PSI-TERMINATOR-PB-TBUS

Active termination resistor for PROFIBUS and RS-485 networks

RS-485



Data sheet
107077_en_04

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1 Description

PROFIBUS and other RS-485 2-wire networks can be actively terminated at the bus end using the **PSI-TERMINATOR-PB-TBUS**. Even if the bus device is connected/disconnected during operation this ensures safe communication.

In addition, the device can be operated as an electrically isolated service interface. The alternative D-SUB connection is used as a power supply for an active programming device.

The bus connection takes place via a plug-in double connection terminal block or alternatively via a D-SUB socket.

Separate LED displays are available to the user for voltage supply and bus activity diagnostics.

An extended temperature range of -40 °C to 70 °C and a compact housing with a width of 22.5 mm allows use under industrial environmental conditions and in confined spaces.

Features

- PROFIBUS up to 12 Mbps
- Electrical isolation of power supply and data interface
- Termination can be connected externally
- 24 V DC supply voltage
- Redundant power supply possible
- Programming interface for active and passive programming devices
- Extended temperature range of -40 °C ...+70 °C
- Diagnostic LEDs for voltage and data activity
- two shield clamps supplied as standard
- Mounting on a 35 mm DIN rail
- Installation as single device or in combination with other devices
- Supply voltage routed through a DIN rail connector for use in combination with other devices

Observe these notes

WARNING: Explosion hazard when used in potentially explosive areas

The device is a category 3 item of electrical equipment. Follow the instructions provided here during installation and observe the safety notes.

Make sure you always use the latest documentation.

It can be downloaded at: phoenixcontact.com/product/2702636

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3 Ordering data

Description	Type	Item no.	Pcs./Pkt.
Active termination resistor for PROFIBUS and RS-485 bus systems, redundant power supply, routing of the supply voltage via DIN rail connector, electrical isolation, switchable termination, integrated programming interface	PSI-TERMINATOR-PB-TBUS	2702636	1

Accessories	Type	Item no.	Pcs./Pkt.
DIN rail connector, color: green, nominal current: 8 A (parallel contacts), rated voltage (III/2): 125 V, number of positions: 5, product range: TBUS5-22,5.., pitch: 3.81 mm, mounting: DIN rail mounting, locking: without, mounting: without, type of packaging: packed in cardboard, Item with gold-plated contacts, bus connectors for connecting with electronics housings, 5 parallel contacts	ME 22,5 TBUS 1,5/ 5-ST-3,81 GN	2707437	50
D-SUB connector, 9-pos., pin, 90° cable outlet, bus system: PROFIBUS DP up to 12 Mbps, termination resistor can be switched on via slide switch, pin assignment: 3, 5, 6, 8; IDC terminal block connection	SUBCON-PLUS-PROFIB/90/IDC	2313672	1
D-SUB connector, 9-pos., pin, 90° cable outlet, bus system: PROFIBUS DP up to 12 Mbps with PG D-SUB socket for connecting a programming device, termination resistor can be switched on via slide switch, pin assignment: 3, 5, 6, 8; IDC terminal block connection	SUBCON-PLUS-PROFIB/90/PG/IDC	2313685	1
D-SUB connector, 9-pos., pin, 90° cable outlet, bus system: PROFIBUS DP up to 12 Mbps, termination resistor can be switched on via slide switch, pin assignment: 3, 5, 6, 8; screw connection terminal blocks	SUBCON-PLUS-PROFIB/90/SC	2313698	1
D-SUB connector, 9-pos., pin, 90° cable outlet, bus system: PROFIBUS DP up to 12 Mbps with PG D-SUB socket for connecting a programming device, termination resistor can be switched on via slide switch, pin assignment: 3, 5, 6, 8; screw connection terminal blocks	SUBCON-PLUS-PROFIB/90/PG/SC	2313708	1
D-SUB plug, 9-pos., pin, assignment: 3, 5, 6, 8; two 35° cable entries M12 (B-coded). Bus system: PROFIBUS DP up to 12 Mbps. Termination resistor via separate M12 terminator.	SUBCON-PLUS-PROFIB/35/M12	2902320	1
D-SUB plug, 9-pos., pin, assignment: 3, 5, 6, 8; two 90° M12 cable glands (B-coded). Bus system: PROFIBUS DP up to 12 Mbps. Termination resistor via separate M12 terminator.	SUBCON-PLUS-PROFIB/90/M12	2902318	1
D-SUB plug, 9-pos., pin, assignment: 3, 5, 6, 8; two 90° cable entries M12 (B-coded). Bus system: PROFIBUS DP up to 12 Mbps. Termination resistor via separate M12 terminator. Long version; S7-compatible.	SUBCON-PLUS-PROFIB/90X/M12	2902729	1

Accessories	Type	Item no.	Pcs./Pkt.
By the meter, Bus system cable, PROFIBUS (12 Mbps), shielded, PVC FR VI/PVC, violet, 2-wire (1x2xAWG22/1), color single wire: red, green, cable length: Free entry (1.0 ... 1000.0 m)	PSM-CABLE-PROFIB/FC	2744652	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
Quick stripping tool for PROFIBUS cable, type Fast Connect	PSM-STRIP-FC/PROFIB	2744623	1
Stripping tool for cables with PVC insulation, stripping range: 0.08 to 6 mm², wire cutting up to 6 mm² flexible or 4 mm² rigid	QUICK WIREFOX 6	1204384	1
D-SUB connector, 9-pos., pin, 35° cable outlet, bus system: PROFIBUS DP up to 12 Mbps, termination resistor can be switched on via slide switch, pin assignment: 3, 5, 6, 8; screw connection terminal blocks	SUBCON-PLUS-PROFIB/SC2	2708232	1
D-SUB connector, 9-pos., pin, 35° cable outlet, bus system: PROFIBUS DP up to 12 Mbps with PG D-SUB socket for connecting a programming device, termination resistor can be switched on via slide switch, pin assignment: 3, 5, 6, 8; screw connection terminal blocks	SUBCON-PLUS-PROFIB/PG/SC2	2708245	1
D-SUB connector, 9-pos., male connector, axial version with two cable entries, bus system: PROFIBUS DP up to 12 Mbps, termination resistor can be switched on via slide switch, pin assignment: 3, 5, 6, 8; screw connection terminal blocks	SUBCON-PLUS-PROFIB/AX/SC	2744380	1
Modular repeater for electrical isolation and range increase for PROFIBUS up to 12 Mbps, 4-way isolation, rail-mountable, supply 24 V DC	PSI-REP-PROFIBUS/12MB	2708863	1
Modular repeater for electrical isolation and range increase in RS-485 2-wire bus systems up to 500 kbps, 4-way isolation, rail-mountable, supply 24 V DC	PSI-REP-RS485W2	2313096	1
Repeater, for potential separation and range increase in RS-485 2-wire bus systems, 3-way isolation, rail-mountable	PSM-ME-RS485/RS485-P	2744429	1

Accessories	Type	Item no.	Pcs./Pkt.
Interface converter, for converting RS-232 (V.24) to RS-422 (V.11) and RS-485, with electrical isolation, 2 channels, rail-mountable	PSM-ME-RS232/RS485-P	2744416	1
Primary-switched power supply, QUINT POWER, screw connection, DIN rail mounting, supply of devices possible via the TBUS DIN rail connector, protective coating, input: single-phase, output: 24 V DC/2.5 A	QUINT4-SYS-PS/1AC/24DC/2.5/SC	2904614	1
DIN rail connector, color: light gray, nominal current: 8 A (parallel contacts), rated voltage (III/2): 125 V, number of positions: 5, product range: TBUS5-17,5.., pitch: 3.81 mm, mounting: DIN rail mounting, locking: without, mounting: without, type of packaging: packed in cardboard, Item with gold-plated contacts, bus connectors for connecting with electronics housings, 5 parallel contacts	ME 17,5 TBUS 1,5/ 5-ST-3,81 KMGY	2713645	50

4 Technical data

Supply	
Supply voltage range	18 V DC … 30 V DC (via pluggable COMBICON screw terminal block)
Nominal supply voltage	24 V DC (via pluggable COMBICON screw terminal block)
Typical current consumption	10 mA (24 V DC, no load on D-SUB) 60 mA (24 V DC, current drain at D-SUB of 150 mA)
Max. current consumption	12 mA (18 V DC, no load on D-SUB) 77 mA (18 V DC, current drain at D-SUB of 150 mA)
Electrical isolation	RS-485 // VCC
Test voltage data interface/power supply	1.5 kV AC (50 Hz, 1 min.)
Tightening torque	0.6 Nm … 0.8 Nm
Stripping length	7.00 mm
Conductor cross section	
flexible	0.2 mm² … 2.5 mm²
flexible AWG	24 … 12
rigid	0.2 mm² … 2.5 mm²

PROFIBUS acc. to IEC 61158, RS-485 2-conductor	
Connection method	D-SUB-9, COMBICON
Output nominal voltage	5 V DC
Tightening torque	0.4 Nm (D-SUB interface)
Stripping length	8 mm
Conductor cross section	
flexible	0.2 mm² … 1.5 mm²
flexible AWG	24 … 16
rigid	0.2 mm² … 1.5 mm²
rigid AWG	24 … 16
Strain relief	Shield connection clamp in spring-cage terminal block
Termination resistor	390 Ω / 220 Ω / 390 Ω
Serial transmission speed	≤ 12 Mbps
Transmission length	≤ 1200 m (Depends on transmission speed and cable type)
Status and diagnostic indicators	LEDs: US (power supply), ACT (data activity)

General data	
Degree of protection	IP20
Overvoltage category	II
Pollution degree	2
Mounting type	DIN rail mounting
Dimensions (W/H/D)	22.5 mm x 92 mm x 73 mm
Material	
Housing	PA 6.6-FR
Color	
Housing	green (6021)
Free fall in acc. with EN 60068-2-31	1 m
Vibration resistance in accordance with EN 60068-2-6/ IEC 60068-2-6	5g, 10…150 Hz, 2.5 h, in XYZ direction
Shock in accordance with EN 60068-2-27/IEC 60068-2-27	25g, 11 ms period, half-sine shock pulse
Electromagnetic compatibility	Conformance with EMC Directive 2014/30/EU
Free from substances that could impair the application of coating	in accordance with VW-AUDI-Seat central standard P-VW 3.10.7 57 65 0

MTTF (mean time to failure)	
SN 29500 standard, temperature 25°C, operating cycle 21%	3305 Years
SN 29500 standard, temperature 40°C, operating cycle 34.25%	1923 Years
SN 29500 standard, temperature 40°C, operating cycle 100%	911 Years

Ambient conditions	
Ambient temperature	
Operation	-40 °C ... 70 °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)
Air pressure	
Operation	≤ 80 kPa (When used in EX zone 2)

Conformance/Approvals	
CE	CE-compliant
ATEX Please follow the special installation instructions in the documentation!	Ⓔx II 3 G Ex ec IIC T4 Gc PxCIF16ATEX2702636X
UL, USA/Canada	508 Listed
Corrosive gas test	ISA-S71.04-1985 G3 Harsh Group A

Conformance with EMC Directive 2014/30/EU		
Immunity in accordance with 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 (Test Level 3)
	Signal	± 2.2 kV (Test Level 3)
	Comments	Criterion B
Surge current loads (surge)	EN 61000-4-5	
	Input	± 0.5 kV (sym./asym.)
	Signal	± 1 kV (Data line, asymmetrical)
	Comments	Criterion B
Conducted interference	EN 61000-4-6	
	Frequency range	0.15 MHz ... 80 MHz
	Voltage	10 V
	Comments	Criterion A

Criterion A	Normal operating behavior within the specified limits.
Criterion B	Temporary impairment to operational behavior that is corrected by the device itself.

Emitted interference in acc. with EN 61000-6-4	
Interference emission	EN 55011 Class A, industrial applications

5 Safety regulations and installation notes

5.1 Installation notes

WARNING:

Observe the following safety notes when using the device.

- The category 3 product is designed for installation in zone 2 potentially explosive areas. It satisfies the requirements of the following standards:
  – EN 60079-0, EN 60079-7
  – 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 general technical regulations, must be observed. The safety-relevant data is listed in this document.
- Observe the specified conditions for use in potentially explosive areas! Also observe the requirements of EN 60079-14.
- Opening or modifying the product is prohibited. Do not repair the product yourself; replace it with an equivalent product instead. Repairs may only be carried out by the manufacturer. The manufacturer is not liable for damage resulting from non-compliance.
- Do not subject the product to mechanical and/or thermal stress that exceeds the specified limits.
- The product must be stopped and immediately removed from the Ex area if it is damaged, has been subjected to an impermissible load, stored incorrectly, or if it malfunctions.

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.
- Install the device in such a way that a degree of protection of at least IP54 is achieved in accordance with EN 60529. To this end, use a suitable, approved housing that meets the requirements of EN 60079-0.
- 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.
- In potentially explosive areas, only connect and disconnect cables and plug-in connections (e.g., connector, SD card, DIN rail connector, etc.) when the power is disconnected.
- For safe operation, lockable plug-in connections (e.g., connector, SD card, DIN rail connector, etc.) must be fully inserted and have a functional interlock (e.g., locking clip, screw connection, etc.).
- Insert the interlock. Repair any damaged plug-in connections immediately.
- Only connect one cable per terminal point.
- Use the device in an environment that does not exceed pollution degree 2 in accordance with EN 60664-1.
- Use transient protection so that short-term surge voltages do not exceed 119 V.
- The switches of the device that can be accessed may only be actuated when the power supply to the device is disconnected or when it has been ensured that there is no potentially explosive atmosphere present.
- The application height in zone 2 is limited to 2000 m (80 kPa).
- The product is not designed for use in potentially dust-explosive atmospheres.

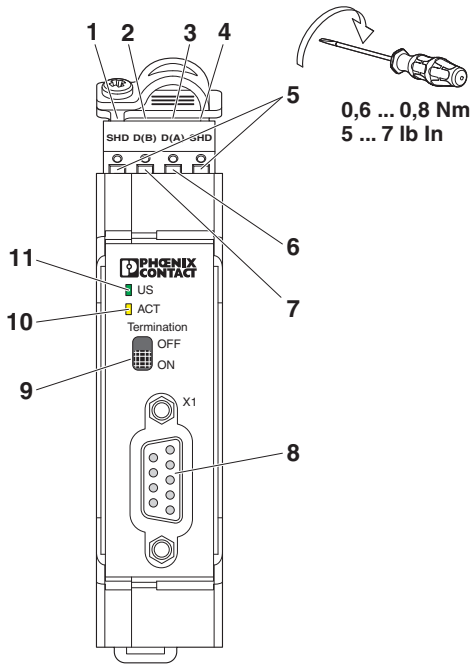
5.3 UL note



INDUSTRIAL CONTROL EQUIPMENT 11AE
Wire Range: 24-16 AWG (signal), 24-12 AWG (power)
Cu Copper Wire, 60/75C
Terminal tightening torque value: 5-7 (Lbs-Ins)
Environmental designation: "Open Type Device"
"Pollution Degree 2 Installation Environment"

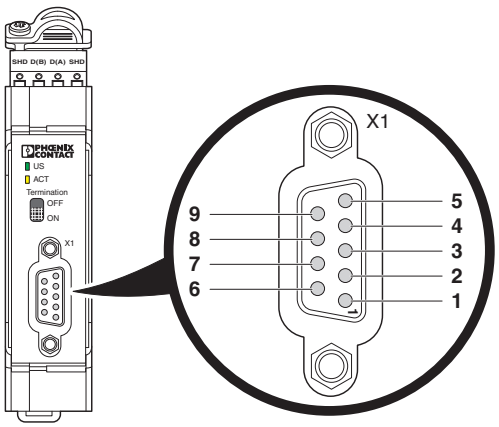
6 Product description

Figure 1 Function elements



1 U_{S1}, power supply 1, 24 V DC
2 GND, 0 V voltage supply
3 U_{S2}, 24 V DC voltage supply 2, redundant
4 GND, 0 V voltage supply
5 SHD, shield connection
6 D(A), negative, PROFIBUS (green cable) / RS-485 connection
7 D(B), positive, PROFIBUS (red cable) / RS-485 connection
8 D-SUB, programming interface
9 Slide switch for termination resistor
10 LED, yellow, data activity
11 LED, green, supply voltage

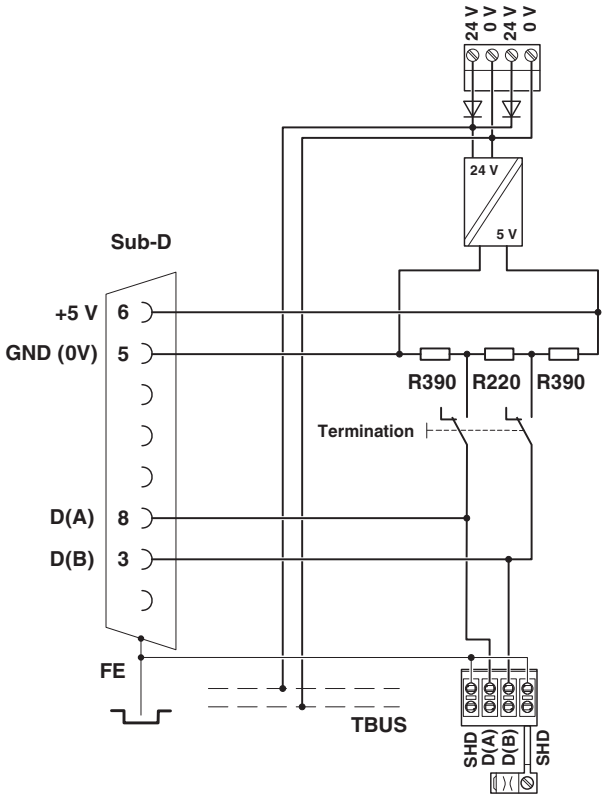
Figure 2 D-SUB, programming interface



1 Not used
2 Not used
3 D(B), positive data
4 Not used
5 GND, 0 V
6 +5 V
7 Not used
8 D(A), negative date
9 Not used

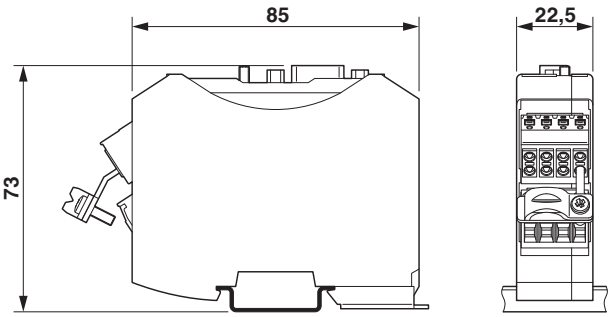
6.1 Basic circuit diagram

Figure 3 Basic circuit diagram



6.2 Dimensional drawing

Figure 4 Dimensional drawing



7 Installation

NOTE: device damage

Only mount and remove devices when the power supply is disconnected.

NOTE: Interference

Connect the DIN rail to protective earth ground using a grounding terminal block. The device is grounded when it is snapped onto the DIN rail (installation according to PELV). Make a low-resistance connection to protective earth ground.

The product can be snapped onto all 35 mm DIN rails in accordance with EN/IEC 60715.

The DIN rail connector bridges the supply voltage.

7.1 Mounting

The device can be installed as a single device or in combination with other devices. When installed in combination with other devices, the supply voltage is routed through the DIN rail connector.

- Mount the device on a 35 mm DIN rail in accordance with EN 60715.

Mounting as a stand-alone device

- Place the device onto the DIN rail from above. Push the device from the front toward the mounting surface until it audibly engages.

Joining station

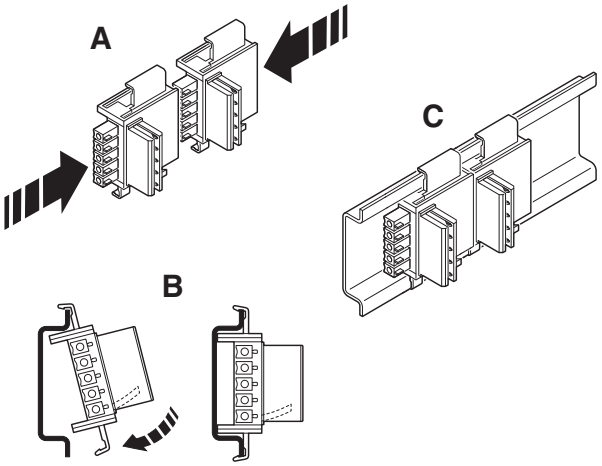
If you operate the devices in a joining station, the supply voltage must only be supplied to the first device.

The remaining devices are supplied via the DIN rail connector.

Maximum number of terminators in a joining station	
No load connected to D-SUB	32
A load connected to one terminator (e.g., programming device)	28
A load connected to each terminator	5

- To form a joining station, connect the DIN rail connectors (item no.: 2707437, 1 pc. per device) together.
- Push the connected DIN rail connectors into the DIN rail.
- Place the device onto the DIN rail from above. Push the device from the front toward the mounting surface until it audibly engages.

Figure 5 Install DIN rail connector



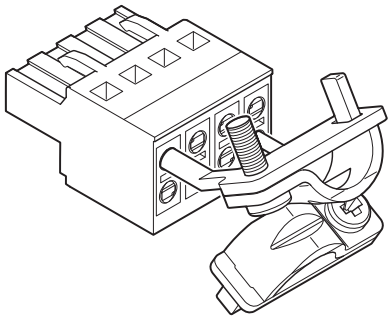
7.2 Removal

- 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.
- When removing a complete joining station, also remove the DIN rail connectors.

7.3 Install shield connection clamp

- Insert the shield clamp(s) into the spring-cage terminal block.

Figure 6 Install shield connection clamp



- Fold back 10 mm of the braided shield over the outer cable sheath.

Figure 7 Push the braided shield back

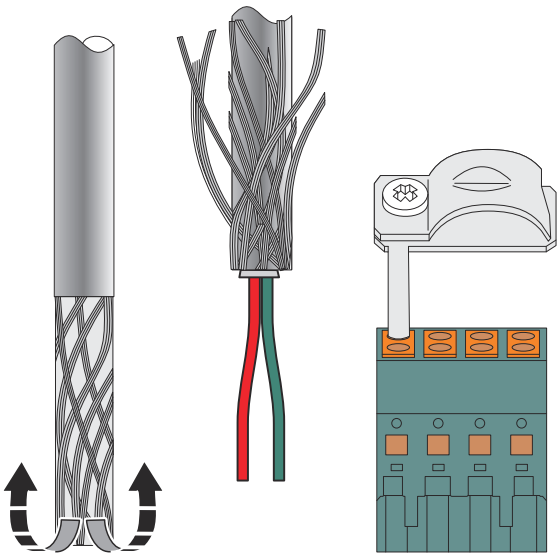
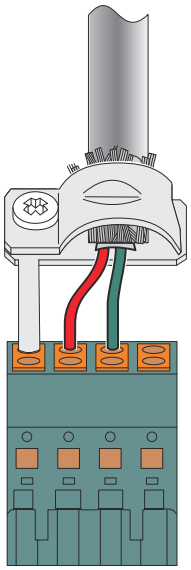


Figure 8 Connecting cables with a shield clamp

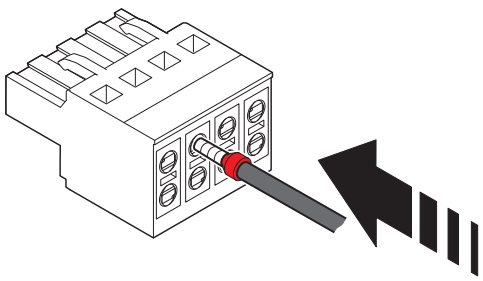


7.4 Install signal cable

Integrate the PSI-TERMINATOR-PB-TBUS into the bus system by connecting the incoming and outgoing bus cable to the spring-cage terminal block.

Pay attention to the application examples in the last section.

Figure 9 Install signal cable

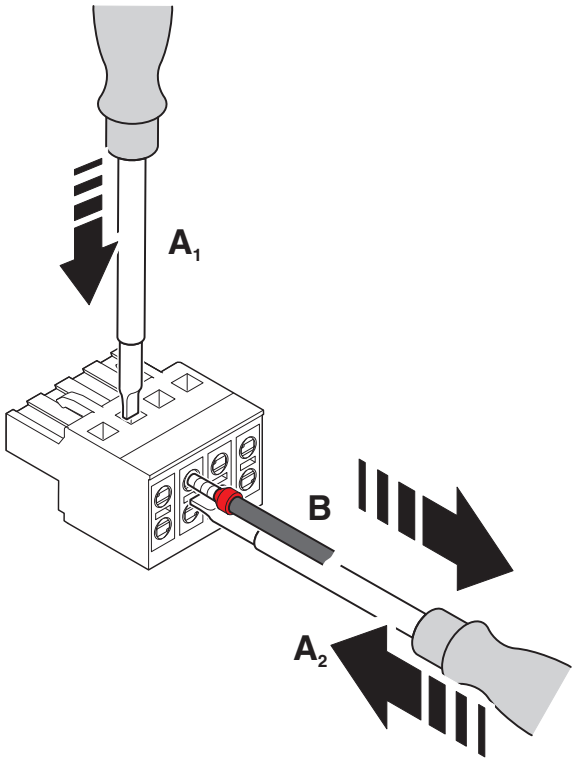


- Connect the incoming and outgoing bus line to the plug-in spring-cage terminal block.
- Rigid conductors / ferrule assembled conductors: Insert the conductors directly into the terminal block without using a tool.
- Stranded conductors: Open the terminal first. Insert a screwdriver into the release slot above the connection terminal block (A1).

7.5 Deinstall signal cable

Depending on the mounting position, you have different possibilities for releasing the cable again:

Figure 10 Deinstall signal cable



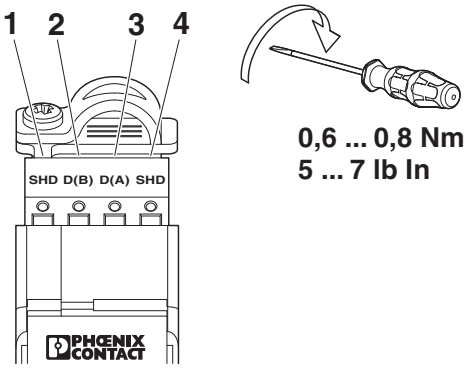
- Insert a screwdriver into the release slot above the connection terminal block (A1) or press with the screwdriver on the spring opener (A2).
- Remove the conductor from the terminal block (B).

7.6 Connecting the supply voltage

CAUTION: Electric shock

The device is designed exclusively for operation with SELV/PELV from a Class ES1 “electrical energy source” in accordance with EN/IEC 62368-1 and VDE 0868-1.

Figure 11 Connecting the supply voltage



Plug-in screw terminal blocks

1 U_{S1}, power supply 1, 24 V DC
2 GND, 0 V voltage supply
3 U_{S2}, 24 V DC voltage supply 2, redundant
4 GND, 0 V voltage supply

- Supply voltage to the device via terminal blocks **1** (24 V) and **2** (0 V).
- Optional: for a redundant power supply, connect an additional power supply unit to terminal blocks 3 and 4.

System power supply

- Connect the system power supply with one DIN rail connector to the left of the joining station.
  - QUINT4-SYS-PS/1AC/24DC/2.5/SC, Item No. 2904614
  - DIN rail connector, Item No. 2713645
- A second power supply unit can be used to create a redundant supply concept.

Refer to the user documentation for the power supply at phoenixcontact.com/product/2904614.

8 Application examples

When the terminator is missing, communication is quickly disrupted in bus systems with changing bus users. For example, this occurs in the following applications:

Automatic vehicles

Mobile devices, such as conveying vehicles if they regularly log in and out of processing stations. Even if the device is not connected, the terminator ensures a defined state on the bus.

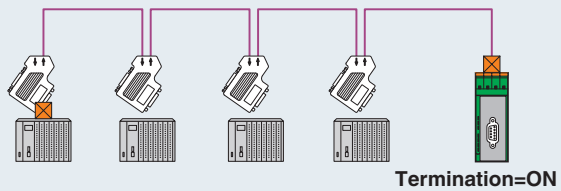
Exchangeable tools

The terminator is suitable for use on robots that utilize various exchangeable tools for production and are equipped with a bus interface.

Motor Control Center (MCC)

The terminator is suitable for ensuring bus termination when changing MCC racks. In these applications, the terminator is installed after the last bus device in the cable. The bus cable is permanently terminated when the termination resistor at the device is switched on.

Termination operation

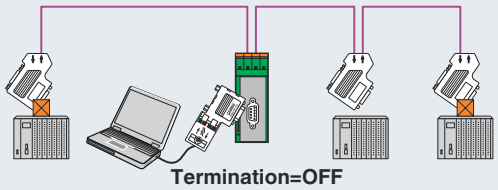


☒ = Active bus termination resistor

Service and programming

The terminator can be integrated into the bus system as a fixed programming interface. Termination is deactivated in this mode of operation. Passive and active programming devices are supported.

Programming access



☒ = Active bus termination resistor

Termination must not take place in the device or the D-SUB connector plug. The signal quality of the continuing bus is impacted otherwise.

Do **not** use the device as an access for diagnostic measurements. The branch line falsifies the measurements.

9 Revision history

Document revision	Hardware revision	Date	Description
00	-	2016-03-10	First publication
01	-	2017-04-12	ATEX approval and UL approval, technical data and safety notes extended, pollution degree and overvoltage category added
02	-	2020-09-09	Note added: The use in potentially explosive areas is not permitted in China.
03	10	2021-11-02	Power supply QUINT4-SYS-PS/1AC/24DC/2.5/SC added, conductor cross-section supply added
04	10	2024-08-12	ATEX re-evaluation, technical data, and safety notes updated