

PP-RJ-...-F

Patch panel with surge protection

Data sheet
107964_en_06

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COMPLETE line

PROFI
NET

Modbus

dnp
Distributed
Network
Protocol



1 Description

The device is an Ethernet patch panel for DIN rail mounting. It represents the transition of the field cabling to the internal control cabinet cabling.

The patch panel is connected to the end device via the RJ45 jack using a pre-assembled patch cable.

The device includes integrated surge protection for high system availability and shield current monitoring with visual indicator.

The patch panels are passive devices and do not usually need an external power supply. However, in order to use shield current monitoring, the patch panel must be used in a PoE-carrying cable. The required power is drawn from the PoE voltage.

Features

- 10/100/1000 Mbps
- Mounting on a DIN rail
- Safe shield connection to ground potential
- Surge protection
- Shield current monitoring
- Installation in Ex zone 2
- Shipbuilding approval in accordance with DNV GL
- PoE-capable in accordance with IEEE 802.3bt, type 4
- Various connection options depending on the product version
 - RJ45 jack
 - Screw terminal blocks
 - Push-in connection
 - IDC connection



Make sure you always use the latest documentation.
It can be downloaded from the product at phoenixcontact.net/products.

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3 Ordering data

Description	Type	Order No.	Pcs./Pkt.
Patch panel, two RJ45 jacks, 10/100/1000 MBps, DIN rail adapter, IP20, shield current monitoring, surge protection	PP-RJ-RJ-F	2703020	1
Patch panel, RJ45 jack on screw terminal blocks, 10/100/1000 Mbps, DIN rail adapter, IP20, shield contacting with strain relief, shield current monitoring, surge protection	PP-RJ-SC-F	2703021	1
Patch panel, RJ45 jack on Push-in terminal blocks, 10/100/1000 Mbps, DIN rail adapter, IP20, shield contacting with strain relief, shield current monitoring, surge protection	PP-RJ-SCC-F	2703022	1
Patch panel, RJ45 jack on IDC terminal blocks, 10/100/1000 Mbps, DIN rail adapter, IP20, shield contacting with strain relief, shield current monitoring, surge protection	PP-RJ-IDC-F	2703023	1
Accessories	Type	Order No.	Pcs./Pkt.
Patch panel, two RJ45 jacks, 10/100/1000 MBps, DIN rail adapter, IP20	PP-RJ-RJ	2703015	1
Patch panel, RJ45 jack on screw terminal blocks, 10/100/1000 Mbps, DIN rail adapter, IP20, shield contacting with strain relief	PP-RJ-SC	2703016	1
Patch panel, RJ45 jack on Push-in terminal blocks, 10/100/1000 Mbps, DIN rail adapter, IP20, shield contacting with strain relief	PP-RJ-SCC	2703018	1
Patch panel, RJ45 jack on IDC terminal blocks, 10/100/1000 Mbps, DIN rail adapter, IP20, shield contacting with strain relief	PP-RJ-IDC	2703019	1
Crimping pliers, for assembling the RJ45 plugs FL PLUG RJ45..., for assembly on site	FL CRIMPTOOL	2744869	1
Actuation tool, for ST terminal blocks, also suitable for use as a bladed screwdriver, size: 0.4 x 2.5 x 75 mm, 2-component grip, with non-slip grip	SZF 0-0,4X2,5	1204504	10
Passive network isolator for electrical isolation in Ethernet networks. This protects Ethernet devices from potential differences of up to 4 kV. Can be used for transmission speeds of up to 100 Mbps. Connection using RJ45 and COMBICON plug-in screw terminal block.	FL ISOLATOR 100-RJ/SC	2313928	1
Passive network isolator for electrical isolation in Ethernet networks. This protects Ethernet devices from potential differences of up to 4 kV. Can be used for transmission speeds of up to 100 Mbps. Possible to connect two RJ45 plugs.	FL ISOLATOR 100-RJ/RJ	2313931	1

Accessories	Type	Order No.	Pcs./Pkt.
Passive network isolator for electrical isolation in Ethernet networks. This protects Ethernet devices from potential differences of up to 4 kV. Can be used for transmission speeds of up to 1 Gbps. Possible to connect two RJ45 plugs.	FL ISOLATOR 1000-RJ/RJ	2313915	1
Passive network isolator for electrical isolation in Ethernet networks. For the protection of Ethernet devices against potential differences of up to 4 kV. Can be used for transmission speeds of up to 100 Mbps. Ethernet connection via two M12 sockets (D-coded).	FL ISOLATOR 100-M12	2902985	1
Patch cable, CAT5, assembled, 0.3 m	FL CAT5 PATCH 0,3	2832250	1
Patch cable, CAT5, assembled, 0.5 m	FL CAT5 PATCH 0,5	2832263	1
Patch cable, CAT5, assembled, 1 m	FL CAT5 PATCH 1,0	2832276	1
Patch cable, CAT5, assembled, 1.5 m	FL CAT5 PATCH 1,5	2832221	1
Patch cable, CAT5, assembled, 2 m	FL CAT5 PATCH 2,0	2832289	1
Patch cable, CAT5, assembled, 3 m	FL CAT5 PATCH 3,0	2832292	1
Patch cable, degree of protection: IP20, number of positions: 8, 10 Gbps, CAT6 _A , cable outlet: straight	NBC-R4AC-R4AC-IE8A/.../...	1411854	1
Patch cable, CAT6 _A , 4-pair, shielded, connection not crossed (line), assembled at both ends with RJ45/IP20 connectors, outer sheath material: PUR, length: 2.0 m	NBC-R4AC/10G-R4AC/10G-94F/2,0	1408360	1
Patch cable, CAT6 _A , 4-pair, shielded, connection not crossed (line), assembled at both ends with RJ45/IP20 connectors, outer sheath material: PUR, length: 3.0 m	NBC-R4AC/10G-R4AC/10G-94F/3,0	1408365	1
PROFINET patch cable, shielded, star-quad, 22 AWG stranded (7-wire), green, straight RJ45 male connector/IP20 to straight RJ45 male connector/IP20, length: 1.0 m	NBC-R4AC/1,0-93B/R4AC	1408968	1
PROFINET patch cable, shielded, star quad, 22 AWG stranded (7-wire), green, straight RJ45 plug/IP20, to straight RJ45 plug/IP20, length: 2 m	NBC-R4AC/2,0-93B/R4AC	1408969	1
RJ45 connector, IP20, CAT6 _A , 8-pos., with QUICKON fast connection technology, for 26 ... 24 AWG 1-wire and 7-wire conductors, color: black	VS-08-RJ45-10G/Q	1419001	1
RJ45 connector, degree of protection: IP20, number of positions: 4, 100 Mbps, CAT5 (IEC 11801:2002), material: PA, connection method: IDC fast connection, cable outlet: straight, color: traffic grey A RAL 7042	VS-PN-RJ45-5-Q/IP20	1658435	1
Stripping tool, for the multi-level stripping of shielded cables	VS-CABLE-STRIP-VARIO	1657407	1
RJ45 connector, degree of protection: IP20, number of positions: 8, 1 Gbps, CAT5 (IEC 11801:2002), material: PA, connection method: IDC fast connection, connection cross section: AWG 26- 23, cable outlet: straight, color: traffic grey A RAL 7042	VS-08-RJ45-5-Q/IP20	1656725	1

Accessories	Type	Order No.	Pcs./Pkt.
RJ45 connector, degree of protection: IP20, number of positions: 8, 1 Gbps, CAT5 (IEC 11801:2002), material: PA, connection method: IDC fast connection, connection cross section: AWG 26- 23, cable outlet: straight, color: black	VS-08-RJ45-5-Q/IP20 BK	1658008	1
Actuation tool, for ST terminal blocks, also suitable for use as a bladed screwdriver, size: 0.4 x 2.5 x 75 mm, 2-component grip, with non-slip grip	SZF 0-0,4X2,5	1204504	10
Electronic diagonal cutter , tapered head, angled (21°), without chamfer, with opening spring	MICROFOX-SP	1212488	1
Network cable, Ethernet CAT6 _A (10 Gbps), 8-position, PUR halogen-free, water blue RAL 5021, shielded, free cable end, on free cable end, cable length: free entry (0.5 ... 400 m)	VS-OE-OE-94F/...	1417359	1

4 Technical data

Supply				
Supply voltage range	36 V DC ... 52 V DC \pm 10 % (via PoE, for shield current monitoring) 42 V DC ... 57 V DC (with UL approval)			
Electrical isolation	FE // Ethernet			
Ethernet interface, 10/100/1000Base-T(X) in accordance with IEEE 802.3	PP-RJ-RJ-F	PP-RJ-SC-F	PP-RJ-SCC-F	PP-RJ-IDC-F
Connection method	RJ45 jack	Screw terminal block	Push-in connection	IDC connection
Conductor cross section				
flexible		0.14 mm ² ... 1.5 mm ²	0.2 mm ² ... 1.5 mm ²	0.14 mm ² ... 0.34 mm ²
rigid		0.14 mm ² ... 1.5 mm ²	0.2 mm ² ... 1.5 mm ²	0.14 mm ² ... 0.34 mm ²
AWG flexible		28 AWG...16 AWG	26 AWG...16 AWG	26 AWG...22 AWG
Flexible with ferrules without plastic sleeve			0.25 mm ² ... 1.5 mm ² (only together with CRIMPFOX 6)	
Flexible with ferrules with plastic sleeve			0.25 mm ² ... 1.5 mm ² (only together with CRIMPFOX 6)	
Stripping length		5 mm	8 mm	
Pin assignment	1:1	1:1	1:1	1:1
Torque		0.22 Nm ... 0.25 Nm		
Wire diameter incl. insulation				1.6 mm (Terminal block is tested with PVC insulation - other insulation materials available on request)
Frequency of connections between conductors of the same cross section				10
Transmission method	CAT5e	CAT5e	CAT5e	CAT5e
Frequency	125 MHz	125 MHz	125 MHz	125 MHz
Serial transmission speed	10/100/1000 Mbps	10/100/1000 Mbps	10/100/1000 Mbps	10/100/1000 Mbps

Ethernet interface, 10/100/1000Base-T(X) in accordance with IEEE 802.3

Connection method	RJ45 jack
Maximum output power	60 W
Maximum output current	725 mA (PoE)
Serial transmission speed	10/100/1000 Mbps
Transmission length	100 m (including patch cables)
Connection line	twisted pair, shielded, CAT5 or better
Pin assignment	1:1
Current carrying capacity	≤ 1.5 A (≤ 60 W (PoE+))

Surge protection

Nominal discharge current I_n (8/20) μ s, core-ground	1 kA (C2 - 2 kV)
Nominal discharge current I_n (8/20) μ s, shield-ground	1 kA (C2 - 2 kV)
Standards	DIN EN 61643-21

Shield current monitoring

Switch-on threshold	≥ 30 mA
Local diagnostics	Yellow LED
Precision	± 5 %
Response time	3 s
Shield current	≤ 1.5 A
Power consumption	270 mW (shield current monitoring)
Impedance	≤ 1 Ω
Voltage	≤ 10 V

General data

Degree of protection	IP20 (manufacturer's declaration)
Degree of pollution	2
Overvoltage category	II
Flammability rating according to UL 94	V0
Rated insulation voltage	85 V DC
Mounting type	DIN rail mounting, stationary
Dimensions (W/H/D)	23.8 mm x 101.3 mm x 86 mm
Cable diameter	5.5 mm ... 6.5 mm
Housing material	Plastic gray
Vibration resistance in acc. with EN 60068-2-6/IEC 60068-2-6	10 Hz ... 57 Hz, amplitude ±3.5 mm, 57 Hz ... 150 Hz, 5g
Shock in acc. with EN 60068-2-27/IEC 60068-2-27	30g for 11 ms, three shocks in each spatial direction
Continuous shock according to EN 60068-2-27/ IEC 60068-2-27	10g for 16 ms, 1000 shocks in each spatial direction
MTTF (mean time to failure) SN 29500 standard, temperature 25°C, operating cycle 21%	3281 Years
MTTF (mean time to failure) SN 29500 standard, temperature 40°C, operating cycle 34.25%	1245 Years
MTTF (mean time to failure) SN 29500 standard, temperature 40°C, operating cycle 100%	472 Years

Ambient conditions

Ambient temperature

Operation -40 °C ... 75 °C

Storage/transport -40 °C ... 85 °C

Humidity

Operation 10 % ... 95 % (non-condensing)

Altitude

≤ 5000 m (for restrictions, see the manufacturer's declaration for altitude operation)

≤ 2000 m (restrictions for ATEX applications)

Conformance/Approvals

CE

CE-compliant

ATEX

Ⓢ II 3 G Ex nA nC IIC T4 Gc X

Please follow the special installation instructions in the documentation!

UL, USA/Canada

Class I, Zone 2, AEx nA IIC T4, Ex nA IIC Gc X T4
Class I, Div. 2, Groups A, B, C, D

UL, USA

UL 60079-0 Ed. 6 / UL 60079-15 Ed. 4

UL, Canada

CSA 22.2 No. 60079-0 Ed. 3 / CSA 22.2 No. 60079-15:16

Corrosive gas test

ISA-S71.04-1985 G3 Harsh Group A

Shipbuilding

DNV GL

Temperature

D

Humidity

B

Vibration

B

EMC

B

Conformance with EMC Directive 2014/30/EU**Noise immunity according to EN 61000-6-2**

Electrostatic discharge	EN 61000-4-2	
	Contact discharge	± 6 kV (Test Level 3)
	Discharge in air	± 8 kV (Test Level 3)
	Indirect discharge	± 6 kV
	Comments	Criterion B
Electromagnetic HF field	EN 61000-4-3	
	Frequency range	80 MHz ... 3 GHz (Test Level 3)
	Field intensity	10 V/m
	Comments	Criterion A
Fast transients (burst)	EN 61000-4-4	
	Input	± 2.2 kV (1 minute)
	Signal	± 2.2 kV (1 minute)
	Comments	Criterion B
Surge current loads (surge)	EN 61000-4-5	
	Input	± 0.5 kV
	Signal	± 1 kV (Data line, asymmetrical)
Conducted interference	EN 61000-4-6	
	Frequency range	0.15 MHz ... 80 MHz
	Voltage	10 V
	Comments	Criterion A

Emitted interference in acc. with EN 61000-6-4

Interference emission	EN 61000-6-4	Class A, industrial applications
	EN 61000-6-3	Class B, domain of use: residential and small commercial

5 Safety regulations and installation notes



CAUTION:

Observe the following safety notes when using the device.

- The device can be installed in zone 2 potentially explosive areas. It satisfies the demands of the following standards:
 - EN 60079-0
 - EN 60079-15
 - Comprehensive details are to be found in the EU Declaration of Conformity which is enclosed and also available on our website in the latest version.
- Installation, operation, and maintenance may only be carried out by qualified electricians. Follow the installation instructions as described.
- When installing and operating the device, the applicable regulations and safety directives (including national safety directives), as well as the generally recognized codes of practice must be observed. The safety-relevant data is included in this packing slip and on the certificates (manufacturer's declaration, additional approvals where applicable).
- The device must not be opened or modified. Do not repair the device yourself, replace it with an equivalent device. Repairs may only be carried out by the manufacturer. The manufacturer is not liable for damage resulting from violation.
- The IP20 degree of protection (IEC/EN 60529) specifies that the device is intended for use in a clean and dry environment. Do not subject the device to mechanical and/or thermal stress that exceeds the specified limits.
- The device is not designed for use in atmospheres with a danger of dust explosions.
- The device must be stopped and immediately removed from the Ex area if it is damaged, was subject to an impermissible load, stored incorrectly or if it malfunctions.
- The surge protective devices discharge disturbances of $<500 V_{\text{rms}}$ between the signal connection and functional ground.
- An impedance of $\leq 1 \Omega / U_f \leq 10 V$ is present between the shielding and functional ground.
- Before measuring the insulation, disconnect the plugs for the power supply and the signal line. Otherwise, incorrect test results are possible. Reinsert the plugs once the insulation measurement has been completed.
- The device must be installed upright in Zone 2.

5.1 Power over Ethernet (PoE)

All patch panels are PoE-capable in accordance with IEEE 802.3bt, type 4.

Connecting or disconnecting PoE cables under load will damage the contacts.

- Only connect and disconnect PoE cables when the voltage is disconnected.

5.2 Installation in Zone 2



WARNING: Explosion hazard when used in potentially explosive areas

Please make sure that the following notes and instructions are observed.

- Use in potentially explosive areas is not permitted in China.
- When installing in zone 2, the devices must be built into a suitable housing that satisfies the demands of EN 60079-15 (at least IP54) or a different type of protection in accordance with EN 60079-0, section 1.
- Only devices that are designed for operation in Ex Zone 2 and the conditions at the installation location may be connected to the circuits in Zone 2.
- Connecting and disconnecting cables in the potentially explosive area is only permissible in a de-energized state or when it has been ensured that an explosive atmosphere is not present.
- For safe operation, lockable plug connections must have a functional interlock (e. g. locking clip, screw connection etc.). Insert the interlock. Repair any damaged connectors immediately.
- Use a transient protection system which limits the interference voltage to a maximum of 140% of the rated voltage.

5.3 UL notes



WARNING: Explosion hazard when used in potentially explosive areas

Please make sure that the following notes and instructions are observed.



IND. CONT. EQ., ALSO
LISTED IND. CONT.
EQ. FOR HAZ. LOC.
E366272



U = 42 - 57 V DC

P = max. 60 W

Amb. Temp.: $-40^{\circ}\text{C} < T_a < 75^{\circ}\text{C}$

Class I, Zone 2, AEx nA IIC T4, Ex nA IIC Gc X T4

Class I, Division 2, Groups A, B, C and D

INDUSTRIAL CONTROL EQUIPMENT FOR HAZARDOUS LOCATIONS

- A) This equipment must be mounted in an enclosure certified for use in Class I, Zone 2 minimum and rated IP54 minimum in accordance with IEC 60529 when used in Class I, Zone 2 environment.
- B) Device shall only be used in an area of not more than pollution degree 2.
- C) If the equipment is used in a manner not specified, the protection provided by the equipment may be impaired.
- D) Minimum temperature rating of the cables to be connected to the field wiring terminals: 80°C
- E) The external circuits connected to the terminal of the device must be supplied from SELV/PELV.
- F) The device has to be built in the final safety enclosure, which has adequate rigidity according to UL 61010-1, UL 61010-2-201 and meets the requirements with respect to spread of fire.
- G) Use copper conductors only.

6 Transport and unpacking

- Check the delivery for visible damage caused by transportation.
- Submit claims for any transport damage immediately. Inform Phoenix Contact or your supplier as well as the shipping company without delay.
- Read the complete packing slip carefully.
- Retain the packing slip.
- Keep the packaging for a possible later transport.

7 Product description

7.1 Compatibility

The PP-RJ... patch panels are compatible with the devices of the FL-PP... product family.

When replacing FL-PP... devices with PP-RJ... devices, strip an additional 1.4 cm of the cable sheath away.

7.2 Dimensions

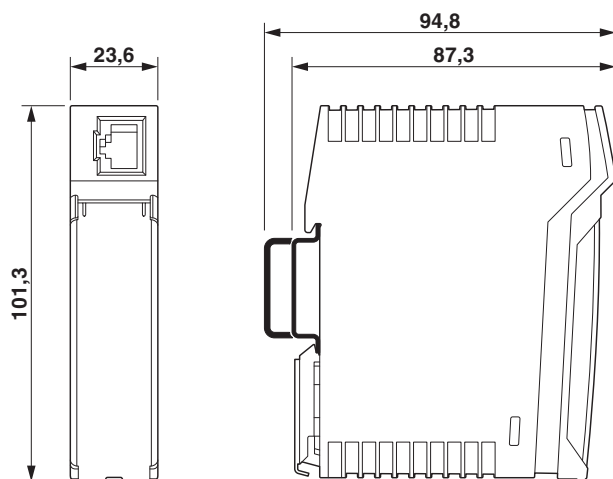


Figure 1 Dimensions

PP-RJ-RJ-F

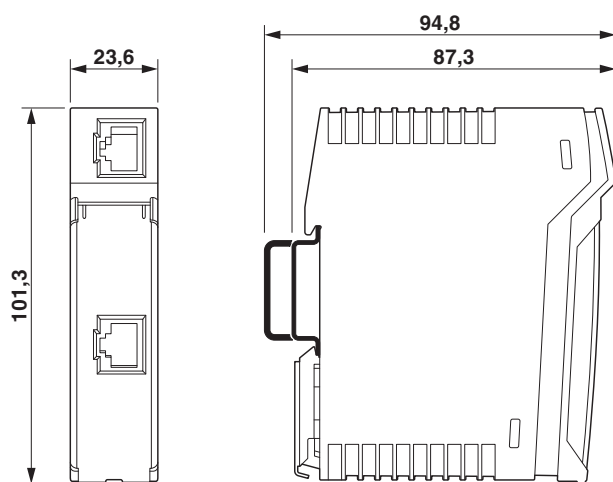


Figure 2 Dimensions

7.3 Function elements

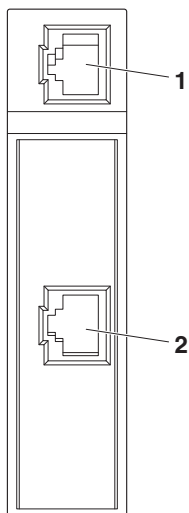


Figure 3 PP-RJ-RJ-F

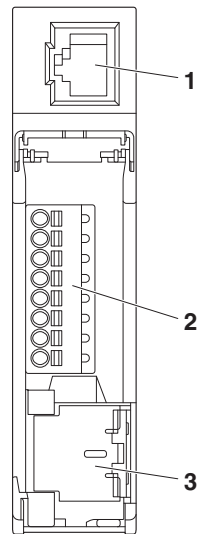


Figure 5 PP-RJ-SCC-F

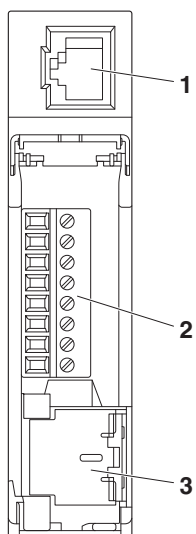


Figure 4 PP-RJ-SC-F

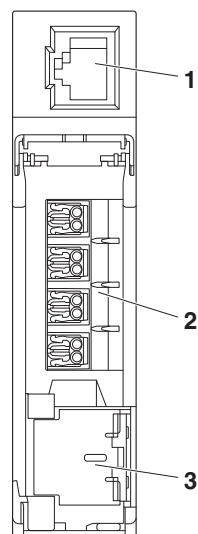


Figure 6 PP-RJ-IDC-F

- 1 X1 Shielded RJ45 jack (TP port)
- 2 X2 Port 2 depending on product version, see above
- 3 Shield contact spring (shield contacting with strain relief)

8 Installation



WARNING: Explosion hazard when used in potentially explosive areas

- Only mount or remove the device when it is disconnected and de-energized.
- Only connect and disconnect cables when the voltage is disconnected.

8.1 Mounting

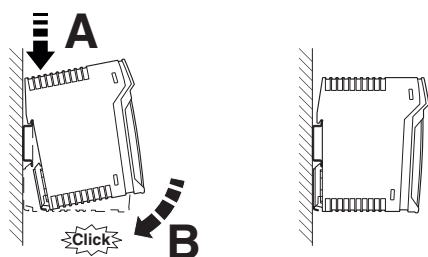


Figure 7 Mounting on a DIN rail

The device is intended for installation in a control cabinet.

- Connect a 35 mm EN DIN rail to the protective earth via a grounding terminal block. The device is grounded by snapping it onto the DIN rail.
- Snap the device onto the DIN rail.

8.2 Removal

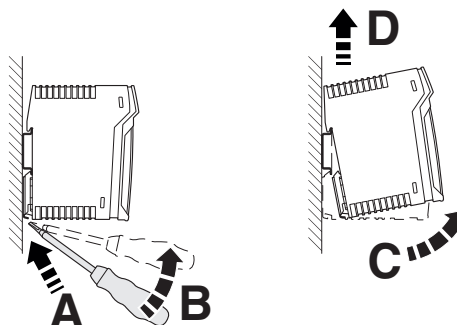


Figure 8 Removal

- Push down the locking tab with a screwdriver, needle-nose pliers or similar.
- Slightly pull the bottom edge of the device away from the mounting surface.
- Pull the device away from the DIN rail.

8.3 RJ45 interface

- Only use shielded twisted pair cables and matching shielded RJ45 connectors.
- Only twisted pair cables with an impedance of 100 Ω can be connected to the RJ45 Ethernet interface.
- Insert the Ethernet cable with the RJ45 plug into the TP interface until the plug engages audibly. Observe the plug keying.

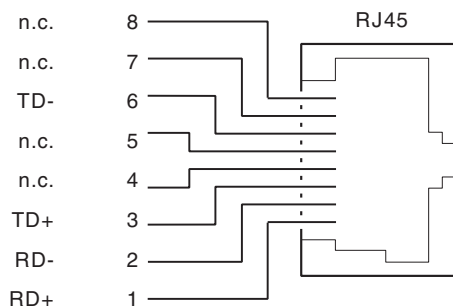


Figure 9 Pin assignment

8.4 Terminal assignment

Terminal assignment for Ethernet (IEEE 802.3: TIA 568 A, TIA 568 B) and PROFINET

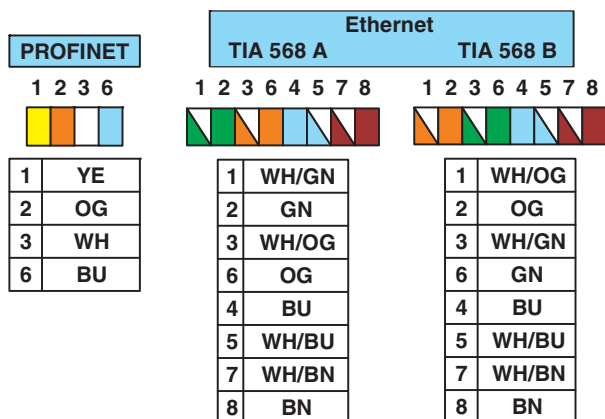


Figure 10 Terminal assignment

Key:

OG Orange
 WH White
 GN Green
 YE Yellow
 BU Blue
 BN Brown

8.5 Stripping

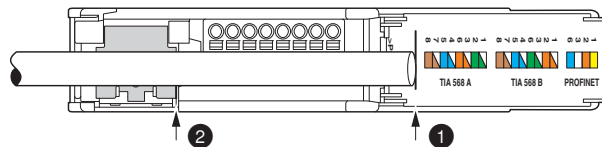


Figure 11 Stripping length

You can quickly determine the crimping length for the product versions with connection terminal blocks:

- Open the cover.
- Place the cable end on the marking line ①.
- The edge of the shield contact spring ② indicates the correct length for stripping (5.5 cm).
- Strip the cable.
- Keep the aluminum foil on the single wires as far as possible.
- Fold back 20 mm of the braided shield backwards over the outer sheath.

8.6 Screw terminal blocks (only PP-RJ-SC-F)

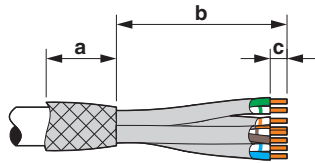


Figure 12 Stripping specifications

- a 20 mm
- b 55 mm
- c 5 mm

- Strip off each individual wire to 5 mm.
- If possible, make sure that the individual wires remain twisted up to the terminal blocks.
- Connect the single wires to the terminal blocks.

8.7 Push-in terminal blocks (only PP-RJ-SCC-F)

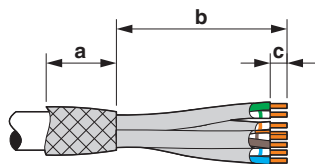


Figure 13 Stripping specifications

- a 20 mm
- b 55 mm
- c 8 mm

- Strip off each individual wire to 8 mm.
- If possible, make sure that the individual wires remain twisted up to the terminal blocks.
- Connect the single wires to the terminal blocks.

8.8 IDC terminal blocks (only PP-RJ-IDC-F)



NOTE: device damage

Note the following limitations:

- Single wire diameter: 1.6 mm maximum
- Wire insulation material: PVC

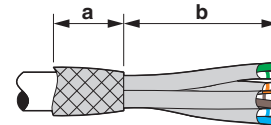


Figure 14 Stripping specifications

- a 20 mm
- b 55 mm

- Open the connection terminal blocks.
- If possible, make sure that the individual wires remain twisted up to the terminal blocks.
- Insert the single wires into the connection terminals as far as they will go.
- Snap in the terminal blocks.

8.9 Shield contacting with strain relief

The product versions with connection terminal blocks are equipped with built-in strain relief and shielding braid.

- Only use cables with an outside diameter of 5.5 ... 6.5 mm.

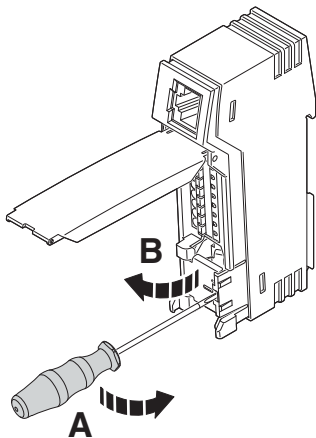


Figure 15 Open shield contact spring

- Open the shield contact spring.
- If the spring is latched in place, use a screwdriver to open it.

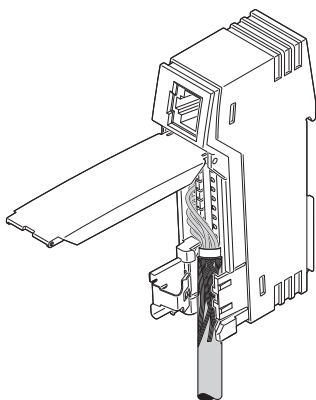


Figure 16 Inserting the cable

- Place the cable with the folded braided shield into the guiding shaft.

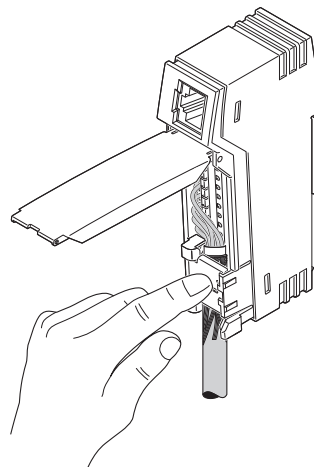


Figure 17 Close shield contact spring

- Snap in the shield contact spring. The braided shield is pressed against the left side of the guiding shaft. This establishes the shield contacting.
- Organize the wires so that you can close the cover.



Fully snap in the foldable cover to prevent unintentional opening.

9 Shield current monitoring

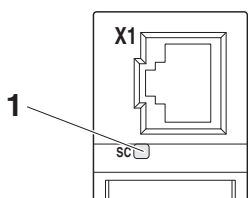


Figure 18 Shield current monitoring

If there are different potential references within an installation, equalization currents can flow via the cable shielding. This can damage the device or disrupt communication.

LED 1 lights up in the event of cable shield currents greater than +30 mA and less than -30 mA on port 2.

The LED may flicker or flash because the shield currents are not constant. You can reduce the equipotential bonding across the data lines by laying the equipotential bonding lines between the individual installation sites separately.



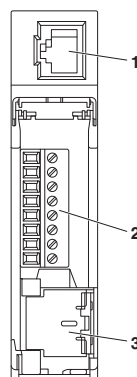
Shield current monitoring is only possible under the following conditions:

- The device is installed in a PoE supply line in accordance with IEEE 802.3af or at.
- The Power Sourcing Equipment (PSE) supplies a power of at least 270 mW.

10 Surge protection

The surge protection protects the patch panel and the downstream devices against overvoltages that can arise via port 2.

- Protective function in accordance with CAT5e for data rates of up to 1 GB
- Protective adapter for all eight signal paths including PoE supply



- 1 X1 OUT Protected output side
- 2 X2 IN Unprotected side, possible surge voltage

- Install the patch panel immediately upstream of the device to be protected.
- Connect the RJ45 connection X1 and the device to be protected via a patch cable (see accessories).

Grounding can be created directly on the NS 35 DIN rail.

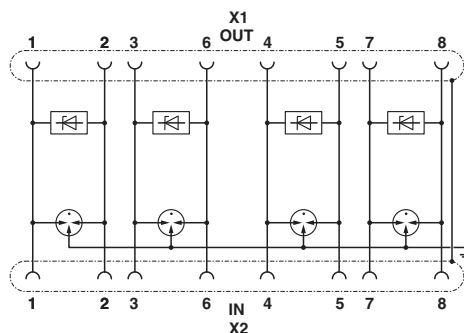


Figure 19 Circuit diagram

11 Disposal



Dispose of the device separately from other waste, i.e., via an appropriate collection site.