

PROCENTEC



ProfiHub F1

User Manual

Important information

Purpose of the Manual

This user manual provides information how to work with ProfiHub F1.

Recycling and Disposal

The parts of the ProfiHub F1 can be recycled. For further information about environment-friendly recycling and the procedure for disposing of your old equipment, please contact:

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Document Updates

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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. ProfiHub F1 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 ProfiHub F1.

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.

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1. System description

The interface modules ProfiHub F1 couple PROFIBUS-DP or PROFIBUS-FMS two-wire-segments (RS-485) via optical fibres. The module can work as a ring module or work in a Line- or Point-to-point-structure. This can be set by a DIP-switch.

They are equipped with two supply voltage inputs to provide redundant power supply. The integrated error relay can be used to indicate malfunctions.

The PROFIBUS-data rates 9,6KBit/s, 19,2KBit/s, 45,45KBit/s, 93,75KBit/s, 187,5KBit/s, 500KBit/s, 1,5MBit/s, 3MBit/s, 6MBit/s and 12MBit/s are automatically detected by the module.

2. Hardware installation

Power off the devices, which will be connected by using the fiber optic system.

Snap the system onto the DIN EN rail and check the correct holding!



Use only the correct optical connectors for the fiber optic system. Using incorrect connectors can cause damage to the fiber optic system. Take care that connectors with a latch can only be mounted in a defined position.



Don't stare into the optical cable or the transmitter of the fiber optic system. Visible and non-visible light (depending on its wavelength) of the optical transmitter can cause eye-damages!

Connect the fiber optic system by using the correct fiber optic cable. Take care that you always have to connect an optical transmitter and an optical receiver.

Use the plugs to save the unused optical receiver and transmitter against impurity.



Don't bend the fiber optic cable! Please refer to the specifications of the cable manufacturer. Otherwise the fiber optic cable can be damaged or the communication will be disturbed.

Power on the devices. Please use a power supply of 12-30VDC, connected to the terminals marked with VDC1, VDC 2 and GND. Note, that VDC 1 and VDC 2 are redundant power inputs with reverse voltage protection.

Function of the DIP-Switch :

- SW1 to SW3** : PROFIBUS termination between "A" and "B" line
- SW4** : Choose Ring or Line / Point-to-Point structure
- SW5** : Disables Fiber Port CH2
- SW6** : Disables Fiber Port CH1

Function of the Status-LEDs:

- VDC** : Power Supply at VDC1 or VDC2
- FAIL** : Failure group signal and failure relay opened
- Status** : No data rate detected yet or bus-error (to long data-frame or to long duration of a zero). Changed PROFIBUS-wires can be detected by the status-led when the termination of the ProfiHub F1 is turned off (DIP-switches 1 to 3).
- Rx** : Data being received. A received frame is only shown at the Rx-led of the channel where it arrives first. Thus it can happen that although working in a ring, only one of the Rx-leds lights or both Rx-leds of the ProfiHub F1 are blinking.

Function of the Status-LEDs Fiberview:

- Fail** : Received optical signal failed
- Limit** : System reserve reached
- Link / Act** : Transmitting or receiving data

Failure Relay: Terminals K1 to K3 are connected to a potential free relay. If the optical connection works without failures the relay gets active and closes K1 to K2 and opens K2 to K3. If the optical connection is disconnected or power supply at VDC1 or VDC2 fails, the relay will get inactive and K1 to K2 opens and K2 to K3 closes

Function of K1 – K2: Potential free failure relay contact NC.

Function of K2 – K3: Potential free failure relay contact NO.



Systems with 2 FX-Ports always have transceiver CH1 as the upper one.

Start-up: After having applied the supply voltage the module start the data rate detection. When the data rate is detected, the transmission of the received data is started.

Thus, at slow data rates and in ring structures with many converters closing the ring at start-up can take some seconds. As well, after having changed the data rate of the system, the ring may take some seconds before adjusting the new data rate.

The fail-led of the PROFIBUS-connector lights until the first data rate is detected. After the data rate detection it only lights to show bus-errors.



To meet the required values a PROFIBUS-cable has to be used and modules and cable-shield have to be grounded properly.

POF-connection:

To connect the POF cable into the Optolock, the end of the cable is cut cleanly. Use a POF-Cutter to make a straight cut in an angle of 90° at the chose position of the cable. After that the end of the two strands are separated. Then the strands are inserted into the two holes in the termination housing, which is then pressed close to hold the POF in place.

Pay attention on the bending radius of the optical cables while installing them and check the temperature range of the used plugs.

3. Project: planning a ring structure

When planning a ring structure the following things have to be considered:

- Set DIP-switch 4 ON, 5 and 6 to position OFF
- The minimum response time of the slaves (min T_{SDR}) must be set to 11 bit times or higher.
- The slot time or the PROFIBUS (T_{SL}) must be adjusted to a value high enough to guarantee that the answers of all slaves are at the master within the slot time, even when an optical connection is broken. The minimum slot time depends on the data rate, the length of the optical fibre and on the number of ProfiHub F1 in the ring. It can be calculated using the formula below

$$T_{SL} \geq \max_T_{SDR} + L_{LWL} \cdot t_{LWL} + n_{DL} \cdot t_{DL}$$

$\max_T_{SDR}$: maximum response time of the slaves.

L_{LWL} : Length of the whole optical fibre in the ring. The two longest branch lines – if there are any – should be added to the length of the fibre optical in the ring.

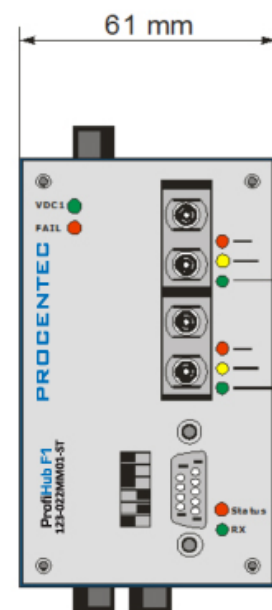
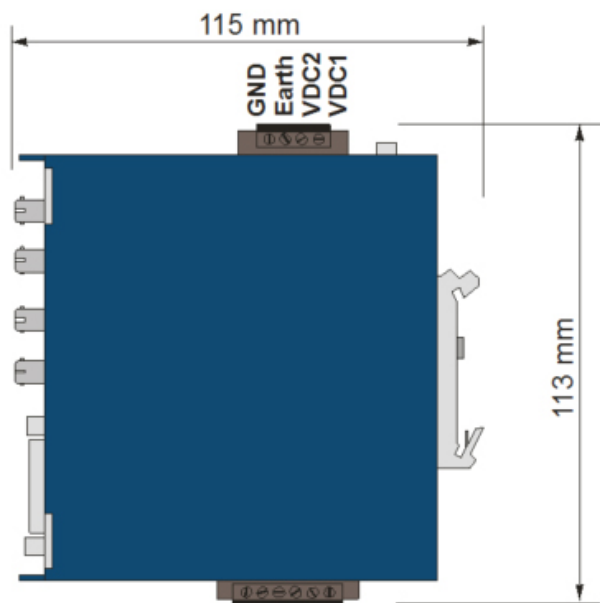
t_{LWL} : Constant considering the bit times per km fibre optical cable (see table)

n_{DL} : Number of ProfiHub F1 in the ring.

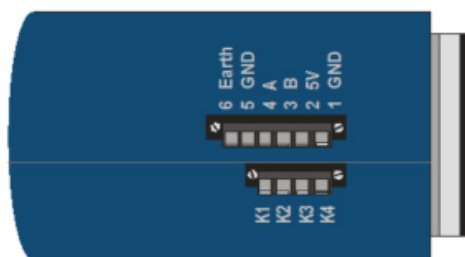
t_{DL} : Constant considering the delay time (in bit times) of one ProfiHub F1 (see table below).

Data rate [KBit/s]	t_{LWL} [Bit times/km]	t_{DL} [Bit times]
12.000	240	80
6.000	120	40
3.000	60	20
1.500	30	10
500	10	4
187,5	3,33	3
93,75	1,66	3
45,45	1,66	3
19,2	0,33	2
9,6	0,17	2

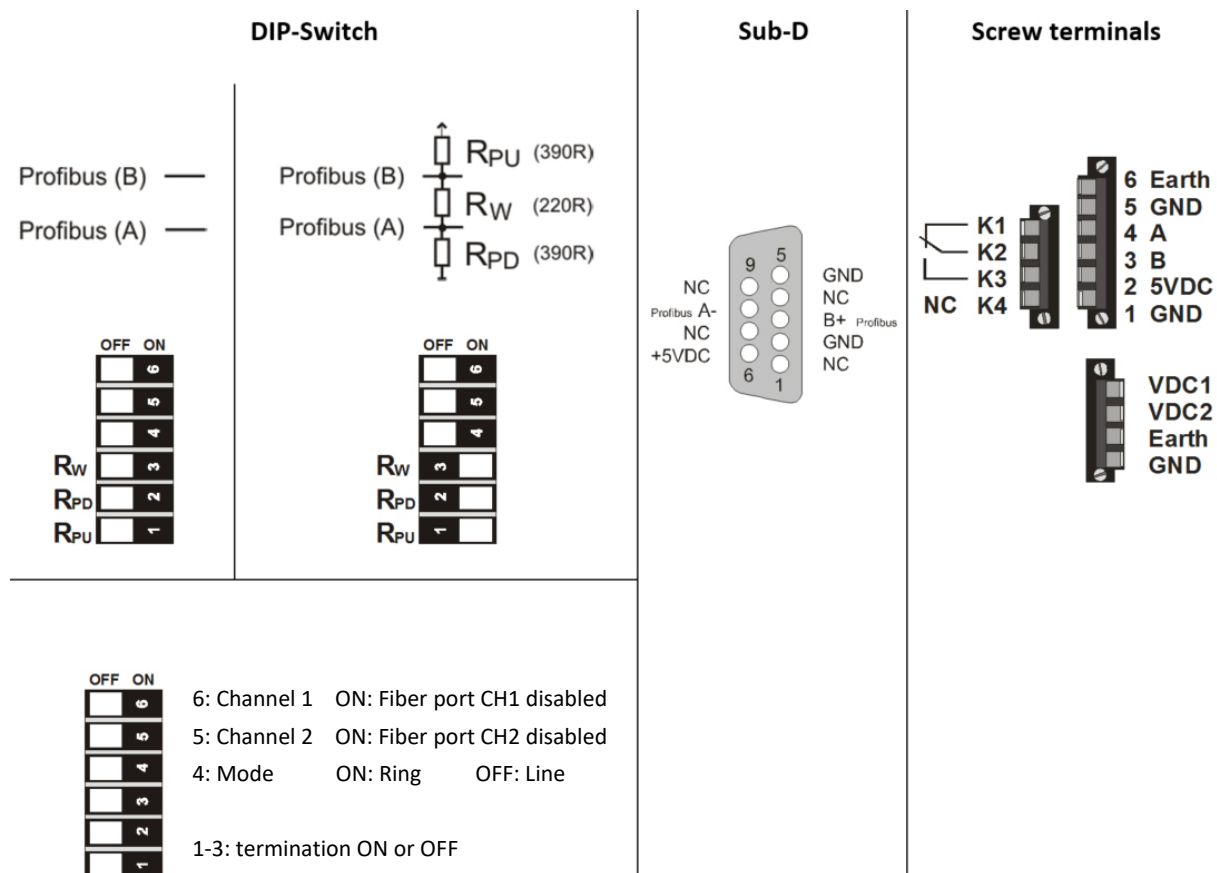
4. Dimensions



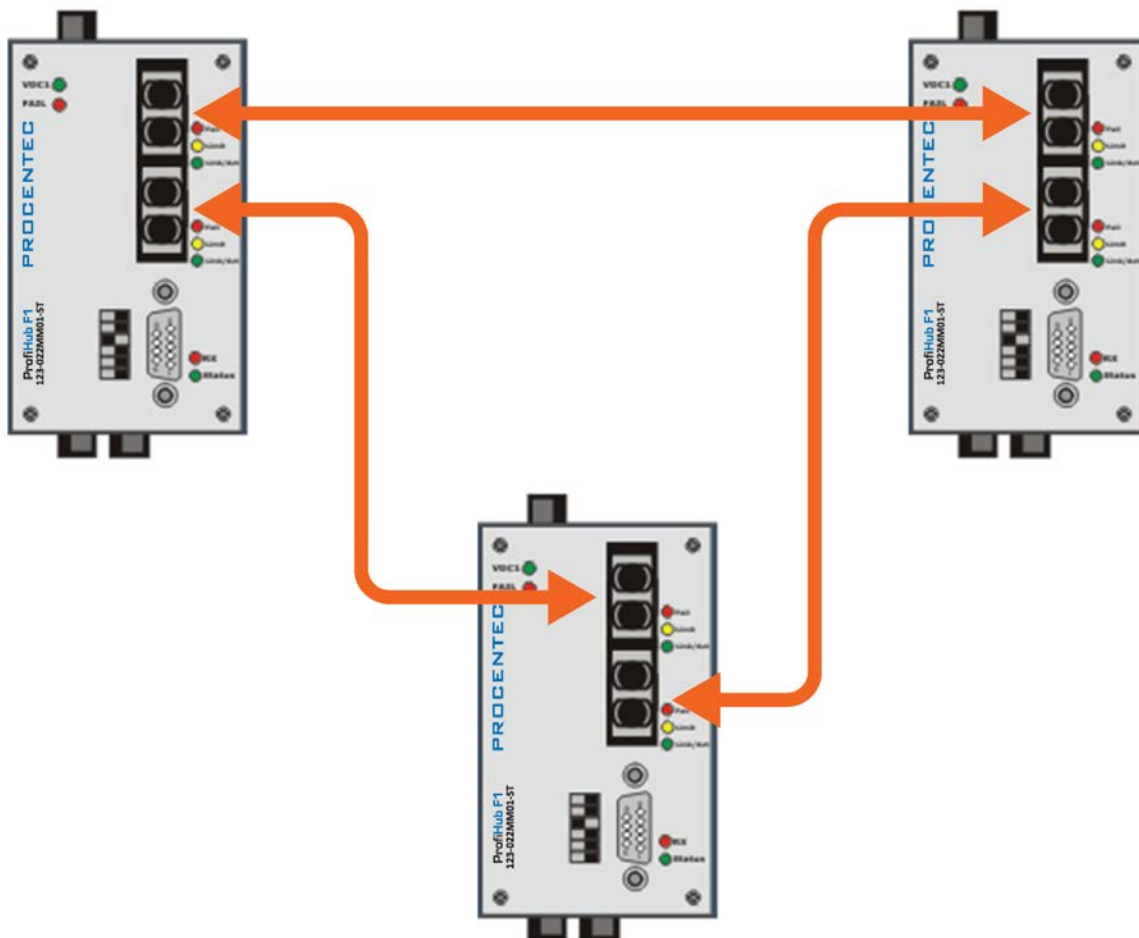
CH1
CH2



5. Connectors and operation modes



6. System Description



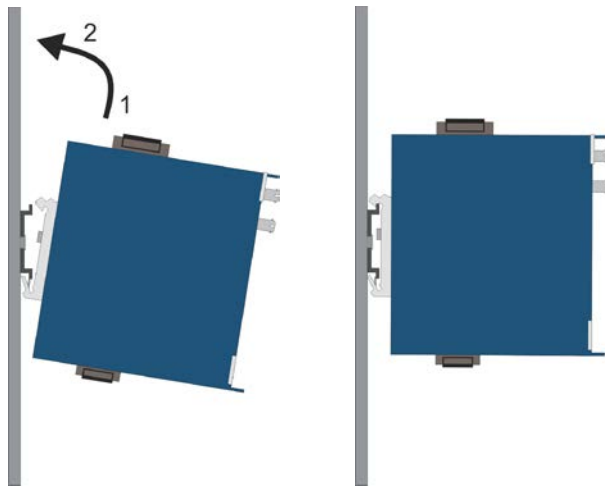
A ring topology must be connected from CH1 to CH1 and CH2 to CH2. Only with an uneven number of FO modules, the cables may be connected from CH1 to CH2 and CH2 to CH1 (only once per ring).

7. Mounting

As standard, the system has a clip for 35mm DIN rails according to DIN EN 60175.

For mounting the system please engage it onto the rail at the bottom side (see left picture), press it against the spring force to the top (1) and then towards the mounting plate (2). The system latches as shown in the picture at the right. Please refer to the above mentioned steps in reverse order to demount the switch.

As an option, a wall mount kit is also available. If the system should be fixed onto the wall, the clip for DIN rail mount has to be unscrewed first.



8. Type selection and technical data

Type	13-MM-ST
Order no.	123-022MM01-ST
Fiber connector	ST
Fiber	Multi mode 62,5 (50) /125µm
Optical budget	13dB
Transmission path	5 km (2 dB/km)
Wavelength	1310 nm
Transmission rate max.	12MBit/s
Transmission	Half duplex
Operation Mode	RS485 ↔ Fiber Optic LWL : < 3 TBit / Tx ↔ Rx : 11 TBit
Load	switchable termination: open or characteristic impedance (Rw + Rpd + Rpu)
Cable Length	1.200m (9,6 – 187,5KBit/s), 400m (500KBit/s), 200m (1.5MBit/s) 100m (3MBit/s – 12MBit/s) Cable Length according to PROFIBUS User Organization
Connector	9-pin female Sub-D and 6-pin connection terminal
Control - LED's	Power supply (green) / Failure (red) / Data receive (green) / Status (red) / Fiber view (red, yellow, green)
Operating voltage	12-30 VDC, other voltages on request
Current consumption	200 mA
Potential separation	500 VDC (24 VDC → RS-485)

Failure relay contact	25VDC (1A) / 60VDC (0,3A)
Operating temperature	-40°C ... +70°C (Multi mode and Single mode with ST or SC) -20°C ... +55°C (all others)
Storage temperature	-40 ... +85° C
EMC	EN61000-6-2 (2001) / EN55022 Kl. B (1998) +A1 + A2
Weight	500 g
Dimensions H x D x W	H: 115mm W: 61mm D: 113mm
Case	Stainless steel, powder-coated

9. Other PROCENTEC products

PROFINET Cable Tester

- Suitable for 4- and 8-wire PROFINET and regular Ethernet cables
- Suitable for straight and 90°, metal or plastic PROFINET plugs
- Tests cable shielding
- Detects short circuits, wire breaks, swaps, miswiring and split pairs
- Large LCD clearly indicates the test results
- 150 hours on one 9 V battery
- Operating temperature: 0 to 50 °C
- Just 1-key-press to start continuous testing
- It can also test telephone and coax cable



www.PROFINETcabletester.com

ProfiHub B5+R

- 6 galvanically isolated channels
- Configurable grounding system
- Redundant power supply
- Bus redundancy option
- Star, tree and bus structured networks
- Alarm contact
- Monitoring port per channel
- IP20
- Certifications: UL Listed, DNV, FCC, CE



www.procentec.com/profihub

ProfiHub A5

- 5 Isolated channels
- Transparent
- Increased signal strength
- 31 devices per channel
- 12 Mbps
- 1200 m spur line length
- No address required
- Integrated switchable termination
- IP 65 classification

www.procentec.com/profihub



Compact PROFIBUS Repeater B1

- Single channel PROFIBUS repeater
- Transparent
- Increased signal strength
- 12 Mbps
- Auto baudrate detection
- Redundant power supply
- Digital glitch filtering
- No limit in cascading
- Integrated switchable termination
- Diagnostic LEDs
- DB9 connector for measurements
- **IP 20 with DIN-rail mounting**

www.procentec.com/profihub



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If your country or region is not listed, please contact us. We are still searching for distributors who can cover complete areas or countries.



11. About PROCENTEC

PROCENTEC is a specialist in PROFIBUS and PROFINET technology and develops products to optimize the production processes of end users. Our innovative solutions ensure that our customers successfully operate in the world of industrial automation and enjoy maximum results from their process.

PROCENTEC globally supplies all the components required to install a measurable and steerable network. We develop and produce all products in the Netherlands and they are exported through our worldwide distribution network. At PROCENTEC, we have a professional team of qualified support engineers who provide technical support on-site and online. Our professionals have more than 20 years of experience with PROFIBUS and PROFINET technology. They provide the necessary support to end users during implementation procedures, certification processes, audits and malfunctions. PROCENTEC also is an international accredited Competence and Training centre for PROFIBUS and PROFINET. We provide training courses that help employees using those techniques optimally for their business objectives

Products

- ProfiTrace
- ComBricks
- ProfiHub
- PROFINET tools
- Cables & Connectors

Services

- On-site & Online Support
- Network Audit
- Network Certification
- Consultancy
- Testlab & Democenter
- Competence Center

Training

- PROFIBUS training courses
- PROFINET training courses
- Product training courses

12. Notes

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Blank page with horizontal dotted lines for writing.

Blank page with horizontal dotted lines for writing.



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