



## Quick Start Guide FLEXtra PROFINET-Switch FO, 16 Port, 10/100/1000 MBps

Order number: 700-856-12F41

As of firmware V1.10

Version  
**2** en



## Content

|          |                                                                 |           |
|----------|-----------------------------------------------------------------|-----------|
| <b>1</b> | <b>Safety instructions .....</b>                                | <b>3</b>  |
| <b>2</b> | <b>Introduction .....</b>                                       | <b>3</b>  |
| <b>3</b> | <b>Preparing the PROFINET-Switch .....</b>                      | <b>4</b>  |
| 3.1      | Connecting .....                                                | 4         |
| <b>4</b> | <b>Setup and use .....</b>                                      | <b>5</b>  |
| 4.1      | Install GSDML file .....                                        | 5         |
| 4.2      | Setup in the hardware-configuration .....                       | 5         |
| 4.3      | Setup of SFP modules .....                                      | 6         |
| 4.4      | Setting the port properties.....                                | 7         |
| 4.5      | Use of SFP modules .....                                        | 8         |
| 4.6      | Assign the PROFINET switch a name .....                         | 9         |
| 4.7      | Further configuration and diagnosis via the web interface ..... | 10        |
| 4.7.1    | Port Status .....                                               | 10        |
| 4.7.2    | SFP-Port Information .....                                      | 10        |
| <b>5</b> | <b>Diagnosis via LEDs .....</b>                                 | <b>11</b> |
| 5.1      | System LEDs .....                                               | 11        |
| 5.2      | Ethernet LEDs P1 – P12 (RJ45).....                              | 11        |
| 5.3      | FO LEDs P13 – P16 (SFP1-4).....                                 | 11        |
| <b>6</b> | <b>Function of buttons .....</b>                                | <b>11</b> |
| <b>7</b> | <b>Technical data .....</b>                                     | <b>12</b> |



# 1 Safety instructions

## Target audience



This description is only intended for trained personnel qualified in control and automation engineering who are familiar with the applicable national standards.

For installation, commissioning, and operation of the components, compliance with the instructions and explanations in this operating manual is essential. The specialist personnel is to ensure that the application or the use of the products described fulfills all safety requirements, including all applicable laws, regulations, provisions, and standards.

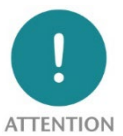
## Intended use



The device has a protection rating of IP 20 (open type) and must be installed in an electrical operating room or a control box/cabinet in order to protect it against environmental influences. To prevent unauthorized operation, the doors of control boxes/cabinets must be closed and possibly locked during operation.

The consequences of improper use may include personal injury to the user or third parties, as well as property damage to the control system, the product, or the environment. Use the device only as intended!.

## Operation



ATTENTION

Successful and safe operation of the device requires proper transport, storage, setup, assembly, installation, commissioning, operation, and maintenance. Operate the device only in flawless condition. The permissible operating conditions and performance limits (technical data) must be adhered to. Retrofits, changes, or modifications to the device are strictly

forbidden.

## Security



ATTENTION

The device is a network infrastructure component and therefore an important element in the security consideration of a plant. When using the device, therefore, observe the relevant recommendations to prevent unauthorized access to installations and systems. Further information on this can be found in the device manual.

# 2 Introduction

The managed FLEXtra PROFINET-Switch FO can be used to connect PROFINET components at 100 Mbps as well as Ethernet devices at up to 1000 Mbps. The FLEXtra PROFINET switch FO has 12 RJ45 ports with up to 1000Mbps and 4 SFP ports for fiber optic transmission with 1000 Mbps.

The supported PROFINET protocols, such as LLDP, DCP or diagnostic alarms, can be easily parameterized and managed via the integration of a GSDML file.

In addition to the PROFINET functions, further network management functions are available in the FLEXtra PROFINET-Switch, which can be configured via the web interface. These include VLAN, SNMP, port mirroring, QoS/CoS mapping.

The functional design with the smart arrangement of the Network connection ports saves space in the control cabinet. The status LEDs on the top of the FLEXtra PROFINET switch, which are always clearly visible, enable easy diagnostics even with full cabling.



In addition, the FLEXtra PROFINET switch supports the control of ports via inputs and the display of port states via outputs. As inputs and outputs bits in the PROFINET-IO image of the switch can be used as well as 4 digital inputs and 2 digital outputs with 24V.

The assignment of the can be configured via the GSDML file.



The website can also be used to query extensive information about the status of the FLEXtra PROFINET-Switch, such as port status and statistics, stored MAC addresses and the ARP table.

The configuration set via the web interface can be downloaded or saved to an SD card as a backup or for series commissioning.

Further information about the network management functions, the status displays and the configuration management can be found in the detailed manual of the FLEXtra PROFINET-Switch.



This document explains the initial commissioning of the FLEXtra PROFINET-Switch FO with a standard use case. The latest version of the document and the detailed manual can be found at [www.helmholz.de](http://www.helmholz.de) or scan the QR code directly.

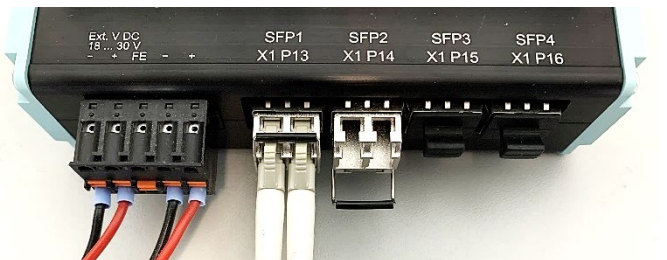


## 3 Preparing the PROFINET-Switch

### 3.1 Connecting

The FLEXtra PROFINET-Switch has a redundant power supply. The FLEXtra PROFINET-Switch must be supplied with 24 VDC via the supplied connector plug at at least one of the two "-/+ " wide-range inputs (18 - 30 VDC).

The RJ45 sockets "X1 P1" – "X1 P12" are used to connect the network nodes (PROFINET or Ethernet) via copper Ethernet at up to 1000 Mbit/s.



The sockets "SFP1 / X1 P13" - "SFP4 / X1 P16" can be equipped with SFP transceiver

modules. Both SM "Single Mode" and MM "Multi Mode" SFP modules with 1000 Mbit/s transmission rate are supported.



*The housing of the PROFINET-Switch is not grounded. Please connect the functional grounding connection (FG named FE on front) of the PROFINET-Switch correctly with the reference potential.*

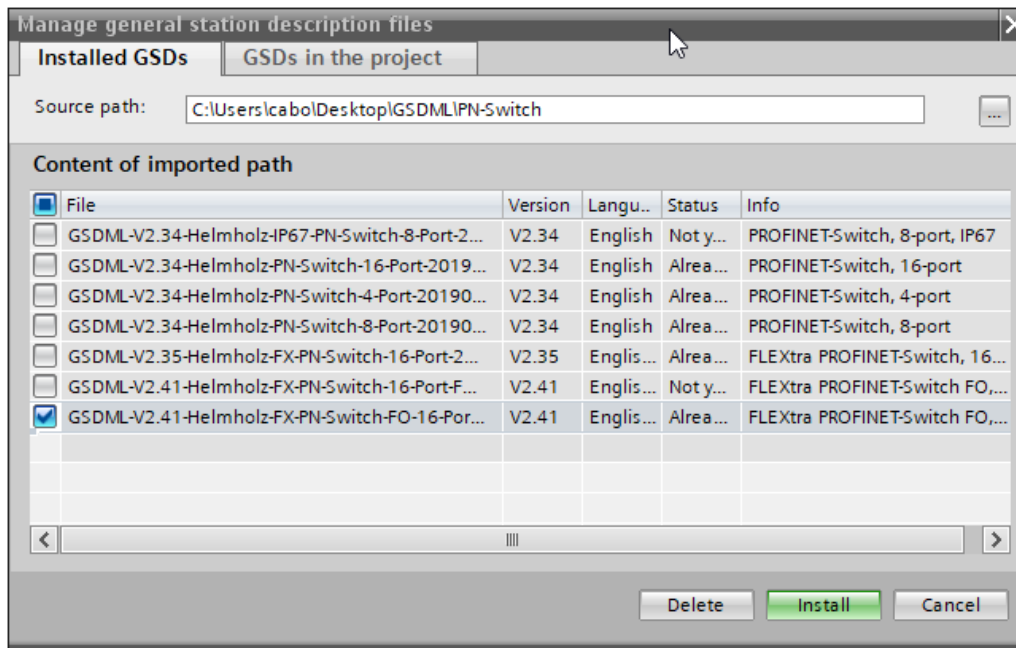
## 4 Setup and use

### 4.1 Install GSDML file

You can download the GSDML file for the FLEXtra PROFINET-Switch from the website [www.helmholz.de](http://www.helmholz.de) in the download area of the product or use the QR code shown.

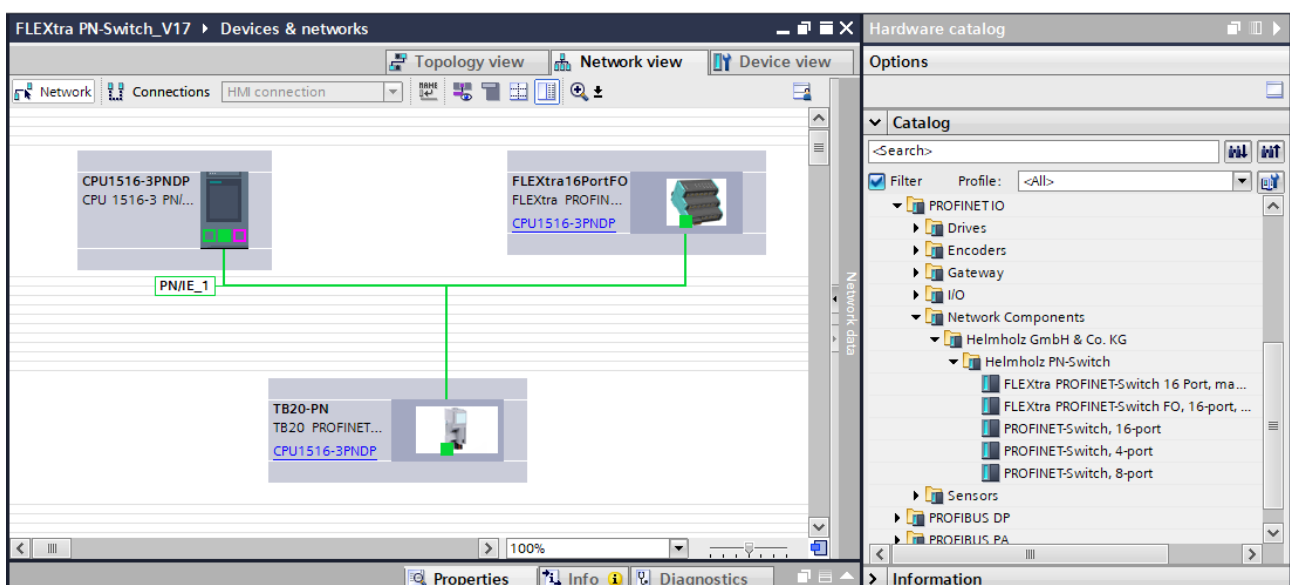


Install the GSDML file "GSDML-V2.41-Helmholz-FX-PN-Switch-FO-...XML" via the TIA Portal menu "Options" / "Manage general station description files (GSD)".



### 4.2 Setup in the hardware-configuration

After installation, the FLEXtra PROFINET-Switch FO is listed in the hardware catalog under "Other field devices → PROFINET IO → Network Components → Helmholz GmbH & Co. KG → Helmholz PN-Switch" in the hardware catalog. Insert the "FLEXtra PROFINET-Switch FO, 16 port" device into the project and connect it to your PROFINET network.



By calling up the object properties, you must give the FLEXtra PROFINET switch a unique PROFINET name in the project and check the IP address for plausibility.



NOTE

*The real device must later be assigned the same name as in the project.*

**FLEXtra16PortFO [FLEXtra PROFINET-Switch FO, 16-port, managed...]** Properties Info Diagnostics

**General** IO tags System constants Texts

**General**

Name: **FLEXtra 16PortFO**

Author: cabo

Comment:

Rack: 0

Slot: 0

**Catalog information**

Short designation: FLEXtra PROFINET-Switch FO, 16-port, managed, 1 GBit

Description: FLEXtra PROFINET-Switch FO, 16-port, managed, 1 GBit, 12x RJ45, 4x SFP, MRP client, supports Conformance Class A,B

### 4.3 Setup of SFP modules

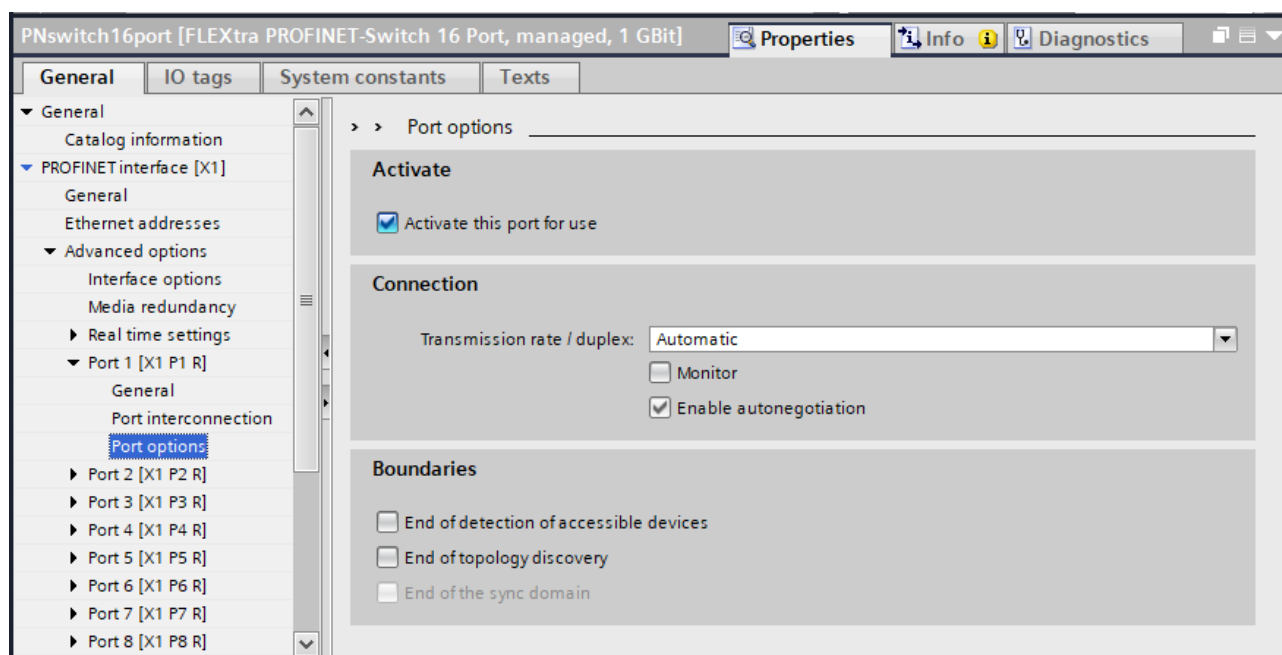
The required SFP modules can be preconfigured for SFP ports 13- 16 in the configuration. The Helmholtz SFP modules (see page 8) or an entry for any other SFP module ("Gen\_SFP\_xxx") are available.

| Device overview     |      |          |           |           |                                 |               |          |  |
|---------------------|------|----------|-----------|-----------|---------------------------------|---------------|----------|--|
| Module              | Rack | Slot     | I address | Q address | Type                            | Article no.   | Firmware |  |
| FLEXtra 16PortFO    | 0    | 0        | 11...27   | 0...2     | FLEXtra PROFINET-Switch FO, ... | 700-856-12F41 |          |  |
| PN-IO               | 0    | 0 X1     |           |           | FLEXtra 16PortFO                |               |          |  |
| Port 1              | 0    | 0 X1 P1  |           |           | Port 1                          |               |          |  |
| Port 2              | 0    | 0 X1 P2  |           |           | Port 2                          |               |          |  |
| Port 3              | 0    | 0 X1 P3  |           |           | Port 3                          |               |          |  |
| Port 4              | 0    | 0 X1 P4  |           |           | Port 4                          |               |          |  |
| Port 5              | 0    | 0 X1 P5  |           |           | Port 5                          |               |          |  |
| Port 6              | 0    | 0 X1 P6  |           |           | Port 6                          |               |          |  |
| Port 7              | 0    | 0 X1 P7  |           |           | Port 7                          |               |          |  |
| Port 8              | 0    | 0 X1 P8  |           |           | Port 8                          |               |          |  |
| Port 9              | 0    | 0 X1 P9  |           |           | Port 9                          |               |          |  |
| Port 10             | 0    | 0 X1 P10 |           |           | Port 10                         |               |          |  |
| Port 11             | 0    | 0 X1 P11 |           |           | Port 11                         |               |          |  |
| Port 12             | 0    | 0 X1 P12 |           |           | Port 12                         |               |          |  |
| SFP_MM_LC_500       | 0    | 0 X1 P13 |           |           | SFP_MM_LC_500                   | 700-998-1AD01 |          |  |
| SFP_SM_LC_10        | 0    | 0 X1 P14 |           |           | SFP_SM_LC_10                    | 700-997-1AM01 |          |  |
| Gen_SFP_1000Base_LX | 0    | 0 X1 P15 |           |           | Gen_SFP_1000Base_LX             |               |          |  |
|                     | 0    | 1 P16    |           |           |                                 |               |          |  |

If the Helmholtz SFP modules are configured, the FLEXtra PROFINET switch checks whether exactly the configured SFP module has been plugged into the specified port. If an SFP module is missing or an SFP module of a different type is plugged, a diagnosis is triggered. Thus a wrong configuration or a wrong cabling can be detected easily.

## 4.4 Setting the port properties

Each port of the PROFINET switch can be individually configured.



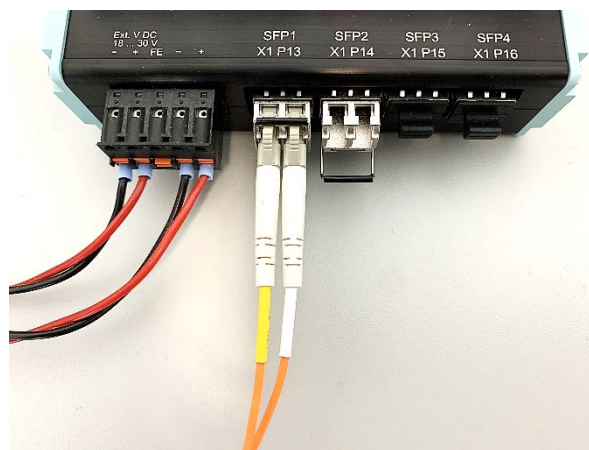
|                                                                                        |                                                                                                                                                                                                                                                       |
|----------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| “Activate this port”                                                                   | The port can be switched off here. This option is recommended when the port should not be used. Unauthorized trespass into the network is prevented.                                                                                                  |
| Transmission rate / duplex<br>“Automatic”                                              | The port synchronizes itself automatically with the communication partner (auto-negotiation).                                                                                                                                                         |
| Transmission rate / duplex<br>“TP 100 Mbps full duplex”<br>„TP 1000 Mbit/s Vollduplex“ | Fixed presetting of the transmission rate.<br>The option "TP 100 Mbit/s full duplex" is recommended when connecting 100 Mbit/s PROFINET-IO devices.                                                                                                   |
| Monitor                                                                                | Send a diagnosis by Link Down                                                                                                                                                                                                                         |
| Enable autonegotiation                                                                 | Automatic recognition of the transmission speed and the cable type (cross or patch cable)                                                                                                                                                             |
| End of detection of accessible devices                                                 | The DCP telegrams for recording accessible devices are not forwarded from this port. Subscribers behind this port are no longer displayed under "Accessible subscribers" in the topology. Users behind this port can no longer be reached by the CPU. |
| End of topology discovery                                                              | LLDP frames for topology discovery are not forwarded on this port.                                                                                                                                                                                    |

## 4.5 Use of SFP modules

Up to four SFP transceivers can be plugged into the FLEXtra PROFINET switch FO (SFP1 - SFP4). Each SFP transceiver is a separate port in the switch (ports 13 - 16).

The FLEXtra PROFINET Switch FO has no manufacturer lock-in, i.e. SFP modules from any manufacturer can be used (see below for restrictions).

However, since there are a large number of manufacturers and SFP transceivers on the market, we cannot provide a functional guarantee for all transceivers.



Helmholz offers the following SFP transceiver modules tested with the FLEXtra PROFINET Switch FO:

700-997-1AM01 SFP Transceiver 1000 Mbps, single mode 1310 nm, LC-Anschluss, up to 10 km

700-997-1AN01 SFP Transceiver 1000 Mbps, single mode 1310 nm, LC-Anschluss, up to 40 km

700-998-1AD01 SFP Transceiver 1000 Mbps, multimode 850 nm, LC-Anschluss, up to 500 m

700-998-1AG01 SFP Transceiver 1000 Mbps, multimode 1310 nm, LC-Anschluss, up to 2 km

Please ensure that an SFP transceiver with the same technical data is used on the opposite side of the fiber optic connection.



*The FLEXtra PROFINET switch currently only supports SFP transceivers with a transmission speed of 1000Mbit/s.*

ATTENTION

*The FLEXtra PROFINET switch FO does not support SFP+ transceivers.*

To plug in a SFP transceiver, the protective cap on the SFP slot must be removed. Please keep the protective cap in case the SFP transceiver is removed again. The protective cap prevents dirt from contaminating the empty SFP slot, which could lead to malfunctions.



NOTE

*SFP transceivers can also be plugged in when the FLEXtra PROFINET switch FO is powered and the other ports are in operation. The switch automatically detects newly inserted SFP modules and puts them into operation.*

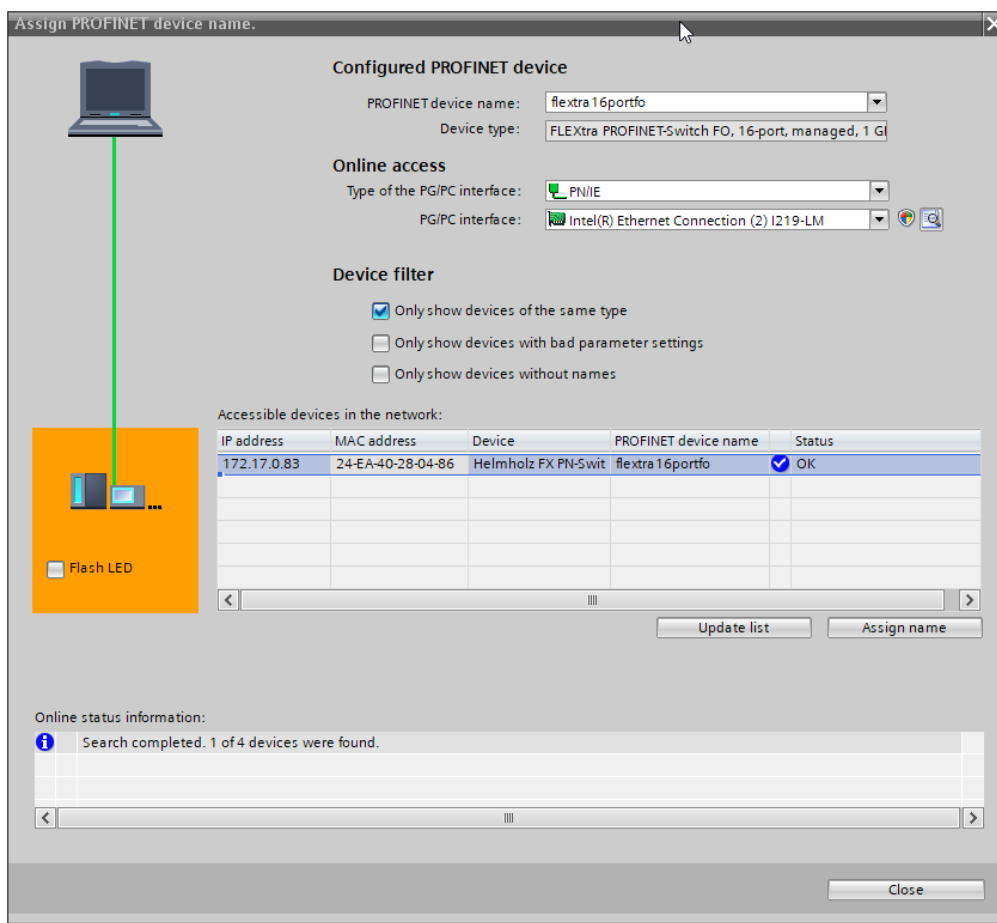
The port properties correspond to those of the RJ45 ports (see page 7). However, currently only 1000Mbit/s can be used as transmission speed for SFP port and autonegotiation is not available for FO.

## 4.6 Assign the PROFINET switch a name

When the configuration of the FLEXtra PROFINET-Switch FO has been completed in the hardware configurator of the engineering tool, it can be loaded into the PLC.

In order that the FLEXtra PROFINET-Switch FO can be found by the PROFINET controller, the PROFINET device name must be assigned to the PROFINET switch. To this purpose, use the function “Assign device name”, which you can access in the Online menu with the right mouse button when the PROFINET switch is activated.

With the “Update list” button, the network can be browsed for PROFINET participants. The PROFINET device name can be assigned to the device with “Assign name”.



The clear identification of the FLEXtra PROFINET switch is ensured here by the MAC address of the device. The MAC address of the device can be found on the device front of the FLEXtra PROFINET switch.

If the PROFINET switch has been assigned the correct PROFINET name, it is recognized by the PLC and configured. If configuration has taken place correctly, the PROFINET “BF” LED is off.

The Helmholz IPSet tool, which can be downloaded at no charge from the Helmholz website, can also be used to set the PROFINET name. Scan the following QR code to download the IPSet tool:

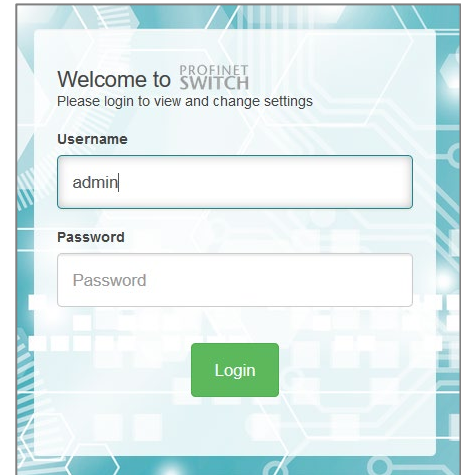


## 4.7 Further configuration and diagnosis via the web interface

Via the web interface, the status of the PROFINET switch can be queried and further functions can be configured. Furthermore, a firmware update can be performed via the web interface.

The web interface can be operated as soon as the device has a network configuration. The IP address of the device must be entered as URL.

In the following login dialog the username is "admin" and the password is the serial number of the PROFINET switch which can be read at the device side. For the first login the default password must be changed.



Welcome to PROFINET SWITCH  
Please login to view and change settings

Username  
admin

Password  
Password

Login

### 4.7.1 Port Status

On the start page after login, the status of all ports is displayed as an overview:

Port Status Overview Show all Hide all

|                                 |                                 |                                 |                                 |
|---------------------------------|---------------------------------|---------------------------------|---------------------------------|
| <b>Port 1</b>                   | <b>Port 2</b>                   | <b>Port 3</b>                   | <b>Port 4</b>                   |
| Status: Link up, 1000 Mbps      | Status: Link up, 100 Mbps       | Status: Link down, -            | Status: Link down, -            |
| Peer/s: 1 Peer Connected        | Peer/s: 1 Peer Connected        | Last peer/s:                    | Last peer/s:                    |
| VLAN: <a href="#">Show Info</a> | VLAN: <a href="#">Show Info</a> | VLAN: <a href="#">Show Info</a> | VLAN: <a href="#">Show Info</a> |
| Netload: Rx 0.00%<br>Tx 0.00%   | Netload: Rx 0.03%<br>Tx 0.04%   | Netload: Rx 0.00%<br>Tx 0.00%   | Netload: Rx 0.00%<br>Tx 0.00%   |
| Error packets: -                | Error packets: -                | Error packets: -                | Error packets: -                |
| More info:  1000 Mbps           | More info:                      | More info:                      | More info:                      |
| Port 5                          | Port 6                          | Port 7                          | Port 8                          |
| Port 9                          | Port 10                         | Port 11                         | Port 12                         |
| Port 13 (SFP)                   | Port 14 (SFP)                   | Port 15 (SFP)                   | Port 16 (SFP)                   |

### 4.7.2 SFP-Port Information

In the "Switch/SFP Status" menu, the information read out by the switch from the SFP transceiver can be viewed.

| System -                                               | Agent -                  | Switch -                                                                                                                                                                                                         | Statistics -        |
|--------------------------------------------------------|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| <b>SFP Module Information</b>                          |                          | <ul style="list-style-type: none"><li>Port Status</li><li>Port Mirroring</li><li>ARP Table</li><li>LLDP</li><li>DCP</li><li>CoS</li><li>MAC Table</li><li><b>SFP Status</b></li><li>VLAN Configuration</li></ul> |                     |
| <b>Port 13 - Module Plugged, Information Available</b> |                          |                                                                                                                                                                                                                  |                     |
| Vendor Name                                            | CORETEK                  | Temperature [°C]                                                                                                                                                                                                 | 43.281              |
| Part Number                                            | CT-1250NSP-SB1LE         | Voltage [V]                                                                                                                                                                                                      | 3.329               |
| Revision                                               | 0000                     | Tx Bias [mA]                                                                                                                                                                                                     | 3.664               |
| Serial Number                                          | CF0060U8100007           | Tx Power [mW]                                                                                                                                                                                                    | 0.218               |
| Transceiver Type                                       | SFP/SFP+/SFP28 and later | Tx Power [dBm]                                                                                                                                                                                                   | -6.6000000000000005 |
| Connector Type                                         | LC (Lucent Connector)    | Rx Power [mW]                                                                                                                                                                                                    | 0.000               |
| Signaling Rate [Mbit/s]                                | 1300                     | Rx Power [dBm]                                                                                                                                                                                                   | -Infinity           |
| Max Link Length (50 um)[m]                             | 550                      |                                                                                                                                                                                                                  |                     |
| Max Link Length (62.5 um)[m]                           | 270                      |                                                                                                                                                                                                                  |                     |

Further information about the web interface can be taken from the manual.

## 5 Diagnosis via LEDs

The two system LEDs "PWR", "RUN" and the two PROFINET LEDs "BF" and "SF" indicate the system status of the switch. After power-on or a reset, all 4 LEDs are permanently on for approx. 5 seconds to indicate the start-up process.

The LEDs P1-P16 show the status of the ports.



### 5.1 System LEDs

|     |                                          |                                           |
|-----|------------------------------------------|-------------------------------------------|
| PWR | Off                                      | No power supply or device defective       |
|     | On                                       | Device is correctly supplied with voltage |
| RUN | On                                       | Device is ready to operate                |
|     | Flashing                                 | Device is starting up                     |
|     | Flashing synchronous with BF and SF LED  | PROFINET function device identification   |
| BF  | On                                       | Bus error, no configuration               |
|     | Flashing synchronous with RUN and SF LED | PROFINET function device identification   |
| SF  | On                                       | System error, network status in error     |
|     | Flashing synchronous with RUN and BF LED | PROFINET function device identification   |

### 5.2 Ethernet LEDs P1 – P12 (RJ45)

|        |          |                                                                             |
|--------|----------|-----------------------------------------------------------------------------|
| Off    |          | No network cable connected or network cable defective or partner device off |
| Green  | On       | Ethernet connection with 10/100 MBps                                        |
|        | Flashing | Ethernet communication with 10/100 Mbps                                     |
| Orange | On       | Ethernet connection with 1000 Mbps                                          |
|        | Flashing | Ethernet communication with 1000 Mbps                                       |

### 5.3 FO LEDs P13 – P16 (SFP1-4)

|        |          |                                                                                   |
|--------|----------|-----------------------------------------------------------------------------------|
| Off    |          | No SFP module plugged, FO connection not possible or connected device not present |
| Orange | On       | FO connection with 1000 Mbps                                                      |
|        | Flashing | FO communication with 1000 Mbps                                                   |

## 6 Function of buttons

The "RST" button triggers an immediate restart of the PROFINET switch in which all stored settings are retained. A restart is indicated by the permanent illumination of all 4 status LEDs.

With the "FCN" button the PROFINET switch can be reset to factory settings. If the "FCN" button is pressed during the switch start-up phase or after a reset, the green "PWR" and the orange "SF" LEDs light up continuously. This indicates that the switch has loaded the factory setting. After releasing the button, the switch is restarted.

## 7 Technical data

|                                   |                                                                                                                                                                                                                      |
|-----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Order number                      | 700-856-12F41                                                                                                                                                                                                        |
| Name                              | FLEXtra PROFINET-Switch FO, 16-Port, managed, 10/100/1000Mbit                                                                                                                                                        |
| Scope of delivery                 | FLEXtra PROFINET-Switch FO, 16-Port with power supply plug                                                                                                                                                           |
| Dimensions (D x W x H)            | 78 x 125 x 111 mm                                                                                                                                                                                                    |
| Weight                            | Ca. 550 g                                                                                                                                                                                                            |
| PROFINET/Ethernet interface (X1)  |                                                                                                                                                                                                                      |
| Connection                        | 12 x RJ45<br>4 x Fiber Optic (FO) for SFP Transceiver modules, Single mode or Multimode integrated Switch                                                                                                            |
| Protocol                          | PROFINET IO Device as defined in IEC 61158-6-10                                                                                                                                                                      |
| Transmission rate                 | RJ45: 10/100/1000 Mbps<br>SFP: 1000 Mbps                                                                                                                                                                             |
| Features                          | PROFINET Conformance Class B ( <i>in Preparation</i> ),<br>Media Redundancy (MRP),<br>automatic addressing (DCP), topology detection (LLDP),<br>diagnostic alarms,<br>VLAN, SNMP V2, Port-Mirroring, Port statistics |
| Digital IO                        |                                                                                                                                                                                                                      |
| Inputs                            | 4, type 3 acc. DIN EN 61131-2                                                                                                                                                                                        |
| Outputs                           | 2, 500mA 24V DC, electronic fused                                                                                                                                                                                    |
| Status indicator                  | 4 LEDs function status, 16 LEDs Ethernet-Status (two-colored)                                                                                                                                                        |
| Voltage supply                    | 2x DC 24 V, 18 – 30 V DC, redundant                                                                                                                                                                                  |
| Power consumption                 | max. 400 mA with DC 24 V                                                                                                                                                                                             |
| Current draw                      | Max. 9,6 W                                                                                                                                                                                                           |
| Ambient conditions                |                                                                                                                                                                                                                      |
| Installation position             | Any                                                                                                                                                                                                                  |
| Ambient temperature               | -40 °C ... +75 °C                                                                                                                                                                                                    |
| Transport and storage temperature | -40 °C ... +85 °C                                                                                                                                                                                                    |
| Relative air humidity             | 95 % r H without condensation                                                                                                                                                                                        |
| Protection rating                 | IP20                                                                                                                                                                                                                 |
| REACH & RoHS                      | Yes                                                                                                                                                                                                                  |





*The contents of this Quick Start Guide have been checked by us so as to ensure that they match the hardware and software described.*

*However, we assume no liability for any existing differences, as these cannot be fully ruled out. The information in this Quick Start Guide is, however, updated on a regular basis. When using your purchased products, please make sure to use the latest version of this Quick Start Guide, which can be viewed and downloaded on the Internet from [www.helmholz.de](http://www.helmholz.de).*

*Our products contain open source software, among others. This software is subject to the respectively relevant license conditions. We can send you the corresponding license conditions, including a copy of the complete license text together with the product. They are also provided in our download area of the respective products under [www.helmholz.de](http://www.helmholz.de). We also offer to send you or any third party the complete corresponding source text of the respective open source software for an at-cost fee of 10.00 Euro as a DVD upon request. This offer is valid for a period of three years, starting from the date of product delivery.*

*Our customers are important to us, we are happy to receive suggestions and ideas for improvement. If you have any questions regarding the use of the product, please contact Helmholtz Support by phone or send an e-mail to [support@helmholz.de](mailto:support@helmholz.de).*

*All trademarks shown or mentioned in this document are the property of their respective owners or manufacturers. The representation and naming serve exclusively to explain the use and setting options of the products documented here.*

