

# **MPI/Profibus Repeater Manual**

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HW 1

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**Note:**

We have checked the content of this manual for conformity with the hardware and software described. Nevertheless, because deviations cannot be ruled out, we cannot accept any liability for complete conformity. The data in this manual have been checked regularly any necessary corrections will be included in subsequent editions. We always welcome suggestions for improvement.

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# 1 Safety Information

Please observe the safety information given for your own and other people's safety. The safety information indicates possible hazards and provides information how you can avoid hazardous situations.

The following symbols are used in this manual:



*Caution, indicates hazards and sources of error*



*gives information*



*hazard, general or specific*



*danger of electric shock*

## 1.1 General

The MPI/Profibus repeater is only used as part of a complete system.



*The operator of a machine system is responsible for observing all safety and accident prevention regulations applicable to the application in question.*



*During configuration, safety and accident prevention rules specific to the application must be observed.*



*EMERGENCY OFF facilities according to EN 60204 / IEC 204 must remain active in all modes of the machine system. The system must not enter an undefined restart.*



*Faults occurring in the machine system that can cause damage to property or injury to persons must be prevented by additional equipment. Such equipment must also ensure entry into a safe state in the event of a fault. Such equipment includes electromechanical safety buttons, mechanical interlocks, etc. (see EN 954-1, risk estimation).*



*Never execute or initiate safety-related functions using the operator terminal.*



*Only authorized persons  
must have access to the  
MPI/Profibus repeaters!*

## 1.2 Restriction of access

The MPI/Profibus repeater is open equipment and must only be installed in electrical equipment rooms, cabinets, or housings. Access to the electrical equipment rooms, barriers, or housings may only be possible using a tool or key and only permitted to personnel having received instruction or authorization. See also Chapter 2.

## 1.3 Information for the user

This manual is addressed to anyone wishing to configure or install the MPI/Profibus repeater.

It is intended for use as a programming manual and reference work by the configuring engineer. It provides the installing engineer with all the necessary data.

The MPI/Profibus repeater is for use in an MPI or Profibus network only. For that reason, the configuring engineer, user, installing technician must observe the standards, safety and accident prevention rules applicable in the particular application. The operator of the automation system is responsible for observing these rules.

## 1.4 Use as intended

The MPI/Profibus repeater must only be used as described in the manual.

## 1.5 Avoiding use not as intended

Safety-related functions must not be controlled using the MPI/Profibus repeater alone.

## 2 Installation and Mounting

The MPI/Profibus repeater must be installed according to VDE 0100 IEC 364. The MPI/Profibus repeater provides the degree IP20 and must be installed in the (control) cabinet.

Ambient temperature: 40 °C ... 60 °C



*Before you start installation work, disconnect all system components from the mains.*



*Danger of **electric shock***



*During installation, application-specific safety and accident prevention rules must be observed.*

### 2.1 Vertical and horizontal installation

The MPI/Profibus repeaters can be installed either vertically or horizontally.

#### 2.1.1 Installation on a mounting rail

Installation on 35 mm mounting rails to DIN EN 50 022):

- Hook the device into the upper edge of the mounting rail.
- Lock it by pressing downwards.

Removal:

- Retract the metal snap-lock fastener using a screw driver.
- Lift the device off the rail.



*To install the mounting rail adapter, use the original screws if possible. The thread of the screws must not be longer than 5 mm (M3 x 5).*

The mounting rail adapter on the rear can be removed. When doing so, no assembly parts are loosening in the housing. The mounting rail adapter can be screwed on again without opening the housing.



*Do not screw the screws more than 5 mm into the housing; otherwise, the electronics of the MPI/Profibus repeater will be destroyed.*

### 2.1.2 Mounting by direct screw connection

The MPI/Profibus repeater can also be screwed on directly, without the mounting rail adapter. The hole pitch is 38 mm. M3 screws must be used.

## 2.2 Minimum clearance

- There is no minimum clearance to be observed to adjacent modules.
- Make sure that enough clearance is provided beneath for the cable routing.
- Access to the front must be granted if you want to use the heavy-gauge conduit thread socket.
- Make sure that the front panel is well visible for diagnostic purposes.



## 3 System Overview

### 3.1 Application and description of functions

The RS 485 repeater is used to connect two MPI or PROFIBUS bus segments designed in the RS 485 technology to a maximum of 32 stations, including the repeater. It provides transfer rates ranging from 9.6 Kbit/s up to 12 Mbit/s (including 45.45 Kbit/s for PROFIBUS-PA).

Up to 9 MPI/Profibus repeaters can be connected in series.

The transmission signals are regenerated and retransmitted by the repeater. The original levels, rates of change and mark-to-space ratios are restored.

The repeater can thus also be used to realize longer Profibus segments without reducing the transfer rate.

With long segments, the transfer rate can also be increased by interconnecting a repeater. Irrespective of the line length, the number of stations connected to the bus can be increased to a number greater than 32.

The bus can be segmented by interconnecting a repeater. The switches S1 ... S3 can be used to separate and/or terminate the segments as required (see Section 3.5 and Section 3.6).



Fig. 3-1:

MPI/Profibus repeater



*Make sure that the cable clips are in contact with the shield over as large an area as possible.*

## 3.2 Connections

The connections are provided via terminal blocks (see Fig. 3-1.) The repeater need not be opened for connection. The shield is grounded via the cable clips.

Power supply	M	0 V	
	L+	+24 V	
	PE	Protective grounding	
Segment 1	A1	Green cable	Segment 1 incoming
	B1	Red cable	Segment 1 incoming
	A1'	Green cable	Segment 1 outgoing
	B1'	Red cable	Segment 1 outgoing
Segment 2	A2	Green cable	Segment 2 incoming
	B2	Red cable	Segment 2 incoming
	A2'	Green cable	Segment 2 outgoing
	B2'	Red cable	Segment 2 outgoing



*Make sure that the cable length does not exceed 3 m.*

## 3.3 PG/OP

The "PG/OP" socket can be used to connect either an operator panel (OP) or a programming device (PG). This connection can also be used as a short tap line.

### Connector pin assignment

Pin	Profibus / Sub-D connector, 9-pin
1	-
2	M 24 V
3	DATA B
4	-
5	GND
6	+5V
7	+24V
8	DATA A
9	-

## 3.4 LEDs

The three LEDs on the front side of the MPI/Profibus repeater (see Fig. 3-1) inform you about its operating state.

*LED DP1 ON (yellow):*

A flashing light indicates that data are being transferred on bus segment 1.

*LED DP1 ERR (red):*

Continuous light indicates an error.

*LED PWR (green):*

24 V power supply present

*LED DP2 ON (yellow):*

A flashing light indicates that data are being transferred on bus segment 2.

*LED DP2 ERR (red):*

Continuous light indicates an error.

### 3.5 Switches

The switch S3 will switch off the repeater, disconnecting the connected bus segments 1 and 2. The bus segments connected to A1/B1 and A1'/B1', as well as to A2/B2 and A2'/B2' continue to operate irrespectively of each other.

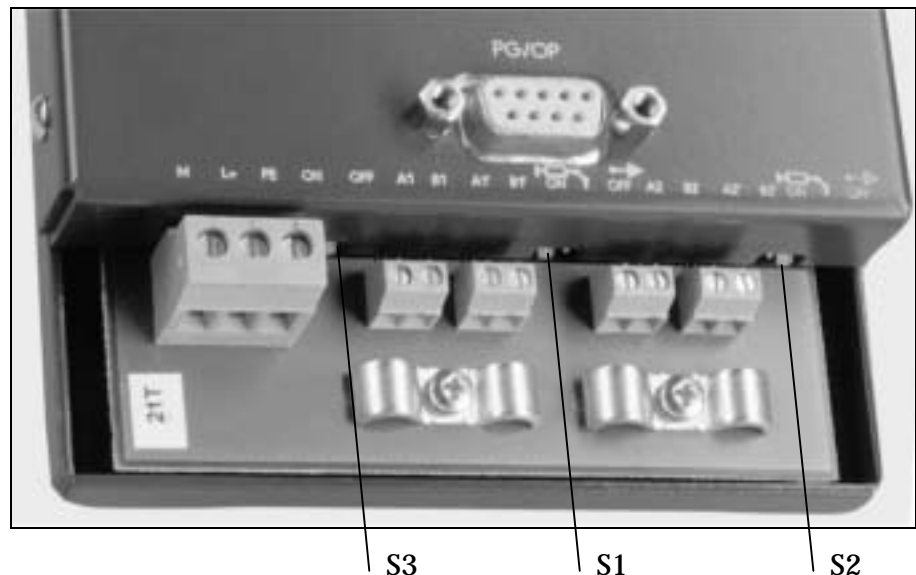


Fig. 3-2:

MPI/Profibus repeater connections

The switches S2 and S3 can be used to separate and terminate the bus segments.

S1	ON	Segment connection A1/B1 (incoming) is separated by A1'/B1' (outgoing) and terminated via terminating resistors. The PG/OP socket remains in operation at A1/B1.
	OFF	Segment connections A1/B1 and A1'/B1' connected.
S2	ON	Segment connection A2/B2 (incoming) is separated by A2'/B2' (outgoing) and terminated via terminating resistors.
	OFF	Segment connections A2/B2 and A2'/B2' connected.

**!**  
*The bus lines should always be connected as tap lines. Make sure that there are no ring connections between Ax/Bx and Ax'/Bx'.*

### 3.6 Circuit examples

For the combinations of the possible bus structures that can be realized, please refer to the block diagram (see Fig. 3-3). The three switches can be used to disconnect the bus for start-up and diagnosis. Please note that terminating resistors are only connected to the incoming bus lines A1/B1 (via S1) and A2/B2 (via S2). S3 will switch off the repeater and will disconnect the bus segments 1 and 2 without influencing the autonomous function.

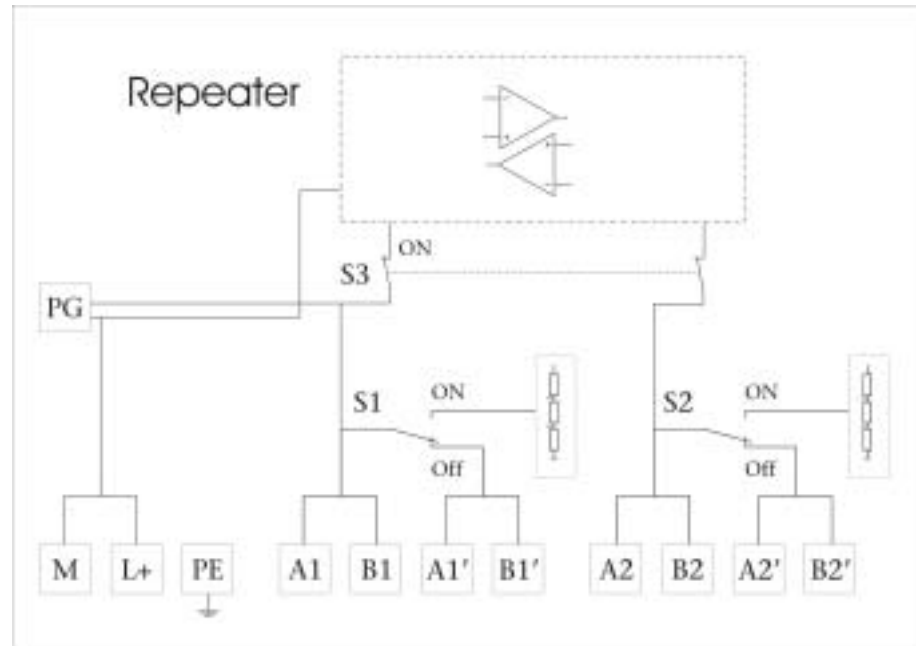


Fig. 3-3:  
 Block diagram of the  
 repeater

For long bus lines, it is possible to connect several repeaters in series:

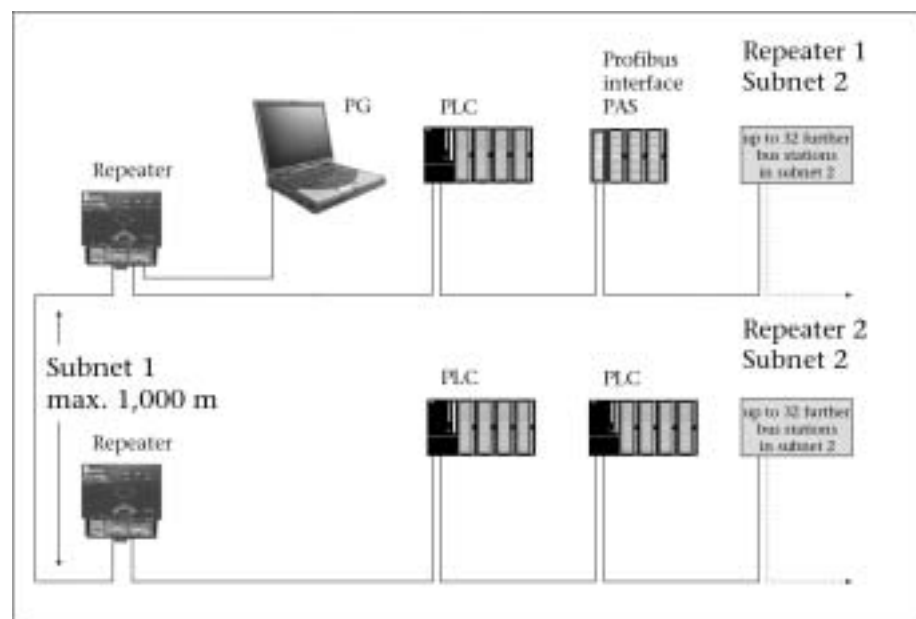


Fig. 3-4:  
 Application example for  
 a long bus line

For complex bus structures, the bus can be realized as a structure or a point-to-point connection.

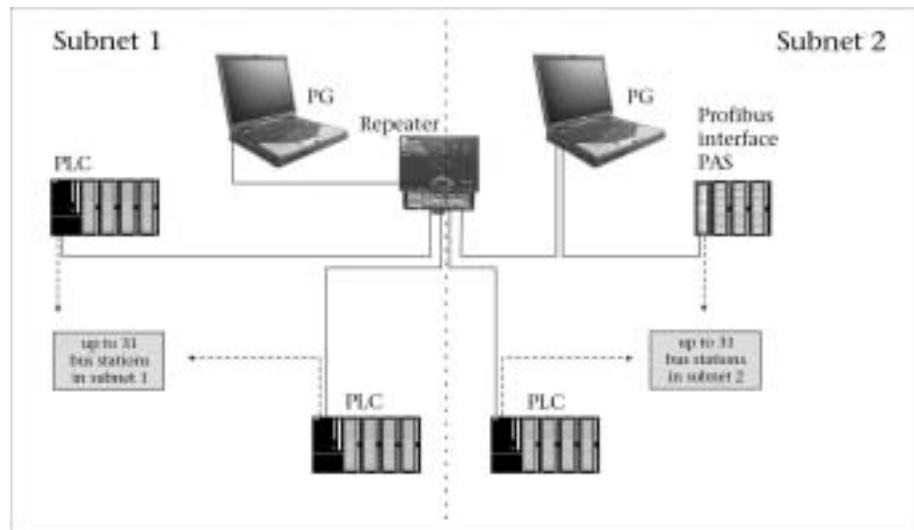


Fig. 3-5:

Application example for  
more than 32 stations

A maximum of 31 stations can be connected to a repeater integrated into a subnet. The number of stations can be increased by interconnecting further repeaters.

## 4 Technical data

### 4.1 Operating conditions

Dimensions in mm (LxWxH)	115 x 110 x 35
Weight	approx. 240 g
Housing designed in the degree of protection IP 20	
<b>Power supply</b>	
Voltage	24 V DC
Current consumption	max. 700 mA at 24 V
Voltage display	DC 24 V
Segment connection	2 terminal blocks
Interface	PG/OP
<b>Permissible ambient conditions</b>	
• Ambient temperature during operation	0 °C ... +60 °C
• Temperature during transport and storage	-25 °C ... +75 °C
<b>Profibus interface</b>	
Transfer rate	9.6 Kbit/s ... 12 Mbit/s; detected automatically
Profibus DP protocol	acc. to EN 50 170
Connection socket	SUB-D 9-pin
<b>Special features</b>	
Quality assurance to ISO 9002	
Maintenance: maintenance-free	no battery

### 4.2 Transfer rates

The transfer rates on the bus segment are detected by the MPI/Profibus repeater automatically.

Transfer rate		Max. segment length
9.6	Kbit/s	1,000 m
19.2	Kbit/s	1,000 m
45.45	Kbit/s	1,000 m
93.75	Kbit/s	1,000 m
187.5	Kbit/s	1,000 m
500	Kbit/s	400 m
1.5	Mbit/s	200 m
3	Mbit/s	100 m
6	Mbit/s	100 m
12	Mbit/s	100 m

### 4.3 Accessories

Manual, German	900-972-0AA01
Manual, English	901-972-0AA01
Profibus connector	700-972-0BA11
Profibus connector with connection socket	700-972-0BB11
Profibus connector with axial cable outlet	700-972-0CA11
insulation stripping tool for Profibus	700-972-6AA00
Profibus slave interface	700-153-0AA02
Distributor for MPI and Profibus	700-751-MPV20
Profibus radio link	700-760-0PB01

## 5 Further documentation

Internet: [www.helmholz.de](http://www.helmholz.de), [www.profibus.de](http://www.profibus.de)

Siemens Manuals: "S7-300/S7-400 Installing and Wiring", "S7-300 Module Data"

"Profibus DP/DPV1", Manfred Popp, Hüthig Verlag

## Notes