

# PSM-ME-RS232/RS485-P

Interface converter for RS-232 to RS-485 2-/4-wire or RS-422

## 1. Short Description

The PSM-ME-RS232/RS485-P rail-mountable and compact interface converters have been designed especially for industrial use in the switch cabinet or switch box. They convert the RS-232 interface signals bidirectionally to the RS-485 2-/4-wire and RS-422 standard.

The devices are simply snapped onto standard EN mounting rails and supplied with 24 V DC or AC.

Their particular feature is the multifunctional application:

- RS-232 master interface in RS-485 bus systems
- Networking RS-232 equipment
- RS-232 range increase to 1000 m as interference-free and fast point-to-point connection
- RS-232 interface adaptation to RS-422 and RS-485 systems

The following features of the interface converter are particularly outstanding:

- 3 operating modi can be configured
  - RS-232 ↔ RS-485-2-wire
  - RS-232 ↔ RS-485-4-wire
  - RS-232 ↔ RS-422
- Can be used universally in all common bus systems with UART/NRZ data format and 10/11 bits character length
- Transmission rate can be set between 4.8 kbit/s and 115.2 Mbit/s
- Automatic transmit/receive changeover
- High-quality 3-way isolation (VCC // RS-232 // RS-485)
- Integrated surge voltage protection with transient discharge to the mounting rail
- Supply voltage of 24 V DC or AC to suit the switch cabinet
- Minimal current consumption/power dissipation



If you have any technical questions, please contact us at:  
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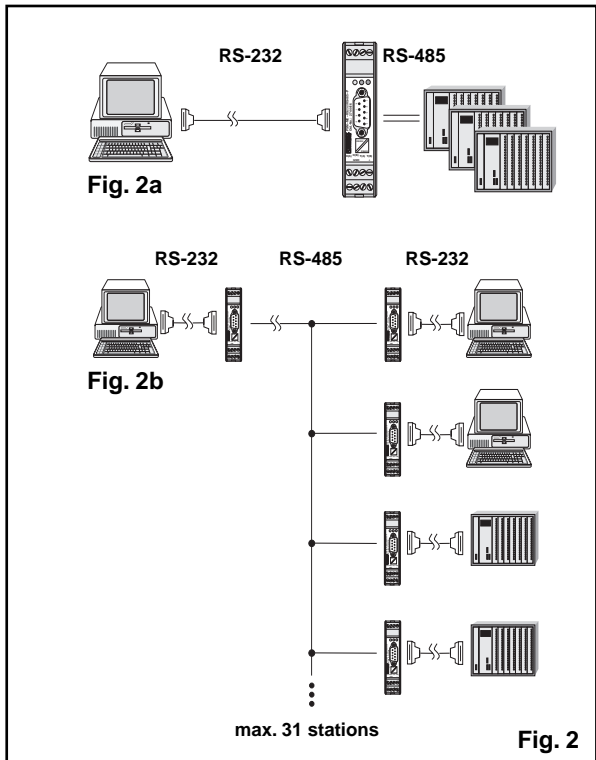
# PSM-ME-RS232/RS485-P

## Interface converter for RS-232 to RS-485 2-/4-wire or RS-422

### 1.1. Sample applications

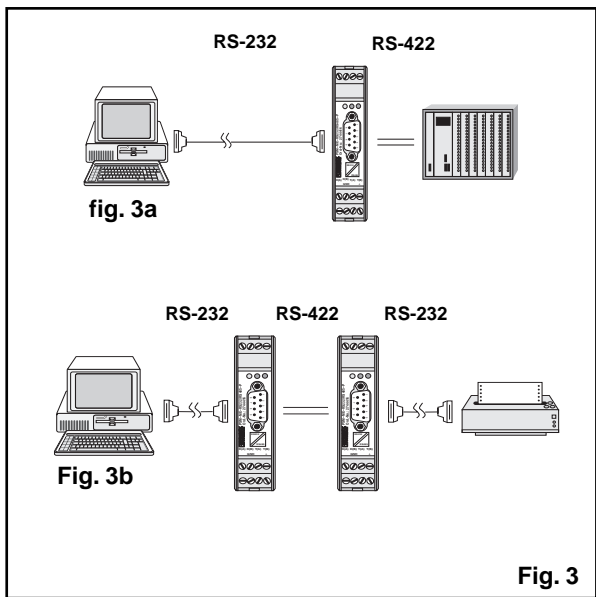
#### 1.1.1. RS-232 // RS-485 interface converter

- The RS-485 standard is specified for applications with multipoint connections. We distinguish between 2-wire bus systems with half-duplex transmission and 4-wire bus systems with full-duplex transmission:
- RS-232 master adaptation (fig. 2a)
  - Programming /and parameterizing connection (fig. 2a)
  - Networking RS-232 stations (the software must guarantee that the stations can be addressed; (fig. 2b)



#### 1.1.2. RS-232 // RS-422 interface converter

- The RS-422 interface is a balanced to earth interface for point-to-point connections. The logical states are represented by a differential voltage between two lines. Areas of application are:
- Interface adaptation to RS-422 devices (fig. 3a).
  - Interference-free and fast point-to-point connection up to 1000 m (fig. 3b)



# PSM-ME-RS232/RS485-P

## Interface converter for RS-232 to RS-485 2-/4-wire or RS-422

### 2. Order data

**Interface converter**, for the conversion of RS-232 to RS-485 2-/4-wire or RS-422, with electrical 3-way isolation, rail-mountable

#### 2.1. Accessories

|  |                                   |
|--|-----------------------------------|
| <b>Compact power supply</b> , primary switched-mode, 24 V DC, 650 mA, rail-mountable           | 230 V AC<br>120 V AC              |
| <b>RS-232 cable, 2m</b> , to connect the PSM-ME converter to a <b>9-pos.</b> device interface  | SUB-D9/SUB-D9<br>(socket/socket)  |
| <b>RS-232 cable, 2m</b> , to connect the PSM-ME converter to a <b>25-pos.</b> device interface | SUB-D9/SUB-D25<br>(socket/socket) |
| <b>SUB-D plug</b> , 9-pos., with screw connection for free assembly of an RS-232 cable         | socket<br>pin                     |

#### 2.2. Technical Data


|                                |             |
|--------------------------------|-------------|
| <b>Supply voltage</b>          |             |
| Frequency                      |             |
| Rated current consumption      |             |
| Connection                     |             |
| LED operational availability   |             |
| <b>RS-232 interface</b>        |             |
| Type of transmission           |             |
| Coding option                  |             |
| Data indicator                 |             |
| Transmission rates in kbit/s   |             |
| Transmission length            |             |
| Connection                     |             |
| <b>RS-485/RS-422 interface</b> |             |
| Interface standards            |             |
| Data format/coding             |             |
| Character length               |             |
| Tri-State                      |             |
| Transmission rates in kbit/s   |             |
| Transmission length            |             |
| Data direction switching       |             |
| Terminating resistances        |             |
| Connection                     | data/shield |

### 3. General data

|   |                        |
|---|------------------------|
| Protection circuit                        |                        |
| Transient discharge                       |                        |
| Electrical 3-way isolation                |                        |
| Test voltage                              |                        |
| Resistance to vibration                   |                        |
| Ambient temperature range                 |                        |
| Protection type                           |                        |
| Housing:                                  | Material               |
|   | Dimensions (W / H / D) |
| Connection data (conductor cross section) |                        |
| - COMBICON plug connectors                |                        |
| Weight                                    |                        |
| Approval                                  |                        |

| Type                            | Order No.         | Pcs. Pkt. |
|---------------------------------|-------------------|-----------|
| <b>PSM-ME-RS232/RS485-P</b>     | <b>27 44 41 6</b> | 1         |
| <b>MCR-PS 230 AC/24 DC/650</b>  | <b>28 11 95 4</b> | 1         |
| <b>MCR-PS 120 AC/24 DC/650</b>  | <b>28 11 96 7</b> | 1         |
| <b>PSM-KA-9SUB 9/BB/2METER</b>  | <b>27 99 47 4</b> | 1         |
| <b>PSM-KA-9SUB 25/BB/2METER</b> | <b>27 61 06 2</b> | 1         |
| <b>SUBCON 9/F-SH</b>            | <b>27 61 49 9</b> | 1         |
| <b>SUBCON 9/M-SH</b>            | <b>27 61 50 9</b> | 1         |

|  |
|--|
| 24 V AC/DC ± 20 %  |
| DC-60 Hz   |
| typ. 85 mA   |
| pluggable COMBICON screw terminal block                      |
| LED green  |
| acc. to DIN 66 259 T1, CCITT V.28                            |
| transparent to protocol                                      |
| DTE/DCE switchover via DIP switch                            |
| LED green (RD) RS-232 receive data (dynamic)                 |
| LED yellow (TD) RS-232 transmit data (dynamic)               |
| 4.8; 9.6; 19.2; 38.4; 57.6; 75; 93.75; 115.2                 |
| 0...15 m shielded (recommended from 38.4 kbit/s, max.)       |
| 5 m in industrial applications)                              |
| 9-pos. SUB-D pin strip                                       |
| acc. to DIN 66 259-4   |
| RS-485 2-wire, half duplex,                                  |
| RS-485 4-wire, full duplex,                                  |
| RS-422, full duplex, can be configured via DIP switch        |
| UART/NRZ <sup>1)</sup> ,                                     |
| 10/11 bit  |
| 11.5 bit after start bit edge                                |
| corresponding to the RS-232 interface                        |
| 0...1200 m, twisted pair, shielded                           |
| either automatic control or control via RS-232 RTS/CTS       |
| RTS/CTS ≥ 3V, transmit in direction of RS-485                |
| Inversion possible via DIP switch                            |
| switchable, 390 Ω pull up/down, 150 Ω terminating resistance |
| pluggable COMBICON screw terminal block /shield connector    |

|   |
|---|
| Y-capacitors,   |
| suppressor diodes, gas-filled surge arresters                                       |
| via metal foot on EN mounting rail  |
| power supply // RS-232 // RS-485/RS-422   |
| 2 kVrms, 50 Hz, 1 min.  |
| 5 g in acc. with IEC 68-2-6   |
| 0 °C to + 55 °C   |
| IP 20   |
| PA-V0   |
| (99 / 22.5 / 118.6) mm  |
| 0.2 - 2.5 mm <sup>2</sup> (AWG 24-12)   |
| approx. 120 g   |
|  |
| 1) NRZ: Non Return To Zero  |

# PSM-ME-RS232/RS485-P

## Interface converter for RS-232 to RS-485 2-/4-wire or RS-422



Complies with EMC guideline 89/336/EEC

### EMC (electromagnetic compatibility)

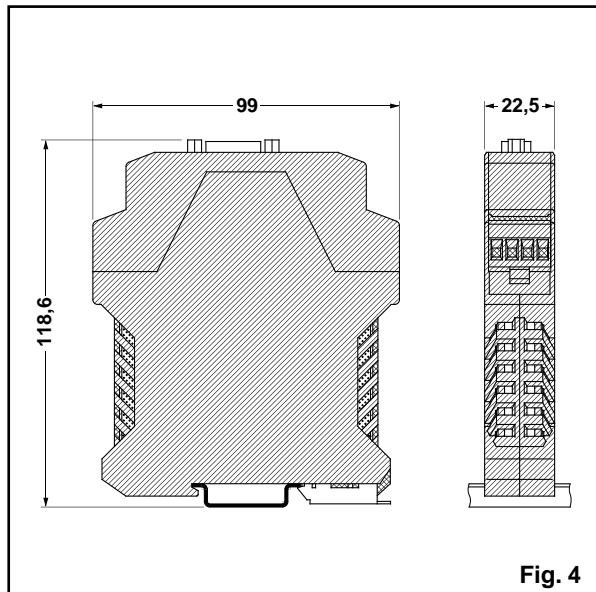
Immunity to interference in acc. with EN 50082-2

|   |              |  |
|---|--------------|--|
| • Electrostatic discharge (ESD)   | EN 61000-4-2 | Criterion B<br>8 kV discharge in air<br>6 kV contact discharge |
| • Electromagnetic HF field:<br>Amplitude modulation:<br>Pulse modulation: | EN 61000-4-3 | Criterion A<br>10 V/m<br>10 V/m                                |
| • Fast transients (Burst)<br>Signal:<br>Supply:                           | EN 61000-4-4 | Criterion B<br>2 kV/5 kHz<br>4kV/5 kHz                         |
| • Surge voltage capacities (Surge)<br>Signal:<br>Supply:                  | EN 61000-4-5 | Criterion B<br>2 kV/12 Ω<br>0.5 kV/2 Ω                         |
| • Conducted disturbance   | EN 61000-4-6 | Criterion A<br>10 V  |
| Noise emission in acc. with EN 50081-2                                    | EN 55011     | Class A  |

EN 61000 corresponds to IEC 1000  
EN 55011 corresponds to CISPR11

Criterion A: Normal operating behavior within the defined limits.  
Criterion B: Temporary impairment of operational behavior that the device corrects itself.

Class A: Area of application: industry, without special installation measures.



# PSM-ME-RS232/RS485-P

## Interface converter for RS-232 to RS-485 2-/4-wire or RS-422

### Function elements (fig. 5)

- ① Supply voltage 24 V AC/DC
- ② LED Supply voltage (VCC)
- ③ LED-RS-232 receive data (RD)
- ④ LED-RS-232 transmit data (TD)
- ⑤ RS-232 interface connection
- ⑥ RS-485/RS-422 interface connection
- ⑦ Shield connector
- ⑧ Snap-on foot for mounting rails in acc. with DIN EN 50 022

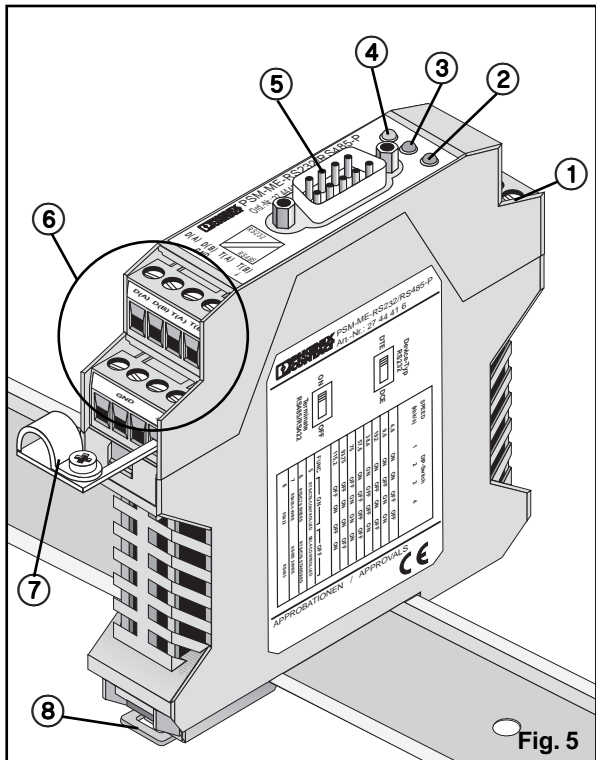


Fig. 5

## 4. Operational Diagram

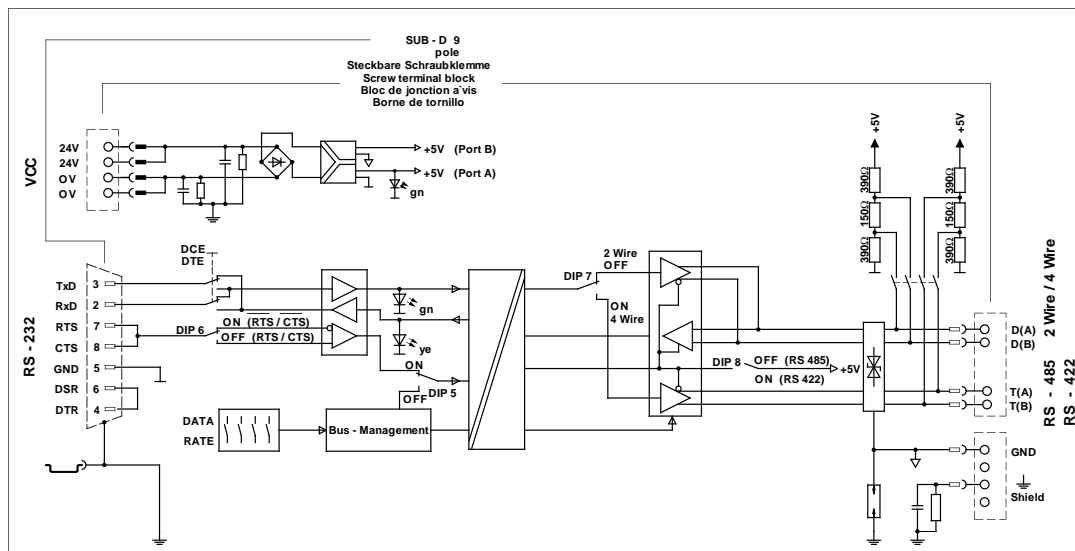


Fig. 6

# PSM-ME-RS232/RS485-P

## Interface converter for RS-232 to RS-485 2-/4-wire or RS-422

### 5. Notes on connection

#### 5.1. Connections (fig. 7)

- ① **Plug connector power supply**  
Connect 24 V AC/DC  $\pm 20\%$  via the COMBICON plug connector (PIN 1 and 3). Operational availability is signaled via the VCC LED ②.
- ③ **RS-232 interface**  
9-pos. SUB-D pin strip
- ④ **RS-485/RS-422 interface**  
pluggable COMBICON screw terminal block

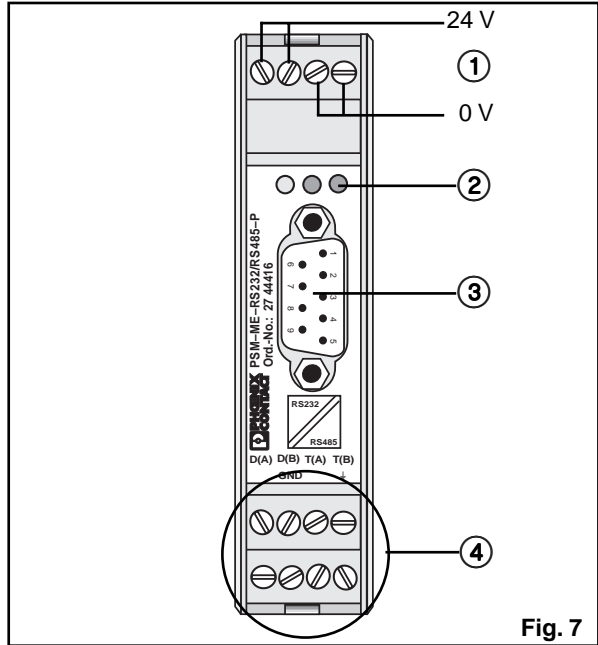


Fig. 7

#### 5.2. Mounting in the switch cabinet (fig. 8)

**Mounting (on 35 mm mounting rails in acc. with DIN EN 50 022):**

Hinge the device into the upper edge of the mounting rail and snap it in with a downward motion.

**Note:** The mounting rail must be connected to ground potential. This is the only way to guarantee that the integrated surge voltage protection functions and that the shield of the bus conductor makes contact effectively.

#### Dismantling:

Pull back the metal disassembling lever ① with the aid of a screwdriver and remove the device from the top.

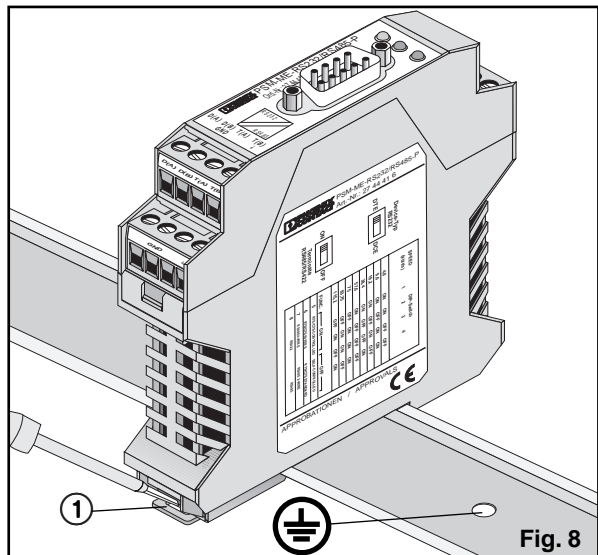


Fig. 8

# PSM-ME-RS232/RS485-P

## Interface converter for RS-232 to RS-485 2-/4-wire or RS-422

### 6. The RS-232 interface

| Designation             | SUB-D 9-pos. | (pin)  |
|-------------------------|--------------|--------|
| Transmit data           | TXD          | PIN 3  |
| Receive data            | RXD          | PIN 2  |
| Clear to send           | CTS          | PIN 8  |
| Request to send         | RTS          | PIN 7  |
| Functional ground       | GND          | PIN 5  |
| DEE data terminal ready | DTR          | PIN 4  |
| Data set ready          | DSR          | PIN 6  |
| Ground                  | ⊥            | Shield |

#### 6.1. Interface coupling

Make a 1-to-1 connection between the PSM module and the peripheral device as shown in Fig. 9.

**Note:** For a minimum configuration, you need to connect TXD, RXD and GND (software handshake)!  
Connect the 9-pos. SUB-D plug to the module (fig.10).

#### 6.2. Data indicator

Two diagnostic LEDs indicate the RS-232 interface modes

- Yellow: Transmit data (TD), dynamic
- Green: Receive data (RD), dynamic

#### 6.3. Configuration

For configuration, release the top of the housing on both sides (1). Pull the p.c.b. out of the housing as far as possible (2) (fig. 11).



**Static charges can damage electronic devices.**  
Discharge the electrical charge from your body before opening and configuring the device.  
To do so, touch a grounded surface, e.g. the metal housing of the switch cabinet.

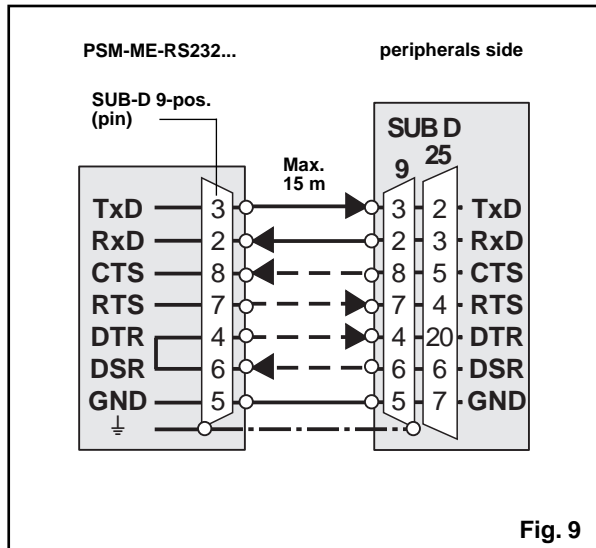


Fig. 9

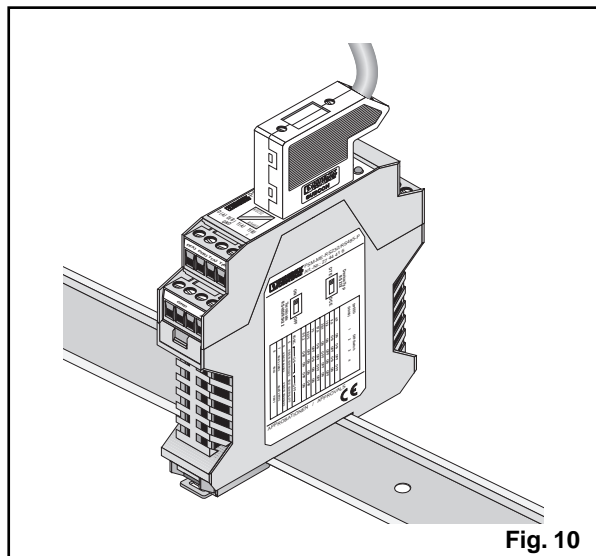


Fig. 10

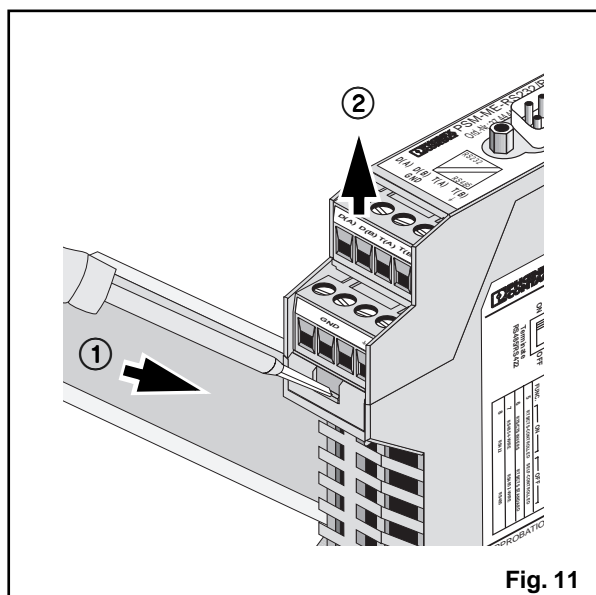


Fig. 11

# PSM-ME-RS232/RS485-P

## Interface converter for RS-232 to RS-485 2-/4-wire or RS-422

### 6.4. DTE/DCE switchover (fig. 12)

The DTE/DCE slide switches can be used to cross the cables TXD and RXD as well as RTS and CTS internally so that an adaptation to DTE or DCE interfaces can be performed easily.

- For the connection to:
- Data terminal equipment (DTE) → switch to position DTE.  
(Standard setting for most applications)
  - Data communication equipment (DCE) → switch to position DCE.

If the connected interface type is unknown, you can determine the right configuration by **trial and error** (DTE/DCE switch).

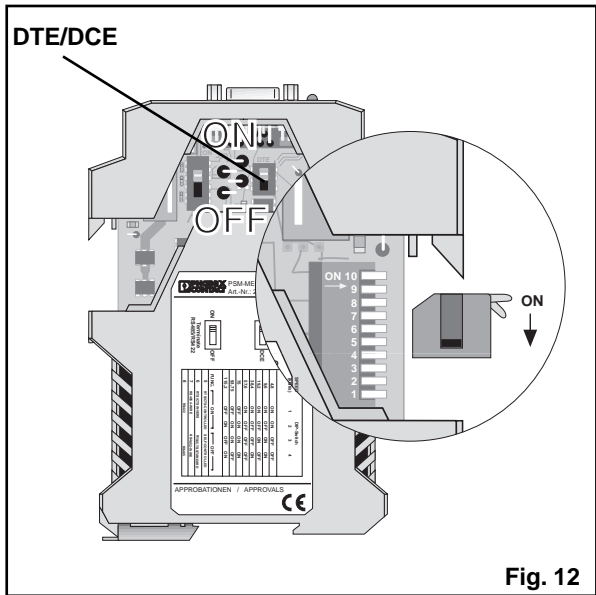


Fig. 12

### 6.5. CTS/RTS support (DIP switch 5)

In normal operating mode, no control lines (RTS/CTS) are required for data direction switching (switch position DIP 5 "OFF").

The data direction switching can alternatively be controlled through the RTS/CTS lines. Set the DIP switch 5 to the "ON" position.

#### Function:

- RTS/CTS -3 V to -15 V ≙ RS-485 receive mode
- RTS/CTS +3 V to +15 V ≙ RS-485 transmit mode

### 6.6. RTS/CTS inversion (DIP switch 6)

In uncommon applications, the control lines must be inverted. Set the DIP switch 6 to the "ON" position (default: "OFF"). The signal position in inverse mode is then as follows:

- RTS/CTS +3 V to +15 V ≙ RS-485 receive mode
- RTS/CTS -3 V to -15 V ≙ RS-485 transmit mode

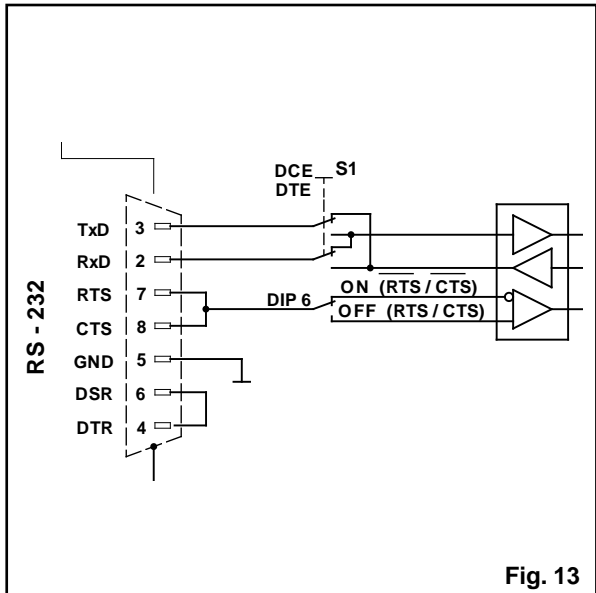


Fig. 13



# PSM-ME-RS232/RS485-P

## Interface converter for RS-232 to RS-485 2-/4-wire or RS-422

### 7. The RS-485/RS-422 interface

#### 7.1. Operation as RS-485 2-wire interface

##### Pin configuration

| Designation                       | COMBICON    | (pin)        |
|-----------------------------------|-------------|--------------|
| <b>Data line (+)</b>              | <b>D(B)</b> | <b>PIN 2</b> |
| <b>Data line (-)</b>              | <b>D(A)</b> | <b>PIN 1</b> |
| <b>Signal ground</b>              | <b>GND</b>  | <b>PIN 6</b> |
| <b>Ground/shielded connection</b> | ⊥           | <b>PIN 8</b> |

##### Settings:

- As described in the section "RS-232 interface", set the operating mode of the RS-232 interface with DIP switch 5 and 6 and the type of interface with the DTE/DCE switchover switch.

**Note:** If automatic operating mode is selected, no control lines from the RS-232 interface are required.

- If the automatic operating mode was selected, set the transmission rate with the aid of DIP-switches S1-S4 (fig. 15) and the table below.

**All PSM converters and bus stations must be set to the same transmission rate!**

The interface converters only convert an electric signal.

- Set DIP switch 8 to position "OFF" to activate the RS-485 operating mode.
- Set DIP switch 7 to "OFF" to activate the 2-wire mode.
- If necessary, activate the terminating resistors fig. 15 (Please observe the section 8 on "Terminating resistor for the RS-485/RS-422 interface", page 12).
- To couple two RS-485 interfaces, connect the connections acc. to fig. 14. (Ⓛ = twisted pair) GND connection is recommended, but is not essential.

##### Shielding the data cables

The data cables are shielded using a shield terminal block that is fixed in the ⊥ terminal block (fig. 16). The ⊥ terminal block is connected capacitively to the mounting rail contact on the underside of the device.

The shield connector is included in the scope of delivery.

**Use shielded twisted pair cables. Connect the cable shield to both sides of the transmission path!**

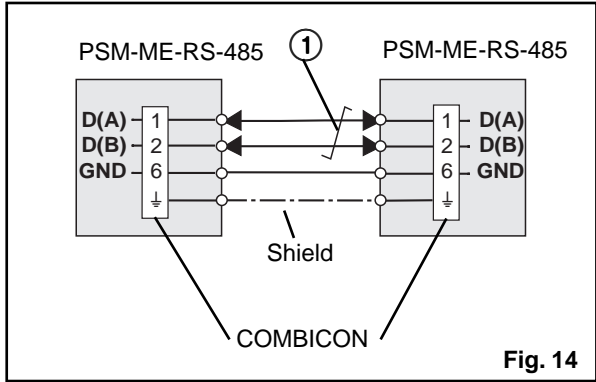


Fig. 14

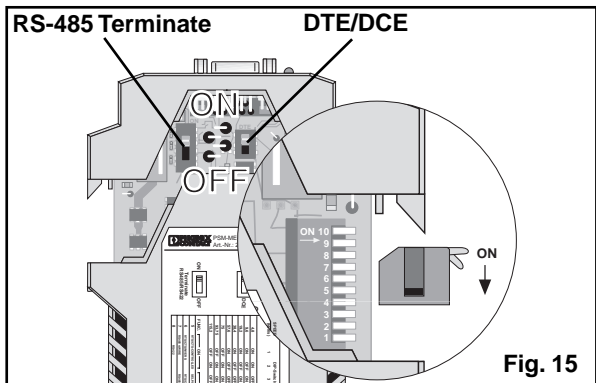


Fig. 15

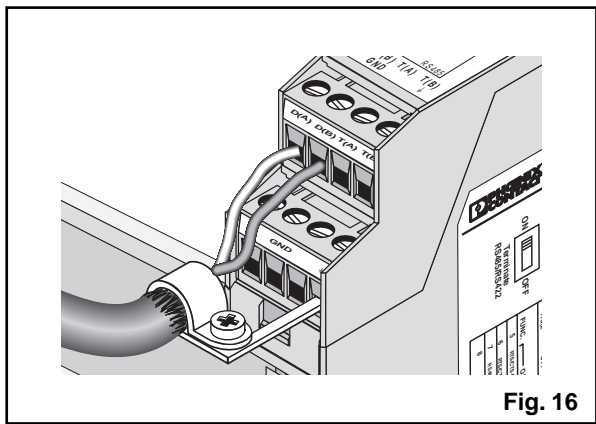


Fig. 16

| SPEED (kbit/s) | DIP            |                    |                  |                 |
|----------------|----------------|--------------------|------------------|-----------------|
|                | 1              | 2                  | 3                | 4               |
| 4.8            | ON             | ON                 | OFF              | OFF             |
| 9.6            | ON             | OFF                | ON               | ON              |
| 19.2           | ON             | OFF                | ON               | OFF             |
| 38.4           | ON             | OFF                | OFF              | ON              |
| 57.6           | ON             | OFF                | OFF              | OFF             |
| 75             | OFF            | ON                 | ON               | ON              |
| 93.75          | OFF            | ON                 | ON               | OFF             |
| 115.2          | OFF            | ON                 | OFF              | ON              |
| FUNC. DIP      | ON             |                    | OFF              |                 |
|                | 5              | RTS/CTS-CONTROLLED | 6                | SELF-CONTROLLED |
| 7              | RTS/CTS INVERS | 8                  | RTS/CTS STANDARD |                 |
| 8              | RS485 4-WIRE   |                    | RS485 2-WIRE     |                 |
|                |                |                    | RS422            |                 |

# PSM-ME-RS232/RS485-P

## Interface converter for RS-232 to RS-485 2-/4-wire or RS-422

### 7.2. Operation as RS-485 4-wire interface

#### Pin configuration

| Designation                | COMBICON | (pin) |
|----------------------------|----------|-------|
| Receive data (+)           | D(B)     | PIN 2 |
| Receive data (-)           | D(A)     | PIN 1 |
| Transmit data (+)          | T(B)     | PIN 4 |
| Transmit data (-)          | T(A)     | PIN 3 |
| Signal ground              | GND      | PIN 6 |
| Ground/shielded connection | ⊥        | PIN 8 |

#### Settings:

- 1) Set as described in the section "RS-232 interface" the operating mode of the RS-232 interface using DIP switch 5 and 6 and the type of interface with the DTE/DCE switchover switch.
- Note:** If automatic operating mode is selected, no control lines from the RS-232 interface are required.
- 2) If the automatic operating mode was selected, set the transmission rate with the aid of DIP-switches S1-S4 (fig. 18) and the table below.

**All PSM converters and bus stations must be set to the same transmission rate!**

The interface converters only convert an electric signal.

- 3) Set DIP switch 8 to position "OFF" to activate the RS-485 operating mode.
- 4) Set DIP switch 7 to "ON" to activate the 4-wire mode.
- 5) If necessary, activate the terminating resistors fig.18 (Please observe the section 8 on "Terminating resistor for the RS-485/RS-422 interface", page 12).
- 6) To couple two RS-48 interfaces, connect the connections acc. to fig. 17. (⊕ = twisted pair)  
When connecting the device, take into account that it is necessary to cross transmitted and received data.  
GND connection is recommended, but is not essential.

#### Shielding the data cables

The data cables are shielded using a shield terminal block that is fixed in the ⊥ terminal block (fig. 19). The ⊥ terminal block is connected capacitively to the mounting rail contact on the underside of the device.  
The shield connector is included in the scope of delivery.

**Use shielded twisted pair cables. Connect the cable shield to both sides of the transmission path!**

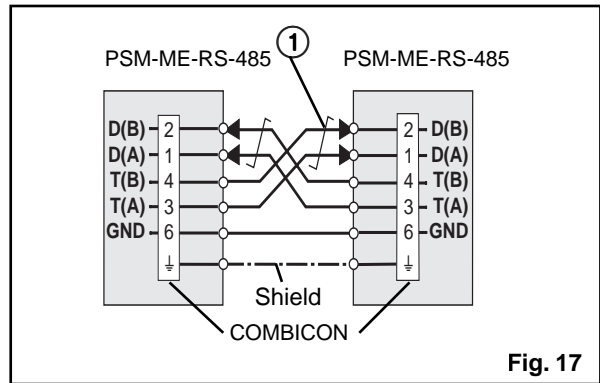


Fig. 17

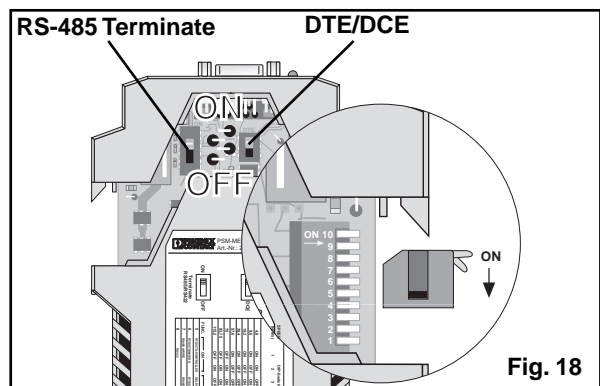


Fig. 18

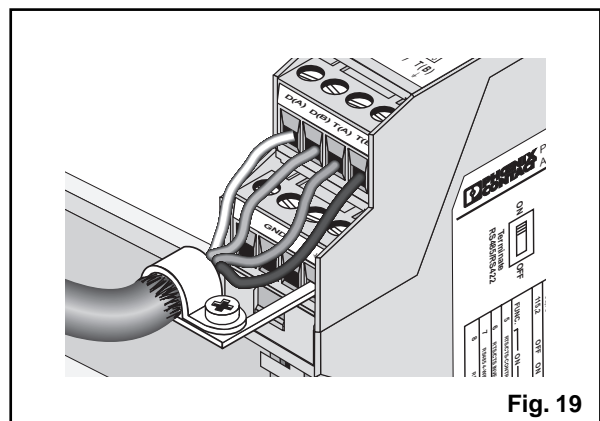


Fig. 19

| SPEED (kbit/s) | DIP |                    |                  |     |
|----------------|-----|--------------------|------------------|-----|
|                | 1   | 2                  | 3                | 4   |
| 4.8            | ON  | ON                 | OFF              | OFF |
| 9.6            | ON  | OFF                | ON               | ON  |
| 19.2           | ON  | OFF                | ON               | OFF |
| 38.4           | ON  | OFF                | OFF              | ON  |
| 57.6           | ON  | OFF                | OFF              | OFF |
| 75             | OFF | ON                 | ON               | ON  |
| 93.75          | OFF | ON                 | ON               | OFF |
| 115.2          | OFF | ON                 | OFF              | ON  |
| FUNC. DIP      | ON  |                    | OFF              |     |
|                | 5   | RTS/CTS-CONTROLLED | SELF-CONTROLLED  |     |
|                | 6   | RTS/CTS INVERSE    | RTS/CTS STANDARD |     |
|                | 7   | RS485 4-WIRE       | RS485 2-WIRE     |     |
|                | 8   | RS422              | RS485            |     |

# PSM-ME-RS232/RS485-P

## Interface converter for RS-232 to RS-485 2-/4-wire or RS-422

### 7.3. Operation as RS 422 interface

#### Pin configuration

| Designation                | COMBICON | (pin) |
|----------------------------|----------|-------|
| Receive data (+)           | D(B)     | PIN 2 |
| Receive data (-)           | D(A)     | PIN 1 |
| Transmit data (+)          | T(B)     | PIN 4 |
| Transmit data (-)          | T(A)     | PIN 3 |
| Signal ground              | GND      | PIN 6 |
| Ground/shielded connection | ⊥        | PIN 8 |

#### Settings:

- 1) Set the DIP switch 8 to position "ON" to activate the RS-422 operating mode (fig. 21).
- 2) Set as described in the section "RS-232 interface" the interface type of the RS-232 interface with the DTE/DCE switchover switch.


**Note:** In this operating mode, no control lines from the RS-232 interface are required and none are transmitted.

- 3) Switch the line terminating resistor on both sides of the RS422 transmission link on. → Put "Terminate" slide switch to "ON".
- 4) To couple two RS-422 interfaces, connect the connections acc. to fig. 20. (① = twisted pair) When connecting the device, take into account that it is necessary to cross transmitted and received data. GND connection is recommended, but is not essential.

#### Shielding the data cables

The data cables are shielded using a shield terminal block that is fixed in the ⊥ terminal block (fig. 22). The ⊥ terminal block is connected capacitively to the mounting rail contact on the underside of the device.

The shield connector is included in the scope of delivery.



**Use shielded twisted pair cables.**  
**Connect the cable shield to both sides of the transmission path!**

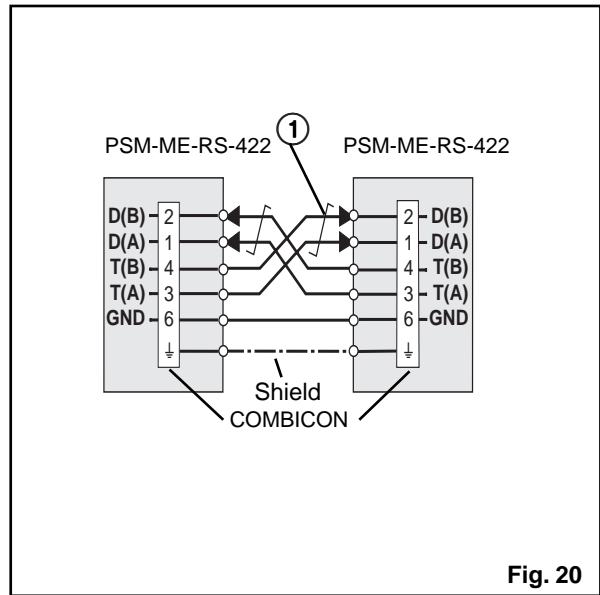


Fig. 20

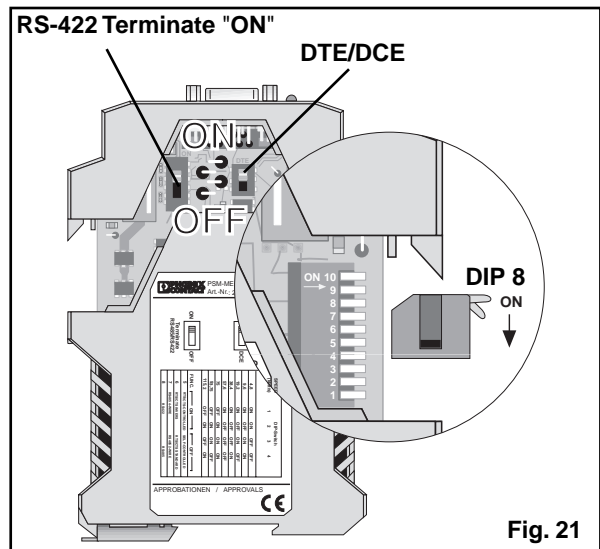


Fig. 21

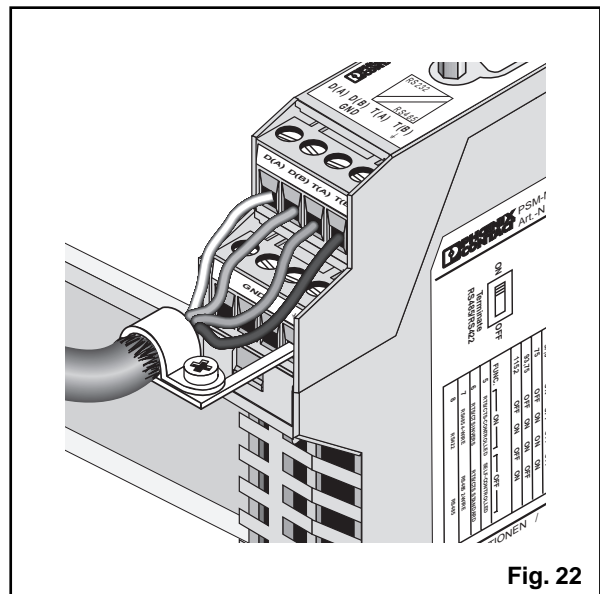


Fig. 22

**PSM-ME-RS232/RS485-P**  
**Interface converter for RS-232 to RS-485 2-/4-wire or RS-422**

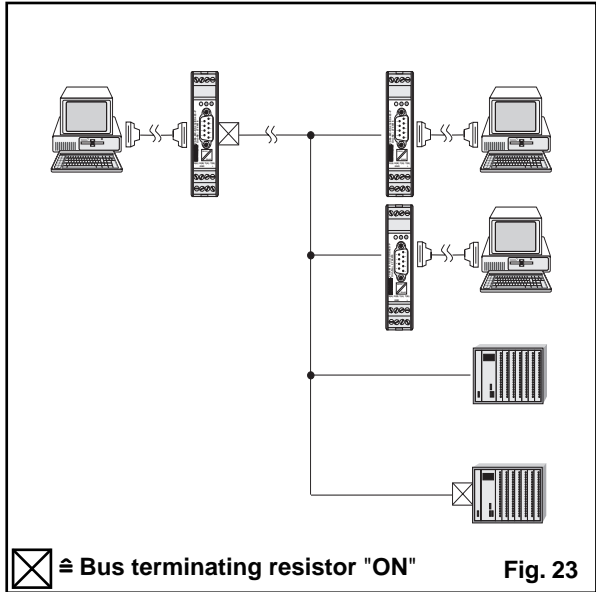
**8. Set the line terminating resistor correctly in RS-485 and RS-422 mode.**

A connectable line terminating resistor is integrated in the converter and it must be switched on or off, depending on the application.

**8.1. In RS-485 mode (2/4-wire)**

RS-485 is the standard for a multi-point-capable connection (up to 32 terminals).  
 The RS-485 bus line may only be terminated at the two most distant bus ends.

→ "Terminate" slide switch to "ON" at the beginning and end of the bus line (fig. 23).

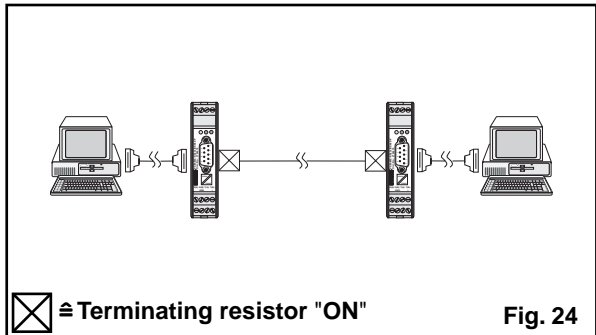


**Fig. 23**

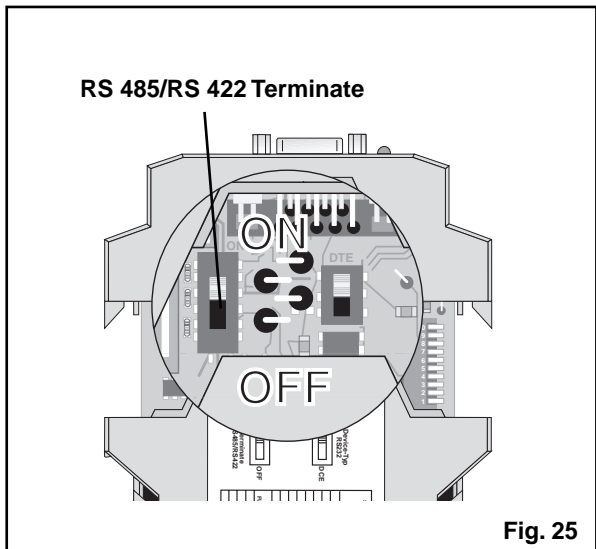
**8.2. In RS-422 mode**

RS-422 is the standard for a point-to-point connection between two devices. The line terminating resistor on both sides of the RS-422 transmission link must be switched on.

→ "Terminate" slide switch always in "ON" position (fig. 24).



**Fig. 24**



**Fig. 25**