# Baumer
Passion for Sensors

EN-US

## Operating Manual

CM50I.PN
IO-Link Master with PROFINET

**EN-US**

# 1        About this document

## 1.1        Purpose and scope of application

This document instructs the technical staff of the machine manufacturer or machine operator on the safe use of the described devices.

It does not include instructions on the safe use of the machine in which the devices are integrated. Information on this is found in the operating manual of the machine.

- Read this chapter carefully before you start working with the device.
- Study the documentation carefully before device commissioning.
- Store the manual in a place that is accessible to all users at all times for the entire service life of the device.

Understanding the present manual requires general knowledge about automation technology. In addition, planning and using automation systems requires technical knowledge which is not included in this manual.

## 1.2        Applicable documents

- Available for download at www.baumer.com:
  - Instruction manual
  - Data sheet
  - Device description file
  - EU Declaration of Conformity
  - Certificates and Approvals
- Attached to product:
  - General information sheet (11042373)

## 1.3        Labels in this manual

| Identifier | Usage | Example |
|---|---|---|
| ***Dialog element*** | Indicates dialog elements. | Click **OK**. |
| *Unique name* | Indicates the names of products, files, etc. | *Internet Explorer* is not supported in any version. |
| `Code` | Indicates entries. | Enter the following IP address: `192.168.0.250` |

## 1.4 Warnings in this manual

Warnings draw attention to potential personal injury or material damage. The warnings in this manual indicate different hazard levels:

| Symbol | Warning term | Explanation |
|---|---|---|
| ⚠ | DANGER | Indicates an imminent potential danger with high risk of death or serious personal injury if not being avoided. |
|  | WARNING | Indicates potential danger with medium risk of death or (serious) personal injury if not being avoided. |
|  | CAUTION | Indicates a danger with low risk, which could lead to light or medium injury if not avoided. |
|  | NOTE | Indicates a warning of material damage. |
| 💡 | INFO | Indicates practical information and tips that enable optimal use of the devices. |

## 1.5 Scope of delivery

Delivery includes:

- 1 x *CM50I* device
- 1 x instruction manual - multilingual
- 15 x designation label

## 1.6 Trademarks

The present documentation uses the trademarks of the following companies and institutions:

| | |
|---|---|
| *PROFINET/PROFINET IO* | PROFIBUS Nutzerorganisation e.V. (PNO) |
| *EtherNet/IP* | ODVA, Inc. |
| *IO-Link* | c/o PROFIBUS Nutzerorganisation e.V. (PNO) |
| *STUDIO 5000 LOGIX DESIGNER* | Rockwell Automation Inc. |

## 1.7 Software-Tools

| Applied software |
|---|
| *Totally Integrated Automation (TIA) Portal* of Siemens AG |
| *Studio5000, Rockwell Automation Inc* |
| *Baumer Sensor Suite (BSS)* |

## 1.8         Specifications

| Specification | Link |
|---|---|
| *GSDML Technical Specification for PROFINET IO*<br>Version 2.34 of 08.2017 | www.profibus.com |
| *PROFINET*<br>Specification V2.4 | www.profibus.com |
| *IO-Link*<br>Version 1.1.2 of 07.2013 | www.io-link.com |

**INFO**
The features of IO-Link specification V 1.1.3 are supported.

# 2 General information

**Intended use**

This product is a precision device and serves the detection of items, objects, or physical measurement variables and the preparation or provision of measured values as electric variables for the higher-level system.

Unless specifically labeled, this product may not be used in explosive environments.

**Commissioning**

Assembly, installation, and calibration of this product may only be performed by a specialist.

**Installation**

Only use the fasteners and fastener accessories intended for this product for installation. Outputs not in use must not be wired. Unused wires of cable outputs must be insulated. Do not go below the permissible cable bending radii. Disconnect the system from power before the product is electrically connected. Use shielded cables to prevent electro-magnetic interference. If the customer assembles plug connections on shielded cables, then EMC-version plug connections should be used and the cable shield must be connected to the plug housing across a large surface area.

**Disposal (environmental protection)**



Used electrical and electronic devices may not be disposed of in household waste. The product contains valuable raw materials that can be recycled. Therefore dispose of this product at the appropriate collection point. For additional information visit www.baumer.com.

# 3 Safety

## 3.1 General safety instructions

> ⚠ **DANGER**
>
> **High electrical voltage in the machine/system.**
>
> Death or severe injuries resulting from electric shock.
>
> a) While working on the machine/devices, comply with the five safety rules of electrical engineering.

**Protection of persons and material assets**

- According to DIN VDE 0105-100 - Operation of electrical systems - Part 100: General definitions

**The 5 Safety Rules**

Protect against *high electrical voltage*

1. Switch off the device.

2. Secure against unwanted switchon.

3. Ensure that each pole is not live respectively under voltage.

4. Grounding and short-circuiting.

5. Cover or block neighboring parts under voltage.

**Qualified personnel**

The appliance may only be installed, commissioned and operated by qualified personnel who have received safety training.

Qualified means fulfilling the following requirements:

- the personnel underwent suitable training in electrical engineering,
- the personnel is familiar with the safety standards which are common practice in automation engineering,
- the personnel has access to the Operating instructions and the present Instruction Manual,
- are familiar with the safety standards of automation technology,
- the personnel is familiar with the related and applicable basic and technical standards.

**Intended use of the device**

- During project engineering, installation, commissioning, operation, and testing of the device comply with the existing regulations on accident prevention as well as health and safety at work.
- Check material resistance against aggressive media.

> 💡 **INFO**
>
> Any manipulation/modification of hardware and software only qualified *Baumer* personnel, except for firmware updates.

**INFO**

Only use a power unit of max. 60 V DC respectively 25 V AC in single fault condition. Power supply must comply with *SELV* or *PELV*.

**Protective measures by the machine operator**

- Follow the instructions in this manual.
- Observe the specifications and operating instructions of each connected component.
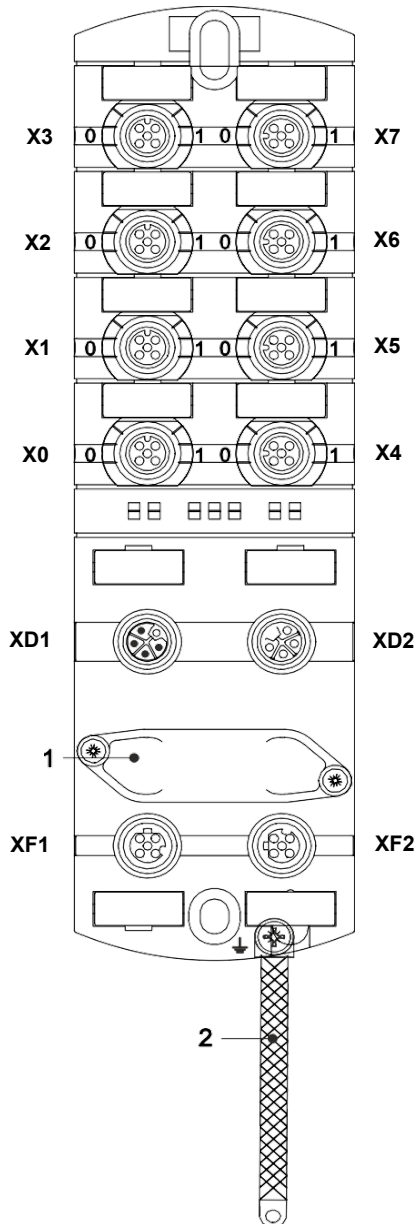
# 4    Description

## 4.1    Device

**CM50I.PN**

- *PROFINET* compact module, plastic
- *PROFINET* encoding via M12 -D- encoding
- Power via M12 L- encoding, 5-pin
- 8x M12 slots, digital inputs/outputs/8 IOL, A-encoding

### 4.1.1 Device structure



| | |
|---|---|
| **X0 ... X7** | Digital I/O or IO-Link M12 A-encoding |
| 0 | Channel corresponds to pin 4 |
| 1 | Channel corresponds to pin 2 |
| | Examples: |
| | Channel **0**2 = **Pin 4** port X2 |
| | Channel **1**6 = **Pin 2** port X6 |
| **XD1** | Power supply POWER IN, M12 L-encoding 5-pin |
| **XD2** | Power supply POWER OUT, M12 L-encoding 5-pin |
| **1** | Rotary switch |
| **XF1** | Ethernet Port 1, M12 D encoding |
| **XF2** | Ethernet Port 2, M12 D encoding |
| **2** | Ground strap for functional ground |
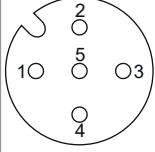
### 4.1.2 Product name nomenclature

The nomenclature is based on a scheme indicating the product functionality.
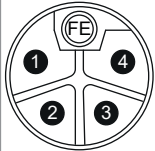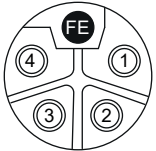
| | |
|---|---|
| **CM50I** | Product family |
| **PN** | Industrial Ethernet Protocol<br>▪ PROFINET |

### 4.1.3 Pin assignment
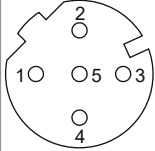
**M12 female connector A-encoding**

| X0 ... X7 | | |
|---|---|---|
| | Pin 1 | 24V Us |
| | Pin 2 | DIO / 24V Ua |
| | Pin 3 | 0V |
| | Pin 4 | C/Q |
| | Pin 5 | 0V |

**M12 male/female connector, POWER IN/OUT**

| XD1 | | | XD2 |
|---|---|---|---|
| | Pin 1 | 24V Us | |
| | Pin 2 | 0V | |
| | Pin 3 | 0V | |
| | Pin 4 | 24V Ua | |
| | Pin 5 | FE | |

**M12 female connector D-coded port 1 / port 2**

| XF1 / XF2 | | |
|---|---|---|
| | Pin 1 | Tx + |
| | Pin 2 | Rx + |
| | Pin 3 | Tx - |
| | Pin 4 | Rx - |
| | Pin 5 | n.a. |
| | Shield | FE |

### 4.1.4 Display elements
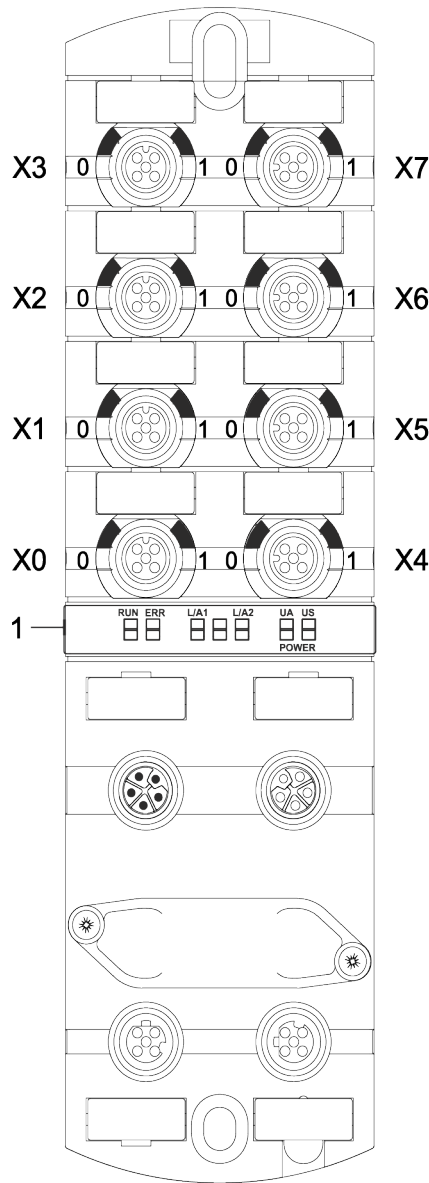
**X0 ... X7** LED digital I/O or IO-Link

**1** LED BUS RUN

LED CfgF

LED LNK1/ACT1

LED LNK2/ACT2

LED Status (ST)

LED POWER UA

LED POWER US

**Also see about this**

📄 LED indicator [▶ 115]

## 4.2 IO-Link

Within the IO-Link standard, smart devices at sensor and actuator level connect to automation systems.

Communication takes place between the IO-Link master and one or more IO- Link peripheral devices. Each port connects a single device. IO-Link is a point-to-point communication standard, not a fieldbus system.

The IO-Link Master acts as interface between the superior fieldbus level and the IO-Link devices.
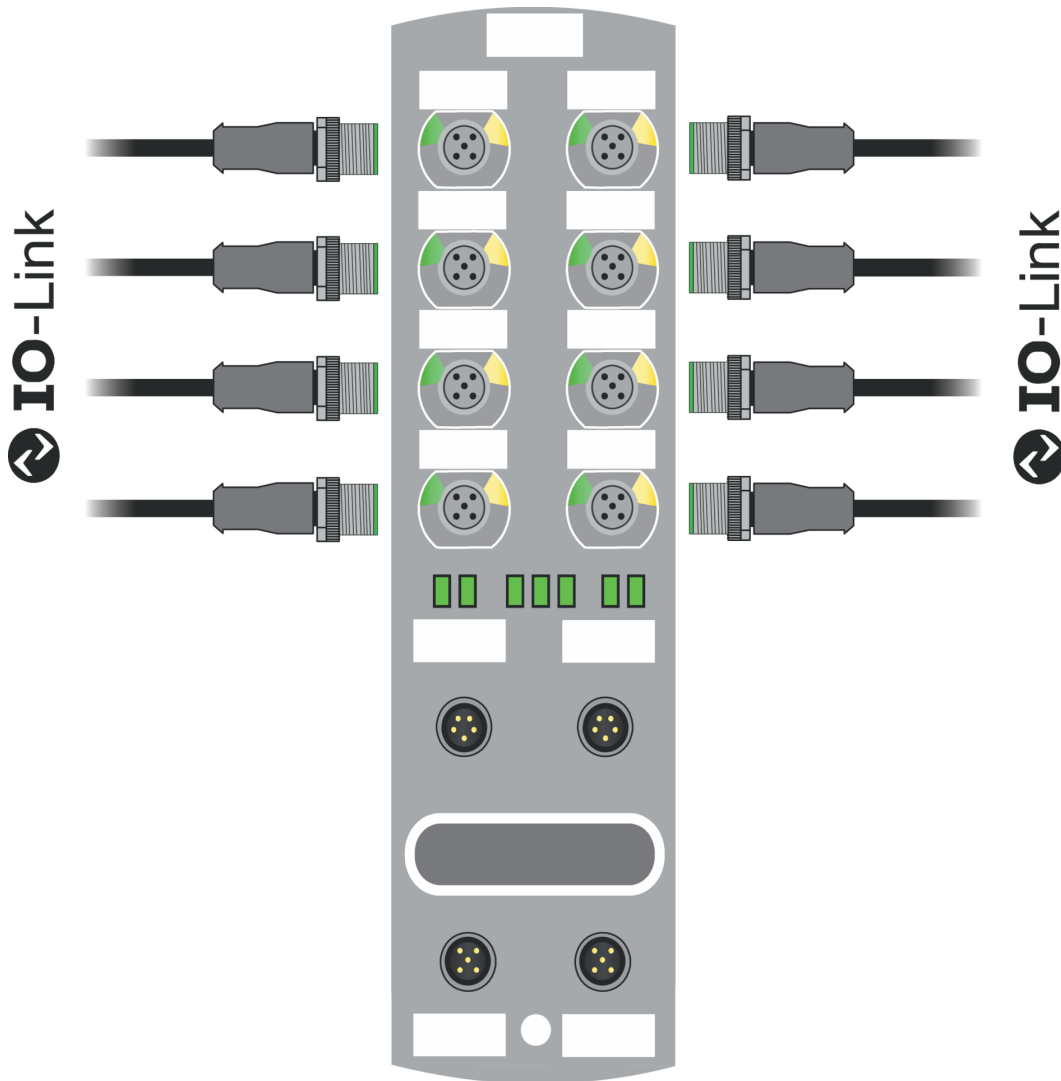


*Ill. 1:* IO-Link

**IO-Link-Mode (IOL)**

The IO-Link communication (C/Q) is assigned to pin 4, for connection and use of an IOL device.

Acyclic data may serve for writing device parameters of a IO-Link device or for reading parameters, measured values and diagnostic data from a IO-Link device.

**IO-Link CALL**

The following tasks can be performed:

- Parameterization/configuration of IO-Link devices during operation.

- Diagnostic of IO-Link devices by reading diagnostic parameters.
- Execute IO-Link port functions.
- Back-up/recovery of IO-Link device parameters.

IO-Link device data are uniquely addressed via index and sub-index.

Such data can be accessed with the so-called IOL CALL block. Usually, it is provided as data handling block by the PLC manufacturer.

# IO-Link  CALL
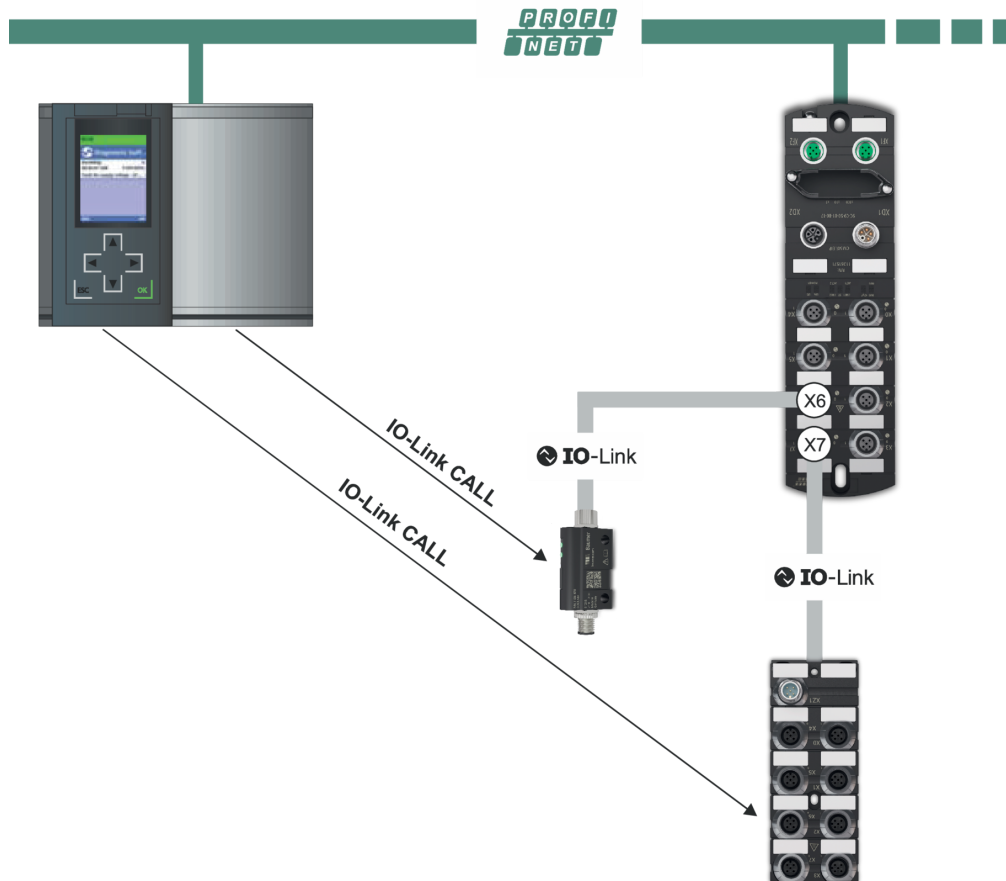


*Ill. 2:* IO-Link CALL

**Also see about this**

**4.2.1**          **Data storage**

**INFO**

Data storage is only available for IO-Link devices compliant to IO-Link version V1.1 and higher.

- Data storage allows for replacing IO-Link devices without the need for new configuration.
- IO-Link master and IO-Link device save the parameterization of the previous device.
- Data storage synchronizes the data memories of IO-Link master and IO-Link device.
- Once the IO-Link device has been replaced, the master will write the saved parameters into the new device, provided data storage is enabled in the IO- Link Master.
- This allows for application restart without parameterization from scratch.
- When replacing the IO-Link master, the new Master will read parameterization out of the IO-Link device and save it. Doing so requires the data storage option "Save and restore" being enabled.
- This allows for application restart without parameterization from scratch.
- For data storage application, vendor ID and device ID of the connected IO-Link device must be entered in the validation settings of each IO-Link master port.
- The IO-Link port mode must be set to "Manual".
- To store the modified IO-Link device parameters again in the master, de- vice parameterization must be done via block parameterization.
    - After this, the device transmits an upload request to the Master.
    - Block parameterization can be carried out via the IO-Link device tool in the "Parameter" window and with the "Block Write Mode".
    - Optionally, block parameterization can be done by device parameter writing via web server or PLC block, e.g. Siemens IOL_Call.
    - Always terminate block parameterization with command "Parameter Download Store" ISDU Index 0x02 Subindex 0 Value 05.
- In validation/backup mode "no Device check", the saved device parameter content in the IO-Link master is deleted.

## 4.3 PROFINET IO

### 4.3.1 PROFINET IO Communication

**IEC 61784-2**

*PROFINET IO* is an open communication protocol compliant to *IEC 61784-2*. The communication protocol is based on Ethernet.

**Data exchange**

Data is exchanged between the control unit, the sol-called *PROFINET IO* Controller and the connected users called *PROFINET IO* devices.

**Communication**

Communication is based on a full-duplex Ethernet network with 100 Mbit/s or 1 Gbit/s. IO controller and IO devices communicate by Ethernet telegrams. Devices exchange data cyclically based on the provider-consumer principle. Devices function as receiver (consumer) and transmitter (provider) at the same time.

The IO controller sends output data to the IO devices and receives input data from the IO devices. The IO devices send input data and receive output data.

Other components of the communication protocol include telegrams in form of acyclic communication for parameter transfer and read/write access to the I&M data or manufacturer-specific features.

### 4.3.2 Structure of the conformance classes

**Structure**

The scope of functions of *PROFINET IO* classified in *Conformance Classes (CC)*. These classes give a clear overview of the various minimum properties. There are three conformance classes:
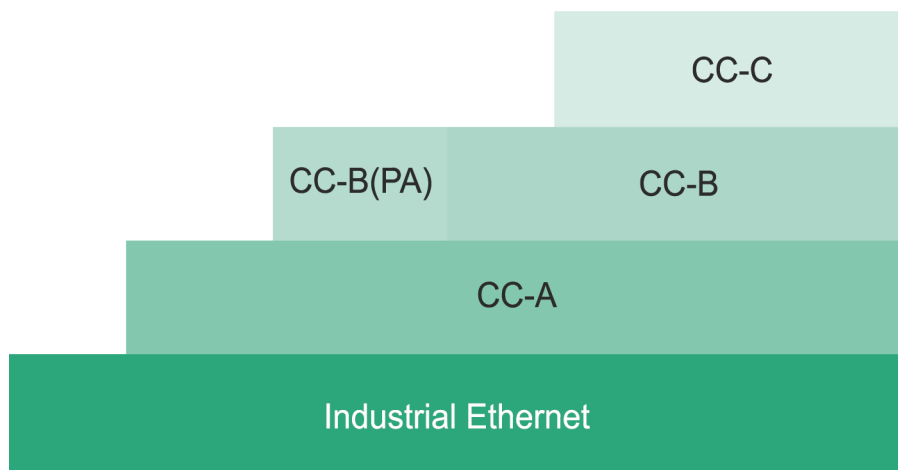


*Ill. 3:* Structure of the conformance classes

**CC-A**

**CC-A** offer basic functions for *PROFINET IO* with RT communication. Typical cycle times are 2 ms and more. Also unmanaged switches can also be used. Wireless communication is only enabled in this class.

All I *CM50I.PN* comply with the **CC-A** class.

All *Baumer* switches (unmanaged and managed) can be used.

**CC-B**

**CC-B** expands the concept by the inclusion of network diagnostics and topology information. Typical cycle times are 2 ms and more. Topology information and projected device names enable easy device exchange. The defective device can be easily exchanged by a new device with factory settings. All *CM50I.PN* comply with the **CC-B** class.

**CC-C**

**CC-C** describes the basic functions for devices with hardware-supported bandwidth reservation and synchronization (IRT communication) and hence is the basis for isochronous applications. Implementing Isochronous Real Time (IRT) in Ethernet controllers allows for update times of 31.25 µs and jitter accuracy of less than 1 µs.

### 4.3.3      Media redundancy (MRP)

The Media Redundancy Protocol (MRP) according to IEC 62439 describes the *PROFINET* redundancy with a typical reconfiguration time of <200 ms for communication paths with TCP / IP and RT frames after the occurrence of error. Failure-free operation of automation systems implies a Media Redundancy Manager (MRM) and several Media Redundancy Clients (MRC) in a ring arrangement.
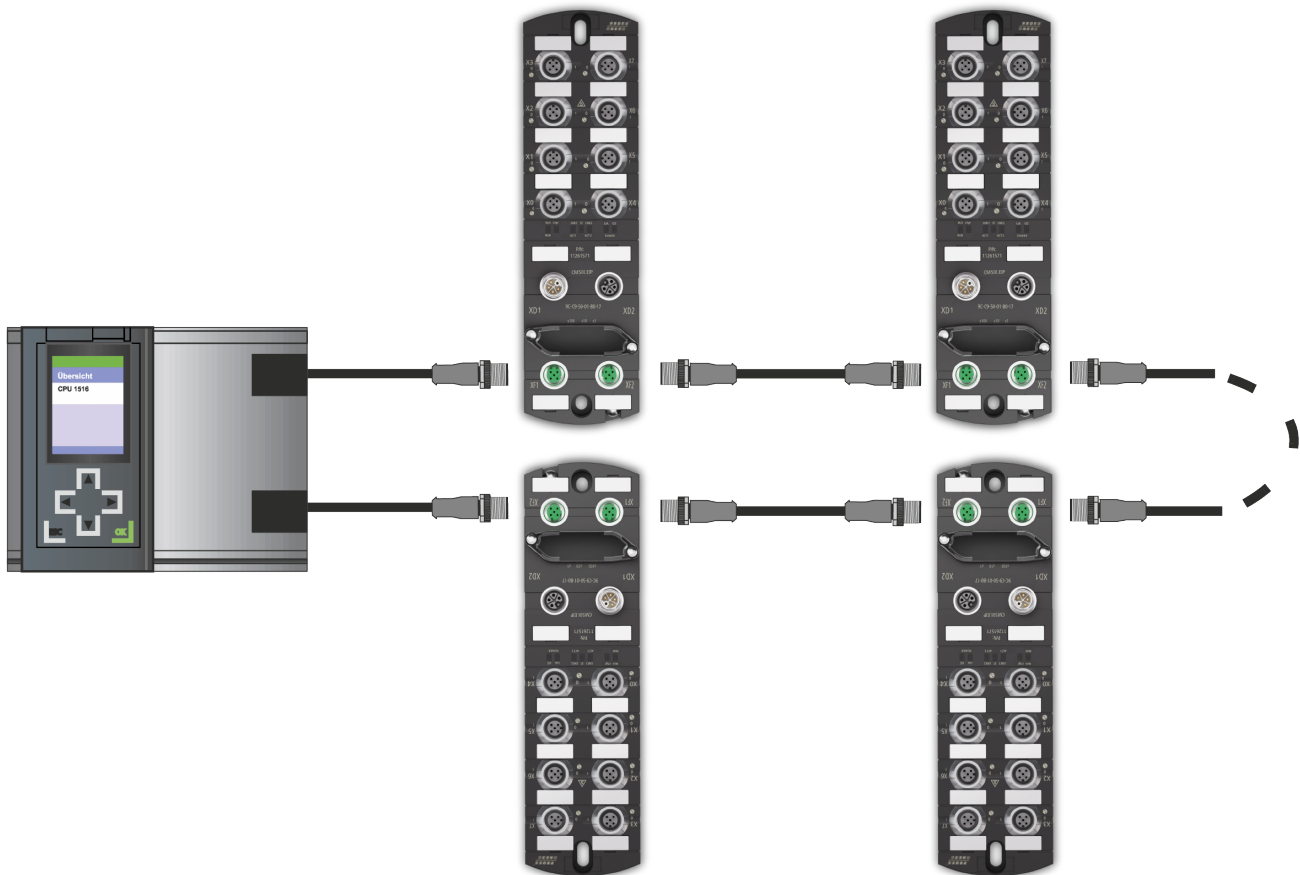


*Ill. 4:* Standard operation
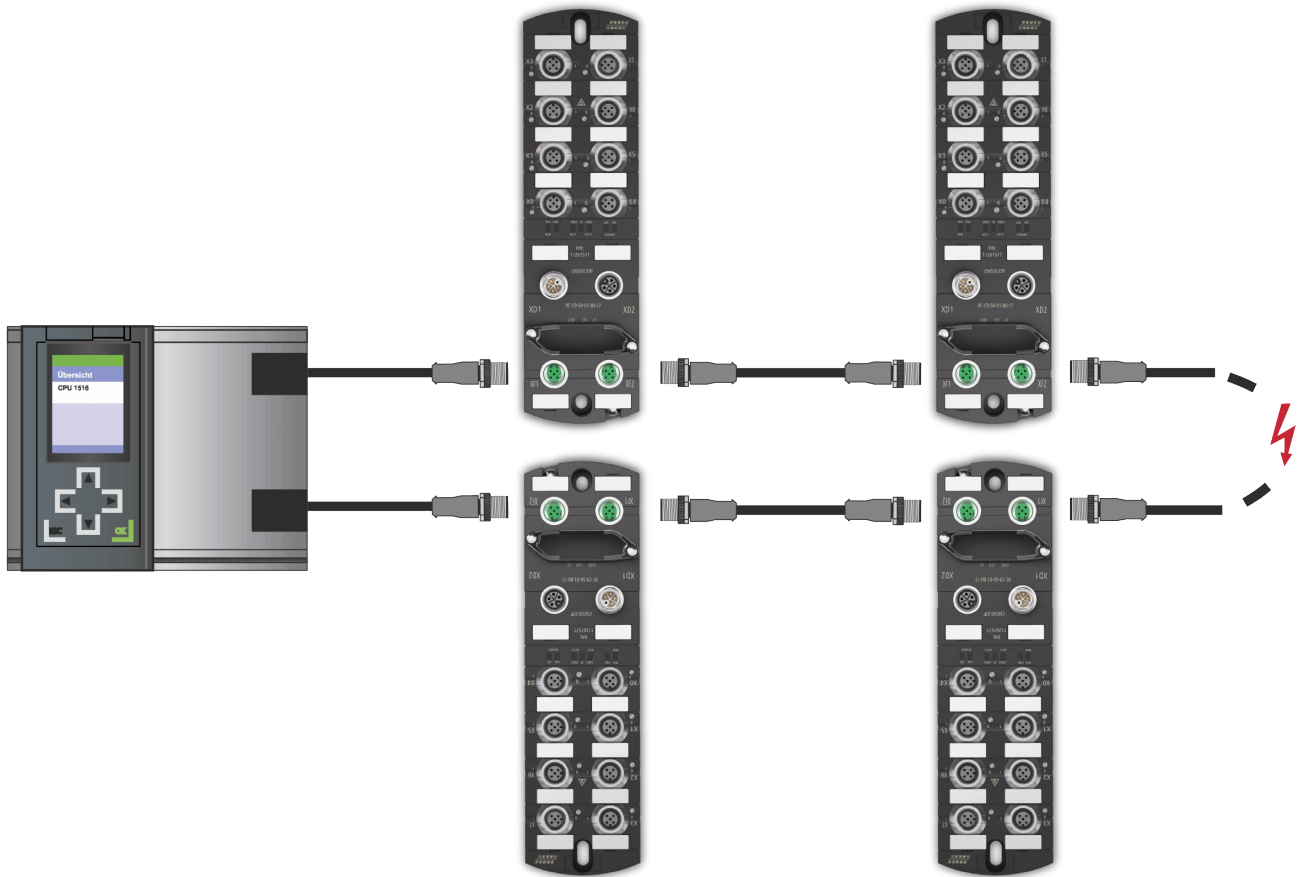
*Ill. 5:* Malfunction

**Function of Media Redundancy Manager (MRM)**

The function of a Media Redundancy Manager (MRM) is to check the operability of the ring structure specified by the configuration. This is done by cyclic transmission of telegrams. As long as the MRM is receiving the test telegrams, the ring structure is intact. The MRM uses this behavior to prevent telegram circulation and converts the ring structure into a line structure.

**Media Redundancy Clients (MRC**) are switches acting as so- called "telegram transfer hatch" and usually do not play an active role.

MRC must provide two switch ports to connect to other MRCs or the MRM in a single ring. Devices can be configured as MRC. When being interrupted from the ring, *PROFINET* communication is continued after reconfiguration.

**Also see about this**

**4.3.4**        **Isochronous-Real-Time (IRT)**

In *PROFINET* communication, the IRT concept (Isochronous-Real-Time) defines , isochronous data exchange by transmission of data frames at regular time intervals ranging from few hundred milliseconds up to four milliseconds.

The beginning of a bus cycle is adhered to with the highest precision (jitter ≤1 µs). Each of the individual time intervals in IRT communication is split into an IRT interval and an open standard interval; this requires special IRT switches.

**Communication cycle using IRT and RT**
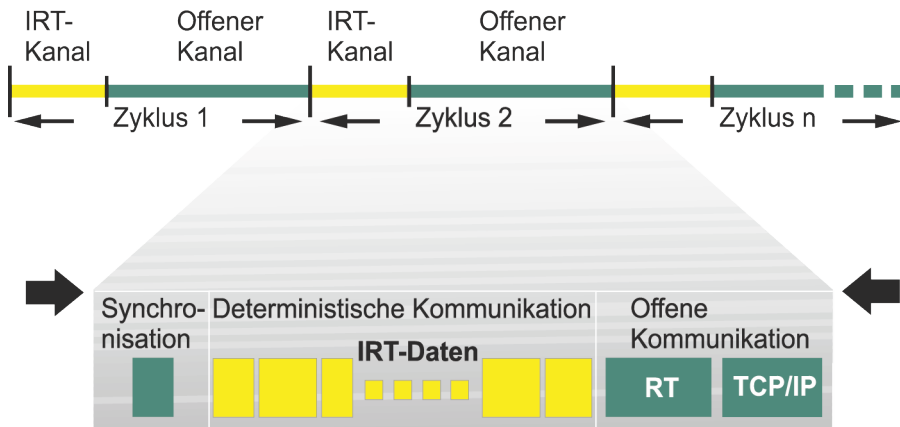


*Ill. 6:* Communication cycles split into IRT and RT

**Also see about this**

📄 Isochronous-Real-Time (IRT) configuration [▷ 88]

**4.3.5**        **I&M data**

**Identification and Maintenance (I&M)**

The I&M function is a standard of the PROFIBUS Nutzerorganisation e.V (PNO) and a prerequisite for high-performance asset management.

**Identification data**

Identification data (I data) provides device information, such as order or serial number. Sometimes, this information can be seen on the device housing. I-data is manufacturer-specific device information. They provide read access only.

**Maintenance data**

Maintenance data (M data) is system-specific information, such as installation site and date. M-data is created during projecting, written into the remanent memory of the device.

**Also see about this**

📄 I&M-Daten [▷ 72]

## 4.4        Simple Network Management Protocol (SNMP)

**SNMP** is a simplified network protocol with varied objects for monitoring the following:

1.   Network components,

2.   Remote control and configuration of network components,

3.   Error detection and error messaging.

TCP/IP based network components relate to standard RFC 1213. This standard describes the access options and structure of the corresponding objects.

**Also see about this**

📄 Simple Network Management Protocol (SNMP) [▶ 90]

## 4.5        Industrial Internet of Things (IIoT)

The device supports the following IIoT functions for industrial communication: *JSONMQTT* and OPC UA.

# 5 Technical data

## 5.1 Electrical Data

| IIoT functions | | |
|---|---|---|
| Web Interface | http:// | Yes |
| OPC UA | For IO-Link according to Companion Specification Release 1.0 | Yes |
| OPC UA | Transport | UA TCP, UA Secure Conversation, UA Binary Encoding |
| OPC UA | Minimum release interval | 100 ms |
| OPC UA | Maximum number of sessions/clients | 5 |
| JSON | JSON integration for IO-Link V1.0.0 | Yes, via REST API and MQTT |
| Energy monitoring | Current and voltage | Yes |
| Temperature monitoring | | Yes |

| Bus data | | |
|---|---|---|
| Fieldbus protocol | | PROFINET |
| Connection | | 4-pin M12, D- encoding |
| PROFINET Conformance Class | | C |
| Transmission rate | | 100 Mbit/s |
| PROFINET addressing | | Via DCP |
| Cycle time | | ≥1 ms |
| IRT | Network communication | Yes |
| | Application | No |
| MRP | Client | Yes |
| SNMP | | Yes |
| PROFINET Netload Class | | III |

| IO-Link | | |
|---|---|---|
| Operating voltage IO-Link devices | | 24 V ⎐ |
| Voltage range IO-Link devices | | 20 ... 30 V ⎐ |
| Transmission rate | | COM1 / COM2 / COM3 |
| Standardized Master Interface (SMI) | | According to IO-Link Specification V1.1.3 |
| Transmission rate recognition | | Automatic |

| **Supply** | | |
|---|---|---|
| Operating voltage US | | 24 V ☐ |
| Voltage range US | | 18 ... 30 V ☐ |
| | When using IO-Link | 20,3 ... 30 V ☐ |
| Operating voltage UA | | 24 V ☐ |
| Voltage range UA | | 18 ... 30 V ☐ |
| Sensor current US | ≤40 °C (see Derating) | ≤16 A |
| Actuator current UA | ≤40 °C (see Derating) | ≤16 A |
| Current consumption | At idle | ≤0,18 A |
| Protection against reverse polarization for US and UA | | Yes |
| Reverse polarity protection | | Yes |
| Connection | | 5-pin M12, L-encoding |
| Conductor cross-section | Current per supply ≤12 A | ≥1.5 mm2 |
| | Current per supply >12 A | ≥2.5 mm2 |

| **Input (DI)** | | |
|---|---|---|
| Sensor supply + | Per port, ≤40 °C (see Derating) | ≤2 A load Automatic start |
| Total current sensor supply | ≤40 °C (see Derating) | ≤10 A |
| Filter time | | 0 ... 15 ms + tcycle, adjustable |
| Delay time at changed signal | | 2 ... 5 ms |
| Input characteristic | EN 61131-2 | Type 1 + Type 3 |
| Short-circuit protection sensor supply | | MOSFET with current measurement |
| Connection | | 5-pin M12, A-encoding |
| Cable cross-section M12 | | ≤0.75 mm2 |
| Cable length | | ≤30 m |
| Total current | Per port | ≤4 A |

| **Output (DO)** | | |
|---|---|---|
| Output current DO (UA) | Per pin, ≤40 °C (see Derating) | ≤2 A |
| Total current outputs | ≤40 °C (see Derating) | ≤10 A |
| Switching frequency | | ≤50 Hz |
| Short-circuit protection actuator | | MOSFET with current measurement |
| Connection | | 5-pin M12, A-encoding |
| Cable cross-section M12 | | ≤0.75 mm2 |
| Cable length | | ≤30 m |
| Total current | Per port | ≤4 A |

**Derating sensor current US/ actuator current UA**
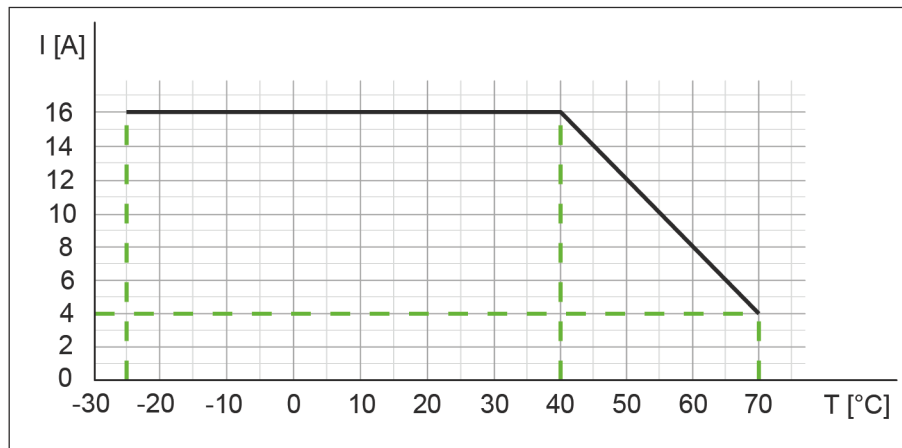


*Ill. 7:* Derating sensor current US/ actuator current UA

**Derating total current, sensor power supplies/outputs total current**
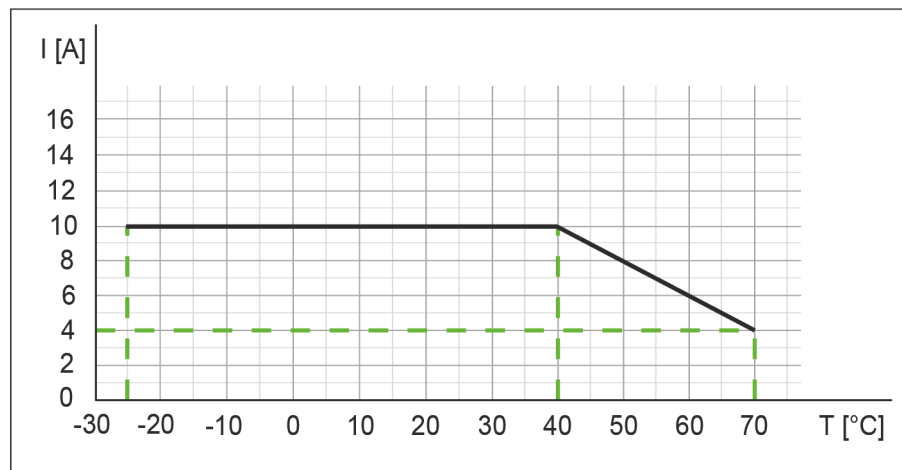


*Ill. 8:* Derating total current, sensor power supplies and total current, outputs

**Derating current per sensor supply/output**
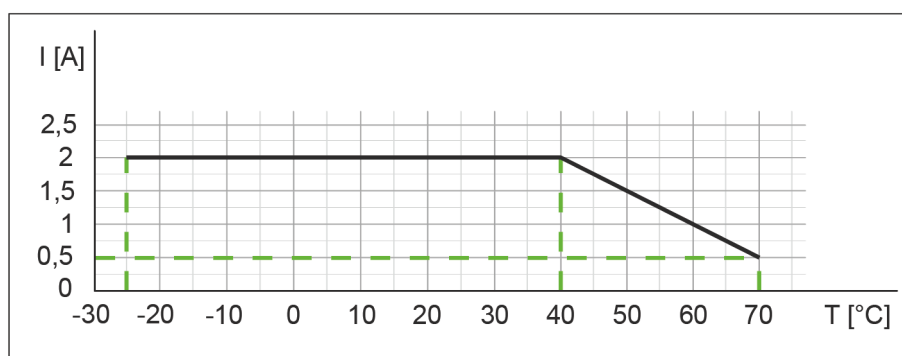


*Ill. 9:* Derating current per sensor power supply and output

## 5.2 Ambient conditions

| Climate | | |
|---|---|---|
| Operating temperature | | -25 °C ... +70 °C |
| Storage temperature | Ensure acclimatization for commissioning | -25 °C ... +85 °C |
| Transport temperature | Ensure acclimatization for commissioning | -25 °C ... +85 °C |
| Relative humidity | | ≤95 % |
| Installation hight | Above sea level | ≤3000 m |

| Mechanical | | |
|---|---|---|
| Oscillation test | EN 60068 Part 2-6 | 10 ... 58 Hz, amplitude 0.35 mm, 58 ... 150 Hz; 20 g |
| Shock test | EN 60068 Part 2-27 | 50 g for 11 ms |

| Electrical safety | | |
|---|---|---|
| Protection | EN 60529 | IP67 |
| Protection rating | Using a SELV- or PELV- power supply | III |
| Level of contamination | | 2 |

| EMC emission | | |
|---|---|---|
| Radiated inteference E-field housing enclosure | EN 55016-2-3 | Compliant |

| EMC-immunity | | |
|---|---|---|
| Electrostatic discharge (ESD) | EN 61000-4-2 | Compliant |
| Electromagnetic RF-fields | EN 61000-4-3 | Compliant |
| Fast transient burst | EN 61000-4-4 | Compliant |
| Shock tension surge | EN 61000-4-5 | Compliant |
| Conducted RF-fields | EN 61000-4-6 | Compliant |
| Voltage dips | EN 61000-4-11 | Compliant |

## 5.3 Protection

| Device protection | | |
|---|---|---|
| Overvoltage protection | | Yes |
| Overload protection device supply | To be ensured by load circuit monitoring | Yes |
| Inverse-polarity protection device supply | | Yes |
| Short-circuit protection sensor supply | | Electronically |
| Short-circuit protection output | | Electronically |
| Protective circuit input | Internal | Suppressor diode |

## 5.4        Mechanical data

| Material data | | |
|---|---|---|
| Housing material | | Plastic |

| Mounting data | | |
|---|---|---|
| Weight | Net | 470 g |
| Dimensions | L x W x H | 225,4 x 63 x 36 mm |

## 5.5        Conformity, Approvals

| Conformity, Approvals | | |
|---|---|---|
| Product standard | EN 61131-2 Programmable Logic Controllers Part 2 | Compliant |
| CE | 2014/30/EU 2011/65/EU | Compliant |
| UKCA | | Compliant |
| EMC | 2014/30/EU | Compliant |
| REACH | No. 1907/2006 | SVHC List |
| WEEE | 2012/19/EU | Compliant |
| ULus | | E201820 |
| RoHS | 2011/65/EU & 2015/863 | Exception 6c&7a |
| China RoHS | SJ/T 11364-2014 | 25 EPUP |

| Hazardous substance (有害物質) | | | | | | |
|---|---|---|---|---|---|---|
| Part Name 零件名稱 | Lead (Pb) 铅 | Mercury (Hg) 汞 | Cadmium (Cd) 镉 | Hexavalent Chromium (Cr (VI)) 六价铬 | Polybrominated biphenyls (PBB) 多溴联苯 | Polybrominated diphenyl ethers (PBDE) 多溴联苯醚 |
| Component part PCB 组件部分 印刷电路板 | X | O | O | O | O | O |
| Connection Terminal/ Screws 接线端子 / 拧 | X | O | O | O | O | O |

O: Indicates that the content of the harmful substance in all homogeneous materials of the component part is below the limit defined in GB/T 26572.

O: 表明該有害物質在組成部分的所有均質材料的含量低於按GB/ T26572定義的限制.

X: Indicates that the content of the harmful substance in at least one homogeneous material of the component part exceeds the limit defined in GB/T 26572.

X: 表示該有害物質在組成部分中的至少一個均質材料的含量超過按GB / T26572定義的限制。

# 6 Installation

## 6.1 Requirements

Installation requirements:

- Even mounting surface to avoid mechanical tension.
- Provide proper grounding.
- Suitable installation site in terms of vibration and shock load, temperature and humidity (see *Technical data [▶ 20]*).
- Protected site to prevent connection cables from being torn off accidentally.

## 6.2 Dimensions
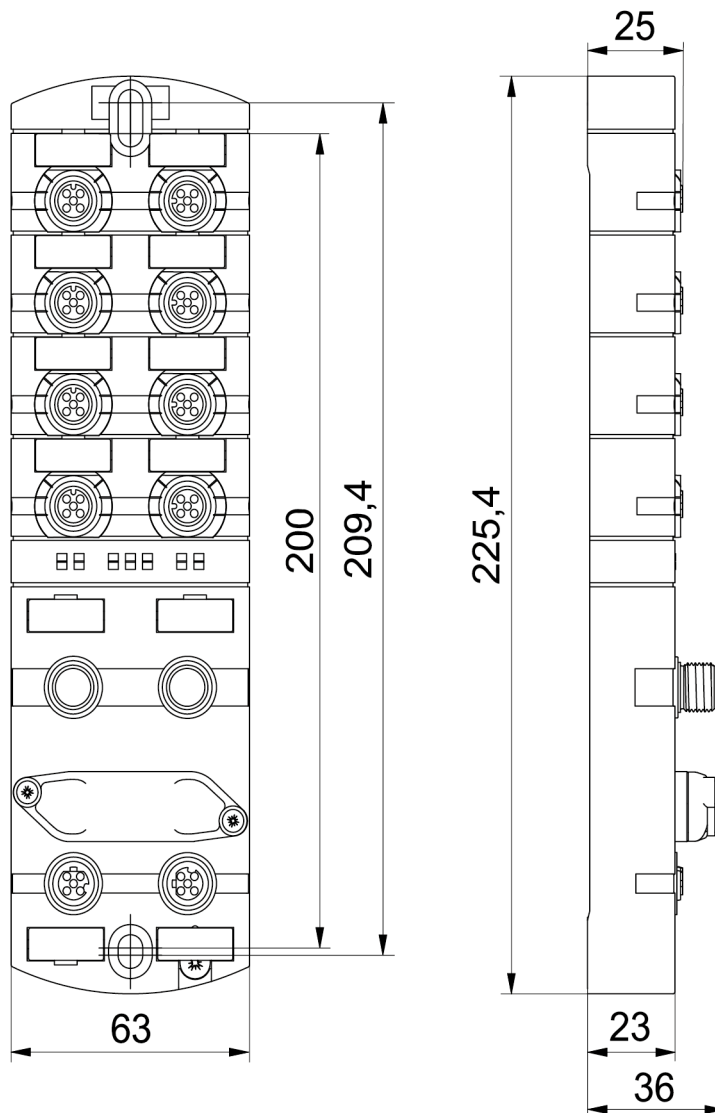


*Ill. 10:* Dimensions in mm

## 6.3        Mounting distance
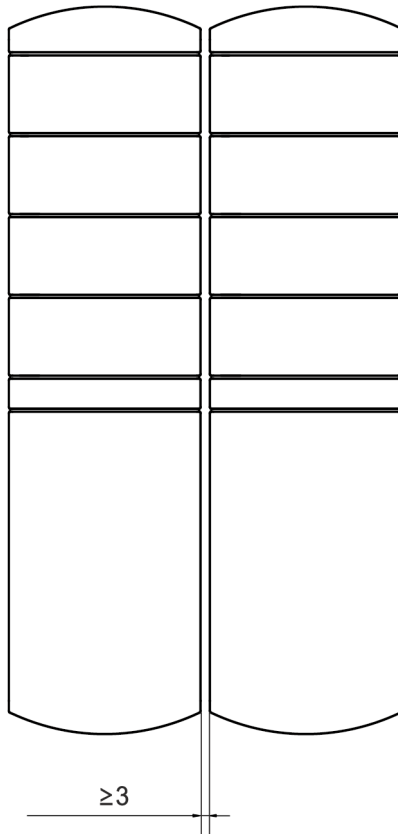


*Ill. 11:* Distance in mm

---

**INFO**

For proper installation and improved heat dissipation, we recommend maintaining a minimum distance of 3 mm when installing *CM50I*.

---

---

**INFO**

Minimum distance of 50 mm requried where using angled connectors.

---

## 6.4        Mounting the device

⚠ **WARNING**

**Material damage due to incorrect installation.**

Use fastening screws that are appropriate for the mounting surface.

   a) Fastening screws and tightening torques depend on mounting surface.

   b) Ttighten the screws carefully. Observe the specified tightening torques.

⚠ **WARNING**

**Material damage through improper use.**

Do not use the devices as climbing aids. Devices may come off by improper use or might be damaged.

   a) Install the device in such a way that it cannot be used as climbing aid.
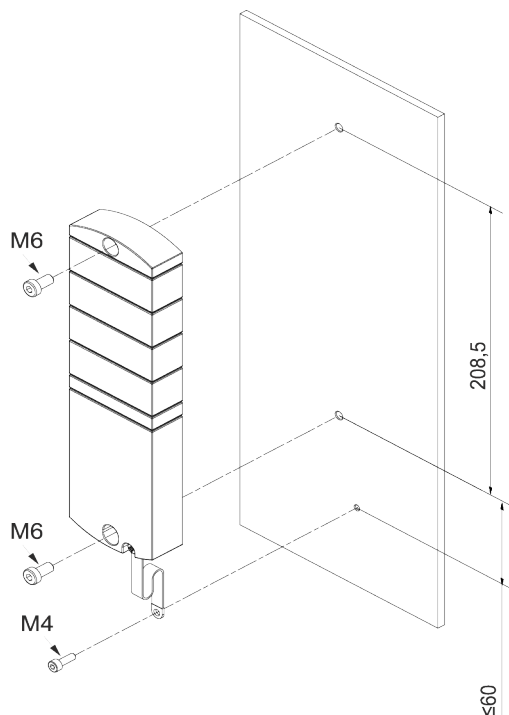


*Ill. 12:* Fasten the device. Dimensions in mm (illustration similar)

| M6 | 3 Nm | | Art.-No. 7000-98001-0000000 |
| --- | --- | --- | --- |

*When mounting the device, observe the order indicated below:*

   a) Slightly tighten the top M6 screw.

   b) Align the housing.

   c) Slightly tighten the lower M6 screw.

   d) Tighten both M6 screws to the specified torque.

   e) *Device grounding:* Attach grounding strap (see *Functional ground [▶ 28]*).

☼ **INFO**

The screws and grounding strap of the illustration are not included in the delivery.

### 6.4.1      Functional ground

**INFO**

Use a conductive screw to attach the grounding strap.
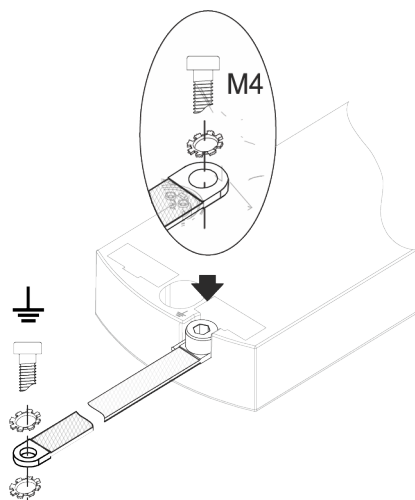


*Ill. 13:* Attach the grounding strap

**Tool**

- ⭕ M4

- ◆ Tighten the screw at 1.2 Nm ±0.1 Nm.

**INFO**

The screws and grounding strap of the illustration are not included in the delivery. The grounding strap is available at the Baumer Website http://baumer.com.

**Also see about this**

- 📄 Accessories [▶ 141]

**6.4.2**      **Addressing lid**
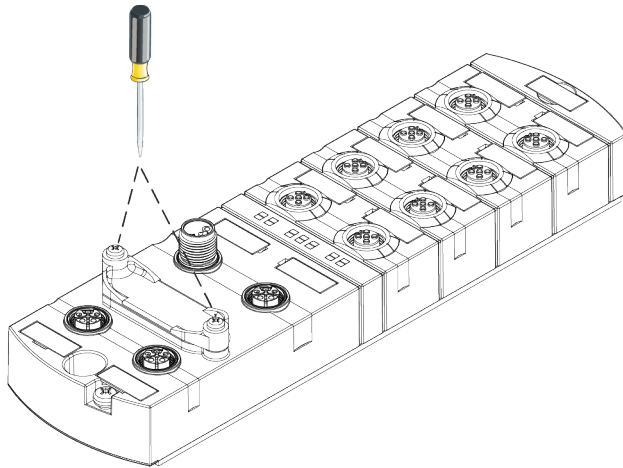


*Ill. 14:* Attaching the adressing lid

**Tool**

- ⭕ M3

*Instruction:*

♦ Tighten the screws at 0.8 Nm ±0.1 Nm fest.

# 7 Installation

## 7.1 Electrical installation of the device

> ### ⚠ DANGER
> **High electrical voltage in the machine/system.**
> Death or severe injuries resulting from electric shock.
>
> a) While working on the machine/devices, comply with the five safety rules of electrical engineering.

**Protection of persons and material assets**

- In accordance with *DIN VDE 0105-100 - Operation of electrical installations - Part 100: General requirements*

> ### ⚠ WARNING
> **Risk of fire due to short circuit.**
> Supply lines and/or devices may short circuit when damaged causing overheating and fire.
>
> a) Ensure smart current monitoring or fuse
>    The fuse must be able to hold max. 9 A.

> ### ⚠ CAUTION
> **Loss of function due to improper installation.**
> Failure to observe may result in personal injury and/or damage to property.
>
> a) Only use cables and accessories compliant to the requirements and relevant regulations for safety, electromagnetic compatibility and, if required, telecommunication end devices and specifications.

> ### ⚠ CAUTION
> **Hot surface.**
> Minor personal injuries and damage to the device when contacting hot surfaces.
>
> a) Wear suitable isolating gloves.
>
> b) Only use connection cables that meet thermal requirements.

> ### ⚠ CAUTION
> **Damage to machine/system by improper voltage on/off.**
> Switching on the device by separate actuator and sensor voltage, the functions of the digital inputs and outputs cannot be guaranteed.
>
> a) For device switch-on observe the following order:
>
> a) Switch on sensor voltage.
>
> b) Switch on actuator voltage.

> ### 💡 INFO
> Only use a power unit capable of limiting voltage to max. 60 VDC resp. 25 AC at the occurrence of error. Power supply must comply with SELV or PELV.

### 7.1.1 Rotary switch settings

💡 **INFO**

**Factory defaults** : Rotary switch position is **000**.

💡 **INFO**

An unambiguous and unique IP address must be assigned to each user in the network.
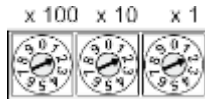
**Address range 1 ... 999**

| x1 | Rotary switch (units) |
| x10 | Rotary switch (tens) |
| x100 | Rotary switch (hundreds) |

*Tab. 1:* Rotary switch for addressing

| Position/ Range | Web server | JSON | OPC UA | MQTT | Description | |
|---|---|---|---|---|---|---|
| 0 | - | - | - | - | Standard operation | |
| 001 ... 910 | - | - | - | - | Reserviert** | |
| 911 | Disabled | Disabled | Disabled | Disabled | Secure Mode | Fieldbus communication in standard operation |
| 912 | - | Disabled | Disabled | Disabled | IIoT mode disabled | |
| 913 | Disabled | - | - | - | Web server disabled | |
| 914 | Enabled | Enabled | Enabled | Enabled | Enables all IIoT protocols and web server. | |
| 915-978 | - | - | - | - | Reserved | |
| 979 | Enabled | Enabled | Enabled | Enabled | Restore default | Sequence of actions only for this rotary switch position: 1. Disconnect device from power supply. 2. Set switch to position 979. 3. Connect device to power supply. 4. **Wait for at least 2 minutes**. 5. Disconnect device from power supply. 6. Set switch to position 000 or any other required. 7. Connect device to power supply. |
| 980-999 | - | - | - | - | Reserved | |

*Tab. 2:* Setting the address

> **INFO**
> Reserved switch positions do n ot enable fieldbus communication, see *LED indicator [▷ 115]*.

**Service settings**

Switch positions 911, 912 and 913 disable the device services marked in the "set address" matrix. With these settings, the switching behaviour of the device is according to the previous address configuration without limiting any functions, except the services disabled by this switch position. The services disabled by doing so could not be re-enabled in any other way, e.g. via the control's configuration parameters.

Switch position 914 will enable all services again. Again, the device funtionalities are not limited.

1. Connect device to power supply.

2. Disconnect supply.

3. Set original address.

**Setting the address**

**Setting the address**

1. Disconnect device from supply.

2. Remove addressing lid.

3. Set an address which is unique.

4. Fasten addressing lid again.

5. Connect device to power supply.

> **INFO**
> For appropriate tightening torque see *Addressing lid [▷ 29]*.

**7.1.2          Sensors and actuators**

**Connection of M12 female connector**
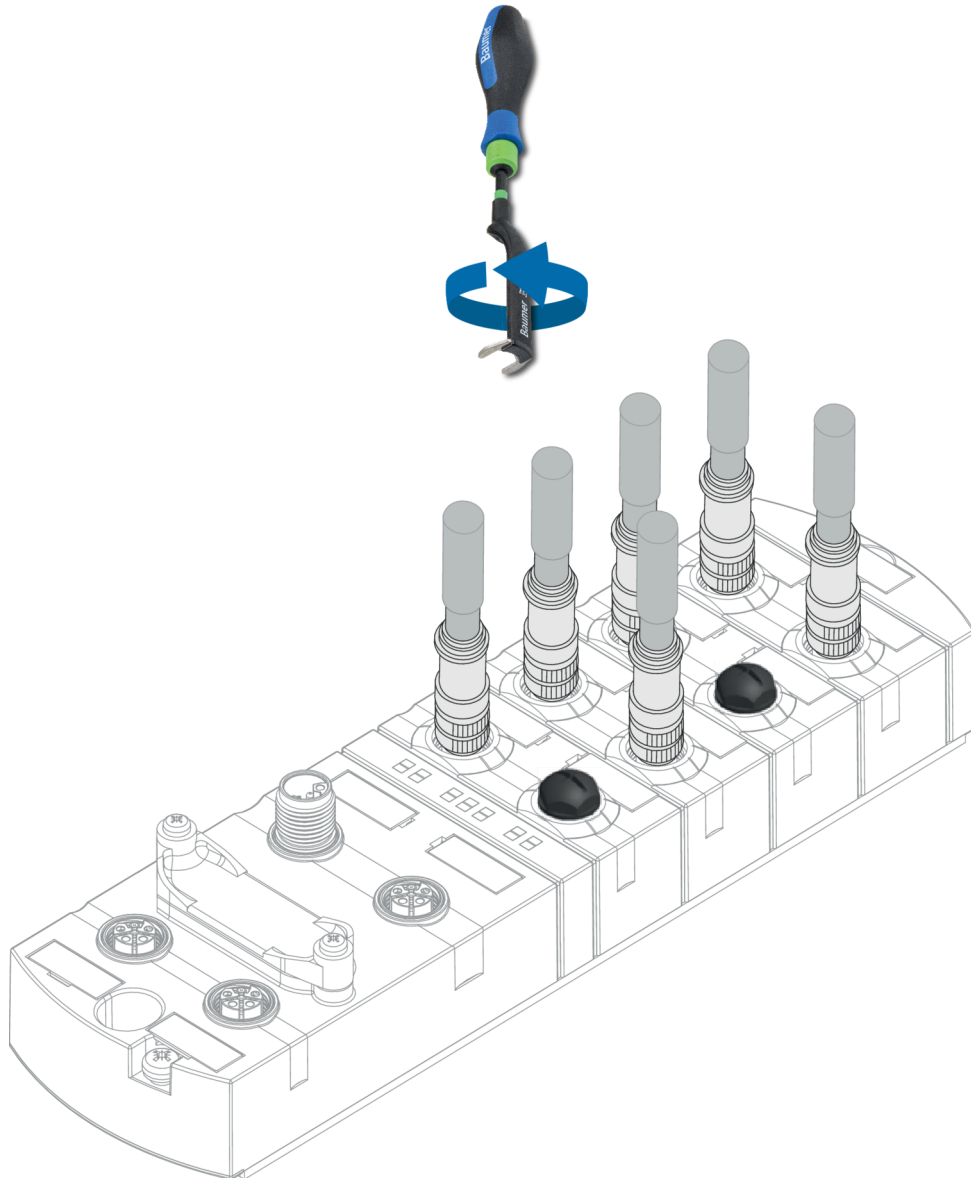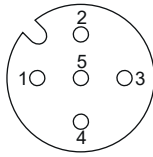




*Ill. 15:* Example of M12 connection inputs and outputs

| M12 | 0.6 Nm | | ArtNo. 7000-99102-0000000 |
|-----|--------|---|---|
| | | | |

**INFO**

Feeding external ground via M12 female connectors may lead to errors.

   a) ☐Do not feed external ground into the device via the M12 female connectors.

**INFO**

Maximum length of sensor and actuator cables is limited to 30 m.

**Sensor supply**

**Important:**

- Sensors supply is via **pin 1** (24 V) and **pin 3** (0 V) of the M12 female connectors.
- The maximum permissible current for supplying the sensors is **2 A** per M12 socket.
- In the event of overcurrent or short circuit, **disconnect** supply cable resp. sensor from the M12 female connector.

**Supported IO-Link communication**

The device supports IO-Link communication at the following rates:

- 4.800 Baud (COM 1)
- 38.400 Baud (COM 2)
- 230.400 Baud (COM 3)

**INFO**

The device would automatically select the communication rate apporpriate for the related IO-Link device.

**INFO**

Maximum cable length for IO-Link communication is 20 m.

**INFO**

A large selection of connection cables can be found on the Baumer website https://www.baumer.com.

### 7.1.3 PROFINET IO Communication

**Connection of M12 female connector**
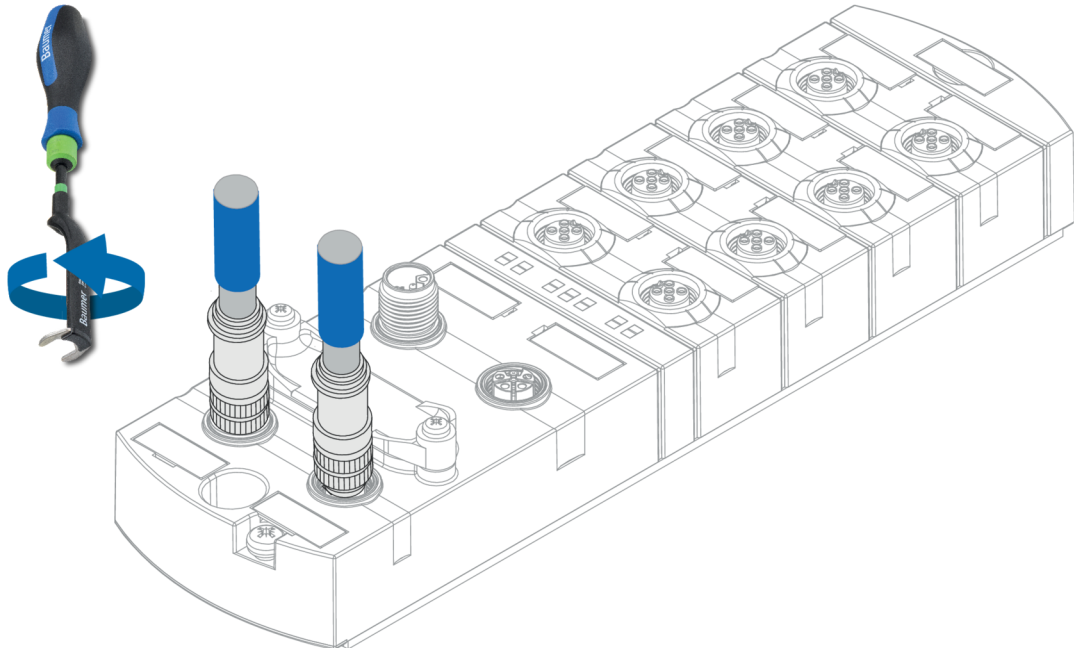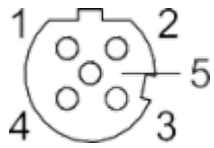




*Ill. 16:* Example of M12 connection (EtherNet/IP Bus)

| M12 | 0.6 Nm | | Art.-No. 7000-99102-0000000 |
|-----|--------|--|------------------------------|
|     |        |  |                              |

**Also see about this**

📄 Pin assignment [▷ 10]

### 7.1.4     Power supply

According to *PROFINET Cabling and Interconnection Technologys [4] Guideline Version 4.00 May 2017*, a cable with a black outer sheath and 4 strands with the following colors must be used for an M12 L-coded style 4 (4 pin without FE):



*Ill. 17:* [4]: Excerpt from "PROFINET Cabling and Interconnection Technology"

A fifth strand which is not connected in the device can increase the interference on the 24 V conductor in the event of EMC interference due to capacitive coupling.

**Connection with M12**

**POWER IN**
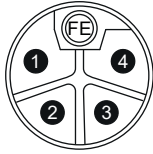
**POWER OUT**
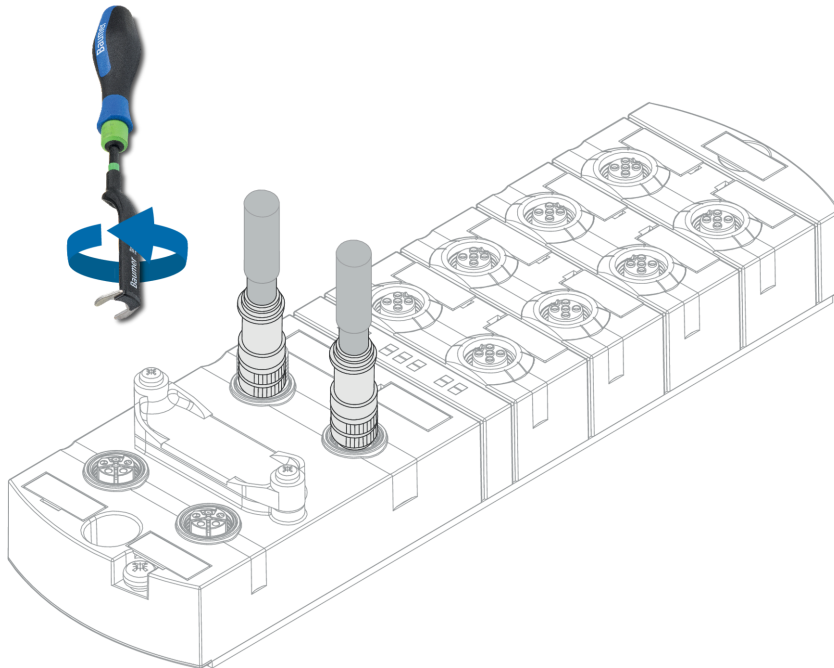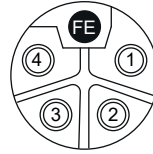
*Ill. 18:* Example of M12 connection (POWER)

| M12 | 0.6 Nm | | ArtNo. 7000-99102-0000000 |
| --- | --- | --- | --- |

💡 **INFO**
A large selection of connection cables can be found on the Baumer website https://www.baumer.com.

## 7.2          Ensuring Tightness (IP67)

> ⚠ **CAUTION**
>
> **Leaky housing.**
>
> Risk of personal injury and material damage due to failure caused by ingress of conductive liquids.
>
> a) Seal any male and female connectors not in use.

**Cable connection**



*Ill. 19:*
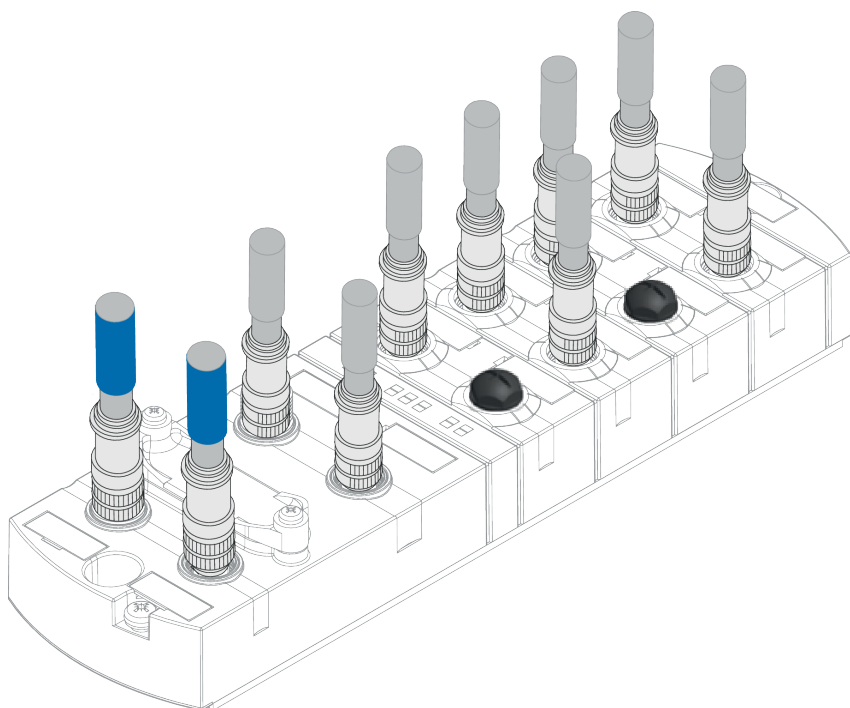


*Ill. 20:* Cable connection

| M12 | 0,6 Nm |  | Art.-No. 7000-99102-0000000 |
|-----|--------|--|------------------------------|

💡 **INFO**

A large selection of connection cables can be found on the Baumer website https://www.baumer.com.

# 8          Commissioning

> ⚠ **WARNING**
>
> **Risk of burns.**
>
> Prohibited to separate or establish electrical connection during operation. Failure to observe this warning may result in electric arcs that can cause burns.
>
> a) Disconnect device from power supply.

> ⚠ **CAUTION**
>
> **Uncontrolled processes.**
>
> Personal injury and material damage due to incorrect commissioning (initial commissioning, device restart or change in device configuration).
>
> a) Commissioning should always observe the order below:
>
> a) Insert the device.
>
> b) System check and approval by an expert.
>
> c) Put into operation.

> ⚠ **CAUTION**
>
> **Functional errors in residential areas.**
>
> Devices of EMC Class A may cause interference in residential areas.
>
> a) The system operator must take appropriate measures.

## 8.1          Loading GSDML Files

**GSDML Files"**

**Install GSDML file respectively description file**

The GSDML file import procedure is described in your engineering software manual. In the engineering software, this is referred to as *Install GSDML files* or *Install device description file*.

> 💡 **INFO**
>
> The GSDML file is stored on the Baumer website https://www.baumer.com under the article number of the device in the download area.

**Hardware catalog**

- Read the GSDML file of the *CM50I.PN* into the hardware catalog of the hardware configuration program.

When using **TIA** , the module can then be found in the hardware catalog in the directory structure:

**Other field devices | PROFINET IO | I/O | Baumer | CM50I.PN | V1.0**

If the engineering software supports structuring in folders, the module is displayed in a similar way to the *hardware catalog* illustration.
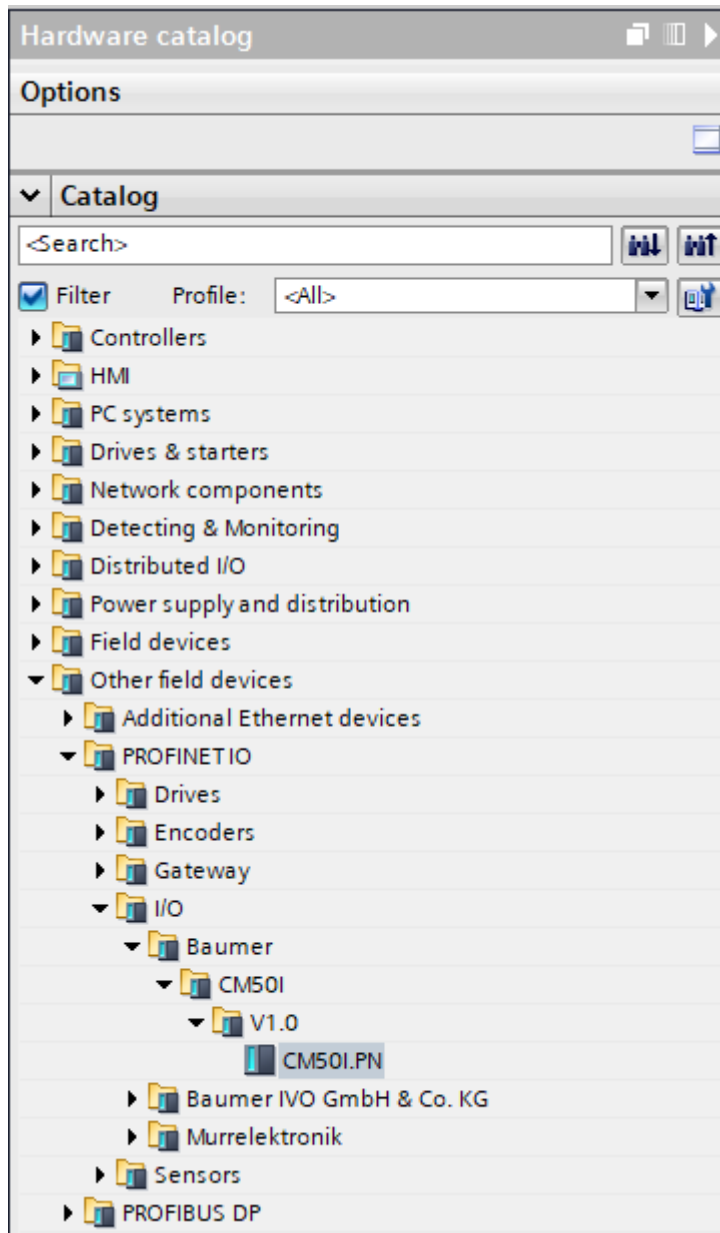


*Ill. 21:* Hardware catalog

a) Select the module *CM50I.PN* in the hardware catalog.

b) Drag & drop the entry to a free space in **Devices & networks**.

**Assign module to new IO controller**
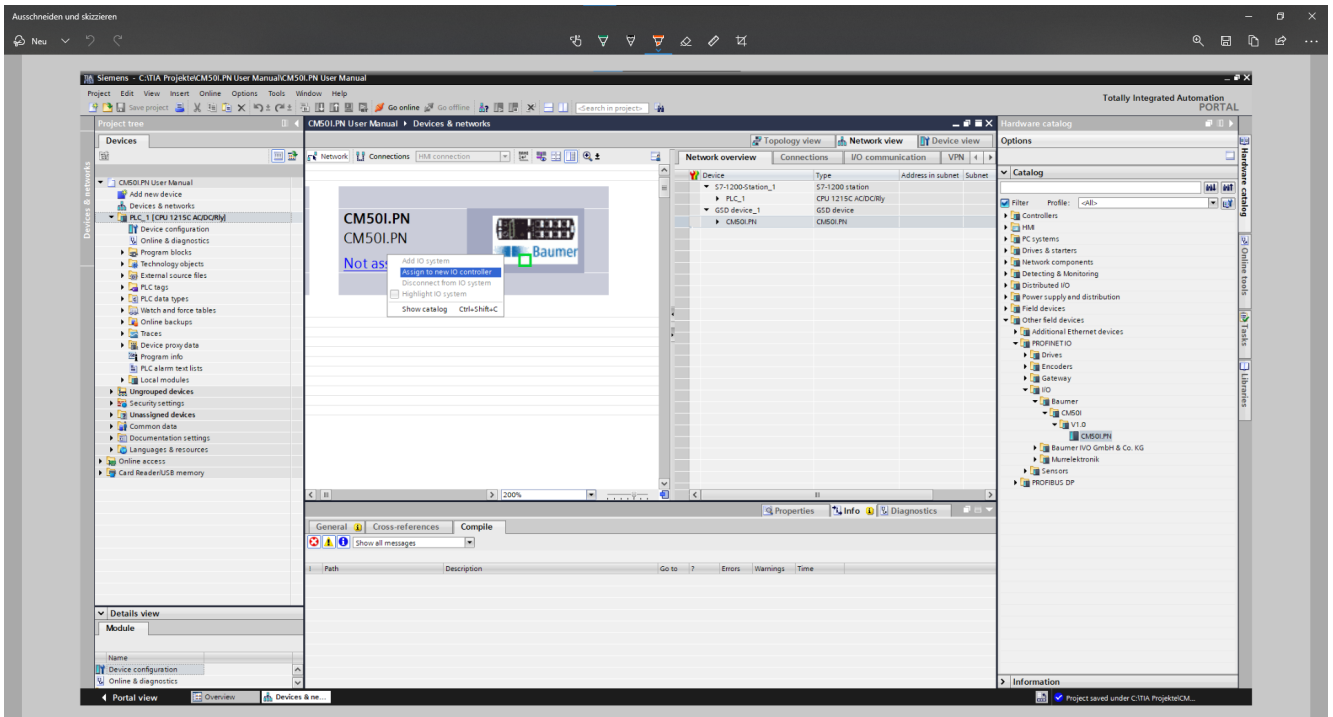


*Ill. 22:* Assign module to new IO controller

    a) On the module icon, click ***not assigned***.

    b) Select ***PLC_1.PROFINET-Schnittstelle_1***.

        ✓ Module is assigned an IO controller.

    c) Double-click on module for further configuration.

# 9        Configuration/setting

**Overview**

There are two options for device configuration.

- First: GSDML file is available for download at the Baumer Website.
    - As described in chapter *Read GSDML files* they can be imported into the programming software to benefit from pre-configured connections.
- Second: Device configuration via the integrated web server.

**INFO**

To adopt index changes made via Webserver and via acyclic ISDU into DataStorage, a *ParamDownloadStore Command* must be transmitted after the index change.

a) The *ParamDownloadStore Command* can be triggered by writing value `0x05` to index `0x02`.

## 9.1      Changing the Configuration

**⚠ WARNING**

**Device protection function impaired by changed device configuration.**

a) Only authorized persons may change configuration.

b) When changing the configuration, use the password hierarchy provided by your engineering software.

c) After every change in configuration, check proper activity of the safety equipment.

## 9.2      Module configuration

Individual IO-Link ports *and* virtual modules can be implemented and configured via the hardware catalog.

| Standard Module | |
|---|---|
| MVK Pro device | ▪ Module parameterization<br>▪ Read and write access to the digital IOs<br>▪ Read and write access to IO-Link devices/ports |
| MVK Pro options | ▪ Access to system state and qualifier<br>▪ Communication protocol parameterization<br>▪ Output forcing and web server access |

*Tab. 3:* Module_Configuration_Standard_Modules

### 9.2.1 Slots

The 8 hardware ports are configured and parameterized via slots 1.X0 to 1.X7. For more port-specific parameter settings please see module "SIO data/Module parameters" on slot 1.1.

The module has the following display in the TIA Portal device view:

- **Slot 1**: PROFINET user
  - with pre-configured "SIO data/Module parameter" slot for universal IO channels and parameter settings
  - with 8 IO-Link ports
- **Slot 2**: Optional module*
  - with 8 optional submodules for design and parameterization of

    a) optional communication protocols

    b) the qualifier

    c) system status

    d) outputforcing

    e) web server



*Ill. 23:* Slots for module configuration

As an option, the saved slots can be assigned specific virtual submodules.

Virtual modules are used to map the various diagnostic and status information to the process image of the IO-Link master.

Sub module to slot assignment is defined by GSDML file.

---

### INFO

**At least one module, however, must be configured.

---

**9.2.2**          **Modul MVK Pro device**

Module *MVK Pro Device* is firmly assigned to slot **1**.

**Submodules**

| Name | Slot | Description |
|---|---|---|
| SIO data/Module parameters | 1.1 | ■ **Module parameterization**<br>■ **Port parameterization**<br>■ **2 Byte In Digital input data of the ports**<br>■ **2 Bytes Out – digital output data of the ports** |
| IO-Link Port X0 | 1.X0 (IO-Link master port 1) | IO-Link slot.<br>Select a submodule from the hardware catalog. |
| IO-Link Port X1 | 1.X1 (IO-Link master port 2) | |
| IO-Link Port X2 | 1.X2 (IO-Link master port 3) | |
| IO-Link Port X3 | 1.X3 (IO-Link master port 4) | |
| IO-Link Port X4 | 1.X4 (IO-Link master port 5) | |
| IO-Link Port X5 | 1.X5 (IO-Link master port 6) | |
| IO-Link Port X6 | 1.X6 (IO-Link master port 7) | |
| IO-Link Port X7 | 1.X7 (IO-Link master port 8) | |

*Tab. 4:* Submodule for MVK Pro Device

**9.2.2.1**        **IO-Link-Ports**

The module provides 8 IO-Link ports on slots 1 (X0 to X7), which can be assigned specific IO-Link devices or set to SIO mode.

■ Read and write access to the IO-Link devices/ports.

**Submodules**

| Disabled | **1 Byte In**<br>■ The corresponding IO-Link port is disabled, i.e. the channel is neither used as digital input or output, nor as IO-Link port.<br>■ Input byte is reserved. |
|---|---|
| Standard digital input | **0 Byte In, 0 Byte Out**<br>■ IO-Link standard IO mode<br>■ The data is provided at slot 1.1 "SIO data".<br>■ Output is addressed via slot 1.1 "SIO Data/ Module parameters". |
| Standard digital output | **0 Byte In, 0 Byte Out**<br>■ IO-Link standard IO mode<br>■ Output is addressed via slot 1.1 "SIO Data".<br>■ The input is addressed via slot 1.1 "SIO Data/Module parameters". |

| IO-Link In x bytes + PQI | **x Byte In**<br>■ IO-Link device with PQI and x byte(s) of input data.<br>■ Input data come in the following order:<br> ▪ PQI-Daten (1 Byte)**<br> ▪ one padding byte if required*<br>■ Optional parameterization of diagnostic and IO link properties. |
|---|---|
| IO-Link Out x bytes + PQI | **y Byte Out**<br>■ IO-Link device with PQI and y byte(s) of output data.<br>■ Input data:<br> ▪ PQI-Daten (1 Byte)<br> ▪ one padding byte if required*<br>■ Optional parameterization of diagnostic and IO link properties. |
| IO-Link In/Out x/y byte + PQI | **x Byte In, y Byte Out**<br>■ IO-Link device with x byte(s) of input data and y byte(s) of output data.<br>■ Input data come in the following order:<br> ▪ current input data of IO-Link device<br> ▪ PQI Daten (1 Byte)<br> ▪ one padding byte if required*<br>■ Optional parameterization of diagnostic and IO link properties. |
| Profile Devices (diverse) | Number of input and output bytes is module-specific.<br>■ Input data come in the following order:<br> ▪ current input data of IO-Link device (if present)<br> ▪ PQI Daten (1 Byte)<br> ▪ one padding byte if required*<br>■ Output data come in the following order:<br> ▪ current output data of the IO-Link device (if present)<br> ▪ one padding byte if required<br> ▪ Optional parameterization of diagnostic and IO link properties. |
| ME devices (various) | Number of input and output bytes is module-specific.<br>■ Input data come in the following order:<br> ▪ current input data of IO-Link device (if present)<br> ▪ PQI Daten (1 Byte)<br> ▪ one padding byte if required*<br>■ Output data come in the following order:<br> ▪ current output data of the IO-Link device (if present)<br> ▪ one padding byte if required<br> ▪ Optional parameterization of diagnostic and IO link properties.<br> ▪ Optional device parameterization by module-specific parameters (if present). |

*Tab. 5:* Submodules for IO-Link ports

**\* Padding byte**: Reserved byte to achieve even data length.

**\*\* PQI**

The **Port Qualifier Information** (PQI) provides status information on IO-Link port and/ or device.

The flags "PQ"..and DevErr and DevCom" are copied directly from the Arg- Block of the SMI service "SMI_PDIn".

The flags in bit 2 to 4 are generated within the master application layer.

**PQI-Flag-Bit Layout**

| Bit7 | Bit6 | Bit5 | Bit4 | Bit3 | Bit2 | Bit1 | Bit0 |
|---|---|---|---|---|---|---|---|
| Device process data validty | Port / device error | Device communication | Port operation | Replacement device identified | New parameter | Reserved ("0") | Reserved ("0") |
| PQ | DevErr | DevCom | PortActive | SubstDev | New-Par | – | – |

*Tab. 6:* PQI-Flag-Bit Layout

**Description of table "Layout of the PQI flag bits"**

| Flag | M/O | Value | Description |
|---|---|---|---|
| NewPar | M | 0 | No update of the device parameters identified. |
| | | 1 | Device parameter update identified: Master has performed a data memory upload and a new IOLD-backup object (0xB901) is available. |
| SubstDev | M | 0 | No replacement device identified (identical serial number).. |
| | | 1 | Replacement device identified (different serial number). |
| PortActive | M | 0 | Port disabled via port function. |
| | | 1 | Port enabled (standard). |
| DevCom | M | 0 | No device available. |
| | | 1 | Device identified and in status pre-operate or operate. |
| DevErr | M | 0 | No error/warning occurred. |
| | | 1 | Error/warning assigned to device or port has occurred. |
| PQ | M | 0 | Invalid IO device process data. |
| | | 1 | Valid IO device process data. |

**Byte assignment of the generic IO-Link In/Out xx/yyc**

| | Submodule type | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Input data submodule | | | | | | | Output data submodule | | | | | | |
| Bytes | DEAC | SIO | 00/yy | 01/yy | 02/yy | 04/yy | 08/yy | 16/yy | 32/yy | | xx/00 | xx/01 | xx/02 | xx/04 | xx/08 | xx/16 | xx/32 |
| 0 | R | | PQI | I | I | I | I | I | I | | O | O | O | O | O | O |
| 1 | | | | PQI | I | I | I | I | I | | R | O | O | O | O | O |
| 2 | | | | | PQI | I | I | I | I | | | O | O | O | O | O |
| 3 | | | | | R | I | I | I | I | | | O | O | O | O | O |
| 4 | | | | | | PQI | I | I | I | | | | O | O | O | O |
| 5 | | | | | | R | I | I | I | | | | O | O | O | O |
| 6 | | | | | | | I | I | I | | | | | O | O | O |
| 7 | | | | | | | I | I | I | | | | | O | O | O |

| Byte s | DEAC | SIO | Input data submodule | | | | | | | | Output data submodule | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 00/ yy | 01/ yy | 02/ yy | 04/ yy | 08/ yy | 16/ yy | 32/ yy | | xx/ 00 | xx/ 01 | xx/ 02 | xx/ 04 | xx/ 08 | xx/ 16 | xx/ 32 |
| 8 | | | | | | | PQI | I | I | | | | | | | O | O |
| 9 | | | | | | | R | I | I | | | | | | | O | O |
| 10 | | | | | | | | I | I | | | | | | | O | O |
| 11 | | | | | | | | I | I | | | | | | | O | O |
| 12 | | | | | | | | I | I | | | | | | | O | O |
| 13 | | | | | | | | I | I | | | | | | | O | O |
| 14 | | | | | | | | I | I | | | | | | | O | O |
| 15 | | | | | | | | I | I | | | | | | | O | O |
| 16 | | | | | | | | PQI | I | | | | | | | | O |
| 17 | | | | | | | | R | I | | | | | | | | O |
| 18 | | | | | | | | | I | | | | | | | | O |
| 19 | | | | | | | | | I | | | | | | | | O |
| 20 | | | | | | | | | I | | | | | | | | O |
| 21 | | | | | | | | | I | | | | | | | | O |
| 22 | | | | | | | | | I | | | | | | | | O |
| 23 | | | | | | | | | I | | | | | | | | O |
| 24 | | | | | | | | | I | | | | | | | | O |
| 25 | | | | | | | | | I | | | | | | | | O |
| 26 | | | | | | | | | I | | | | | | | | O |
| 27 | | | | | | | | | I | | | | | | | | O |
| 28 | | | | | | | | | I | | | | | | | | O |
| 29 | | | | | | | | | I | | | | | | | | O |
| 30 | | | | | | | | | I | | | | | | | | O |
| 31 | | | | | | | | | I | | | | | | | | O |
| 32 | | | | | | | | | PQI | | | | | | | | |
| 33 | | | | | | | | | R | | | | | | | | |

Legend:

- I = Input
- O = Output
- P = PQI (Port Qualifier Information)
- R = Reserved (Padding Byte)
- DEAC = Deactiviert
- SIO Mode

### 9.2.3 Modul MVK Pro options

- is firmly assigned to **slot 2**
- All submodules are optional

▪ However, at least one module must be seated.

**Submodules**

| Name | Slot | Description |
|------|------|-------------|
| Qualifier DI | 2.1 | **2 Byte In**<br>▪ Status of individual bits of the inputs in "Digital IO"<br>  ▪ 0 = invalid<br>  ▪ 1: valid<br>▪ Layout according to parameterization |
| Qualifier DO | 2.2 | **2 Byte In**<br>▪ Status of individual bits of the outputs in "Digital IO"<br>  ▪ 0 = invalid<br>  ▪ 1: valid<br>▪ Layout according to parameterization |
| System status * | 2.3 | **4 Byte In**<br>▪ Summary of the current system state. |
| MQTT | 2.4 | Option to enable MQTT |
| OPC UA | 2.5 | Option to enable OPC UA |
| JSON | 2.6 | Option to enable JSON |
| Web server | 2.7 | Option to enable web server |
| Output forcing | 2.8 | Option to enable output forcings |
| MQTT | 2.4 | Option to enable MQTT |

*Tab. 7:* Submodules for MVK Pro options

**INFO**

\* For further information on the system status refer to chapter\* 8.2.3.1 "Digitale I/O and System Status"

## 9.2.3.1 Digital I/O and System Status

**System status IO layout in decimal and hexadecimal format**

| Bit | Value in decimal (dec) format | Value in hexadecimal (hex) format | Description |
|-----|-------------------------------|-----------------------------------|-------------|
| 0 | 1 | 0x00 00 00 01 | Sensor undervoltage |
| 1 | 2 | 0x00 00 00 02 | Actuator undervoltage |
| 2 | 4 | 0x00 00 00 04 | No actuator supply |
| 3 | 8 | 0x00 00 00 08 | Reserved |
| 4 | 16 | 0x00 00 00 10 | Sensor short circuit on at least one channel. |
| 5 | 32 | 0x00 00 00 20 | Actuator short circuit on at least one channel. |
| 6 | 64 | 0x00 00 00 40 | Reserved |

| Bit | Value in decimal (dec) format | Value in hexadecimal (hex) format | Description |
|---|---|---|---|
| 7 | 128 | 0x00 00 00 80 | Reserved |
| 8 | 256 | 0x00 00 01 00 | Reserved |
| 9 | 512 | 0x00 00 02 00 | IO-Link error, e.g. validation or data storage failed. |
| 10 | 1024 | 0x00 00 04 00 | Sensor overvoltage |
| 11 | 2048 | 0x00 00 08 00 | Actuator overvoltage |
| 12 | 4096 | 0x00 00 10 00 | Reserved |
| 13 - 31 | | | Reserved |

*Tab. 8:* System status IO-Layout

**Bit assignment of system status binary IO layout**

**Byte 3**

| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|---|---|---|---|---|---|---|---|
| | | | | | | | Sensor undervoltage |
| | | | | | | Actuator undervoltage | |
| | | | | | No actuator supply | | |
| | | | | Reserved | | | |
| | | | Sensor short circuit on at least one channell | | | | |
| | | Actuator short circuit on at least one channel | | | | | |
| | Reserved | | | | | | |
| Reserved | | | | | | | |

**Byte 2**

| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|---|---|---|---|---|---|---|---|
| | | | | | | | Reserved |
| | | | | | | IO-Link error, e.g. validation or data storage failed | |
| | | | | | Sensor overvoltage | | |
| | | | | Actuator overvoltage | | | |
| | | | Reserved | | | | |
| | | Reserved | | | | | |
| | Reserved | | | | | | |
| Reserved | | | | | | | |

**Byte 0 and byte 1 system status reserved**

### 9.2.4  Addresses

Once the module has been assigned to the IO-Controller, the I/O addresses are assigned to the project according to the allocated addresses.

I/O addresses manually may also be changed manually.



*Ill. 24:* Module configuration addresses

## 9.3 Module parameterization

☀ **INFO**
The present chapter explains the parameterization options.

The following modules are described:

- MVK Pro device
- MVK Pro options

### 9.3.1 Modul MVK Pro device

**Submodule overview**

- SIO data/Module parameters
- Disabled
- Standard digital input
- Standard digital output

- Generic IO-Link modules
- Profile Devices
- ME devices

**Submodule module parameters**

| No. | Sub-module | Parameter-No. | Parameter |
|---|---|---|---|
| 1 | SIO data/Module parameters | 1 | Pin/port-based |
| | | 2 | Disable global diagnostics report |
| | | 3 | Disable undervoltage bus/sensor supply report |
| | | 4 | Threshold value undervoltage bus/sensor supply |
| | | 5 | Disable undervoltage actuator supply report |
| | | 6 | Enable threshold actuator undervoltage |
| | | 7 | Disable missing actuator supply report |
| | | 8 | Enable LED indication for suppressed diagnostics |
| | | 9 | Enable IO-Link diagnostics report |
| | | 10 | US disabled at pin 1 |
| | | 11 | SIO Channel functionality pin 2 |
| | | 12 | Input delay pin 2 |
| | | 13 | Rated current for pin 1 |
| | | 14 | Rated current for pin 2 |
| | | 15 | Rated current for pin 4 |
| | | 16 | IO-Link diagnostic event integration |
| | | 17 | Manual restart pin 2 in the event of overcurrent |
| | | 18 | Input value in the event of module failure |
| 2 | Disabled | 19 | Port mode |
| | | 20 | Input value in the event of module failure |
| 3 | Standard digital input | 21 | Function pin 4 |
| | | 22 | Input delay pin 4 |
| | | 23 | Enable port diagnostics report |
| 4 | Standard digital output | 24 | Static output signal at pin 4 |
| | | 25 | Manual restart pin 4 in the event of overcurrent |
| | | 26 | Enable port diagnostics report |
| 5 | Generic | 27 | Enable port diagnostics report |
| 6 | IO-Link modules | 28 | Enable process alarms report |
| 7 | Profile Devices, ME devices | 29 | Configuration via PDCT |
| | | 30 | Input data fraction |
| | | 31 | Enable pull/plug diagnostics report |
| | | 32 | Port mode |
| | | 33 | Validiation/backup |

| No. | Sub-module | Parameter-No. | Parameter |
|-----|------------|---------------|-----------|
|     |            | 34            | Cycle time |
|     |            | 35            | Vendor ID |
|     |            | 36            | Device ID |

*Tab. 9:* Overview on submodule parameters 1 ... 36

### 9.3.1.1    Submodul 1_SIO data/Module parameters

**Parameter 1**
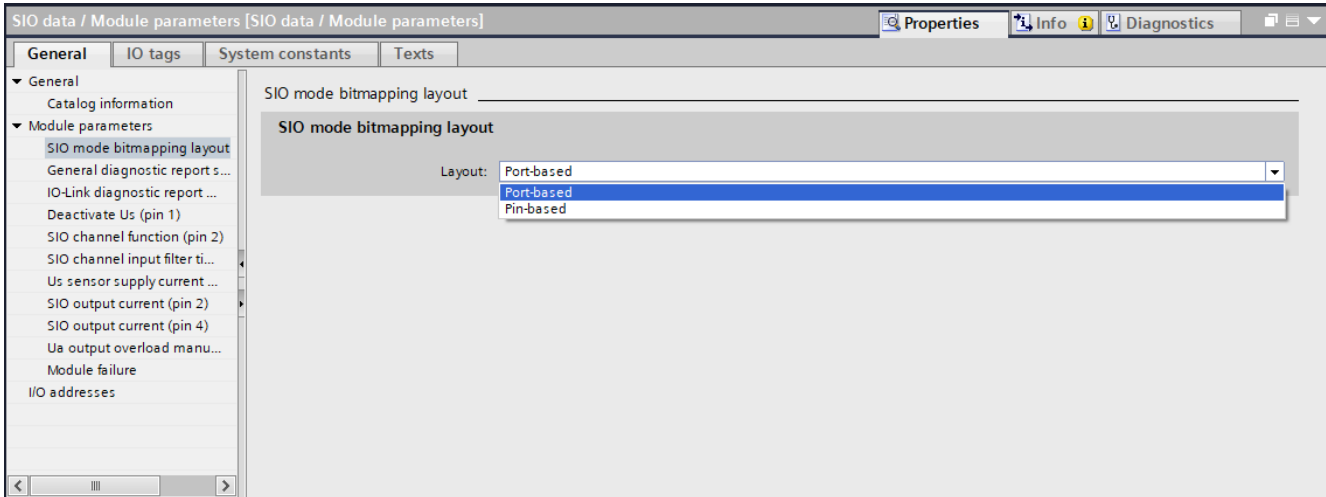


*Ill. 25:* Parameter No. 1_pin/port based

| No. | Parameter | Selection (D-Default) | Description |
|-----|-----------|----------------------|-------------|
| 1 | Layout | Port-based (D) | Transmission of IO data in port-based format. |
|   |        | Pin-based | Transmission of IO data in port-based format. |

**Port-based I/O data / Qualifier, DI/DO**

| I/O Byte 0 | | | | | | | |
|-----------|--------|--------|--------|--------|--------|--------|--------|
| **Bit 0** | **Bit 1** | **Bit 2** | **Bit 3** | **Bit 4** | **Bit 5** | **Bit 6** | **Bit 7** |
| Port X0 Pin 4 | Port X0 Pin 2 | Port X1 Pin 4 | Port X1 Pin 2 | Port X2 Pin 4 | Port X2 Pin 2 | Port X3 Pin 4 | Port X3 Pin 2 |
| **I/O Byte 1** | | | | | | | |
| **Bit 0** | **Bit 1** | **Bit 2** | **Bit 3** | **Bit 4** | **Bit 5** | **Bit 6** | **Bit 7** |
| Port X4 Pin 4 | Port X4 Pin 2 | Port X5 Pin 4 | Port X5 Pin 2 | Port X6 Pin 4 | Port X6 Pin 2 | Port X7 Pin 4 | Port X7 Pin 2 |

*Tab. 10:* Port-based data layout

**Pin-based I/O data / Qualifier, DI/DO**

| I/O Byte 0 | | | | | | | |
|-----------|--------|--------|--------|--------|--------|--------|--------|
| Bit 0 | Bit 1 | Bit 2 | Bit 3 | Bit 4 | Bit 5 | Bit 6 | Bit 7 |

| Port X0 Pin 4 | Port X1 Pin 4 | Port X2 Pin 4 | Port X3 Pin 4 | Port X4 Pin 4 | Port X5 Pin 4 | Port X6 Pin 4 | Port X7 Pin 4 |
|---|---|---|---|---|---|---|---|
| **I/O Byte 1** | | | | | | | |
| Bit 0 | Bit 1 | Bit 2 | Bit 3 | Bit 4 | Bit 5 | Bit 6 | Bit 7 |
| Port X0 Pin 2 | Port X1 Pin 2 | Port X2 Pin 2 | Port X3 Pin 2 | Port X4 Pin 2 | Port X5 Pin 2 | Port X6 Pin 2 | Port X7 Pin 2 |

*Tab. 11:* Pin-based data layout

### Parameter 2-8
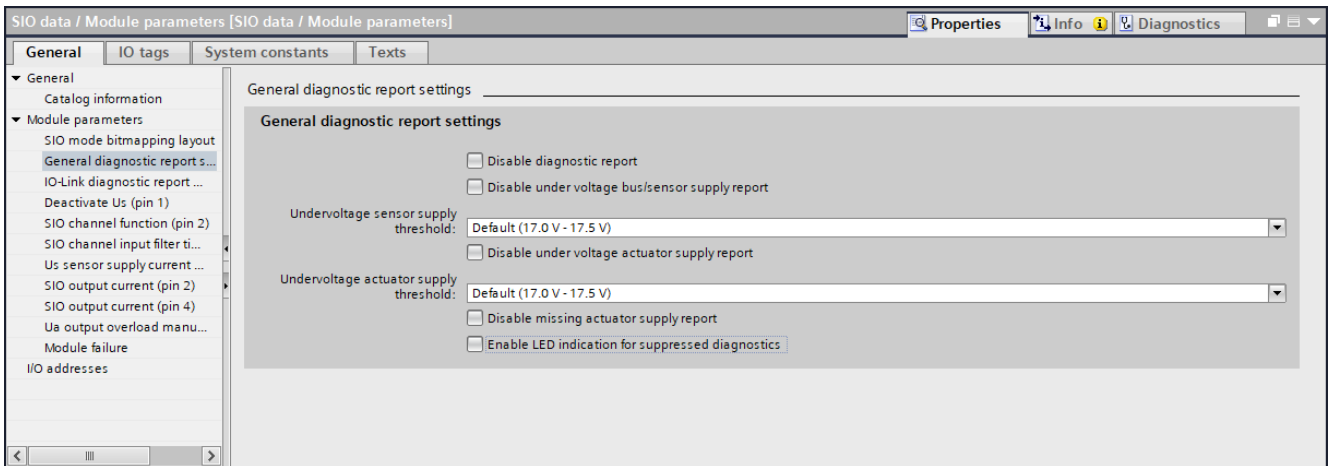


*Ill. 26:* Parameter no. 2-8 _General diagnostic messages

| No. | Parameter | Selection (D-Default) | Description |
|---|---|---|---|
| 2 | Disable diagnostics report | Off (D) | Enable diagnostic report. |
| | | On | Diagnostic report *disabled* . |
| 3 | Disable undervoltage bus/sensor supply report | Off (D) | Enable reporting undervoltage bus/sensor supply. |
| | | On | Undervoltage bus/sensor supply is *disabled* . |
| 4 | Undervoltage sensor supply threshold | 17.0 ... 17.5 V (D) | Reporting is within the selected range. |
| | | 17.5 ... 18.0 V (D) | |
| | | 18.0 ... 18.5 V (D) | |
| | | 18.5 ... 19.0 V (D) | |
| | | 19.0 ... 19.5 V (D) | |
| | | 19.5 ... 20.0 V (D) | |
| 5 | Disable missing actuator supply report | Off (D) | Reporting undervoltage of actuator supply is enabled. |
| | | On | Reporting undervoltage of actuator supply *disabled* . |
| 6 | Undervoltage actuator supply threshold | 17.0 ... 17.5 V (D) | Reporting is within the selected range. |
| | | 17.5 ... 18.0 V (D) | |
| | | 18.0 ... 18.5 V (D) | |
| | | 18.5 ... 19.0 V (D) | |
| | | 19.0 ... 19.5 V (D) | |

| No. | Parameter | Selection (D-Default) | Description |
|---|---|---|---|
| | | 19.5 ... 20.0 V (D) | |
| 7 | Disable missing actuator supply report | Off (D) | Reporting undervoltage of actuator supply is enabled. |
| | | On | Reporting undervoltage of actuator supply *disabled* . |
| 8 | Enable LED indication for suppressed diagnostics | Off (D) | Disable LED indication for suppressed diagnostics. |
| | | On | Enable LED indication for suppressed diagnostics. |

**Parameter 9**
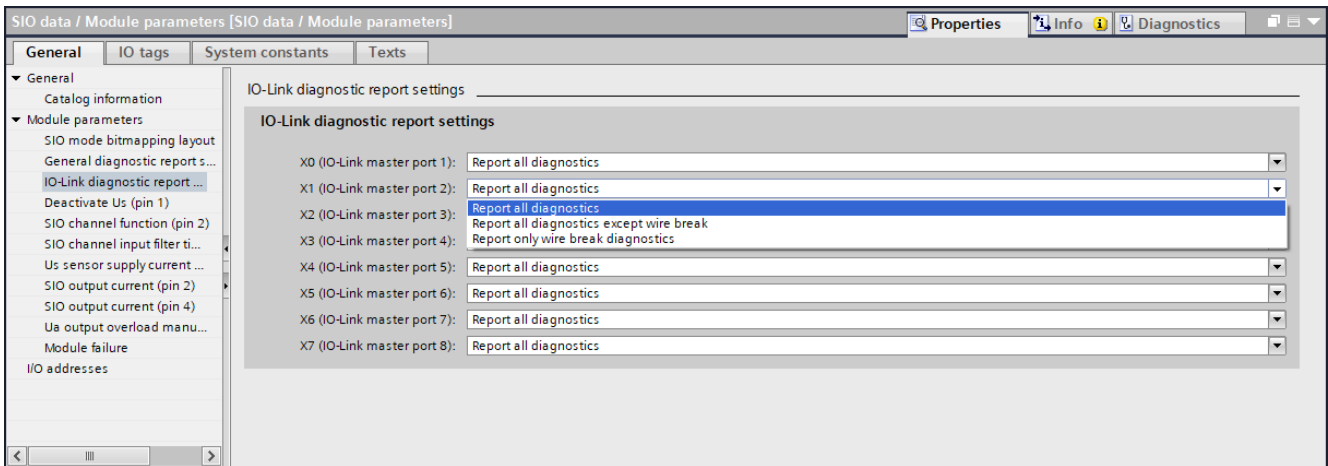


*Ill. 27:* Parameter No. 9_IO-Link diagnostics report

| No. | Parameter | Selection (D-Default) | Description |
|---|---|---|---|
| 9 | Enable IO-Link master port report | Report all diagnostics | All diagnostics are displayed |
| | | Report all diagnostics except wire break | No line break diagnostics are displayed. |
| | | Report only wire break diagnostics | Only cable break diagnoses are displayed. |

**Parameter 10**
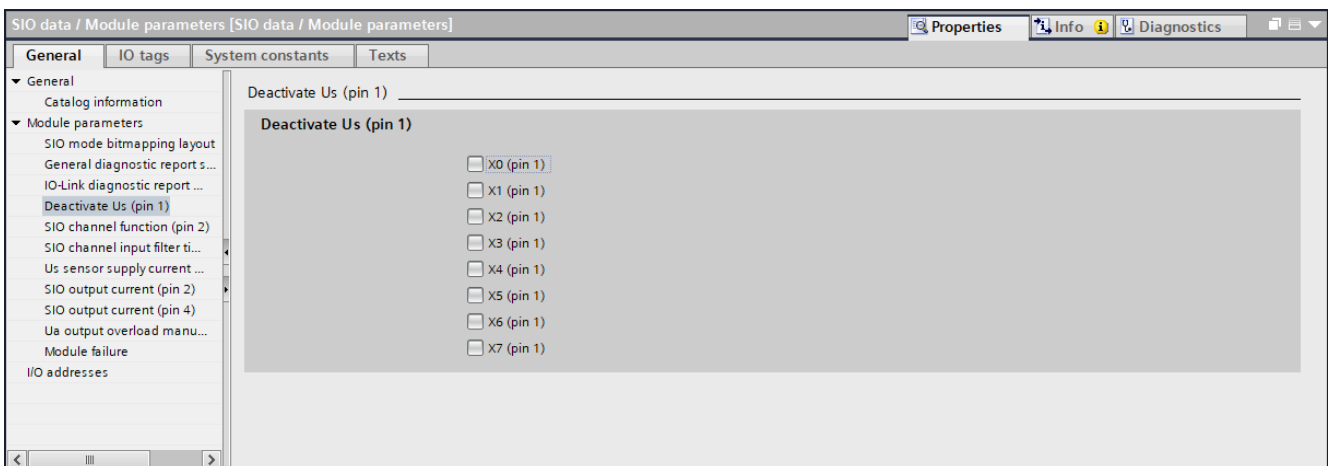


*Ill. 28:* Parameter No. 10_disable US at pin 1

| No. | Parameter | Selection (D-Default) | Description |
|-----|-----------|----------------------|-------------|
| 10 | Deactivate US (pin1) | Off (D) | Pin 1 supplies 24 VDC, e.g. for sensor supply. |
| | | On | No voltage on pin 1! |

**INFO**

Free selection of the individual port settings.

**Parameter 11**



*Ill. 29:* Parameter No. 11_SIO channel function pin 2

| No. | Parameter | Selection (D-Default) | Description |
|-----|-----------|----------------------|-------------|
| 11 | SIO channel function (pin 2) | Automatic mode (D) | Automatic configuration (automatic input or output recognition). |
| | | Digital input (normally-open NO) | Input normally closed |
| | | Output (CPU STOP =off) | Output |
| | | AUX power | Static voltage +24 V DC for supply of Class B devices. |
| | | Disabled | Disabled |

**Parameter 12**
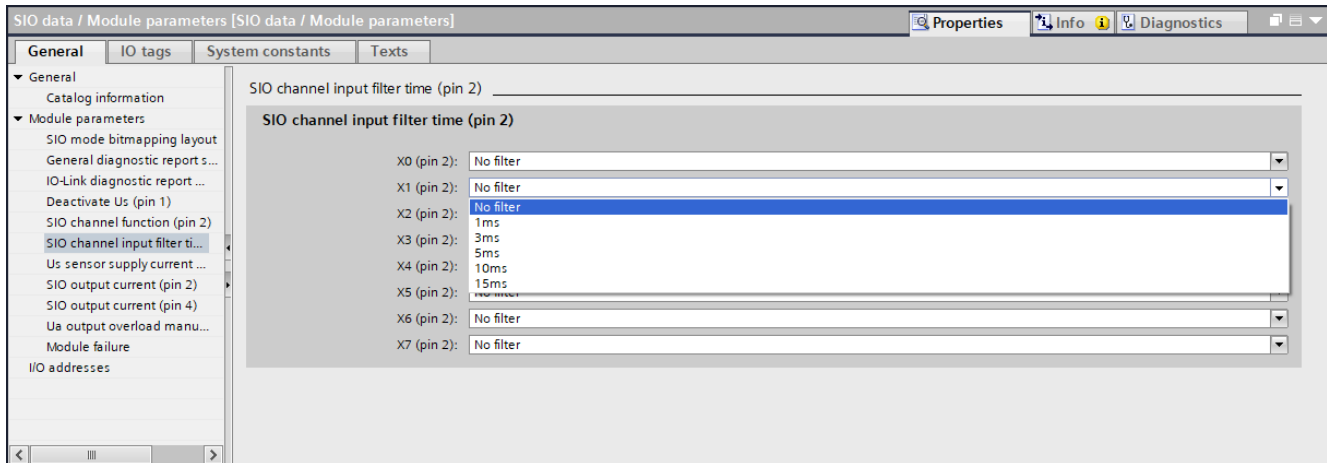


*Ill. 30:* Parameter No. 12_Input delay pin 2

| No. | Parameter | Selection (D-Default) | Description |
|---|---|---|---|
| 12 | SIO channel input filter time (pin 2) | No filter (D) | No input delay |
| | | 1 ms | Input delay 1 ms |
| | | 3 ms | Input delay 3 ms |
| | | 5 ms | Input delay 5 ms |
| | | 10 ms | Input delay 10 ms |
| | | 15 ms | Input delay 15 ms |

**INFO**

The input delay time acts as a filter that detects input signals as high only when time X is active.

**Parameter 13**
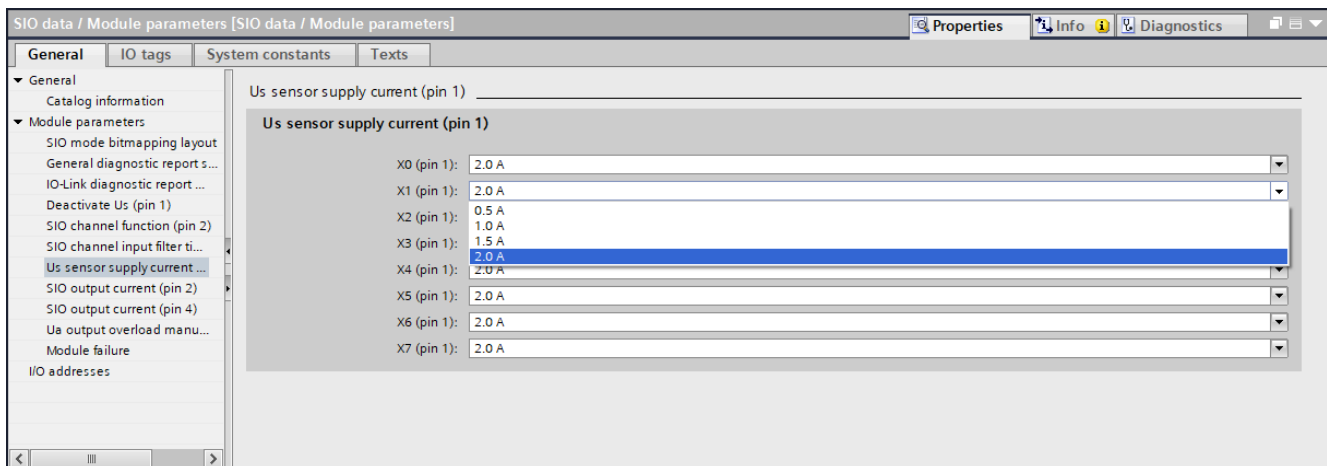


*Ill. 31:* Parameter No. 13_Rated current for pin 1

| No. | Parameter | Selection (D-Default) | Description |
|---|---|---|---|
| 13 | Ua sensor supply current (pin 1) | 2,0 A (D) | Overload of 125 % will switch off pin. |
| | | 1,5 A | |
| | | 1 A | |
| | | 0,5 A | |

**Parameter 14**



*Ill. 32:* Rated current for pin 2 at the output

| No. | Parameter | Selection (D-Default) | Description |
|---|---|---|---|
| 14 | Rated current for pin 2 at the output (SIO output current pin 4) | 2,0 A (D) | Overload of 125 % will switch off pin. |
| | | 1,5 A | |
| | | 1 A | |
| | | 0,5 A | |

**Parameter 15**



*Ill. 33:* Rated current for pin 2 at the output

| No. | Parameter | Selection (D-Default) | Description |
|---|---|---|---|
| 15 | Rated current for pin 4 at the output (SIO output current pin 4) | 2,0 A (D) | Overload of 125 % will switch off pin. |
| | | 1,5 A | |
| | | 1 A | |
| | | 0,5 A | |

**INFO**

Free parameter selection for ports X0 to X7.

**Parameter 17**
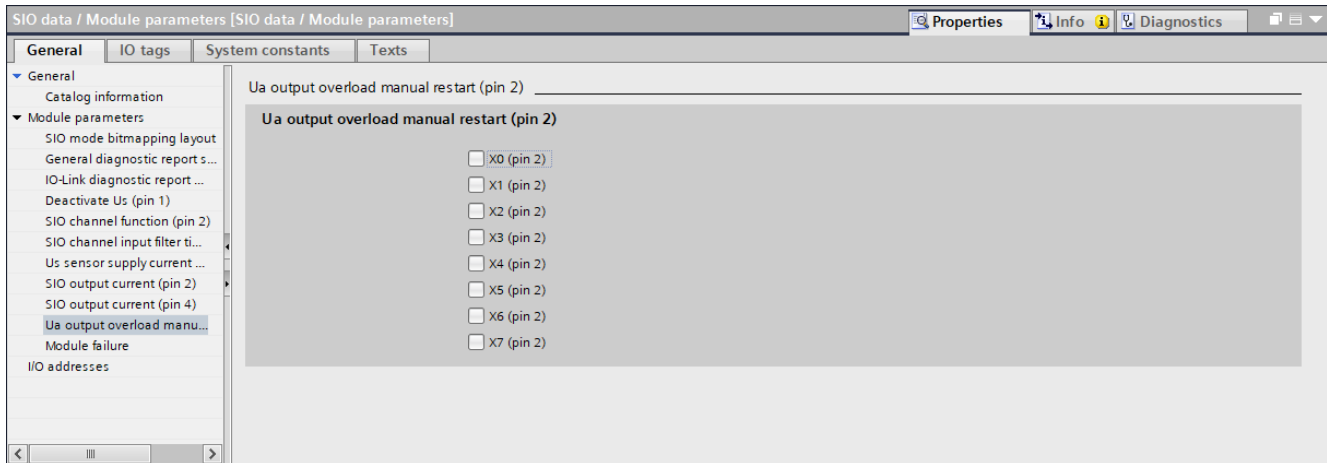


*Ill. 34:* Parameter No. 17_Manual restart pin 2 in the event of overcurrent

| No. | Parameter | Selection (D-Default) | Description |
|---|---|---|---|
| 17 | Ua output overload manual restart pin 2 | Off (D) | Autotmatic errro reset after approx. 10 seconds if error has not occurred again. |
| | | On | No error reset until the related output signal has been manuallyset to 0.<br><br>**This function is currently not available. For this reason, this parameter is not accessible.** |

**Parameter 18**
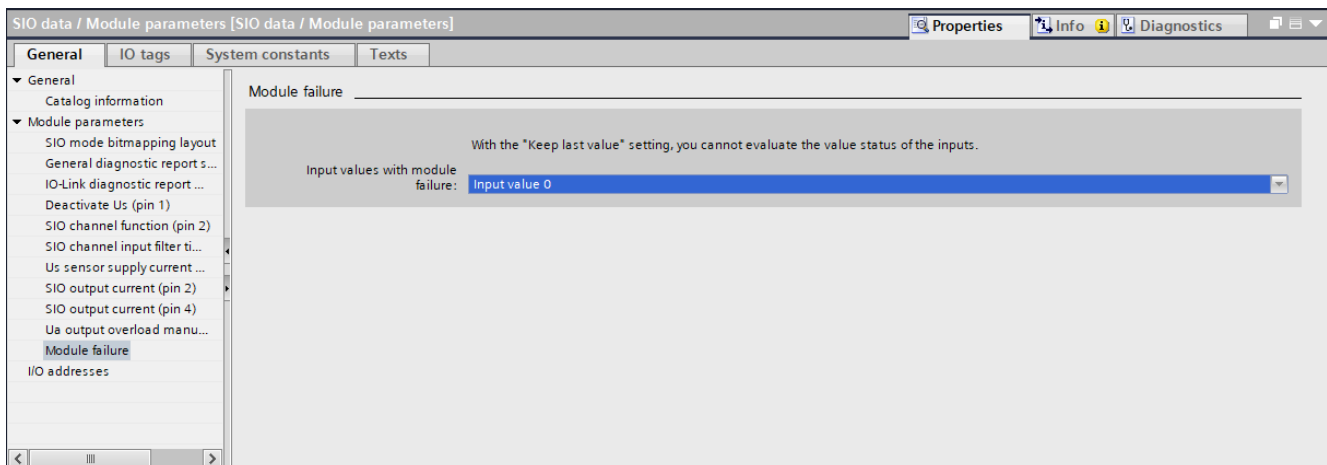


*Ill. 35:* Parameter No. 18_Input value in case of module failure

| No. | Parameter | Selection (D-Default) | Description |
|---|---|---|---|
| 18 | Input values with module failure | Input value 0 (D) | The input value is set to 0. |
| | | Keep last value | The last input value remains active. |

### 9.3.1.2        Submodule 2_Disabled

#### Parameter 19 -20



*Ill. 36:* Parameter Nor. 19-20_Module Parameters

| No. | Parameter | Selection (D-Default) | Description |
|-----|-----------|------------------------|-------------|
| 19 | Port mode | Disabled (D) | **Parameter cannot be edited!** |
| 20 | Input values with module failure | Input value 0 (D) | The input value is set to 0. |
|    |           | Keep last value | The last input value is used and not overwritten with 0. |

### 9.3.1.3 Submodul 3_Standard digital input

**Parameter 21 - 23**
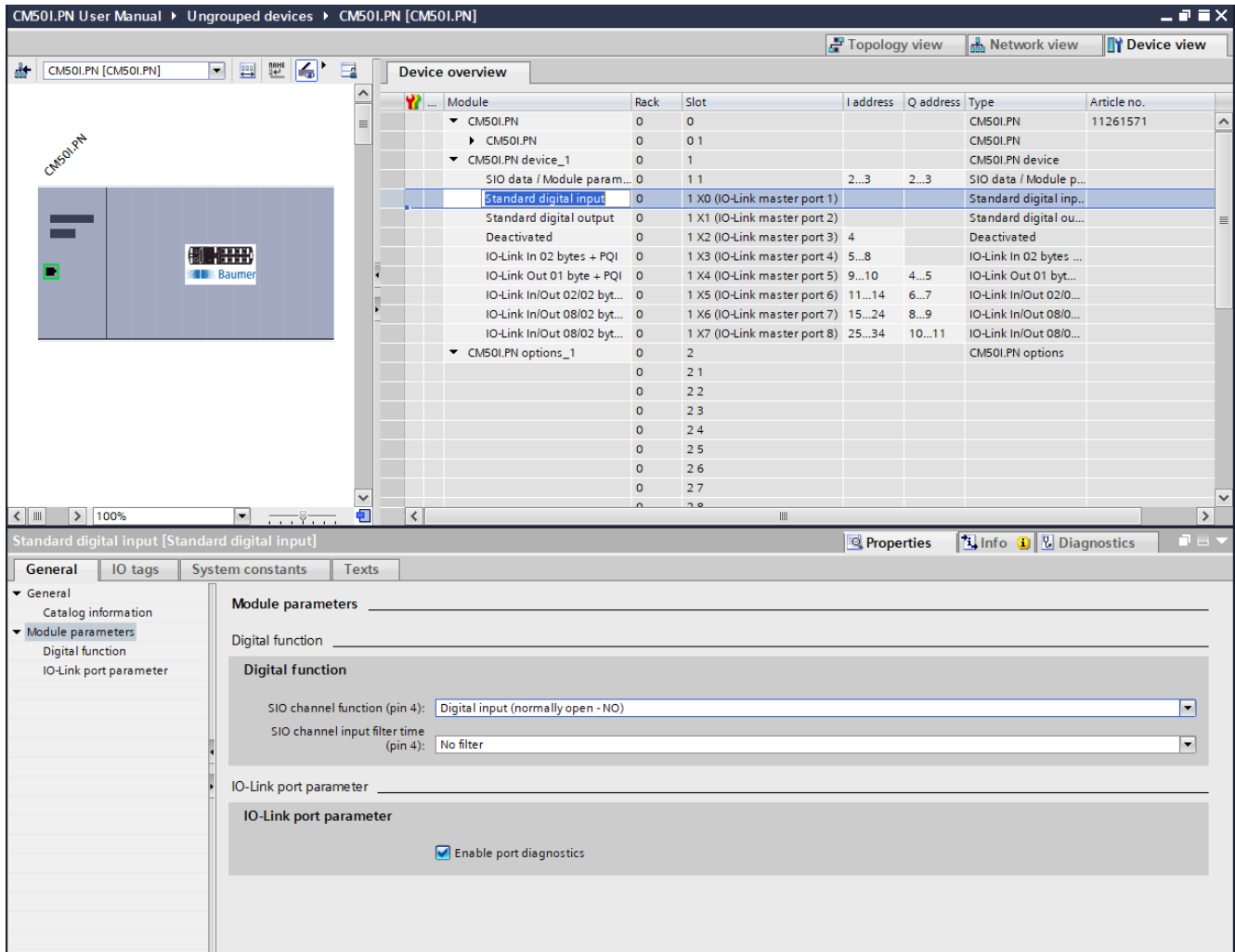


*Ill. 37:* Parameter No. 21, 22, 23_Digital input

| No. | Parameter | Selection (D-Default) | Description |
|---|---|---|---|
| 21 | SIO channel function (pin 4) | Digital input (normally open NO) (D)<br><br>Digital input (normally closed NC) | Normally open or closed |
| 22 | SIO channel input filter time (pin 4) | No filter | The input delay time acts as a filter that detects input signals as high only when time X is active. |
| 23 | Enable IO-Link port parameter report | Enable port diagnostics An (D)<br><br>Enable port diagnostics Off | Reporting of IO-Link device and IO-Link master errors.<br><br>*No* reporting of IO-Link device and IO-Link master errors. |

### 9.3.1.4          Submodul 4_Standard digital output

**Parameter 24 - 26**



*Ill. 38:* Parameter No. 24, 25, 26_Digital output

| No. | Parameter | Selection (D-Default) | Description |
|---|---|---|---|
| 24 | Static output signal at pin 4 (Output static = on (pin 4)) | Off (D) | No static output signal os active. |
| | | On | Static output signal is active. |
| 25 | Ua output overload manual restart (pin 4) | Off (D) | *Automatic* error reset after approx. 10 seconds, provided the error has not occurred again. |
| | | On | The error is only logged off after the relevant output signal has been *manually* set to 0.<br><br>**This function is currently not available. For this reason, this parameter is not accessible.** |

| No. | Parameter | Selection (D-Default) | Description |
|---|---|---|---|
| 26 | Enable IO-Link port parameter report | Enable port diagnostics On (D) | Reporting of every IO-Link device and IO-Link master error. |
| | | Enable port diagnostics Off | No reporting of IO-Link device and IO-Link master errors. |

### 9.3.1.5 Submodule 5, 6, 7

- Submodule 5 generic IO-Link modules
- Submodule 6 Profile Devices
- Submodule 7 ME devices

#### Parameter 27 - 36
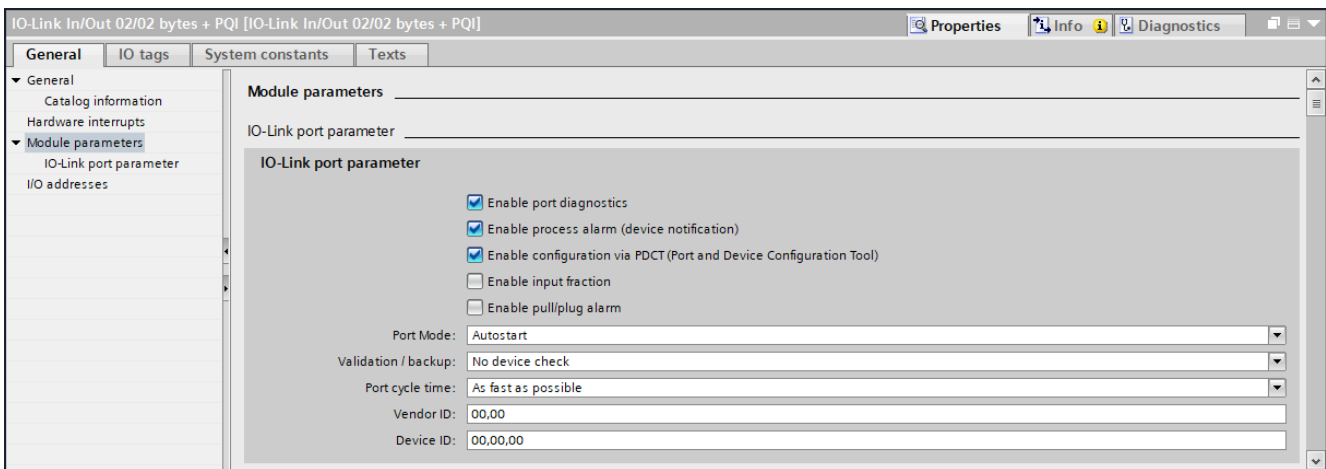


*Ill. 39:* Parameter Nr. 27 ... 36
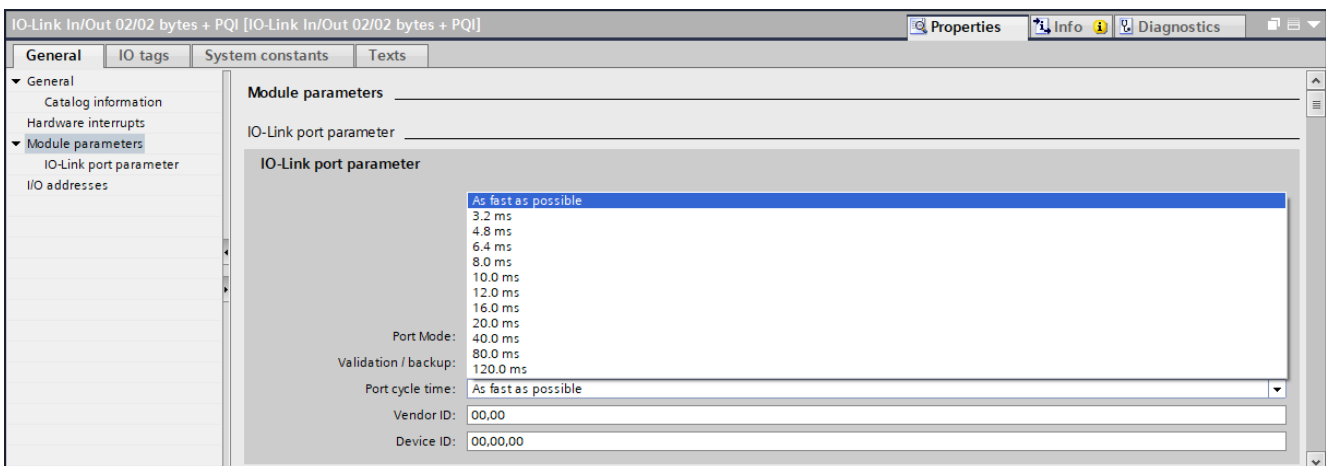


*Ill. 40:* Parameter No. 34_Cycle time

| No. | Parameter | Selection (D-Default) | Description |
|---|---|---|---|
| 27 | Enable port diagnostics report | Off | *NO* reporting of IO-Link port diagnostics. |
| | | On (D) | Reporting of IO-Link port diagnostics. |
| 28 | Enable process alarm report (device notification) | Off | *No* process alarm reporting. |
| | | On (D) | Process alarm reporting enabled. |

| No. | Parameter | Selection (D-Default) | Description |
|---|---|---|---|
| 29 | Configuration via PDCT (Enable configuration via PDCT (Port and Device Configuration Tool) | Off | *No* configuration via PDCT enabled. |
|    |    | On (D) | Configuration via PDCT enabled. |
| 30 | Enable input fraction | Off (D) | Validating input data length of the connected device. |
|    |    | On | The input data length of the connected device may exceed the configured length. However, no error report. |
|    |    |    | For more informationen see "IO-Link-data length" |
| 31 | Enable pull/plug diagnostics report | Off | *No* pull/plug diagnostics reporting if<br>■ an IO-Link device connection gets lost<br>■ a device has been identified. |
|    |    | On (D) | Pull/plug reporting enabled if<br>■ an IO-Link device connection gets lost<br>■ a device has been identified. |
| 32 | Port mode* | Autostart (D) | IO-Link mode.<br>Validity check and filter time setting not enabled. |
|    |    | Manual | IO-Link mode.<br>Validity check and filter time setting not enabled. |
|    |    | Disabled | Disabled |

| No. | Parameter | Selection (D-Default) | Description |
|---|---|---|---|
| 33 | Validation/backup* | No device check (D) | No validity checks enabled |
| | | Type compatible device (1.0) | Validity check is performed if port mode is set to Manual. Check is performed on IO-Link version 1.0. Output of diagnostics if device is not compatible. |
| | | Type compatible device (1.1) | Validity check is performed if port mode is set to Manual. Check is performed on IO-Link version 1.1. Output of diagnostics if device is not compatible. |
| | | Type compatible V1.1 device with backup + restore | Validity check is performed if port mode is set to Manual. Check is performed on IO-Link version 1.0. Output of diagnostics if device is not compatible. Restore+backup behavior as defined in the IO-Link specification, see "IO-Link_DataStorage. Option Restore" |
| | | Type compatible V1.1 device with restore | Validity check is performed if port mode is set to Manual. Check is performed on IO-Link version 1.0. Diagnostics reporting if device is not compatible. Restore behavior as defined in the IO- Link specification. |
| 34 | ☐Cycle time (Port cycle time), see "Parameter cycle time" | as fast as possible (D) | The Master and connected IO-Link module will automatically determine the shortest cycle time. |
| | | 3.2 ms | Specified filter time |
| | | 4.8 ms | Specified filter time |
| | | 6.4 ms | Specified filter time |
| | | 8.0 ms | Specified filter time |
| | | 10 ms | Specified filter time |
| | | 12 ms | Specified filter time |
| | | 16 ms | Specified filter time |
| | | 20 ms | Specified filter time |
| | | 40 ms | Specified filter time |
| | | 80 ms | Specified filter time |
| | | 120 ms | Specified filter time |
| 35 | Vendor ID* | 00, 00 | Vendor ID of the IO-Link device to be used. Will be applied in validity check. |

| No. | Parameter | Selection (D-Default) | Description |
|---|---|---|---|
| | | 2-byte list, byte by byte, separated by comman and in hexacecimal format | |
| 36 | Device ID* | 00, 00, 00<br><br>3-byte list, byte by byte, separated by comman and in hexacecimal format | Device ID of the IO-Link device to be used. Will be applied in validity check. |

**\*Submodule 7 ME devices**

Check the validity of the connected devices in submodule 7 "ME devices". Therefore the following restrictions apply to the parameter selection:

- **Port mode**
  - Parameter "Port mode" is permanently set to "Manual".
- **Validiation/backup**
  - Parameter "Validation/backup" is preset to "Type compatible device (1.1)". Only the options "Type compatible device (1.1)" and "Type compat- ible device (1.0)" can be selected.
- **Vendor ID**
  - Parameter "Vendor ID" is permanently set to the ID of the described device.
- **Device ID**
  - Parameter "Device ID" is permanently set to the ID of the described device.

**IO-Link data length**

**INFO**

Different lengths of IO-Link data are transmitted to Profinet without error.

In this case, however, part of the input data is transferred via Profinet. We expect input data length may vary (4, 6, and 8 bytes) according to sensor parameterization or profile. Sub module configuration in Profinet can define 4 input bytes and enable parameter "enable input fraction". This prevents any mismatch alarm and the first 4 bytes of the sensor are mapped to Profinet. The other bytes will be ignored.

A use case would be the IOL sensor which provides optional additional diagnostic input bytes; these would be ignored in Profinet if they are not PLC/machine. relevant. In this case, data are accessible in another way, e.g. OPC UA, MQTT, JSON.

**IO-Link-DataStorage. Option Restore**

---

**INFO**

When switching to "Restore" status, any previous device configurations stored in the device will be discarded, especially when switching from "Back- up&Restore" to "Restore".

Upon iInitial connection of a compatible device in "Restore" status:

a) Master is retrieving the DataStorage data (one-time backup) from the device,

b) saves it *and*

c) will transmit the data to every compatible device which is connected next with different con-figuration (Restore).

---

**Parameter cycle time**

**Communication cycle time**

| Selection (D = Default) | Description |
| --- | --- |
| As fast as possible (D) | The master and the IO-Link device automati-cally determine the fastest cycle time. |
| 3,2 … 128,0 ms | Set cycle time to this value. |

*Tab. 12:* Communication cycle time

The parameter cycle time defines the cycle time applied in IO-Link Master and IO-Link device r communication.

For most applications, "As fast as possible" is best. When establishing communication, master and device select the shortest possible cycle time.

Specific conditions (e.g. using inductive couplers or other intermediate devices between master and IO-Link device) may require manual setting of cycle time.

If so, select a permanent cycle time (to be supported both by master and device) to remedy the problem.

Further information on the bits used in generic IO-Link devices please refer to section *IO-Link-Ports [▸ 44]*

9.3.2      **Modul MVK Pro options**

**Submodule overview**
- Qualifier DI
- Qualifier DO
- System status
- MQTT
- OPC UA
- JSON
- Web server
- Output Forcing

**Submodule module parameters**

| No. | Sub-module | Parameter-No. | Parameter |
|-----|-----------|---------------|-----------|
| 1 | Qualifier DI | 37 | Input value in the event of module failure |
| 2 | Qualifier DO | | |
| 3 | Systemstatus | | |
| 4 | MQTT | 38 | Activation |
| | | 39 | Server IP-Adresse |
| | | 40 | Client ID |
| | | 41 | Client head topic |
| | | 42 | Topic for system data |
| 5 | OPC UA | 43 | Activation |
| | | 44 | TCP port number |
| | | 45 | Writing of ISDU data |
| | | 46 | Writing of PDO data |
| 6 | JSON | 47 | Activation |
| 7 | Web server | 48 | Activation |
| 8 | Output Forcing | 49 | Forcing rules |

*Tab. 13:* Overview on submodule parameters 37 ... 49

### 9.3.2.1 Submodule 1-3

- Submodule Qualifier DI
- Submodule Qualifier DO
- Submodule System Status

**Parameter 37**
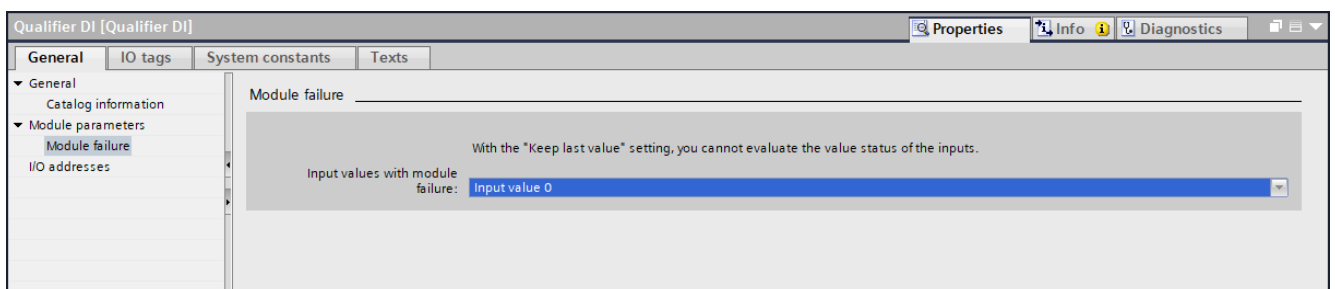


*Ill. 41:* Parameter no. 37

| No. | Parameter | Selection (D-Default) | Description |
|-----|-----------|----------------------|-------------|
| 37 | Input values with module failure | Input value 0 (D) | The input value is set to 0. |
| | | Keep last value | The last input value is applied and will not be overwritten by 0. |

### 9.3.2.2 Submodule 4_MQTT

#### Parameter 38
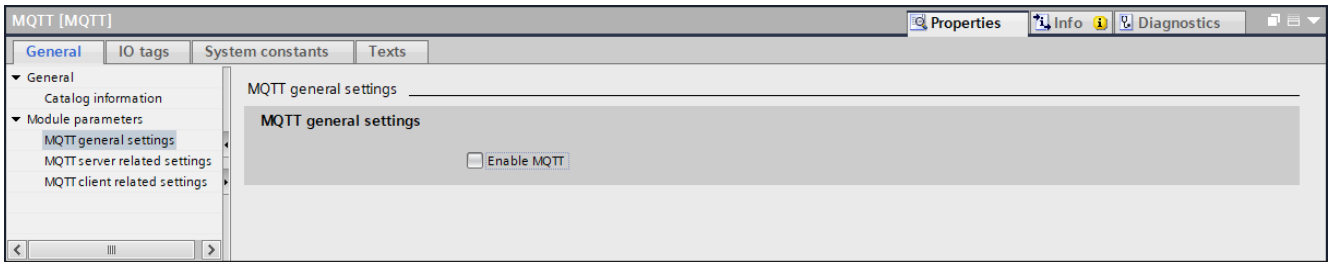


*Ill. 42:* Parameter no. 38_General settings

| No. | Parameter | Selection (D-Default) | Description |
|---|---|---|---|
| 38 | Enable MQTT | Off (D) | MQTT is *not* available. |
| | | On | MQTT is available. |

#### Parameter 39
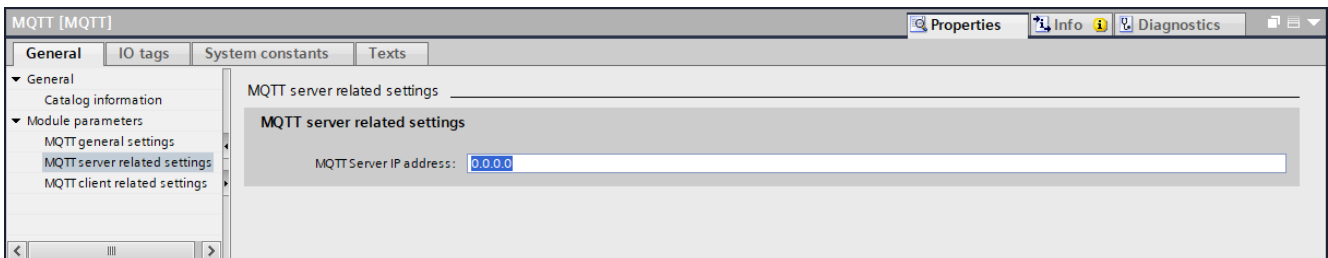


*Ill. 43:* Parameter No. 39_Server IP address

| No. | Parameter | Selection (D-Default) | Description |
|---|---|---|---|
| 39 | MQTT Server IP-Address | 0.0.0.0 | MQTT server IP address. |

#### Parameter 40-42
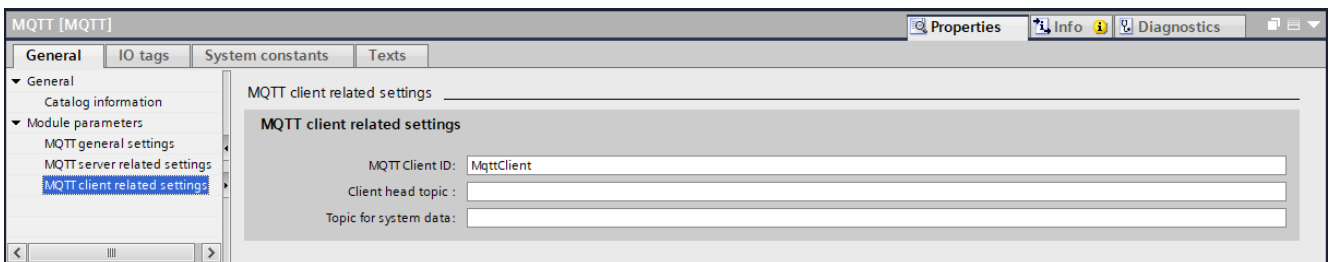


*Ill. 44:* Parameter 40, 41, 42_Client settings

| No. | Parameter | Selection (D-Default) | Description |
|---|---|---|---|
| 40 | MQTT Client ID | MqttClient | ID des MQTT Clients |
| 41 | Client head topic | | Client head topic |
| 42 | Topic for system data | | Not applied! |

### 9.3.2.3    Submodul 5_OPC UA

**Parameter 43-46**
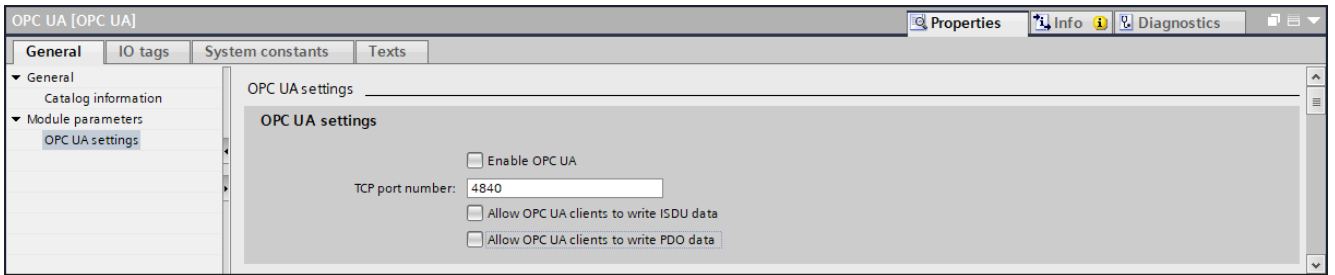


*Ill. 45:* Parameter 43, 44, 45, 46_OPC UA

| No. | Parameter | Selection (D-Default) | Description |
|-----|-----------|----------------------|-------------|
| 43 | Enable OPC UA | Off (D) | Disabled. OPS UA *not* available. |
| | | On | Enabled. OPC UA is available |
| 44 | TCP port number | 4840 | TCP port number |
| 45 | Allow OPC UA clients to write ISDU data | Off (D) | Disabled |
| | | On | Enabled |
| 46 | Allow OPC UA clients to write PDO data | Off (D) | Disabled |
| | | On | Enabled |

### 9.3.2.4    Submodul 6_JSON

**Parameter 47**
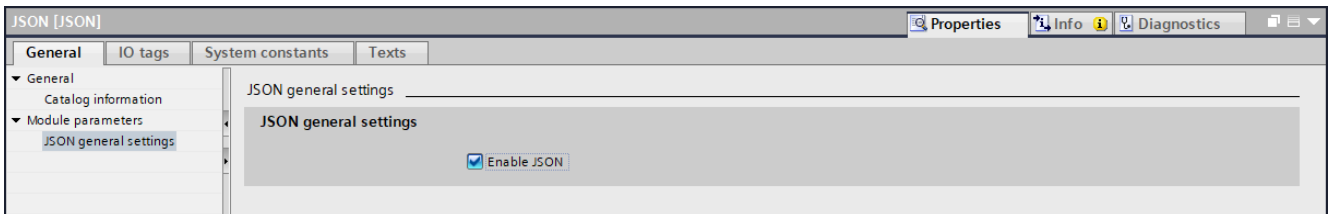


*Ill. 46:* Parameter no. 47_General settings

| No. | Parameter | Selection (D-Default) | Description |
|-----|-----------|----------------------|-------------|
| 47 | Enable JSON | Off (D) | Disabled. JSON *not* available. |
| | | On | Enabled. JSON available. |

### 9.3.2.5    Submodul 7_Webserver

**Parameter 48**
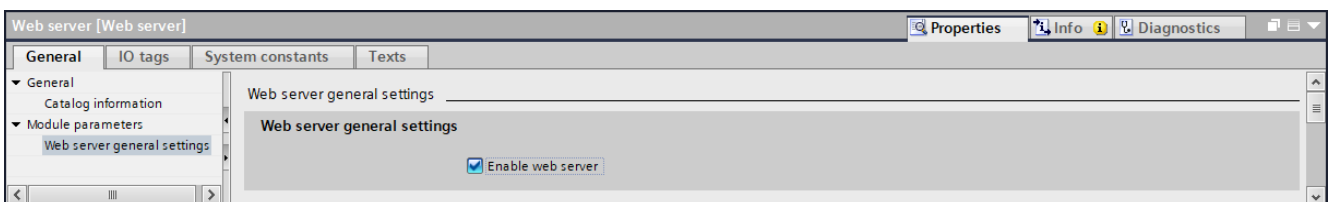


*Ill. 47:* Parameter No. 48_enable web server

| No. | Parameter | Selection (D-Default) | Description |
|-----|-----------|----------------------|-------------|
| 48 | Enable web server | Off (D) | Disabled. Web server *not* available. |
|  |  | On | Enabled. Web server available. |

### 9.3.2.6    Submodul 8_Output Forcing

**Parameter 49**
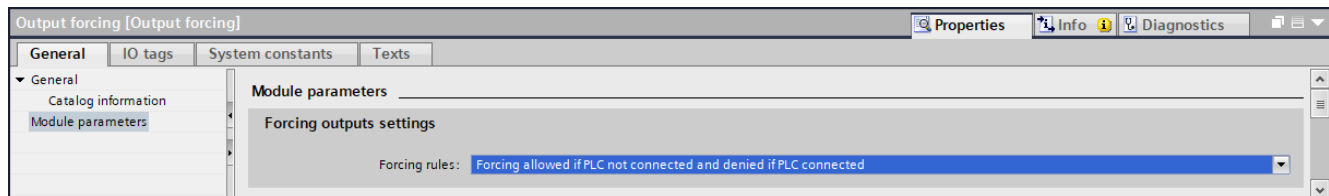


*Ill. 48:* Parameter No. 49_Forcing rules

💡 **INFO**

**Output Forcing:**

Instead of transferring the controller process data, the data set via Output Forcing is transferred to the outputs. Output Forcing is accessible via Website or OPC UA.

Enable Output Forcing is only feasible if the set forcing rules are met.

| No. | Parameter | Selection (D-Default) | Description |
|-----|-----------|----------------------|-------------|
| 49 | Forcing rules | Output forcing:<br>▪ permitted if no PLC connection established<br>▪ not permitted if PLC connection established (D) | Output forcing of the output data is only allowed with no PLC connection established. |
|  |  | Output forcing permitted | Output forcing is *always permitted* , no matter what is the PLC connection status. |
|  |  | Output forcing not permitted | Output forcing is *never permitted,* no matter what is the PLC connection status. |

## 9.4    IO-Link configuration

**IO-Link configuration**

Module *CM50I.PN* provides two ways for for IO-Link device configuration and parameterization:
▪ IO-Link parameterization via *PROFINET*
▪ *Baumer Sensor Suite (BSS)*

**IO-Link-Integration in *PROFINET***

IO-Link integration in *PROFINET* is a standardized method for accessing IO-Link device parameterization and configuration via *PROFINET* interfaces.

*CM50I.PN* supports integration V1.0 Edition 2*.*

> **INFO**
>
> For further information please see document *IO-Link-Integration-for-PROFINET_Ed2_2_832_V10_Jun17*.

**Baumer Sensor Suite (BSS)**

*BSS* allows for IO-Link device parameterization.

IO-Link data is visualized via a graphical interface and the parameterization of the device is made possible in the simplest possible way.

> **INFO**
>
> Software *Baumer Sensor Suite (BSS)* and the corresponding manual is available at *Baumer* website https://www.baumer.com/bss.

## 9.5 Cyclic and acyclic communication

The IO-Link specification defines three types of data in the transmission between IO-Link master and IO-Link device:

- Cyclic process data (process data objects input/output)
- Acyclic data as device data (on-request data objects)
- Acyclic data as events

Process data objects and their port qualifiers are transmitted cyclically once communication has been established.

Each IO-Link port enables individual parameterization of the transmission time as IO-Link cycle time (parameter *cycle time*).

Process data of the connected device may include 0 to 32 bytes (each input and output) and are transmitted via the set range of addresses.

The device defines the process data size. The port qualifier indicates whether process data is valid.

Device data (on-request data objects) comprise:

- Device parameters
- I&M data records (Identification & Maintenance)
- Diagnostic information

Device data can be written to the device as parameters or read out from the device as device status. Transmission is acyclically and on IO-Link Master request only.

IO-Link events are error messages and warnings/maintenance data.

The device flagging an event is followed by the IO Link master request for diagnostic data. *CM50I.PN* transmits diagnostics data via fieldbus to the control.

For more information on device diagnostics and IO-Link event codes please see chapter Kap. 9.2.3.1 "Description according IO-Link directive of integration edition 2" beschrieben.. ".

### 9.5.1    Acyclic IO-Link access

Acyclic access to different data sections in the IO-Link master or access to IO-Link device data utilizes PN-IO read/write services:

- Read/Write services for I&M data in Master and IO-Link devices.
- IO-Link function block IOL_Call with ISDU (Index Service Data Unit)
    - IOL_Index 0x0000 – 0x7FFF and IOL_Subindex 0x00 – 0xFF

(See: IO-Link Integration Part1 2812_V100_080124 and IO-Link Integration for PROFINET_Ed2_2832_V10_Jun17).

The IO-Link function block supports the following tasks:

- IO-Link device parameterization,
- IO-Link device diagnostics,
- Execute IO-Link port functions,
- save and recover IO-Link device parameters.

The IO-Link function block is provided by the controller manufacturer (e.g. Siemens FB IO_Link_Device for TIA Portal), see chapter 8.5.3 "IO-Link Funktion block".

**INFO**

For more information please refer to the instruction manual of the related control manufacturer.

### 9.5.2    I&M-Daten

I&M data acyclic reading may be any time in order to identify the system-installed devices. The system-specific description, location, function and date of installation can be written to the module.

The module supports the following I&M data records:

- IM_Index = 0xAFF0 -> Read access to IM0 IOL_M
- IM_Index = 0xAFF1 -> Read access to IM1 IOL_M
- IM_Index = 0xAFF2 -> Read access to IM2 IOL_M
- IM_Index = 0xAFF3 -> Read access to IM3 IOL_M
- IM_Index = 0xAFF4 -> Read access to IM4 IOL_M
- IM_Index = 0xB063 -> Read access to IOL_M Directory

**I&M0 (Slot0, Index 0xAFF0)**

| I&M0 Data | Size in bytes/access (read/write) | Description |
|---|---|---|
| VendorID | 2 / r | Manufacturer ID |
| OrderID | 20 / r | Product name |
| IM_Serial_Number | 16 / r | Device serial number |
| IM_Hardware_Revision | 2 / r | Device hardware revision |
| IM_Software_Revision | 4 / r | Device software revision (V0.0.0) |
| IM_RevisionCounter | 2 / r | Revision counter |

| I&M0 Data | Size in bytes/access (read/write) | Description |
|---|---|---|
| IM_Profile_ID | 2 / r | ID IO-Link sub module profile (API = 0x4E01) |
| IM_Profile_Specific_Type | 2 / r | Additional profile value (= 0 not used) |
| IM_Version | 2 / r | I&M-Version (Default 0x0101) |
| IM_Supported | 2 / r | Supported I&M data records (e.g. 0x0001 -> only I&M0 is supported) |

*Tab. 14:* I&M0 data record

**I&M1 (Slot0, Index 0xAFF1)**

| I&M1 Data | Size in bytes/access (read/write) | Description |
|---|---|---|
| TagFunction of submodule | 32 / r/w | Device function |
| TagLocation of submodule | 22 / r/w | Device location within the system |

*Tab. 15:* I&M1 data record

**I&M2 (Slot0, Index 0xAFF2)**

| I&M2 Data | Size in bytes/access (read/write) | Description |
|---|---|---|
| Installation_Date | 16 / r/w | Device installation date |

*Tab. 16:* I&M2 data record

**I&M3 (Slot0, Index 0xAFF3)**

| I&M3 Data | Size in bytes/access (read/write) | Description |
|---|---|---|
| Descriptor | 54 / r/w | Device description |

*Tab. 17:* I&M3 data record

**Reading of I&M data record**

**Function block RDREC_Instance in the TIA portal**

| Website |
|---|
| http://support.industry.siemens.com |

Example: I&M Index 0xAFF0



*Ill. 49:* Function Block RDREC_Instance

| RDREC block | Functionality |
|---|---|
| RDREC_Instance | This function block is used |

| RDREC block | Functionality |
|---|---|
| | ▪ for acyclic reading via S7-program I&M data |

### 9.5.3    IO-Link function block

**IO_LINK_DEVICE function block in TIA Portal**

The IO-Link function block is included in the library *IO_LINK_Library_V14.zal14*.

| Library | Website |
|---|---|
| IO_LINK_Library_V14.zal14 | http://support.industry.siemens.com |

Function block **IO_LINK_DEVICE** in the TIA Portal is similar to *IOL_CALL*. *IOL_CALL* is defined in the IO-Link specification.



*Ill. 50:* Function block IO-Link device

| IO-Link block | Functionality |
|---|---|
| IO_LINK_DEVICE | This function block is used<br><br>▪ for acyclic writing of device parameters to an IO-Link device via S7 program<br><br>▪ for reading parameters, measured values and diagnostic data from an IO-Link device |

**Input parameters**

| Parameter | Data type | Description |
|---|---|---|
| REQ | BOOL | Positive edge: initiate data transmission |
| ID | HW_IO | For **S7-1200/1500**<br><br>Hardware ID of the IO-Link communication module |
| | DWORD | For **S7-300/400**<br><br>Logical address of the IO-Link communication module (module or sub module) |
| CAP | DINT<br>(S7-1200/1500)<br>INT<br>(S7-300/400) | Client Access Point (CAP = 0xB400) |
| RD_WR | BOOL | Read or write access<br><br>0: read<br><br>1: write |
| PORT | INT | Port number the IO-Link device is operated at. Permitted values: 0 ... 63<br><br>Port 0 IO-Link Master Modul;<br><br>Port 1 IO-Link device on port 1, etc. |

| Parameter | Data type | Description |
|---|---|---|
| IOL_INDEX | INT | Number of IO-Link index to be read out or de-scribed |
| IOL_SUBINDEX | INT | Number of IO-Link sub index to be read out or de-scribed;<br><br>0: entire record<br><br>1 ... 255: parameter of record |
| LEN | INT | Length of data to be written (net data) Read: 0 ... 232 (not relevant)<br><br>Wrote 1 ... 232 |

*Tab. 18:* IO_LINK_DEVICE Input parameters

**Output parameters**

| Parameter | Data type | Description |
|---|---|---|
| DONE_VALID | BOOL | Validity:<br><br>0: data not valid<br><br>1 = data valid |
| BUSY | BOOL | Order in progress:<br><br>0: order completed (valid or error)<br><br>1: Order in progress |
| ERROR | BOOL | Error status:<br><br>0: no error<br><br>1: aborted with error |
| STATUS | DWORD | ERROR = 1 -> function error, see table 8-19: "IO_LINK_DEVICE<br><br>- Parameter STATUS" and Tab. 8-20: "IO_LINK_DEVICE - Parameter STATUS error code"<br><br>ERROR = 0 -> status of function DW#16#000x0000<br><br>(x: processing step 0 ... 3) |
| IOL_STATUS | DWORD | ERROR = 1 -> IO Link error or communication er-ror, see tab. 8-21: "IOL M Error Codes" |
| RD_LEN | INT | Length of the read data (net data) |

*Tab. 19:* IO_LINK_DEVICE Output parameters

**Input and output parameters**

| Parameter | Data type | Description |
|---|---|---|
| RECORD_IOL_DATA | ARRAY [0 ... 231] of BYTE | Source and target areas for the data to be read and to be written |

*Tab. 20:* IO_LINK_DEVICE Input and output paramters

**Parameter STATUS**

The STATUS is composed of 4 bytes:

| Byte 3 | Byte 2 | Byte 1 | Byte 0 |
|---|---|---|---|
| Manufacturer-specific ID | 0x80<br><br>defines error as acyclic communication error | **STATUS Code** | Manufacturer-specific ID |

*Tab. 21:* IO_LINK_DEVICE - Parameter STATUS

| Status-Code | Name | Description |
|---|---|---|
| 0xFF000000 | TIMEOUT | Internal error module communication error |
| 0x00FFFF00 | INVALID_HANDLE | |
| 0x00FFFE00 | HANDLE_OUT_OF_ BUFFERS | |
| 0x00FFFD00 | HANDLE_DESTINATION_ UN-AVAILABLE | |
| 0x00FFFC00 | HANDLE_UNKNOWN | |
| 0x00FFFB00 | HANDLE_METHOD_ INVALID | |
| 0xxx80A0xx | MASTER_READ_ERROR | Reading error |
| 0xxx80A1xx | MASTER_WRITE_ ERROR | Writing error |
| 0xxx80A2xx | MASTER_MODULE_ FAILURE | IO-Link master failure, potential bus error |
| 0xxx80A6xx | MASTER_NO_DATA | No data received |
| 0xxx80A7xx | MASTER_BUSY | IO-Link master busy |
| 0xxx80A9xx | MASTER_FEA-TURE_NOT_SUPPORTED | Feature not supported by IO-Link Master |
| 0xxx80AAxx | MASTER_RESOURCE_ UN-AVAILABLE | IO-Link Master not available |
| 0xxx80B0xx | ACCESS_INVALID_INDEX | Index invalid, incorrect *INDEX_CAP* |
| 0xxx80B1xx | AC-CESS_WRITE_LENGTH_ER-ROR | Module cannot process data length to be written, maybe you are addressing the wrong module |
| 0xxx80B2xx | ACCESS_INVALID_ DESTINA-TION | Incorrect slot addressing |
| 0xxx80B03xx | ACCESS_TYPE_CONFLICT | *IOL_CALL* invalid |
| 0xxx80B5xx | ACCESS_STATE_CONFLICT | error in sequence *IOL_CALL* |
| 0xxx80B6xx | ACCESS_DENIED | Access denied by IO-Link Master block |
| 0xxx80C2xx | RESOURCE_BUSY | IO-Link Master module busy resp. await-ing reply of connected IO-Link device |
| 0xxx80C3xx | RESOURCE_UNAVAILABLE | |
| 0xxx8901xx | INPUT_LEN_TOO_SHORT | The index to be read contains more data than specified in input variable *LEN* |

*Tab. 22:* IO_LINK_DEVICE - Parameter STATUS error code

**IOL_STATUS**

The IOL_STATUS comprises the 2-byte IOL M error code and 2-byte IOL error type.

FB IO_LINK_DEVICE - Parameter IOL_STATUS / IOL M Error Codes

**IOL M Error Codes (2 bytes)**

| Error Code | Designation according to specification. | Description |
|---|---|---|
| 0x0000 | No error | no error |
| 0x7000 | IOL_CALL conflict | Unexpected write request, read request expected |
| 0x7001 | Wrong IOL_CALL | Decoding error |
| 0x7002 | Port blocked | Port blocked by another task |
| ... | Reserved | - |
| 0x8000 | Timeout | Timeout, IOL master or IOL device ports busy |
| 0x8001 | Wrong index | Error: IOL index specified <32767 or >65535 |
| 0x8002 | Wrong port address | Port address not available |
| 0x8003 | Wrong port function | Port function not available |
| ... | Reserved | - |

*Tab. 23:* IOL M Error Codes

FB IO_LINK_DEVICE - Parameter IOL_STATUS / IOL Error Types

**IOL Error Types (2 bytes)**

| Error Code | Designation according to specification. | Description |
|---|---|---|
| 0x1000 | COM_ERR | Communication error<br><br>Potential cause:<br><br>The addressed port is parameterized as DI and not in IO-Link mode |
| 0x1100 | I_SERVICE_TIMEOUT | Communication timeout, maybe device reply delayed |
| 0x5600 | M_ISDU_CHECKSUM | Master is reporting checksum error, device not accessible |
| 0x5700 | M_ISDU_ILLEGAL | Device cannot process master request |
| 0x8000 | APP_DEV | Device application error |
| 0x8011 | IDX_NOTAVAIL | Index not available |
| 0x8012 | SUBIDX_NOTAVAIL | Subindex not available |
| 0x8020 | SERV_NOTAVAIL | Service temporarily unavailable |
| 0x8021 | SERV_NOTAVAIL_LOCCTRL | Service temporarily unavailable, device busy (e.g. on-device teaching/ parametrization is active) |
| 0x8022 | SERV_NOTAVAIL_DEVCTRL | Service temporarily unavailable, device busy (e.g. device teaching/parameterization via DTM/PLC etc is active) |
| 0x8030 | PAR_VALOUTOFRNG | Parameter value outside valid range |
| 0x8031 | PAR_VALGTLIM | Parameter value exceeds maximum limit |
| 0x8032 | PAR_VALLTLIM | Parameter value below minimum limit |

**IOL Error Types (2 bytes)**

| Error Code | Designation according to specification. | Description |
|---|---|---|
| 0x8033 | VAL_LENOVRRUN | Length of the data to be written does not match the defined parameter length |
| 0x8034 | VAL_LENUNDRUN | |
| 0x8035 | FUNC_NOTAVAIL | Function in device unavailable |
| 0x8036 | FUNC_UNAVAILTEMP | Function in device temporarily unavailable |
| 0x8040 | PARA_SETINVALID | Set parameter invalid: May not match the general device parameterization |
| 0x8041 | PARA_SETINCONSIST | Set parameter not consistent |
| 0x8082 | APP_DEVNOTRDY | Application not ready, device busy |
| 0x8100 | UNSPECIFIC | Manufacturer-specific according to device documentation |
| 0x8101 bis 0x80FF | VENDOR_SPECIFIC | |

*Tab. 24:* IOL Error Types

## 9.6 Basic settings

### 9.6.1 Topology

*PROFINET* offers numerous functions as well as options for diagnostics and maintenance based on the existing topology or utilizing knowledge of this topology.

All *CM50I.PN* support the topology settings and automatic topology recognition by the Engineering Tool.

The section below describes how to set the *CM50I.PN* topology. The settings for connected neighboring devices are made via the ports **X1 P1** and **X1 P2**, which represent the physical interfaces.

Tab **Port interconnection** | **Partner port** provides under menu item **Partner port** a list of all ports for the devices in the project.
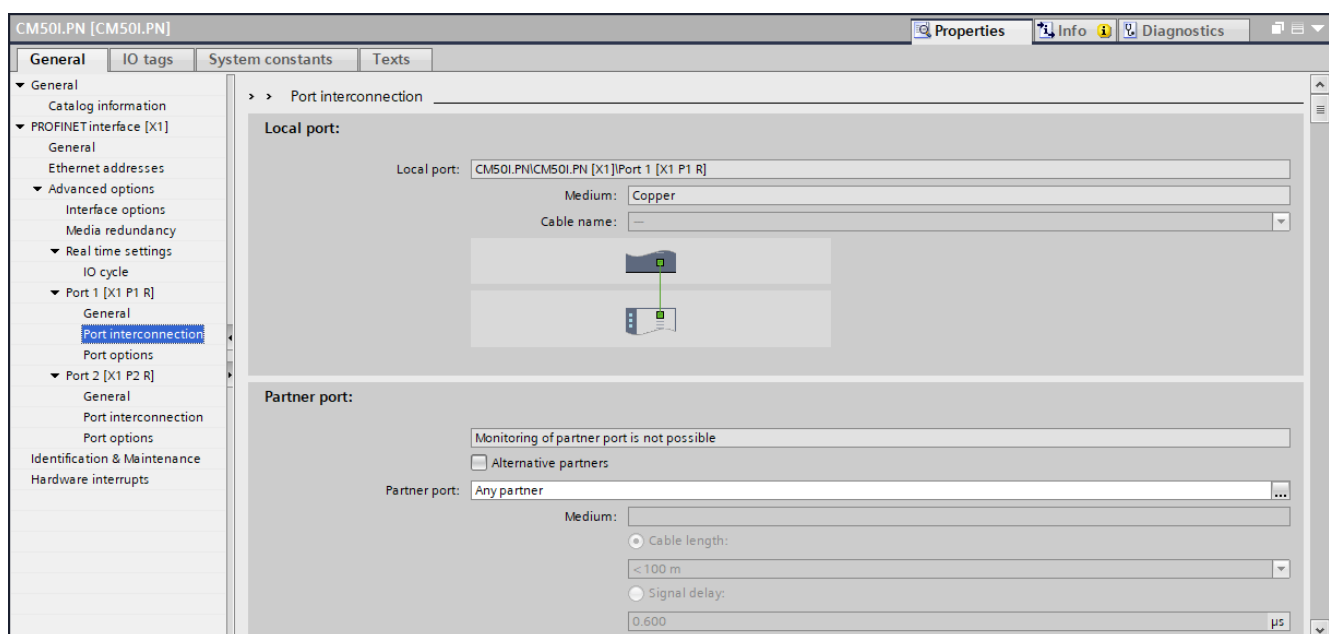


*Ill. 51:* Topology description
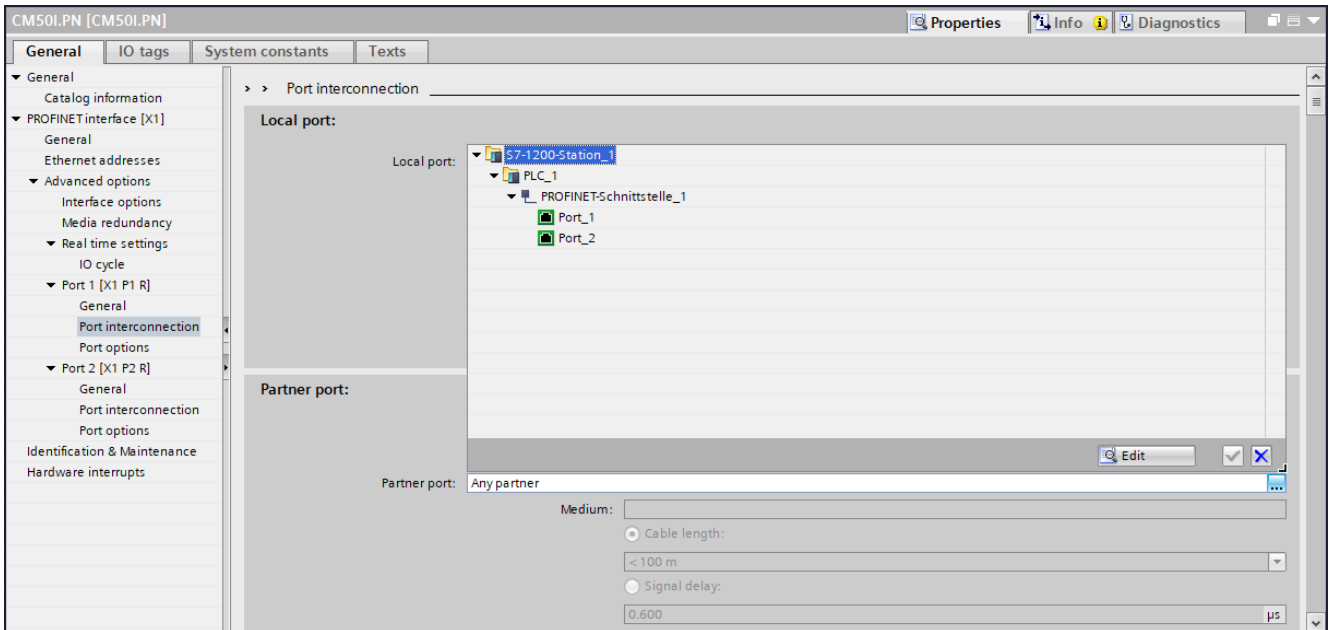
*Ill. 52:* Topology description

**Module identification in the network**

PNIO devices identify by ther MAC address and the respective module type.

Putting several modules of the same type into operation requires them to be clearly differentiated from one another.

Using the following path and selecting the *PN/IE_1* network in the network view, you can search for available users *Online* | *Assign PROFINET device name*.
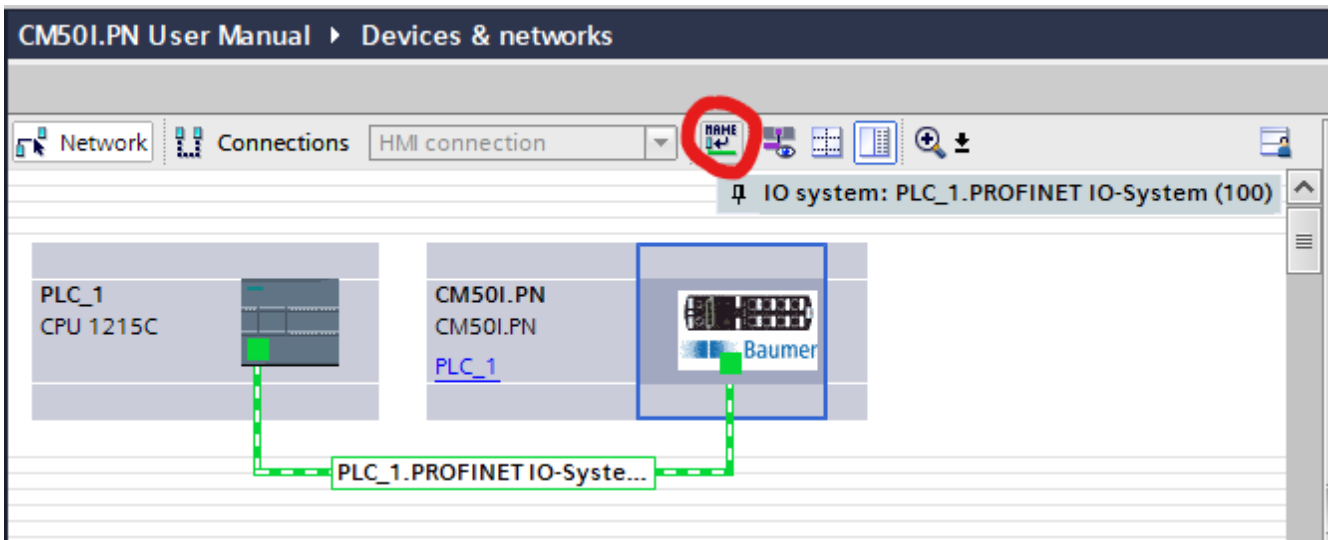


*Ill. 53:* Identify individual modules in the network
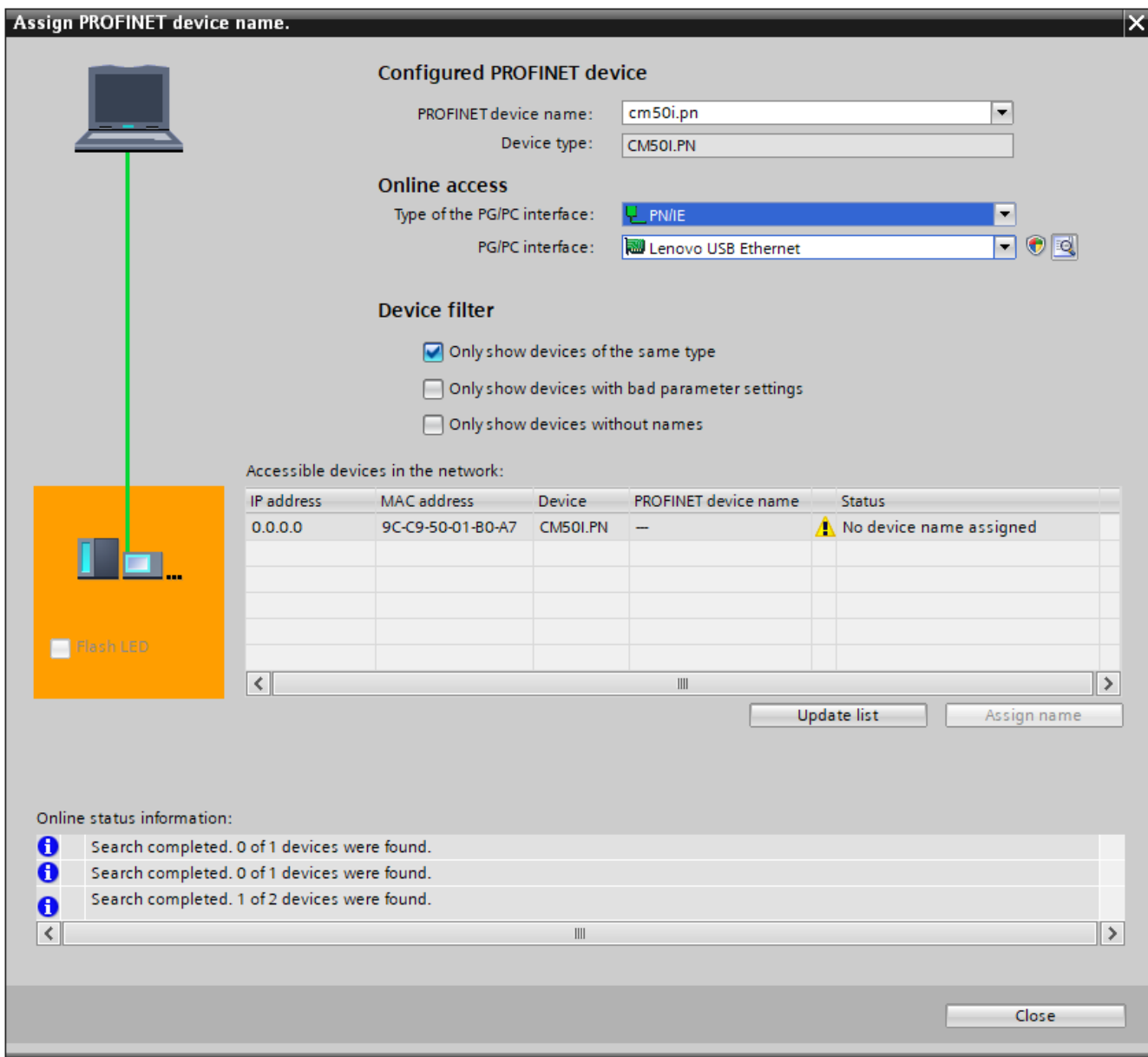
*Ill. 54:* Identify individual modules in the network

Device identifies by flashing. The LEDs of the selected *CM50I.PN* start flashing.

**Instruction:**

a) | Mark the available module.

b) Select option **LED flashing**.

**Also see about this**

📄 LED indicator [ ▶ 115]

9.6.2           **PROFINET device name**

**Assigning the PROFINET device name**

Once having clearly identified a module, you can assign it a name.

The PNIO controller will automatically assign the IP addres via *DCP (Discovery and Configuration Protocol)*.

Address and name resolution are only managed via the name remanently saved in this module.

*Instruction:*

a) Select module.

b) Click *Assign name*.
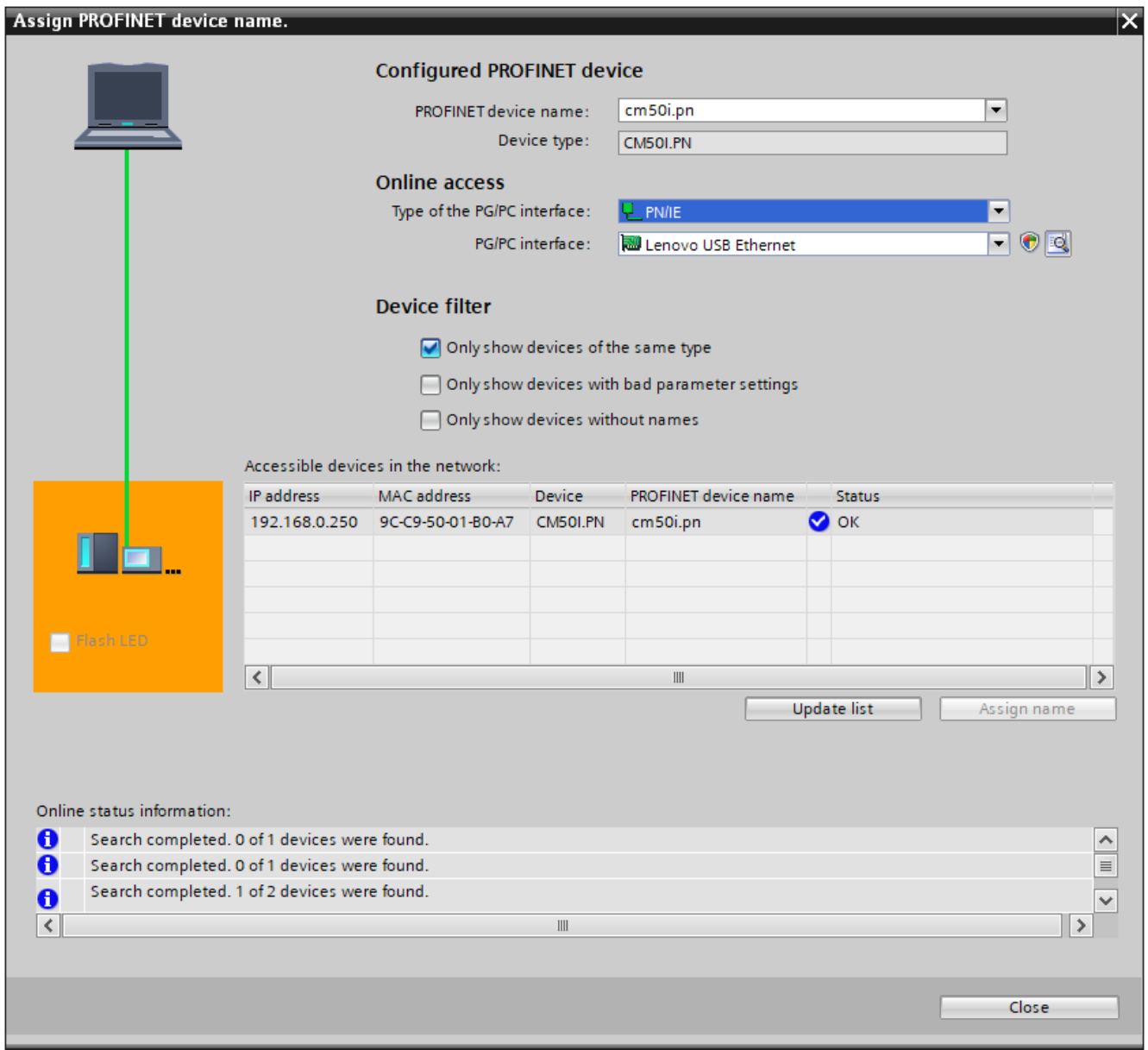


*Ill. 55:* PROFINET device name

**TIA Portal** now indicates the module *CM50I.PN* and the new assigned device name..

**IP address assignment**

You can assign an IP address to module *CM50I.PN* which will not be stored in the module. To do so, enter the required IP address and the subnet mask to be used.
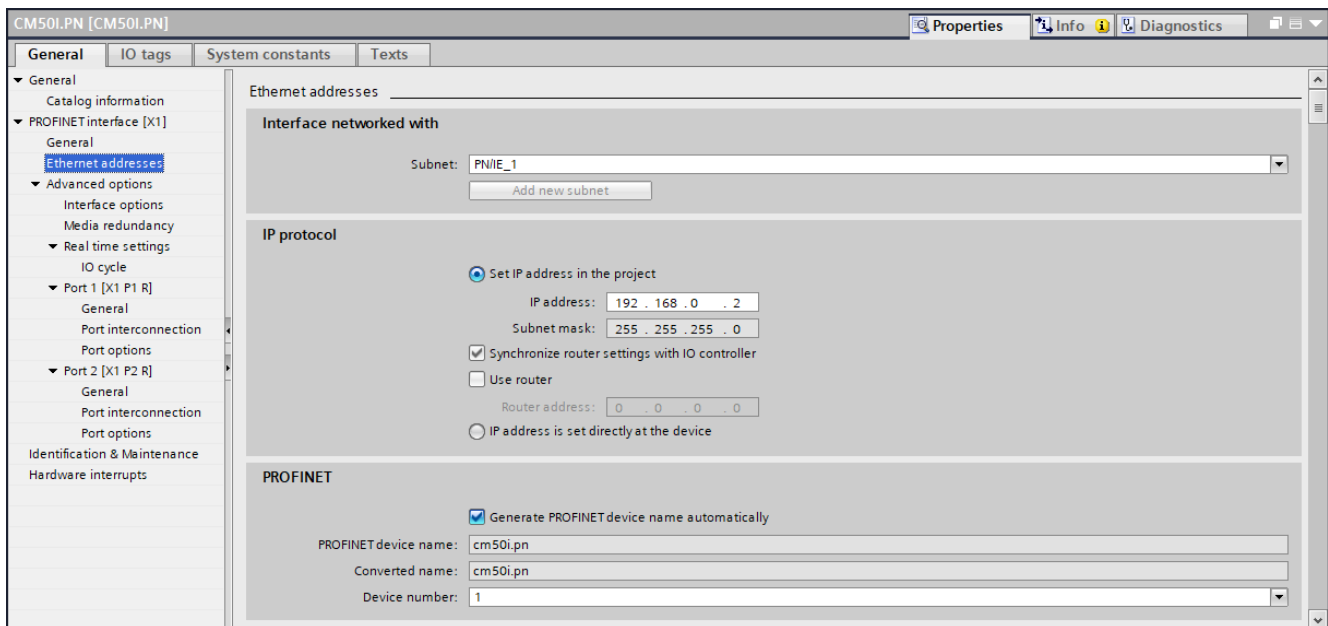
*Ill. 56:* IP address assignment

In tab **Properties** | **General**

 ◆ Double-click **Ethernet addresses**.

### 9.6.3          Default settings

**Restore default**

Function **Restore default - retain I&M data** will reset the module to the default settings while retaining the I&M data saved in the memory.

Proceed as follows:

**Instruction:**

 a) Click **Connect online** in the **TIA Portal**.

 b) Once connection has been established, select the related module.

 c) In the project navigator, open module **MVK-MPNIO**. Double-click **Online & Diagnostics**.

 d) Under tab **Functions** click **Restore default** to open a dialog window.

 e) Select **Retain I&M data**.

 f) Click button **Reset**.

**Result:**

 ✓ Module is reset to default.

**Restore default - default parameters**

| Settings | Value |
|---|---|
| IP address | 0.0.0.0 |
| Subnet mask | 0.0.0.0 |
| Router address | 0.0.0.0 |
| PROFINET device name | *Blank* |

*Tab. 25:* Restore default - default parameters

**Restore default - I&M parameters**

| I&M parameters | Value |
|---|---|
| Installation ID | *Blank* |
| Location ID | *Blank* |
| Installation date | *Blank* |
| Description | *Blank* |
| Additional information | *Blank* |

*Tab. 26:* Restore default - I&M parameters

**Restore default - retain I&M data**
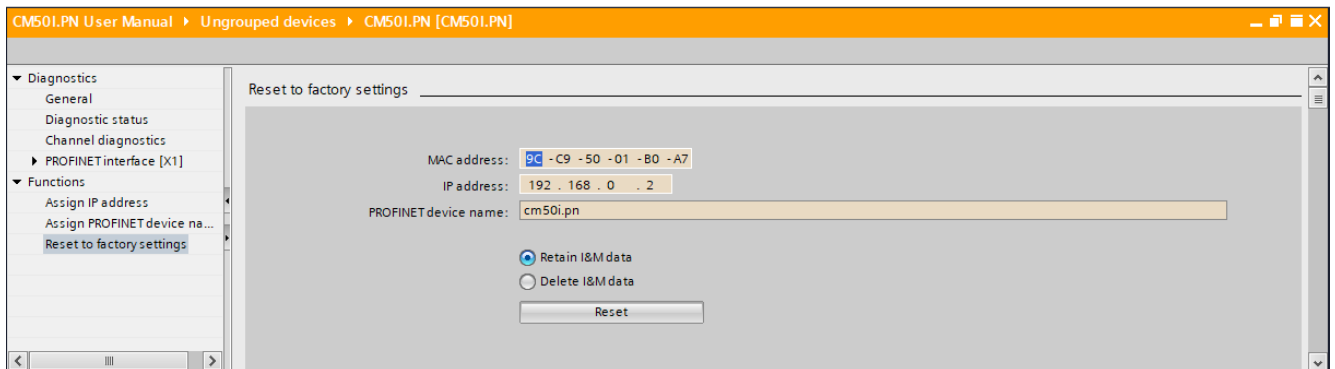


*Ill. 57:* Restore default - retain I&M data

**Restore default - delete I&M data**

The function **Restore default - delete I&M data** restores default settings in the module and at the same time deletes the I&M data stored in memory.

Proceed as follows:

a) Click **Connect online** in the **TIA Portal**.

b) Once connection has been established, select the related module.

c) In the project navigator, open module **MVK-MPNIO**. Double-click **Online & Diagnostics**.

d) Under tab **Functions** click **Restore default** to open a dialog window.

e) enable selection **delete I&M data**.

f) Click button **Reset**.

**Result:**

✓ Module is reset to default.

**Restore default - delete I&M data**
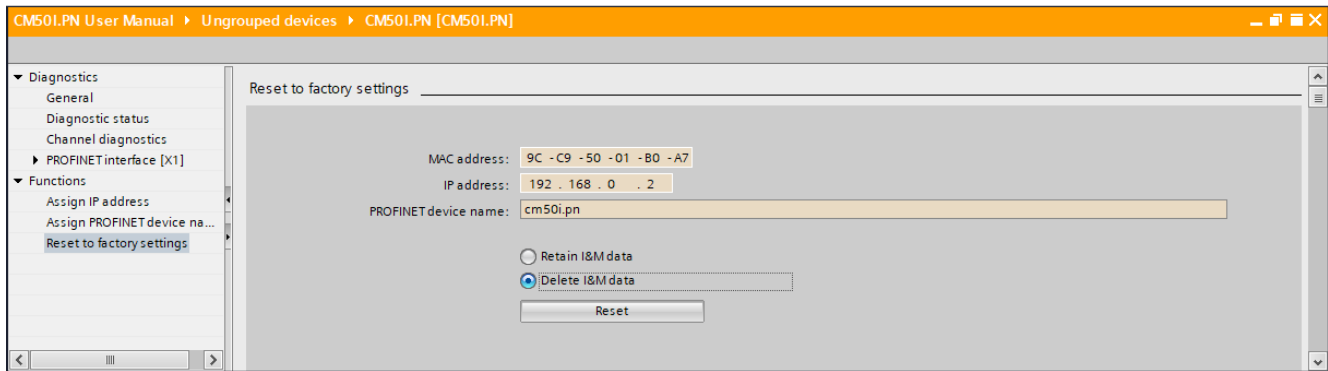


*Ill. 58:* Restore default, delete I&M data
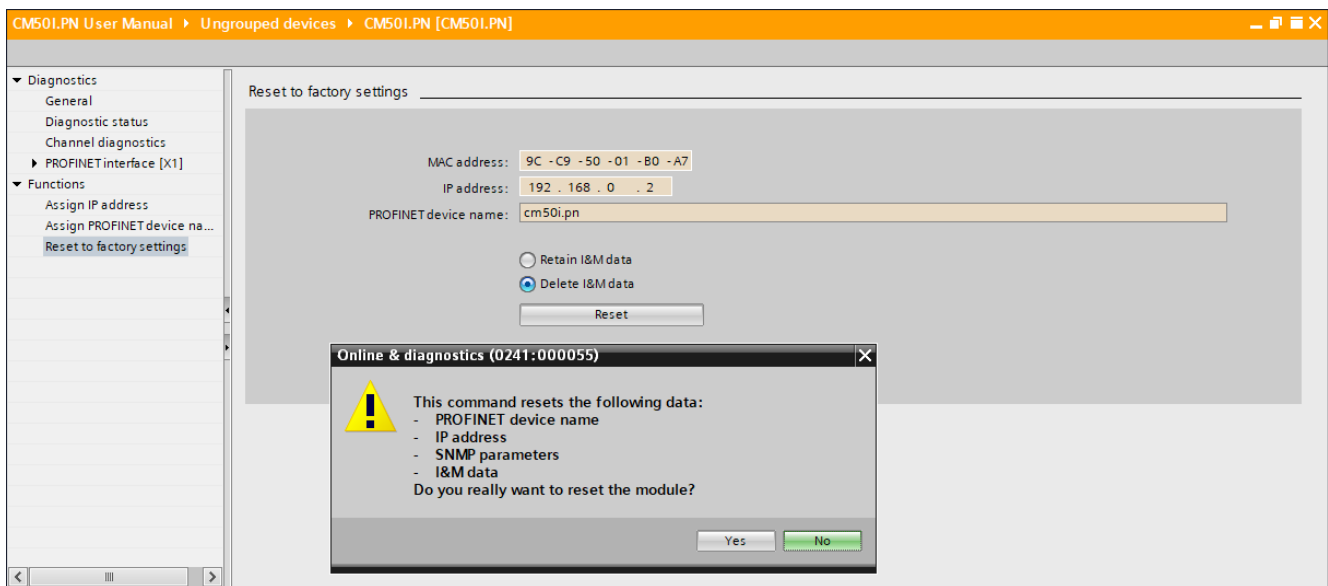


*Ill. 59:* Restore default, delete I&M data - confirmation dialog

## 9.7 Media Redundancy Protocol (MRP) configuration

How to configure media redundancy is described in the engineering software manual.

This document describes a configuration via the *Siemens TIA Portal Engineering Software*.

**Preparation:**

*Instruction:*

a) Set up a project in the *TIA Portal*.

b) Add a **controller** with two ports or an additional *PROFINET Managed Switch*.

c) Add the *CM50I.PN* device.

d) Assign the *CM50I.PN* device to the controller (see **MRP-Manager**).

**MRP manager setup**

A ring configuration requires 2 ports of a *PROFINET Managed Switch* or *S7 CPU* to be configured as ring managers and all remaining users as clients.
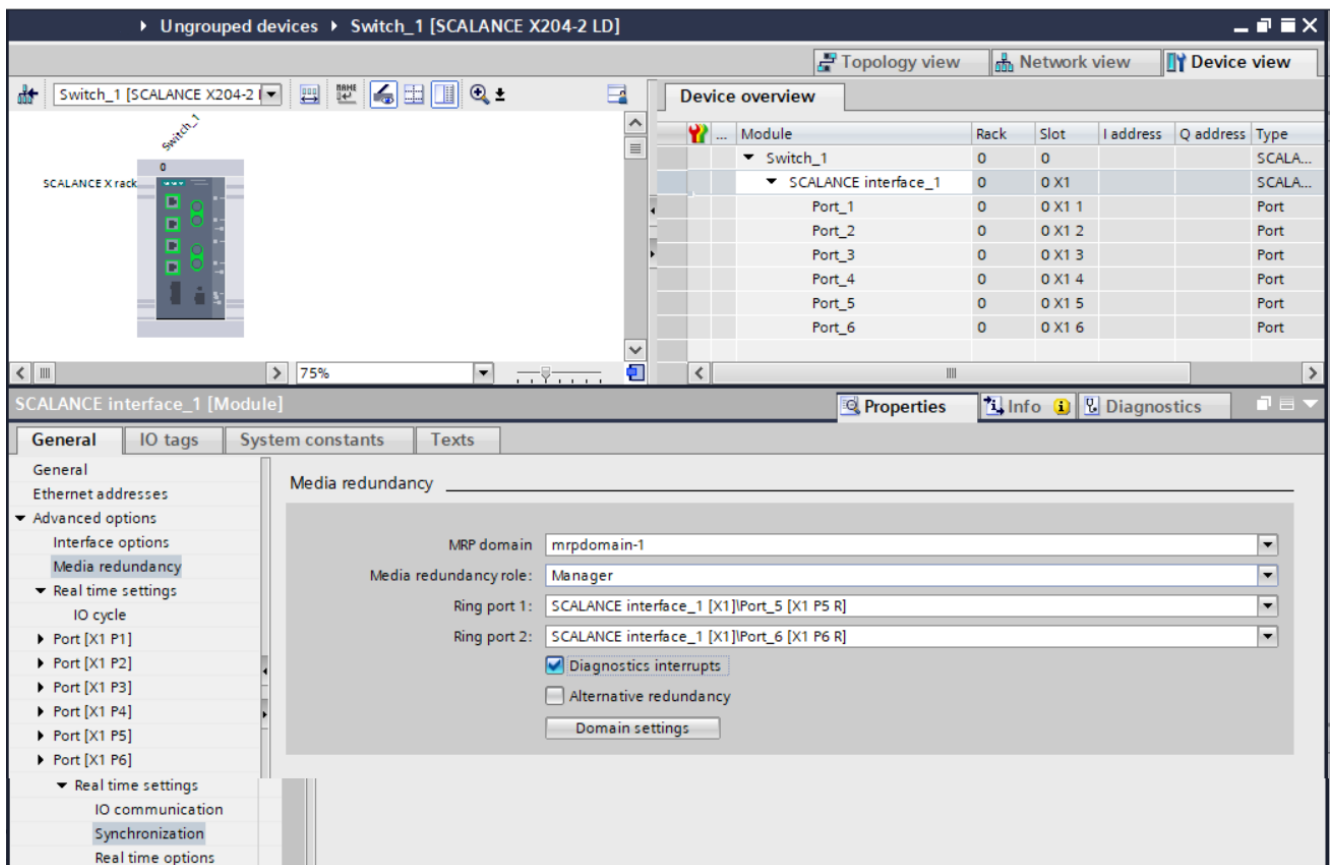


*Ill. 60:* MRP manager setup

a) Select *PROFINET Managed Switch*.

b) Navigate to menu item **PROFINET interface | Advanced options | Media redundancy**.

c) Under **Media redundancy role** select *Manager (Auto)*.

d) | Enable the selectionenable **Diagnostics interrupts**.

### Setting up MRP client



*Ill. 61:* Setting up MRP client

a) Select module *CM50I.PN*.

b) Navigate to menu item **PROFINET interface** | **Advanced options** | **Media redundancy**.

c) Set *client* for **media redundancy role**.

d) Activate **diagnostic alarms**.
   **Note:** The *CM50I.PN* module must be located in the same MRP domain.

### Setting up the MRP cycle times

If media redundancy has been set, the IO cycle times must be parameterized for each module.

According to the PLC, RT requirements and system advancement requires setting the IO cyle times and factors in the following window.
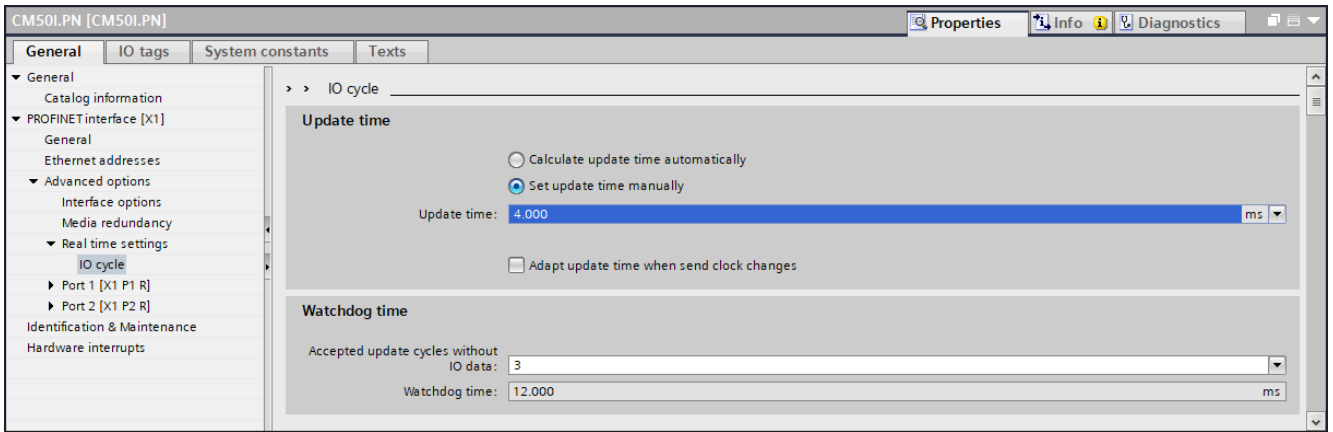
*Ill. 62:* Setting up the MRP cycle times

> a) Navigate to menu item **PROFINET interface** | **advanced options** | **media redundancy** | **IO cycle**.
>
> b) Enter the parameter values: *Update time* and *Accepted update cycles without IO data*

**Setting up MRP domain**
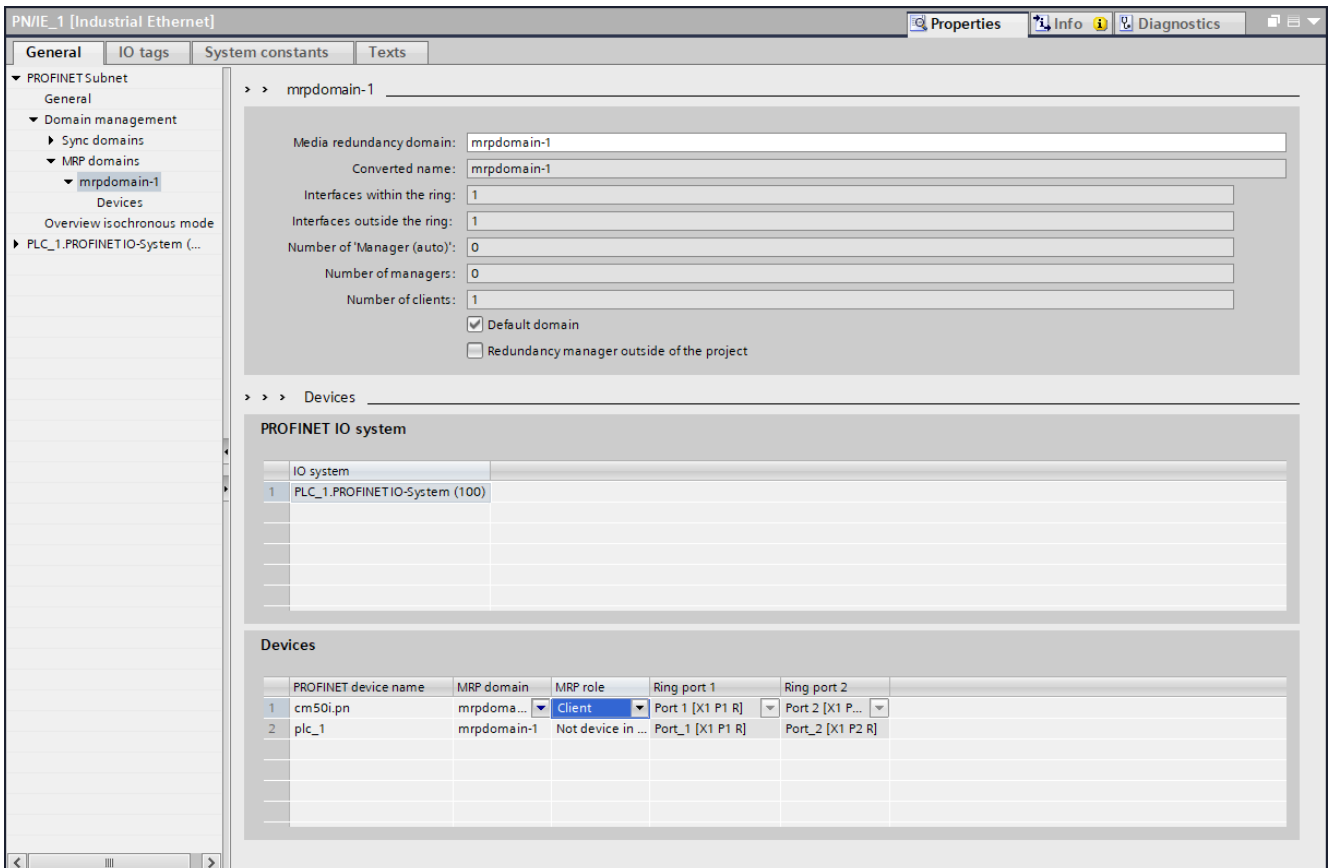


*Ill. 63:* Setting up MRP domain

> a) For an oview of ring users, navigate to menu item **Domain-Management** | **MRP-Domains** | **mrpdomain-1**.
>
> b) Assign the *PROFINET Managed Switch* to IO controller.
>
> c) Save the project.
>
> d) Click **PNIE sub net**.
>
> ✓ Bus *PLC_1.PROFINET IO-System (100)* appears.
>
> e) Assign module *MVK-MPNIO* to the IO controller.

*Result:*

✓ All users of the ring configuration are listed under ***Devices***.

**Also see about this**

📄 Media redundancy (MRP) [▶ 16]

## 9.8 Isochronous-Real-Time (IRT) configuration

**IRT**

You will find the procedure for configuring IRT operation in the manual for your engineering software.

This document describes a configuration via the *Siemens TIA Portal Engineering Software*. This communication type requires specialized real-time capable hardware components (IRT).

**INFO**

The device is no active user in IRT data exchange. It supports transmission of IRT telegrams without loss for synchronized fieldbus devices in the same Ethernet subnet.

**Preparation:**

a) Set up a project in the *TIA Portal*.

b) Add an IRT-capable controller.

c) Add the device.

d) Connect the *PROFINET* interfaces.

**INFO**

Make sure that media redundancy is not set (see chapter 8.7 "Media Redundancy Protocol (MRP) configuration").

**IRT communication: Setting up the Sync master**

**INFO**

This procedure describes the projecting of non-synchronized IRT communication. For how to set up clock-synchronized IRT communication please refer to the manual of your engineering software.
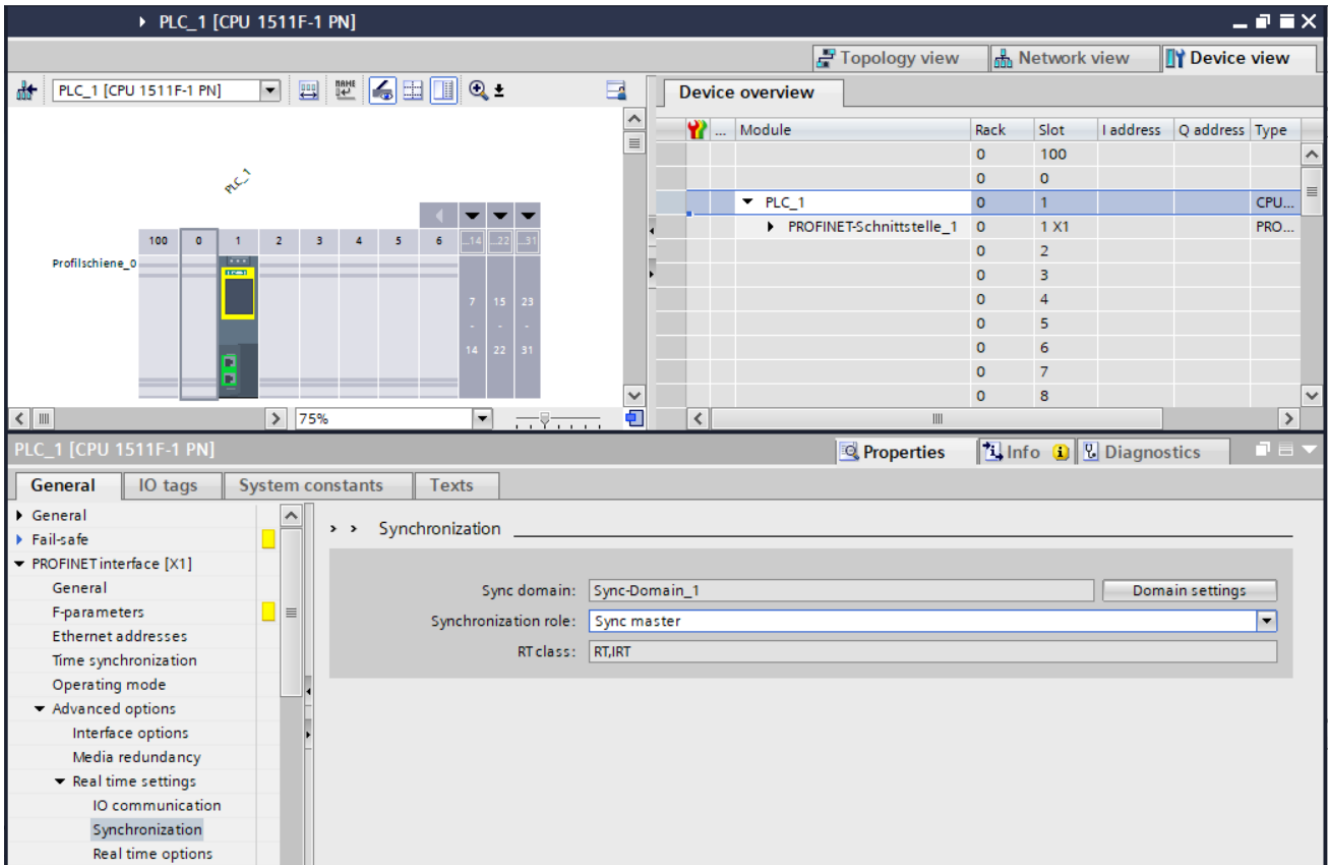
*Ill. 64:* IRT communication: Setting up the Sync master

     a) Double click **Controller PLC_1**.

     b) Navigate to menu item **Advanced Options** | **Real time settings** | **Synchronisation**.

     c) For **Synchronisation role** select **Sync-Master**.

### IRT communication: Setting up Sync-Slave
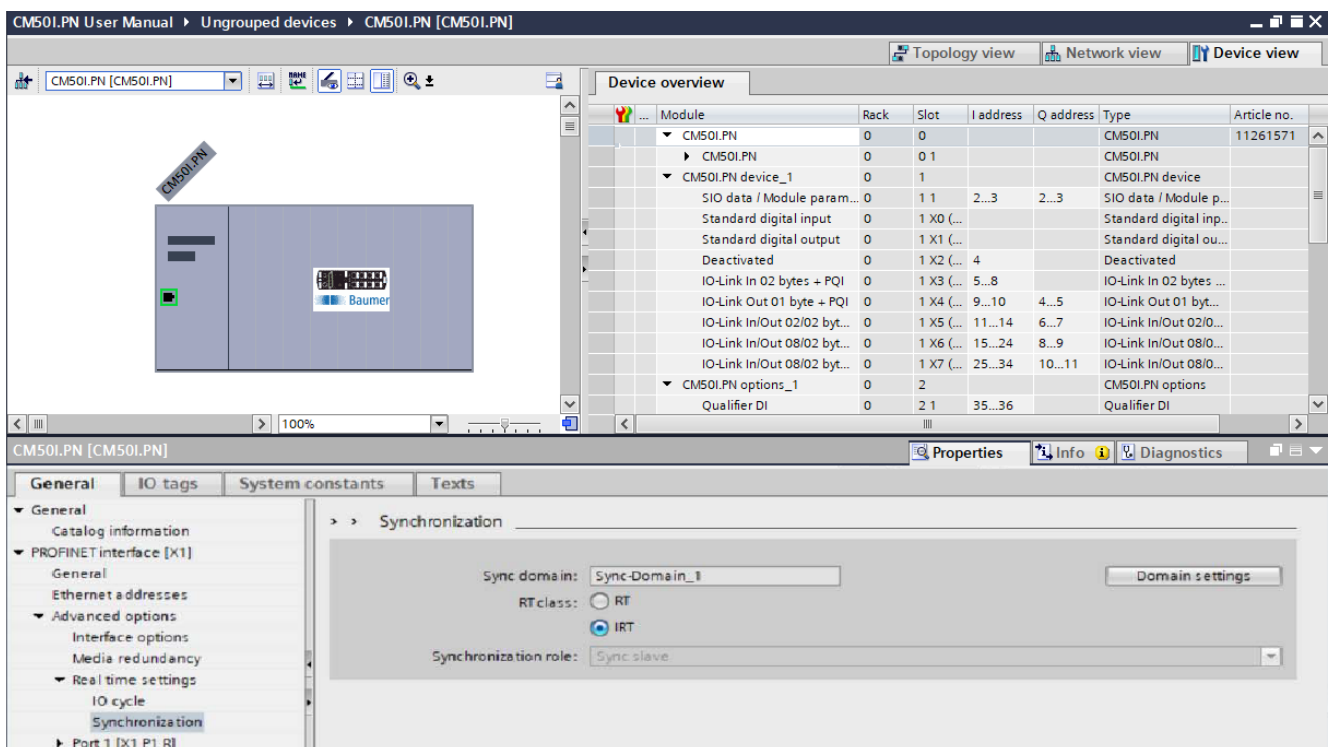


*Ill. 65:* IRT communication: Setting up Sync-Slave

**Also see about this**

📄 Isochronous-Real-Time (IRT) [▶ 18]

## 9.9     Simple Network Management Protocol (SNMP)

**Transmitting SNMP request**

*Request*        On request, *Baumer CM50I.PN* will transmit a SNPM message.

- `SNMPv2-MIB:sysDescr.0 Objekt (1.3.6.1.2.1.1.1.0)`

*Response*      Device response structure:

- Baumer, CM50I, Art.-No., HW version, SW version, MAC address.

## 9.10        Industrial Internet of Things (IIoT)

### 9.10.1       JSON

**JSON standard settings**

| No. | REST API URL | Description | Supporting |
|---|---|---|---|
| 1 | GET /iolink/v1/gateway/identification | Identification of the gateway | Yes |
| 2 | GET /iolink/v1/gateway/capabilities | Capabilities of the gateway | Yes |
| 3 | GET /iolink/v1/gateway/configuration | Read network configuration of the gateway | Yes |
| 4 | POST /iolink/v1/gateway/configuration | Write network configuration of the gateway | Yes |
| 5 | POST /iolink/v1/gateway/reset | Reset the gateway including all masters | - |
| 6 | POST /iolink/v1/gateway/reboot | Reboot the gateway including all masters | - |
| 7 | GET /iolink/v1/gateway/events | Event log containing all events from gateway, masters, ports, and devices | Yes |
| 8 | GET /iolink/v1/masters | Get all available master number keys and identification information | Yes |
| 9 | GET /iolink/v1/masters/$MASTER_NUMBER/ capabilities | Capabilities of the master | Yes |
| 10 | GET /iolink/v1/masters/$MASTER_NUMBER/ identification | Read identification of the master | Yes |
| 11 | POST /iolink/v1/masters/$MASTER_NUMBER/ identification | Write identification of the master | Yes |
| 12 | GET /iolink/v1/masters/$MASTER_NUMBER/ports | Get all available port number keys | Yes |
| 13 | GET /iolink/v1/masters/$MASTER_NUMBER/ports/ $PORT_NUMBER/capabilities | Read capability information of the specified port | Yes |
| 14 | GET /iolink/v1/masters/$MASTER_NUMBER/ports/ $PORT_NUMBER/status | Read status of the master | Yes |
| 15 | GET /iolink/v1/masters/$MASTER_NUMBER/ports/ $PORT_NUMBER/configuration | Read configuration of the specified port | Yes |
| 16 | POST /iolink/v1/masters/$MASTER_NUMBER/ ports/$PORT_NUMBER/configuration | Write configuration of the specified port | Yes |
| 17 | GET /iolink/v1/masters/$MASTER_NUMBER/ports/ $PORT_NUMBER/datastorage | Read data storage content of the specified port | Yes |
| 18 | POST /iolink/v1/masters/$MASTER_NUMBER/ ports/$PORT_NUMBER/datastorage | Write data storage content of the specified port | Yes |
| 19 | GET /iolink/v1/devices | Address all devices of all masters | Yes |

| No. | REST API URL | Description | Supporting |
|-----|--------------|-------------|------------|
| 20 | GET /iolink/v1/devices/{deviceAlias}/ capabilities | Read capability information of the speci- fied device | Yes |
| 21 | GET /iolink/v1/devices/{deviceAlias}/ identification | Read identification information of the speci- fied device | Yes |
| 22 | POST /iolink/v1/devices/{de- viceAlias}/identification | Write identification information of the specified device | - |
| 23 | GET /iolink/v1/devices/{deviceAlias}/ processdata/ value?format=byteArray | Read process data value from the speci- fied device | Yes |
| 24 | GET /iolink/v1/devices/{deviceAlias}/ processdata/ getdata/value?for- mat=byteArray | Read process data input value from the speci- fied device | Yes |
| 25 | GET /iolink/v1/devices/{deviceAlias}/ processdata/ setdata/value?for- mat=byteArray | Read process data output value from the specified device | Yes |
| 26 | POST /iolink/v1/devices/{de- viceAlias}/processdata/ value | Write the process data output value to the specified device | Yes |
| 27 | GET /iolink/v1/devices/{deviceAlias}/ parameters/ {index}/value/?for- mat=byteArray | Read a specific parameter value and its sub- parameter values (if the parameter has com- plex type) with the given index of the device | Yes |
| 28 | GET /iolink/v1/devices/{deviceAlias}/ parameters/ {index}/subindices/ {subindex}/value/?format= byteArray | Read the value of a specific sub-parame- ter with the given index and subindex | Yes |
| 29 | GET /iolink/v1/devices/{deviceAlias}/ parameters/{parameterName}/ value/?format=byteArray | Read a specific parameter value with the gi- ven name | - |
| 30 | POST /iolink/v1/devices/{de- viceAlias}/parameters/ {index}/value | Write the parameter with the given index to the device | Yes |
| 31 | POST /iolink/v1/devices/{de- viceAlias}/parameters/ {parameter- Name}/value | Write the parameter with the given name to the device | - |
| 32 | POST /iolink/v1/devices/{de- viceAlias}/parameters/ {index}/ subindices/{subindex}/value | Write the sub-parameter with the given in- dex and subindex to the device | Yes |
| 33 | POST /iolink/v1/devices/{de- viceAlias}/parameters/ {parameter- Name}/subindices/{subParameter- Name}/ value | Write the sub-parameter with the given para- meter name and sub-parameter name to the device | - |
| 34 | POST /iolink/v1/devices/{de- viceAlias}/ blockparametrization/?for- mat=byteArray | Read or write one or more parameters as a block | Yes |
| 35 | GET /iolink/v1/devices/{deviceAlias}/ events | Read event log from the specified device | Yes |
| 36 | GET /iolink/v1/mqtt/configuration | Read configuration of MQTT clients | Yes |

| No. | REST API URL | Description | Supporting |
|---|---|---|---|
| 37 | POST /iolink/v1/mqtt/configuration | Write configuration of MQTT clients | - |
| 38 | GET /iolink/v1/mqtt/topics | Read list of MQTT topics | - |
| 39 | POST /iolink/v1/mqtt/topics | Write list of MQTT topics | - |
| 40 | DELETE /iolink/v1/mqtt/topics/{topicID} | Delete a specific MQTT topic | - |
| 41 | GET /iolink/v1/mqtt/topics/{topicID} | Read a specific MQTT topic | - |
| 42 | GET /iolink/v1/mqtt/connectionstatus | Read connection status | Yes |

**Vendor-specific JSON settings**

| No. | REST API URL | Description | Supporting |
|---|---|---|---|
| 43 | GET /iolink/v1/vendor/masters/ $MASTER_NUMBER/diagnostics/ configuration | Diagnostic configuration of the master | Yes |
| 44 | GET /iolink/v1/vendor/masters/ $MASTER_NUMBER/diagnostics/ value | Diagnostic values of the master | Yes |
| 45 | GET /iolink/v1/vendor/masters/ $MASTER_NUMBER/ports/ $PORT_NUMBER/ statistics/current | Current statistic values of the specified port of the master | Yes |
| 46 | GET /iolink/v1/vendor/masters/ $MASTER_NUMBER/ports/ $PORT_NUMBER/ statistics/voltage | Voltage statistic values of the specified port of the master | Yes |
| 47 | GET /iolink/v1/vendor/masters/ $MASTER_NUMBER/ports/ $PORT_NUMBER/ statistics/temperature | Temperature statistic values of the specified port of the master | Yes |
| 48 | GET /iolink/v1/vendor/masters/1/ ports/1/statistics/ stack | IO-Link stack statistic values of the specified port of the master | - |
| 49 | GET /iolink/v1/vendor/masters/ $MASTER_NUMBER/ports/ $PORT_NUMBER/ diagnostics/configuration | Diagnostic configuration of the specified port of the master | Yes |
| 50 | GET /iolink/v1/vendor/masters/ $MASTER_NUMBER/ports/ $PORT_NUMBER/ diagnostics/current | Diagnostic current value of the specified port of the master | Yes |
| 51 | GET /iolink/v1/vendor/masters/ $MASTER_NUMBER/ports/ $PORT_NUMBER/ diagnostics/voltage | Diagnostic voltage value of the specified port of the master | Yes |

| No. | REST API URL | Description | Supporting |
|-----|--------------|-------------|------------|
| 52 | GET /iolink/v1/vendor/masters/ $MASTER_NUMBER/ports/ $PORT_NUMBER/ diagnostics/temperature | Diagnostic temperature value of the specified port of the master | Yes |

**9.10.2      MQTT**

**INFO**

If MQTT is enabled, mandatory that JSON is activated as well.

**MQTT settings**

| No. | MQTT topics | Description |
|-----|-------------|-------------|
| 1 | $MQTT_CLIENT_HEAD_TOPIC /iolink/v1/ gateway/ identification | Identification of the gateway |
| 2 | $MQTT_CLIENT_HEAD_TOPIC /iolink/v1/ gateway/ capabilities | Capabilities of the gateway |
| 3 | $MQTT_CLIENT_HEAD_TOPIC /iolink/v1/ gateway/ configuration | Network configuration of the gateway |
| 4 | $MQTT_CLIENT_HEAD_TOPIC /iolink/v1/ masters | Get all available master number keys and identification information |
| 5 | $MQTT_CLIENT_HEAD_TOPIC /iolink/v1/ masters/$MASTER_NUMBER/diagnostics/ value | Diagnostic values of the master |
| 6 | $MQTT_CLIENT_HEAD_TOPIC /iolink/v1/ masters/$MASTER_NUMBER/diagnostics/ configuration | Diagnostic configuration of the master |
| 7 | $MQTT_CLIENT_HEAD_TOPIC /iolink/v1/ masters/$MASTER_NUMBER/capabilities | Capabilities of the master |
| 8 | $MQTT_CLIENT_HEAD_TOPIC /iolink/v1/ masters/$MASTER_NUMBER/identification | Identification of the master |
| 9 | $MQTT_CLIENT_HEAD_TOPIC /iolink/v1/ masters/$MASTER_NUMBER/ports | Get all available port number keys |
| 10 | $MQTT_CLIENT_HEAD_TOPIC /iolink/v1/ masters/$MASTER_NUMBER/ports/ $PORT_NUMBER/capabilities | Read capability information of the specified port |
| 11 | $MQTT_CLIENT_HEAD_TOPIC /iolink/v1/ masters/$MASTER_NUMBER/ports/ $PORT_NUMBER/status | Read actual status of the specified port |
| 12 | $MQTT_CLIENT_HEAD_TOPIC /iolink/v1/ masters/$MASTER_NUMBER/ports/ $PORT_NUMBER/configuration | Read/Write configuration of the specified port |
| 13 | $MQTT_CLIENT_HEAD_TOPIC /iolink/v1/ masters/$MASTER_NUMBER/ports/ $PORT_NUMBER/diagnostics/ configuration | Diagnostic configuration of the specified port of the master |

| No. | MQTT topics | Description |
|-----|-------------|-------------|
| 14 | $MQTT_CLIENT_HEAD_TOPIC /iolink/v1/ masters/$MASTER_NUMBER/ports/ $PORT_NUMBER/diagnostics/ current | Diagnostic current value of the specified port of the master |
| 15 | $MQTT_CLIENT_HEAD_TOPIC /iolink/v1/ masters/$MASTER_NUMBER/ports/ $PORT_NUMBER/diagnostics/ voltage | Diagnostic voltage value of the specified port of the master |
| 16 | $MQTT_CLIENT_HEAD_TOPIC /iolink/v1/ masters/$MASTER_NUMBER/ports/ $PORT_NUMBER/diagnostics/ temperature | Diagnostic temperature value of the specified port of the master |
| 17 | $MQTT_CLIENT_HEAD_TOPIC /iolink/v1/ masters/$MASTER_NUMBER/ports/ $PORT_NUMBER/statistics/ current | Current statistic values of the specified port of the master |
| 18 | $MQTT_CLIENT_HEAD_TOPIC /iolink/v1/ masters/$MASTER_NUMBER/ports/ $PORT_NUMBER/statistics/ voltage | Voltage statistic values of the specified port of the master |
| 19 | $MQTT_CLIENT_HEAD_TOPIC/iolink/v1/masters/$MASTER_NUMBER/ports/$PORT_NUMBER/statistics/ temperature | Temperature statistic values of the specified port of the master |
| 20 | $MQTT_CLIENT_HEAD_TOPIC /iolink/v1/devices/$DEVICE_ALIAS/processdata/value | Read/Write process data value from/to the specified device |
| 21 | $MQTT_CLIENT_HEAD_TOPIC /iolink/v1/devices/$DEVICE_ALIAS/processdata/getdata/ value | Read process data input value from the speci- fied device |
| 22 | $MQTT_CLIENT_HEAD_TOPIC /iolink/v1/devices/$DEVICE_ALIAS/processdata/setdata/ value | Read process data output value from the spe- cified device |
| 23 | $MQTT_CLIENT_HEAD_TOPIC /iolink/v1/devices/$DEVICE_ALIAS/events | Read event log from the specified device |
| 24 | $MQTT_CLIENT_HEAD_TOPIC /Asset | Information about the publisher (network, ven- dor, firmware) |
| 25 | $MQTT_CLIENT_HEAD_TOPIC /Online | Status of the publisher (online when con- nec- ted) |

### 9.10.3      OPC UA

**INFO**

The devices shown in the screenshots serve as examples.

The device features OPC UA server. The OPC UA client can establish a connecton to the device for access to the following parameters:

- Device identification,
- configuration parameters,
- process data,
- measured values,
- diagnostic information,
- statistical information, etc.

The OPC UA client establishes connection using the following URL:

**opc.tcp://IP-Adresse:4840**

**INFO**

The IP address of the device is used for **IP address** .

### 9.10.3.1 OPC UA PC Client

The device integrates OPC UA server. The OPC UA client is for device communication.

For test purposes, you can use *UaExpert* from *Unified Automation GmbH*, for example: https://www.unifiedautomation.com.

The OPC UA client has read access to the device using the authentication "Anonymous". The OPC UA client has read and write access to the device using the authentication "User name and Password", provided the related user has write rights.

**Conneting to CM50I.PN**

*Condition:*

⇨ You have OPC UA client.

⇨ For write access to the device, you need to know user name, password and have write access.

⇨ You know the device IP address.

*Instruction:*

a) Start *UaExpert*.

b) Create a new project via **File** > **New**.

c) ☐ Add new server by selecting **Server** r > **Add**.

*Result:*

✓ Dialog window **Add Server** is shown in tab **Discovery**.
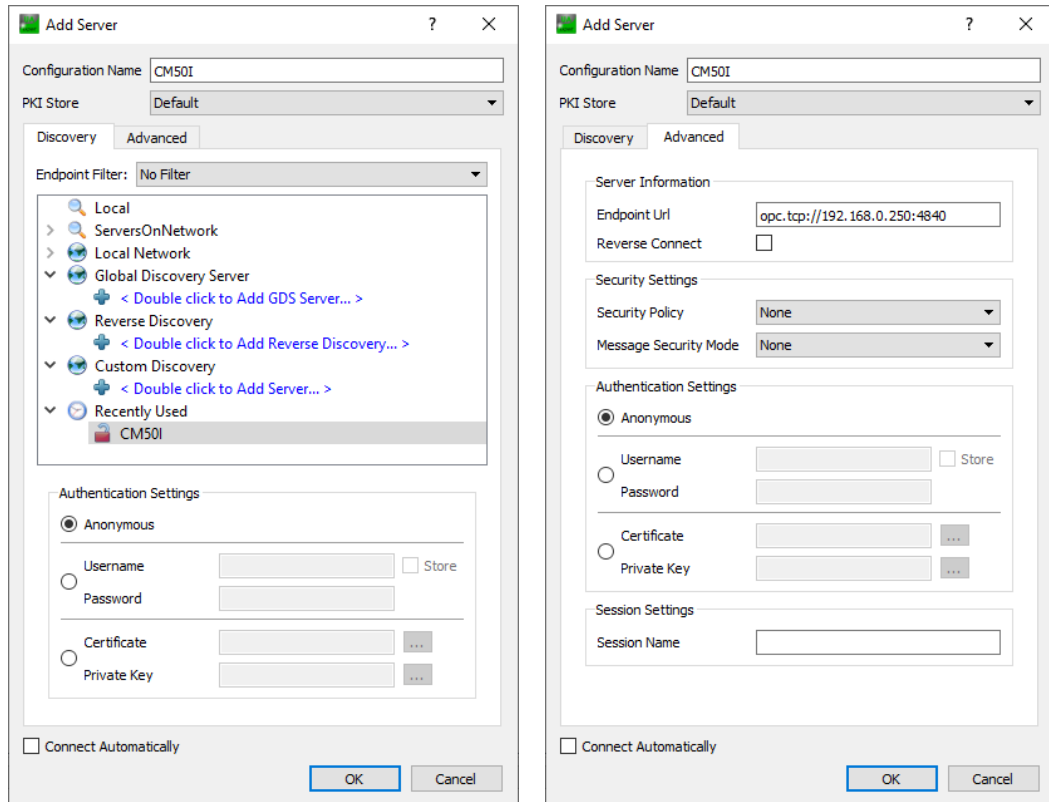
*Ill. 66:* Dialog window Add Server – tabs Discovery and Advanced

   a) In field **Configuration Name** enter a name for the configuration, e.g. `Test`.

   b) Select tab **Advanced**.

   c) In the **Server Information** area of the **Advanced** tab, enter the following in the **Endpoint Url** data field:
   `opc.tcp://<IP address>:4840`
   Enter the IP address of the device for `<IP address>`.

   d) In the **Authentication Settings** area, select the option **Username/ Password** if you want write access to the device or **Anonymous** if read access is sufficient.

   e) If you have selected option **Username/Password**, enter your user name and your password.

   f) Click **OK**.
   ✓ In the project window, *UaExpert* enters the server under **Project** > **Servers** with the selected name.

   g) Open server context menu (`Test` in the example) and select **Connect**.

**Result:**
   ✓ The connection is being established.

Client can access device parameters anonymously (read only) or with user name/password (read and write). User name and passwort are entered via web server.

The following figure shows an excerpt of the device information model.
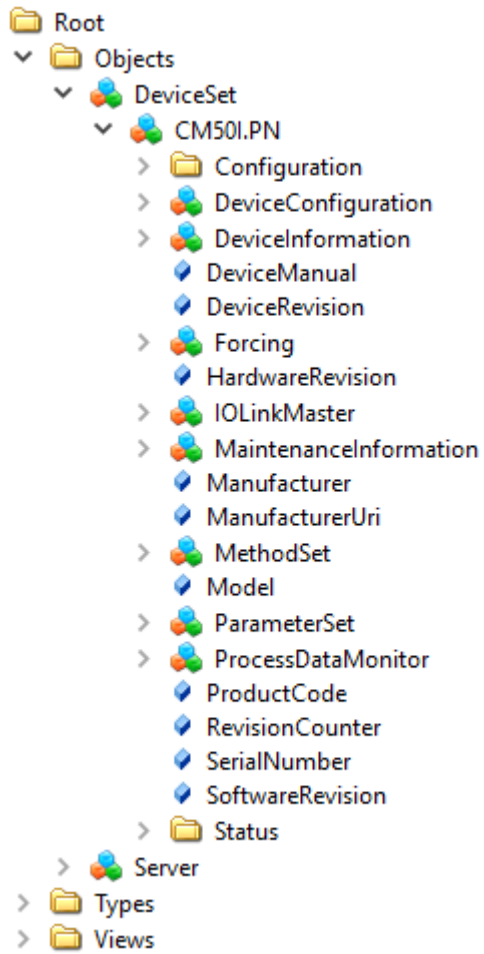


*Ill. 67:* OPC-UA-Server - Device information model

The following figure shows an excerpt of an IO-Link port information model.

```
∨ 🔵 Port X7
    > 📁 Alarms
    > 📁 Capabilities
    > 📁 Configuration
    ∨ 🔵 Device
        > 📁 Alarms
          🔹 DeviceAccessLocks
        > 🟩 DeviceHealth
          🔹 DeviceID
        > 📁 General
          🔹 HardwareRevision
        > 📁 Identification
          🔹 Manufacturer
        > 🔵 MethodSet
          🔹 MinCycleTime
          🔹 Model
          🔹 NodeVersion
        > 🔵 ParameterSet
          🔹 ProductID
          🔹 ProductText
          🔹 ProfileCharacteristic
          🔹 RevisionID
          🔹 SerialNumber
          🔹 SoftwareRevision
          🔹 VendorID
          🔹 VendorText
      🔹 DeviceConfigurationDisabled
    ∨ 📁 Diagnostics
        > 📁 Configuration
        ∨ 📁 Current
            > 🟩 CurrentPin1
            > 🟩 CurrentPin2
            > 🟩 CurrentPin4
        > 📁 Flags
        > 📁 Temperature
        > 📁 Voltage
        > 📁 Information
        > 🔵 MethodSet
          🔹 NodeVersion
        > 🔵 ParameterSet
        ∨ 📁 SIOProcessData
            > 🟩 Pin2ProcessData
        > 📁 Statistics
    > 📁 Statistics
      🔹 VendorID
```

*Ill. 68:* OPC-UA-Server - Port information model

**9.10.3.2      Authentication**

**User log on**

OPC UA use the same users and passwords as those documented in the web server description.

OPC UA server connection is established via user *guest* allowing read access to the OPC UA objects.
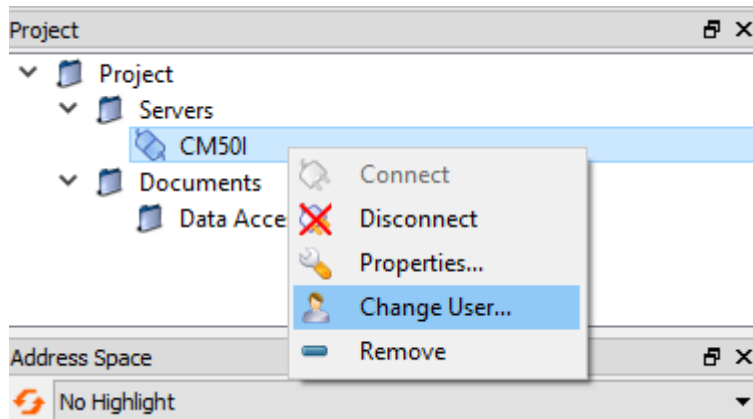


*Ill. 69:* Changing the user

For further actions, another user must be selected.

*Instruction:*

   a) User name *<admin>*

   b) Password *<private>*
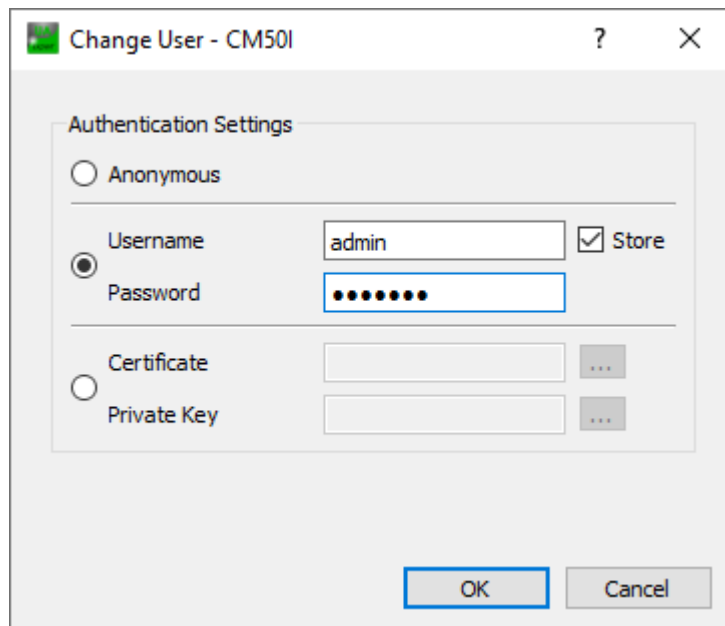


*Ill. 70:* User name and password

**Forcing**

Digital outputs enable manual switching via OPC UA(Forcing).

**Step 1**

Create an ID from the device using the *GetForcingID* method.
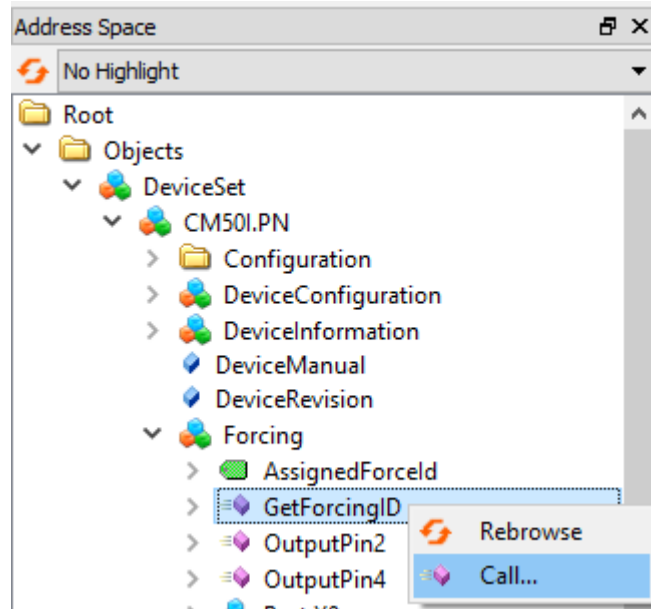


*Ill. 71:* Accessing *GetForcingID-Methode*
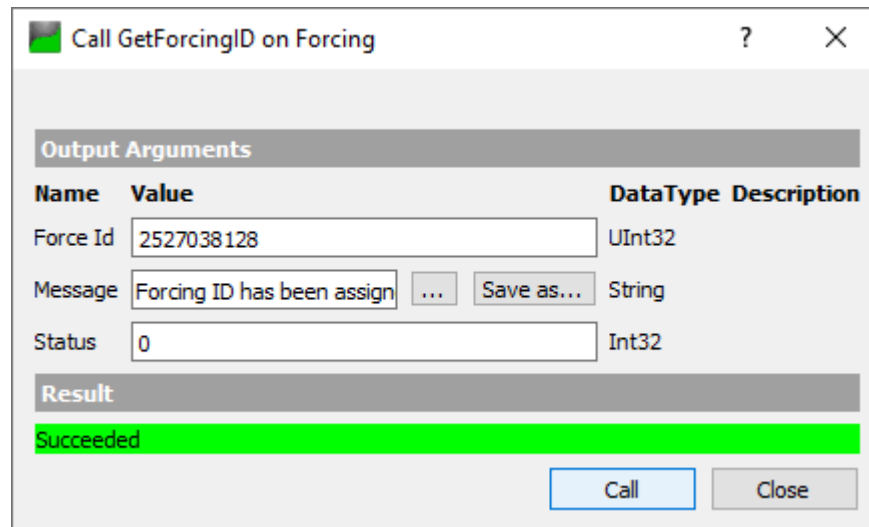


*Ill. 72:* Dialog window of the *GetForcingID* method

---

**INFO**

*ForcingID* is only valid for 10 seconds. Every access to *Forcing* will refresh validity to another 10 seconds.

---

**Step 2**

Set the digital outputs using methods *OutpuPin2* respectively *OutputPin4*.
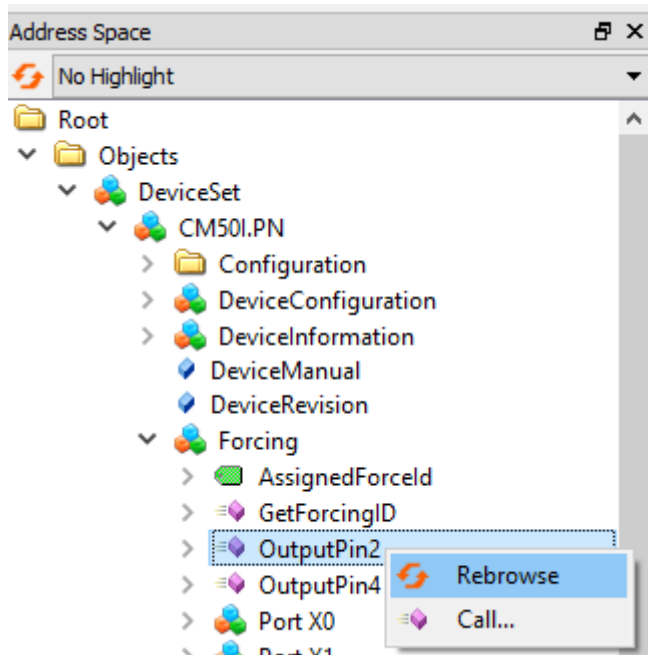


*Ill. 73:* Accessing method *OutputPin2*

This method expects as parameters the included *Forcing ID*, a bit mask and the data to be written.

### 9.10.3.3 Device identification

The device provides nodes for device identification. From this node, the *OPC UA* client for example will read the applied device firmware revision.

| Node ID | Node class | Access | Description |
|---|---|---|---|
| Manufacturer | Variable | read | Device manufacturer |
| ManufacturerUri | Variable | read | Device manufacturer URL |
| Model | Variable | read | Device model designation |
| ProductCode | Variable | read | Device product code |
| RevisionCounter | Variable | read | Device Hardware Revision |
| SerialNumber | Variable | read | Device serial number |
| SoftwareRevision | Variable | read | Device firmware revision |

*Tab. 27:* Device identification

*Ill. 74:* Device identification

### 9.10.3.4 Configuration parameters

The *OPC UA* server provides nodes with device configuration parameters. For example, in node *OverTemperature* the *OPC UA* client can read out the maximum temperature limit.

| Node ID | Node class | Access | Default | Description |
|---|---|---|---|---|
| CurrentHysteresis | Variable | read | 10 mA | Current hysteresis, unit: mA<br><br>If the limit is exceeded by current, current must first drop below again by the hysteresis value to cancel diagnostics. |
| OverTemperature | Variable | read | 70 °C | Maximum limit for port temperature, unit: 0.1 °C |
| OverVoltageL | Variable | read | 30 V | Maximum power limit assigned to supply line 1 enabling monitoring of pins L+, DI, DO, DIO, IO-Link. Unit: mV |
| OverVoltageL2 | Variable | read | 30 V | Maximum power limit assigned to supply line 2, unit: mV |
| TemperatureHysteresis | Variable | read | 2 °C | Temperature hysteresis, unit: 0.1 °C<br><br>If the limit is exceeded by temperature, temperature must first drop below again by the hysteresis value to cancel diagnostics. |
| UnderTemperature | Variable | read | -25 °C | Minimum limit for por temperature, unit: 0.1C° |

| Node ID | Node class | Access | Default | Description |
|---------|-----------|--------|---------|-------------|
| UnderVoltage L | Variable | read | 18 V | Minimum power limit assigned to supply line 1 enabling monitoring of pins L+, DI, DO, DIO, IO-Link. Unit: mV |
| UnderVoltage L2 | Variable | read | 18 V | Minimum power limit assigned to supply line 2, unit: mV |
| Voltage Hysteresis | Variable | read | 300 mV | Voltage hysteresis, unit: mV

If the limit is exceeded by voltage, voltage must first drop below again by the hysteresis value to cancel diagnostics. |

*Tab. 28:* Device specific configuration parameters



*Ill. 75:* Device specific configuration parameters

| Node ID | Node class | Access | Default | Description |
|---------|-----------|--------|---------|-------------|
| OverCurrentPin1, OverCurrentPin2, OverCurrentPin4 | Variable | read | 0 | Warning level for maximum current limit at pin 1, pin 2 or pin 4, unit: 1mA |

| Node ID | Node class | Access | Default | Description |
|---------|-----------|--------|---------|-------------|
| UnderCurrent-Pin1, UnderCurrent-Pin2, UnderCurrentPin4 | Variable | read | 0 | Warning level for minimum current limit at pin 1, pin 2 or pin 4, unit: 1mA 0: monitoring not enabled |

*Tab. 29:* Port-specific configuration parameters



*Ill. 76:* Port-specific configuration parameters

### 9.10.3.5 Process data

The *OPC UA* server provides nodes including process data. For example, in node **Pin2ProcessData** the *OPC UA* client can read out a port value provided at pin 2.

| Node ID | Node class | Access | Description |
|---------|-----------|--------|-------------|
| Pin2ProcessData | Variable | read | Process data at pin 2 |
| Pin4ProcessData | Variable | read | Process data at pin 4 |

*Tab. 30:* Process data

*Ill. 77:* Process data

### 9.10.3.6     Measured values

The *OPC UA* server provides nodes with calculated measured values. For example, in node **SumCurrentL** the *OPC UA* client can read in calculated total current of supply line 1.

| Node ID | Node class | Access | Description |
|---|---|---|---|
| SumCurrentL | Variable | read | The total current calculated from individual measurements in supply line 1, unit: mA |
| SumCurrentL2 | Variable | read | The total current calculated from individual measurements in supply line 2, unit: mA |
| MeanTemperature | Variable | read | Average temperature value assigned to the component, calculated from each temperature value individualls measured at the three chips. Unit: °C |
| MeanVoltageL | Variable | read | Average voltage in supply line 1, unit: mV |
| MeanVoltageL2 | Variable | read | Average voltage in supply line 2, unit: mV |

*Tab. 31:* Device-specific (calculated) measured values

*Ill. 78:* Device-specific (calculated) measured values

| Node ID | Node class | Access | Description |
|---|---|---|---|
| CurrentPin1, CurrentPin2, CurrentPin4 | Variable | read | Current measured at pin 1, pin 2 or pin 4, unit: mA |
| TemperaturePin1, TemperaturePin2, TemperaturePin4 | Variable | read | Temperature measured at pin 1, pin 2 or pin 4, unit: °C |
| VoltagePin1, VoltagePin2, VoltagePin4 | Variable | read | Voltage measured at pin 1, pin 2 or pin 4, unit: mA |

*Tab. 32:* Port specific measuring values

*Ill. 79:* Port specific measuring values

### 9.10.3.7    Diagnostic tools

The *OPC UA* server provides nodes with diagnostic information. In node ***DiagnosticsPin1***, the *OPC UA* client can read whether the device has identified presence of any over current at pin 1 of a port.

| Node ID | Node class | Access | Description |
|---|---|---|---|
| DiagnosticsPin1, DiagnosticsPin2, DiagnosticsPin4 | Variable | read | Diagnostics on pin 1, pin 2 or pin 4. The numerical value contains bit-coded information:<br>▪ Bit 0: Short circuit,<br>▪ Bit 1: Overload protection,<br>▪ Bit 2: Overtemperature protection,<br>▪ Bit 3: Overvoltage protection,<br>▪ Bit 4: Overcurrent,<br>▪ Bit 5: Undercurrent,<br>▪ Bit 0: Overtemperature<br>▪ Bit 1: Undertemperature<br>▪ Bit 2: Overvoltage<br>▪ Bit 3: Undervoltage |

| Node ID | Node class | Access | Description |
|---------|-----------|--------|-------------|
|         |           |        | ▪ Bit 4: Watchdog |
|         |           |        | 0: Diagnosis not active |
|         |           |        | 1: Diagnosis active |

*Tab. 33:* Port-specific diagnostics



*Ill. 80:* Port-specific diagnostics

### 9.10.3.8    Statistics

The *OPC UA* server provides nodes with statistical information. In node ***MaxCurrentPin1***, the *OPC UA* client can read at pin 1 of a port the maximum measured current.

| Node ID | Node class | Access | Description |
|---------|-----------|--------|-------------|
| **Current** | | | |
| MaxCurrentPin1, MaxCurrentPin2, MaxCurrentPin4 | Variable | read | Maximum current at pin 1, pin 2 or pin 4 since value reset, unit: mA |
| MinCurrentPin1, MinCurrentPin2, MinCurrentPin4 | Variable | read | Minimum current at pin 1, pin 2 or pin 4 since value reset, unit: mA |
| **Temperature** | | | |
| MaxTemperaturePin1, MaxTemperaturePin2, MaxTemperaturePin4 | Variable | read | Maximum temperature at pin 1, pin 2 or pin 4 since value reset, unit: °C |

| Node ID | Node class | Access | Description |
|---------|-----------|--------|-------------|
| MinTemperaturePin1, MinTemperaturePin2, MinTemperaturePin4 | Variable | read | Minimum temperature at pin 1, pin 2 or pin 4 since value reset, unit: °C |
| **Voltage** | | | |
| MaxVoltagePin1, MaxVoltagePin2, MaxVoltagePin4 | Variable | read | Maximum voltage at pin 1, pin 2 or pin 4 since value reset, unit: mV |
| MinVoltagePin1, MinVoltagePin2, MinVoltagePin4 | Variable | read | Minimum voltage at pin 1, pin 2 or pin 4 since value reset, unit: mV |

*Tab. 34:* Port specific statistical information



*Ill. 81:* Port specific statistical information

**9.10.3.9     NTP client configuration**

The *OPC UA* server provides nodes for NTP client configuration.

| Node ID | Node class | Access | Description |
|---|---|---|---|
| NtpClientServerIpAd-dress | Variable | Read / Write | • NTP server IP address<br>• The NTP client uses the set IP address for retrieving the time information from the NTP server.<br>• The IP address must be converted into a decimal number. The table shows how to convert.<br>• Value 0 disables the function. |
| NtpClientServerIpAd-dressFallback | Variable | Read / Write | • IP address of the NTP server (fallback)<br>• The optional IP address if the NTP server is not accessible via the IP address in node Ntp-ClientServerIpAddress.<br>• The IP address must be converted into a decimal number. The table shows how to convert.<br>• Value 0 disables the function. |
| NtpClientUpdateCon-figuration | Variable | Write | Method for writing the nodes Ntp-ClientServerIpAddress and Ntp-ClientServerIpAddressFallback |

*Tab. 35:* NTP client configuration

The following formula is used to convert the IP address into a decimal number. Starting from an IP address in the format **A.B.C.D**:

((A * 256 + B) * 256 + C) * 256 + D = IP address converted into a decimal number

Example: IP address 192.53.103.108:

((192 * 256 + 53) * 256 + 103) * 256 + 108 = 3224725356

**NTP server example**

NTP-Server `ptbtime1.ptb.de` of the German National Metrology Institute in Braunschweig with the IP address `192.53.103.108`

Replacement NTP server (optional) is NTP server `ptbtime2.ptb.de` of the Physikalisch-Technische Bundesanstalt in Braunschweig with IP address `192.53.103.104`

*Condition:*

⇨ You have OPC UA client.

⇨ You know user name and password and have write access.

⇨ You know the IP Address of an NTP Server.

⇨ You have converted the IP address of this NTP server into a decimal number, as described in chapter "NTP Client Configuration".

⇨ Connection to the MVK device has already been established.

**Instruction:**

a) In window **Address Space** pen context menu: Root > Objects > **DeviceSet** > **[device name]** > **Configuration** > **NtpClient** > **NtpClientUpdateConfiguration**.
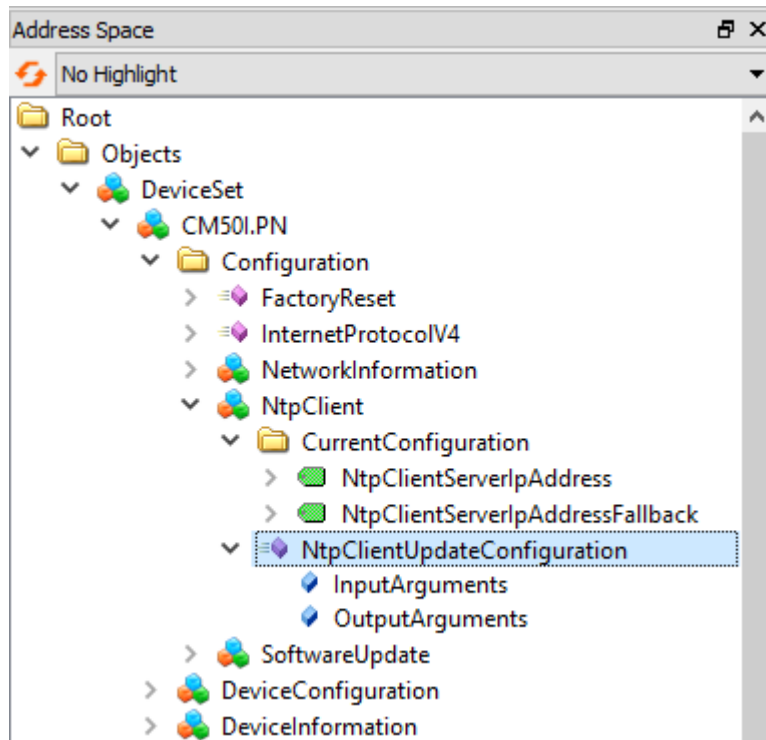


*Ill. 82:* NTP client update configuration

b) In the context menu, select **Call**.
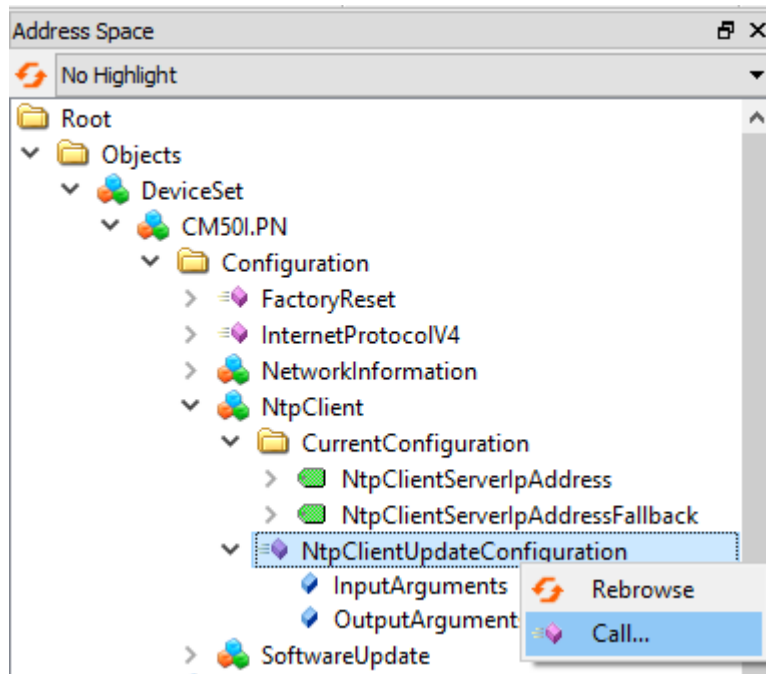


*Ill. 83:* NTP client configuration

✓ Dialog window **Call NtpClientUpdateConfiguration on NtpClient** pops up:

*Ill. 84:* Dialog window for NTP client configuration

a) In the ***Input Arguments*** area, enter the value `3224725356` in the input field ***ServerIpAddress*** for the IP address of the NTP server.

b) In the ***Input Arguments*** area, enter `3224725352` in the ***ServerIpAddressFallback*** input field for the IP address of the replacement NTP server.

c) Click ***Call***.

If the function call was successful, the output field to the right of the status in the ***Output Arguments*** area displays the value `0`. A green bar with the text `Succeeded` is displayed in the ***Result*** area.

Both variables *ServerIpAddress* and *ServerIpAddressFallback* are now set. The device receives the current time from the time server via NTP and synchronizes its internal time.
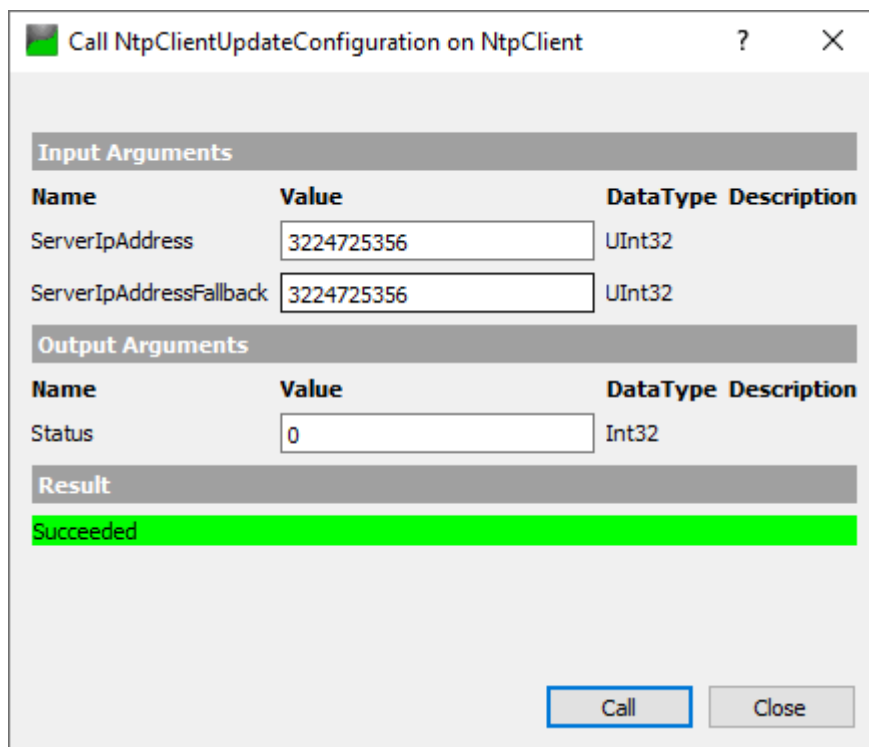
*Ill. 85:* Dialog window for NTP client configuration (successful)

# 10      Operation

## 10.1     LED indicator

The device provides clearly arranged indicators:

- LED indicator inputs / outputs
- LED indicator BUS
- LED indicator POWER
- Advanced LED indicator

The front LED indicators are correspondingly marked for clear assignment. Either indicated by continuous or flashing LEDs.

### 10.1.1     LED assignment to channel and pin

Each input and output is assigned an individual status indicator.

- LED channel **0**X (X= port number) is assigned to **pin 4** .
- LED channel **1**X (X= port number) is assigned to **pin 2** .
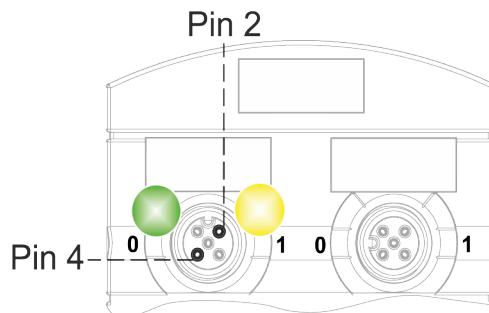


### 10.1.2     LED flashing behavior
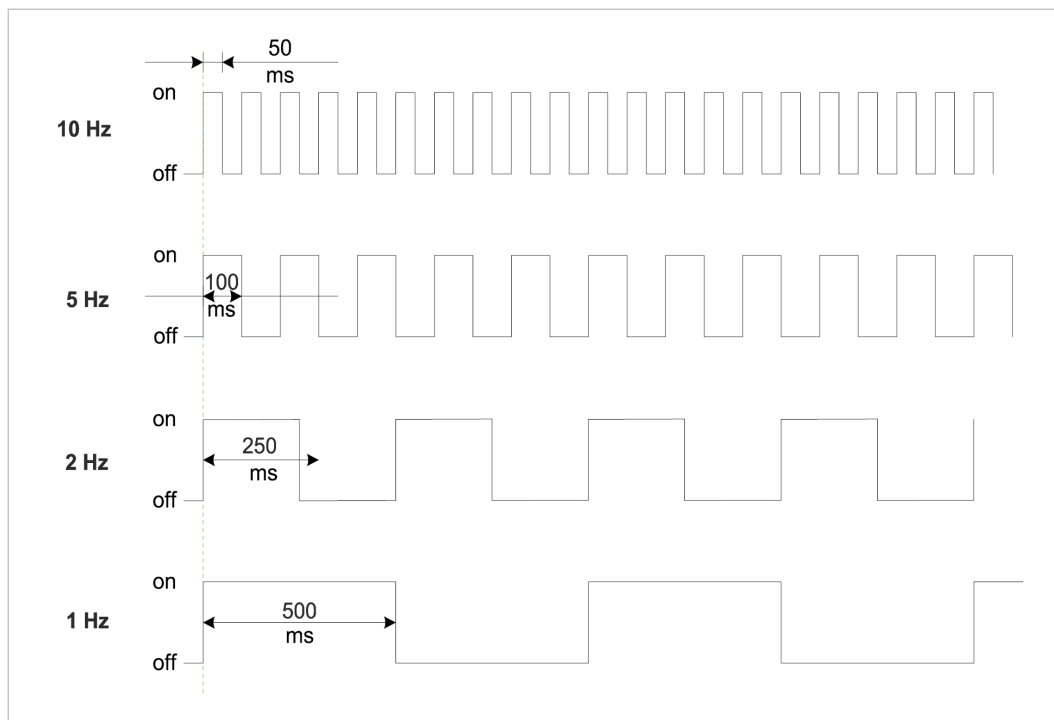


*Ill. 86:* LED flashing behavior

### 10.1.3 LED indicator for inputs and outputs



Each input and output is assigned an individual status indicator.

**Pin 2 digital input DI**

| Indicator | Status | Description |
|---|---|---|
| Yellow | On continuous | Permanent configuration: DI (NO) visible in process data. 24 V |
| Red | Flashing at 1 Hz | Overload/short circuit in sensor supply 24 V + Pin1 |
| | Off | Pin 2 is not assigned or disabled |

*Tab. 36:* LED indicator DI pin 2

**PIN 2 digital output DO**

| Indicator | Status | Description |
|---|---|---|
| Yellow | On continuous | Permanent configuration: DO switchable by process data 24 V |
| Red | On continuous | Overload / short circuit at pin 2 |
| Red | Flashing at 1 Hz | Overload/short circuit in sensor supply 24 V + Pin1 |
| | Off | Pin 2 is not assigned or disabled |

*Tab. 37:* LED indicator DO pin 2

**Error at the input or output**

In the event of error present at one of the inputs or outputs, the related LED at the M12 port will light up red.

**Pin 4 digital input DI**

| Indicator | Status | Description |
|---|---|---|
| Yellow | On continuous | Permanent configuration: DI (NO) visible in process data 24 V |
| Red | Flashing at 1 Hz | Overload/short circuit in sensor supply 24 V + Pin1 |
| | Off | Pin 4 is not assigned or disabled |

*Tab. 38:* LED indicator DI pin 4

**PIN 4 digital output DO**

| Indicator | Status | Description |
|---|---|---|
| Yellow | On continuous | Permanent configuration: DO switchable by process data<br>24 V |
| Red | On continuous | Overload / short circuit at pin 4 |
| Red | Flashing at 1 Hz | Overload/short circuit in sensor supply 24 V + Pin1 |
| | Off | Pin 4 is not assigned or disabled |

*Tab. 39:* LED indicator DO pin 4

**Pin 4 IO-Link mode**

| Indicator | Status | Description |
|---|---|---|
| Green | On continuous | IO-Link in status *Operate*. |
| Green | Flashing at 1 Hz | ▪ Device is not connected<br>▪ No communication with connected device. |
| Green | Flashing at 10 Hz | ▪ IO-Link in status *Pre-Operate* during data storage<br>▪ Validation failed. Connected IO-Link not compatible. |
| Red | On continuous | Overload / short circuit at pin 4 |
| Red | Flashing at 2 Hz | ▪ Validation failed.<br>▪ Connected IO-Link device for data storage is not compatible.<br>▪ Data storage failed. |
| | Off | IO-Link connection deactivated. |

*Tab. 40:* LED indicator IO-Link mode Pin 4

**10.1.4**   **BUS RUN- and CfgF LED**

```
        BUS  CfgF    LNK1  ST  LNK2    UA  US
        [  ] [  ]    [  ] [  ] [  ]    [  ][  ]
        RUN          ACT1     ACT2     POWER
```
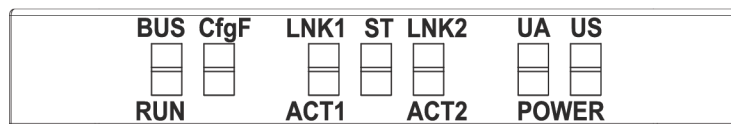
- **BUS RUN** indicates the bus status.
- **CfgF** shows PLC configuration satus.

**LED indicator BUS_RUN**

| Indicator | Status | Description |
|---|---|---|
| Red | On continuous | No configuration, no connection present |
| Red | Flashing at 2 Hz | No data transfer |

| Indicator | Status | Description |
|-----------|--------|-------------|
|           | Off    | Error-free operation |

*Tab. 41:* LED indicator BUS_RUN

**LED indicator CfgF**

| Indicator | Status | Description |
|-----------|--------|-------------|
| Red       | On continuous | ▪ Channel, generic or advanced diagnostics available<br>▪ Watchdog-Timeout<br>▪ System error |
| Red       | Flashing at 1 Hz 3 s | DCP signal service initiated via bus |
|           | Off    | Error-free operation |

*Tab. 42:* LED indicator CfgF

**10.1.5    LED indicator LNK/ACT**
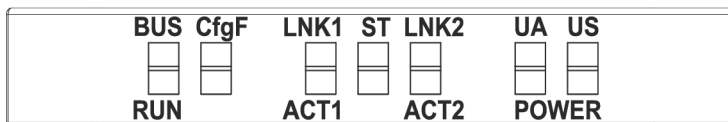


▪ LNK/ACT LNK/ACT (Link/Activity) indicates the status of EtherCAT communication at each port.

**LED indication LNK/ACT**

| LED indicator | LED status | Description |
|---------------|-----------|-------------|
| Green         | On continuous | Connection to network present. |
|               | Off       | No connection to network. |

*Tab. 43:* LED indication LNK/ACT

**LED indicator ACT**

| LED indicator | LED status | Description |
|---------------|-----------|-------------|
| Yellow        | Flashing  | Device is transmitting / receiving Ethernet frames |
|               | Off       | The device is transmitting /receiving Ethernet frames |

*Tab. 44:* LED indicator ACT

**LED indicator off**

This is what to do:

*Instruction:*

◆ Check the line connections.

### 10.1.6 LED status indicator
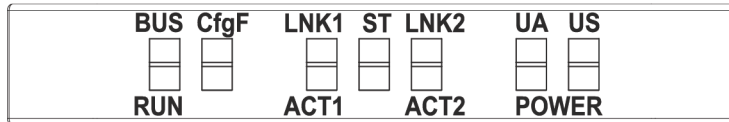


- ST indicates the overall device status.

**LED indicator ST**

| Indicator | Status | Description |
|---|---|---|
| Green | On continuous | Regular FW is running. Error-free operation. |
| Green | Flashing at 4 Hz | The process requested by rotary switch position is being executed. Do not switch off device. |
| Red | Flashing at 1 Hz | Invalid rotary switch position. System does not start. |
| Red | On continuous | Initialization error. Error during device initialization.<br>- HW issues,<br>- no valid configuration,<br>- COM FW not found<br>- rotary switch operation failed, etc. |

*Tab. 45:* LED indicator ST

**LED indicator flashing red**

This is what to do:

***Instruction:***

a) Select a valid position.

b) Restart device.

### 10.1.7 LED-Anzeige POWER US and UA
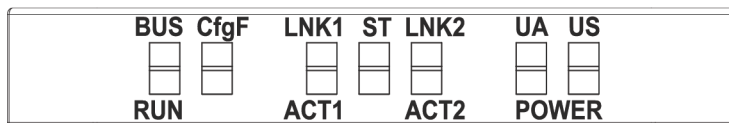


The power LEDs indicate the supply status

- **UA** actuator voltage
- **US** operating voltage

**LED indicator POWER US**

| Indicator | Status | Description |
|---|---|---|
| Green | On continuous | 18 V ≤ US ≤30 V<br>error-free operation |
| Red | On continuous | 11 V ≤ US ≤18 V<br>undervoltage |

| Indicator | Status | Description |
|---|---|---|
| Red | Flashing at 4 Hz | US >30 V overvoltage |
| | Off | US <11 V no voltage |

*Tab. 46:* LED indicator POWER US

**LED indicator POWER UA**

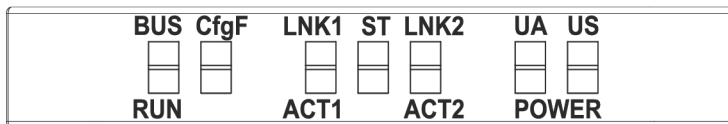| Indicator | Status | Description |
|---|---|---|
| Green | On continuous | 18 V ≤ UA ≤30 V error-free operation |
| Red | On continuous | 11 V ≤ UA ≤18 V undervoltage |
| Red | Flashing at 4 Hz | UA >30 V overvoltage |
| | Off | UA <11 V no voltage |

*Tab. 47:* LED indicator POWER UA

**INFO**
Fault-free operation is no longer guaranteed at US <18 V.

**10.1.8    Advanced LED indicator**

h



**Device identification**

| LED | Indicator | Status | Description |
|---|---|---|---|
| CfgF | Red | Flashing 3 times at 1 Hz | Device identification |

*Tab. 48:* Advanced LED indicator, device identification

**10.2    PROFINET Diagnostics**

**Alarm**

*CM50I* transmits diagnostic information in the form of alarms based on *PROFINET* specification V2.3.

### 10.2.1 Device-specific diagnostic messages

| Channel Error Type | Description | Action |
|---|---|---|
| 0x0100 | Sensor undervoltage | Check the sensor supply voltage of the device. |
| 0x0101 | Sensor overvoltage | Check the sensor supply voltage of the device. |
| 0x0102 | Device overtemperature | Remouve heat source. |
| 0x0103 | Sensor current overload | Check current consumption of connected load. |
| 0x0104 | Actuator current overload | Check current consumption of connected load. |
| 0x0105 | Device undertemperature | Insulate device. |
| 0x0106 | Actuator undervoltage | Check the device actuator supply. |
| 0x0107 | Actuator overvoltage | Check the device actuator supply. |
| 0x0108 | Force Mode Active | Deactivate Force mode via WebUI / OPC-UA / JSON. |
| 0x0109 | Short circuit pin 4 | Check wiring to the mating connector. |
| 0x010A | Short circuit pin 2 | Check wiring to the mating connector. |
| 0x010B | Short circuit pin 1 | Check wiring to the mating connector. |
| 0x010C | No actuator supply | Check the device actuator supply. |
| 0x010D | No Connection to NTP Server | Check SNTP parameters and connection to NTP server. |
| 0x010E | NTP Syncronisation lost | Check connection to NTP server. |

*Tab. 49:* Device-specific diagnostic messages - error types, description and remedies

### 10.2.2 Diagnostic messages at IO-Link ports via IODD

| Channel Error Type | Extended Channel Error Type | Description | Action |
|---|---|---|---|
| 0x10 (16) | 0x50E0 (20704) | IODD-on-Board: error in *GSDML* | Please contact *Baumer*. |
| 0x10 (16) | 0x50E0 (20704) | IODD-on-Board: general error | Please contact *Baumer*. |
| 0x10 (16) | 0x50E1 (20705) | IODD-on-Board: error in *GSDML* | Please contact *Baumer*. |
| 0x10 (16) | 0x50E2 (20706) | IODD-on-Board: error in *GSDML* | Please contact *Baumer*. |
| 0x10 (16) | 0x50E3 (20707) | IODD-on-Board: error in *GSDML* | Please contact *Baumer*. |
| 0x10 (16) | 0x50E4 (20708) | IODD-on-Board: error in *GSDML* | Please contact *Baumer*. |

| Channel Error Type | Extended Channel Error Type | Description | Action |
|---|---|---|---|
| 0x10 (16) | 0x50E5 (20709) | IODD-on-Board: invalid parameter value | Check device parameterization. |
| 0x10 (16) | 0x50E6 (20710) | IODD-on-Board: invalid parameter value | Check device parameterization. |
| 0x10 (16) | 0x50E7 (20711) | IODD-on-Board: invalid parameter value | Check device parameterization. |

*Tab. 50:* Diagnostic messages at IO-Link ports via IODD – error types, meaning and action

### 10.2.3 Diagnostic messages at IO-Link ports

#### 10.2.3.1 According to IO-Link integration guideline Edition 2

The listed diagnostics is available if the parameter for IO-Link event integration **Parameter 16** is set to **According to IO-Link integration guideline Edition 2**.

| Channel Error Type | Extended Channel Error Type | IO-Link event code(s) | Description |
|---|---|---|---|
| 0x9502 | 0x0000 – 0x7FFF | 0x0000 – 0x7FFF | IO-Link master event. The *Extended Channel Error Type* corresponds to the original IO-Link event code. |
| 0x9500 | 0x0000 – 0x7FFF | 0x0000 – 0x7FFF | IO-Link device event. The *Extended Channel Error Type* corresponds to the original IO-Link event code. |
| 0x9501 | 0x0000 – 0x7FFF | 0x8000 – 0xFFF | IO-Link device event. The *Extended Channel Error Type* plus `0x8000 (32768)` correspond to the original IO-Link event code. |

*Tab. 51:* Diagnostic messages at IO-Link ports, according to IO-Link integration guideline Edition 2

**INFO**

The meaning of the IO-Link event codes can be found in the Profinet specification IO-Link Integration - Edition 2, Version 1.1 (IO-Link-Integration-for-PROFINET_Ed2_2832_V11_Feb20.pdf) or in the document IO-Link Interface and System, V1.1.3 (IOL-Interface-Spec_10002_V113_Jun19.pdf) of the IO-Link community.

# 11 Web server

The web server is a graphical tool with which you can obtain information about the device quickly and intuitively.
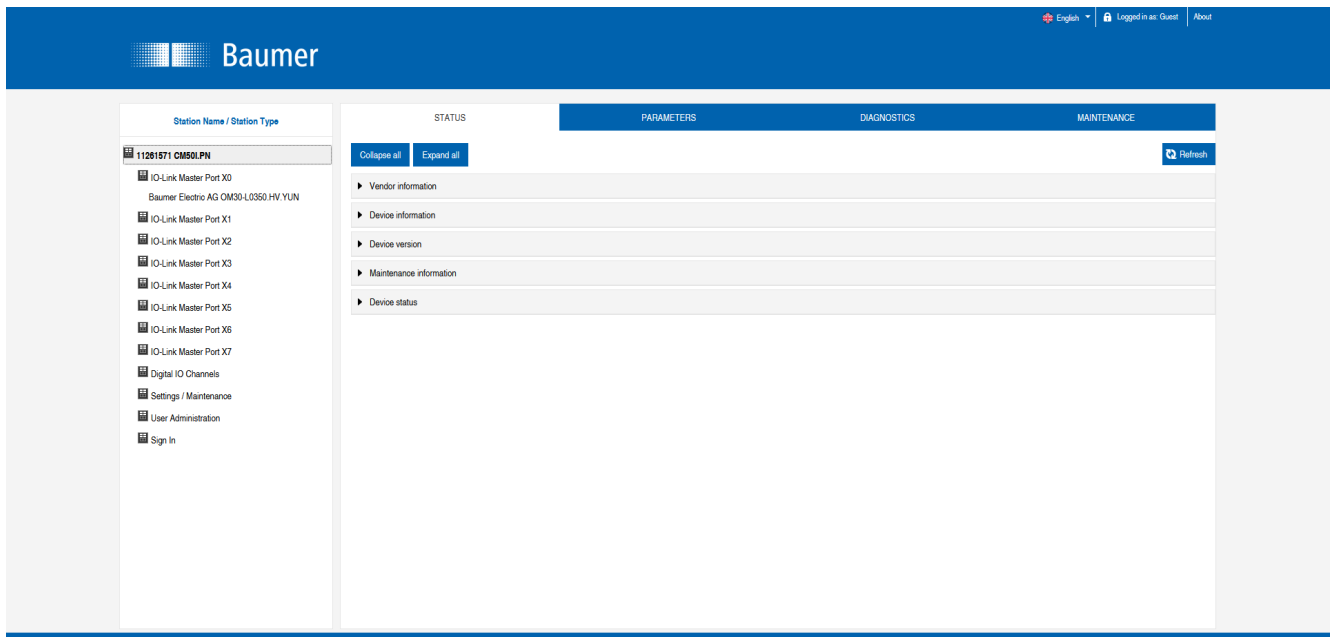


*Ill. 87:* Web server

> 💡 **INFO**
> The devices shown in the screenshots serve as examples.

## 11.1 Starting the web server

***Condition:***

⇨ The current versions of the following browsers with HTML5 and ES5 are supported: *Mozilla Firefox*, *Microsoft Edge*, *Google Chrome*.

***Instruction:***

a) Start the web browser.

b) Enter the device IP address in the web browser.

***Result:***

✓ The start screen of the web server is the ***Status*** page.

## 11.2 Access and login

**Username and password**

***Instruction:***

◆ Enter the login data for user name and password at the first start:
User name `<admin>`
Password `<private>`
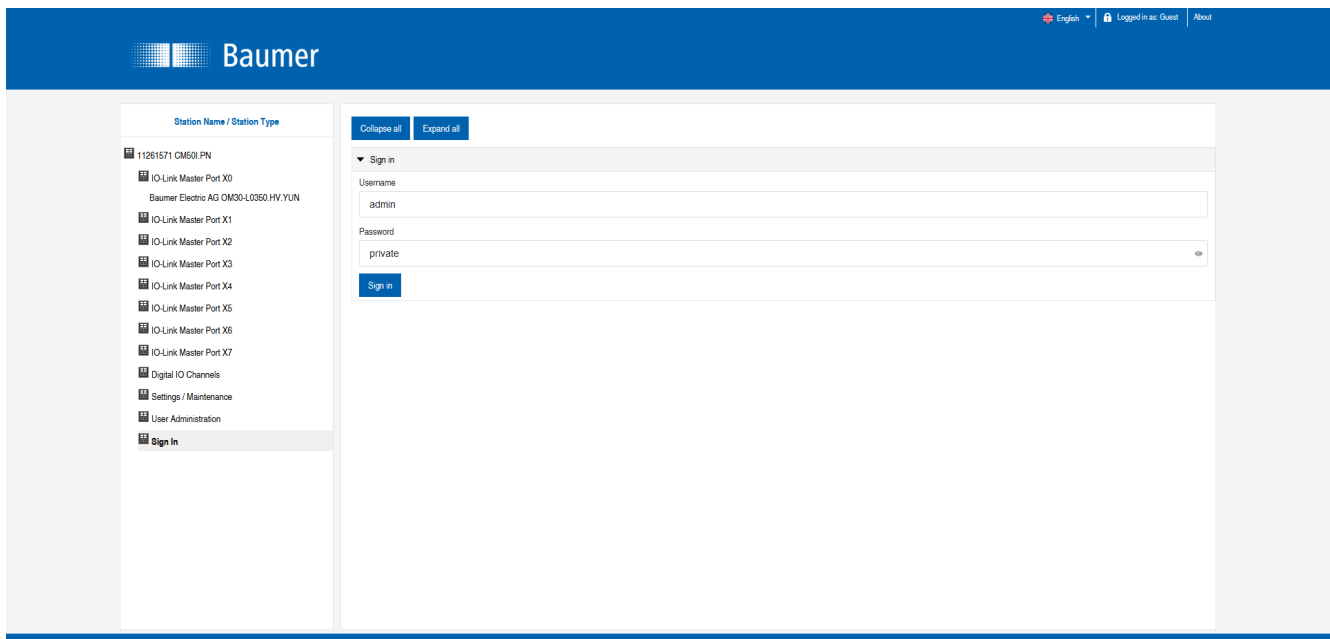
**Change password**

---

**NOTICE**

**Ensure data security!**

a) Change username and password after first login and after every restore default.
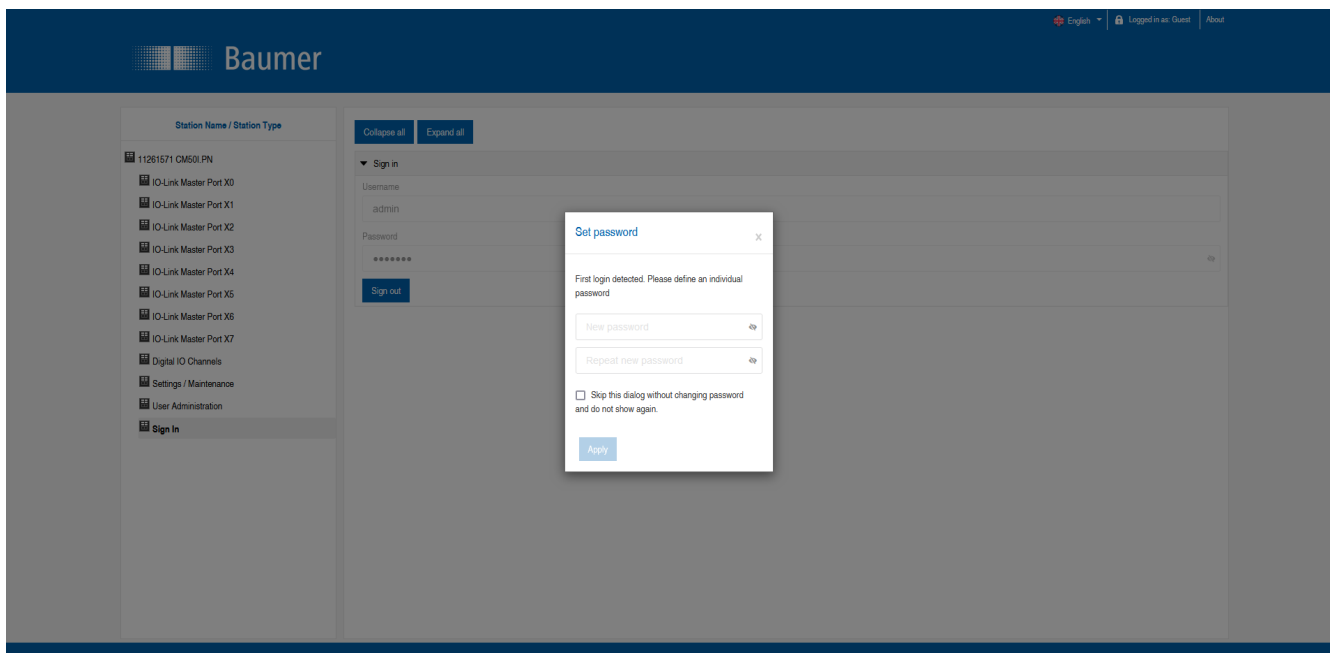


## 11.3 Initial screen

**Operating areas**

The web server provides 4 operating areas.
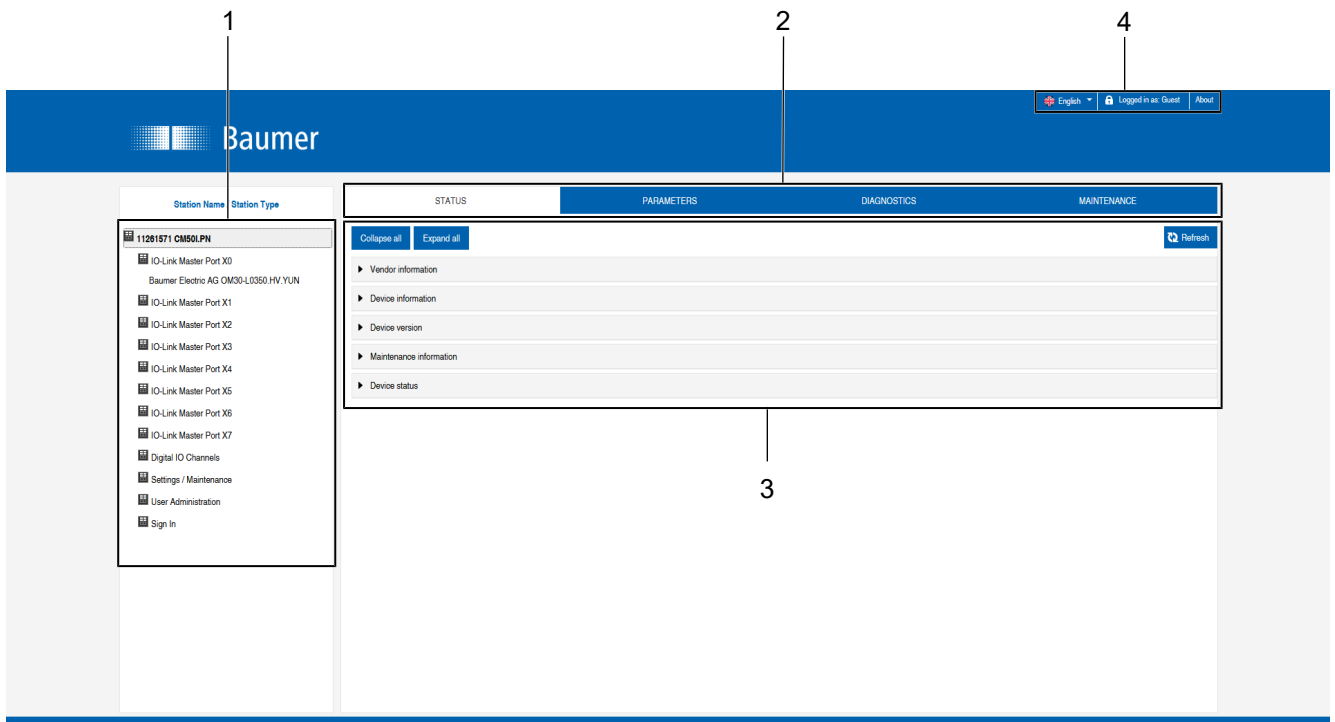
*Ill. 88:* Operating areas

| 1 | **System tree** | Provides device and available sub functions. |
|---|---|---|
| 2 | **Menu bar** | The menu bar can be used to switch between the different pages of the device or the sub-function. In addition, the white highlighting indicates which page you are currently on. |
| 3 | **Page content** | This area displays the content of the selected page. |
| 4 | **Header bar** | Language and interface settings, system information. |

## 11.4    Menu bar

The first line in the system tree provides device with article number and product name.

The menu bar comprises the following menu items:

- *Status*
- *Parameter*
- *Diagnostic tools*
- *Preventive maintenance*
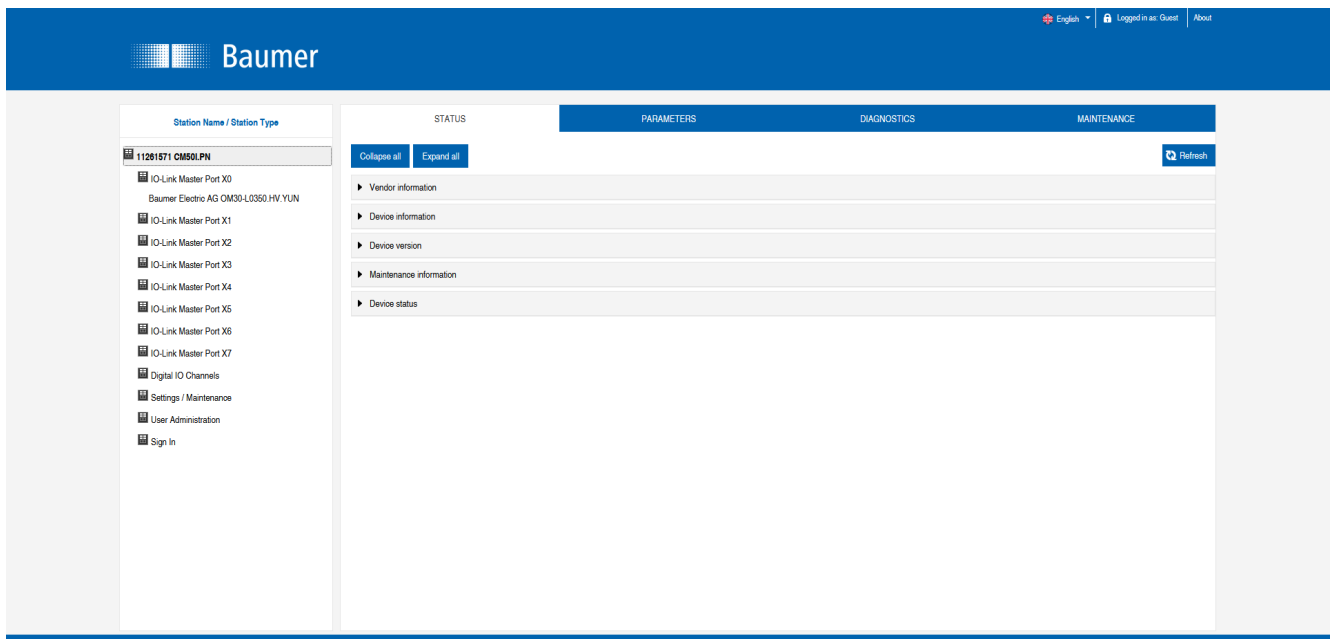
*Ill. 89:* Menu bar

## 11.4.1          STATUS menu

The **Status** menu item contains the following sub-items:
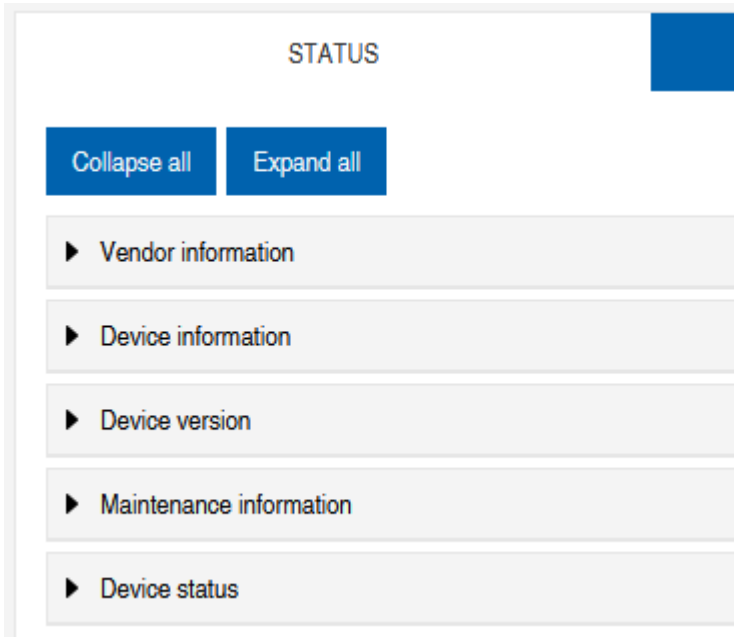


*Ill. 90:* **Status** menu item

**Manufacturer information**

**Manufacturer information** displays the following information:

| Parameter designation | Description |
| --- | --- |
| Manufacturer name | Fixed data from the manufacturer |
| Manufacturer address | Fixed data from the manufacturer |
| Manufacturer telephone | Fixed data from the manufacturer |
| Manufacturer URL | Website of the manufacturer |

**Device information**

*Device information* displays the following information:

| Parameter designation | Description |
| --- | --- |
| Order number | Article number of the device |
| Hardware name | Permanent article number of the device |
| Software name | Fieldbus designation of the device |
| Software number | Device manufacturing number |

**Device version**

*Device version* displays the following information:

| Parameter designation | Description |
| --- | --- |
| Hardware version | Hardware execution version |
| Software version | Software version run in the device |
| Website version | Web server version currently run in the device |

**Maintenance information**

**INFO**

Maintenance information is read only. The fields are entered or changed via *Settings/Maintenance* | *Maintenance information*.

*Maintenance information* provides the following information:

| Parameter designation | Description |
| --- | --- |
| Name | Device name, free text |
| Installation location | Name of place, free text |
| Contact information | Contact, free text |
| Description | Description, free text |
| Last maintenance date (yyyy-mm-dd) | Free date entry |
| Next maintenance date (yyyy-mm-dd) | Free date entry |

**IO-Link device information**

*IO-Link device information* displays the following information:

| Parameter designation | Description |
| --- | --- |
| 1L Voltage [V] | Provides sensor voltage in volts |
| 1L Current [A] | Provides sensor voltage in amperes |
| 2L Voltage [V] | Provides actuator voltage in volts |
| 2L Current [A] | Provides actuator voltage in amperes |
| Temperature [°C] | Display of the appliance temperature in Celsius |
| Total operating time [hh:mm:ss] | Operating time since the device was switched on |
| Number of starts | Number ofice restarts |

### 11.4.2          Menu PARAMETERS

The **Parameters** menu item contains the following sub-items:
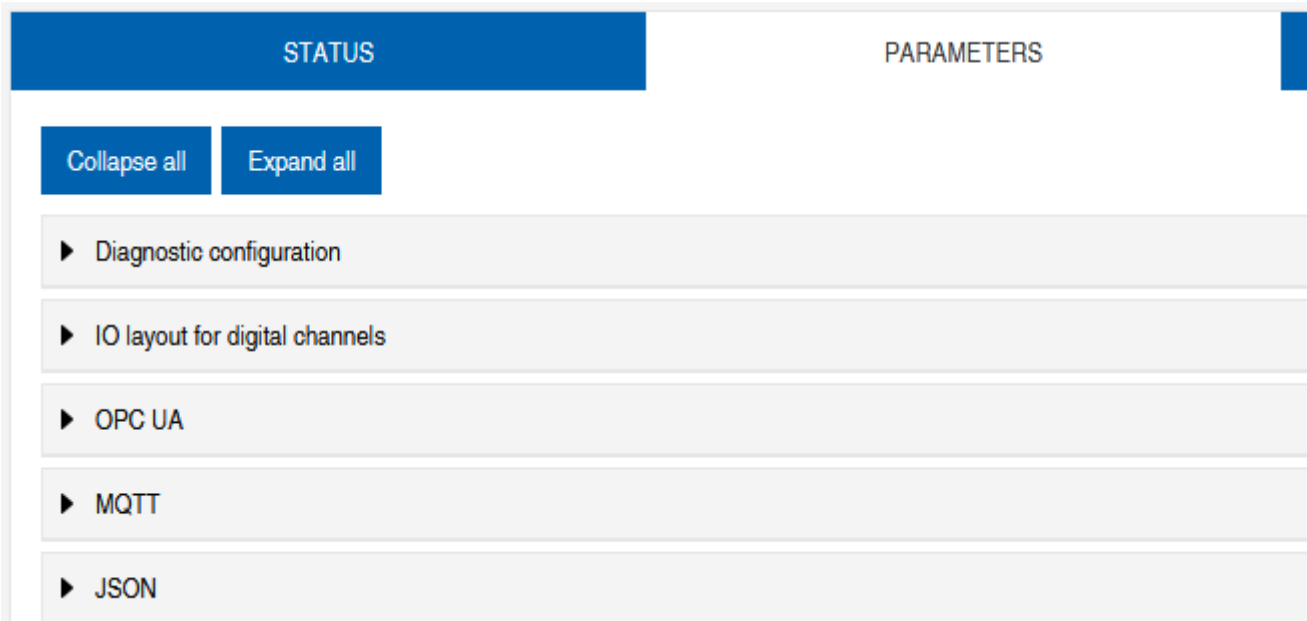


*III. 91: **Parameter** menu*

#### OPC UA

Users with admin and operator rights can change settings and enter the OPC UA port number. Guest users with read rights only.

**OPC UA** displays the following information:

| Parameter designation | Description |
| --- | --- |
| Activate OPC UA Server | OPC UA server on the module active / passive |
| Allow OPC UA clients to write ISDU data | OPC UA client may write ISDU data (Indexed Service Data Unit) to the module on the IO-Link master |
| Allow OPC UA clients to write PDO data | OPC UA client may write PDO (process data objects) to the module on the IO-Link master |
| OPC UA port number | Display / definition of the OPC UA port |

#### MQTT

Users with admin and operator rights can change settings and enter the IP address of the MQTT server. Guest users with read rights only.

**MQTT** displays the following information:

| Parameter designation | Description |
| --- | --- |
| Enable MQTT | MQTT client on component active / passive |
| MQTT server IP address | MQTT server IP address |
| MQTT Client ID | Read/write MQTT client ID |
| Client head topic | Read/write MQTT topic |
| Topic for system data | Read/write MQTT topic |

**JSON**

Users with admin and operator rights can activate and deactivate JSON. Guest users with read rights only.

*JSON* displays the following information:

| Parameter designation | Description |
|---|---|
| Enable JSON | JSON interface on component active / passive |

**11.4.3      DIAGNOSTICS menu**

The incoming and outgoing alarms of the master are displayed in the *Diagnostics* menu item.

The menu shows an overview of the diagnostic messages.

Depending on the setting in the *Please select an entry* drop-down menu, the following device diagnostics are displayed:

- **Enabled**
  - All pending diagnostics at the time of the web server call.
  - All diagnoses that no longer exist are not displayed.
- **History**
  - All diagnostics from the retentive diagnostics memory that no longer exist are displayed.
  - More than 40 diagnostics in the memory. The latest diagnostics overwrites the most previous one in the memory.
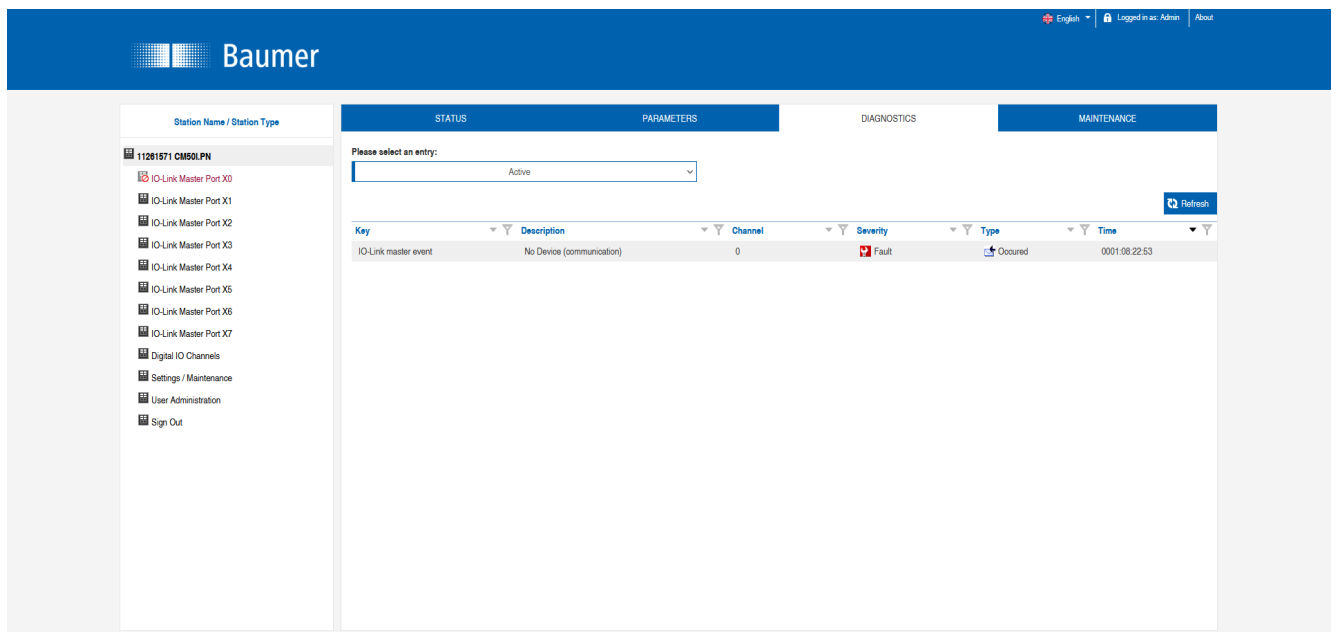


*Ill. 92: Diagnostics menu item*

**11.4.4      MAINTENANCE menu**

In the *Maintenance* menu item, users with admin and operator rights can delete the diagnostic memory.
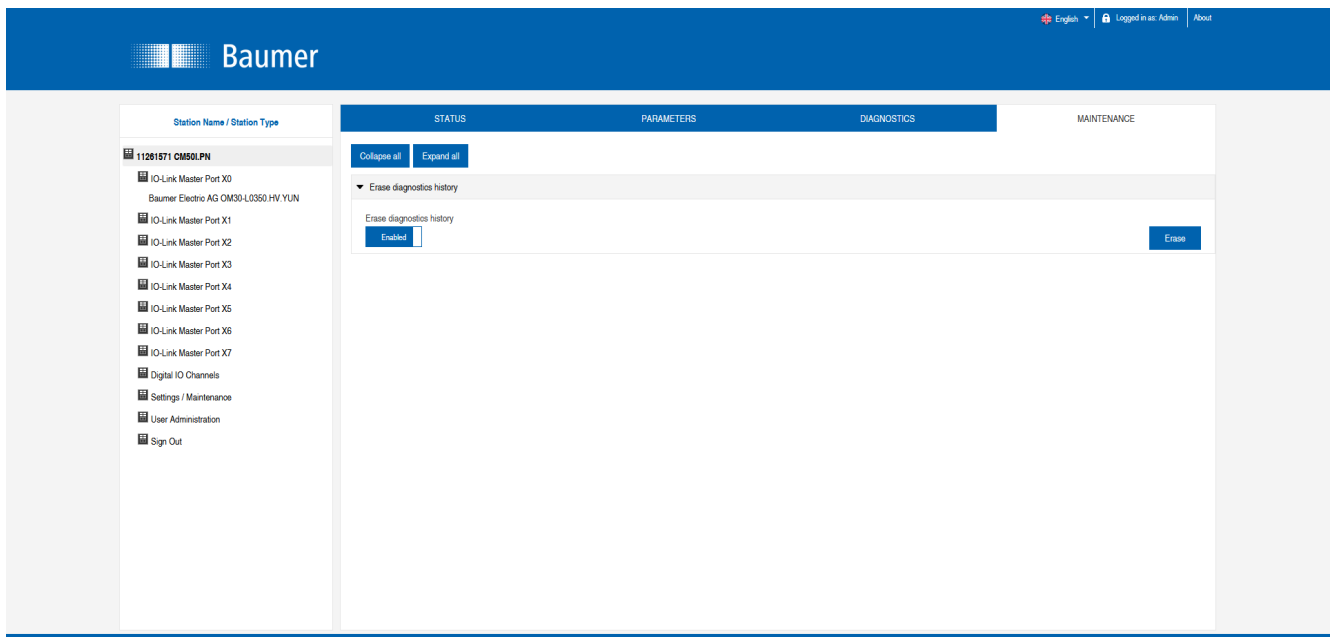
*Ill. 93:* Delete diagnostic memory

## 11.5    IO-Link master port

The system tree provides 8 IO-Link master ports (X0 ... X7) for individual selection. According to the user role, information is read only or enables configuration.

In active IO-Link communication, the IO-Link device name automatically appears under the relevant port.
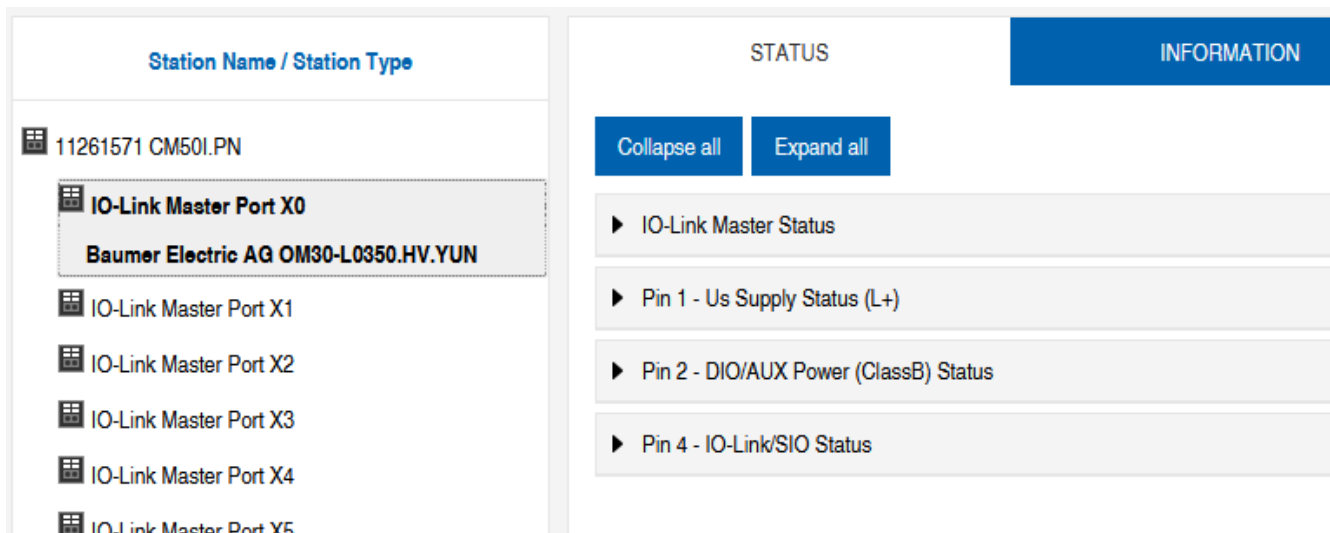


*Ill. 94:* IO-Link master port

### 11.5.1    STATUS menu

The IO-Link master status is displayed here in the ***Status*** menu.

*Ill. 95:* IO-Link master port - IO-Link master status

If pin 4 is in IO-Link mode, all relevant IO-Link data including the I/O bytes of the device are displayed.

If pin 4 is in operation without a connected IO-Link device, it is displayed that no device is connected.



*Ill. 96:* IO-Link master port - IO-Link master status for digital operation

If pin 4 is configured as a digital input, you can see it here.

Optional indication of:

- Status: Disabled
- Status: Digital input
- Status: Digital output

**Port Status - Pin 1**

*Port status - pin 1* provides the following information

| Parameter designation | Description |
|---|---|
| Temperature [°C] | Temperature in degrees Celsius |
| Voltage [V] | Voltage in Volts |
| Current [A] | Current in Ampere |
| Status | Pin status |

**Port Status - Pin 2**

*Port status - pin 2* provides the following information

| Parameter designation | Description |
|---|---|
| Temperature [°C] | Temperature in degrees Celsius |

| Parameter designation | Description |
|---|---|
| Voltage [V] | Voltage in Volts |
| Current [A] | Current in Ampere |
| Status | Pin status |

**Port Status - Pin 4**

*Port status - pin 4* provides the following information

| Parameter designation | Description |
|---|---|
| Temperature [°C] | Temperature in degrees Celsius |
| Voltage [V] | Voltage in Volts |
| Current [A] | Current in Ampere |
| Status | Pin status |

## 11.5.2 INFORMATION menu

Menu item *Information* provides the following subitems:



| STATUS | INFORMATION | CONFIGURATION | IO-LINK PARAM |
|---|---|---|---|

Collapse all   Expand all

▼ IO-Link Device Information

| | |
|---|---|
| - Min cycle time | 1.0 ms |
| - Function ID | 0 |
| - Number of profile IDs | 1 |
| - Vendor name | Baumer Electric AG |
| - Vendor text | www.baumer.com |
| - Product name | OM30-L0350.HV.YUN |
| - Product ID | 11232075 |
| - Product text | Optical distance sensor, Connector M8 |
| - Serial number | R245.85343 |
| - Hardware revision | 01.00.01 |
| - Firmware revision | 01.01.09 |

*Ill. 97:* IO-Link Master Port – *Information*

**IO-Link device information**

Technical data and manufacturer information of a connected and active IO-Link device is provided at the related master port.

*"IO-Link device information"* provides the following information:

| Parameter designation | Description |
|---|---|
| Minimum. cycle time | Minimum process cycle time of IO-Link device |
| Function ID | Function ID IO-Link device |
| Number of profile IDs | Number of profiles supported by the IO-Link device |
| Manufacturer name | Manufacturer name IO-Link device |
| Manufacturer text | Manufacturer text IO-Link device |

| Parameter designation | Description |
|---|---|
| Product name | Product name IO-Link device |
| Product ID | Article number IO-Link device |
| Product text | Additional description IO-Link device |
| Serial number | Serial number |
| Hardware version | Hardware version |
| Firmware version | Firmware version |

### 11.5.3 CONFIGURATION menu

Menu item *Configuration* of the selected IO-Link port provides the setting of pin 1, pin 2 and pin 4 and allows also for configuration.

Users with operator and admin rights can set the functions and behavior of pin 1, pin 2 and pin 4.

Users with service and maintenance rights have read rights.

Pin 4 can be deactivated or configured as an IO-Link master, input or output.



*Ill. 98:* IO-Link master port - configuration (pin 4)

Pin 2 can be deactivated or configured as an input, output or DIO in *Automatic Mode*.



*Ill. 99:* IO-Link master port - Configuration - IQ behavior (pin 2)

If pin 2 or pin 4 is configured as an input, the digital input filters can be set individually.
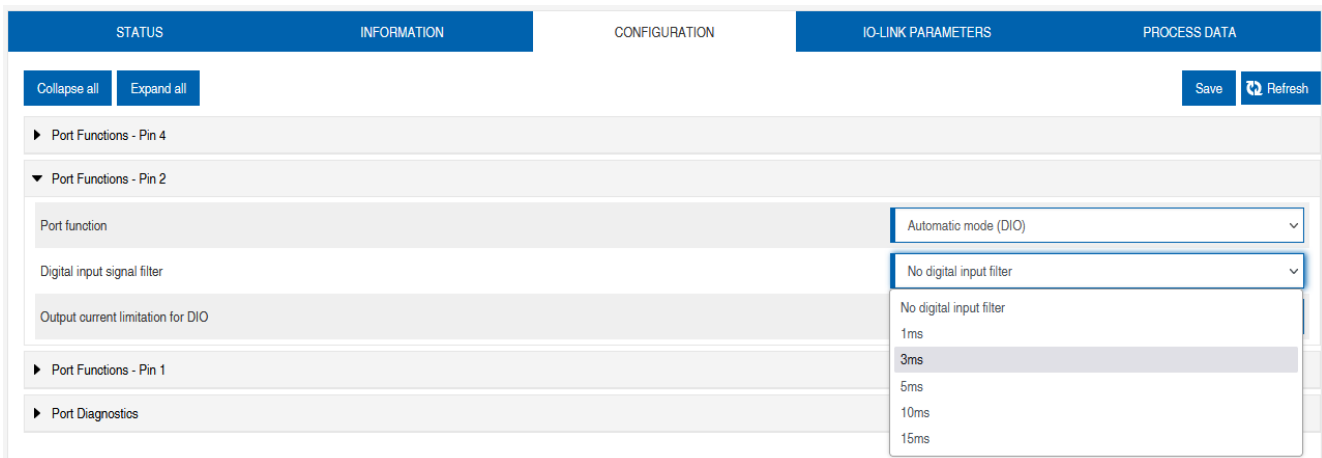
*Ill. 100:* IO-Link master port - Configuration - Setting digital input filters

## 11.5.4  IO-LINK PARAMETERS menu

In this menu item, the *ISDU (Index Service Data Unit)* of the device can be read and written during IO-Link operation. This primarily allows an IO-Link device to be evaluated or parameterized without a controller. The input can be made in both hex and ASCII format.

### INFO
Observe the information in the IO-Link device manufacturer's manual.

Users with maintenance and admin rights can write ISDU values. Users with service rights have read rights.
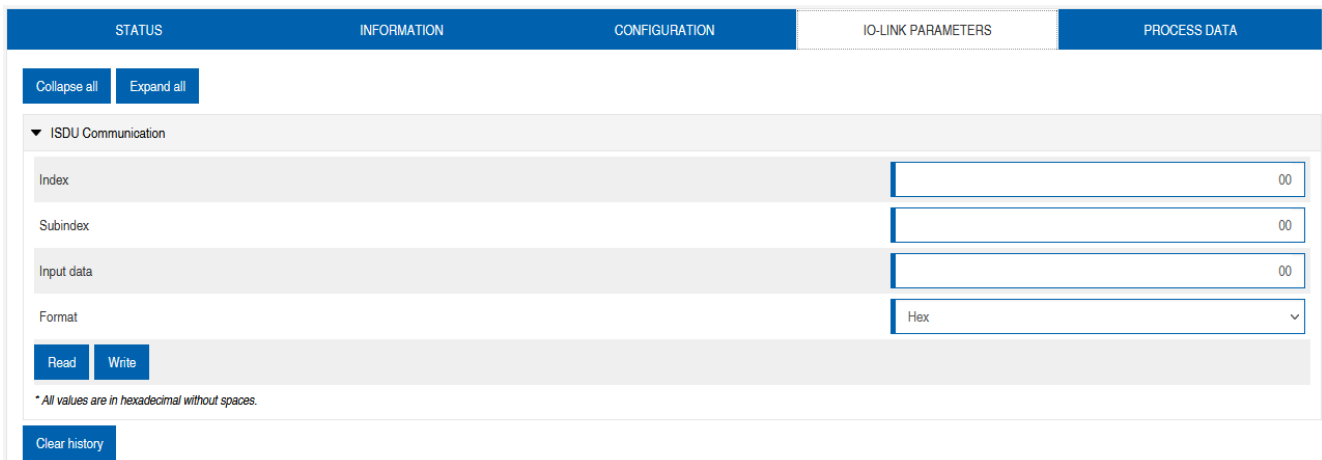


*Ill. 101:* IO-Link master port - IO-LINK PARAMETER

## 11.5.5  PROCESS DATA menu

In the **Process data** menu item, the current process data of the connected IO-Link device is continuously displayed if pin 4 of the corresponding port has been configured as an IOL port. Example: Port X2: Pin 4 (IO- Link Autostart) and Pin 2 (Digital output static on).

*Ill. 102:* IO-Link Master Port - PROCESS DATA

The current statuses of the digital inputs are displayed in this menu item. Example: Port X1: Pin 4 (DI) and pin 2 (DI)



*Ill. 103:* IO-Link master port - Digital inputs - PROCESS DATA

## 11.6        Digital IO channels/ IO overview

In the *Configuration* menu of the selected IO-Link port, the setting of pin 2 and pin 4 on the selected port is displayed. Outputs can be set under certain conditions.

### 11.6.1        Input data

Each user can monitor the digital statuses of the inputs configured on the device.



*Ill. 104:* Overview of input data

## 11.6.2        Output data

### Allow outputs to be set

Users with admin, service and maintenance rights can allow the outputs to be set in this menu.

The right to do this is only granted if the device is not in an active fieldbus connection with the control unit. The control system has priority.
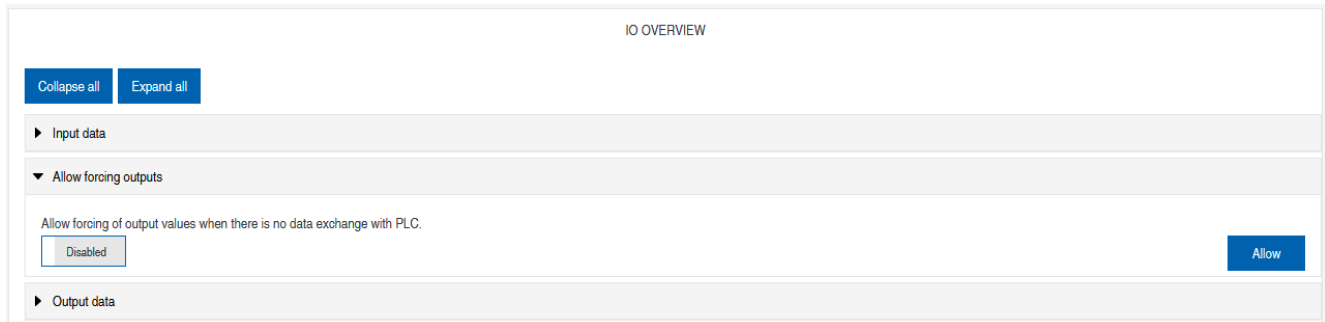


*III. 105:* Allow outputs to be set

### Setting output data

Guest users are not permitted to set the exits.

All other users (admin, operator, maintenance) can set the outputs.

As soon as the user (admin, operator, maintenance) logs out, the outputs go to $0$.

As soon as a fieldbus is actively working with the device, the outputs go to $0$ and then adopt the status that they receive from the controller.
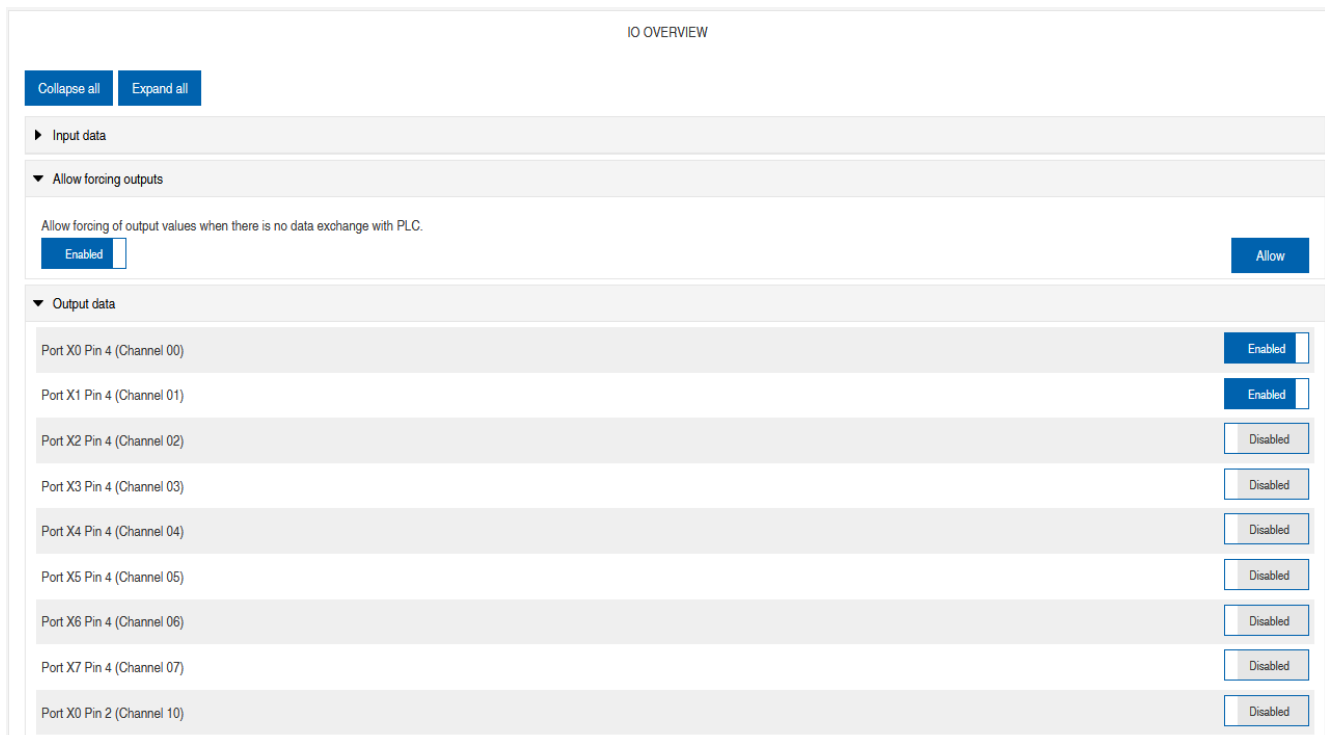


*III. 106:* Setting output data

## 11.7        Settings and maintenance

### 11.7.1        DEVICE CONFIGURATION menu

In Profinet, the address is usually assigned by the controller using DCP. Only the IP setting can therefore be read in the web server.
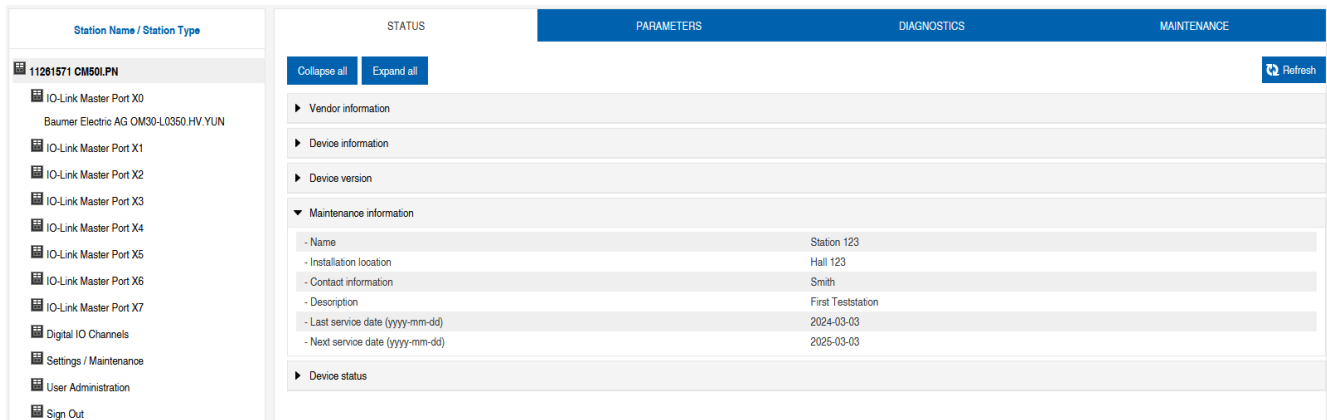


*Ill. 107:* Settings IP address Profinet

### 11.7.2        MAINTENANCE INFORMATION menu

Users with service, maintenance and admin rights can enter information about the device here.



*Ill. 108:* Maintenance information setting

The maintenance information appears in the device in the ***Status*** menu item and ***Maintenance information*** submenu.

*Ill. 109:* Maintenance information status

### 11.7.3    FIRMWARE menu

This menu item displays the data of the firmware running on the device.

Users with service, maintenance and admin rights can upload new firmware, provided in ZIP folders, to the device here. After successful loading, the device checks the firmware container and starts automatically with the new firmware version.
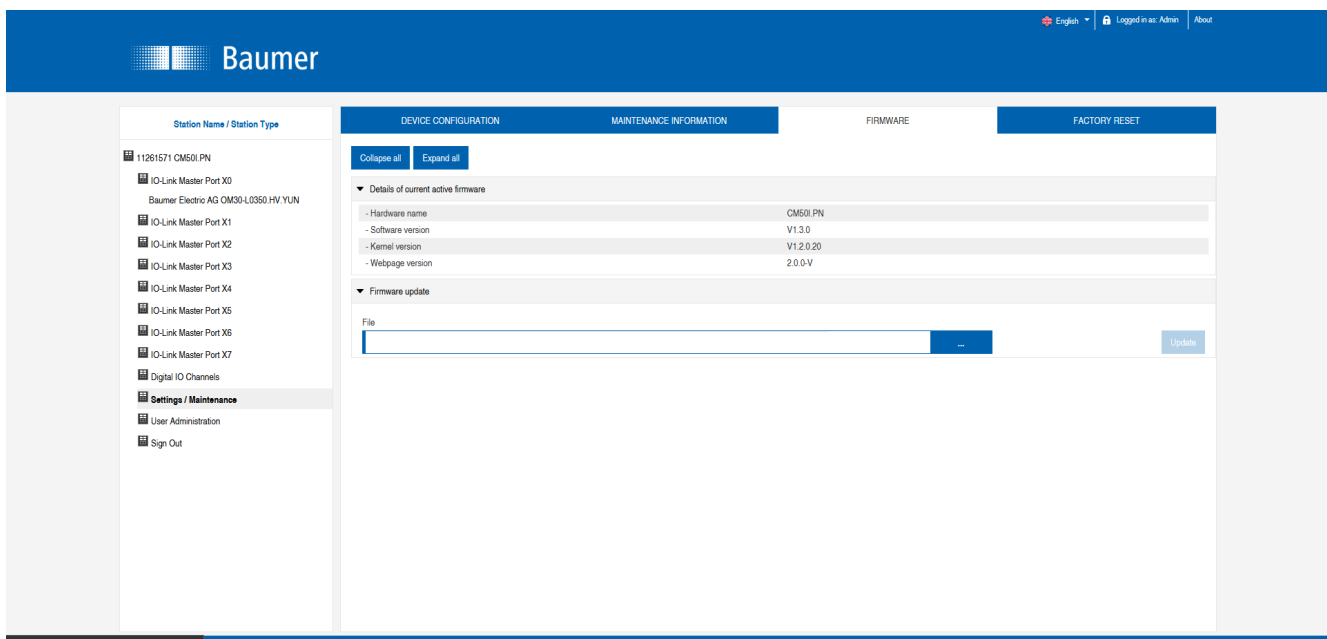


*Ill. 110:* Firmware

### 11.7.4    WORK RESET menu

In this menu item, users with service, maintenance and admin rights can reset the entire device or individual sub-areas (device information, network, application).

*Ill. 111:* Factory reset

## 11.8 User administration

User administration can only be carried out with admin rights.

When the product is delivered, the administrator is called `admin` and has the password `private`.

**INFO**
The administrator default password can be changed from the control unit in the system with the field bus running.

Users log in and off in the system tree at the bottom left.

 Click on *Logout*.



*Ill. 112:* User administration

# 12      Maintenance and cleaning

> ⚠ **WARNING**
>
> **Material damage due to defective or damaged appliances.**
> The function of the devices is not guaranteed.
>
> a) Replace defective or damaged devices.

> **INFO**
>
> You can replace the device with the same type if maintenance is required.
>
> a) Check whether the switch settings of the old and new device are identical.

> **INFO**
>
> Cleaning the appliance.
>
> a) Only use oil-free compressed air or spirit.
>
> b) Only use non-fibrous materials (e.g. leather cloth).
>
> c) Do not use contact spray.

## 13       Annex

### 13.1      Accessories

#### 13.1.1    Tools

| Designation | Art. no. |
|---|---|
| M12 installation wrench set SW 13 | 11238694 |
| M12 mounting wrench bit SW 17 | 11238695 |



*Ill. 113:* Assembly wrench

### INFO

**PRODUCTS AND ACCESSORIES**

You can find a large selection of products at: https://www.baumer.com

### 13.2      Glossary

| Term | Description |
|---|---|
| Bus-Run-LED | LED for signaling the bus status. |
| CfgF-LED | LED for signaling correct/incorrect configuration. |
| Bytes | iTerm from IEC 61158. Corresponds to 1 byte or 8 bits. |
| DI | Digital Input |
| DIP switch | Dual in-line package/switch with two parallel rows of connections. |
| DO | Digital output/digital output |
| EMC | Electromagnetic compatibility |
| EN | European standard |
| ESD | Electrostatic discharges |
| FE | Functional earth |
| IIoT | The Industrial Internet of Things (IIoT) is the industrial version of the Internet of Things (IoT). In contrast to the IoT, it does not represent consumer-oriented concepts, but focuses on the application of the Internet of Things in the manufacturing and industrial environment. |
| IN | Input |

| Term | Description |
|---|---|
| I&M data | For identification and maintenance (I&M), data records (data structures) have been defined for PROFIBUS, which must be implemented for all devices with DP-V1. These data structures are used to uniquely identify the field device and facilitate maintenance. |
| IO-Link | Standardized communication system for connecting intelligent sensors and actuators to an automation system |
| IRT | Isochronous real time/protocol for clock-synchronous activation of data and functions on different devices. |
| IP67 | Ingress protection according to DIN EN 60529 |
| IP address | Address for identification in an Ethernet network |
| LED | Light Emitting Diode |
| LNK/ACT-LED | Link/Activity LED for signaling Ethernet communication. |
| MAC address | MAC address stands for Media Access Control address and represents the unique identifier of a network interface. The MAC address is often also referred to as the physical address. |
| MRP | Media Redundancy Protocol/A protocol for the management of ring topologies in a production plant. It is used to increase the availability of devices in the network. |
| n.c. | Not connected |
| OUT | Output |
| PELV | Protective Extra Low Voltage |
| Power-LED | LED for signaling the power supply |
| PROFINET | Process Field Network |
| PROFIenergy | PROFINET profile for energy management in production plants |
| PQI | The port qualifier information (PQI) provides status information about the IO-Link port or the device status. |
| SELV | Safety Extra Low Voltage with safe isolation. |
| Shared Device (SD) | Protocol extension of a PNIO device to establish simultaneous communication relationships with several PNIO controllers. |
| SNMP | Simple Network Management Protocol/Protocol for simple monitoring and control of various network participants. |
| PLC | Programmable Logic Controller |
| UA | Actuator voltage |
| US | Sensor voltage |
| Validation IO-Link | Check for compatibility or identity of a connected IO-Link device. |

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**Baumer Germany GmbH & Co. KG**
Bodenseeallee 7
DE-78333 Stockach
www.baumer.com