HIRSCHMANN
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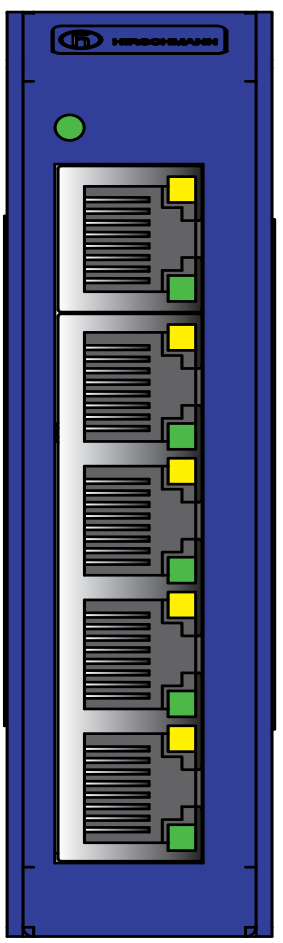
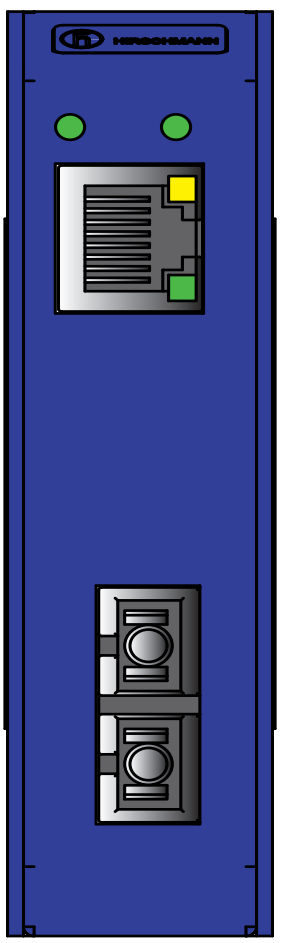
User Manual

Installation
Industrial Ethernet Rail Switch
SPIDER PD



SPIDER 5TX PD EEC



SPIDER 1TX/1FX-MM PD EEC
SPIDER 1TX/1FX-SM PD EEC

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

Printed in Germany
Hirschmann Automation and Control GmbH
Stuttgarter Str. 45-51
72654 Neckartenzlingen
Germany
Tel.: +49 1805 141538

Contents

Safety instructions

Important Information

Notice: Read these instructions carefully, and look at the equipment to become familiar with the device before trying to install, operate, or maintain it. The following special messages may appear throughout this documentation or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.

The addition of this symbol to a Danger or Warning safety label indicates that an electrical hazard exists, which will result in personal injury if the instructions are not followed.

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠ DANGER

DANGER indicates an imminently hazardous situation which, if not avoided, **will result in** death or serious injury.

⚠ WARNING

WARNING indicates a potentially hazardous situation which, if not avoided, **can result in** death or serious injury.

⚠ CAUTION

CAUTION indicates a potentially hazardous situation which, if not avoided, **can result in** minor or moderate injury.

Note: Contains important information on the product, on how to manage the product, or on the respective section of the documentation to which your special attention is being drawn.

Certified usage

The device may only be employed for the purposes described in the catalog and technical description, and only in conjunction with external devices and components recommended or approved by the manufacturer. The product can only be operated correctly and safely if it is transported, stored, installed and assembled properly and correctly. Furthermore, it must be operated and serviced carefully.

Supply voltage

⚠ CAUTION

ELECTRIC SHOCK
Only connect a supply voltage that corresponds to the type plate of your device.

Non-adherence to these instructions can lead to physical injury or material damage.

The devices are designed for operation with a safety extra-low voltage. For the voltage supply use only Power over Ethernet in accordance with IEEE 802.3af.
The supply voltage is electrically isolated from the housing.

- ☐ Use undamaged parts.
- ☐ Connect the ground connector before you set up the other connections. When removing the connections, you remove the ground connector last.
- ☐ Only switch on the device when the housing is closed.

Shielding ground

- ☐ Beware of possible short circuits when connecting a cable section with conductive shielding braiding.

Housing

⚠ CAUTION

ELECTRIC SHOCK
Only connect a supply voltage that corresponds to the type plate of your device.

Non-adherence to these instructions can lead to physical injury or material damage.

⚠ CAUTION

EQUIPMENT OVERHEATING

When installing the device, make sure any ventilation slots remain free. Maintain a clearance of at least 10 cm (3.94 in).

Failure to follow these instructions can result in injury or equipment damage.

Only technicians authorized by the manufacturer are permitted to open the housing.
The device is grounded via the separate ground screw on the back of the device, below the DIN rail adapter.

☐ Make sure that the electrical installation meets local or nationally applicable safety regulations.

☐ The device must be installed in the vertical position.
☐ If installed in a living area or office environment, the device must be operated exclusively in switch cabinets with fire protection characteristics in accordance with EN 60950-1.

Environment

The device may only be operated at the specified surrounding air temperature (temperature of the surrounding air at a distance of up to 5 cm (1.97 in) from the device) and relative air humidity specified in the technical data.

☐ Install the device in a location where the climatic threshold values specified in the technical data will be observed.
☐ Use the device only in an environment within the pollution degree specified in the technical data.
☐ The equipment is designed for in building installation only and is not intended to be connected to exposed (outside plant) networks.

Qualification requirements for personnel

Qualified personnel as understood in this manual and the warning signs, are persons who are familiar with the setup, assembly, startup, and operation of this product and are appropriately qualified for their job. This includes, for example, those persons who have been:

- trained or directed or authorized to switch on and off, to ground and to label power circuits and devices or systems in accordance with current safety engineering standards;
- trained or directed in the care and use of appropriate safety equipment in accordance with the current standards of safety engineering;
- trained in providing first aid.

General safety instructions

Electricity is used to operate this equipment. Comply with every detail of the safety requirements specified in the operating instructions regarding the voltages to apply.
See “Supply voltage” on page 5.

Non-observance of these safety instructions can therefore cause material damage and/or injuries.

- ☐ Only appropriately qualified personnel should work on this device or in its vicinity. These personnel must be thoroughly familiar with the warnings and maintenance procedures in accordance with this operating manual.
- ☐ The proper and safe operation of this device depends on proper handling during transport, proper storage and assembly, and conscientious operation and maintenance procedures.
- ☐ Never start operation with damaged components.
- ☐ Only use the devices in accordance with this manual. In particular, observe the warnings and safety-related information.
- ☐ Any work that may be required on the electrical installation may only be carried out by personnel trained for this purpose.

Note: LED or LASER components in compliance with IEC 60825-1 (2007):
CLASS 1 LASER PRODUCT
CLASS 1 LED PRODUCT

National and international safety regulations

- ☐ Make sure that the electrical installation meets local or nationally applicable safety regulations.

CE marking

The 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
72654 Neckartenzlingen
Tel.: +49 1805 141538

The product can be used in living areas (living area, place of business, small business) and in industrial areas.

- Interference immunity: EN 61000-6-2:2005
- Emitted interference: EN 55022:2010

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.

E marking

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

Rule No. 10 of the Economic Commission for Europe (ECE): Devices with a certification are labelled with the E type-approval mark.

Note: For use in connection with a suitable type approved power supply only.

FCC note:

This device complies with part 15 of 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 radiate same, and 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 living 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 product 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” document contains a device description, safety instructions, a display description and other information that you require to install the device before starting with the configuration of the device.

Legend

The symbols used in this manual have the following meanings:

▶	Listing
☐	Work step
■	Subheading

1 Device description

1.1 General device description

The SPIDER PD 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 using copper wires or optical fibers in a line structure.

Depending on the device variant, you can choose various media to connect terminal devices and other infrastructure components:

- twisted pair cable
- multimode F/O
- singlemode F/O

The twisted pair ports support:

- Autocrossing
- Autonegotiation
- Autopolarity

The F/O ports support:

- Full duplex mode

The Hirschmann network components help you ensure continuous communication across all levels of the company.

1.2 Description of the device variants

The devices differ with regard to the number of interfaces and the media type for connecting segments.
The table below shows the number and type of the ports for each product variant. The abbreviations F/O (optical fiber) and TP (twisted pair) indicate the media type. The abbreviations DSC and RJ45 indicate the socket type. The abbreviations MM (Multimode) and SM (Singlemode) indicate the optical fiber type.

Variant	10/100 Mbit/s, TP, RJ45	PoE PD ports	100 Mbit/s, F/O, MM, DSC	100 Mbit/s, F/O, SM, DSC
SPIDER 5TX PD EEC	5	1		
SPIDER 1TX/1FX-MM PD EEC	1	1	1	
SPIDER 1TX/1FX-SM PD EEC	1	1		1

Table 1: Number and type of ports

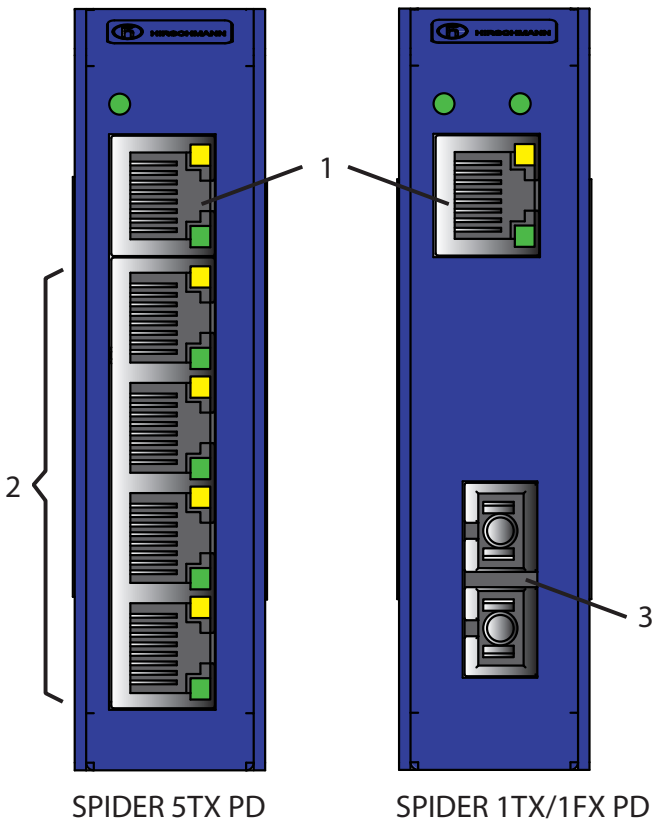


Figure 1: Overview of the device variants
1 – Port 1: Port based on 10/100BASE-T(X) (RJ45 connection), PoE PD (voltage supply via Power over Ethernet)
2 – Ports 2 to 5: Ports based on 10/100BASE-T(X) (RJ45)(SPIDER 5TX PD EEC)
3 – F/O port 100 Mbit/s SM or MM DSC (SPIDER 1TX/1FX-MM PD EEC, SPIDER 1TX/1FX-SM PD EEC)

The SPIDER 5TX PD devices have five twisted-pair ports (10BASE-T/100BASE-TX ports, RJ45 sockets), of which one is a PoE PD port. PoE switches conforming to 802.3af or 802.3at can be connected to the PD ports.

The SPIDER 1TX/1FX devices have 2 ports, of which one is a twisted-pair PoE PD port (10BASE-T/100BASE-TX ports, RJ45 socket), and depending on the variant, an F/O singlemode port or an F/O multimode port (100BASE-FX, duplex DSC connection). Terminal devices and an optical network component can be connected at these ports.

With a phantom voltage the PoE voltage is fed in via the wire pairs transmitting the signal, and with spare-pair voltage via the free wire pairs.

The devices comply with the specifications of the standard(s):

- ISO/IEC 8802-03 10BASE-T/100BASE-TX
- ISO/IEC 8802-03 100BASE-FX

2 Assembly and start-up

The devices have been developed for practical application in a harsh industrial environment.
On delivery, the device is ready for operation.

The following steps should be performed to install and configure a Switch:

- Unpacking and checking
- Mounting the device on the DIN rail
- Connecting the data lines
- Starting up

2.1 Installing the device

2.1.1 Unpacking and checking

☐ Check that the contents of the package are complete (see page 22 “Scope of delivery”).
☐ Check the individual parts for transport damage.

2.1.2 Installing the device on the DIN rail, grounding

⚠ CAUTION
TRANSIENT OR ELECTROSTATIC DISCHARGES Do not open the housing. **Non-adherence to these instructions can lead to physical injury or material damage.**

Note: The device is grounded via the separate ground screw on the back of the device, below the DIN rail adapter.

Note: The shielding ground of the connectable twisted pair lines is connected to the ground connection as a conductor.

☐ Mount the device on a 35 mm DIN rail in accordance with DIN EN 60175.
☐ Attach the upper snap-in guide of the device into the DIN rail and press it down against the DIN rail until it snaps into place.

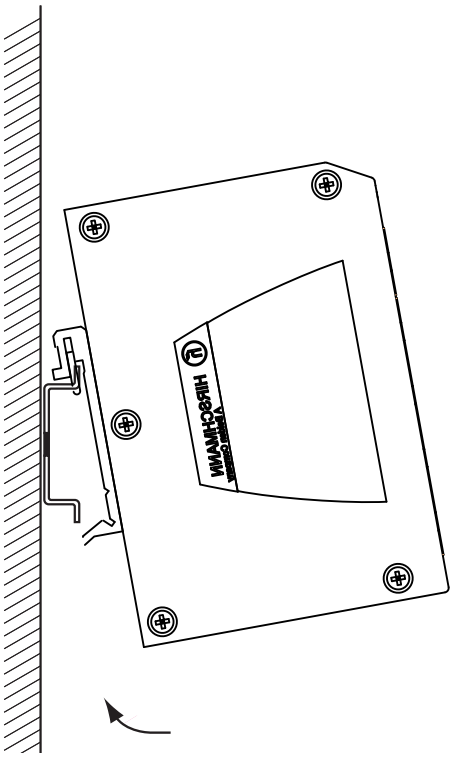


Figure 2: Mounting on the DIN rail

2.1.3 Dimensions

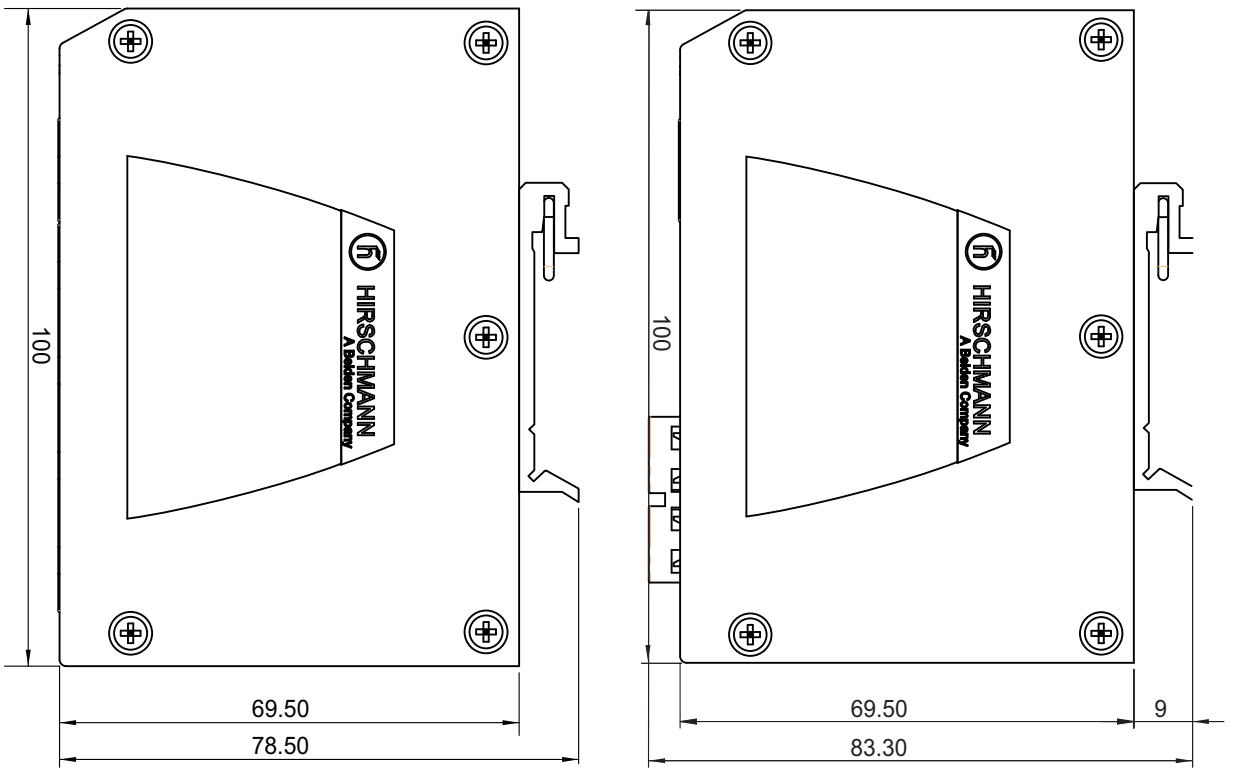


Figure 3: Dimensions of the SPIDER PD (left: 5TX, right: 1TX/1FX)

2.1.4 Startup procedure

⚠ CAUTION

ELECTRIC SHOCK
Only connect a supply voltage as described in the data plate of your device.

Non-adherence to these instructions can lead to physical injury or material damage.

By connecting the data line to the PoE PD port, you start the operation of the device.

2.1.5 Connecting the data lines

You can connect terminal devices and other segments at the ports of the device via twisted pair cables or F/O cables.

☐ Install the data lines according to your requirements.

10/100 Mbit/s twisted pair connection

These connections are RJ45 sockets.
10/100 Mbit/s TP ports enable the connection of terminal devices or independent network segments according to the IEEE 802.3 10BASE-T/ 100BASE-TX standard.
These ports support:

- Autonegotiation
- Autopolarity
- Autocrossing
- 100 Mbit/s half-duplex mode, 100 Mbit/s full duplex mode
- 10 Mbit/s half-duplex mode, 10 Mbit/s full duplex mode

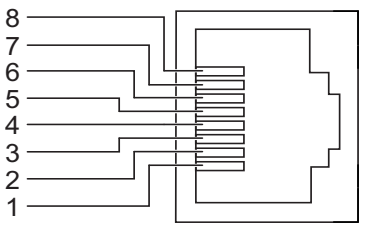
Figure	Pin	Function
	1+2	Cable pair 1
	3+6	Cable pair 2
	4,5,7,8	Not used

Table 2: Pin assignment of a TP/TX interface, RJ45 socket

10/100 Mbit/s twisted pair connection PoE

This connection is an RJ45 socket.

10/100 Mbit/s TP PoE ports enable the connection of terminal devices or independent network segments according to the IEEE 802.3 10BASE-T/ 100BASE-TX and IEEE 802.3af (Power over ETHERNET) standards.
These ports support:

- 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
- Power over Ethernet powered device (PoE PD) according to 802.3af

The sockets are electrically connected to the housing.
With a phantom voltage the PoE voltage is fed in via the wire pairs transmitting the signal, and with spare-pair voltage via the free wire pairs.

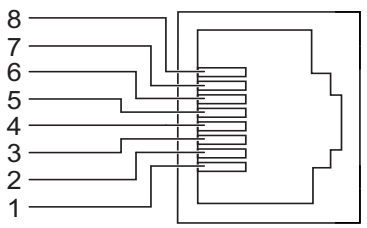
Figure	Pin	data	Input for PoE voltage	
	1	Cable pair 1+	V+	V−
	2	Cable pair 1-	V+	V−
	3	Cable pair 2+	V−	V+
	6	Cable pair 2-	V−	V+
	4,5,7,8	Not used		

Table 3: Pin assignment of a TP/TX interface, RJ45 socket. Input of PoE voltage via the wire pairs transmitting the signal (phantom voltage).

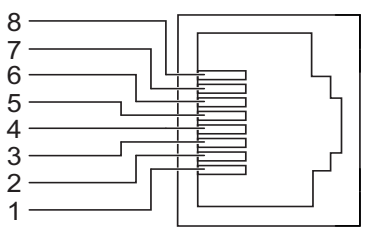
Figure	Pin	data	Input for PoE voltage	
	1	Cable pair 1+		
	2	Cable pair 1-		
	3	Cable pair 2+		
	6	Cable pair 2-		
	4	Cable pair 3+	V+	V−
	5	Cable pair 3-	V+	V−
	7	Cable pair 4+	V−	V+
	8	Cable pair 4-	V−	V+

Table 4: Pin assignment of a TP/TX interface, RJ45 socket. Input of PoE voltage via the free wire pairs (spare pair).

100 Mbit/s F/O connection

For the device variants 1TX/1FX-MM PD EEC and 1TX/1FX-SM PD EEC, these ports are DSC connectors.

100 MBit/s F/O ports enable the connection of terminal devices or independent network segments in compliance with the IEEE 802.3 100BASE-FX standard.
These ports support:

- Full duplex mode

Note: Make sure that the SM ports are only connected with SM ports, and MM ports only with MM ports.

2.2 Display elements

2.2.1 Device state

These LEDs provide information about conditions that affect the operation of the whole device. They are located on the top edge of the front of the device.

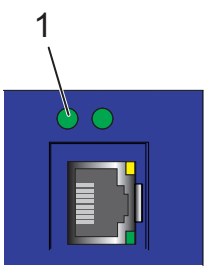


Figure 4: Device status LEDs
1 – Power LED (P)

LED	Display	Color	Activity	Meaning
P	Power	Green	Lights up	The supply voltage is on.
			None	The supply voltage is too low.

2.2.2 Port state

Along with the LED for the device status, there is an LED for the port status in the devices with an F/O port.

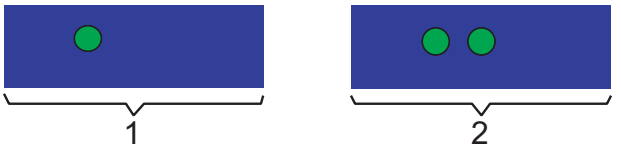


Figure 5: Port status LED for the F/O port
1 – No port status LED for devices without an F/O port (SPIDER 5TX PD EEC)
2 – One port status LED (LS/DA) for devices with an F/O port (SPIDER 1TX/1FX-MM PD EEC and SPIDER 1TX/1FX-SM PD EEC)

The green and yellow LEDs at the individual TP ports display port-related information.

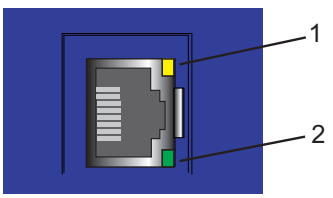


Figure 6: Port status LEDs at TP ports
1 – Data rate
2 – Link status data

LED	Display	Color	Activity	Meaning
LS/DA	Link status data	Green	Lights up	Valid connection
			Flashing	Data traffic
			None	No valid connection
100	Data rate	Yellow	Lights up	100 Mbit/s connection
			None	10 Mbit/s connection

2.3 Maintenance

- ☐ When designing this device, Hirschmann was largely able to forego using wear parts. The parts subject to wear are dimensioned to last longer than the lifetime of the product when it is operated normally. Operate this device according to the specifications (see “Technical data”).
- ☐ Depending on the degree of pollution in the operating environment, check at regular intervals that the ventilation slots in the device are not obstructed.

2.4 Disassembly

2.4.1 Removing the device from the DIN rail

☐ To remove the device from the DIN rail, press the device downwards and pull it out from under the DIN rail.

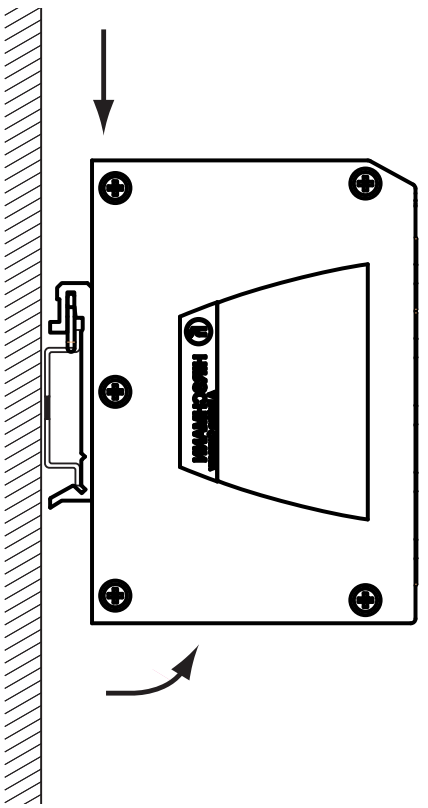


Figure 7: Removal from the DIN rail

3 Technical data

General technical data

Dimensions W × H × D		25 mm x 100 mm x 70 mm
Weight	SPIDER 5TX PD EEC SPIDER 1TX/1FX-MM PD EEC SPIDER 1TX/1FX-SM PD EEC	198 g 171 g 171 g
Power supply	Operating voltage	36 to 57 V DC via PoE Safety extra-low voltage (SELV) Relevant for North America: NEC Class 2 power source max. 5A.
Environment	Storage temperature (ambient air)	−40 °C ... +85 °C
	Humidity	to 95% (non-condensing)
	Air pressure	Up to 2000 m (795 hPa), higher altitudes on request
Operating temperature		-40 °C bis +70 °C
Pollution degree		2
Protection classes	Laser protection	Class 1 according to EN 60825-1 (2007)
	Degree of protection	IP 30

EMC and immunity

EMV interference immunity EN 61000-6-2:2005, test based on:		
IEC/EN 61000-4-2	Electrostatic discharge	
	Contact discharge Air discharge	+/- 4 kV +/- 8 kV
IEC/EN 61000-4-3	Electromagnetic field	
	80 - 2000 MHz	10 V/m
IEC/EN 61000-4-4	Fast transients (burst)	
	Data line	+/- 1 kV
IEC/EN 61000-4-5	Voltage surges	
	Data line, line / earth	+/- 1 kV
IEC/EN 61000-4-6	Line-conducted interference voltages	
	150 kHz ... 80 MHz	10 V
EMC emitted interference		
EN 55022		Class A
FCC 47 CFR Part 15		Class A
Stability		
Vibration	IEC 60068-2-6, test Fc	5 Hz to 8.4 Hz with 3.5 mm amplitude; 1g at 4 Hz to 150 Hz;
Shock	IEC 60068-2-27, Test Ea	15 g at 11 ms

Network range

TP port	
Length of a twisted pair segment	typ. 100 m (cat5e cable with 100BASE-TX)

Table 5: TP port 10BASE-T / 100BASE-TX

Product code SPIDER 1TX/1FX ...	F/O type	Wave length	Fiber	System attenua-tion	Example for F/O line length	Fiber attenua-tion	BLP/ disper-sion
SPIDER 1TX/1FX-MM PD EEC	MM	1380 nm	50/125 µm	0-8 dB	2 km	1.0 dB/km	800 MHz·km
SPIDER 1TX/1FX-MM PD EEC	MM	1380 nm	62.5/125 µm	0-11 dB	2 km	1.0 dB/km	500 MHz·km
SPIDER 1TX/1FX-SM PD EEC	SM	1360 nm	9/125 µm	0–16 dB	30 km	0.4 dB/km	3.5 ps/ (nm·km)

Table 6: LWL-Port 100BASE-FX

MM = Multimode, SM = Singlemode, LH = Singlemode Longhaul

Power consumption/power output at 48 V DC

Device name	Max. power consumption	Power output
SPIDER 5TX PD EEC	2.4 W (with PoE)	13,9 Btu (IT)/h
SPIDER 1TX/1FX-MM PD EEC SPIDER 1TX/1FX-SM PD EEC	2.3 W (with PoE)	10,7 Btu (IT)/h

Scope of delivery

Device	Scope of delivery
SPIDER PoE PD	Device
	Installation user manual

Order numbers

Device	Order number
SPIDER 5TX PD EEC	942 051-001
SPIDER 1TX/1FX-MM PD EEC	942 051-002
SPIDER 1TX/1FX-SM PD EEC	942 051-003

Underlying norms and standards

Name	
cUL 508	Safety for Industrial Control Equipment
EN 55022	IT equipment – radio interference characteristics
EN 61000-6-2	Generic norm – immunity in industrial environments
EN 61131-2	Programmable logic controllers
EN 60950-1	Safety for the installation of IT equipment
FCC 47 CFR Part 15	Code of Federal Regulations
ECE No. 10	Radio interference from motor vehicles (E type-approval)

Table 7: List of norms and standards

The device has a certification based on a specific standard only if the certification indicator appears on the housing.
However, with the exception of Germanischer Lloyd, ship certifications are only included in the product information under www.hirschmann.com.

A Further Support

Technical Questions

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

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

Contact our support at
https://hirschmann-support.belden.eu.com

You can contact us

in the EMEA region at
- Tel.: +49 (0)1805 14-1538
- E-mail: hac.support@belden.com

in the America region at
- Tel.: +1 (717) 217-2270
- E-mail: inet-support.us@belden.com

in the Asia-Pacific region at
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