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**HIRSCHMANN**

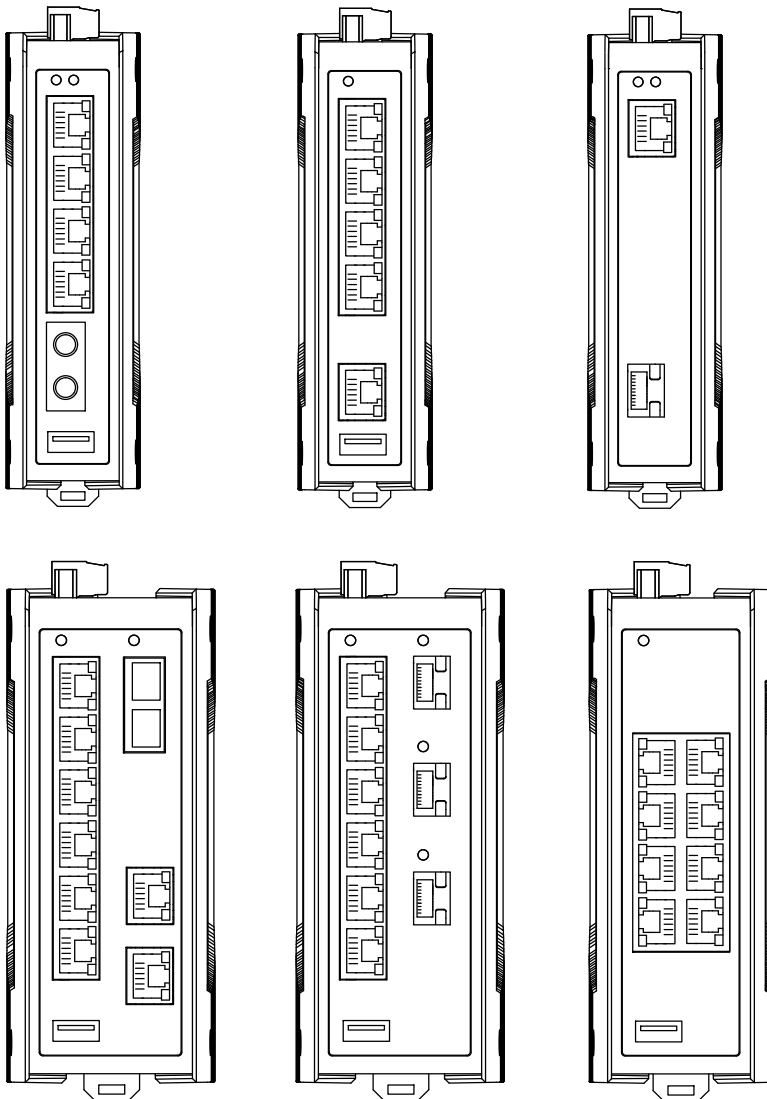
A **BELDEN** BRAND

# User Manual

## Installation

### Industrial Ethernet Rail Switch

### SPIDER III Premium Line



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# Safety instructions

## ■ 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.

## ■ Certified usage

Use the device solely for the application cases described in the Hirschmann product information, including this manual.

Operate the device solely according to the technical specifications.

See [“Technical data” on page 35](#).

## ■ Installation site requirements

- When you are selecting the installation location, make sure you observe the climatic threshold values specified in the technical data.
- Operate the device at the specified ambient temperature (temperature of the ambient air at a distance of 2 inches (5 cm) from the device) and at the specified relative humidity exclusively.
- Use the device in an environment with a maximum pollution degree that complies with the specifications in the technical data.

## ■ 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.

## ■ Device casing

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

- Never insert pointed objects (narrow screwdrivers, wires, etc.) into the device or into the connection terminals for electric conductors. Do not touch the connection terminals.
- Keep the ventilation slits free to ensure good air circulation.  
[See “General technical data” on page 35.](#)
- Install the device in the vertical position.
- At ambient temperatures > 140 °F (60 °C):  
The surfaces of the device housing may become hot. Avoid touching the device while it is operating.

## ■ Requirements for connecting electrical wires

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

### General requirements for connecting electrical wires

The following requirements apply without restrictions:

- ▶ The electrical wires are voltage-free.
- ▶ The cables used are permitted for the temperature range of the application case.
- ▶ Relevant for North America:  
Use 60/75 or 75 °C copper (Cu) wire only.

### Requirements for connecting the signal contact

The following requirements apply without restrictions:

- ▶ 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 35.](#)

### Requirements for connecting the supply voltage

The following requirements apply without restrictions:

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 power supply cable is suitable for the voltage, the current and the physical load.  
Hirschmann recommends a wire diameter of 0.5 mm<sup>2</sup> to 0.75 mm<sup>2</sup> (AWG20 up to AWG18).

The following requirements apply alternatively:

Relevant when the device is supplied via 1 voltage input:

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 as per NEC Class 2

## Requirements for connecting the supply voltage

- 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.
  - ▶ Supply with DC voltage:  
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 35.](#)
  - ▶ Supply with AC voltage:  
A fuse is located in the outer conductor of the power supply.  
The neutral conductor is on ground potential at both voltage inputs.  
Otherwise, a fuse is also located in the neutral conductor.  
Regarding the properties of this fuse:  
["General technical data" on page 35](#)

### ■ National and international safety regulations

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

### ■ CE marking

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

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.

2004/108/EC (EMC)

Directive of the European Parliament and the council for standardizing the regulations of member states with regard to electromagnetic compatibility.

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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The device can be used in the industrial sector.

- ▶ Interference immunity: EN 61000-6-2
- ▶ Emitted interference: EN 55022

**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 device description

The SPIDER III PL devices are designed for the special requirements of industrial automation. They meet the relevant industry standards, provide very high operational reliability, even under extreme conditions, and also long-term reliability and flexibility.

The devices allow you to set up switched industrial Ethernet networks that conform to the IEEE 802.3 standard.

You have numerous options of combining the device characteristics. You can determine the possible combinations using the configurator which is available in the Belden E-Catalog ([www.e-catalog.beldensolutions.com](http://www.e-catalog.beldensolutions.com)) on the web page of the device.

## 1.2 Device name and product code

The device name corresponds to the product code. The product code is made up of characteristics with defined positions. The characteristic values stand for specific product properties.

Item	Characteristic	Characteristic value	Description
1 ... 9	Product	SPIDER III PL	SPIDER III Premium Line
10	(hyphen)	–	
11	Data rate	2	10/100 Mbit/s
		4	10/100/1000 Mbit/s
12	Power over Ethernet (PoE)	0	without PoE support
13	(hyphen)	–	
14 ... 17	Number Twisted pair ports	01T1	
		04T1	
		05T1	
		06T1	
		07T1	
		08T1	

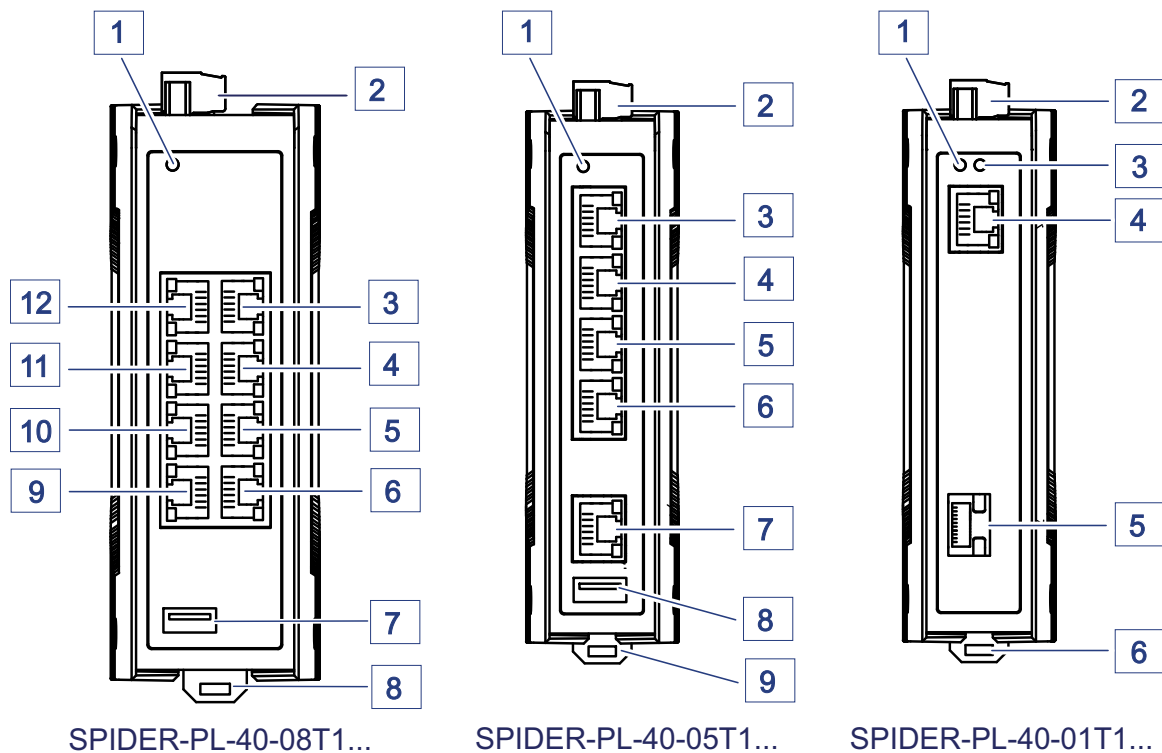
Table 1: Device name and product code

Item	Characteristic	Characteristic value	Description
18 ... 19	Optical fiber port 1	M2	DSC multimode socket for 100 Mbit/s F/O connections
		S2	DSC singlemode socket for 100 Mbit/s F/O connections
		M4	ST multimode socket for 100 Mbit/s F/O connections
		O6	SFP slot for 100/1000 Mbit/s F/O connections
		Z6	SFP slot for 100 Mbit/s F/O connections
		99	without
20 ... 21	Optical fiber port 2	M2	DSC multimode socket for 100 Mbit/s F/O connections
		S2	DSC singlemode socket for 100 Mbit/s F/O connections
		Z6	SFP slot for 100 Mbit/s F/O connections
		99	without
22 ... 23	Optical fiber port 3	Z6	SFP slot for 100 Mbit/s F/O connections
		99	without
24	Temperature range	T	Extended -40 °F ... +158 °F (-40 °C ... +70 °C)
		E	Extended with Conformal Coating -40 °F ... +158 °F (-40 °C ... +70 °C)
25	Certificates and declarations	Z9	CE, FCC, EN61131
		Y9	Z9 + cUL61010
		WV	WU + EN50121-4 + E1
		WW	WU + IEC61850, IEEE1613 + EN50121-4
27 ... 28	Customer-specific version	HH	Hirschmann standard
		HK	Voltage terminal with spring
29 ... 30	Configuration	HH	Hirschmann standard
		HV	Extended voltage range (48 V DC, 24 V AC)

*Table 1: Device name and product code*

## 1.3 Device view

### 1.3.1 Front view



Front view using example of device variants SPIDER III PL-40...

#### **SPIDER III PL-40-08T1...**

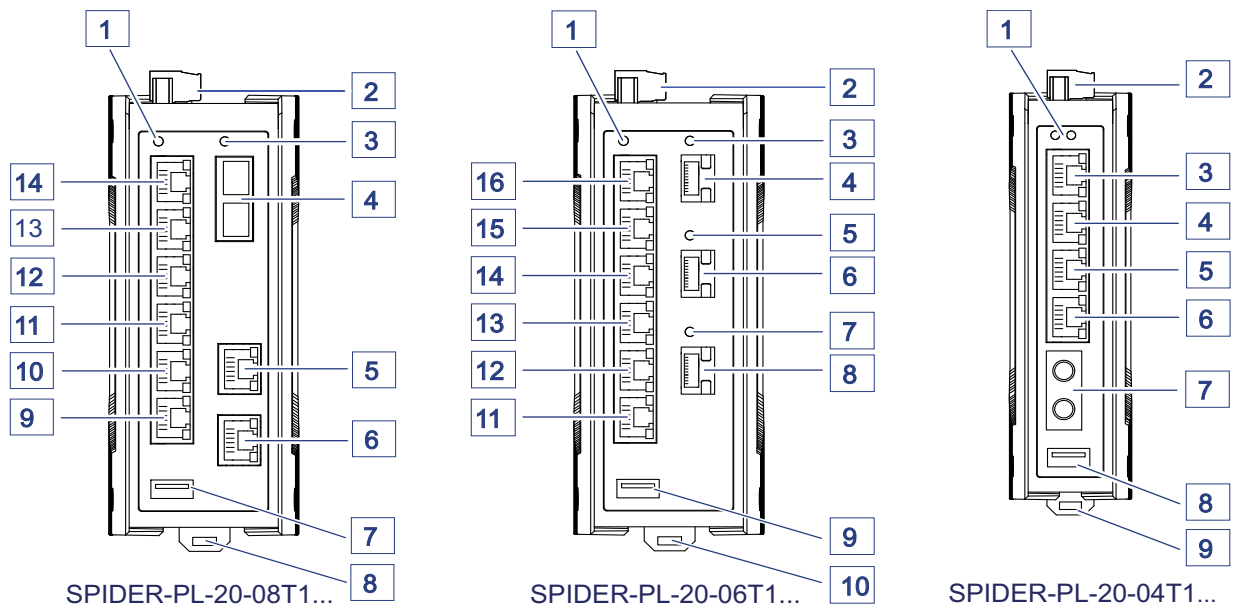
- |          |   |
|----------|---|
| 1        | LED display elements for device status                              |
| 2        | 6-pin, pluggable terminal block for power supply and signal contact |
| 3 ... 6  | 4 × RJ45 socket for 10/100/1000 Mbit/s Twisted Pair connections     |
| 7        | USB interface   |
| 8        | Rail lock gate for DIN rail mounting                                |
| 9 ... 12 | 4 × RJ45 socket for 10/100/1000 Mbit/s Twisted Pair connections     |

#### **SPIDER III PL-40-05T1...**

- |         |   |
|---------|---|
| 1       | LED display elements for device status                              |
| 2       | 6-pin, pluggable terminal block for power supply and signal contact |
| 3 ... 7 | 5 × RJ45 socket for 10/100/1000 Mbit/s Twisted Pair connections     |
| 8       | USB interface   |
| 9       | Rail lock gate for DIN rail mounting                                |

#### **SPIDER III PL-40-01T1...**

- |   |   |
|---|---|
| 1 | LED display elements for device status                              |
| 2 | 6-pin, pluggable terminal block for power supply and signal contact |
| 3 | LED display elements for port status                                |
| 4 | RJ45 socket for 10/100/1000 Mbit/s Twisted Pair connections         |
| 5 | SFP slot for 100/1000 Mbit/s F/O connections                        |
| 6 | Rail lock gate for DIN rail mounting                                |



Front view using example of device variants SPIDER III PL-20...

**SPIDER III PL-20-08T1...**

(depending on the device variant)

- |          |   |
|----------|---|
| 1        | LED display elements for device status  |
| 2        | 6-pin, pluggable terminal block for power supply and signal contact   |
| 3        | LED display elements for port status  |
| 4        | depending on device variant <ul style="list-style-type: none"> <li>▶ DSC multimode socket for 100 Mbit/s F/O connections</li> <li>▶ DSC singlemode socket for 100 Mbit/s F/O connections</li> </ul> |
| 5 ... 6  | 2 × RJ45 socket for 10/100 Mbit/s twisted pair connections  |
| 7        | USB interface   |
| 8        | Rail lock gate for DIN rail mounting  |
| 9 ... 14 | 6 × RJ45 socket for 10/100 Mbit/s twisted pair connections  |

**SPIDER III PL-20-06T1...**

- |           |   |
|-----------|---|
| 1         | LED display elements for device status                              |
| 2         | 6-pin, pluggable terminal block for power supply and signal contact |
| 3, 5, 7   | LED display elements for port status                                |
| 4, 6, 8   | SFP slot for 100 Mbit/s F/O connections                             |
| 9         | USB interface   |
| 10        | Rail lock gate for DIN rail mounting                                |
| 11 ... 16 | 6 × RJ45 socket for 10/100 Mbit/s twisted pair connections          |

**SPIDER III PL-20-04T1...**

- |         |   |
|---------|---|
| 1       | LED display elements for device status  |
| 2       | 6-pin, pluggable terminal block for power supply and signal contact   |
| 3 ... 6 | 4 × RJ45 socket for 10/100 Mbit/s twisted pair connections  |
| 7       | depending on device variant <ul style="list-style-type: none"> <li>▶ ST multimode socket for 100 Mbit/s F/O connections</li> <li>▶ DSC multimode socket for 100 Mbit/s F/O connections</li> <li>▶ DSC singlemode socket for 100 Mbit/s F/O connections</li> </ul> |
| 8       | USB interface   |
| 9       | Rail lock gate for DIN rail mounting  |

## 1.4 Power supply

You have the following options to supply your device with voltage:

### ■ Power supply via a 6-pin terminal block

A 6-pin terminal block is available for the power supply to the device.

You will find more information here:

[See “Installing terminal blocks, switching on the supply voltage” on page 25.](#)

## 1.5 Ethernet ports

You can connect end devices and other segments to the device ports using twisted pair cables or optical fibers (F/O).

You find information on pin assignments for making patch cables here:

[“Pin assignments” on page 15](#)

### ■ 10/100/1000 Mbit/s twisted pair port

This port is an RJ45 socket.

The 10/100/1000 Mbit/s twisted pair port offers you the ability to connect network components according to the IEEE 802.3 10BASE-T/100BASE-TX/1000BASE-T standard.

This port supports:

- ▶ Autonegotiation
- ▶ Autopolarity
- ▶ Autocrossing (if autonegotiation is activated)
- ▶ 1000 Mbit/s half duplex, 1000 Mbit/s full duplex
- ▶ 100 Mbit/s half-duplex mode, 100 Mbit/s full duplex mode
- ▶ 10 Mbit/s half-duplex mode, 10 Mbit/s full duplex mode

### ■ 10/100 Mbit/s twisted pair port

This port is an RJ45 socket.

The 10/100 Mbit/s twisted pair port offers you the ability to connect network components according to the IEEE 802.3 10BASE-T/100BASE-TX standard.

This port supports:

- ▶ Autonegotiation
- ▶ Autopolarity
- ▶ Autocrossing (if autonegotiation is activated)
- ▶ 100 Mbit/s half-duplex mode, 100 Mbit/s full duplex mode
- ▶ 10 Mbit/s half-duplex mode, 10 Mbit/s full duplex mode

### ■ 100/1000 Mbit/s F/O port

This port is an SFP slot.

The 100/1000 Mbit/s F/O port offers you the ability to connect network components according to the IEEE 802.3 100BASE-FX/1000BASE-SX/1000BASE-LX standard.

This port supports:

- ▶ 1000 Mbit/s full duplex when using a Gigabit Ethernet SFP transceiver
- ▶ 100 Mbit/s half duplex, 100 Mbit/s full duplex when using a Fast Ethernet SFP transceiver

### ■ 100 Mbit/s F/O port

The 100 Mbit/s F/O port offers you the ability to connect network components according to the IEEE 802.3 100BASE-FX standard.

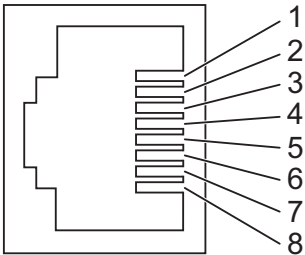
This port supports:

- ▶ 100 Mbit/s half-duplex mode, 100 Mbit/s full duplex mode

State on delivery:

- ▶ 100 Mbit/s, full duplex

## 1.5.1 Pin assignments

RJ45	Pin	10/100 Mbit/s	1000 Mbit/s
	<b>MDI mode</b>		
	1	TX+	BI_DA+
	2	TX-	BI_DA-
	3	RX+	BI_DB+
	4	—	BI_DC+
	5	—	BI_DC-
	6	RX-	BI_DB-
	7	—	BI_DD+
	8	—	BI_DD-
	<b>MDI-X mode</b>		
	1	RX+	BI_DB+
	2	RX-	BI_DB-
	3	TX+	BI_DA+
	4	—	BI_DD+
	5	—	BI_DD-
	6	TX-	BI_DA-
7	—	BI_DC+	
8	—	BI_DC-	

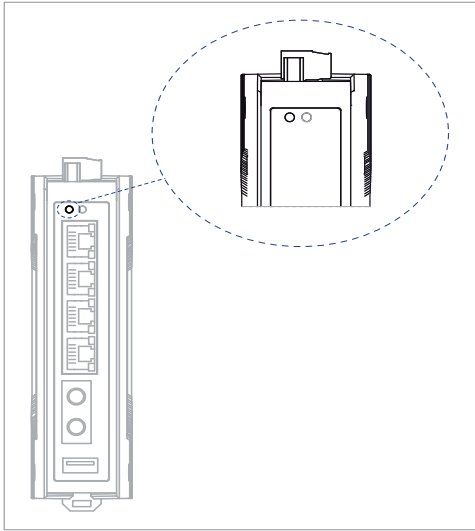


## 1.6 Display elements

After the supply voltage is switched on, the device performs a self-test. During this process, various LEDs light up.

### 1.6.1 Device state

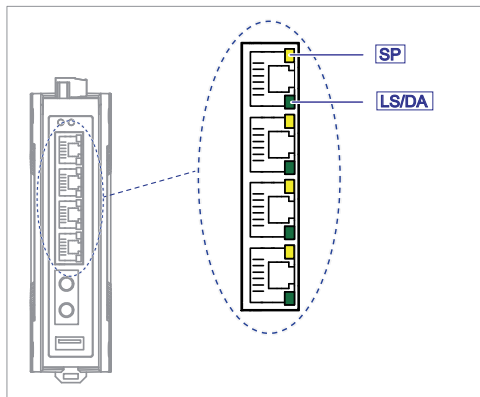
These LEDs provide information about conditions which affect the operation of the whole device.



LED	Display	Color	Activity	Meaning
Power	Supply voltage	—	None	Supply voltage is too low
		Yellow	Lights up	Device variants with redundant power supply: Supply voltage 1 <b>or</b> 2 is on
		Green	Lights up	Device variants with redundant power supply: Supply voltages 1 <b>and</b> 2 are on

## 1.6.2 Port state

These LEDs display port-related information.



SP (data rate)	Color	Activity	Meaning
	—	None	Device detects an invalid or missing link
	Yellow	Flashes 1 time a period	10 Mbit/s connection
	Yellow	Flashing 2 times a period	100 Mbit/s connection
	Yellow	Flashes 3 times a period	1000 Mbit/s connection
LS/DA (link status/data)	Color	Activity	Meaning
	—	None	Device detects an invalid or missing link
	Green	Lights up	Device detects a valid link
	Green	flashing	Device is transmitting and/or receiving data
	yellow/gre en	Flashing alternately	Update of the configuration via the USB interface

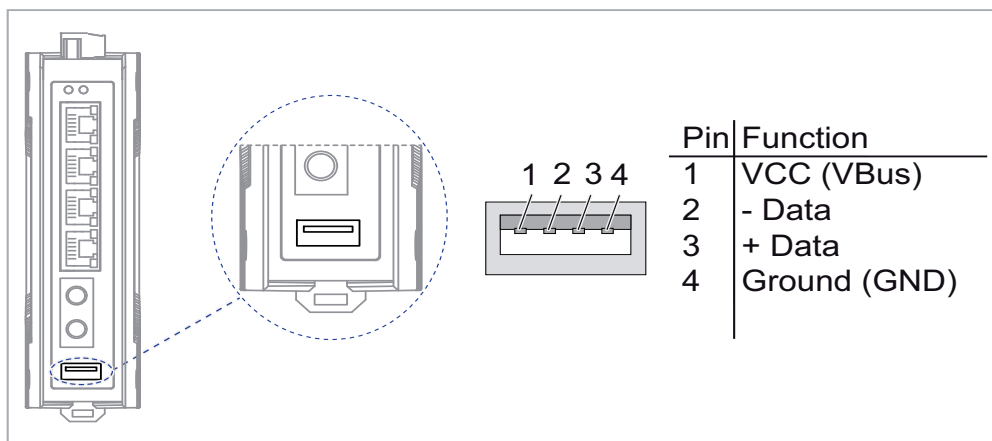
## 2 Configuration interface

### 2.1 USB interface

The USB interface allows you to connect the a storage medium. This is for transferring configuration data.

The USB interface has the following properties:

- ▶ Connectors: type A
- ▶ Supports the USB master mode
- ▶ Supports USB 2.0
- ▶ Supplies current of max. 500 mA
- ▶ Voltage not potential-separated

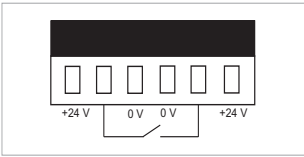


### 3 Signal contact

The potential-free signal contact (relay contact, closed circuit) reports through a break in contact:

- ▶ The failure of at least one supply voltage.
- ▶ The device is not operational.
- ▶ Connection failure to at least one port.

The link state can be masked for each port using the configuration. In the state of delivery, link monitoring is inactive.

Figure	Pin	Function
	1	+ 24 V DC
	2	FAULT
	3	0 V
	4	0 V
	5	FAULT
	6	+ 24 V DC

## 4 Installation

The devices have been developed for practical application in a harsh industrial environment.

On delivery, the device is ready for operation.

Perform the following steps to install and configure the device:

- ▶ [Checking the package contents](#)
- ▶ [Mounting the device](#)
- ▶ [Installing an SFP transceiver \(optional\)](#)
- ▶ [Connecting the terminal block](#)
- ▶ [Operating the device](#)
- ▶ [Connecting data cables](#)
- ▶ [Configuration \(optional\)](#)

### 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 43](#).
- Check the individual parts for transport damage.

### 4.2 Mounting the device

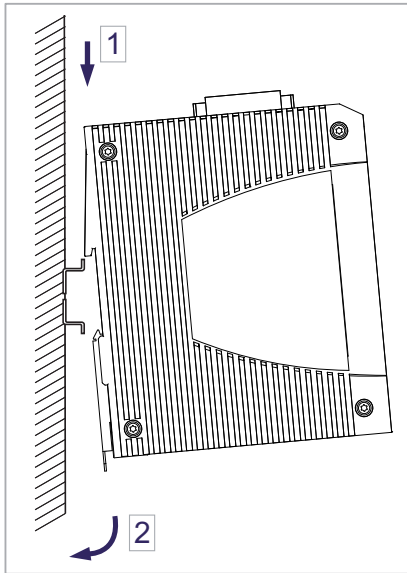
You have the following options for mounting your device:

- ▶ [Installing the device onto the DIN rail](#)
- ▶ [Mounting on a flat surface](#)

#### 4.2.1 Installing the device onto the DIN rail

Prerequisite:

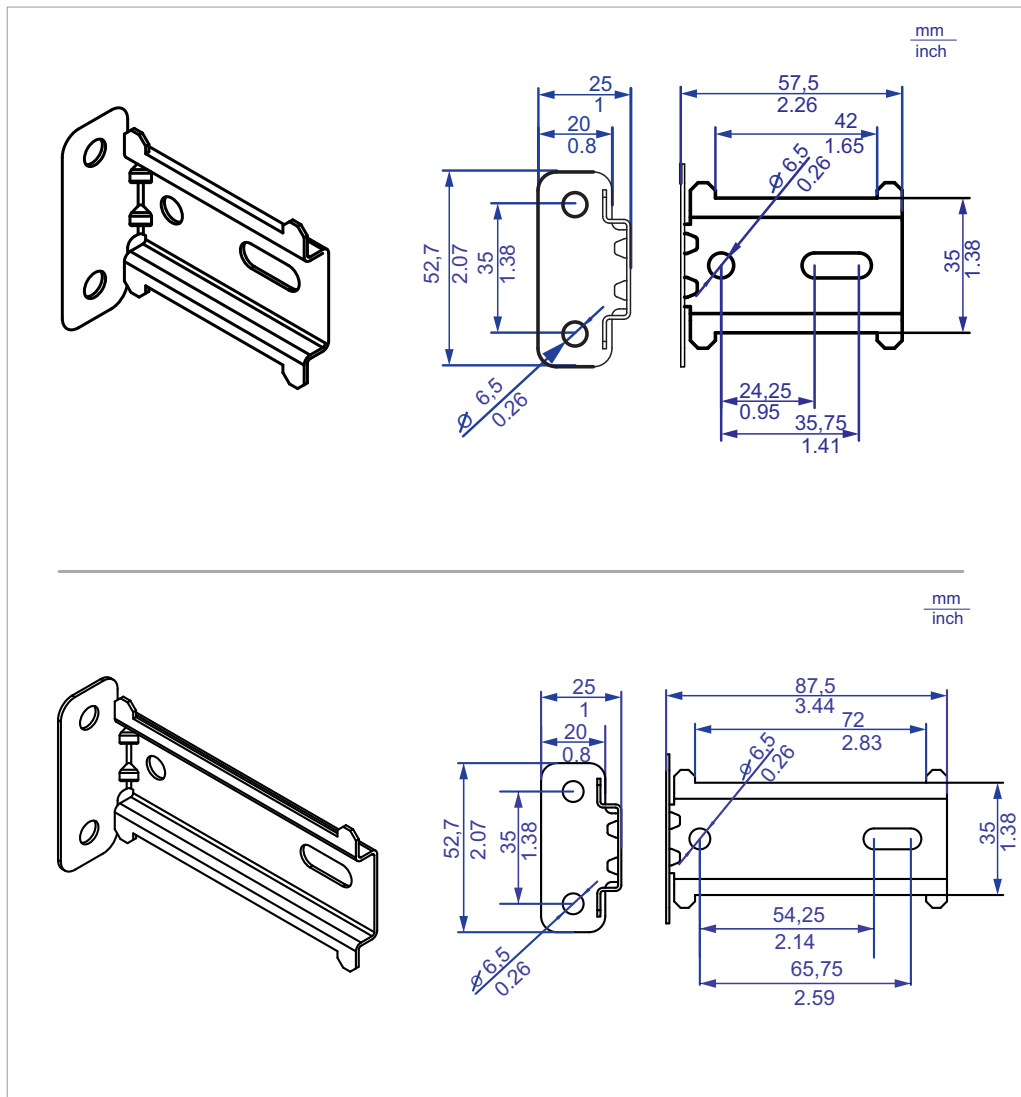
The device is for mounting on a 35 mm DIN rail in accordance with DIN EN 60715.



Proceed as follows:

- Slide the upper snap-in guide of the device into the DIN rail.
- Use a screwdriver to pull the rail lock gate downwards.
- Snap in the device by releasing the rail lock slide.

## 4.2.2 Mounting on a flat surface



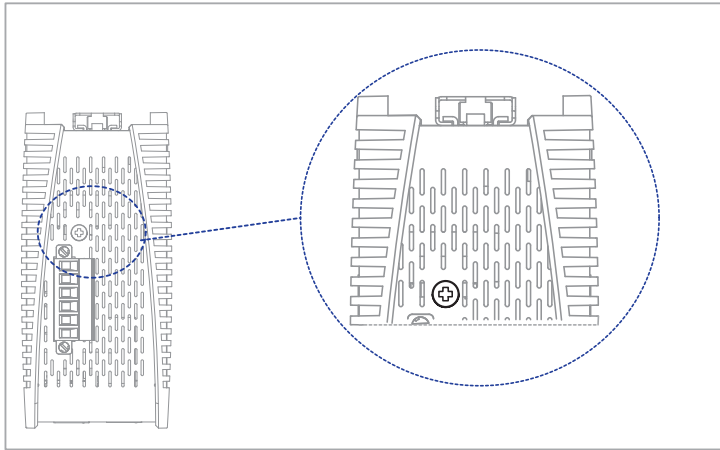
Proceed as follows:

- Attach the wall mounting plate to a flat surface of the wall using screws. You will find the dimensions necessary for mounting the device in the illustration.
- Mount the device on the wall mounting plate. Insert the upper snap-in guide of the device into the rail and press it down against the rail until it snaps into place.
- ▶ Two models of wall mounting plates are available. See “Accessories” on page 44.

## 4.3 Grounding the device

Prerequisite:

- ▶ Use a wire diameter for the ground conductor that is no smaller than the diameter of the supply voltage connection, however of at least 0.5 mm<sup>2</sup> (AWG20).



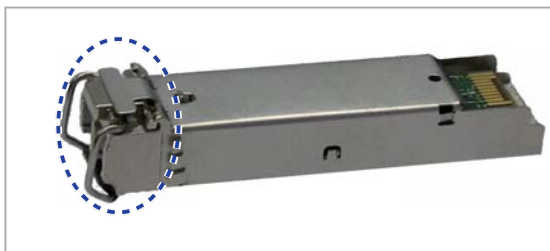
Proceed as follows:

- Ground the device via the ground screw.  
The grounding screw is located on the topside as shown in the illustration.

## 4.4 Installing an SFP transceiver (optional)

Prerequisite:

- ▶ Use only Hirschmann SFP transceivers which are suitable for usage with the device.  
[See "Accessories" on page 44.](#)



Proceed as follows:

- Remove the protection cap from the SFP transceiver.
- Push the transceiver with the lock closed into the slot until it latches in.



## 4.5 Connecting the terminal block

The supply voltage can be connected redundantly. Both inputs are uncoupled. There is no distributed load. With redundant supply, the power supply unit with the higher output voltage supplies the device on its own. The supply voltage is electrically isolated from the housing.

### **WARNING**

#### **ELECTRIC SHOCK**

Connect only a supply voltage that corresponds to the type plate of your device.

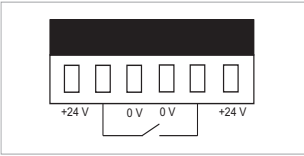
Never insert sharp objects (small screwdrivers, wires, etc.) into the connection terminals for electric conductors, and do not touch the terminals. Observe the maximum values for the contact load of the signal contact.

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

For the supply voltage to be connected, perform the following steps:

- Remove the power connector from the device.
- Connect the wires according to the pin assignment on the device with the clamps.

**Note:** With a non-redundant supply of the supply voltage, the device reports the loss of a supply voltage. You can prevent this message by applying the supply voltage via both inputs, or by changing the configuration.

Figure	Pin	Function
	1	+ 24 V DC
	2	FAULT
	3	0 V
	4	0 V
	5	FAULT
	6	+ 24 V DC

## 4.6 Operating the device

Perform the following steps to start up the device:

- ▶ [Installing terminal blocks, switching on the supply voltage](#)
- ▶ [Connecting data cables](#)

### 4.6.1 Installing terminal blocks, switching on the supply voltage

- By connecting the supply voltage via the terminal block, you start the operation of the device.

### 4.6.2 Connecting data cables

Note the following general recommendations for data cable connections in environments with high electrical interference levels:

- ▶ Keep the length of the data cables as short as possible.
- ▶ Use optical data cables for the data transmission between the buildings.
- ▶ When using copper cables, provide a sufficient separation between the power supply cables and the data cables. Ideally, install the cables in separate cable channels.
- ▶ Verify that power supply cables and data cables do not run parallel over longer distances, and that ideally they are installed in separate cable channels. If reducing the inductive coupling is necessary, verify that the power supply cables and data cables cross at a 90° angle.
- ▶ Use shielded cables (SF/UTP cables as per ISO/IEC 11801:2002).
- Connect the data cables according to your requirements.