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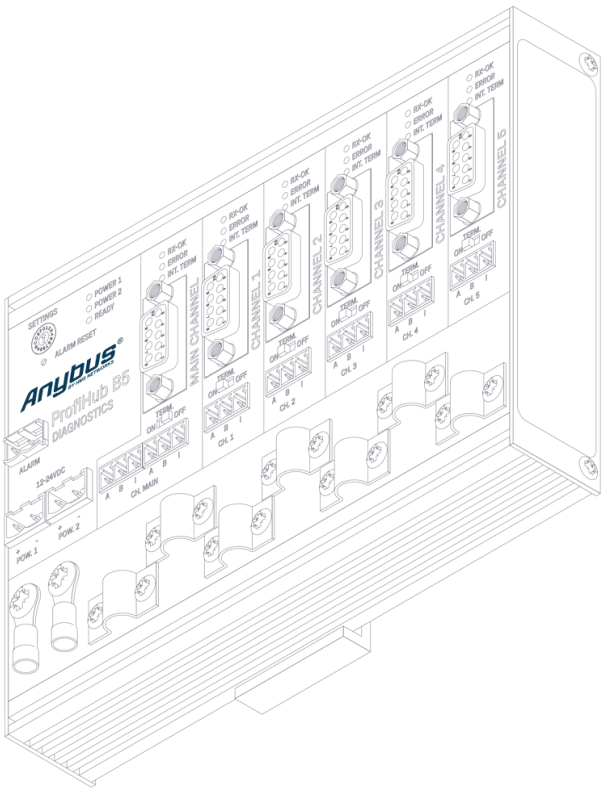

D1 Repeater

Transparent PROFIBUS DP single channel repeater

Safety Guidelines

This manual contains notices which you should observe to ensure your own personal safety, as well as to protect the product and connected equipment. These notices are highlighted in the manual by a warning sign and are marked as followed according to the level of danger:

Draws your attention to important information on handling the product, a particular part of the documentation or the correct functioning of the product.

Warning

This device and its components may only be used for the applications described in this manual and only in connection with devices or components that comply with PROFIBUS and RS 485 interface.
This product can only function correctly and safely if it is transported, stored, set up, installed, operated and maintained as recommended. The D1 Repeater is a CE class A product. In a domestic environment it may cause radio interference in which case the user may be required to take adequate measures.

Warranty

Warranty is void if you open the D1 Repeater.

Qualified Technicians

Only qualified technicians should be allowed to install and work with this equipment. Qualified technicians are defined as persons who are authorized to commission, to ground, to tag circuits and systems in accordance with established safety practices and standards. It is recommended that the technicians carry a Certified PROFIBUS Installer or Certified PROFIBUS Engineer certificate.

Disclaimer of Liability

We have checked the contents of this manual as much as possible. Since deviations cannot be precluded entirely, we cannot guarantee full agreement. However, the content in this manual is reviewed regularly and necessary corrections will be included in subsequent editions. Suggestions for improvements are welcome.

Important information

Purpose of the manual
This user manual provides information how to work with the compact IP66 Repeater D1.

Recycling and Disposal
The parts of the compact IP66 Repeater D1 can be recycled. For further information about environment-friendly recycling and the procedure for disposing your old equipment, please contact:

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Content

1 Introduction

The compact PROFIBUS DP Repeater D1 offers an economic alternative and tackles the technological limitations of existing repeaters. This first-class network component fulfils the electrical, mechanical and diagnostic requirements of the demanding modern industry.

The advanced 12 Mbps core of the D1 is identical to the ProfiHub B5+ and B2+; it can be cascaded unlimitedly and is equipped with the latest isolated RS 485 interface. The data is constantly monitored for glitches which are digitally filtered out. Every channel has on-board switchable termination and can drive 31 devices.

The robust M12 connectors of the PROFIBUS interface provide flexible wiring; a channel can be terminated or daisy-chained to a neighbouring component. An extra M12 connector is featured on the outgoing channel (channel 2) for ProfiTrace or other maintenance/engineering tools.

2 Installation instructions

Location

The D1 can be installed everywhere in a non-hazardous area that complies with IP 66 (DIN 40 050) and the specified ambient temperature range of -25° to +70° Celsius.

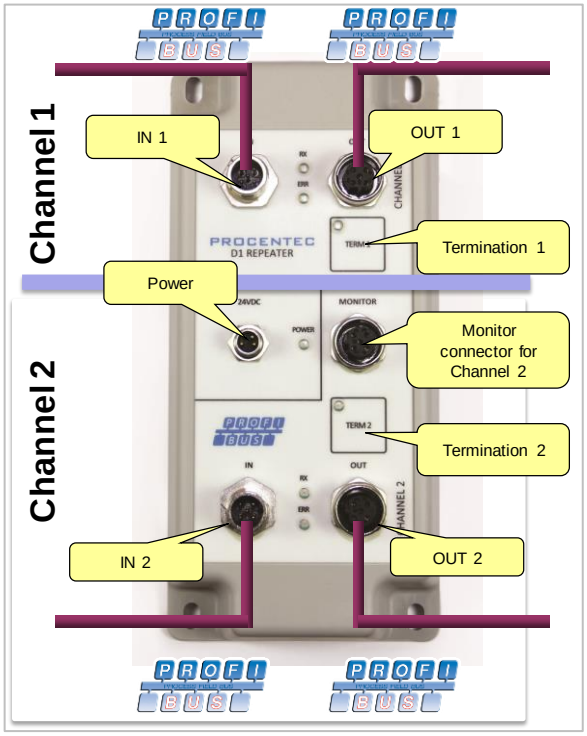
Position

The D1 can be installed in every position. When installing the D1 on a vertical surface, it is recommended to install it with Channel 2 pointing down. In this position it is easier to read the front plate.

Mounting and dismounting

The D1 has to be mounted on a flat surface, by using the four screw holes in the corners of the D1. The M4 mounting screws need to cover at least 3 mm.

3 PROFIBUS



Connectors

Each channel has 2 connectors (IN and OUT). They are both linked 1-on-1, even when the termination is ON.

When a channel of the repeater is NOT the last device on the segment, it does not matter which connector (IN or OUT) is utilized.

PROFIBUS Pin layout

Pin 1: + 5 V DC
Pin 2: A or green wire
Pin 3: DGND
Pin 4: B or red wire
Pin 5: not used
Thread: Shield

Termination

Each channel has its own termination which can be switched ON/OFF. If one of the channels is not used, turn on the termination. Press and hold the 'TERM' button for 3 seconds. The yellow TERM LED will illuminate. After power down/up the D1 will remember the termination state.

Monitoring connector

The busmonitor connector is connected 1-on-1 with channel 2.

Not used connectors

Verify that the unused connectors have the protective cap screwed on tightly to avoid water or dirt entering the connector.

Rubust Repeating mode

The D1 has two repeating modes: normal (default) and Robust Repeating. In normal mode the bits are transferred directly on the other channel with a minimal delay (see delay times on the next page). In Robust mode, the first byte is checked to verify if the following bits are a real PROFIBUS message. If the byte is illegal, the message will not be transferred to the other channel. This helps network stability in EMC sensitive environments.

To enable the Robust Repeating mode, press and hold both TERM buttons simultaneously for 5 seconds. When Robust Repeating has been enabled, you will see the Power LED flashing quickly for 500 ms. After that the Power LED will blink shortly every 5 seconds to indicate that Robust Repeating mode is enabled.
After power down/up the D1 will remember the repeating mode.

In Robust Repeating mode the delay time increases. See the table in Technical Data (next page).

Diagnostic LEDs

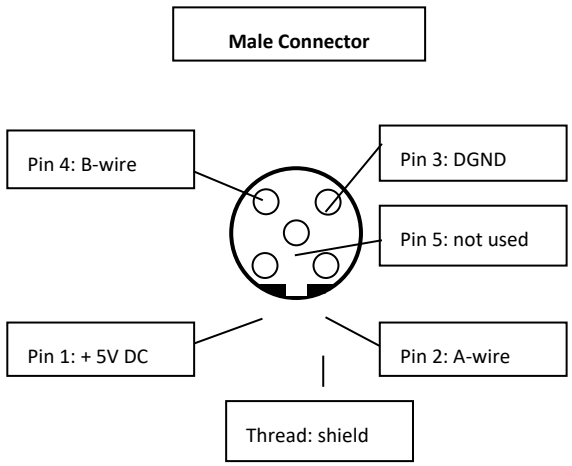
	OFF	**Blinking**	**ON**
POWER	Power is OFF or an internal failure.	Power supply not stable or an internal failure. Blinking every 5 sec: Robust Repeating mode enabled.	Power supply OK.
RX	No communication detected (this Channel).	1 or more devices communicating (this Channel).	Internal error
ERR	No problem has been detected.	Communication problem (this Channel).	Baud rate not found

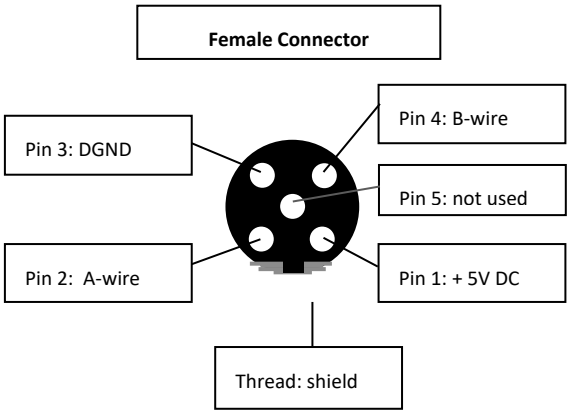
Technical Data ProfiHub D1	
Dimensions and weight	
Dimensions L x W x H (mm)	169 x 79 x 42 mm (excluding DIN-rail and plug-able screw connectors)
Weight	490 g (excluding plug-able screw connectors and packing material).
Mounting holes L x W	155 × 65 mm M4
Ambient conditions	
Operating temperature	-25 to +70° Celsius -13 to +158° Fahrenheit
Isolation class	IP 66 (IEC/EN 60529, DIN 40050)
Protocol specifications	
Supported Protocols	DP-V0, DP- V1, DP-V2, FDL, MPI, FMS, PROFIsafe, PROFIdrive and any other FDL based protocol.
Transmission speed	9.6 kbps to 12 Mbps (including 45.45 kbps)
Transmission speed detection	Auto detect
Transmission speed detection time	< 10 s detection and 50 s baudrate switchover time.
Data delay time	At baudrate 9.6 - 500 kbps 2.8 Tbit 1.5 Mbps 3.2 Tbit 3 Mbps 3.9 Tbit 6 Mbps 4.6 Tbit 12 Mbps 6.4 Tbit
Deviation	2 bit times (over the complete message) for received messages is allowed and is corrected to nominal speed when transmitted.

PROFIBUS cable specifications	
Cable lengths	1200 m at 9.6 kbps to 93.75 kbps 1000 m at 187.5 kbps 400 m at 500 kbps 200 m at 1.5 Mbps 100 m at 3 Mbps to 12 Mbps
Wire diameter	< 2.5 mm2
Wire type	Stranded or Solid core
Number of devices	Max. 31 per Channel (including ProfiHubs, OLMs, Laptops/PCs, etc.)
Termination	Integrated and switchable (hold 'TERM' button for 3 seconds). Powered according to IEC 61158 (390/220/390 Ohms)
Cascading depth	No limit (only limited by busparameters of the master)
Cascading units	With standard busparameters: At baudrate units 9.6 kbps 7 19.2 kbps 7 45.45 kbps 42 93.75 kbps 7 187.5 kbps 7 500 kbps 17 1.5 Mbps 23 3 Mbpss 19 6 Mbps 16 12 Mbps 15 Formula to calculate number of cascading units with adjusted Tslot : Cascading units = (Tslot - maxTsdr) / (2 × Tdata_delay_time) Tdata_delay_time is described in protocol specifications on previous page. Example 1.5 Mbps, normal mode: Cascading units = (300-150) / (2x3.2) = 23
Power supply specifications	
Power supply operating voltage range	12 to 24 VDC
Power supply absolute max. rated voltage	9 to 31 VDC
Redundant power supply	Yes
Current consumption	Max. 125 mA
Power dissipation	Max. 1.5 W
Reverse polarity protection	Yes

Connector lay-out	
Power supply male	M8 connector Pin 1 : 12 to 24 VDC Pin 2 : 12 to 24 VDC Pin 3 : 0 V Pin 4 : 0 V Thread : Shield
PROFIBUS Male CH1 and CH2	M12 connector Pin 1: +5V Pin 2: PROFIBUS A (green wire) Pin 3: DGND Pin 4: PROFIBUS B (red wire) Pin 5: not used Thread : Shield
PROFIBUS Female CH1, CH2 and MONITOR	M12 connector Pin 1: +5V Pin 2: PROFIBUS A (green wire) Pin 3: DGND Pin 4: PROFIBUS B (red wire) Pin 5: not used Thread : Shield
Standards and approvals	
CE	EMC Directive 2014/30/EU, class B Digital Device RoHs Directive 2011/65/EU
FCC	47 CFR 15, Unintentional Radiator, class B Digital Device.
UL	Report reference: E365044-A1-UL Standards for safety: UL 60950-1, Information Technology Equipment - Safety - Part 1 General Requirements CAN/CSA C22.2 No. 60950-1-07, Information Technology Equipment - Safety - Part 1: General Requirements

PROFIBUS connector specifications





Power supply specifications

Power connector	M8
Nominal supply voltage	12 to 24 V DC
Current consumption	Max. 125 mA at 24 Vdc
Power dissipation	Max. 1.5 W
Reverse polarity protection	Yes