

PSM-ME-RS485/RS485-P



Repeater for RS-485 2-wire bus systems

Data sheet
100273_en_06

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1 Description

The **PSM-ME-RS485/RS485-P** RS-485 repeater was developed for the high requirements of fieldbus systems. The device is snapped onto standard DIN rails in the control cabinet and supplied with 24 V DC or AC.

You can use the repeater in all common 2-wire bus systems: Modbus, RACKBUS (Endress & Hauser), SUBCONET-K (Moeller), UNI-TELWAY (Telemecanique), DANBUS (Danfoss), RS-BUS (Landis & Staefa), NET 2000 (B&R), INSUM (ABB), J-BUS (Merlin Gerin), ET-WAY (Jetter), S-BUS (SAIA) and around 60 more company-specific bus systems.

Possible applications:

- Electrical isolation and bus segmentation
- Increasing system availability
- Increasing the range
- Increasing the transmission speed
- Extending the number of devices
- Creation of mixed and network structures

Features

- Supports all popular 10/11-bit UART data formats
- Automatic transmit/receive changeover
- Transmission speed 1.2 kbps ... 1.5 Mbps
- Integrated, connectable termination resistors
- High-quality 3-way isolation between all interfaces
- Integrated surge protection with transient discharge to the DIN rail
- Supply voltage of 24 V DC or AC to suit the control cabinet
- Plug-in screw connection terminal blocks
- Shipbuilding approval according to DNV



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 from the product at phoenixcontact.net/products.

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3 Ordering data

Description	Type	Order No.	Pcs./Pkt.
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	Order No.	Pcs./Pkt.
Shield connection clip for printed circuit terminal block	ME-SAS	2853899	10
Actuation tool, for ST terminal blocks, also suitable for use as a bladed screwdriver, size: 0.6 x 3.5 x 100 mm, 2-component grip, with non-slip grip	SZF 1-0,6X3,5	1204517	10
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

4 Technical data

Supply	
Supply voltage range	18 V AC/DC ... 30 V AC/DC (via pluggable COMBICON screw terminal block)
Nominal supply voltage	24 V AC/DC
Typical current consumption	90 mA (24 V DC)
Max. current consumption	100 mA
Electrical isolation	VCC // RS-485 (A) // RS-485 (B)
Test voltage data interface/power supply	1.5 kV _{rms} (50 Hz, 1 min.)
Torque	0.56 Nm ... 0.79 Nm
RS-485 interface, in acc. with EIA/TIA-485, DIN 66259-4/RS-485 2-wire	
Transmission channels	2 (1/1), TD, RD, half duplex
Operating mode	Semi-duplex
Connection method	Pluggable screw connection
Conductor cross section	0.2 mm ² ... 2.5 mm ² (24 AWG ... 12 AWG)
Data format/encoding	UART (11/10 bit switchable; NRZ)
Data direction switching	Automatic control, min. station response time 1 bits
Termination resistor	390 Ω / 180 Ω / 390 Ω
Serial transmission speed	1.2 / 2.4 / 4.8 / 9.6 / 19.2 / 38.4 / 57.6 / 75 / 93.75 / 115.2 / 136 / 187.5 / 375 / 500 / 1500 kbps
Transmission length	≤ 1200 m (depends on transmission speed, bus system and cable type)
Transmission medium	2-wire twisted pair, shielded
Protocols supported	transparent protocol

General data	
Degree of protection	IP20
Degree of pollution	2
Dimensions (W/H/D)	22.5 mm x 99 mm x 114.5 mm
Housing material	PA 6.6-FR green
Free fall in acc. with IEC 60068-2-32	1 m
Vibration resistance in acc. with EN 60068-2-6/ IEC 60068-2-6	5g, 10-150 Hz, 2.5 h, in XYZ direction
Shock in acc. with EN 60068-2-27/IEC 60068-2-27	25g, 11 ms period, half-sine shock pulse
MTTF (mean time to failure) SN 29500 standard, temperature 25°C, operating cycle 21 % (5 days a week, 8 hours a day)	1808 Years
MTTF (mean time to failure) SN 29500 standard, temperature 40 °C, operating cycle 34.25 % (5 days a week, 12 hours a day)	796 Years
MTTF (mean time to failure) SN 29500 standard, temperature 40°C, operating cycle 100 % (7 days a week, 24 hours a day)	334 Years
Bit distortion, input	max. ± 35 %
Bit distortion, output	< 3.6 %
Bit distortion	< 1.5 %
Noise emission according to	EN 50 081-1
Noise immunity according to	EN 50 082-2
Electromagnetic compatibility	Conformance with EMC Directive 2014/30/EU
Ambient conditions	
Ambient temperature (operation)	-40 °C ... 70 °C
Ambient temperature (storage/transport)	-40 °C ... 85 °C
Permissible humidity (operation)	10 % ... 95 % (non-condensing)
Altitude	5000 m (For restrictions see manufacturer's declaration)
Approvals / Certificates	
Conformance	CE-compliant EAC
ATEX Please follow the special installation instructions in the documentation!	⊕ II 3 G Ex nA IIC T4 Gc (IBExU16ATEXB004 X)
IECEX	Ex nA IIC T4 Gc (IECEX IBE 15.0034X)
UL, USA/Canada	508 recognized Class I, Div. 2, Groups A, B, C, D Class I, Zone 2, AEx nA IIC T4 Class I, Zone 2, Ex nA IIC T4 Gc X
Shipbuilding approval	DNV

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)
	Comments	Criterion B
Electromagnetic HF field	EN 61000-4-3	
	Frequency range	26 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 (DC supply)
	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

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

Interference emission EN 55011
Class A, industrial applications

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

5 Safety notes

5.1 Installation notes



WARNING:

Observe the following safety notes when using the device.

- The category 3 device is designed for installation in zone 2 potentially explosive areas. It meets the requirements of EN 60079-0:2012+A11:2013 and EN 60079-15:2010.
- 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 generally approved technical regulations, must be observed. The safety data is provided in this package slip and on the certificates (conformity assessment, additional approvals where applicable).
- Changing or modifying the device beyond the configuration is not permitted. Do not repair the device yourself; replace it with an equivalent device. Repairs may only be performed by the manufacturer. The manufacturer is not liable for damage resulting from noncompliance.
- The IP20 protection (IEC 60529/EN 60529) of the device is intended for use in a clean and dry environment. The device must not be subject to mechanical strain and/or thermal loads, which exceed the limits described.
- The device is designed exclusively for SELV operation according to IEC 60950/EN 60950/VDE 0805. The device may only be connected to devices, which meet the requirements of EN 60950.

5.3 UL Notes

PROCESS CONTROL EQUIPMENT FOR HAZARDOUS LOCATIONS 31ZN

- A) All wiring of these devices must be in accordance with the national electric code article 501.4(B) for Class 1, Division 2.
- B) Product must be installed in Class I, Zone 2 certified at least an IP54 enclosure.
- C) Product must be used in no more than a pollution degree 2 environment as defined by IEC 60664-1
- D) Provisions must be made to provide transient protection to the product so that voltage levels do not exceed 40% of the rated voltage at the power supply terminals.

Wire Range: 30-12 AWG,

Torque: 5-7 Lbs-In

Supply voltage range 24 V DC $\pm 20\%$ --- 90 mA

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.

- Observe the specified conditions for use in potentially explosive areas.
- The devices must be installed in a housing which is designed in a type of protection in accordance with EN 60079-0, section 1 and has a minimum protection rating of IP54.
- In zone 2, only connect devices to the supply and signal circuits that are suitable for operation in the Ex zone 2 and the conditions at the installation location.
- The switches of the device that can be accessed may only be actuated when the power supply to the device is disconnected.
- 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.
- In potentially explosive areas, terminals may only be snapped onto or off the DIN rail connector and wires may only be connected or disconnected when the power is switched off.
- The device is not designed for use in atmospheres with a danger of dust explosions.

6 Application examples

The repeater can be used to create network structures that are tailored to the relevant application.

The limits set by the RS-485 standard are therefore extended. The standard defines the following basic specifications:

- Up to 32 devices per potential segment
- Only line structures
- Maximum bus cable length: 1200 m
- Maximum branch line length without termination resistor: 5 m, depending on the transmission speed
- Bus cable termination at the start and end of the bus cable



Please note that in each potential segment, the port of the repeater must be considered as a device.

The bus and spur line lengths depend on the transmission speed and cable type. For specifications, refer to the manufacturer's manual for the bus system used.

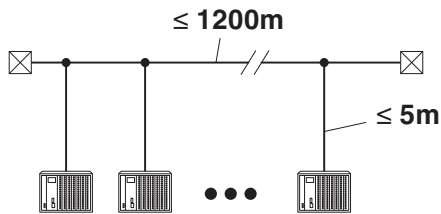
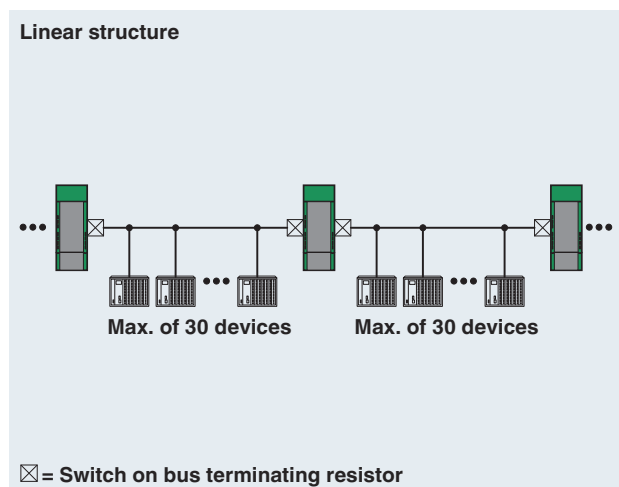


Figure 1 Cable lengths according to the RS-485 standard



7 Structure

7.1 Dimensions

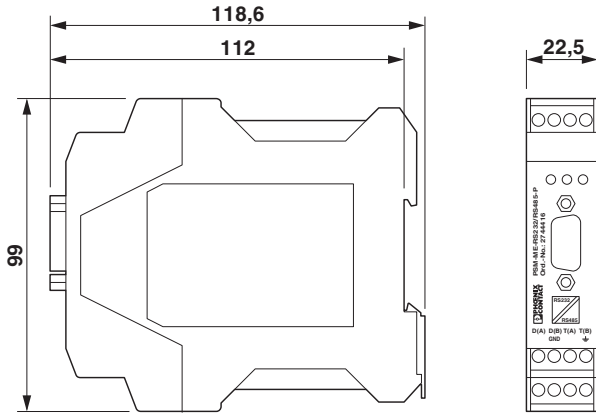


Figure 2 Housing dimensions

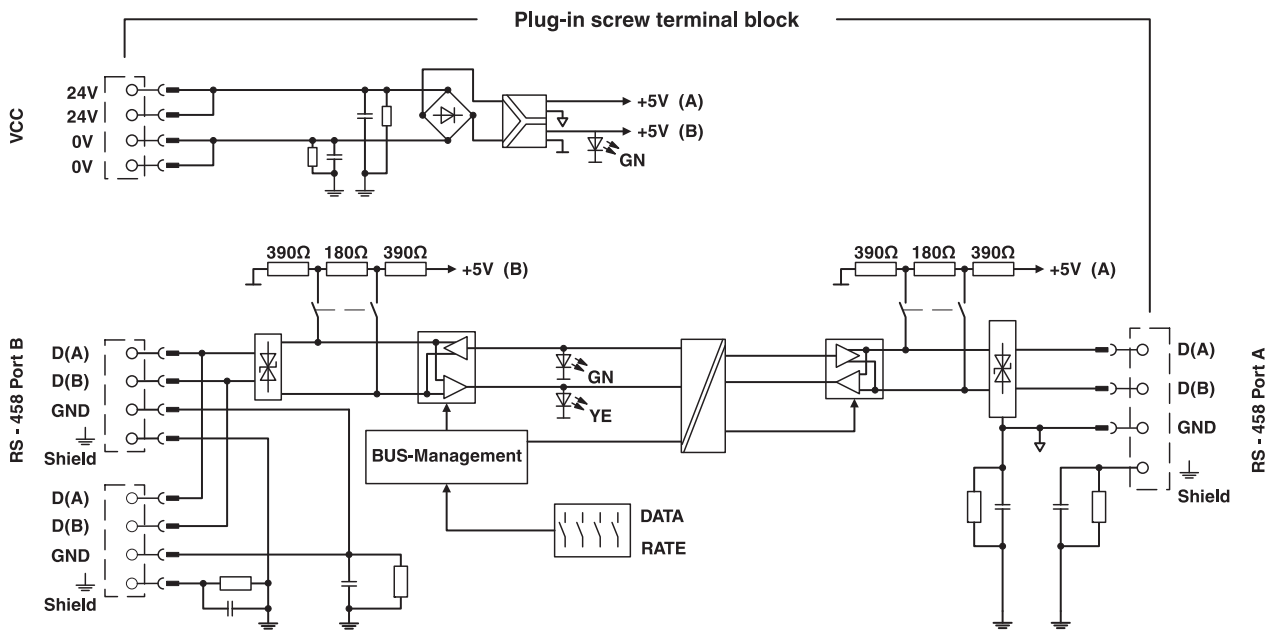


Figure 3 Block diagram

7.2 Function elements

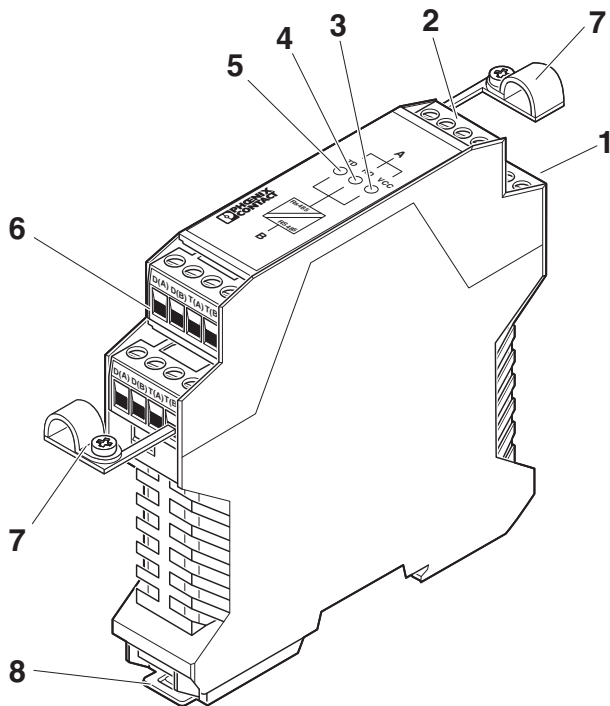


Figure 4 Function elements

COMBICON plug-in screw terminal blocks

- 1 Power supply (pin 1 + pin 3)
- 2 RS-485 interface, port A
- 6 RS-485 interface, port B

Diagnostics and status indicators

- 3 VCC (green) Supply voltage
- 4 RD (green) RS-485 (A) Data reception
- 5 TD (yellow) RS-485 (A) Data transmission

Operating elements

- 7 Shield connection clip
- 8 Locking latch for DIN rail mounting

8 Configuration via DIP switches

You must open the housing to access the DIP switches and slide switches.



NOTE: electrostatic discharge!

The device contains components that can be damaged or destroyed by electrostatic discharge. When handling the device, observe the necessary safety precautions against electrostatic discharge (ESD) according to EN 61340-5-1 and IEC 61340-5-1.

- Disengage the housing cover with a screwdriver (A).
- Carefully pull the PCB out of the housing as far as possible.

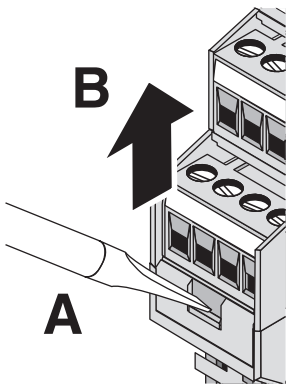


Figure 5 Opening the housing

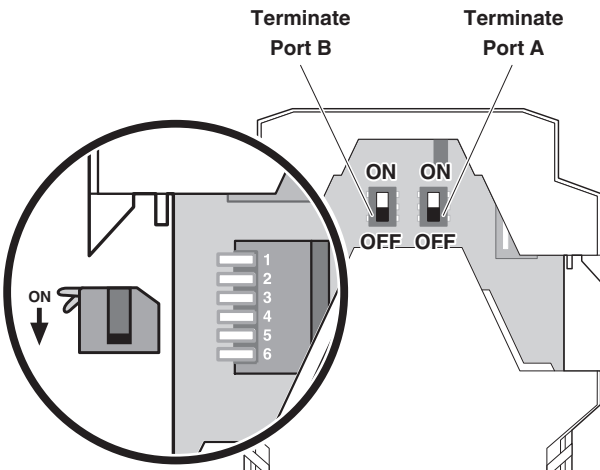


Figure 6 Remove the PCB

8.1 Transmission speed

- Set the transmission speed using the DIP switches.

	ON $\hat{=}$ <input type="checkbox"/>	DIP					
		1	2	3	4	5	6
Speed	1500						
kbps	500				•		
	375			•			
	187.5			•	•		
	136		•				
	115.2		•		•		
	93.75		•	•			
	75		•	•	•		
	57.6	•					
	38.4	•				•	
	19.2	•		•			
	9.6	•		•	•		
	4.8	•	•				
	2.4	•	•			•	
	1.2	•	•	•			

* Transmission speeds of 1.2 kbps and 2.4 kbps are available as of hardware/firmware (HW/FW) Version 20/300.



Set all PSM repeaters and bus devices to the same data speed.

8.2 Termination resistor

To terminate the RS-485 bus line, the device incorporates a connectable termination resistor for each port.

- Activate the termination resistor by setting the TERMINATE slide switch to ON.



Terminate the RS-485 bus line at the two furthest ends of the bus.

9 Connecting data cables



NOTE: Interference

Use shielded twisted pair data cables.
Connect the cable shielding at both ends of the transmission path.

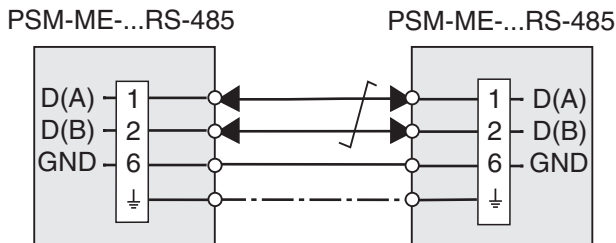


Figure 7 RS-485 interface

- To couple two RS-485 interfaces, connect them with a twisted lead pair.

D(A) = Data line -

D(B) = Data line +

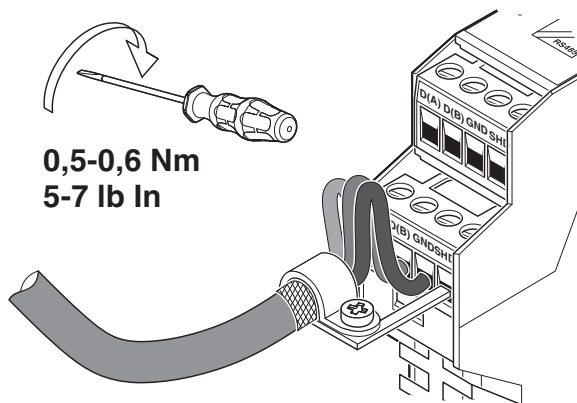


Figure 8 Install shield clip

- For the shield connection, use the provided shield connection clip.

10 Assembly



CAUTION: Electric shock

The device is only intended for operation with SELV according to IEC 60950/EN 60950/VDE 0805.



NOTE: Malfunction

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.

This ensures the integrated surge protection is functional and that the shielding of the data cable is effective.

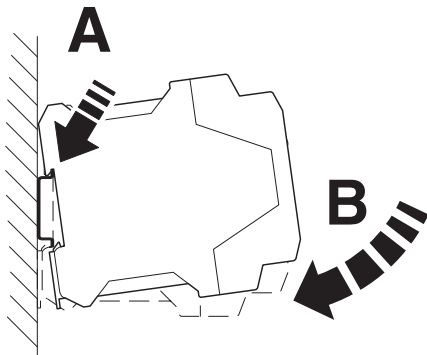


Figure 9 Mounting on a DIN rail

- To avoid contact resistance, only use clean, corrosion-free 35 mm DIN rails according to DIN EN 60715.
- Install an end bracket next to the left-hand device to prevent the devices from slipping.
- Place the device onto the DIN rail from above. Push the module from the front toward the mounting surface until it audibly engages.

10.1 Removal

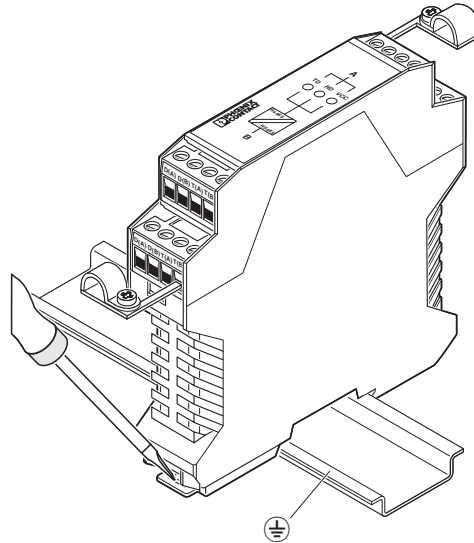


Figure 10 Removal

- 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.

10.2 Power supply

The device is supplied with 24 V DC or AC.

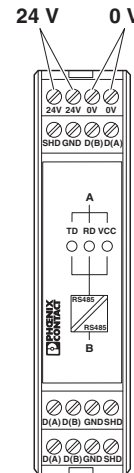


Figure 11 Power supply

- Provide supply voltage to the device via terminal 1 (pin 1 and pin 3).