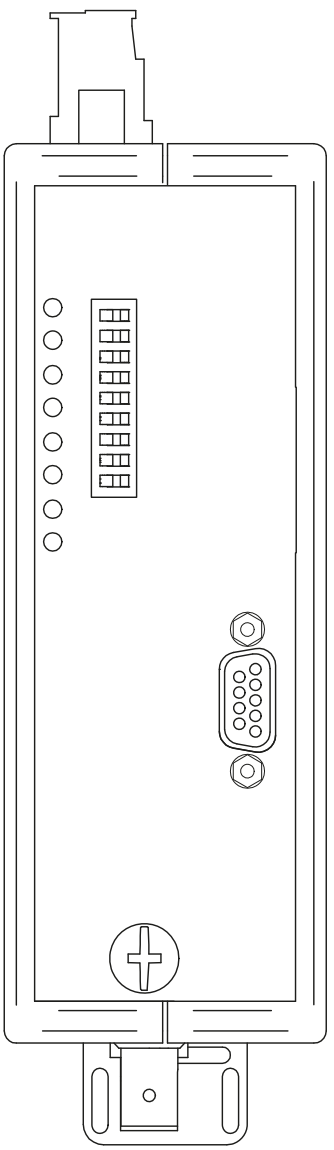
HIRSCHMANN
A BELDEN BRAND

User Manual

Installation
Fiberoptic Repeater
OZD Modbus Plus...



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You can get the latest version of this manual on the Internet at the Hirschmann product site (www.hirschmann.com).

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Contents

Safety instructions

WARNING
UNCONTROLLED MACHINE ACTIONS To avoid uncontrolled machine actions caused by data loss, configure all the data transmission devices individually. Before you start any machine which is controlled via data transmission, be sure to complete the configuration of all data transmission devices. **Failure to follow these instructions can result in death, serious injury, or equipment damage.**

General safety instructions

You operate this device with electricity. Improper usage of the device entails the risk of physical injury or significant property damage. The proper and safe operation of this device depends on proper handling during transportation, proper storage and installation, and careful operation and maintenance procedures.

- ☐ Before connecting any cable, read this document, and the safety instructions and warnings.
- ☐ Operate the device with undamaged components exclusively.
- ☐ The device is free of any service components. In case of a damaged or malfunctioning the device, turn off the supply voltage and return the device to Hirschmann for inspection.

Qualification requirements for personnel

- ☐ Only allow qualified personnel to work on the device.

Qualified personnel have the following characteristics:

- ▶ Qualified personnel are properly trained. Training as well as practical knowledge and experience make up their qualifications. This is the prerequisite for grounding and labeling circuits, devices, and systems in accordance with current standards in safety technology.
- ▶ Qualified personnel are aware of the dangers that exist in their work.
- ▶ Qualified personnel are familiar with appropriate measures against these hazards in order to reduce the risk for themselves and others.
- ▶ Qualified personnel receive training on a regular basis.

Certified usage

- ☐ Use the product only for the application cases described in the Hirschmann product information, including this manual.
- ☐ Operate the product only according to the technical specifications. See “Technical data” on page 36.
- ☐ Connect to the product only components suitable for the requirements of the specific application case.

Device casing

Only technicians authorized by the manufacturer are permitted to open the housing.

National and international safety regulations

Verify that the electrical installation meets local or nationally applicable safety regulations.

Grounding the device

Functional grounding the device is by means of a separate connection on the device.

- ☐ Ground the device before connecting any other cables.
- ☐ Disconnect the grounding only after disconnecting all other cables.
- ☐ Ground the device via the ground screw.

Requirements for connecting electrical wires

- ☐ Before connecting the electrical wires, **always** verify that the requirements listed are complied with.

All of the following requirements are complied with: ▶ The electrical wires are voltage-free. ▶ The cables used are permitted for the temperature range of the application case.

Table 1: General requirements for connecting electrical wires

Requirements for connecting the signal contact

- ☐ Before connecting the signal contact, **always** verify that the requirements listed are complied with.

All of the following requirements are complied with: ▶ The voltage connected complies with the requirements for a safety extra-low voltage (SELV) as per IEC/EN 60950-1. ▶ The connected voltage is limited by a current limitation device or a fuse. Observe the electrical threshold values for the signal contact. See “General technical data” on page 36.

Table 2: Requirements for connecting the signal contact

Requirements for connecting the supply voltage

☐ Before connecting the supply voltage, **always** verify that the requirements listed are complied with.

Requirements	
All of the following requirements are complied with: ▶ The supply voltage corresponds to the voltage specified on the type plate of the device. ▶ The power supply conforms to overvoltage category I or II. ▶ The power supply has an easily accessible disconnecting device (e.g., a switch or a plug). This disconnecting device is clearly identified. So in the case of an emergency, it is clear which disconnecting device belongs to which power supply cable. ▶ The cross-section of the ground conductor is the same size as or bigger than the cross-section of the power supply cables. ▶ Relevant for North America: The power supply cables are suitable for ambient air temperatures of at least 167 °F (75 °C). The power supply cable wires are made of copper.	
The wire diameter of the power supply cable is at least 0.75 mm² (North America: AWG18) on the supply voltage input.	
The following requirements are **alternatively** complied with:	
Alternative 1	The power supply complies with the requirements for a limited power source (LPS) as per EN 60950-1.
Alternative 2	Relevant for North America: The power supply complies with the requirements according to NEC Class 2.
Alternative 3	**All** of the following requirements are complied with: ▶ The power supply complies with the requirements for a safety extra-low voltage (SELV) as per IEC/EN 60950-1. ▶ A fuse suitable for DC voltage is located in the plus conductor of the power supply. The minus conductor is on ground potential. Otherwise, a fuse is also located in the minus conductor. Regarding the properties of this fuse: See “General technical data” on page 36.

Table 3: Requirements for connecting the supply voltage

Supply voltage

Only switch on the device when the housing is closed.

CE marking

The labeled devices comply with the regulations contained in the following European directive(s):

2014/30/EU (EMC)
Directive of the European Parliament and of the Council on the harmonisation of the laws of the Member States relating to electromagnetic compatibility.

2011/65/EU (RoHS)
Directive of the European Parliament and of the Council on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

In accordance with the above-named EU directive(s), the EU conformity declaration will be at the disposal of the relevant authorities at the following address:

Hirschmann Automation and Control GmbH
Stuttgarter Str. 45-51
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Germany

The product can be used in the industrial sector.

- Interference immunity: EN 61000-6-2
- Emitted interference: EN 55032
- Reliability: EN 60950-1

You find more information on technical standards here:
“Technical data” on page 36

Warning! This is a class A device. This device can cause interference in living areas, and in this case the operator may be required to take appropriate measures.

Note: The assembly guidelines provided in these instructions must be strictly adhered to in order to observe the EMC threshold values.

LED or laser components

LED or LASER components according to IEC 60825-1 (2014):
CLASS 1 LASER PRODUCT
CLASS 1 LED PRODUCT

FCC note:

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference; (2) this device must accept any interference received, including interference that may cause undesired operation.
Appropriate testing has established that this device fulfills the requirements of a class A digital device in line with part 15 of the FCC regulations.
These requirements are designed to provide sufficient protection against interference when the device is being used in a business environment. The device creates and uses high frequencies and can also radiate these frequencies. If it is not installed and used in accordance with this operating manual, it can cause radio transmission interference. The use of this device in a residential area can also cause interference, and in this case the user is obliged to cover the costs of removing the interference.

Recycling note

After usage, this device must be disposed of properly as electronic waste, in accordance with the current disposal regulations of your county, state, and country.

About this Manual

The “Installation” user manual contains a device description, safety instructions, a description of the display, and the other information that you need to install the device.

Key

The symbols used in this manual have the following meanings:

▶	Listing
☐	Work step
■	Subheading

1 Description

1.1 General description

The OZD Modbus Plus... is designed for use in optical Modbus Plus bus field bus networks. It allows conversions of electrical Genius bus interfaces into optical Modbus Plus bus interfaces and vice versa.

You have the option to integrate the OZD Modbus Plus... into existing electrical Modbus Plus field bus networks. OZD Modbus Plus... repeaters can also be used to configure a complete Modbus Plus bus field bus network with the line or ring topology.

No adjustment is necessary during start-up.

- **Device casing**
  The device is supplied in a metal housing. You have the option of mounting the device onto the DIN rail or to the mounting plate.

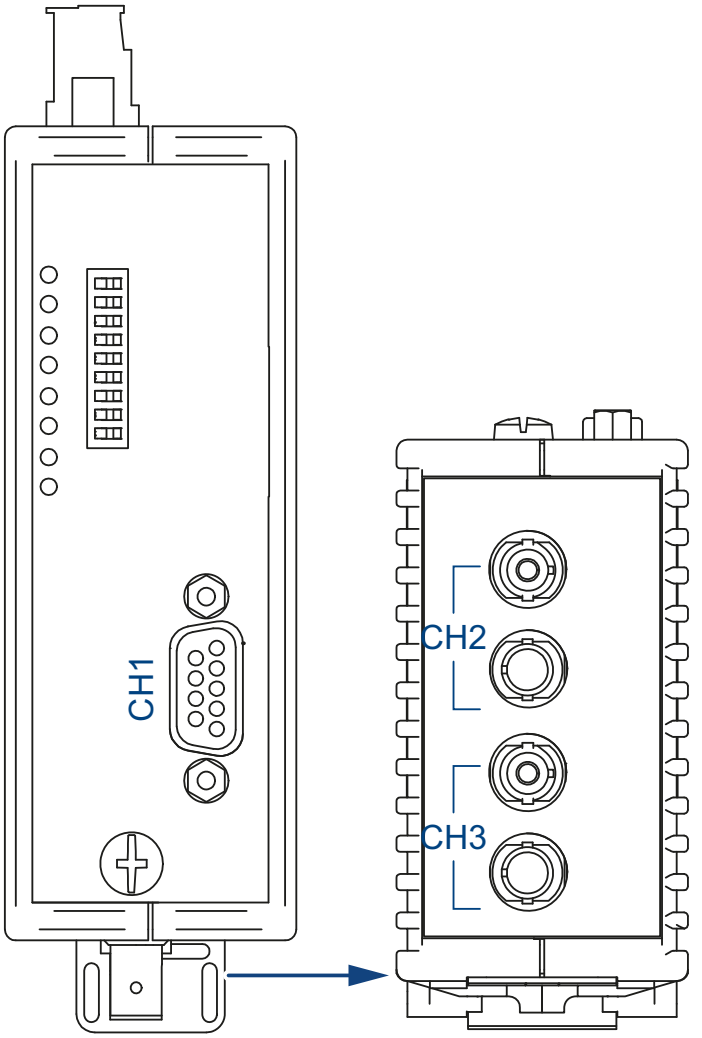
- **Glass fiber technology**
  The use of glass fiber transmission technology enables a very large transmission range and ensures optimal protection from EMC effects on the transmission path and due to the potential separation on the Repeater itself.

- **Transmission rate**
  The OZD Modbus Plus... functions at a transmission rate of 1 MBit/s.

- **Redundancy**
  Redundant optical signal transmission ensures a very high level of transmission reliability. The redundant operating power supply can further improve the operating reliability.

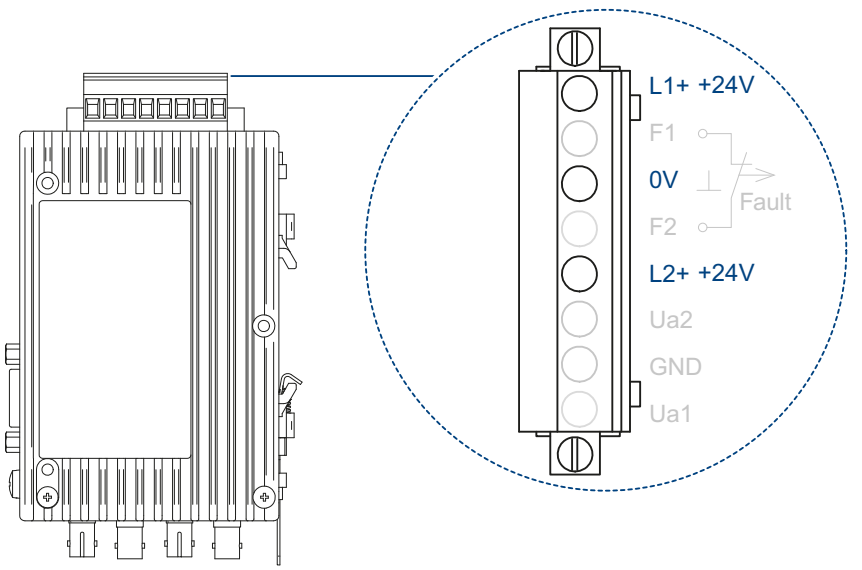
Port

The repeater has 3 mutually independent ports (channels), each of which consists of a transmitter and receiver. The electrical port is a 4-pin connector, the optical ports are BFOC/2.5 (ST ®) sockets.



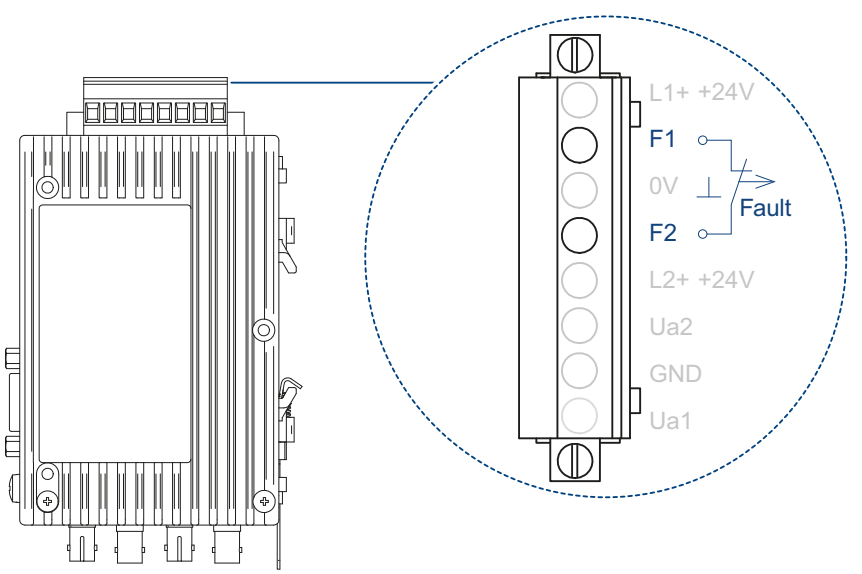
Power supply

The power supply is 24 V direct current. To improve the operating safety, a redundant operating power supply consisting of two separate sources can be used. For this purpose, you must connect the two supply voltages to two different terminals of the 8-pin screw-type terminal block. There is no load distribution between the sources. With redundant supply, the power supply unit with the higher output voltage must supply the repeater alone.



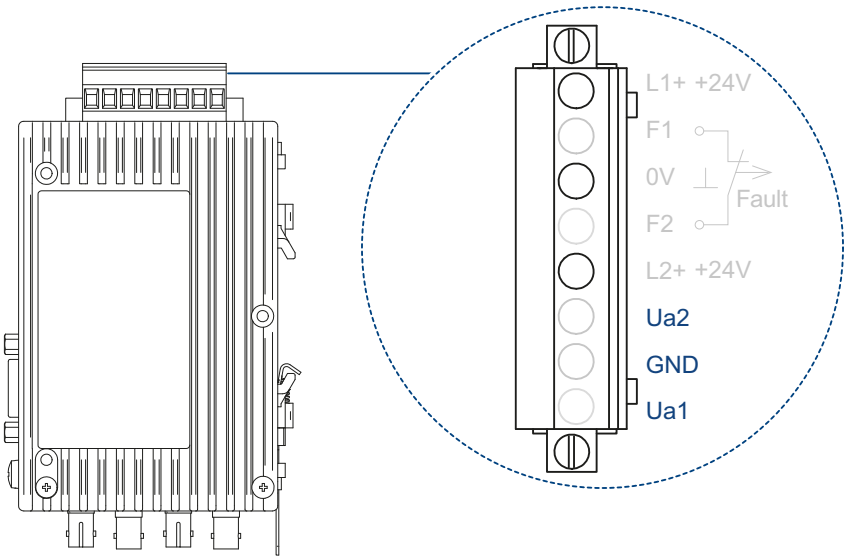
Signal contact

A signal contact (relay with unconnected contacts) is used to signal various disruptions in the repeaters. The signal contact is also connected to the 8-pin screw type terminal block.



Measuring output

One measuring output is available for each optical port. The measuring output is connected to the 8-pin screw type terminal block.



Signal regeneration

The OZD Modbus Plus... regenerates the signal form and amplitude of the received data. This function allows unlimited cascading of optical links.

1.1.1 Modnet, Modbus and Modbus Plus

Modnet

With Modnet a complete communication system for automation engineering was offered by the former AEG. This is not a single bus system but a communication system with 3 performance classes. Due to the different requirements, these performance classes range from usage in proximity to the process, to superordinate backbone communication.

Performance class 1: Communication in proximity to object	**Modnet1/M +**
Performance class 2: System communication	**Modnet1/P** **Modnet1/IS:** **Modnet1/SFB**
Performance class 3: Backbone communication	**Modnet3 / MMSE**
The following applies:	
Modnet1/M+	Low-cost, Modbus Plus
Modnet1/P	System field bus in accordance with Profibus standard
Modnet1/IS	System and sensor-actuator bus in accordance with Interbus standard
Modnet3/MMSE	Communication system for superordinate levels in accordance with IEEE 802.3 and MAP (MMS on Ethernet)

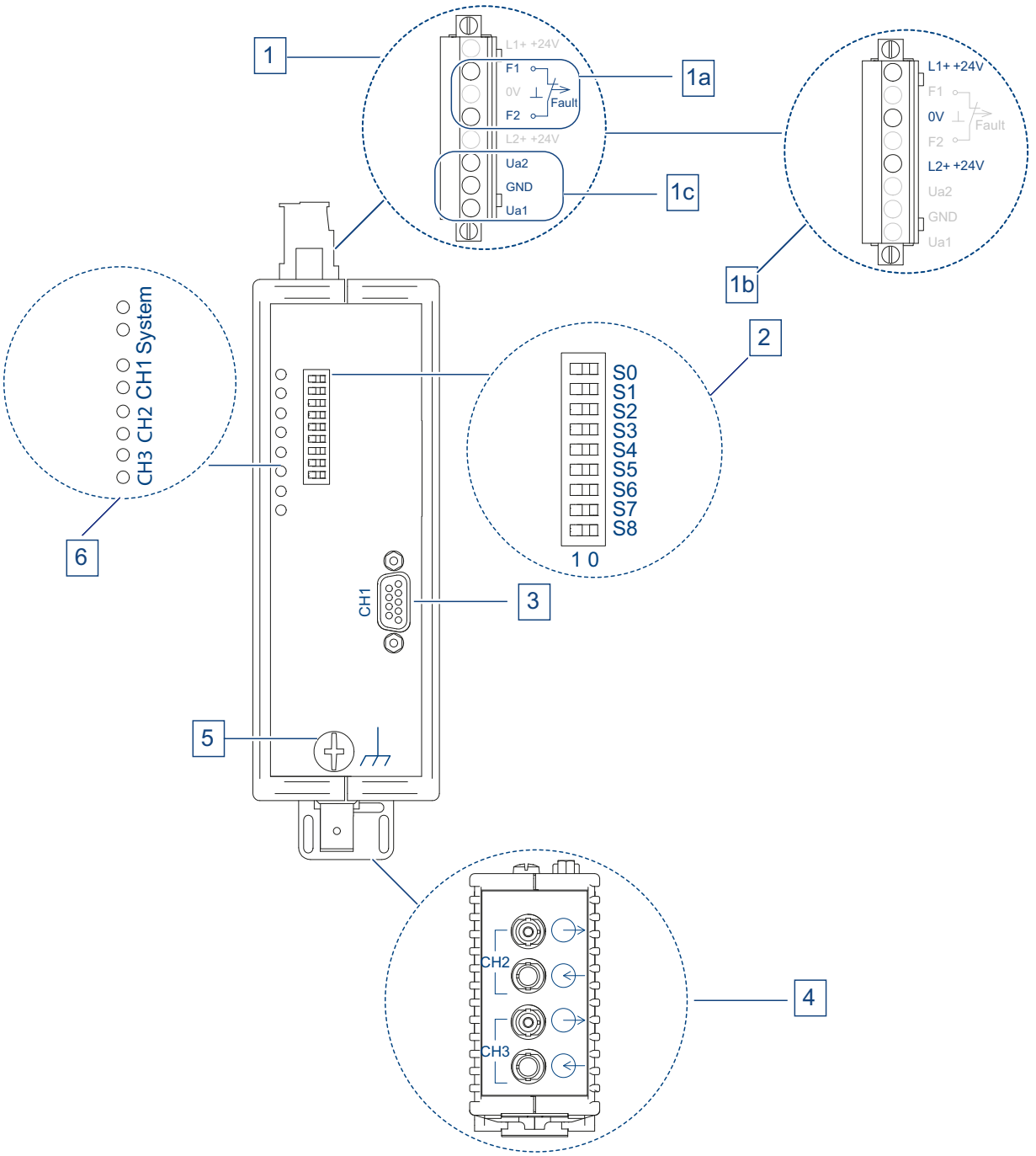
Modbus

Modbus is a widely used, defined message structure for master-slave communication. A Modbus message, sent from the master to the slave, contains the address of the slave, the command, the data, and an error checksum. Modbus RTU and Modbus ASCII are different data codes.As only the data format is defined, any medium can be used (RS232, RS422, RS485 copper cable, optical fiber, radio, …). Suitable optical fiber converters are OZDV 24…, OZDV 114... and OZDV 485… .

Modbus Plus

Modbus Plus is a complete protocol and network definition. Modbus Plus uses the Modbus command structure, but it transmits the commands together with a token that is passed rapidly from one network user to the next. Modbus Plus defines how the token is forwarded, how commands are repeated, how the data is checked for errors, and how these errors are then indicated, and of course the complete design of the physical interface, this also relates to the data cable and the network infrastructure (tabs, bridges, terminating resistors, …). The objective here is a real ”plug and play“ field bus system.

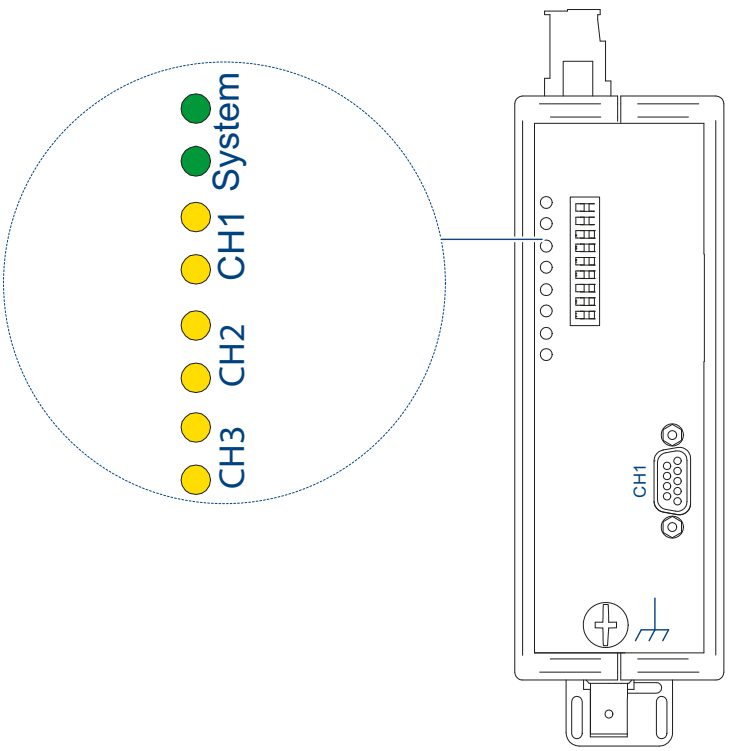
1.2 Device view



Front view using example of device variants **OZD Modbus Plus...** / **OZD Modbus Plus G12-1300**	
1	8-pin terminal block for power supply, signal contact, measuring output
1a	Pin assignment of the signal contact
1b	Pin assignment of the power supply
1c	Pin assignment of the measuring output Ua1 for the optical port CH2 Ua2 for the optical port CH3
2	8-pin DIP switch
3	CH1 - electrical port

4	CH2, CH3 - optical ports
5	Grounding screw
6	LED display element for system status and port status

1.3 Display elements



Display	Color	Meaning
System	none	Supply voltage is too low
	green	Data reception at all ports
	red	No data reception for 500 ms at minimum one port
Ports	none	No data reception for 500 ms
	green	Data reception; no error detected
	orange/yellow	Data reception, error detected: – echo error (fiber in sending direction interrupted) – malformed data packets (Jabber or Fragment)
Signal contact	open	– Supply voltage is too low – No data reception for 500 ms at minimum one port
	closed	Data reception at all ports

2 Network Topologies

2.1 Redundant optical ring (HIPER ring)

This network topology is used in the case of an optical link between end devices or bus segments. The implementation of a redundant link with OZD Modbus Plus... repeaters ensures a high degree of reliability.

As many repeaters as required can be operated in a HIPER ring. For the safe and reliable operation of the ring redundancy, it is necessary that at least one active terminal unit is connected to the electrical port (CH 1) of each OZD Modbus Plus... repeater.

The failure of an optical cable between any two OZD Modbus Plus... repeaters does not affect the availability of the network. The repeaters detect total failure of an optical link. The port LED of the faulty link is deactivated and the failure is indicated by illumination of the red system LED and response of the signal contact.
It is advisable to install the duplex F/O cables of the two optical ports along different routes.

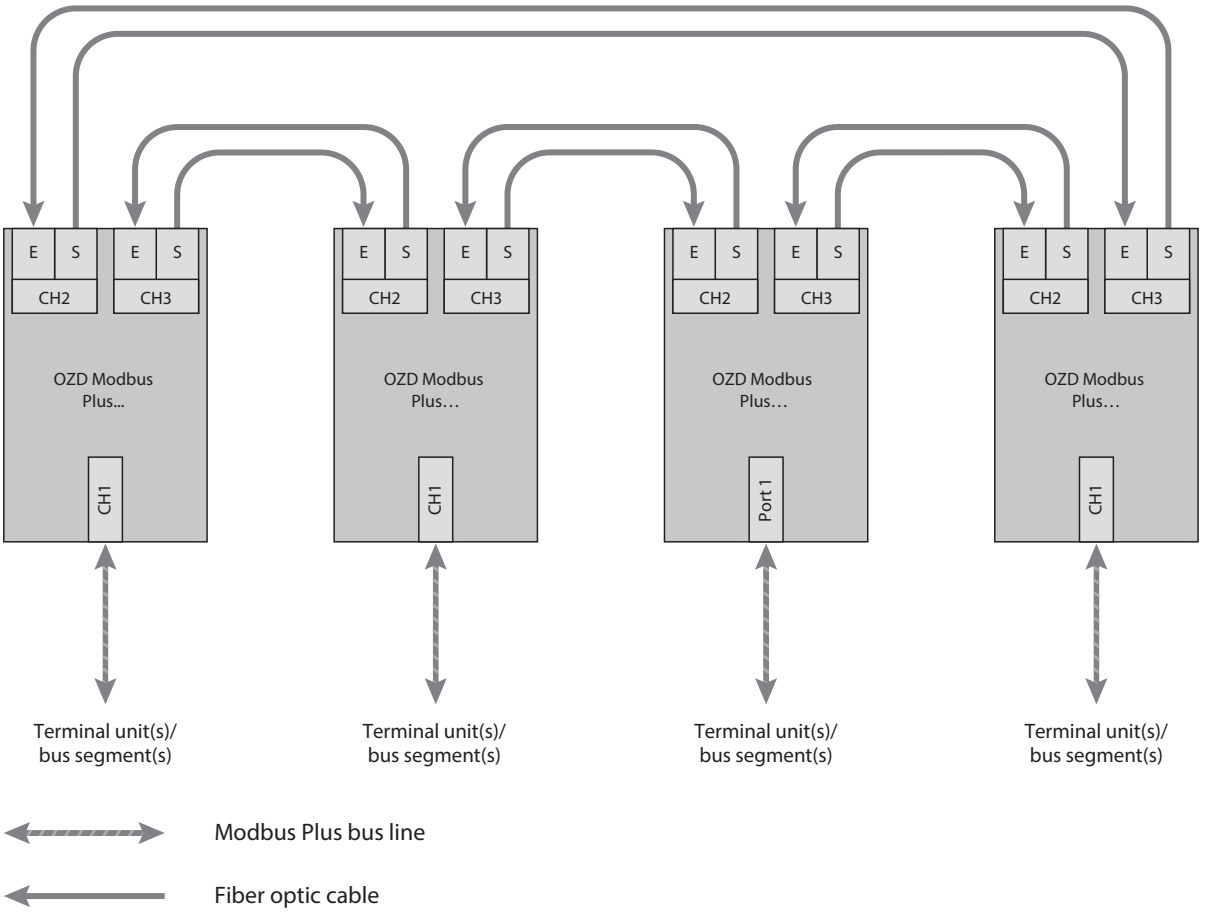


Figure 1: Network structure in a redundant optical ring topology

If problems are encountered with the configuration of a redundant optical ring on account of excessively long fiber-optic line sections, connections can also be implemented as shown in Figure 1. In this case, each repeater is linked (in spatial terms) with the next repeater but one. Two adjacent repeaters must be interconnected at the start and end of every such line. This prevents the individual fiber-optic line sections from being ”excessively long“.

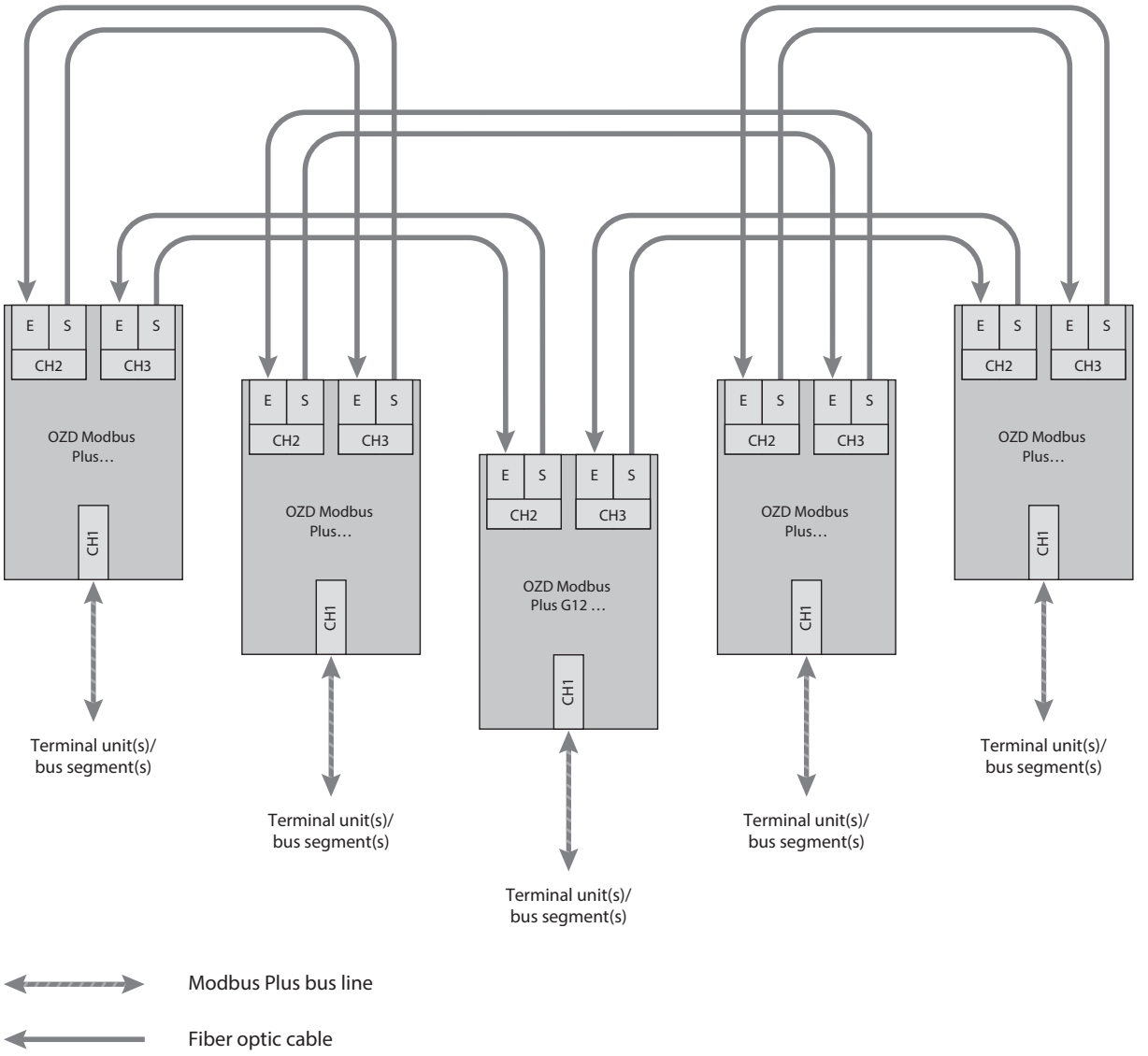


Figure 2: Alternative wiring system for network structure in redundant optical ring topology

2.2 Line topology without redundancy

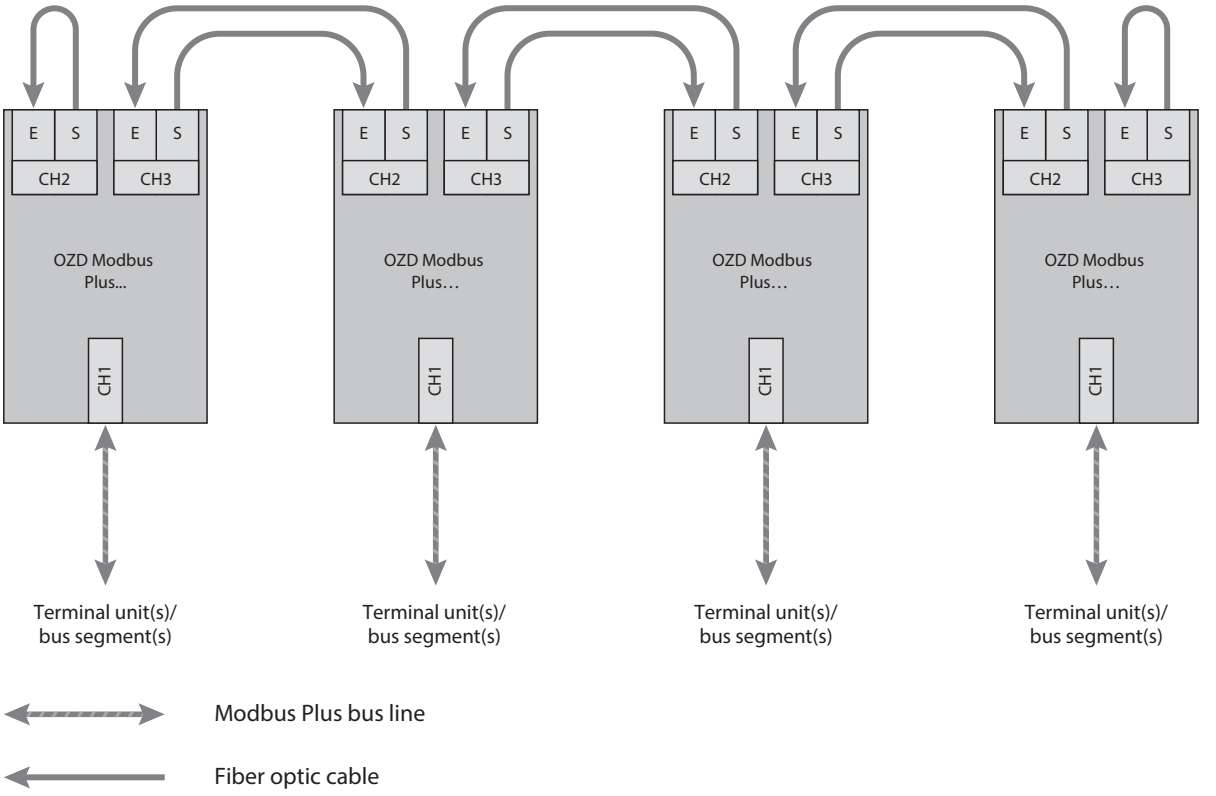


Figure 3: Line topology without redundancy

This network topology is used in the case of an optical link between end devices or bus segments.

As many repeaters as required can be operated in an optical line. For the safe and reliable operation of the ring redundancy, it is necessary that at least one active terminal unit is connected to the electrical port (CH 1) of each OZD Modbus Plus... repeater.

The first and last repeater in the line should be terminated with an “optical short-circuit“. To do this, each input and output of the free ports is connected via a short length of optical cable with BFOC connectors.

3 Installation guidelines

3.1 Electromagnetic compatibility (EMC)

Electromagnetic compatibility (EMC) covers all aspects regarding the effects of radiated and received electrical, magnetic, and electromagnetic emissions. In order to prevent interference in electrical systems, these effects must be reduced to a minimum. The structural design and correct connection of bus lines as well as the interference suppression of switched inductances play a major role in limiting interference.

3.2 Interference suppression of switched inductances

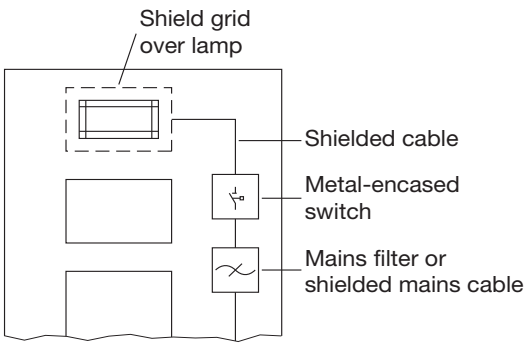


Figure 4: Interference suppression of fluorescent lamps in cabinet

3.2.1 Suppressing switched inductances with fuses

Switching inductances, e.g. in relays and fans, generates interference voltages which are many times higher than the switched operating voltage. These interference voltages can affect electronic devices. The interference voltages of inductances must be limited at their source of emission by means of fuses (by connecting diodes or RC elements). Only use interference suppressors which are intended for the used relays and fans.

3.2.2 Cabinet lighting

☐ Use filament lamps (e.g. LINESTRA lamps) for the cabinet lighting.
☐ Do not use fluorescent lamps because they generate interference fields. If the use of fluorescent lamps cannot be avoided, the interference suppression measures shown in Figure 4 must be implemented.

3.3 Arrangement of devices and cables

3.3.1 Reducing interference by providing adequate space:

A simple yet effective way of reducing interference is to separate devices and cables causing interference from those affected by interference. Inductive and capacitive interference injection decreases by the square of the distance between the elements concerned. This means that doubling the distance reduces the interference by a factor of 4. If the arrangement of the various elements in a building or in the switch cabinet is taken into consideration at the planning stage, the cost of the necessary interference suppression measures is generally very low.

Note: Between an OZD Modbus Plus... and a power switching element (e.g. contactor, relay, temperature regulator, switch, etc.) a minimum separation of 5.9 in (15 cm) is to be maintained. This minimum separation is to be measured between the outer edges of the components and in all directions around an OZD Modbus Plus.... The power supply wires (24 V DC and m/0 V) for the OZD Modbus Plus... must not be laid in the same cable duct as cables for load circuits. The wires (24 V DC and m/0 V) should be twisted together.

3.3.2 Standard recommendations for the arrangement of devices and cables

EN 50174–2 contains recommendations for arranging devices and cables which are aimed at reducing mutual interference to a minimum.

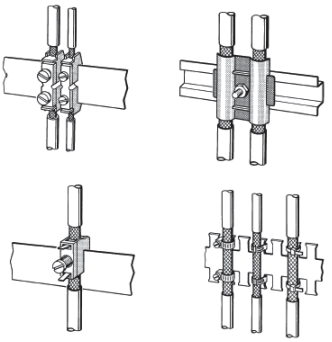
3.3.3 Using bus line shields

It is important to observe the following when shielding bus lines:

- ☐ Use only fully shielded PROFIBUS lines. The shields of these lines must be of sufficient thickness to satisfy the legal requirements for interference radiated and interference received.
- ☐ Always attach the shields at both ends of the bus lines. The legal requirements vis-à-vis interference radiated and interference received for your system will only be satisfied if shields are connected at both ends (CE symbol).
- ☐ Attach the shield for the bus line at the connector plug housing or at the cable clamps provided.
- ☐ In the case of steady-state operation, it is advisable to strip the shielded line entirely and connect it with the shielding bus/protective conductor rail.

Note: If differences in potential occur between the grounding points, an inadmissibly high compensating current could flow across the shielding connected at both ends. Never eliminate this problem by removing the shielding from the bus line. The following solution is permissible: Lay an additional equipotential bonding cable parallel to the bus line. This additional cable will carry the shield current.

3.3.4 Shield connections



Proceed as follows:

- ☐ Secure the shield braid using metal cable clamps.
- ☐ The clamps must fully enclose the shield and make good contact.
- ☐ Only connect the PROFIBUS lines via the copper braid shield, and not via the aluminum foil shield. One side of the foil shield is attached to a plastic film to increase its tearing strength, and is therefore non-conductive.
- ☐ The shields of all cables which are routed into a cabinet from the outside must be clamped at the point of entry inside the cabinet and connected to the cabinet ground with a large contact surface area.
- ☐ When removing the cable jackets, it is important to ensure that the braid shield of the cables is not damaged. Tin-plated or galvanically stabilized surfaces are ideal for optimum contacting between grounding elements. With zinc-plated surfaces, suitable threaded connections must be provided for the required contacts. Painted surfaces at the contact points are unsuitable.
- ☐ Shield clamps/contact points should not be used as strain relief devices. Contact with the shield bus could otherwise deteriorate or break completely.

4 Installation

The devices have been developed for practical application in a harsh industrial environment.
Hirschmann supplies the device ready for operation.

To configure a subdomain, follow these steps:

- Checking the package contents
- Installing and grounding the device
- Connecting the optic bus cables
- Connecting the electric bus cables
- Connecting the power supply
- Connecting the signal contact
- Setting the optical transmitting power
- Connecting the analog voltage outputs (optional)

4.1 Checking the package contents

Proceed as follows:

☐ Check whether the package includes all items named in the section “Scope of delivery” on page 40.
☐ Check the individual parts for transport damage.

4.2 Installing and grounding the device

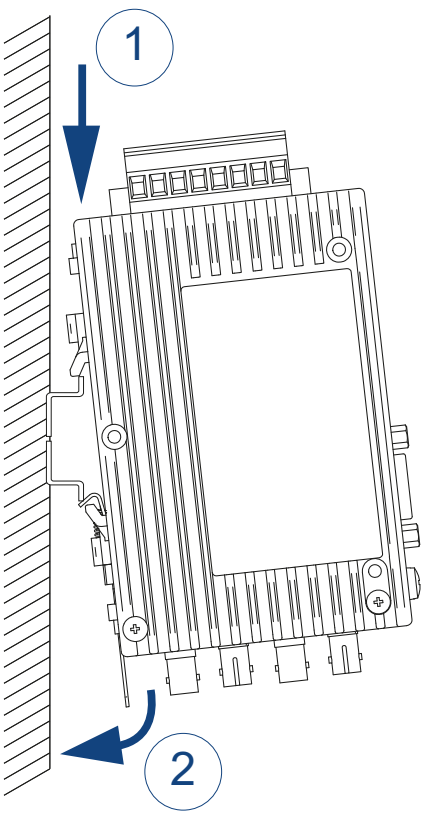
You have the following options for mounting your device:

- Installing the device onto the DIN rail
- Mounting the device on a mounting plate

Prerequisites:

- ☐ Install the device in a location where the climatic threshold values specified in the technical data are adhered to.
- ☐ Ensure that there is sufficient room to connect the bus and power supply cabling.
- ☐ Connect the optical fiber line before mounting the repeater as this simplifies the procedure.
- ☐ If possible, the repeaters should only be installed on a mounting plate or DIN rail with low-impedance and low-inductance grounding.
- ☐ If the mounted DIN rail and mounting plate are insulated, the repeater must be provided with a low-impedance and low-inductance ground connection directly via the grounding screw.

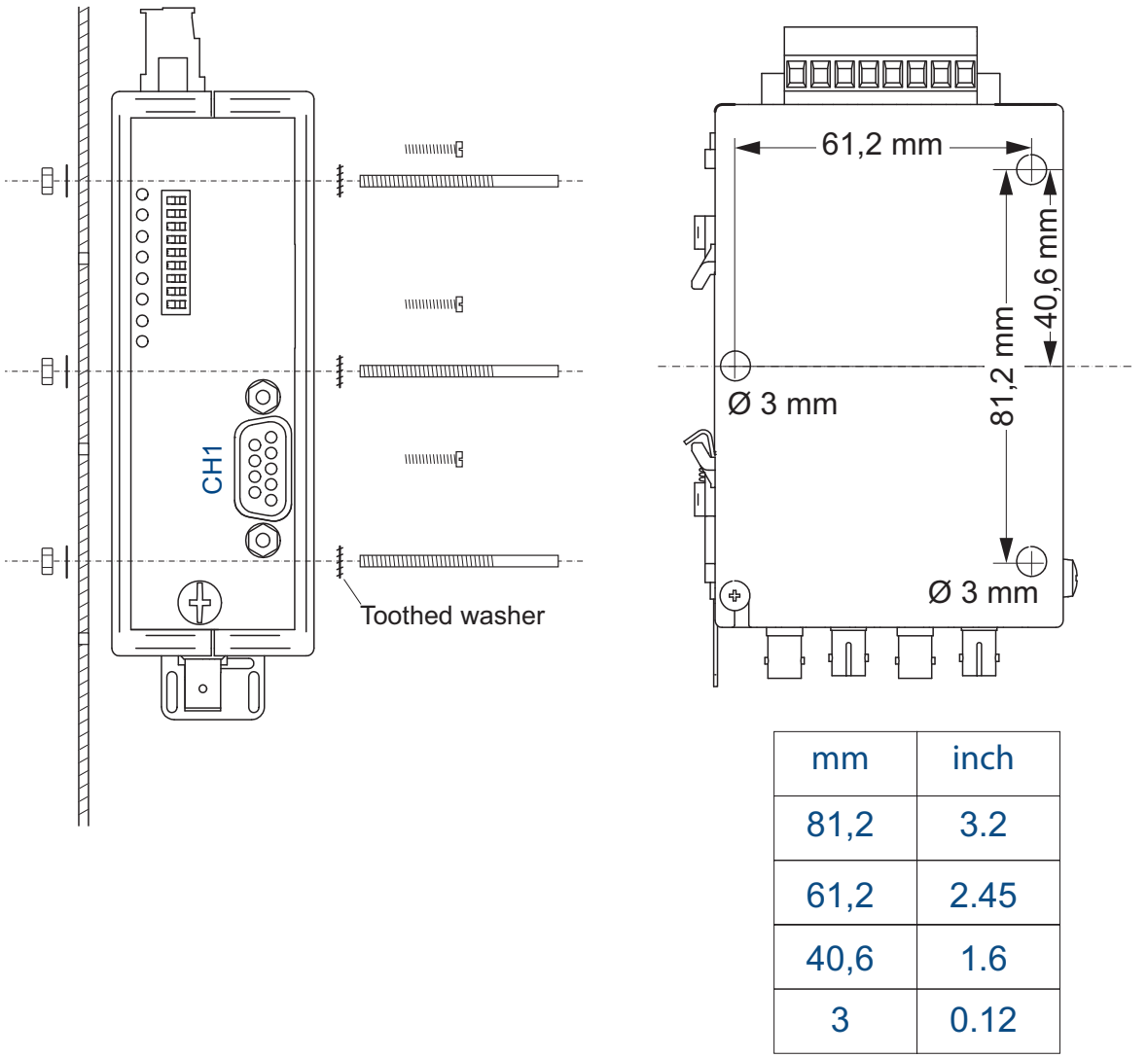
4.2.1 Installing the device onto the DIN rail



Proceed as follows:

- ☐ Slide the upper snap-in guide of the device into the DIN rail.
- ☐ Press the device downwards onto the clip-in bar.

4.2.2 Mounting the device on a mounting plate



mm	inch
81,2	3.2
61,2	2.45
40,6	1.6
3	0.12

Note: The repeater has 3 through-holes. The through-holes allow to mount the repeater to any flat surface, e.g. to the mounting plate of a switch cabinet.

Proceed as follows:

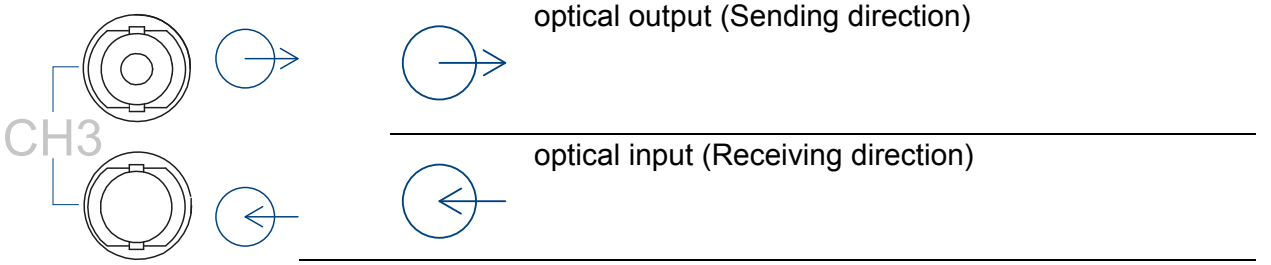
☐ Make 3 holes in the mounting plate corresponding the drilling template.
☐ Use the machine bolts (e.g. M3 x 40) to secure the repeater.
☐ Ensure reliable electrical connection between the repeater casing and the mounting plate.
☐ Place toothed washers under the bolt heads to pierce the varnish.

4.2.3 Grounding the device

Functional grounding the device is by means of a separate connection on the device.

☐ Ground the device before connecting any other cables.
☐ Disconnect the grounding only after disconnecting all other cables.
☐ Ground the device via the ground screw.

4.3 Connecting the optic bus cables



Proceed as follows:

- ☐ Use a duplex fiber-optic cable with BFOC/2.5 (ST ®) connectors to connect the individual repeaters.
- ☐ Pay attention to the maximum cable length of the fiber-optic cable as well as the possible types of fibers specified in the Technical Data.
- ☐ Make sure that each optical input is connected to an optical output at the opposite end (“cross-overlink“). The corresponding BFOC sockets of the two ports are marked on the lower front panel.
- ☐ Ensure sufficient strain relief for the fiber-optic cables and pay attention to their minimum bend radiuses.
- ☐ Unused BFOC sockets are to be covered with the protective caps supplied. Incident ambient light and, in particular, great ambient brightness, can affect the network. The penetration of dust may impair operation of the optical components.

4.4 Connecting the electric bus cables

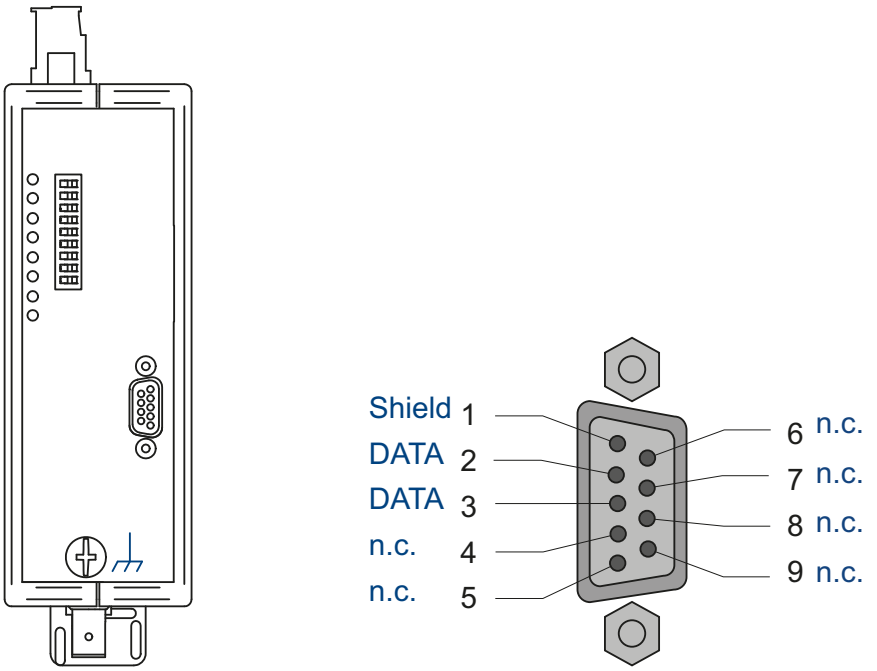


Figure 5: Pin assignment of D-Sub socket

WARNING
The shielding of the Sub-D connector is made of metal to ensure safe ground current conduction and must therefore be conductively connected to the shielding plate of the connector attached to the cable.

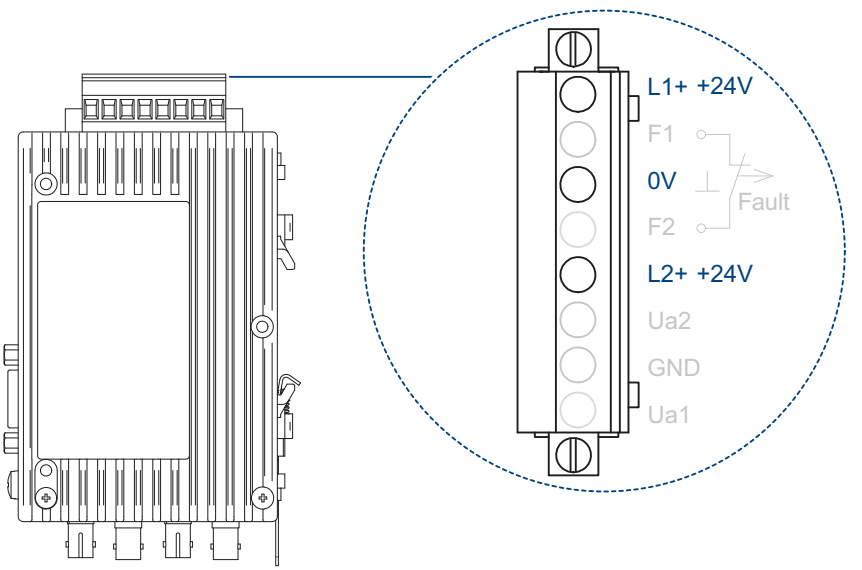
WARNING
Do not use Modbus Plus bus lines to connect Modbus Plus repeaters to system components to which a different ground potential is being applied. Voltage differences > 500 V could destroy the repeaters or cause the system to malfunction.

WARNING
Modbus Plus bus lines which are completely or partially installed outdoors should not be connected. Any lightning strikes in the immediate vicinity could otherwise destroy the repeaters. Optical cables should be used for bus connections which are routed out of buildings.

Proceed as follows:

- ☐ Only use approved shielded twisted pair cable for OZD Modbus Plus... bus wiring, e.g., Modicom ”Super Cable“, FT4, FT6.
- ☐ The electrical Modbus Plus interface (CH 1) is a 9-pin Sub-D connector (female). The pin assignment complies with the Modbus Plus Standard.
- ☐ A line which is fitted with 9-pin Sub-D connectors (male) should be used to connect an end device. Max. length 100 m.
- ☐ The electrical port is internally not terminated. The external termination must be provided in or on the connector of the bus line in accordance with the Modbus Plus Standard.
- ☐ The bus connection plug should be secured using screws.

4.5 Connecting the power supply



Proceed as follows:

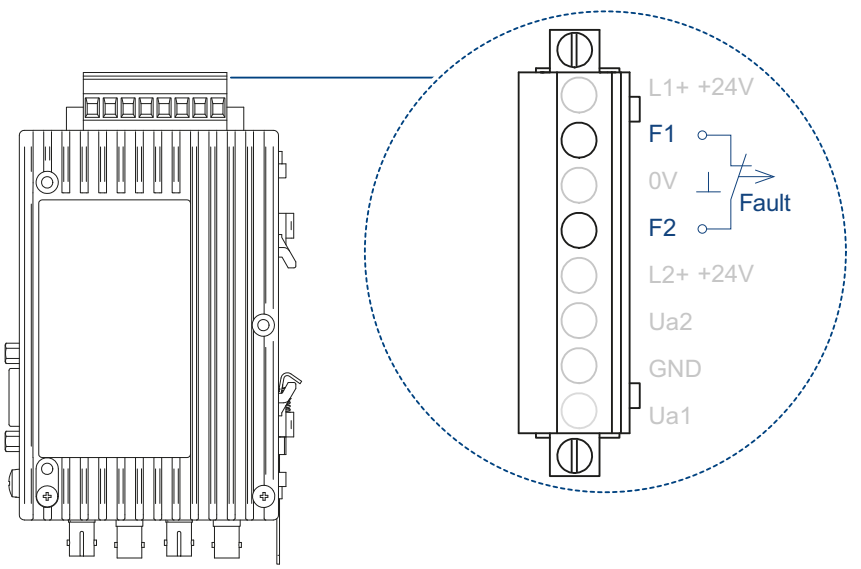
- ☐ The OZD Modbus Plus... should only be supplied with a regulated safety extra-low voltage of between 18 V and 32 V as defined in IEC 60950 / EN 60950 / VDE 0805.
- ☐ To improve the operating safety, a redundant power supply consisting of separate sources can be used. The supply voltages can be supplied in 2 ways:
  via terminal 18 V ... 32 V of the terminal block
  via terminal 18 V ... 32 V of the terminal block
  The common negative connection in the middle of the terminal block is indicated by (0 V).
- ☐ The two voltages can have any values, even different ones, within the specified limits.

4.6 Connecting the signal contact

Note:

- ☐ To connect the signal contact lines, remove the 8-pin terminal block on top of the repeater from the device.
- ☐ Use the correct pin assignment for the 8-pin terminal block.
- ☐ Make sure that the electrical insulation of the connection cables of the signal contacts is sufficient. Incorrect connections can destroy the repeater.

On the 8-pin terminal block on the top of the repeater, the unconnected pins of a relay can be used as signal contacts. When the OZD Modbus Plus... is working correctly, the contact is closed. If there is an error or a power failure, the contact is opened.



The following problems with the network and the repeater can be signaled by means of the signal contact:

Supply voltage	No supply voltage (with redundant supply voltage: loss of all supply voltages)
Internal device errors	
Received data	Loss of received data at port 2 and/or port 3 (e.g.cable breakage)
	No data received at all ports

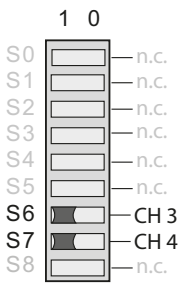
4.7 Setting the optical transmitting power

Note:

- S0, S1, S1, S3, S4, S5 and S8 do not have function on OZD Modbus Plus....

- The DIP switch **S6** is used to set the transmit power of **CH3**.
- The DIP switch **S7** is used to set the transmit power of **CH4**.

☐ Verify that the dip switch **S6** and **S7** is set to position 1.



4.8 Connecting the analog voltage outputs (optional)

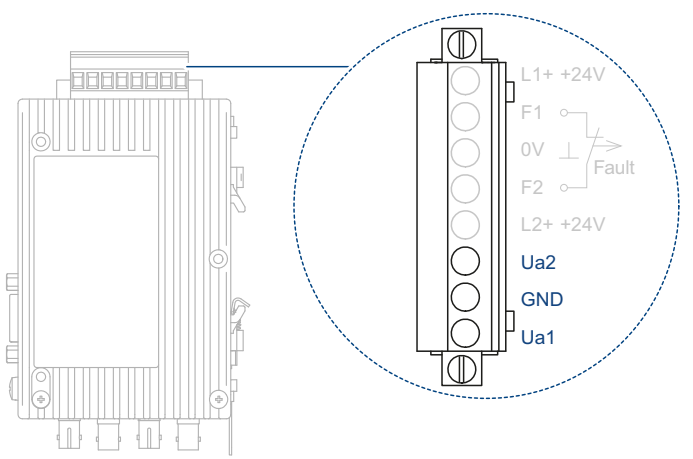


Figure 6: Pin assignment of the analog voltage outputs

The device has 2 analog voltage outputs, Ua1 and Ua2. These voltage outputs are connected using a 8-pin screw terminal on top of the repeater. The screw terminal is suitable for cable leads that have a cross section between 0.2-2.5 mm^2.

The analog voltage outputs supply a short-circuit-proof output voltage dependent on the optical power input at port 2 or port 3, for diagnosis purposes and, for example, for preventative maintenance, in the range from 0-5 V (each with reference to “GND” of the 8-pin terminal block). The analog voltage outputs are electrically connected to the front panel/function ground.

The measuring voltage can be determined by a standard volt meter (ungrounded, high-impedance). This allows the incoming optical power to be documented e.g. for later measurements (aging, damage), a pass/fail examination to be performed (threshold value), wiring to be carried out on input terminals of a PROFIBUS I/O module, thereby making the control system available. As with other process variables, it is possible to define warning thresholds there and use them for preventative maintenance.

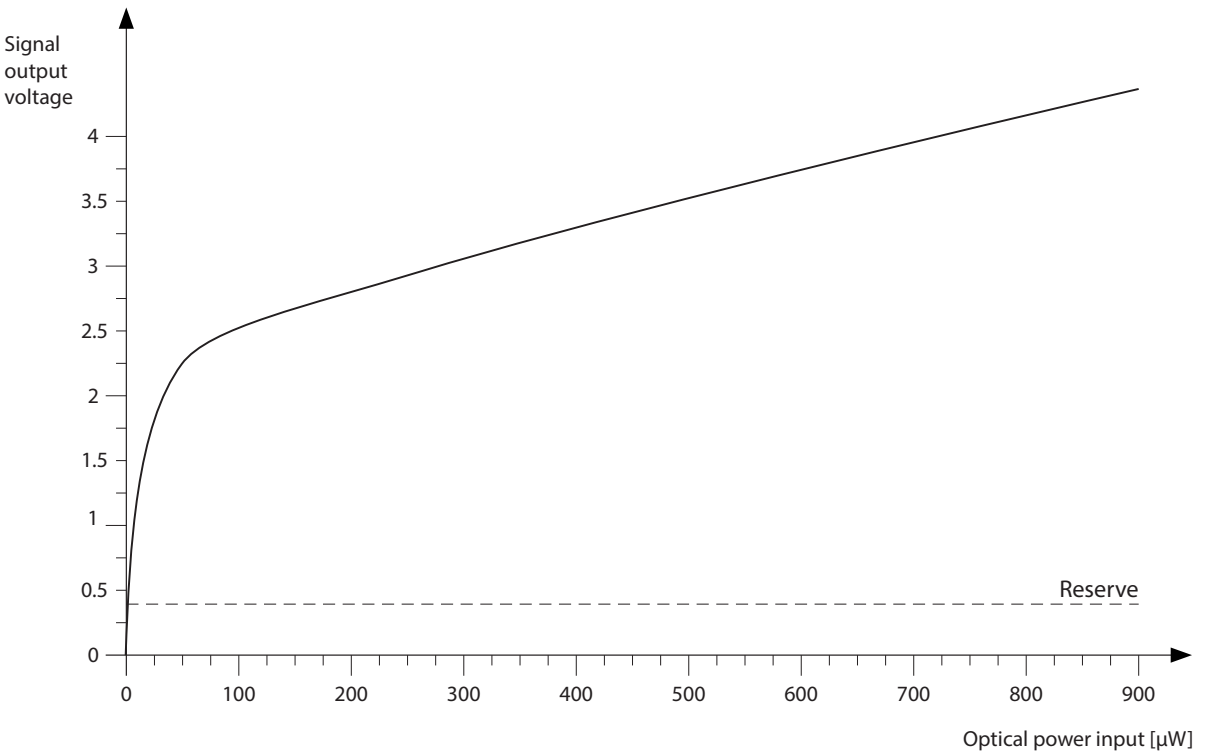
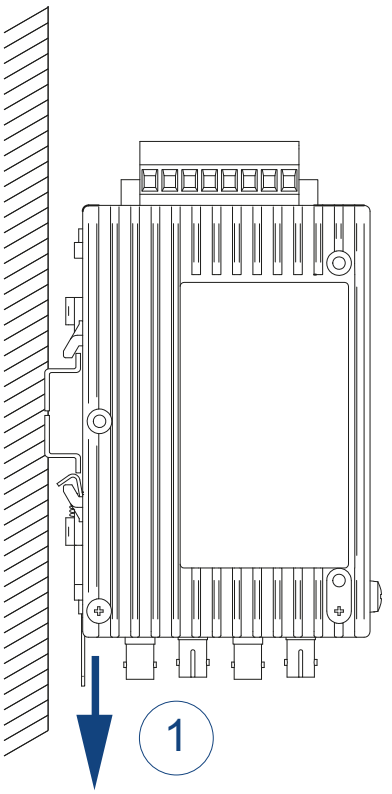


Figure 7: Correlation of measured output voltage to signal quality

Note: For a measured value to be valid, it is necessary that the partner OZD Modbus Plus... on the other end of the optical fiber transmits regular Modbus telegrams. An OZD Modbus Plus... is no substitute for a calibrated, optical level meter. However, it provides each optical port with a voltage derived from the peak value of the optical PROFIBUS telegram without disrupting the communication of data. With regular bus operation, this analog voltage can be used as an indicator for an alteration in optical attenuation. Because data traffic and temperature can affect the voltage value, you should not set any warning threshold too close to the actual value.

5 Disassembly

To remove the device, pull down on the locking slide.



6 Technical data

General technical data

Device variant	OZD Modbus Plus...	OZD Modbus Plus G12-1300
Dimensions W × H × D	See “Dimension drawings” on page 39.	
Weight	approx. 19.75 oz (560 g)	
Supply voltage See “Requirements for connecting electrical wires” on page 6.		
Nominal voltage DC	24 V	
Voltage range DC incl. maximum tolerances	18 V ... 32 V	
Connection type	8-pin terminal block	
Power loss buffer	> 10 ms at 20.4 V DC	
Overload current protection at input	Non-replaceable fuse	
Back-up fuse for each voltage input Nominal rating: Characteristic:	 2 A slow blow	
Peak inrush current	< 4 A	

Signal transmission	
Transmission speed	1 MBit/s
Cascadability	any
Signal processing time (any input/output)	< 1 µs

Electrical port	
Input/output signal	Modbus Plus level
Length of a Modbus Plus cable	100 m, 328 ft
Connection options	max. 31 terminal data devices
Electrical isolation – Shielding/casing – Data cable/shielding	 No Yes
terminating resistor	Must be attached outside to connector

Signal contact	
See “Requirements for connecting electrical wires” on page 6.	
Switching current	max. 1 A
Switching voltage	max. 30 V DC, resistive load

Climatic conditions during operation	
Ambient temperature	+32 °F ... +140 °F (0 °C ... +60 °C)
Humidity	5 % ... 95 % (non-condensing)
Air pressure	minimum 700 hPa (+9842 ft; +3000 m)

Climatic conditions during storage	
Ambient temperature	−40 °F ... +158 °F (−40 °C ... +70 °C)

Humidity	5 % ... 95 % (non-condensing)
Air pressure	minimum 700 hPa (+9842 ft; +3000 m)
Pollution degree	2
Protection classes	
Laser protection	Class 1 in compliance with IEC 60825-1
Degree of protection	IP40

Optical port	**P**	**G**	**G-1300**
Wavelength	**650 nm**	**860 nm**	**1300 nm**
Launchable optical power	–	–	–
into fiber 10/125 (default)	–	–	−19 dBm
into fiber 50/125 (default)		−17 dBm	−17 dBm
into fiber 62.5/125 (default)	–	−13 dBm	−17 dBm
Receiver sensitivity	−25 dBm	−28 dBm	−29 dBm
Receiver overload limit	0 dBm	−1 dBm	−3 dBm

Damping values of the fiber optic	**P**	**G**	**G-1300**
Wavelength	**650 nm**	**860 nm**	**1300 nm**
Damping values:			
Fiber 10/125	–	–	0.5 dB/km
Fiber 50/125	–	3 dB/km	1 dB/km
Fiber 62.5/125	–	3.5 dB/km	1 dB/km
Fiber 200/230	10 dB/km	8 dB/km	–
Fiber 980/1000	0.225 dB/m	–	–

Transmission distance[a]	**G**	**G-1300**
Wavelength	**860 nm**	**1300 nm**
System reserve	3 dB	2 dB
Transmission distance:		
Fiber 10/125	–	8000 m
Fiber 50/125 (default)	2700 m	8000 m
Fiber 62.5/125 (default)	3100 m	10000 m

a. The specified distance allowed between two OZD Modbus G12-1300 must not be exceeded regardless of the optical power budget.

EMC and immunity

EMC interference emission		
Radiated emission		
EN 55032		Class A
FCC 47 CFR Part 15		Class A

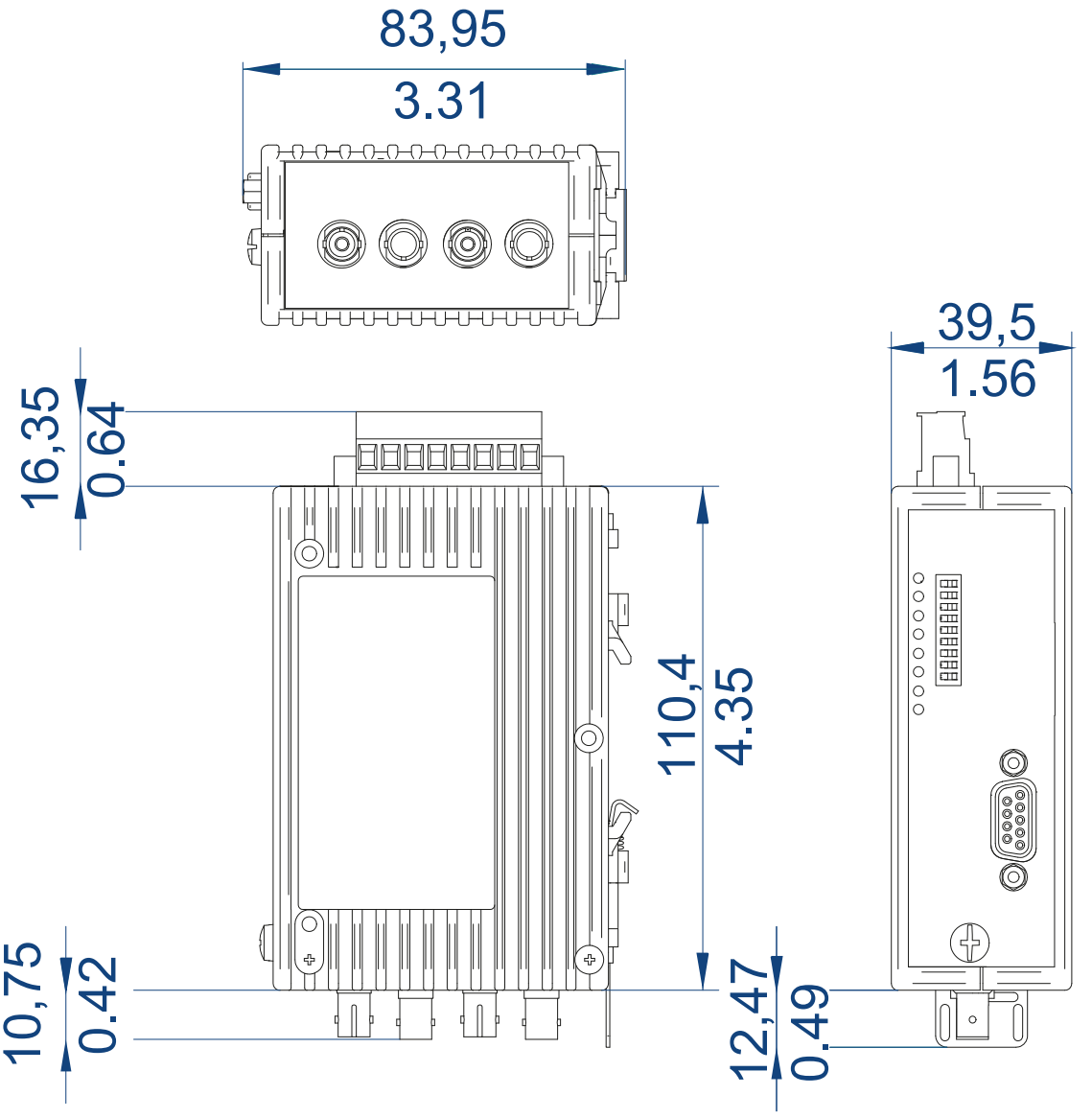
EMC interference immunity		
Electrostatic discharge		
EN 61000-4-2 IEEE C37.90.3	Contact discharge	± 4 kV
EN 61000-4-2 IEEE C37.90.3	Air discharge	± 8 kV
Electromagnetic field		
EN 61000-4-3	80 MHz ... 1000 MHz	10 V/m
Fast transients (burst)		
EN 61000-4-4 IEEE C37.90.1	DC supply connection	± 2 kV
EN 61000-4-4 IEEE C37.90.1	Data line	± 1 kV
Voltage surges - data line		
EN 61000-4-5	line/ground	± 1 kV
Conducted disturbances		
EN 61000-4-6	150 kHz ... 80 MHz	10 V

Power consumption/power output

Device name	Maximum power consumption	Maximum power output
OZD Modbus Plus...	4.8 W	16.3 Btu (IT)/h

Dimension drawings

mm
inch



7 Scope of delivery, order numbers and accessories

Scope of delivery

Number	Article
1 ×	Device
1 ×	General safety instructions

Order numbers/product description

Device name	Order number
OZD Modbus Plus G12	942 148-010
OZD Modbus Plus G12-1300	942 148-011

8 Underlying technical standards

Name	
C-Tick Declaration	Australian Radiocommunication Act 1998 Australian Radiocommunication Standard 2008
CSA C22.2 No. 142	Canadian National Standard(s) – Process Control Equipment – Industrial Products
FCC 47 CFR Part 15	Code of Federal Regulations
DNVGL-CG-0339	Environmental test specification for electrical, electronic and programmable equipment and systems.
UL/IEC 61010-1, UL/IEC 61010-2-201	Safety for Control Equipment
EN 55032	Electromagnetic compatibility of multimedia equipment – Emission Requirements
EN 61000-3-2	Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions
EN 61000-3-3	Electromagnetic compatibility (EMC) - Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker.
EN 61000-6-2	Electromagnetic compatibility (EMC) – Part 6-2: Generic standards – Immunity for industrial environments
EN 61000-6-4	Electromagnetic compatibility (EMC) – Part 6-4: Generic standards – Emission standard for industrial environments
EN 61131-2	Programmable controllers – Part 2: Equipment requirements and tests

Table 4: List of the technical standards

The device has an approval based on a specific standard only if the approval indicator appears on the device casing.
The device generally fulfills the technical standards named in their current versions.

A Further support

Technical questions

For technical questions, please contact any Hirschmann dealer in your area or Hirschmann directly.

You find the addresses of our partners on the Internet at http://www.hirschmann.com.

A list of local telephone numbers and email addresses for technical support directly from Hirschmann is available at https://hirschmann-support.belden.eu.com.

This site also includes a free of charge knowledge base and a software download section.

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