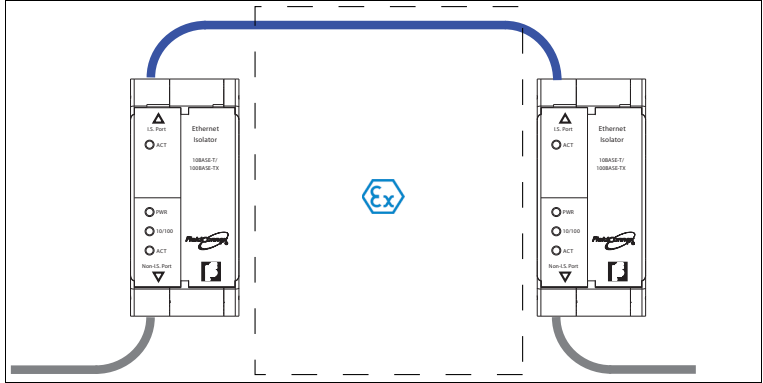
3. Plug-in the wired connector plug back into the power supply socket of the Ethernet Isolator.





Ethernet Wiring

1. Plug in the standard, non-specific Ethernet cable into the non-intrinsically safe ports of the device.
2. Interconnect the 2 Ethernet Isolators by plugging in an Ethernet cable into both the intrinsically safe ports of the devices.



3.2.1

Suitable Ethernet Cables for Connection

The following table provides you with an overview of which Ethernet cable to use for connecting either 2 Ethernet Isolators or one Ethernet Isolator with another device.

In connection with ...	Ethernet Isolator intrinsically safe port	Ethernet Isolator non-intrinsically safe port
Ethernet Isolator intrinsically safe port	Crossover cable	not allowed
Switched standard port	not allowed	Crossover cable
Switch uplink port	not allowed	Standard patch cable
Notebook	not allowed	Standard patch cable
Workstation	not allowed	Standard patch cable
Device with auto-cross-over functionality	not allowed	Standard patch cable

Ethernet Cable Types for Different Use Cases



Note

Background Information

The TIA/EIA-568-B Ethernet connector specification defines 2 types of pin assignment for an Ethernet cable.

Standard Ethernet Patch Cable

The standard Ethernet patch cable is a straight-through connection with both RJ45 connectors at each cable end wired the same way.

Crossover Cable

The Ethernet crossover cable has the RX and TX pairs switched between the end terminals of the cable. The crossover cable is used for connecting 2 devices that do either both not cross or do both cross the signals. In this case, the crossover must be done externally.

In order to guarantee the communication across the cable, the transmission signal of terminal device A has to connect to the receive port of terminal device B and vice versa. The signal has to be crossed at least once in a connection.

Example: A switched hub (network switch) typically performs signal crossing internally. This is why a standard Ethernet patch cable is to be used to connect to another non-crossing device as well if a device supports an auto-crossover detection function.

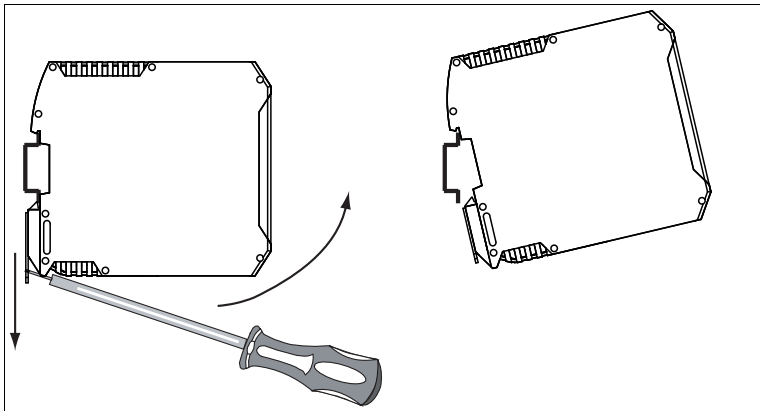
3.3

Dismounting



Dismounting the Device from the DIN Rail

1. Use a screw driver to loose the fixing trap and remove the module from the DIN rail.



4 Operation

4.1 LED Indication and Basic Troubleshooting

LED Indication	Explanation	Remedy
PWR ●	Ethernet Isolator active and powered	
PWR ○	Ethernet Isolator not powered	Check power supply and wiring
	Device defect	Send the device to Pepperl+Fuchs
PWR ● 10/100 ○	Ethernet Isolator active Ethernet transfer rate 10 Mbit/s	
PWR ● 10/100 ●	Ethernet Isolator active Ethernet transfer rate 100 Mbit/s	
PWR ● I.S. Port Act ● Non-I.S. Port Act ○	Ethernet Isolator active Intrinsically safe port is receiving data	
PWR ● I.S. Port Act ○ Non-I.S. Port Act ●	Ethernet Isolator active Non-intrinsically safe port is receiving data	

5 Electromagnetic Compatibility Verification

Verification in Accordance with EC Council Legislation Directive 2004/108/EC and 2014/30/EU

Compatibility in Accordance with EN 61326-1 and NAMUR NE 21 Recommendation

The electromagnetic compatibility (EMC) requirements, applicable for electrical equipment for measurement, control, and laboratory use in general are anchored in the international standard EN 61326. 3 different performance criteria are distinguished in this standard:

A class **A** device operates as intended during the test. This device can withstand the immunity tests without any noticeable performance degradations within the specification limits of the manufacturer.

A class **B** device operates as intended after the test. The device shows temporary degradation or loss of function of performance during the test but self-recovers from that state when the exposures are ceased.

A class **C** device has loss of function. The device may need manual restoration. During the test a temporary loss of function is allowed, as long as an operator can restore the device back to operation.

The requirements of the association for standard and control and regulations of the German chemical industries, defined in the NE 21 recommendation, are partly higher compared to the test levels and failure criteria defined in EN 61326-1. For the product qualification, the failure criteria and test levels selected always represent the worst case conditions.

EN 61000-4, as a generic standard, defines the test setups for the specific required test for EN 61326-1 and NE 21.

See declaration of conformity for standards and editions applied.

Conducted EMC Tests

Immunity

Standard	Type	Test Level	Category
EN 61000-4-2	Electrostatic discharge, direct contact	6 kV	A
	Electrostatic discharge, indirect, air	8 kV	A
EN 61000-4-3	Electromagnetic field radiated, radio frequency	10 V/m	A
EN 61000-4-4	Fast transients burst on signal lines	1 kV	A
	Fast transients burst on power lines	2 kV	A
EN 61000-4-5	Slow transient surge on signal lines	1 kV	B
	Slow transient surge on shielded lines	2 kV	B
EN 61000-4-6	Conducted immunity, radio frequency	10 V	A
EN 55011	Reduction factor conducted emission	Class A	–
	Reduction factor radiated emission	Class A	–

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- Photoelectric Sensors
- Industrial Vision
- Ultrasonic Sensors
- Rotary Encoders
- Positioning Systems
- Inclination and Acceleration Sensors
- Fieldbus Modules
- AS-Interface
- Identification Systems
- Displays and Signal Processing
- Connectivity

Pepperl+Fuchs Quality
Download our latest policy here:

www.pepperl-fuchs.com/quality

