GB

Operating instructions

Remote I/O module 8DO 8DI PROFINET IP65 / IP66 / IP67 / IP69K

AL4303

11599705 / 01 11 / 2024

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1 Preliminary note

You will find instructions, technical data, approvals and further information using the QR code on the unit / packaging or at documentation.ifm.com.

1.1 Legal and copyright information

© All rights reserved by ifm electronic gmbh. No part of these instructions may be reproduced and used without the consent of ifm electronic gmbh.

All product names, pictures, companies or other brands used are the property of the respective rights owners.

1.2 Symbols used

✓	Requirement
▶	Instructions
▷	Reaction, result
[...]	Designation of keys, buttons or indications
→	Cross-reference
!	Important note Non-compliance may result in malfunction or interference.
i	Information Supplementary note

1.3 Warnings

Warnings indicate the possibility of personal injury and damage to property. This enables safe product handling. Warnings are graded as follows:

WARNING

Warning of serious personal injury

▷ If the warning is not observed, fatal and serious injuries are possible.

CAUTION

Warning of minor to moderate personal injury

▷ If the warning is not observed, minor to moderate injuries are possible.

ATTENTION

Warning of damage to property

▷ If the warning is not observed, damage to property is possible.

1.4 Safety symbol on the device

Safety symbol on the device:

▶ Adhere to the operating instructions for the safe operation of the device.

1.5 Change history

Issue	Subject	Date
00	New creation of the document	04 / 2024
01	• Corrected: Description LEDs DO2, Process connections (→ 27) • Added: Description LED UA, Voltage supply (→ 24) • Changed: Supported supply voltages, General wiring information (→ 19) • Changed: Screenshots IoT Core Visualizer	11 / 2024

2 Safety instructions

- The unit described is a subcomponent for integration into a system.
  - The system architect is responsible for the safety of the system.
  - The system architect undertakes to perform a risk assessment and to create documentation in accordance with legal and normative requirements to be provided to the operator and user of the system. This documentation must contain all necessary information and safety instructions for the operator, the user and, if applicable, for any service personnel authorised by the architect of the system.
- Read this document before setting up the product and keep it during the entire service life.
- The product must be suitable for the corresponding applications and environmental conditions without any restrictions.
- Only use the product for its intended purpose (→ Intended use).
- If the operating instructions or the technical data are not adhered to, personal injury and/or damage to property may occur.
- The manufacturer assumes no liability or warranty for any consequences caused by tampering with the product or incorrect use by the operator.
- Installation, electrical connection, set-up, operation and maintenance of the product must be carried out by qualified personnel authorised by the machine operator.
- Protect units and cables against damage.
- Replace damaged units, otherwise the technical data and safety will be impaired.
- Observe applicable documents.

2.1 Cyber security

ATTENTION

Operating the machine in an unprotected network environment

▷ Unauthorised read or write access to data is possible.

▷ Unauthorised manipulation of the device function is possible.

▶ Check and restrict access options to the device.

3 Intended use

The device may only be used for the following purposes:

- Gateway between digital sensors / actuators and a higher-level control system

The device is designed for use without a control cabinet in the food industry.

4 Function

4.1 Visual indication

The device displays the following indications:

- Status and error indication of the PROFINET gateway and the system
- Status and activity indication of the Ethernet connections
- Status of the voltage supplies US and UA
- Status and error indication of the sensor and actuator ports

4.2 Parameter setting

The device can be configured using the following options:

- Parameter setting software
  - ifm moneo OS + ifm moneo|configure
  - ifm moneo|configure free
- ifm IoT Core
  - IoT-Core Visualizer
- PROFINET
  - Projection software

4.3 Inputs

Ports X5...X8 each have 2 digital inputs (type 2 according to EN 61131-3).

The digital inputs are connected to pins 2 and 4 of the ports.

4.4 Outputs

Ports X1...X4 each have 2 digital outputs.

The digital outputs are connected to pins 2 and 4 of the ports.

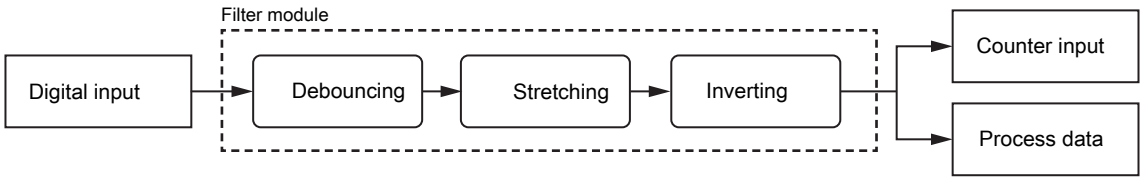
A digital output can be switched either by a switching signal channel or by a fieldbus application.

4.5 Digital input filters

The device pre-processes the digital input signals at ports X5...X8. The filter result is forwarded as a process value and as an input signal for a counter module.

The following filters can be applied to the digital input signals in the sequence specified.

1. Debounce
2. Hold
3. Invert



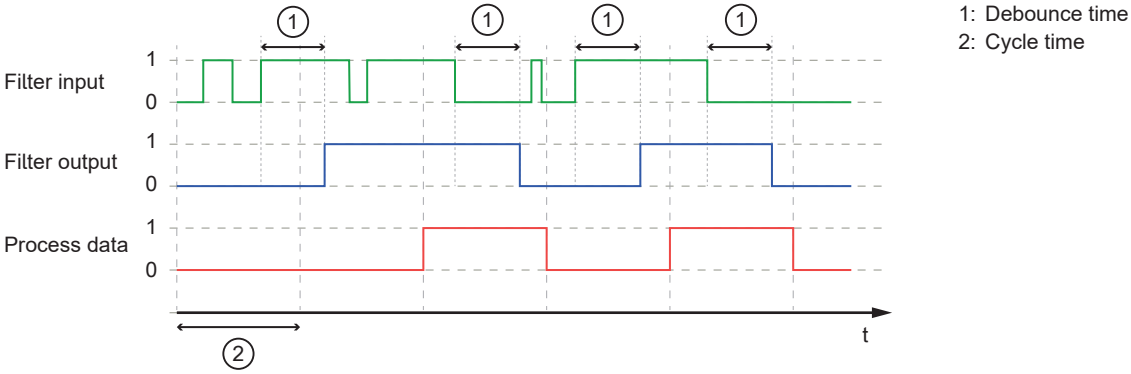
Each filter can be configured separately.

- Maximum input frequency: 4500 Hz
- Minimum detectable positive pulse width: 0.115 ms (+ positive edge)
- Minimum detectable negative pulse width: 0.115 ms (+ negative edge)

4.5.1 Debouncing

The filter suppresses noise signals. The filter provides the input signals at the filter output with a delay (debounce time). All signals shorter than the set debounce time are ignored by the filter.

Time diagram debounce filter:



4.5.2 Inverting

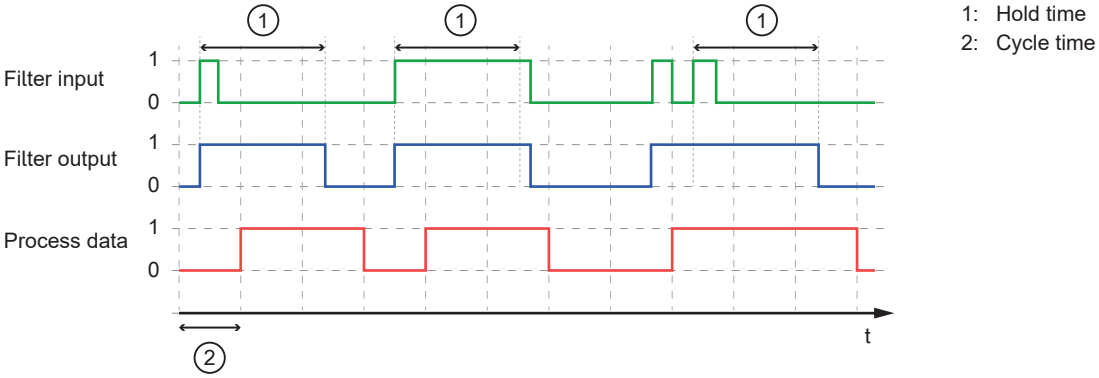
The filter inverts signals.

4.5.3 Stretching

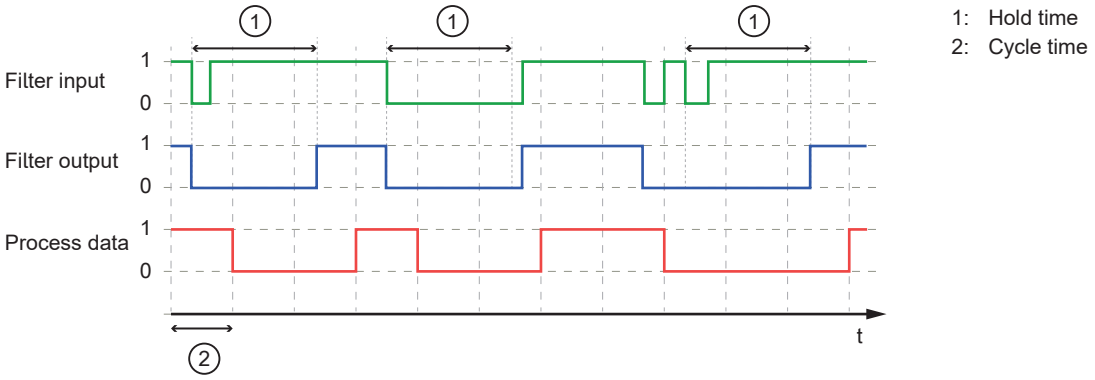
The filter stretches short input pulses. Level changes that occur during a stretching period are ignored. The filter is configured via the following parameters:

- Hold time: pulse duration to which short pulses are to be stretched. Pulses that are present for a longer time than the hold time are not stretched.
- Hold level: signal level to be stretched (HIGH or LOW)

Time diagram stretch filter (status HIGH):



Time diagram stretch filter (status LOW):

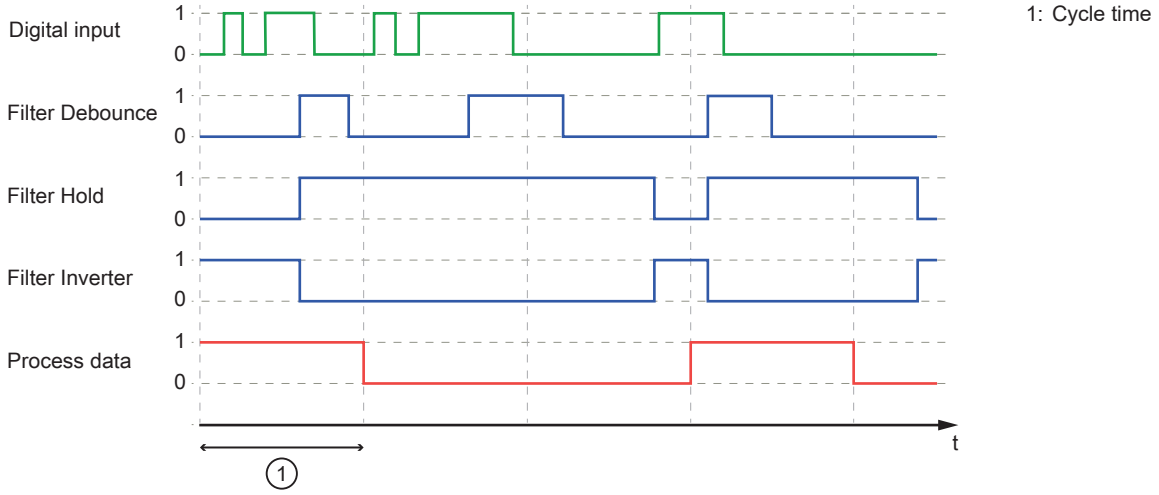


4.5.4 Filter combination

The filters can be combined.

Example: All 3 filters are activated

Time diagram:

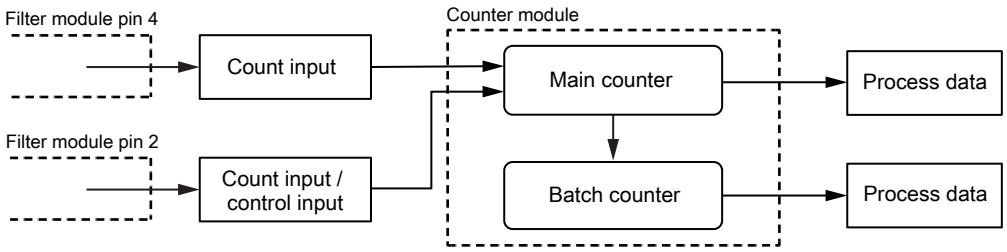


4.6 Counter

The device features one counter module per port.

A counter module consists of 2 separate counters:

- Main counter: The main counter counts the rising edges of the filtered digital input signals. The main counter has a value range that is defined by a threshold value. If the value range of the main counter is exceeded or not reached, an overflow or underflow signal is sent to the batch counter.
- Batch counter: The batch counter counts the overflow or underflow signals of the main counter.



A counter module can be operated in different operating modes. The following operating modes are available.

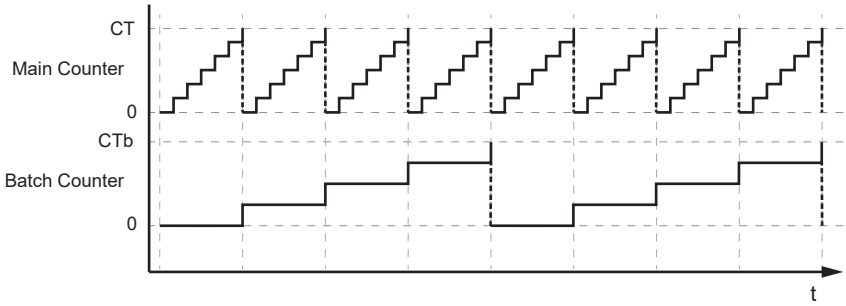
Maximum count frequency: 4500 Hz

4.6.1 Counter mode CTU

In CTU (Count Up) mode, the counter module operates as an up counter with overflow detection and overflow counter.

Behaviour:

- The initial value of the main counter is m = 0. The initial value of the batch counter is b = 0. The main counter has a threshold value CT. The batch counter has a threshold value CTb.
- If the counter module detects a positive edge at pin 4 of the port, the value of the main counter is incremented (m = m+1).
- If the main counter reaches the threshold value CT (m = CT), the counter value is reset (m = 0). Due to the overflow detection, the value of the batch counter is incremented (b = b+1).
- If the batch counter reaches the threshold value CTb (b = CTb), the counter value is reset (b = 0).

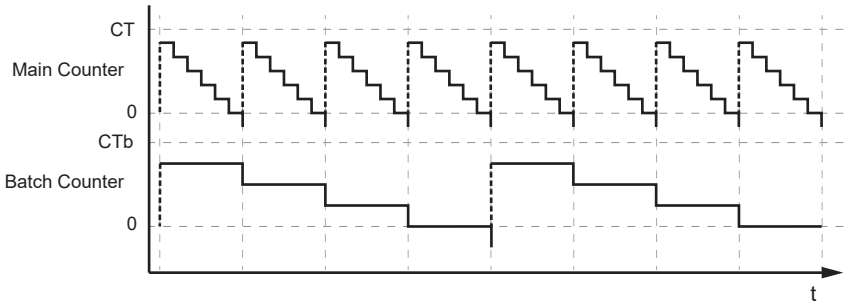


4.6.2 Counter mode CTD

In CTD (Count Down) mode, the counter module operates as a down counter with underflow detection and underflow counting.

Behaviour:

- The initial value of the main counter is m = 0. The initial value of the batch counter is b = 0. The main counter has a threshold value CT. The batch counter has a threshold value CTb.
- The first time a positive edge is detected at pin 4, the value of the main counter is set to the threshold value CT-1 (m = CT-1). At the same time, the value of the batch counter is set to the threshold value CTb-1 (b = CTb-1).
- If the counter module detects a positive edge at pin 4 of the port, the value of the main counter is decremented (m = m-1).
- If the main counter falls below 0, the counter value is reset to the threshold value (m = CT-1). Due to the underflow detection, the value of the batch counter is decremented (b = b-1).
- If the batch counter falls below 0, the counter value is reset to the threshold value (b = CTb-1).

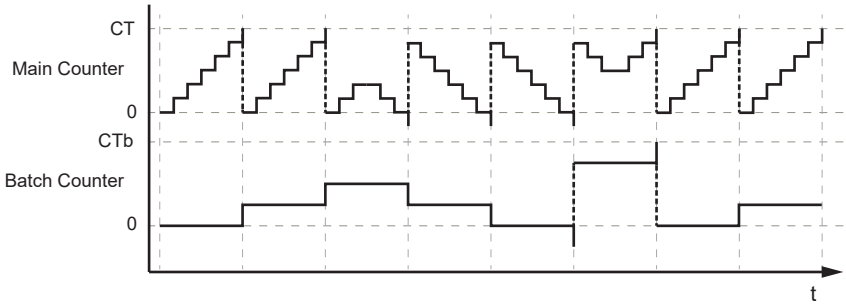


4.6.3 Counter mode CTUD

In CTUD (Count Up Down) mode, the counter operates as a simultaneous up and down counter with overflow and underflow detection.

Behaviour:

- The initial value of the main counter is m = 0. The initial value of the batch counter is b = 0. The main counter has a threshold value CT. The batch counter has a threshold value CTb.
- If the counter module detects a positive edge at pin 4 of the port, the value of the main counter is incremented (m = m+1).
- If the counter module detects a positive edge at pin 2 of the port, the value of the main counter is decremented (m = m-1).
- If the counter module simultaneously detects a positive edge at pin 4 and pin 2 of the port, the counter value of the main counter does not change.
- If the main counter reaches the threshold value CT (m = CT), the counter value is reset (m = 0). Due to the overflow detection, the value of the batch counter is incremented (b = b+1).
- If the main counter falls below 0, the counter value is reset to the threshold value (m = CT-1). Due to the underflow detection, the value of the batch counter is decremented (b = b-1).
- If the batch counter reaches the threshold value CTb (b = CTb), the counter value is reset (b = 0).
- If the batch counter falls below 0, the counter value is reset to the threshold value (b = CTb-1).

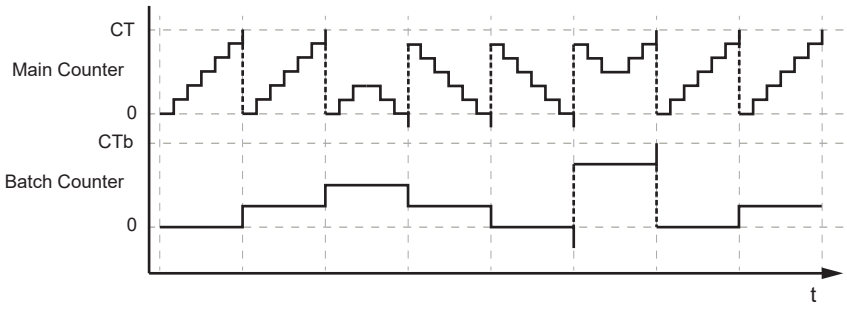


4.6.4 Counter mode CTDIR

In CTDIR (Count Direction) mode, the counter module operates either as an up counter with overflow detection or as a down counter with underflow detection. The counting direction can be set.

Behaviour:

- The initial value of the main counter is m = 0. The initial value of the batch counter is b = 0. The main counter has a threshold value CT. The batch counter has a threshold value CTb.
- The user can determine the counting direction. The counter module initially operates as an up counter with overflow detection.
- If the counter module detects a positive edge at pin 4 of the port and the counting direction of the port is set to “up”, the value of the main counter is incremented (m = m+1).
- If the main counter reaches the threshold value CT (m = CT), the counter value is reset (m = 0). Due to the overflow detection, the value of the batch counter is incremented (b = b+1).
- If the batch counter reaches the threshold value CTb (b = CTb), the counter value is reset (b = 0).
- If the counter module detects a positive edge at pin 4 of the port and the counting direction at pin 2 of the port is set to “down”, the value of the main counter is decremented (m = m-1).
- If the main counter falls below 0, the counter value is reset to the threshold value (m = CT-1). Due to the underflow detection, the value of the batch counter is decremented (b = b-1).
- If the batch counter falls below 0, the counter value is reset to the threshold value (b = CTb-1).



4.7 Switching signal channels

The device has 4 switching signal channels (SSC). The switching signal channels are each assigned to a counter module.

Each switching signal channel provides 2 switching signals. The switching signals can be output at the output channels of ports X1...X4.

The switching signal channels can be operated as normally closed (low active) or normally open (high active).

4.7.1 Deactivated

Can be combined with counter modules: CTU, CTD, CTUD, CTDIR

In the switch point mode Deactivated, the status of the counter module (main counter + batch counter) has no effect on the switching signal output. The switching signal is permanently in the INACTIVE state.

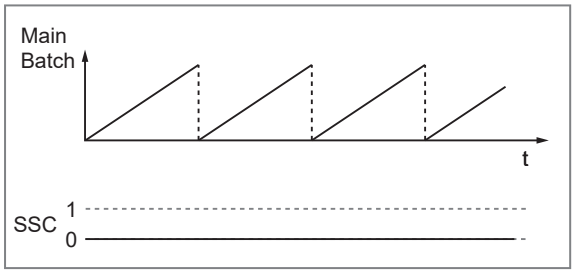


Fig. 1: Deactivated (high active)

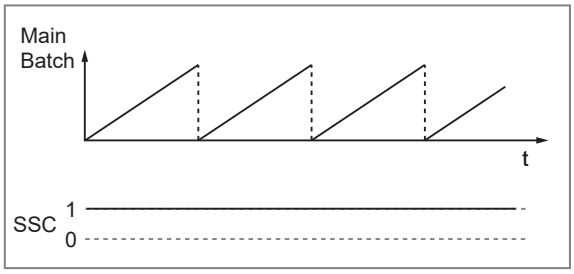


Fig. 2: Deactivated (low active)

4.7.2 Latch mode

Can be combined with counter modules: CTU, CTD, CTUD, CTDIR

In the Latch Mode switch point mode, the overflow or underflow events and the Latch Reset control signal are evaluated to derive the switching signal status.

As soon as the switching signal channel detects an overflow or underflow event, the switching signal is set (ACTIVE). The switching signal remains in this state even if further overflow or underflow events occur.

As soon as the switching signal channel detects a rising edge at the Latch Reset control signal, the switching signal is reset (INACTVE).

If the switching signal channel simultaneously detects an overflow or underflow event and a rising edge at the Latch Reset control signal, the switching signal is reset (INACTIVE).

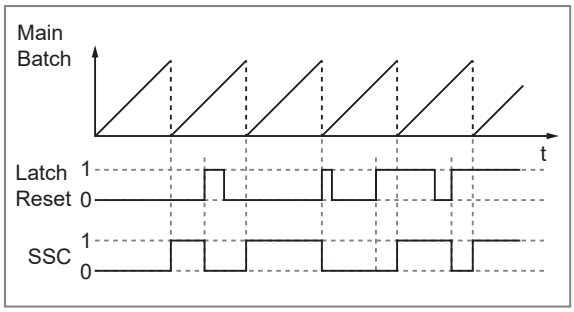


Fig. 3: Latch mode (high-active)

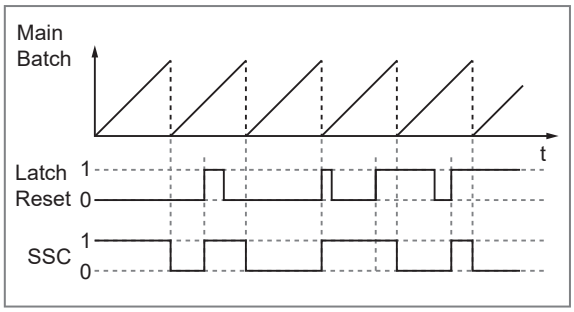


Fig. 4: Latch mode (low-active)

Switch delay is not available.

Reset delay is not available.

The hysteresis function is not available.

4.7.3 Single point mode

Can be combined with counter modules: CTU, CTD, CTUD, CTDIR

In the Single Point Mode switch point mode, the user can define one switch point (SP1). In the basic state, the switching signal is not set (INACTIVE). As soon as the counter value reaches SP1, the switching signal is set (ACTIVE). Subsequently, the switching signal is reset (INACTIVE).

The user can define whether the switching signal channel should evaluate increasing or decreasing counter values.

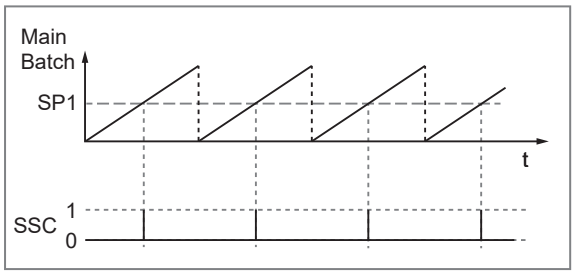


Fig. 5: Single point mode (high-active)

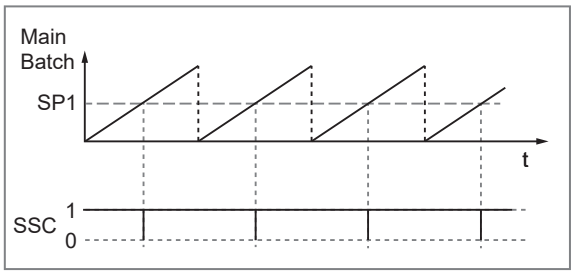


Fig. 6: Single point mode (low-active)

A switching delay can be used to delay the setting of the switching signal. For the switching signal to be set, the counter value must be greater than SP1 for at least as long as the set switching delay.

A reset delay can be used to delay the reset of the switching signal.

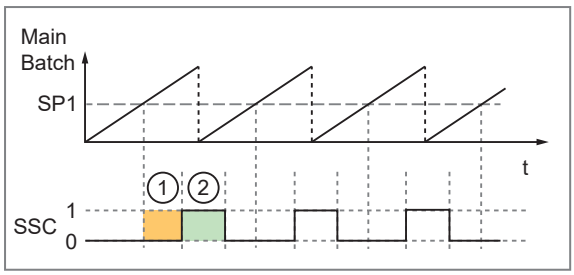


Fig. 7: Single point mode (high-active) with switch delay (1) and reset delay (2)

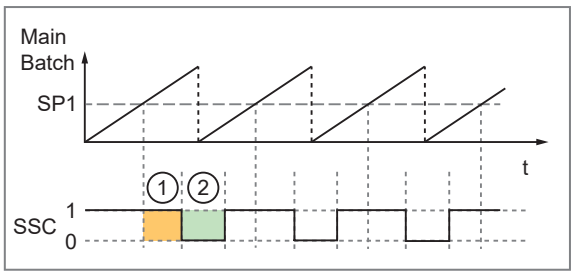


Fig. 8: Single point mode (low-active) with switch delay (1) and reset delay (2)

The hysteresis function is not available.

4.7.4 Two point mode

Can be combined with counter modules: CTUD, CTDIR

In the Two Point Mode switch point mode, the user can define a switch point (SP1) and a reset point (SP2). As soon as the counter value increases and reaches SP1, the switching signal is set (ACTIVE). As soon as the counter value decreases and reaches SP2, the switching signal is reset (INACTIVE).

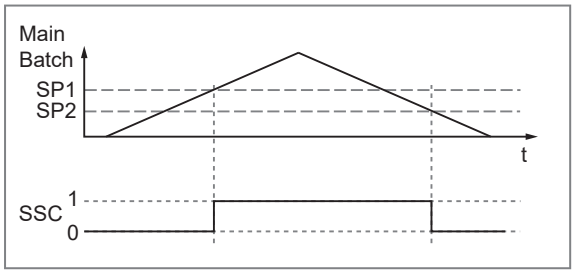


Fig. 9: Two point mode (high-active)

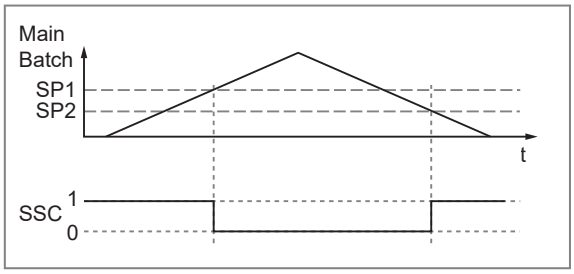


Fig. 10: Two point mode (low-active)

A switching delay can be used to delay the setting of the switching signal. For the switching signal to be set, the counter value must be greater than SP1 for at least as long as the set switching delay.

A reset delay can be used to delay the reset of the switching signals. For the switching signal to be reset, the counter value must be less than SP2 for at least as long as the set reset delay.

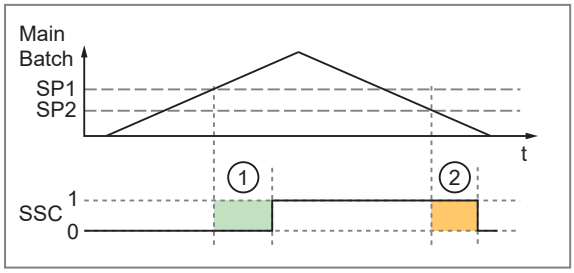


Fig. 11: Two point mode (high-active) with switch delay (1) and reset delay (2)

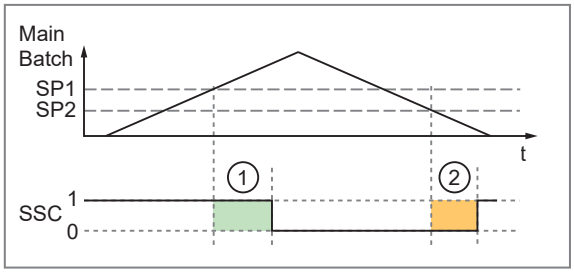


Fig. 12: Two point mode (low-active) with switch delay (1) and reset delay (2)

The hysteresis function is not available.

4.7.5 Window mode

Can be combined with counter modules: CTUD, CTDIR

In the Window Mode switch point mode, the user can define two switch points (SP1, SP2 with SP1 > SP2). The 2 switch points definte a range.

If the counter value is within the SP1...SP2 range, the switching signal is set (ACTIVE).

If the counter value is outside the SP1...SP2 range, the switching signal is reset (INACTIVE).

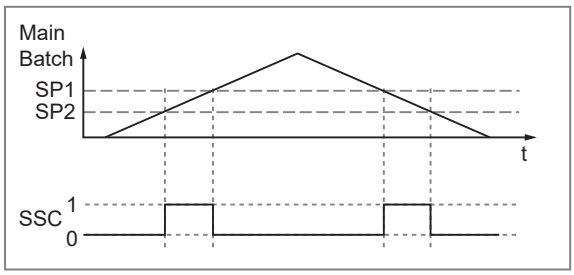


Fig. 13: Window mode (high active)

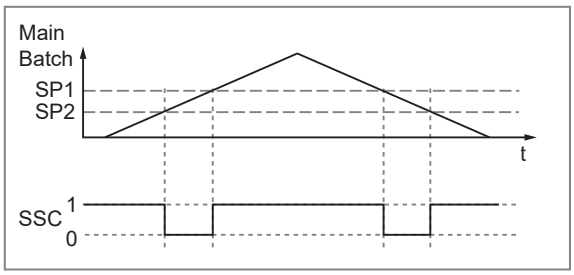


Fig. 14: Window mode (low active)

A switching delay can be used to delay the setting of the switching signal. For the switching signal to be set, the counter value must be greater than SP1 for at least as long as the set switching delay.

A reset delay can be used to delay the reset of the switching signals. For the switching signal to be reset, the counter value must be less than SP2 for at least as long as the set reset delay.

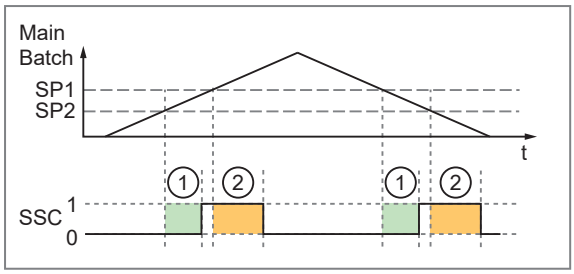


Fig. 15: Window mode (high-active) with switch delay (1) and reset delay (2)

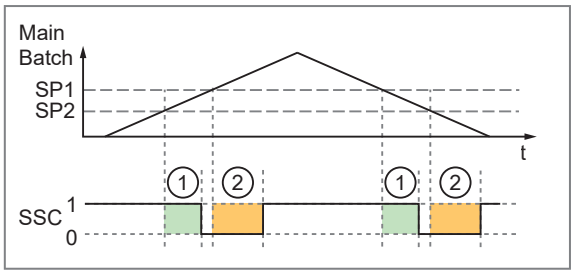


Fig. 16: Window mode (low-active) with switch delay (1) and reset delay (2)

Using the hysteresis function, the switching thresholds of switch points SP1 and SP2 can be equally increased or decreased.

Switching:

- Increasing counter value reaches SP2
- Decreasing counter value reaches SP1

Switching back:

- Increasing counter value reaches SP1 + HyS
  - if SP1 + HyS > HyS_{max}, then reset at HyS_{max}
- Decreasing counter value reaches SP2 - HyS
  - If SP2 – HyS < 0, then reset at 0

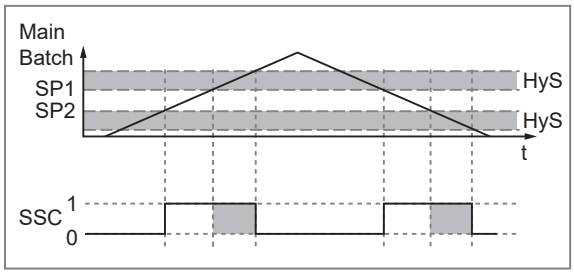


Fig. 17: Window mode (high-active) with hysteresis

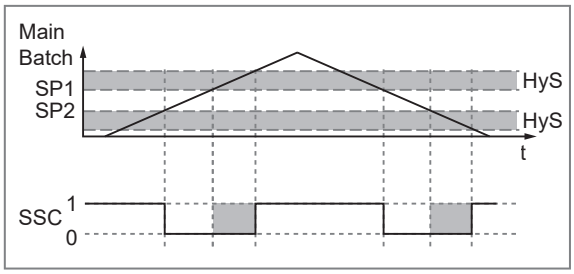


Fig. 18: Window mode (low-active) with hysteresis

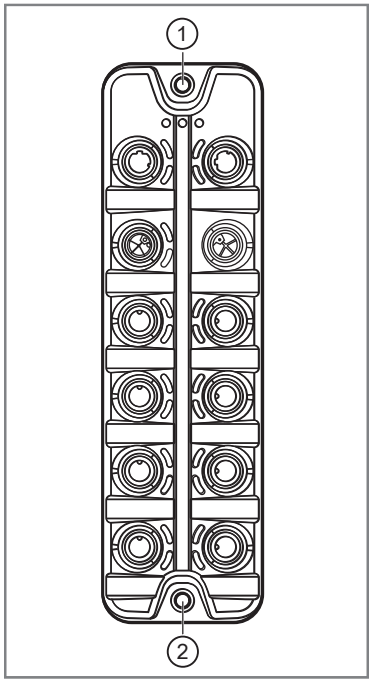
4.8 PROFINET

Supported PROFINET functions:

- Device profile: PROFINET IO device
- Fast Startup (FSU)
- Prioritized Startup
- Participation in network with activated IRT protocol
- System redundancy S2
- Dynamic reconfiguration
- Device description: GSD file

5 Installation

5.1 Overview



1: Upper mounting lug
2: Lower mounting lugs lug

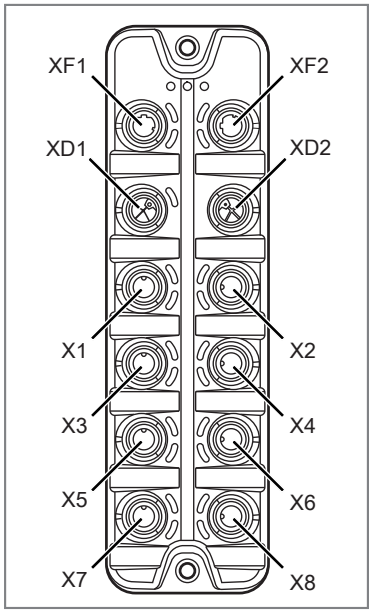
5.2 Install device

- ▶ Disconnect the power of the machine before installation.
- ▶ Use a flat mounting surface for installation.
- ▶ Please observe the maximum tightening torque.

Fasten the device onto the mounting surface using 2 M5 mounting screws and washers (tightening torque: 1.8 Nm).

6 Electrical connection

6.1 Overview



XF1: Ethernet 1 (PROFINET)
XF2: Ethernet 2 (PROFINET)
XD1: Power IN
XD2: Power Out
X1: Process connection 1 (actuator)
X2: Process connection 2 (actuator)
X3: Process connection 3 (actuator)
X4: Process connection 4 (actuator)
X5: Process connection 5 (sensor)
X6: Process connection 6 (sensor)
X7: Process connection 7 (sensor)
X8: Process connection 8 (sensor)

6.2 General wiring information

The device must be connected by a qualified electrician.

▶ Observe the national and international regulations for the installation of electrical equipment.

The device is only suitable for operation on PELV voltages.

This device contains components that may be damaged or destroyed by electrostatic discharge (ESD).

▶ Please observe the required precautions against electrostatic discharge!

The circuits are insulated from each other and from touchable surfaces of the device with basic insulation according to EN 61010-1.

The communication interfaces are insulated from each other and from touchable surfaces of the device with basic insulation according to EN 61010-1.

6.2.1 Connection technology

The threaded connections in the device correspond to the M12 standard. To ensure compliance with the specified protection rating, only cables that comply with this standard may be used. In the case of self-assembled cables, the system manufacturer is responsible for the protection rating.

▶ Use connectors with gold-plated contacts.

▶ During installation, place the connectors vertically so that the coupling nut will not damage the thread.

▶ Observe the coding of the connectors during installation.

▶ Cover unused connections with protective covers. Tightening torque: 1.3 ± 0.1 Nm

6.3 Ethernet

The device is connected to the PROFINET network via Ethernet ports XF1 / XF2 (e. g. PROFINET control, additional PROFINET device). In addition, the device can be connected to an IT network via the Ethernet ports. The user can access functions of the ifm IoT Core via the IT network (parameter setting software, IoT Core Visualizer).

Wiring:

1: TX+
2: RX+
3: TX-
4: RX-
5: n.c.

▶ Connect the device to the PROFINET network via a free Ethernet port.

▶ Optional: Connect the device to the IT network via a free Ethernet port.

▶ For connection, use an M12 connector (minimum protection rating: IP65 / IP66 / IP67 / IP69K).

▶ Tighten the cable plug using 1.3 ± 0.1 Nm.

6.4 Process connections (actuators)

The actuators are connected to the device via ports X1...X4.

Maximum current rating per port: 3.6 A

Maximum current rating per port pair (X1 & X2, X3 & X4): 3.6 A

Maximum overall current rating: 8 A

The ports feature both short-circuit and overload detection.

Wiring:

1: n.c.
2: OUT2 DO2 (UA)
3: L- (UA)
4: OUT1 DO1 (UA)
5: FE

▶ Connect the actuators to ports X1...X4.

▶ For connection, use M12 connectors (minimum protection rating: IP65 / IP66 / IP67 / IP69K; max. cable length: 30 m).

▶ Tighten the cable plug using 1.3 ± 0.1 Nm.

6.5 Process connections (sensors)

The sensors are connected to the device via ports X5...X8.

Maximum current rating per port: 3.6 A

Maximum overall current rating: 3.6 A

The ports feature both short-circuit and overload detection.

Wiring:

1: L+ (US)
2: IN2 DI2
3: L- (US)
4: IN1 DI1
5: FE

▶ Connect the sensors to ports X5...X8.

- ▶ For connection, use M12 connectors (minimum protection rating: IP65 / IP66 / IP67 / IP69K; max. cable length: 30 m).
- ▶ Tighten the cable plug using 1.3 ± 0.1 Nm.

6.6 Voltage supply

The device is connected to the supply voltages US and UA via the Power IN port.

The US supply voltage supplies the device and the sensors connected to the X5...X8 ports.

The UA supply voltage supplies the actuators connected to the X1...X4 ports.

The XD1 port is equipped with overvoltage protection (US, UA).

The XD1 port is equipped with reverse polarity protection (US, UA).

The XD1 port is equipped with cross polarity protection (US, UA).

CAUTION

Exceeding the maximum input current of 16 A

▷ Risk of fire

▶ Dimension the I_U and I_A of the US and UA supply voltages accordingly, taking into account the derating behaviour of the device: Derating behaviour (→ 🗋 21)

Wiring:

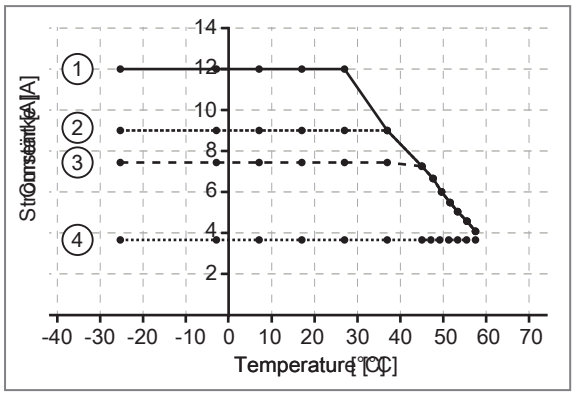
1: L+ (US)
2: L- (UA)
3: L- (US)
4: L+ (UA)
5: FE

- ▶ Disconnect power.
- ▶ Connect the device via the XD1 port to the US supply voltage with 24 V DC (20...28 V PELV).
- ▶ Connect the device via the XD1 port to the UA supply voltage with 24 V DC (20...28 V PELV).
- ▶ For connection, use an L-coded M12 connector (with at least protection rating: IP65 / IP66 / IP67 / IP69K).
- ▶ Tighten the cable sockets according to the torque specifications indicated by the cable vendor. Maximum permissible tightening torque: 0.8 Nm

6.6.1 Derating behaviour

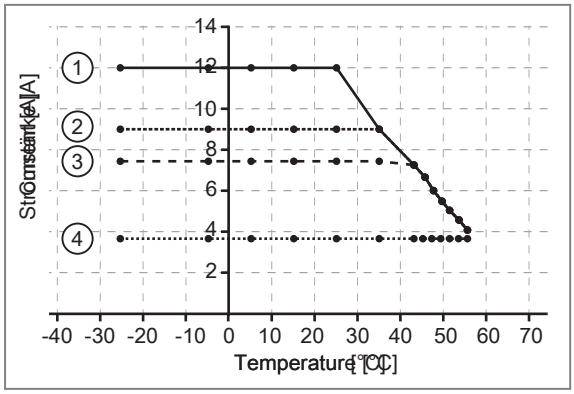
The current I_{US} available at the X5...X8 ports and the currents $I_{US\text{-}daisy\text{-}chain}$ and $I_{UA\text{-}daisy\text{-}chain}$ available at port XD2 depend on the ambient temperature of the device.

- Height: 2000 m



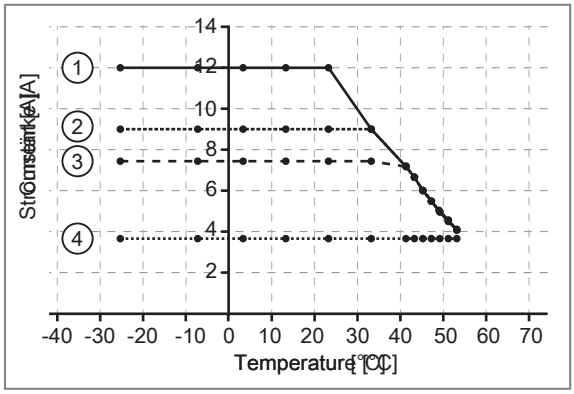
1: $I_{US\text{-}daisy\text{-}chain}$ at port XD2
2: $I_{UA\text{-}daisy\text{-}chain}$ at port XD2
3: I_{UA} at port XD1
4: I_{US} at port XD1

- Height: 3000 m



1: $I_{US\text{-}daisy\text{-}chain}$ at port XD2
2: $I_{UA\text{-}daisy\text{-}chain}$ at port XD2
3: I_{UA} at port XD1
4: I_{US} at port XD1

- Height: 4000 m



1: $I_{US\text{-}daisy\text{-}chain}$ at port XD2
2: $I_{UA\text{-}daisy\text{-}chain}$ at port XD2
3: I_{UA} at port XD1
4: I_{US} at port XD1

6.7 Voltage output

An additional device can be supplied via the Power OUT port (daisy chain). The supply voltages US and UA are looped through from port XD1 to port XD2.

Max. current intensity for US: 15.7 A

Max. current intensity for UA: 16 A.

Wiring:

▶ Optional: Connect an additional device to port XD2.

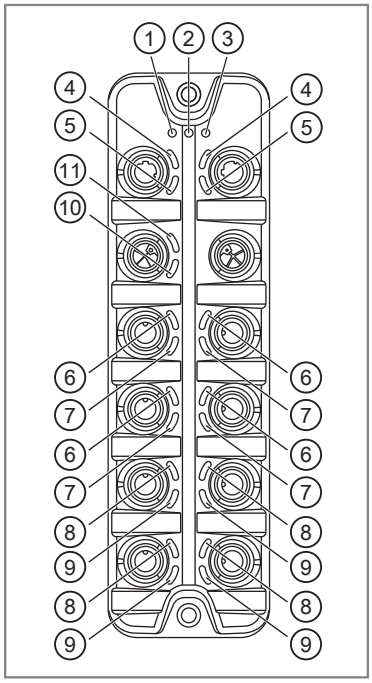
▶ For connection, use an L-coded M12 connector (with at least protection rating: IP65 / IP66 / IP67 / IP69K).

▶ Tighten the cable plug using 1.3 ± 0.1 Nm.

▶ Observe the derating behaviour of the device!

7 Operating and display elements

7.1 LEDs



1: Status: RDY
2: Status: BF
3: Status: SF
4: PROFINET: LNK
5: PROFINET: ACT
6: Process connection: DO1
7: Process connection: DO2
8: Process connection: DI1
9: Process connection: DI2
10: Voltage supply: UA
11: Voltage supply: US

7.1.1 Status

LED	Description	Colour	State	Description
RDY	Gateway status	-	Off	Not active or reboots
		Green	Flashes 3 s (1 Hz)	DCP signalling service initiated via fieldbus
			Flashes (5 Hz)	Error
			Flashes (200 ms on, 800 ms off)	Firmware update running
			On	OK
		Red	On	Error during firmware update (e.g. firmware not compatible)
BF	PROFINET connection status (bus failure)	-	Off	No error
		Red	Flashes (2 Hz)	No data transmission
			On	• No configuration or • physical connection with low speed or • no physical connection
SF	System status (system failure)	-	Off	No error
		Red	Flashes 3 s (1 Hz)	DCP signalling service initiated via fieldbus
			On	• Watchdog expired or • channel diagnosis, general or extended diagnosis available or • system error

7.1.2 Ethernet

LED	Description	Colour	State	Description
LNK	Status of the connection	-	Off	No Ethernet connection
		Green	On	Ethernet connection established
ACT	Status of the data transmis-sion	-	Off	No data transmission
		Yellow	Flashes	Data transmission

7.1.3 Process connections

LED	Description	Colour	State	Description
DO1	Signal level digital output (pin 4)	-	Off	Digital output - pin 4: LOW
		Yellow	On	Digital output - pin 4: HIGH
		red	flashes	Error • Short circuit after 24 V (if DO1 = LOW) • Short circuit after GND / overvoltage (if DO1 = HIGH)
			On	Output is not controlled by application
DO2	Signal level digital input (pin 2)	-	Off	Digital output– pin 2: LOW
		Yellow	On	Digital output– pin 2: HIGH
		Red	Flashes	Error • Short circuit after 24 V (if DO2 = LOW) • Short circuit after GND / overvoltage (if DO2 = HIGH)
			On	Output is not controlled by application
DI1	Signal level digital input (pin 4)	-	Off	Digital input - pin 4: LOW
		Yellow	On	Digital input - pin 4: HIGH
DI2	Signal level digital input (pin 2)	-	Off	Digital input - pin 2: LOW
		Yellow	On	Digital input - pin 2: HIGH

7.1.4 Voltage supply

LED	Description	Colour	State	Description
US	Power supply US status	-	Off	No supply voltage is applied or the applied supply voltage is too low (<4.5 V)
		Green	On	Supply voltage applied
		Red	On	Overvoltage, undervoltage, short circuit at sensor supply
UA	Status power supply UA	-	Off	No supply voltage is applied or the applied supply voltage is too low (<6 V)
		Green	On	Supply voltage applied
		Red	On	Undervoltage / overvoltage / short circuit at actua-tor supply

8 Set-up

▶ Install the unit correctly.

▶ Establish a correct electrical connection with the device.

▷ Once connected to the supply voltage, the unit will start.

▷ The LEDs show status and error conditions.

▷ The unit is ready for operation.

▷ The device can be configured.

9 Settings

9.1 Parameter setting software

9.1.1 Supported parameter setting software

Supported parameter setting options:

- ifm moneo|IIoT Core On-Premises (art no. QM9112)
- ifm moneo|IIoT Core Cloud (art no. QCM100)
- ifm moneo|configure free

▶ For a correct installation: observe the installation instruction for ifm moneo.

▶ Install the desired parameter setting software.

▶ Activate the licences required for operation.

▷ The parameter setting software can be used for parameter setting of the device.

The configuration created with ifm moneo is overwritten when a connection is established between the device and the PROFINET PLC.

9.1.2 Establishing a connection to device

Requirements:

✓ The parameter setting software is correctly installed on the laptop / PC.

✓ The laptop / PC is connected to a free Ethernet port of the device.

▶ Start the parameter setting software.

▶ Scan the network for devices.

▷ The parameter setting software recognises the device.

▶ Optional: Configure the PROFINET interface (→ 🗋 26)

▶ Establish a connection to the device.

▷ The parameter setting software can access the device parameters.

9.1.2.1 Configure the PROFINET interface

The PROFINET interface of the device can only be set via DCP-capable parameter setting software, e.g. PROFINET projection software.

With the parameter setting software ifm moneo or ifm moneo|configure (SA), the IP parameters of the PROFINET interface can only be set during the network scan. In the editor view of the device, the configuration of the PROFINET interface is read-only.

▶ Start the parameter setting software.

▶ Configure the PROFINET interface of the device.

▷ The device has a configured PROFINET interface.

9.1.3 Fieldbus interface

The [fieldbus] menu provides access to the configuration of the fieldbus interface.

The fieldbus interface can only be configured via the fieldbus configuration software.

9.1.3.1 Reading the interface configuration

▶ Observe the notes on the configuration of the PROFINET interface: Configure the PROFINET interface (→ 26)

Available parameters:

Name	Description	Value range	Access
[ipaddress]	IP address of the PROFINET interface	e.g. 192.100.0.10 0.0.0.0 (default)	ro [1]
[subnetmask]	Subnet mask of the network segment	e.g. 255.255.255.0 0.0.0.0 (default)	ro [1]
[ipdefaultgateway]	IP address of the network gateway	e.g. 192.100.0.1 0.0.0.0 (default)	ro [1]
[macaddress]	MAC address of the Ethernet interface	e.g. 00:02:01:0E:10:7F	ro [1]
[hostname]	Name of the device in the PROFINET network	e.g. al4x0x	ro [1]

[1] Read only

Requirements:

✓ The parameter setting software has been started.

✓ The detailed view of the device is active.

▶ Select the [fieldbussetup] > [network] menu.

▷ The menu page displays the current configuration of the PROFINET interface.

9.1.3.2 Reading the connection status

Available information:

Name	Description	Value range	Access
[connectionstatus]	Status of the PROFINET connection	• Disconnected: Not connected • Connected: Connected	ro [1]
[fieldbusfirmware]	Firmware version of the PROFINET stack	e.g. 5.4.0.3 (PROFINET IO Device)	ro [1]

[1] Read only

Requirements:

✓ The parameter setting software has been started.

✓ The detailed view of the device is active.

▶ Select the [fieldbussetup] menu.

▷ The menu page displays the status of the PROFINET connection.

9.1.4 Process connections

The [io] menu provides access to the parameters of the process connections.

9.1.4.1 Configuring the input filters

▶ Observe the notes on input filters: Digital input filters (→ 9)

Available parameters:

Name	Description	Value range	Access
[debounce_time]	Debounce time (= value * 0.1 ms)	• 0: 0 ms (default) … • 500: 50 ms	rw [1]
[hold_time]	hold time (= value * 0.1 ms)	• 0: 0 ms (default) … • 60000: 6000 ms	rw [1]
[hold_level]	hold level	• 0: hold LOW • 1: hold HIGH (default)	rw [1]
[invert]	inversion	• 0: do not invert (default) • 1: invert	rw [1]

[1] Read and write; parameter can only be changed if no connection to fieldbus controller is established

▶ Select menu [io] > [port[n]] > [pin2] (n: 5...8).

▷ The menu page shows the available filter parameters for pin 2 of the port.

▶ Set the parameters.

▶ Select menu [io] > [port[n]] > [pin4] (n: 5...8).

▷ The menu page shows the available filter parameters for pin 4 of the port.

▶ Set the parameters.

▶ Write the changed values to the device.

▷ The digital input filters have been configured.

9.1.4.2 Configuring the counter modules

▶ Observe the notes on counter modules: Counter (→ 🗋 11)

If the operating mode of a counter module is changed, the current counter values will be reset and any active events will be deleted.

Available parameters:

Name	Description	Value range	Access
[mode]	Operating mode of the counter module	• CTU (Up-counter): up counter (default) • CTD (Down-counter): down counter • CTUD (Up-counter / Down-counter): up and down counter • CTDIR (Direction Counter): up or down counter	rw [1]
[pin2_function]	Pin 2 function of the port (Observe note!)	• N/C: no function (default) • Counter Edge Input 2: counting pulse (rising edge) • Count Direction: counting direction • Reset (Main & Batch Counter): reset main counter and batch counter • Disable (Main & Batch Counter): disable main counter and batch counter • Reset Latch: switching signal latch	rw [1]
[count_direction_selection]	Control instance for selecting the counting direction (Observe note!)	• Pin 2 Count Direction: pin 2 of the port (default) • IoT / PLC Count Direction: IoT core or fieldbus control	rw [1]

Name	Description	Value range	Access
[main_threshold]	Main counter threshold (CT)	• 1 … • 4294967295 (default)	rw [1]
[batch_threshold]	Batch counter threshold (CTb)	• 1 … • 65535 (default)	rw [1]

[1] Read and write; parameter can only be changed if no connection to fieldbus controller is established

For the parameters [pin2_function] and [count_direction_selection] all shown parameter values can be selected. It is not checked whether these make sense. For each counter operating mode (parameter [mode]), the table below indicates the valid value ranges (✓: valid setting; ✕: invalid setting):

Counter mode	Pin2 function						Count direction selection	
	No function	counter transition input 2	count direction	Reset counter	Disable counter	Reset SSC Latch	Pin 2	PLC / IoT Core
CTU	✓	✕	✕	✓	✓	✓	✕	✕
CTD	✓	✕	✕	✓	✓	✓	✕	✕
CTUD	✕	✓	✕	✕	✕	✕	✕	✕
CTDIR	✕	✕	✓	✕	✕	✕	✓	✕
	✓	✕	✕	✓	✓	✓	✕	✓

Requirements:

✓ The parameter setting software has been started.

✓ The detailed view of the device is active.

▶ Select menu [io] > [counter[n]] (n: 5...8).

▷ The menu page displays the configuration options of the counter.

▶ Configure the counter module.

▶ Optional: Configure additional counter modules.

▶ Write the changed values to the device.

▷ The counter modules are configured.

9.1.4.3 Configuring the switching signal channels

▶ Observe the notes on switching signal channels: Switching signal channels (→ 14)

Available parameters:

Available parameters (Main SSC):

Name	Description	Value range	Access
[mode]	Main SSC - switching mode of the switching channel	• Deactivated: switching channel deactivated (default) • Single Point: Single point mode. • Latch: latch mode • Two Point: Two point mode: • Window: window mode	rw [1]
[logic]	Main SSC - switching logic of the switching channel	• Active High: high active (default) • Active Low: low active	rw [1]

Name	Description	Value range	Access
[sp1]	Main SSC - switch point 1	• 0: 0 … • 4294967295: 4294967295 (default)	rw [1]
[sp2]	Main SSC - switch point 2	• 0: 0 … • 4294967294: 4294967294 (default)	rw [1]
[single_point_edge]	Main SSC - Defines whether the switching channel reacts to increasing or decreasing counter values	• Rising Counter Value: rising edge (default) • Falling Counter Value: falling edge	rw [1]
[switch_delay]	Main SSC - switch delay (value in ms)	• 0: 0 ms (default) … • 65535: 65535 ms	rw [1]
[reset_delay]	Main SSC - reset delay (value in ms)	• 0: 0 ms (default) … • 65535: 65535 ms	rw [1]
[hysteresis]	Main SSC - hysteresis	• 0: 0 (default) … • 4294967295: 4294967295	rw [1]

[1] Read and write; parameter can only be changed if no connection to fieldbus controller is established

Available parameters (batch SSC):

Name	Description	Value range	Access
[mode]	Batch SSC - switching mode of the switching channel	• Deactivated: switching channel deactivated (default) • Single Point: single point mode. • Latch: latch mode • Two Point: two point mode • Window: window mode	rw [1]
[logic]	Batch SSC - switching logic of the switching channel	• Active High: high active (default) • Active Low: low active	rw [1]
[sp1]	Batch SSC - switch point 1	• 0: 0 … • 65535: 65535 (default)	rw [1]
[sp2]	Batch SSC - switch point 2	• 0: 0 … • 65534: 65534 (default)	rw [1]
[single_point_edge]	Batch SSC - Defines whether the switching channel should react to increasing or decreasing counter values	• Rising Counter Value: rising edge (default) • Falling Counter Value: falling edge	rw [1]
[switch_delay]	Batch SSC - switching delay (value in ms)	• 0: 0 ms (default) … • 65535: 65535 ms	rw [1]
[reset_delay]	Batch SSC - reset delay (value in ms)	• 0: 0 ms (default) … • 65535: 65535 ms	rw [1]
[hysteresis]	Batch SSC - hysteresis	• 0: 0 (default) … • 65535: 65535	rw [1]

[1] Read and write; parameter can only be changed if no connection to fieldbus controller is established

To configure the switching signal channels:

Requirements:

✓ The parameter setting software has been started.

✓ The detailed view of the device is active.

▶ Select menu [io] > [port[n]] > [ssc] (n: 5...8).

▷ The menu page shows the current settings of the switching channels of the main counter (main) and the batch counter (batch) of the port.

▶ Set the parameters.

▶ Write the changed values to the device.

▷ The switching signal channels are configured.

9.1.4.4 Configuring outputs

Available parameters:

Parameter	Description	Value range	Access
[current_limit]	Max. output current of the digital output (value in mA)	• 0: 0 A … • 2000: 2000 mA (default) … • 3600: 3600 mA	rw [1]
[output_select]	Selection of control instance of digital output	• PLC: higher-level PLC • Counter 1 SSC Main: Counter 1 switching channel - main counter • Counter 1 SSC Batch: Counter 1 switching channel - batch counter • Counter 2 SSC Main: Counter 2 switching channel - main counter • Counter 2 SSC Batch: Counter 2 switching channel - batch counter • Counter 3 SSC Main: Counter 3 switching channel - main counter • Counter 3 SSC Batch: Counter 3 switching channel - batch counter • Counter 4 SSC Main: Counter 4 switching channel - main counter • Counter 4 SSC Batch: Counter 4 switching channel - batch counter	rw [1]
[output_state_com_lost]	Fallback value if fieldbus connection is lost	• State off: OFF • State on: ON • Keep last: keep last valid value	rw [1]

[1] Read and write; parameter can only be changed if no connection to fieldbus controller is established

To configure the outputs of a port:

Requirements:

✓ The parameter setting software has been started.

✓ The detailed view of the device is active.

▶ Select the [io] > [port[n]] > [pin2] (n: 1...4) menu.

▷ The menu page shows the current settings of the digital output on pin 2 of the port.

▶ Set the parameters.

▶ Select menu [io] > [port[n]] > [pin4] (n: 1...4).

▷ The menu page shows the current settings of the digital output on pin 4 of the port.

▶ Set the parameters.

▶ Write the changed values to the device.

▷ The digital outputs of the device are configured.

9.1.5 Process data

The dashboard area provides access to the device's process data.

To display the dashboard area:

✓ The parameter value editor for the device is open.

▶ In the vertical bar at the right side of the screen: Click on .

▷ The dashboard view is displayed.

To hide the dashboard area:

✓ The dashboard area is displayed.

▶ Click on the vertical bar in the middle of the screen: Click on .

▷ The dashboard view is hidden.

9.1.5.1 Reading digital input data

Available information:

Name	Description	Value range	Access
[digital]	Signal level of the digital input channel (after filtering)	• LOW: off • HIGH: on	ro [1]

[1] Read only

Requirements:

✓ The parameter setting software has been started.

✓ The detailed view of the device is active.

▶ In the vertical bar at the right side of the screen: Click on .

▷ The dashboard view is displayed.

▷ The view shows the current signal levels of the digital outputs at pin 2 and pin 4 in substructure [io/port[n]] (n: 5...8).

The displayed signal levels are the filtered input data.

9.1.5.2 Writing the digital outputs

Available parameters:

Parameter	Description	Value range	Access
[digital_output]	Signal level of digital output channel	• Low: LOW level • High: HIGH level	rw [1]
[qualifier]	Status indication of digital output	• Output error: Error • Output okay: No error	ro [2]

[1] Read and write; parameter can only be changed if no connection to fieldbus controller is established

[2] Read only

To write the digital outputs:

Requirements:

✓ The parameter setting software has been started.

✓ The detailed view of the device is active.

▶ In the vertical bar at the right side of the screen: Click on .

▷ The dashboard view is displayed.

- ▷ In substructure [io/port[n]/pin2] (n: 1...4), the present signal level of the output channel at pin 2 of the port is displayed.
- ▷ In substructure [io/port[n]/pin4] (n: 1...4), the present signal level of the output channel at pin 4 of the port is displayed.

▶ Set the switching signals.

▶ Write the changed values to the device.

▷ The set values are output at the digital outputs.

▶ Check the validity of the digital outputs.

9.1.5.3 Reading counter values

Available parameters:

Name	Description	Value range	Access
[maincounter_value]	Main counter reading	0…4294967294	ro [1]
[batchcounter_value]	Batch counter value	0…65534	ro [1]

[1] Read only

Requirements:

✓ The parameter setting software has been started.

✓ The detailed view of the device is active.

▶ In the vertical bar at the right side of the screen: Click on ⏲.

- ▷ The dashboard view is displayed.

▷ In substructure [io/counter[n]] (n: 5...8), the current counter values of the main and batch counters are displayed.

9.1.5.4 Controlling counter modules

Available parameters:

Name	Description	Value range	Access
[disable]	Disable main counter and batch counter	• 0: counter module is active (default) • 1: counter module is not active	rw [1]
[reset]	Reset main counter, batch counter and CT and CTb thresholds to initial values	• 0: no action (default) • 1: reset	rw [1]
[direction] [2]	Set the counting direction for the main counter and the batch counter	• 0: up (default) • 1: down	rw [1]

[1] Read and write; parameter can only be changed if no connection to fieldbus controller is established

[2] only effective if operating mode of counter module = `CTDIR`

Requirements:

✓ The parameter setting software has been started.

✓ The detailed view of the device is active.

▶ In the vertical bar at the right side of the screen: Click on ⏲.

- ▷ The dashboard view is displayed.
- ▷ In substructure [io/counter[n]] (n: 5...8), the available control signals of the counter modules are displayed.

▶ Optional: Disable the counter module.

▶ Optional: Reset the counter module.

▶ Optional: Set the counting direction of the counter module.

▶ Write the changed parameter values to the device.

▷ The selected actions are executed.

9.1.5.5 Reading the switching signals

Available data:

Name	Description	Value range	Access
[state]	State of the switching signal	• False: Off • True: On	ro [1]

[1] Read only

Requirements:

✓ The parameter setting software has been started.

✓ The detailed view of the device is active.

▶ In the vertical bar at the right side of the screen: Click on ⏲.

▷ The dashboard view is displayed.

▷ In substructure [io/port[n]/ssc] (n: 5...8), the current states of the switching signals of the main counter (main) and the batch counter (batch) of the port are displayed.

9.1.5.6 Controlling the switching signal channels

Available data:

Name	Description	Value range	Access
[reset_latch]	Reset switching signal (only effective if switch-point mode = latch)	• Inactive ➜ Active: reset switching signal • otherwise: no action	rw [1]

[1] Read and write; parameter can only be changed if no connection to fieldbus controller is established

Requirements:

✓ The parameter setting software has been started.

✓ The detailed view of the device is active.

▶ In the vertical bar at the right side of the screen: Click on ⏲.

▷ The dashboard view is displayed.

▷ In substructure `io/port[n]/ssc` (n: 5...8), the control signals for the switching channels of the main counter (main) and the batch counter (batch) of the port are displayed.

▶ Set the control signals.

▶ Write the changed values to the device.

▷ The switching signal channels pass into the new state.

9.1.5.7 Reading status and diagnostic information

The measuring accuracy of the current and voltage values of the device supply US is ±10%.

Available information:

Parameter	Description	Value range	Access
[temperature]	Device temperature (value in °C)	-30…80	ro [1]
[supervisionstatus_us]	Status of the US device supply	• 0: No error • 1: Error	ro [1]

Parameter	Description	Value range	Access
[supervisionstatus_ua]	Status of the UA device supply	0: No error 1: Error	ro [1]
[voltage_us]	Present voltage value of the US device supply (value in mV)	0…40000	ro [1]
[current_us]	Present current value of the US device supply (value in mA)	0…40000	ro [1]
[voltage_ua]	Present voltage value of the US device supply (value in mV)	0…4000	ro [1]
[current_ua_upper]	Present current value of the UA device supply of ports 1&2 (value in mA)	0…4000	ro [1]
[current_ua_lowerr]	Present current value of the UA device supply of ports 3&4 (value in mA)	0…4000	ro [1]

[1] Read only

Requirements:

✓ The parameter setting software has been started.

✓ The detailed view of the device is active.

▶ In the vertical bar at the right side of the screen: Click on ⏲.

▷ The dashboard view is displayed.

▷ The view shows the device's status and diagnostic information in the [processdatamaster] substructure.

9.1.6 Device information

The [deviceinfo] menu provides access to the device's identification information.

9.1.6.1 Reading identification information

Available information:

Name	Description	Value range	Access
[productcode]	Article number	AL4303	ro [1]
[devicefamily]	Device family	Ethernet modules	ro [1]
[vendor]	Manufacturer	ifm electronic gmbh	ro [1]
[swrevision]	Firmware revision	e.g. AL4x0x_fw_pn_v1.4.0.137	ro [1]
[hwrevision]	Hardware revision (status)	e.g. AA	ro [1]
[bootloaderrevision]	Bootloader version	e.g. AL4xxx_bl_v1.2.0.35	ro [1]
[serialnumber]	Serial number	e.g. 0002043100003	ro [1]
[fieldbustype]	Fieldbus	PROFINET	ro [1]

[1] Read only

Requirements:

✓ The parameter setting software has been started.

✓ The detailed view of the device is active.

▶ Select the menu option [deviceinfo].

▷ The menu page displays the identification information of the device.

9.1.7 Device ID

Das Menü [devicetag] bietet Zugriff auf die Gerätekennung.

9.1.7.1 Setting the application tag

Available parameters:

Parameter	Description	Value range	Access
[applicationtag]	Application-specific identifier of the device in moneo	e.g. plant 1 machine 3	rw [1]

[1] Read and write

Requirements:

✓ The parameter setting software has been started.

✓ The detailed view of the device is active.

▶ Select [devicetag] menu.

▶ Enter the application identifier.

▶ Write the changed values to the device.

▷ The device can be identified by the selected application tag.

9.1.8 Device control

Das Menü [firmware] bietet Zugriff auf die Funktionen zur Steuerung des Geräts.

9.1.8.1 Resetting the device

Requirements:

✓ The parameter setting software has been started.

✓ The detailed view of the device is active.

▶ Select the [Firmware] menu.

▶ Click on [factoryreset].

▷ The device is reset to factory settings.

▷ All parameters are set to their default values.

9.1.8.2 Restarting the device

Requirements:

✓ The parameter setting software has been started.

✓ The detailed view of the device is active.

▶ Select the [Firmware] menu.

▶ Click on [Reboot].

▷ The device will be restarted.

▷ All set parameter values will be retained.

9.1.8.3 Reading the firmware version

Available information:

Parameter	Description	Value range	Access
[version]	Firmware version	e.g. AL4x0x_fw_pn_1.4.0.137	ro [1]

[1] Read only

Requirements:

✓ The parameter setting software has been started.

✓ The detailed view of the device is active.

▶ Select the [Firmware] menu.

▷ The menu page displays the firmware version of the device.

9.2 IoT-Core Visualizer

The IoT Core Visualizer provides a graphical user interface to access the functions of the ifm IoT Core.

9.2.1 Starting the ifm IoT Core Visualizer

To start the IoT Core Visualizer:

Requirements:

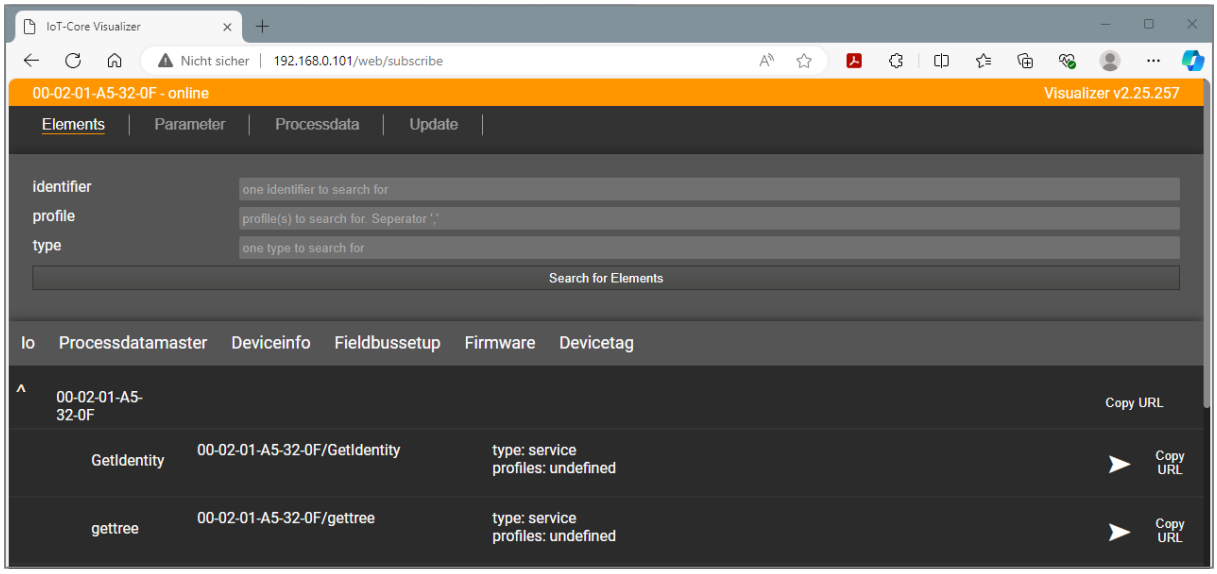
✓ The laptop / PC is connected directly or via a suitable network coupling element (e.g. switch) to a PROFINET port (XF1 / XF2) of the device.

✓ PROFINET interface has been configured.

▶ Start web browser.

▶ Go to the following URL: http://<ip-address> (e.g. `http://192.168.0.10`)

▷ The web browser displays the start page of the IoT Core Visualizer.



The navigation menu gives the user access to the following functions:

- [Elements]: Searching for elements of the IoT Core (→ 🗋 39)
- [Parameter]: Configuring the device (→ 🗋 40)
- [Processdata]: Accessing the process data (→ 🗋 47)
- [Update]: Update firmware (→ 🗋 51)

9.2.2 Searching for elements of the IoT Core

The [Elements] menu page allows you to search the IoT Core tree for elements with specific properties and output the results.

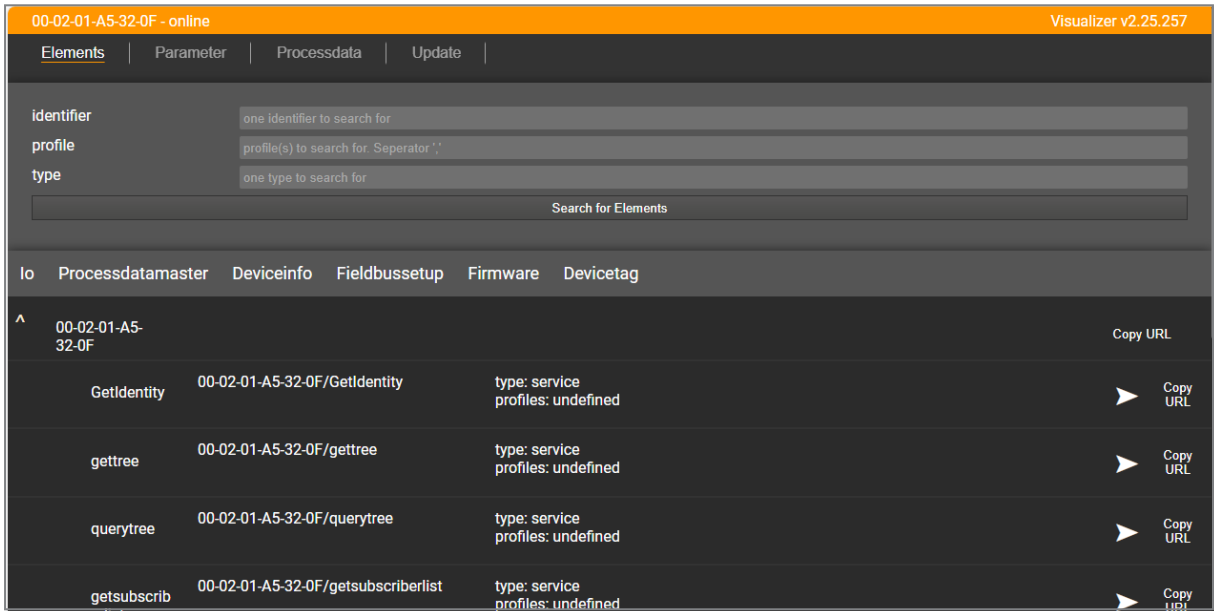
The following properties can be searched for:

- [identifier]: Name of the element
- [profile]: Profile of the element
- [type]: Type of the element

Requirements:

✓ IoT Core Visualizer has been started.

✓ The [Elements] menu is active.



▶ Select the search criteria for the required element in the selection lists [identifier], [profile] and [type].

▶ Click on [Search for Elements].

▶ Click on [Search for…].

▷ IoT Core Visualizer searches the device description for elements with selected search criteria.

▷ The result list shows all the elements found.

9.2.3 Configuring the device

The [Parameter] menu page provides access to the configuration options of the device.

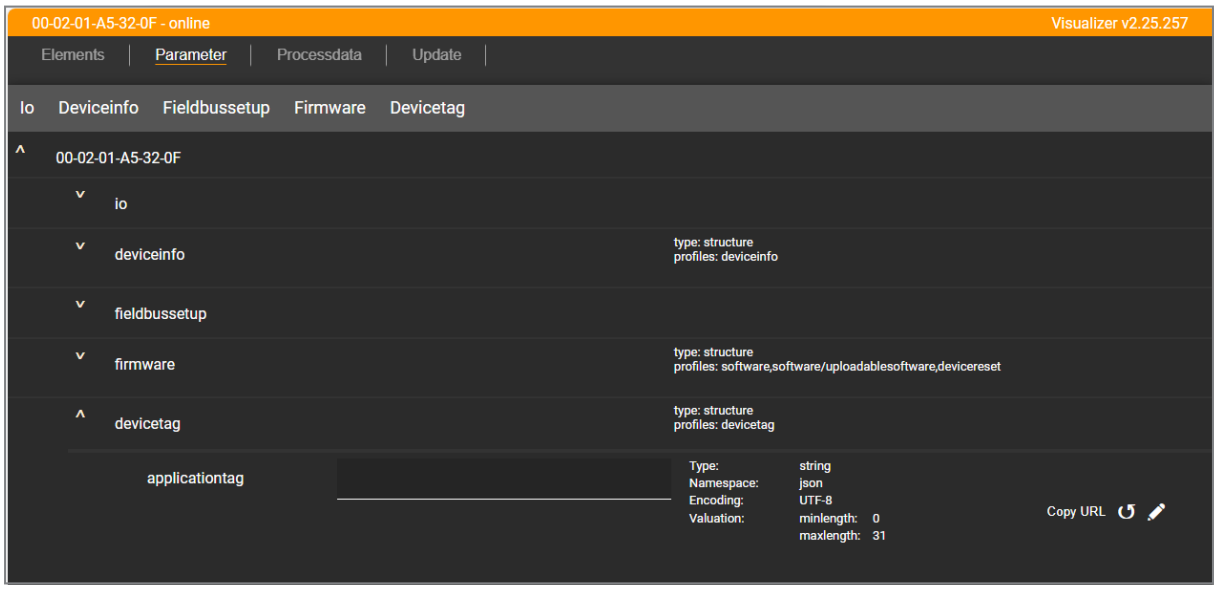
The configuration created via the IoT Core Visualizer is overwritten when a connection is established between the device and the PROFINET PLC.

Requirements:

✓ IoT Core Visualizer has been started.

▶ Select the [Parameter] menu.

▷ The menu page shows the available parameters of the device.



9.2.3.1 Reading the configuration of the PROFINET interface

Available parameters:

Name	Description	Value range	Access
[network] > [ipaddress]	IP address of the Ethernet interface	e.g. 192.200.0.100 • 0.0.0.0 (default)	ro [1]
[network] > [subnetmask]	Subnet mask of the network segment	e.g. 255.255.192.0 • 0.0.0.0 (default)	ro [1]
[network] > [ipdefaultgateway]	IP address of the network gateway	e.g. 192.200.63.1 • 0.0.0.0 (default)	ro [1]
[network] > [macaddress]	MAC address of the Ethernet interface	e.g. 00:02:01:0E:10:7C	ro [1]

[1] Read only

Requirements:

✓ IoT Core Visualizer has been started.

✓ The [Parameter] menu is active.

▶ Select the [Fieldbussetup] submenu.

▷ The menu page displays the current configuration of the PROFINET interface.

9.2.3.2 Configuring input filters

▶ Observe the notes on input filters: Digital input filters (→ 🗋 9)

Available parameters:

Name	Description	Value range	Access
[debounce_time]	Debounce time (= value * 0.1 milliseconds)	• 0: 0 ms (default) … • 500: 50 ms	rw [1]
[hold_time]	Hold time (= value * 0.1 milliseconds)	• 0: 0 ms (default) … • 60000: 6000 ms	rw [1]
[hold_level]	Hold level	• low: hold LOW • high: hold HIGH (default)	rw [1]
[invert]	Inversion	• signal not inverted: do not invert (default) • signal inverted: invert	rw [1]

[1] Read and write; parameter can only be changed if no connection to fieldbus controller is established

Requirements:

✓ IoT Core Visualizer has been started.

✓ The [Parameter] menu is active.

▶ Select submenu [io] > [port[n]] (n: 5...8).

▷ The menu page shows the current settings of the digital input filters on pin 2 and pin 4 of the port.

▶ Set the parameters.

▶ Click on ✎ to save the changes to the device.

▷ The filters of the digital inputs are configured.

9.2.3.3 Configuring the counter modules

▶ Observe the notes on counter modules: Counter (→ 🗋 11)

If the operating mode of a counter module is changed, the current counter values will be reset and any active events will be deleted.

For the parameters [pin2_function] and [count_direction_selection] all shown parameter values can be selected. It is not checked whether these make sense. For each counter operating mode (parameter [mode]), the table below indicates the valid value ranges (✓: valid setting; ✕: invalid setting):

Counter mode	pin2_function					count_direction_selection	
	Counter Edge Input 2	Count Direction	Reset (Main & Batch Counter)	Disable (Main & Batch Counter)	Reset SSC Latch (Main & Batch Counter)	Pin 2 Count Direction	IoT / PLC Count Direction
CTU	✕	✕	✓	✓	✓	✕	✕
CTD	✕	✕	✓	✓	✓	✕	✕
CTUD	✓	✕	✕	✕	✕	✕	✕
CTDIR	✕	✓	✓	✓	✓	✓	✓

Available parameters:

Name	Description	Value range	Access
[mode]	Operating mode of the counter module	• CTU (up counter): up counter (default) • CTD (down counter): down counter • CTUD (up counter / down counter): up and down counter • CTDIR (direction counter): up and down counter with selectable counting direction	rw [1]
[pin2_function]	Pin 2 function of the port (→ Observe note!)	• N/C: no function (default) • Counter edge input 2: counting pulse (rising edge) • Count direction: counting direction • Reset (main & batch counter): reset main counter and batch counter • Disable (main & batch counter): disable main counter and batch counter • Reset SSC Latch (Main & Batch Counter): reset switching signal	rw [1]
[count_direction_selection]	Control instance for selecting the counting direction (→ Observe note!)	• Pin 2 count direction: pin 2 (default) • IoT / PLC count direction: IoT Core / Fieldbus PLC	rw [1]
[main_threshold]	Main counter threshold (CT)	• 1 … • 4294967295 (default)	rw [1]
[batch_threshold]	Batch counter threshold (CTb)	• 1 … • 65535 (default)	rw [1]

[1] Read and write; parameter can only be changed if no connection to fieldbus controller is established

Requirements:

✓ IoT Core Visualizer has been started.

✓ The [Parameter] menu is active.

▶ Select submenu [io] > [port[n]] > [counter] (n: 5...8).

▷ The menu page shows the current settings of the port's counter module.

▶ Set the parameters.

▶ Click on ✎ to save the changes.

▷ The counter modules are configured.

9.2.3.4 Configuring the switching signal channels

▶ Observe the notes on switching signal channels: Switching signal channels (→ 14)

Available parameters (Main SSC):

Name	Description	Value range	Access
[mode]	Main SSC - switching mode of the switching channel	• Deactivated: switching channel deactivated (default) • Single Point: Single point mode. • Latch: latch mode • Two Point: Two point mode: • Window: window mode	rw [1]
[logic]	Main SSC - switching logic of the switching channel	• Active High: high active (default) • Active Low: low active	rw [1]
[sp1]	Main SSC - switch point 1	• 0: 0 … • 4294967295: 4294967295 (default)	rw [1]
[sp2]	Main SSC - switch point 2	• 0: 0 … • 4294967294: 4294967294 (default)	rw [1]
[single_point_edge]	Main SSC - Defines whether the switching channel reacts to increasing or decreasing counter values	• Rising Counter Value: rising edge (default) • Falling Counter Value: falling edge	rw [1]
[switch_delay]	Main SSC - switch delay (value in ms)	• 0: 0 ms (default) … • 65535: 65535 ms	rw [1]
[reset_delay]	Main SSC - reset delay (value in ms)	• 0: 0 ms (default) … • 65535: 65535 ms	rw [1]
[hysteresis]	Main SSC - hysteresis	• 0: 0 (default) … • 4294967295: 4294967295	rw [1]

[1] Read and write; parameter can only be changed if no connection to fieldbus controller is established

Available parameters (batch SSC):

Name	Description	Value range	Access
[mode]	Batch SSC - switching mode of the switching channel	• Deactivated: switching channel deactivated (default) • Single Point: single point mode. • Latch: latch mode • Two Point: two point mode • Window: window mode	rw [1]
[logic]	Batch SSC - switching logic of the switching channel	• Active High: high active (default) • Active Low: low active	rw [1]
[sp1]	Batch SSC - switch point 1	• 0: 0 … • 65535: 65535 (default)	rw [1]

Name	Description	Value range	Access
[sp2]	Batch SSC - switch point 2	• 0: 0 … • 65534: 65534 (default)	rw [1]
[single_point_edge]	Batch SSC - Defines whether the switching channel should react to increasing or decreasing counter values	• Rising Counter Value: rising edge (default) • Falling Counter Value: falling edge	rw [1]
[switch_delay]	Batch SSC - switching delay (value in ms)	• 0: 0 ms (default) … • 65535: 65535 ms	rw [1]
[reset_delay]	Batch SSC - reset delay (value in ms)	• 0: 0 ms (default) … • 65535: 65535 ms	rw [1]
[hysteresis]	Batch SSC - hysteresis	• 0: 0 (default) … • 65535: 65535	rw [1]

[1] Read and write; parameter can only be changed if no connection to fieldbus controller is established

Requirements:

✓ IoT Core Visualizer has been started.

✓ The [Parameter] menu is active.

▶ Select submenu [io] > [port[n]] > [ssc] (n: 5...8).

▷ The menu page shows the current settings of the switching channels of the main counter ([main]) and the batch counter ([batch]) of the port.

▶ Set the parameters.

▶ Click on ✎ to save the changes.

▷ The switching signal channels are configured.

9.2.3.5 Configuring the digital outputs

Available parameters:

Parameter	Description	Value range	Access
[current_limit]	Max. output current of the digital output (value in mA)	• 0: 0 A … • 2000: 2000 mA (default) … • 3600: 3600 mA	rw [1]
[output_select]	Selection of control instance of digital output	• PLC: higher-level PLC • Counter 1 SSC Main: Counter 1 switching channel - main counter • Counter 1 SSC Batch: Counter 1 switching channel - batch counter • Counter 2 SSC Main: Counter 2 switching channel - main counter • Counter 2 SSC Batch: Counter 2 switching channel - batch counter • Counter 3 SSC Main: Counter 3 switching channel - main counter • Counter 3 SSC Batch: Counter 3 switching channel - batch counter • Counter 4 SSC Main: Counter 4 switching channel - main counter • Counter 4 SSC Batch: Counter 4 switching channel - batch counter	rw [1]

Parameter	Description	Value range	Access
[output_state_com_lost]	Fallback value if fieldbus connection is lost	• State off: OFF • State on: ON • Keep last: keep last valid value	rw [1]

[1] Read and write; parameter can only be changed if no connection to fieldbus controller is established

Requirements:

✓ IoT Core Visualizer has been started.

✓ The [Parameter] menu is active.

▶ Select submenu [io] > [port[n]] (n: 1...4).

▷ The menu page shows the current settings of the digital output channels on pin 2 and pin 4 of the port.

▶ Set the parameters.

▶ Click on ✎ to save the changes.

▷ The digital outputs are configured.

9.2.3.6 Reading device information

Available information:

Name	Description	Value range	Access
[productcode]	Article number	AL4303	ro [1]
[vendor]	Vendor	ifm electronic	ro [1]
[devicefamily]	Device family	Ethernet modules	ro [1]
[serialnumber]	Serial number (12 digits)	e.g. 000174210161	ro [1]
[hwrevision]	Hardware revision	E.g. AA	ro [1]
[swrevision]	Firmware version	E.g. AL4x0x_fw_pn_v1.4.0.137	ro [1]
[bootloaderrevision]	Bootloader version	E.g. AL4xxx_bl_v1.2.0.35	ro [1]
[fieldbustype]	Fieldbus	PROFINET	ro [1]

[1] Read only

Requirements:

✓ IoT Core Visualizer has been started.

✓ The [Parameter] menu is active.

▶ Select the [deviceinfo] submenu.

▷ The menu page shows device information.

9.2.3.7 Reading the firmware version

Available information:

Name	Description	Value range	Access
[version]	Firmware version	AL4x0x_fw_pn_1.4.0.137	ro [1]
[type]	Type	• firmware: Firmware type	ro [1]

[1] Read only

Requirements:

✓ IoT Core Visualizer has been started.

✓ The [Parameter] menu is active.

▶ Select the [firmware] submenu.

▷ The menu page shows the available information.

9.2.3.8 Setting the application tag

Available parameters:

Name	Description	Value range	Access
[applicationtag]	Device designation in monitoring software	E.g. “factory 2 plant 1”	rw [1]

[1] Read and write

32 bytes are available on the device for storing the `applicationtag` parameter. If the memory range is exceeded, the device will abort the write process (diagnostic code 400).

▶ When writing the `applicationtag` parameter, observe the different memory requirements of the individual UTF-8 characters (characters 0-127: 1 byte per character; character >127: more than 1 byte per character).

Requirements:

✓ IoT Core Visualizer has been started.

✓ The [Parameter] menu is active.

▶ Select the [devicetag] submenu.

▷ The menu page shows the current settings.

▶ Enter the application tag.

▶ Click on ✎ to save the changes to the device.

▷ The new application tag is set.

9.2.4 Accessing the process data

The [Processdata] menu page provides access to the process data of the device.

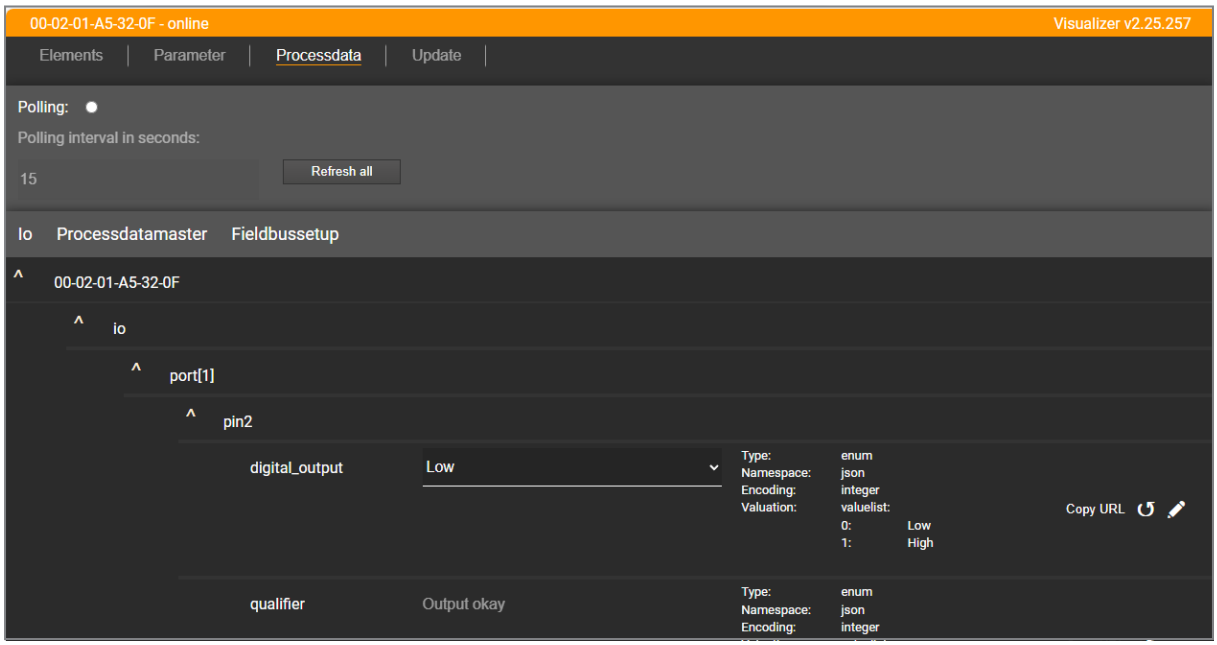
Requirements:

✓ IoT Core Visualizer has been started.

▶ Select the [Processdata] menu.

▷ The menu page shows the substructures of the device description that contains the process data.

▷ The current process values are displayed.



▶ Optional: In the header, activate the [Polling] option and set the polling interval.

▷ The process values will be refreshed with the set interval.

▶ Optional: Click on ↺ next to an element to manually refresh the process value.

9.2.4.1 Reading digital input data

Available information:

Name	Description	Value range	Access
[digital_input]	Process value digital input (after filtering)	• Low: LOW • High: HIGH	ro [1]

[1] Read only

Requirements:

✓ IoT Core Visualizer has been started.

✓ The [Processdata] menu is active.

▶ Select submenu [io] > [port[n]] (n: 5...8).

▷ The menu page shows the digital input data on pin 2 and pin 4 of the port.

9.2.4.2 Reading counter values

Available information:

Name	Description	Value range	Access
[maincounter_value]	Current main counter value	0…4294967295	ro [1]
[batchcounter_value]	Current batch counter value	0…65535	ro [1]

[1] Read only

Requirements:

✓ IoT Core Visualizer has been started.

✓ The [Processdata] menu is active.

▶ Select submenu [io] > [port[n]] > [counter] (n: 5...8).

▷ The menu page shows current counter values of the counter module.

9.2.4.3 Controlling counter modules

Available control signals:

Name	Description	Values	Access
[reset]	Reset counter module (reset counter and threshold values to default values)	• inactive: no action (default) • active: reset	rw [1]
[disable]	Disable counter module	• inactive: enable counter (default) • active: disable counter	rw [1]
[direction] [2]	Set counting direction for main counter and batch counter	• up: up (default) • down: down	rw [1]

[1] Read and write; parameter can only be changed if no connection to fieldbus controller is established

[2] only effective if operating mode of counter module = `CTDIR`

Requirements:

✓ IoT Core Visualizer has been started.

✓ The [Processdata] menu is active.

▶ Select submenu [io] > [port[n]] > [counter] (n: 5...8).

  ▷ The menu page shows the available services.

▶ Set the control signals.

▶ Click on ✎ to send the control signals to the device.

▷ The control signals are executed.

9.2.4.4 Writing the digital outputs

Available data:

Name	Description	Value range	Access
[digital_output]	Signal level of digital output channel	• Low: LOW level • High: HIGH level	rw [1]
[qualifier]	Status of digital output	• Output error: error • Output okay: no error	ro [2]

[1] Read and write; parameter can only be changed if no connection to fieldbus controller is established

[2] Read only

Requirements:

✓ IoT Core Visualizer has been started.

✓ The [Processdata] menu is active.

▶ Select submenu [io] > [port[n]] (n: 1...4).

▷ The menu page shows the options for controlling the digital outputs on pin 2 and pin 4 of the port.

▶ Set the value of the digital outputs.

▶ Click on ✎ to save the changes.

▷ The set value is provided at the digital output.

▶ Check whether the status of the digital output is error-free.

9.2.4.5 Reading the switching signal signals

Available data:

Name	Description	Value range	Access
[state]	State of the switching signal	• False: OFF • True: ON	ro [1]

[1] Read only

Requirements:

✓ IoT Core Visualizer has been started.

✓ The [Processdata] menu is active.

▶ Select submenu [io] > [port[n]] > [ssc] (n: 5...8).

▷ The menu page shows the current states of the switching signals of the main counter (main) and the batch counter (batch) of the port.

9.2.4.6 Controlling the switching signal channels

Available data:

Name	Description	Value range	Access
[reset_latch]	Reset the switching signal (only effective if switch point mode = Latch)	• Inactive > Active: Reset switching signal (INACTIVE) • otherw.: no action	rw [1]

[1] Read and write; parameter can only be changed if no connection to fieldbus controller is established

Requirements:

✓ IoT Core Visualizer has been started.

✓ The [Processdata] menu is active.

▶ Select submenu [io] > [port[n]] > [ssc] (n: 5...8).

▷ The menu page shows the control signals for the switching channels of the main counter (main) and the batch counter (batch) of the port.

▶ Set the status of the switching signals.

▶ Click on ✎ to save the changes.

9.2.4.7 Reading status and diagnostic information

The measuring accuracy of the current and voltage values of the device supply US is ±10%.

Available information:

Name	Description	Value range	Access
[temperature]	Device temperature (value in °C)	E.g. 52: 52 °C	ro [1]
[voltage_us]	Present voltage value of device supply US (value in mV)	E.g. 25236: 25236 mV	ro [1]
[current_us]	Present current value of device supply US (value in mA)	E.g. 82: 82 mA	ro [1]
[supervisionstatus_us]	Status of device supply US	• OK: no error • Fault: error	ro [1]
[voltage_ua]	Voltage value of device supply UA (value in mV)	E.g. 25236: 25236 mV	ro [1]
[current_ua_upper]	Upper current value of device supply UA (value in mA)	E.g. 2: 2 mA	ro [1]
[current_ua_lower]	Lower current value of device supply UA (value in mA)	E.g. 82: 82 mA	ro [1]
[supervisionstatus_ua]	Status of device supply UA	• OK: no error • Fault: error	ro [1]

[1] Read only

Requirements:

✓ IoT Core Visualizer has been started.

✓ The [Processdata] menu is active.

▶ Select the [processdatamaster] submenu.

▷ The menu page shows status and diagnostic information.

9.2.4.8 Reading the connection status

Available information:

Name	Description	Value range	Access
[connectionstatus]	Status of the connection to the PROFINET network	• disconnected: not connected • Connected: connected	ro [1]

[1] Read only

Requirements:

✓ IoT Core Visualizer has been started.

✓ The [Processdata] menu is active.

▶ Select the [fieldbussetup] submenu.

▷ The menu page shows the connection status.

▷ The menu page shows the number of disconnections.

9.2.5 Update firmware

The [Update] menu page allows you to update the firmware of the device:

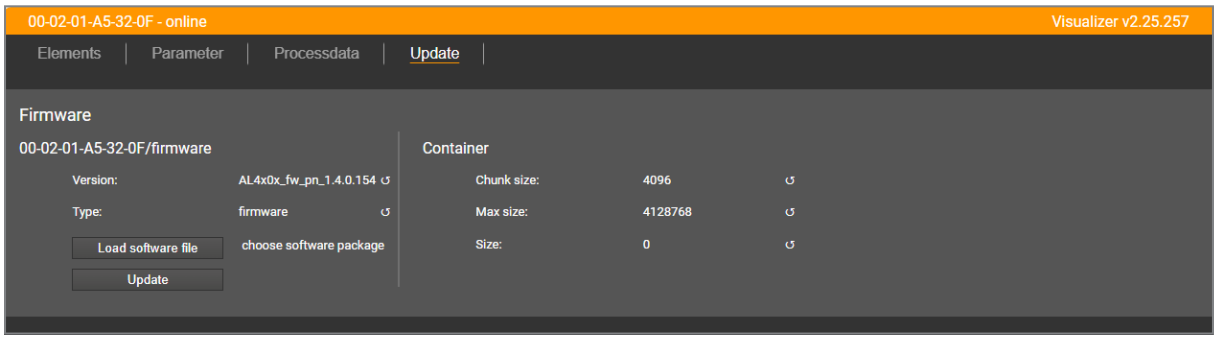
Requirements:

✓ IoT Core Visualizer has been started.

✓ New firmware has been downloaded. documentation.ifm.com

▶ Select the [Update] menu.

▷ Menu page shows information about the current firmware version.



▶ Click on [Load software file] and select the new firmware file (*.bin).

▶ Click on [Update] to start the update process.

▷ The firmware of the device is updated.

▷ The progress of the update process is displayed.

▷ After successful update: The device reboots automatically.

9.3 PROFINET

9.3.1 Install the GSD file

To map the device in a PROFINET projection software, ifm provides an GSD file. The device description file contains identification information, supported parameters and process data. The user can download the GSD file via documentation.ifm.com.

To add the device to the hardware catalogue of the PROFINET projection software:

▶ Download the GSD file of the device.

▶ Launch the PROFINET projection software.

▶ Install the GSD file.

▷ The device is added to the hardware catalogue of the PROFINET projection software.

▷ The PROFINET projection software can access the device functions and data.

9.3.2 Integrating the device into a project

Using the installed device description in the hardware catalogue, the device can be added to a PROFINET project.

Requirements:

▶ Create a new project or open an existing one.

▶ Open the [Devices & networks] view.

▶ Add the necessary components to the network (e.g. PROFINET controller).

▶ Select the device in the hardware catalogue and add it to the network using drag & drop.

▶ Establish a logical PROFINET IO connection between the device and the PROFINET controller.

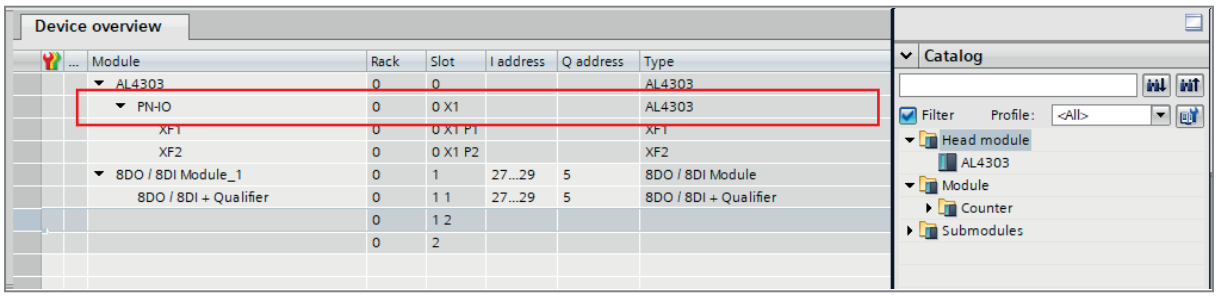
▶ Set the IP configuration of the device's PROFINET interface.

▷ The device has been integrated into the project.

9.3.3 Configure the device

The device is configured via slot [0], subslot [X1].

The module [PN-IO] is permanently assigned to the slot. The assignment cannot be changed.



Requirements:

✓ Device is integrated in PROFINET project.

▶ Open the [Device view].

  ▷ The [Device overview] tab displays the device structure.

▶ Click on the module [PN_IO] in the slot [0 X1].

  ▷ The [Properties] view appears.

  ▷ The [General] tab displays the available configuration options of the device.

▶ Set the parameters.

▷ The device has been configured.

9.3.3.1 Use Prioritized Startup

The device supports the Prioritized Startup function.

To activate the Prioritized Startup function:

Requirements:

✓ Device is integrated in PROFINET project.

▶ Open the [Device view].

▶ Click on the module [PN_IO] (slot 1, subslot X1).

▷ The [General] tab displays general configuration options.

▶ Select [Advanced options] > [Interface options].

▶ Activate the [Prioritized startup] option.

▷ The Fast Startup function has been activated.

9.3.3.2 Use Fast Startup

The device supports the Fast Startup function (FSU).

Achieving the guaranteed fast startup time depends on the complexity and elements used in the PROFINET network.

To activate the Fast Startup function:

Requirements:

✓ Device is integrated in PROFINET project.

✓ The Fast Startup function has been activated.

▶ Open the [Device view].

▷ The [Device overview] tab displays the device structure.

▶ Click on the module [PN_IO] (slot 1, subslot X1).

▷ The [General] tab displays general configuration options.

▶ Select [Advanced options] > [X21 [X1 P1 R]] > [Port options].

▶ In the list [Transmission rate / duplex], select the value [TP 100Mbps full duplex]. The selected value must match the transmission rate of the network partner.

▶ Disable the option [Enable autonegotiation].

▷ The transmission rate of Ethernet port 1 is permanently set.

▶ Repeat steps for Ethernet port 2 ([X22 [X1 P2 R]]).

▷ The transmission rate of Ethernet port 2 is permanently set.

▷ The Fast Startup function is activated for PROFINET IO ports.

9.3.4 Configuring the input filters

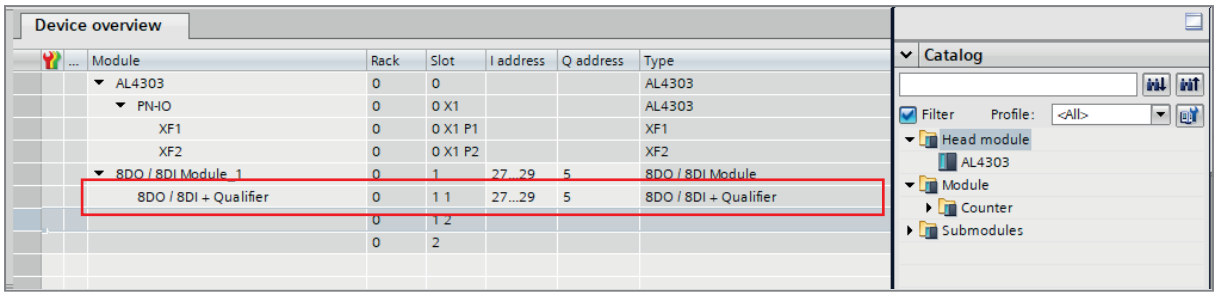
▶ Observe the notes on input filters: Digital input filters (→ 🗋 9)

The digital input filters of ports X5...X8 are configured via the [8DO / 8DI Module] and its submodule:

- Submodule: 8DO/8DI + qualifier (→ 🗋 62)

The module [8DO/8DI Module] is permanently assigned to slot 1.

The submodule [8DO/8DI + Qualifier] is permanently assigned to slot 1, subslot 1.



Each of the digital input filters can be configured separately.

Available parameters per input filter:

- debounce time
- hold time
- hold level
- signal inversion

Requirements:

✓ Device is integrated in PROFINET project.

▶ Open the [Device view] of the device.

▷ The [Device overview] tab displays the device structure.

▶ Click on submodule [8DO/8DI + Qualifier] (slot [1 1]).

▷ The [Properties] view appears.

▷ The [General] tab displays the properties of the module.

▷ [Module parameters] provides access to the available parameters.

▶ Set the parameters of the digital input filters.

▶ Save the project.

▷ The filters of the digital inputs are configured.

▷ The changed configuration will be activated the next time the application is downloaded to the device.

9.3.5 Configuring the digital outputs

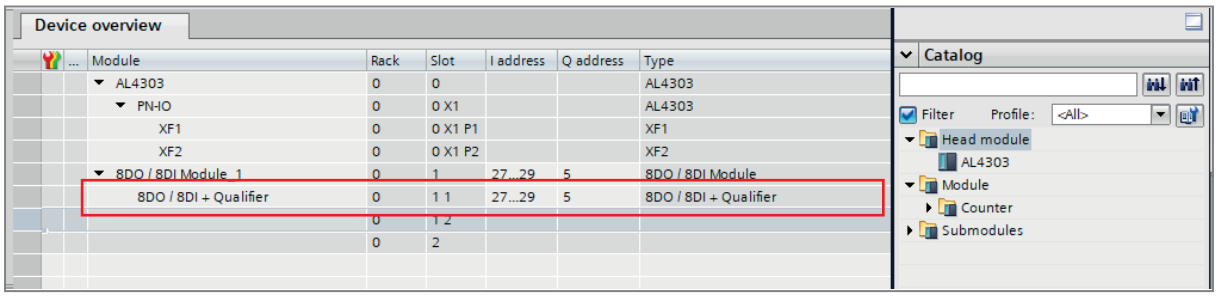
▶ Observe the notes on digital outputs: Outputs (→ 9)

The digital outputs of ports X1...X4 are configured via [8DO / 8DI Module] and its submodule:

- Submodule: 8DO/8DI + qualifier (→ 62)

The module [8DO/8DI Module] is permanently assigned to slot 1.

The submodule [8DO/8DI + Qualifier] is permanently assigned to slot [1 1] .



Each digital output can be configured separately.

Available parameters per digital output:

- Max. current value
- Fallback value if connection to controller is lost
- Control instance for digital output

Requirements:

✓ The device is integrated into the project.

▶ Open the [Device view] of the device.

▷ The [Properties] view appears.

▷ The [General] tab displays the properties of the module.

▷ [Module parameters] provides access to the available parameters.

▶ Set the parameters of the digital outputs.

▶ Save the project.

▷ The digital outputs are configured.

▷ The changed configuration will be activated the next time the application is downloaded to the device.

9.3.6 Configuring the energy monitoring function

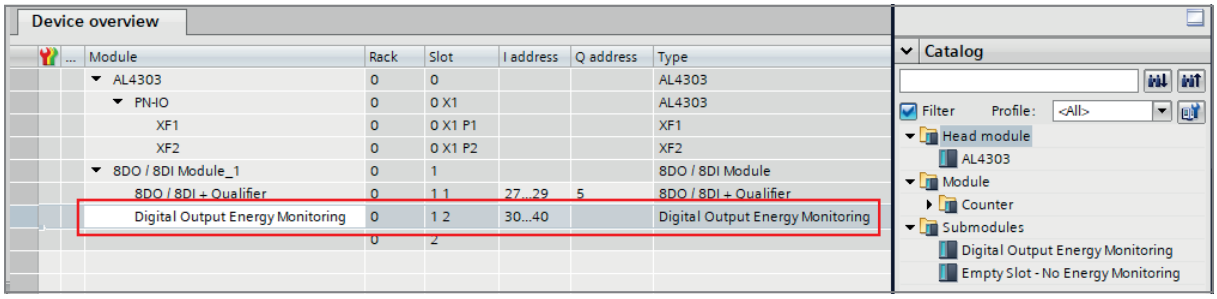
The ports feature an energy monitoring function.

Energy monitoring of ports X1...X4 is configured via [8DO / 8DI Module] and its submodules:

- Submodule: Digital Output Energy Monitoring (→ 🗋 64)
- Submodule: Empty Slot - No Energy Monitoring (→ 🗋 64)

The module [8DO / 8DI Module] is permanently assigned to slot [1].

Energy monitoring is activated and set via slot [1 2].



Available parameters:

- Activate energy monitoring events

Requirements:

✓ Device is integrated in PROFINET project.

▶ Open the [Device view] of the device.

▷ The [Device overview] tab displays the device structure.

Option 1: activate energy monitoring

▶ In the hardware catalogue in the folder [Submodules], select the submodule [Digital Output Energy Monitoring] and assign it to slot [1 2] using drag & drop.

▷ The selected submodule is assigned to the slot.

▶ Click on the submodule [Digital Output Energy Monitoring].

▷ The [Properties] view appears.

▷ The [General] tab displays the properties of the module.

▷ [Module parameters] provides access to the available parameters.

▶ Set the energy monitoring parameters.

▶ Save the project.

▷ Energy monitoring of the device is activated and configured.

Option 2: deactivate energy monitoring

▶ In the hardware catalogue in the folder [Submodules], select the submodule [Empty Slot – No Energy Monitoring] and assign it to slot [1 2] using drag & drop.

▷ The selected submodule is assigned to the slot.

▶ Save the project.

▷ Energy monitoring of the device is deactivated.

▷ The changed configuration will be activated the next time the application is downloaded to the device.

9.3.7 Configuring the counter modules and switching channels

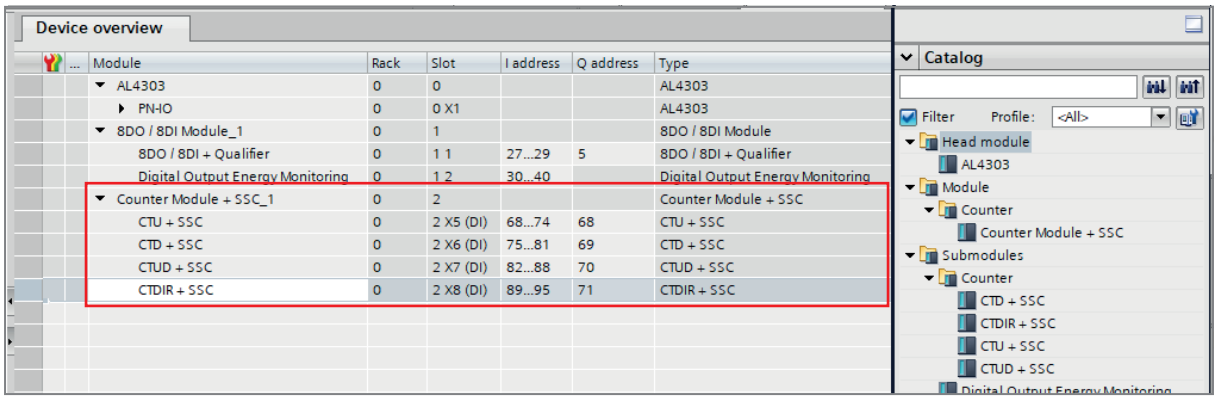
▶ Observe the notes on counter modules: Counter (→ 🗋 11)

▶ Observe the notes on switching signal channels: Switching signal channels (→ 🗋 14)

The counter modules and switching channels of ports X5...X8 are configured via the module [Counter Module + SSC] and its submodules:

- Submodule: CTU + SSC (→ 🗋 65)
- Submodule: CTD + SSC (→ 🗋 67)
- Submodule: CTUD + SSC (→ 🗋 69)
- Submodule: CTDIR + SSC (→ 🗋 71)

The module [Counter Module + SSC] has to be assigned to slot 2 manually. A switching channel counter submodule can then be assigned to each of the sublots [2 X5 (DI)] to [2 X8 (DI)].



The properties of the counter modules and switching channels are set via subslots [2 X5 (DI)] ... [2 X8 (DI)]. Each counter module and each switching channel can be configured separately.

Available parameters for counter modules:

- event messages of the main counter
- event messages of the batch counter
- pin 2 function of the port (only operating modes CTU, CTD)
- pin 2 function of the port / selection of the count direction (only operating mode CTDIR)

- threshold CT of the main counter
- threshold CTb of the batch counter

Available parameters per switching channel:

- Main SSC - switching mode
- Main SSC - switching logic
- Main SSC - reaction to increasing / decreasing counter edges
- Main SCC - switch point SP1
- Main SCC - switch point SP2
- Main SCC - switch delay
- Main SCC - reset delay
- Main SCC - hysteresis
- Batch SCC - switching mode
- Batch SCC - switching logic
- Batch SCC - reaction to increasing / decreasing counter edges
- Batch SCC - switch point SP1
- Batch SCC - switch point SP2
- Batch SCC - reset delay
- Batch SCC - reset delay
- Batch SCC - hysteresis

Requirements:

✓ Device is integrated in PROFINET project.

▶ Open the [Device view] of the device.

▷ The [Device overview] tab displays the device structure.

▶ In the hardware catalogue under [Module] > [Counter], select the module [Counter Module + SSC] and move it to slot 2 using drag & drop.

▷ The counter switching channel module is assigned to the device.

▷ The device overview shows the available port slots.

▷ The hardware catalogue displays the available submodules.

▶ In the hardware catalogue under [Submodule] > [Counter], select the desired counter switching channel submodule and move it to a free slot of the port using drag & drop.

▷ The submodule is assigned to the port slot.

▶ Click on the slot of the assigned submodule.

▷ The [Properties] view appears.

▷ The [General] tab displays the properties of the module.

▷ [Module parameters] provides access to the available parameters.

▶ Set the parameters of the counter module in the [Counter parameters] area.

▶ Set the parameters of the switching channel assigned to the main counter in the [Main SSC Parameters] area.

▶ Set the parameters of the switching channel assigned to the batch counter in the [Batch SSC Parameters] area.

▶ Optional: Repeat the process to assign further counter switching channel submodules to free ports and to configure them.

▶ Save the project.

▷ The counter modules and switching channels are activated and configured.

▷ The changed configuration will be activated the next time the application is downloaded to the device.

9.3.8 Accessing the digital inputs and outputs

The digital input and output data of the ports and the associated validity indicators are part of the cyclical input and output data.

When configuring the input filters and digital outputs, IEC addresses are automatically created for the following process data:

- digital input data
- qualifiers of the digital input data
- digital output data
- qualifiers of the digital output data

Structure of the process data: Submodule: 8DO/8DI + qualifier (→ 🗋 73)

Requirements:

✓ Device is integrated in PROFINET project.

▶ Connect the IEC addresses of the subslots with symbols in the global variable list.

▷ The user can access the process data of the ports via symbol names in the application.

9.3.9 Control counters

The control signals of the counters are part of the cyclical output data.

When configuring the counter modules, IEC addresses are automatically created for the following control signals:

Available control signals per counter module:

- reset counter module
- disable counter module
- set counting direction (only for CTDIR counter operating mode)

Position of the control signals in the cyclical output data:

- Submodule: CTU
- Submodule: CTD
- Submodule: CTUD
- Submodule: CTDIR

To control the counter modules:

Requirements:

✓ Device is integrated in PROFINET project.

✓ The counter submodules are configured.

✓ The IEC addresses of the cyclic process data are linked to variables.

▶ Set the control signals in the output data of the counter submodules.

▷ The control signals are sent to the counter submodule.

9.3.10 Using energy monitoring

The energy monitoring data is transmitted in the cyclic process data.

The measuring accuracy of the current and voltage values of the device supply US is ±10%.

When activating and configuring the submodule [Digital Output Energy Monitoring], IEC addresses are automatically created for the following process data:

- Supply voltage US error indication
- Supply voltage UA error indication
- Present voltage value of supply voltage US
- Present current value of supply voltage US
- Present voltage value of supply voltage UA
- Present current value of supply voltage UA
- Supply voltage US error indication
- Supply voltage UA error indication - ports 1&2
- Supply voltage UA error indication - ports 3&4
- Present voltage value of supply voltage US
- Present current value of supply voltage US
- Present voltage value of supply voltage UA
- Present current value of supply voltage UA - ports 1&2
- Present current value of supply voltage UA - ports 3&4

Position of the energy monitoring data in the cyclical input data: Submodule: Digital Output Energy Monitoring (→ 🗋 78)

Requirements:

✓ Device is integrated in PROFINET project.

✓ The submodule [Digital Output Energy Monitoring] is activated and configured.

▶ Connect the IEC addresses of the subslots with symbols in the global variable list.

▷ The user can access the energy monitoring data via symbol names in the application.

9.3.11 Accessing data records acyclically

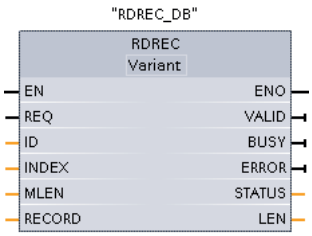
The user can access configuration and process data acyclically via data records.

The device supports the following data records:

- Data record: Counter configuration (→ 🗋 79)
- Data record: main counter (→ 🗋 80)
- Data record: batch counter (→ 🗋 81)

Note: Read data record

▶ Read the data record with the function block RDREC.



Specific parameters:

- Input ID: HW_ID of the subslot (project-specific); properties of the subslot
- Input INDEX: index of the data record

9.3.12 Use I&M data records

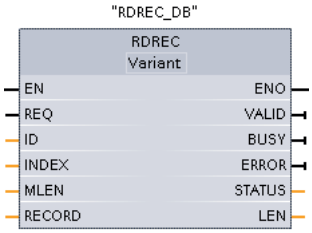
The unit supports the I&M data records I&M0 to I&M3 (→ I&M data 🗋 82).

- The data record I&M0 contains ID information. The I&M0 data record is available for each module / submodule of the device.
- In the data records I&M1...I&M3, the user can store application and device-specific information.

I&M data records can be accessed acyclically. Access to the I&M data records takes place index-based.

Note: Read data record

▶ Read the data record with the function block RDREC.



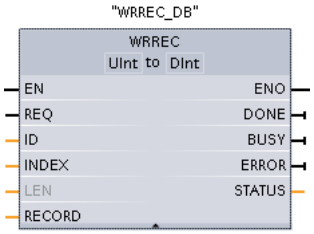
Specific parameters:

- Input ID: HW_ID of the subslot (project-specific); properties of the subslot
- Input INDEX: index of the data record

Note: Write data record

▶ Write the data record with the function block WRREC.

▶ Observe read and write permissions!



Specific parameters:

- Input ID: HW-ID of the slot (project-specific); properties of the slot
- Input INDEX: index of the data record

10 Maintenance, repair and disposal

The operation of the device is maintenance-free.

▶ Dispose of the device in an environmentally friendly way in accordance with the applicable national regulations when it is no longer used.

10.1 Cleaning

▶ Disconnect the device from the voltage supply.

▶ Clean the device from dirt using a soft, chemically untreated and dry cloth.

▶ In case of severe soiling, use a damp cloth.

▶ Do not use any caustic cleaning agents for cleaning!

10.2 Update firmware

The system software of the device can be updated using the following options:

- IoT-Core Visualizer: Update firmware (→ 51)

11 Appendix

11.1 PROFINET

11.1.1 Parameters

11.1.1.1 Modules: 8DO / 8DI modules

Submodule: 8DO/8DI + qualifier

Per input channel:

Parameter	Description	Values	Access
Debounce Time [* 0.1ms]	Debounce time (value * 0.1 ms)	• 0: 0 ms (default) … • 500: 50 ms	rw [1]
Hold time [* 0.1ms]	Hold time (value * 0.1 ms)	• 0: 0 ms (default) … • 60000: 6000 ms	rw [1]
Hold level	Hold level	• 0: Low: hold LOW • 1: High: hold HIGH (default)	rw [1]
Input Inverter	Signal inversion	• 0: Signal not inverted: do not invert signal (default) • 1: Signal inverted: signal inversion	rw [1]

[1] Read and write

Per output channel:

Parameter	Description	Value range	Access
Digital Output Current Limit	Max. current value of the digital output (value in mA)	• 0: 0 mA … • 2000: 2000 mA (default) … • 3600: 3600 mA	rw [1]
Digital Output State Communication Lost	Fall-back value if the connection to the controller is interrupted	• Set OFF when communication lost: OFF state (default) • Set ON when communication lost: ON state • Keep last value when communication lost: keep last valid state	rw [1]
Digital Output Select	Control instance for digital output	• PLC: fieldbus control (default) • MAIN SSC 1: switching channel main counter 1 • BATCH SSC 1: switching channel batch counter 1 • MAIN SSC 2: switching channel main counter 2 • BATCH SSC 2: switching channel batch counter 2 • MAIN SSC 3: switching channel main counter 3 • BATCH SSC 3: switching channel batch counter 3 • MAIN SSC 4: switching channel main counter 4 • BATCH SSC 4: switching channel batch counter 4	rw [1]

[1] Read and write

Submodule: Digital Output Energy Monitoring

Parameter	Description	Values	Access
Energy Monitoring Events Enable	Enable / Disable notifications for energy monitoring	• ☐: disable • ☑: enable (default)	rw [1]

[1] Read and write

Submodule: Empty Slot - No Energy Monitoring

No parameters

11.1.1.2 Modules: Counter module + SSC

Submodule: CTU + SSC

Counter parameters:

Parameter	Description	Values	Access
Enable Main counter event	Notifications for main counter	• ☐: disable • ☑: enable (default)	rw [1]
Enable Main counter event	Notifications for batch counter	• ☐: disable • ☑: enable (default)	rw [1]
Pin2 function	Function of pin 2 of the port	• Not used: no function (default) • Reset main & batch counter: reset main counter and batch counter • Disable main & batch counter: disable main counter and batch counter • Reset main & batch SSC Latch: reset main and batch counter switching signal	rw [1]
Main Threshold	Threshold CT of the main counter	• 1 … • 4294967295 (default)	rw [1]
Batch Threshold	Threshold CTb of the batch counter	• 1 … • 65535 (default)	rw [1]

[1] Read and write

Main SSC parameters:

Parameter	Description	Value range	Access
Mode	Switching mode of switching channel	• Deactivated: switching channel deactivated (default) • Single Point: single point mode • Latch: latch mode • Two Point: two point mode • Window: window mode	rw [1]
Logic	Switching logic of switching channel	• High Active: (default) • Low Active:	rw [1]
Single Point Edge	Defines whether switching channel should react to rising or falling counter values	• Rising Counter Value: rising counter values (default) • Falling Counter Value: falling counter values	rw [1]
Set Point 1	Setpoint 1	0…4294967295	rw [1]
Set Point 2	Setpoint 2	0…4294967294	rw [1]
Switch Delay	Switching delay (value in ms)	0…65535	rw [1]
Reset Delay	Reset delay (value in ms)	0…65535	rw [1]
Hysteresis	Hysteresis	0…4294967295	rw [1]

[1] Read and write

Batch SSC parameters:

Parameter	Description	Value range	Access
Mode	Switching mode of switching channel	• Deactivated: switching channel deactivated (default) • Single Point: single point mode • Latch: latch mode • Two Point: two point mode • Window: window mode	rw [1]

Parameter	Description	Value range	Access
Logic	Switching logic of switching channel	• High Active: (default) • Low Active:	rw [1]
Single Point Edge	Defines whether switching channel should react to rising or falling counter values	• Rising Counter Value: rising counter values (default) • Falling Counter Value: falling counter values	rw [1]
Set Point 1	Setpoint 1	0…65535	rw [1]
Set Point 2	Setpoint 2	0…65534	rw [1]
Switch Delay	Switching delay (value in ms)	0…65535	rw [1]
Reset Delay	Reset delay (value in ms)	0…65535	rw [1]
Hysteresis	Hysteresis	0…65535	rw [1]

[1] Read and write

Submodule: CTD + SSC

Counter parameters:

Parameter	Description	Values	Access
Enable Main counter event	Notifications for main counter	• ☐: disable • ☑: enable (default)	rw [1]
Enable Main counter event	Notifications for batch counter	• ☐: disable • ☑: enable (default)	rw [1]
Pin2 function	Function of pin 2 of the port	• Not used: no function (default) • Reset main & batch counter: reset main counter and batch counter • Disable main & batch counter: disable main counter and batch counter • Reset main & batch SSC Latch: reset main and batch counter switching signal	rw [1]
Main Threshold	Threshold CT of the main counter	• 1 … • 4294967295 (default)	rw [1]
Batch Threshold	Threshold CTb of the batch counter	• 1 … • 65535 (default)	rw [1]

[1] Read and write

Main SSC parameters:

Parameter	Description	Value range	Access
Mode	Switching mode	• Deactivated: switching channel deactivated (default) • Single Point: single point mode • Latch: latch mode • Two Point: two point mode • Window: window mode	rw [1]
Logic	Switching logic	• High Active: (default) • Low Active:	rw [1]
Single Point Edge	Defines whether switching channel should react to rising or falling counter values	• Rising Counter Value: rising counter values • Falling Counter Value: falling counter values (default)	rw [1]
Set Point 1	Setpoint 1	0…4294967295	rw [1]
Set Point 2	Setpoint 2	0…4294967294	rw [1]
Switch Delay	Switching delay (value in ms)	0…65535	rw [1]
Reset Delay	Reset delay (value in ms)	0…65535	rw [1]
Hysteresis	Hysteresis	0…4294967295	rw [1]

[1] Read and write

Batch SSC parameters:

Parameter	Description	Value range	Access
Mode	Switching mode	• Deactivated: switching channel deactivated (default) • Single Point: single point mode • Latch: latch mode • Two Point: two point mode • Window: window mode	rw [1]
Logic	Switching logic	• High Active: (default) • Low Active:	rw [1]

Parameter	Description	Value range	Access
Single Point Edge	Defines whether switching channel should react to rising or falling counter values	• Rising Counter Value: rising counter values • Falling Counter Value: falling counter values (default)	rw [1]
Set Point 1	Setpoint 1	0…65535	rw [1]
Set Point 2	Setpoint 2	0…65534	rw [1]
Switch Delay	Switching delay (value in ms)	0…65535	rw [1]
Reset Delay	Reset delay (value in ms)	0…65535	rw [1]
Hysteresis	Hysteresis	0…65535	rw [1]

[1] Read and write

Submodule: CTUD + SSC

Counter parameters:

Parameter	Description	Values	Access
Enable Main counter event	Notifications for main counter	• ☐: disable • ☑: enable (default)	rw [1]
Enable Main counter event	Notifications for batch counter	• ☐: disable • ☑: enable (default)	rw [1]
Pin 2 function	function of pin 2 of the port	• Counter edge input 2: counting input (default)	rw [1]
Main Threshold	Threshold CT of the main counter	• 1 … • 4294967295 (default)	rw [1]
Batch Threshold	Threshold CTb of the batch counter	• 1 … • 65535 (default)	rw [1]

[1] Read and write

Main SSC parameters:

Parameter	Description	Value range	Access
Mode	Switching mode of switching channel	• Deactivated: switching channel deactivated (default) • Single Point: single point mode • Latch: latch mode • Two Point: two point mode • Window: window mode	rw [1]
Logic	Switching logic of switching channel	• High Active: (default) • Low Active:	rw [1]
Single Point Edge	Defines whether switching channel should react to rising or falling counter values	• Rising Counter Value: rising counter values (default) • Falling Counter Value: falling counter values	rw [1]
Set Point 1	Setpoint 1	0…4294967295	rw [1]
Set Point 2	Setpoint 2	0…4294967294	rw [1]
Switch Delay	Switching delay (value in ms)	0…65535	rw [1]
Reset Delay	Reset delay (value in ms)	0…65535	rw [1]
Hysteresis	Hysteresis	0…4294967295	rw [1]

[1] Read and write

Batch SSC parameters:

Parameter	Description	Value range	Access
Mode	Switching mode of switching channel	• Deactivated: switching channel deactivated (default) • Single Point: single point mode • Latch: latch mode • Two Point: two point mode • Window: window mode	rw [1]
Logic	Switching logic of switching channel	• High Active: (default) • Low Active:	rw [1]
Single Point Edge	Defines whether switching channel should react to rising or falling counter values	• Rising Counter Value: rising counter values (default) • Falling Counter Value: falling counter values	rw [1]
Set Point 1	Setpoint 1	0…65535	rw [1]
Set Point 2	Setpoint 2	0…65534	rw [1]

Parameter	Description	Value range	Access
Switch Delay	Switching delay (value in ms)	0…65535	rw [1]
Reset Delay	Reset delay (value in ms)	0…65535	rw [1]
Hysteresis	Hysteresis	0…65535	rw [1]

[1] Read and write

Submodule: CTDIR + SSC

Counter parameters:

Parameter	Description	Values	Access
Enable Main counter event	Notifications for main counter	• ☐: disable • ☑: enable (default)	rw [1]
Enable Main counter event	Notifications for batch counter	• ☐: disable • ☑: enable (default)	rw [1]
Pin2 function / Count direction selection	Notifications for main counter	• Pin2 Count direction: (default) • Pin2 Not used & Count Direction by PLC: • Pin2 Reset Counter & Count Direction by PLC: • Pin2 Disable Counter & Count Direction by PLC: • Pin2 Reset SSC Latch & Count Direction by PLC:	rw [1]
Main Threshold	Threshold CT of the main counter	• 1 … • 4294967295 (default)	rw [1]
Batch Threshold	Threshold CTb of the batch counter	• 1 … • 65535 (default)	rw [1]

[1] Read and write

Main SSC parameters:

Parameter	Description	Value range	Access
Mode	Switching mode of switching channel	• Deactivated: switching channel deactivated (default) • Single Point: single point mode • Latch: latch mode • Two Point: two point mode • Window: window mode	rw [1]
Logic	Switching logic of switching channel	• High Active: (default) • Low Active:	rw [1]
Single Point Edge	Defines whether switching channel should react to rising or falling counter values	• Rising Counter Value: rising counter values (default) • Falling Counter Value: falling counter values	rw [1]
Set Point 1	Setpoint 1	0…4294967295	rw [1]
Set Point 2	Setpoint 2	0…4294967294	rw [1]
Switch Delay	Switching delay (value in ms)	0…65535	rw [1]
Reset Delay	Reset delay (value in ms)	0…65535	rw [1]
Hysteresis	Hysteresis	0…4294967295	rw [1]

[1] Read and write

Batch SSC parameters:

Parameter	Description	Value range	Access
Mode	Switching mode of switching channel	• Deactivated: switching channel deactivated (default) • Single Point: single point mode • Latch: latch mode • Two Point: two point mode • Window: window mode	rw [1]
Logic	Switching logic of switching channel	• High Active: (default) • Low Active:	rw [1]

Parameter	Description	Value range	Access
Single Point Edge	Defines whether switching channel should react to rising or falling counter values	• Rising Counter Value: rising counter values (default) • Falling Counter Value: falling counter values	rw [1]
Set Point 1	Setpoint 1	0…65535	rw [1]
Set Point 2	Setpoint 2	0…65534	rw [1]
Switch Delay	Switching delay (value in ms)	0…65535	rw [1]
Reset Delay	Reset delay (value in ms)	0…65535	rw [1]
Hysteresis	Hysteresis	0…65535	rw [1]

[1] Read and write

11.1.2 Cyclic data

11.1.2.1 Submodule: 8DO/8DI + qualifier

Input data: 3 byte

Byte (offset)	Bit							
	7	6	5	4	3	2	1	0
n	Ch07: DI	Ch06: DI	Ch05: DI	Ch04: DI	Ch03: DI	Ch02: DI	Ch01: DI	Ch00: DI
n+1	Ch07: QDI	Ch06: QDI	Ch05: QDI	Ch04: QDI	Ch03: QDI	Ch03: QDI	Ch01: QDI	Ch00: QDI
n+2	Ch07: QDO	Ch06: QDO	Ch05: QDO	Ch04: QDO	Ch03: QDO	Ch02: QDO	Ch01: QDO	Ch00: QDO

Legend:

- DI — Signal level of the digital input — 1 BIT
  - 0x0: LOW
  - 0x1: HIGH
- QDI — Validity of the process value of the digital input — 1 BIT
  - 0x0: invalid
  - 0x1: valid
- QDO — Validity of the process value of the digital output — 1 BIT
  - 0x0: invalid
  - 0x1: valid

Output data: 1 byte

Byte (offset)	Bit							
	7	6	5	4	3	2	1	0
n	Ch07: DO	Ch06: DO	Ch05: DO	Ch04: DO	Ch03: DO	Ch02: DO	Ch01: DO	Ch00: DO

Legend:

- DO — Signal level of the digital input — 1 BIT
  - 0x0: LOW
  - 0x1: HIGH

11.1.2.2 Submodule: CTU + SSC

Input data: 7 bytes

Byte (offset)	Bit							
	7	6	5	4	3	2	1	0
0…3	Main Counter Value							
4…5	Batch Counter Value							
6	Reserved						Switching Signal Batch	Switching Signal Main

Legend:

• Main Counter Value	Current main counter value Main Counter Value = 0x12345678 • Main Counter Value[0] = 0x12 • Main Counter Value[1] = 0x34 • Main Counter Value[2] = 0x56 • Main Counter Value[3] = 0x78	UINT32	• 0x00000000: 0 … • 0xFFFFFFFE: 4294967294
• Batch Counter Value	Current batch counter value Batch Counter Value = 0x1234 • Batch Counter Value[0] = 0x12 • Batch Counter Value[1] = 0x34	UINT16	• 0x0000: 0 … • 0xFFFE: 65534
• Switching Signal Main	Switching signal main counter	1 BIT	• 0x0: LOW • 0x1: HIGH
• Switching Signal Batch	Switching signal batch counter	1 BIT	• 0x0: LOW • 0x1: HIGH

Output data: 1 byte

Byte (offset)	Bit							
	7	6	5	4	3	2	1	0
0	Reserved			Reset Batch SSC Latch	Reset Main SSC Latch	Counter Direction	Disable Counter	Reset Counter

Legend:

• Reset Counter	Reset main counter and batch counter to initial value	1 BIT	• 0x0: no action • 0x1: reset
• Disable Counter	Disable main counter and batch counter	1 BIT	• 0x0: no action • 0x1: disable
• Counter Direction	Set counting direction (only effective if parameter [Count direction selection] = [PLC])	1 BIT	• 0x0: up • 0x1: down
• Reset Main SSC Latch	Reset switching channel main counter (only effective if parameter [Mode] = [Latch])	1 BIT	• 0x0: no action • 0x1: reset
• Reset Batch SSC Latch	Reset switching channel batch counter (only effective if parameter [Mode] = [Latch])	1 BIT	• 0x0: no action • 0x1: reset

11.1.2.3 Submodule: CTD + SSC

Input data: 7 bytes

Byte (offset)	Bit							
	7	6	5	4	3	2	1	0
0…3	Main Counter Value							
4…5	Batch Counter Value							
6	Reserved						Switching Signal Batch	Switching Signal Main

Legend:

• Main Counter Value	Current main counter value Main Counter Value = 0x12345678 • Main Counter Value[0] = 0x12 • Main Counter Value[1] = 0x34 • Main Counter Value[2] = 0x56 • Main Counter Value[3] = 0x78	UINT32	• 0x00000000: 0 … • 0xFFFFFFFE: 4294967294
• Batch Counter Value	Current batch counter value Batch Counter Value = 0x1234 • Batch Counter Value[0] = 0x12 • Batch Counter Value[1] = 0x34	UINT16	• 0x0000: 0 … • 0xFFFE: 65534
• Switching Signal Main	Switching signal main counter	1 BIT	• 0x0: LOW • 0x1: HIGH
• Switching Signal Batch	Switching signal batch counter	1 BIT	• 0x0: LOW • 0x1: HIGH

Output data: 1 byte

Byte (offset)	Bit							
	7	6	5	4	3	2	1	0
0	Reserved			Reset Batch SSC Latch	Reset Main SSC Latch	Counter Direction	Disable Counter	Reset Counter

Legend:

• Reset Counter	Reset main counter and batch counter to initial value	1 BIT	• 0x0: no action • 0x1: reset
• Disable Counter	Disable main counter and batch counter	1 BIT	• 0x0: no action • 0x1: disable
• Counter Direction	Set counting direction (only effective if parameter [Count direction selection] = [PLC])	1 BIT	• 0x0: up • 0x1: down
• Reset Main SSC Latch	Reset switching channel main counter (only effective if parameter [Mode] = [Latch])	1 BIT	• 0x0: no action • 0x1: reset
• Reset Batch SSC Latch	Reset switching channel batch counter (only effective if parameter [Mode] = [Latch])	1 BIT	• 0x0: no action • 0x1: reset

11.1.2.4 Submodule: CTUD + SSC

Input data: 7 bytes

Byte (offset)	Bit							
	7	6	5	4	3	2	1	0
0…3	Main Counter Value							
4…5	Batch Counter Value							
6	Reserved						Switching Signal Batch	Switching Signal Main

Legend:

• Main Counter Value	Current main counter value Main Counter Value = 0x12345678 • Main Counter Value[0] = 0x12 • Main Counter Value[1] = 0x34 • Main Counter Value[2] = 0x56 • Main Counter Value[3] = 0x78	UINT32	• 0x00000000: 0 … • 0xFFFFFFFE: 4294967294
• Batch Counter Value	Current batch counter value Batch Counter Value = 0x1234 • Batch Counter Value[0] = 0x12 • Batch Counter Value[1] = 0x34	UINT16	• 0x0000: 0 … • 0xFFFE: 65534
• Switching Signal Main	Switching signal main counter	1 BIT	• 0x0: LOW • 0x1: HIGH
• Switching Signal Batch	Switching signal batch counter	1 BIT	• 0x0: LOW • 0x1: HIGH

Output data: 1 byte

Byte (offset)	Bit							
	7	6	5	4	3	2	1	0
0	Reserved			Reset Batch SSC Latch	Reset Main SSC Latch	Counter Direction	Disable Counter	Reset Counter

Legend:

• Reset Counter	Reset main counter and batch counter to initial value	1 BIT	• 0x0: no action • 0x1: reset
• Disable Counter	Disable main counter and batch counter	1 BIT	• 0x0: no action • 0x1: disable
• Counter Direction	Set counting direction (only effective if parameter [Count direction selection] = [PLC])	1 BIT	• 0x0: up • 0x1: down
• Reset Main SSC Latch	Reset switching channel main counter (only effective if parameter [Mode] = [Latch])	1 BIT	• 0x0: no action • 0x1: reset
• Reset Batch SSC Latch	Reset switching channel batch counter (only effective if parameter [Mode] = [Latch])	1 BIT	• 0x0: no action • 0x1: reset

11.1.2.5 Submodule: CTDIR + SSC

Input data: 7 bytes

Byte (offset)	Bit							
	7	6	5	4	3	2	1	0
0…3	Main Counter Value							
4…5	Batch Counter Value							
6	Reserved						Switching Signal Batch	Switching Signal Main

Legend:

• Main Counter Value	Current main counter value Main Counter Value = 0x12345678 • Main Counter Value[0] = 0x12 • Main Counter Value[1] = 0x34 • Main Counter Value[2] = 0x56 • Main Counter Value[3] = 0x78	UINT32	• 0x00000000: 0 … • 0xFFFFFFFE: 4294967294
• Batch Counter Value	Current batch counter value Batch Counter Value = 0x1234 • Batch Counter Value[0] = 0x12 • Batch Counter Value[1] = 0x34	UINT16	• 0x0000: 0 … • 0xFFFE: 65534
• Switching Signal Main	Switching signal main counter	1 BIT	• 0x0: LOW • 0x1: HIGH
• Switching Signal Batch	Switching signal batch counter	1 BIT	• 0x0: LOW • 0x1: HIGH

Output data: 1 byte

Byte (offset)	Bit							
	7	6	5	4	3	2	1	0
0	Reserved			Reset Batch SSC Latch	Reset Main SSC Latch	Counter Direction	Disable Counter	Reset Counter

Legend:

• Reset Counter	Reset main counter and batch counter to initial value	1 BIT	• 0x0: no action • 0x1: reset
• Disable Counter	Disable main counter and batch counter	1 BIT	• 0x0: no action • 0x1: disable
• Counter Direction	Set counting direction (only effective if parameter [Count direction selection] = [PLC])	1 BIT	• 0x0: up • 0x1: down
• Reset Main SSC Latch	Reset switching channel main counter (only effective if parameter [Mode] = [Latch])	1 BIT	• 0x0: no action • 0x1: reset
• Reset Batch SSC Latch	Reset switching channel batch counter (only effective if parameter [Mode] = [Latch])	1 BIT	• 0x0: no action • 0x1: reset

11.1.2.6 Submodule: Digital Output Energy Monitoring

Input data: 11 bytes

Byte (offset)	Bit							
	7	6	5	4	3	2	1	0
0	res.	res.	res.	res.	res.	AUX PWR Port 1&2	AUX PWR Port 3&4	SENS PWR
1…2	Sensor Supply Voltage (US)							
3…4	Sensor Suppy Current (US)							
5…6	Actuator Supply Voltage (UA)							
7…8	Port 1&2 Actuator Supply Current (UA)							
9…10	Port 3&4 Actuator Supply Current (UA)							

Legend:

• SENS PWR	Error indication supply voltage US	1 BIT	• 0x0: no error • 0x1: error
• AUX PWR Port 3&4	Error indication supply voltage UA - ports 3&4	1 BIT	• 0x0: no error • 0x1: error
• AUX PWR Port 1&2	Error indication supply voltage UA - ports 1&2	1 BIT	• 0x0: no error • 0x1: error
• Sensor Supply Voltage (US)	Present voltage value of supply voltage US (in mV) Sensor Supply Voltage (US) = 0x1234 • Sensor Supply Voltage (US)[0] = 0x12 • Sensor Supply Voltage (US)[1] = 0x34	UINT16	• 0x0000: 0 mV … • 0x0E10: 3600 mV
• Sensor Supply Current (US)	Present current value of supply voltage US (in mA) Sensor Supply Current (US) = 0x1234 • Sensor Supply Current (US)[0] = 0x12 • Sensor Supply Current (US)[1] = 0x34	UINT16	• 0x0000: 0 mA … • 0x0E10: 3600 mA
• Actuator Supply Voltage (UA)	Present voltage of supply voltage UA (in mV) Actuator Supply Voltage (UA) = 0x1234 • Actuator Supply Voltage (UA)[0] = 0x12 • Actuator Supply Voltage (UA)[1] = 0x34	UINT16	• 0x0000: 0 mV … • 0x0E10: 3600 mV
• Port 1&2 Actuator Supply Current (UA)	Present current value of supply voltage UA - ports 1&2 (in mA) Port 1&2 Actuator Supply Current (UA) = 0x1234 • Port 1&2 Actuator Supply Current (UA)[0] = 0x12 • Port 1&2 Actuator Supply Current (UA)[1] = 0x34	UINT16	• 0x0000: 0 mA … • 0x0E10: 3600 mA
• Port 3&4 Actuator Supply Current (UA)	Present current value of supply voltage UA - ports 3&4 (in mA) Port 3&4 Actuator Supply Current (UA) = 0x1234 • Port 3&4 Actuator Supply Current (UA)[0] = 0x12 • Port 3&4 Actuator Supply Current (UA)[1] = 0x34	UINT16	• 0x0000: 0 mA … • 0x0E10: 3600 mA

Output data: none

11.1.3 Acyclical data

11.1.3.1 Data record: Counter configuration

Index: 500

Byte (off-set)	Bit							
	7	6	5	4	3	2	1	0
0	Counter mode							
1	Reserved		Batch Event enable	Main Event enable	Count direction [1] | Pin 2 function / Count direction [2]			
2..5	Main Treshold							
6…7	Batch Threshold							

[1] only available for operating modes [CTU], [CTD] and [CTUD]

[2] only available for operating mode [CTDIR]

Legend:

• Counter mode	Operating mode counter module	UINT8 / rc	• 0x0: CTU – up counter • 0x1: CTD – down counter • 0x2: CTUD – up and down counter • 0x3: CTDIR – up and down counter with selectable counting direction
• Pin 2 function	Pin 2 function of the port	4 bits / rc	For [CTU] and [CTD]: • 0x00: no function • 0x03: reset counter module • 0x04: disable counter module For [CTUD]: • 0x01: count input
• Pin 2 function / Count direction	Pin 2 function of the port and desired counting direction	4 bits / rc	• 0x02: pin 2 determines counting direction • 0x08: pin 2 not used & PLC determines counting direction • 0x0B: pin 2 resets counter module & PLC determines counting direction • 0x0C: pin 2 disables counter module & PLC determines counting direction
• Main Event enable	Enable overflow/underflow event of the main counter	1 bit / rc	• 0x0: disable • 0x1: activate
• Batch Event enable	Enable overflow/underflow event of the batch counter	1 bit / rc	• 0x0: disable • 0x1: activate
• Main Threshold	threshold CT of the main counter	UINT32 /rc	• 0x00000001:1 … • 0xFFFFFFF: 4294967295
• Batch Threshold	threshold CTb of the batch counter	UINT16 /rc	• 0x0001: 1 … • 0xFFFF: 65535

11.1.3.2 Data record: main counter

Index: 0x510

Byte (offset)	Bit							
	7	6	5	4	3	2	1	0
0	Switchpoint Mode							
1	Switchpoint Logic							
2	Single Point Edge							
3…6	SP1							
7…10	SP2							
11…12	Switch Delay							
13…14	Reset Delay							
15…18	Hysteresis HyS							

Legend:

• Switchpoint Mode	Switching mode of switching channel	UINT8 / rc	• 0x00: Deactivated (default) • 0x01: Single point mode • 0x02: Latch mode • 0x03: Two point mode • 0x04: Window mode
• Switchpoint Logic	Switching logic of switching channel	UINT8 / rc	• 0x00: High active (default) • 0x01: Low active
• Single Point Edge	Reaction of the switching channel to rising or falling counter values	UINT8 / rc	• 0x00: Rising Counter Value (default) • 0x01: Falling counter value
• SP1	Setpoint 1	UINT32 / rc	• 0x0000 0000: 0 … • 0xFFFF FFFF: 4294967295 (default)
• SP2	Setpoint 2	UINT32 / rc	• 0x0000 0000: 0 … • 0xFFFF FFFE: 4294967294 (default)
• Switch Delay	Switching delay (value in ms)	UINT16 / rc	• 0x0000: 0 (default) … • 0xFFFF: 65535
• Reset Delay	Reset delay (value in ms)	UINT16 / rc	• 0x0000: 0 (default) … • 0xFFFF: 65535
• Hysteresis HyS	Hysteresis	UINT32 / rc	• 0x0000 0000: 0 (default) … • 0xFFFF FFFF: 4294967295

11.1.3.3 Data record: batch counter

Index: 0x511

Byte (offset)	Bit							
	7	6	5	4	3	2	1	0
0	Switchpoint Mode							
1	Switchpoint Logic							
2	Single Point Edge							
3…6	SP1							
7…10	SP2							
11…12	Switch Delay							
13…14	Reset Delay							
15…18	Hysteresis HyS							

Legend:

• Switchpoint Mode	Switching mode of switching channel	UINT8 / rc	• 0x00: Deactivated (default) • 0x01: Single point mode • 0x02: Latch mode • 0x03: Two point mode • 0x04: Window mode
• Switchpoint Logic	Switching logic of switching channel	UINT8 / rc	• 0x00: High active (default) • 0x01: Low active
• Single Point Edge	Reaction of the switching channel to rising or falling counter values	UINT8 / rc	• 0x00: Rising Counter Value (default) • 0x01: Falling counter value
• SP1	Setpoint 1	UINT32 / rc	• 0x0000 0000: 0 … • 0x0000 FFFF: 65535 (default)
• SP2	Setpoint 2	UINT32 / rc	• 0x0000 0000: 0 … • 0x0000 FFFE: 65534 (default)
• Switch Delay	Switching delay (value in ms)	UINT16 / rc	• 0x0000: 0 (default) … • 0xFFFF: 65535
• Reset Delay	Reset delay (value in ms)	UINT16 / rc	• 0x0000: 0 (default) … • 0xFFFF: 65535
• Hysteresis HyS	Hysteresis	UIN16 / rc	• 0x0000: 0 (default) … • 0xFFFF: 65535

11.1.3.4 I&M data

I&M0 (Slot 0)

Index: 0xAFF0

Variable	Description	Value	Bytes
MANUFACTURER_ID	Manufacturer ID	0x136	2
ORDER_ID	Order ID (ASCII, separated by spaces)	AL4303	20
SERIAL_NUMBER	Serial number (ASCII, separated by spaces)		16
HARDWARE_REVISION	Hardware revision	e.g. AA	2
SOFTWARE_REVISION	Software revision • Byte 0: software type (V: release) • Byte 1: main version (uint8) • Byte 2: minor version (uint8) • byte 3: build version (uint8)	e.g. V1.0.3	4
REVISION_COUNTER	Revision counter; counter is incremented with every parameter change	0x0000 … 0xFFFF	2
PROFILE_ID	Profile ID • 0x0000: unspecific	0x0000	2
PROFILE_SPECIFIC_TYPE	Profile type • 0x0000: unused	0x0000	2
IM_VERSION	I&M version • 0x0101: V1.1	0x0101	2
IM_SUPPORTED	Supported I&M data records • 0x000: I&M0 is supported • 0x00E: I&M0-3 are supported	• DAP: 0x000E • Submodule: 0x0000	2

I&M1 (Slot 0)

Index: 0xAFF1

Variable	Description	Value	Bytes
TAG_FUNCTION	Identifier for function of the submodule • 0x20: empty	0x20	32
TAG_LOCATION	Identifier for location of the submodule • 0x20: empty	0x20	22

I&M2 (Slot 0)

Index: 0xAFF2

Variable	Description	Value	Bytes
INSTALLATION_DATE	Installation date of the submodule (ASCII, separated by spaces) • 0x20: empty	0x20	16
RESERVED	reserved	0x00	38

I&M3 (Slot 0)

Index: 0xAFF3

Variable	Description	Value	Bytes
DESCRIPTOR	Description of the submodule (ASCII, separated by spaces) • 0x20: empty	0x20	54

I&M0 (Slot 1)

Index: 0xAFF4

Variable	Description	Value	Bytes
API	API of the submodule		4
SLOT	Slot of the submodule		2
SUBSLOT	Subslot of the submodule		2
FLAGS	Flags: • 0x01: submodule has own I&M data • 0x02: I&M data of the submodule represent I&M data of the module • 0x04: I&M data of the submodule represent I&M data of the device		4