Operating instructions

Counter

DP2302

GB

11427770 / 00 11 / 2021

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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 www.ifm.com.

1.1 Symbols used

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

1.2 Warnings used

CAUTION

Warning of personal injury

▷ Slight reversible injuries may result.

1.3 Safety symbol on the device

Safety symbol on the device:

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

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, programming, configuration, operation and maintenance of the product must be carried out by personnel qualified and authorised for the respective activity.
- Protect units and cables against damage.
- Replace damaged units, otherwise the technical data and safety will be impaired.
- Observe applicable documents.

3 Intended use

The device is a pulse evaluation system. It can, for example, count any objects on receiving the pulses from external sensors and counting the number of pulses. This value is compared with the set switch points; the outputs are switched in accordance with the set parameters. Scaling factors allow for flexible setting of the increment for each pulse.

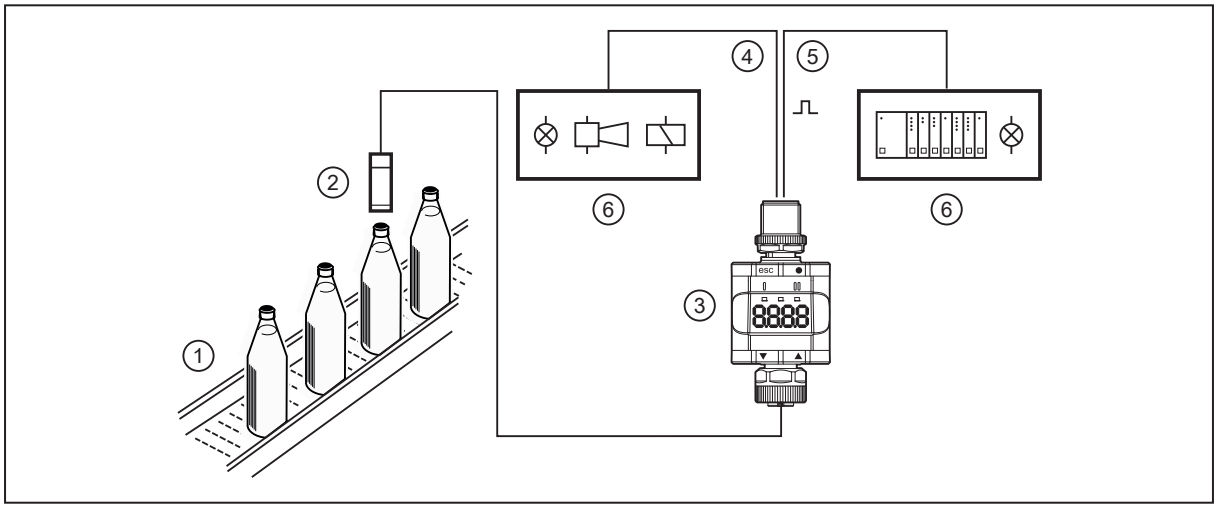


Fig. 1: Example: Counting sealed bottles on a conveyor belt

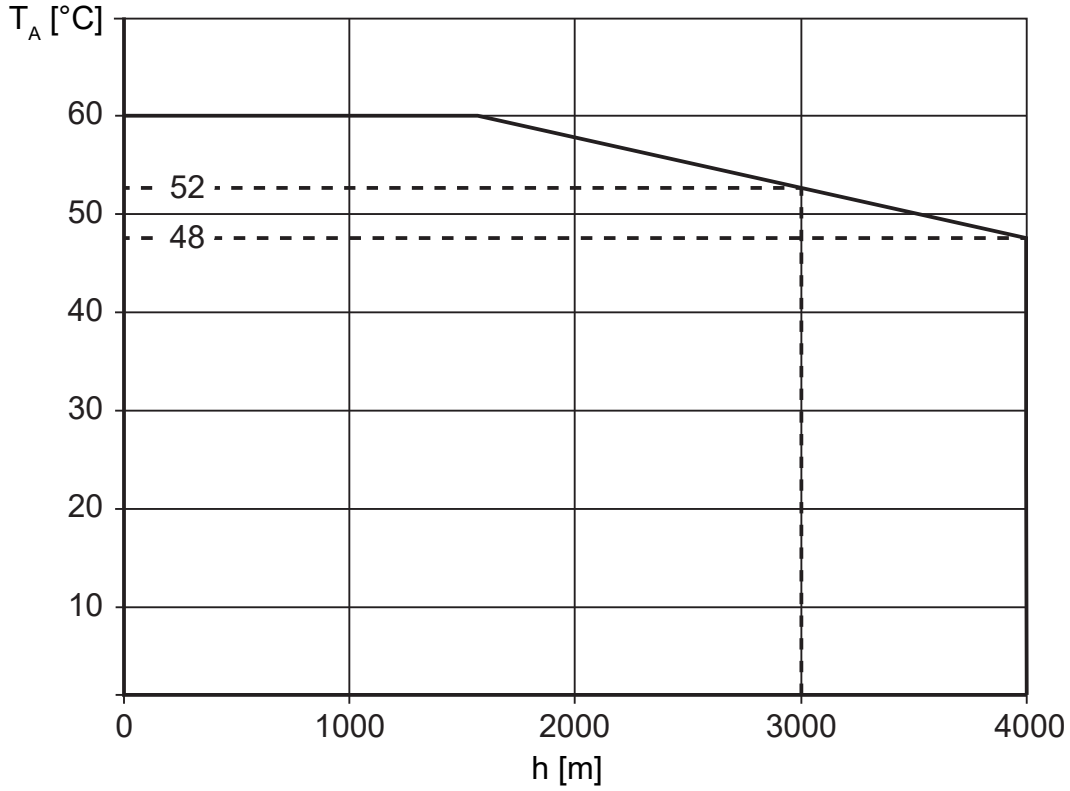
1: Conveyor belt
2: Counting pulse generator on the conveyor belt
3: DP2302
4: Transistor output (e.g. to control a light indicator, horn, relay or fieldbus I/O device Profinet/AS-i etc.)
5: Transistor output / IO-Link
6: Signals depending on the selected switching function

The unit is not suited for environments with particular requirements on mechanical stability (e.g. shock/vibration).

The unit is intended for indoor use only.

▶ Observe the operating conditions (→ Technical data at www.ifm.com).

3.1 Temperature derating depending on the altitude



3.2 Standard IO wiring

Switch points (standard IO mode) can also be used in combination with the standard inputs of a PLC. OUT1 and OUT2 can be switched to digital inputs (e.g. standard input modules). OUT1 and OUT2 can be evaluated via two digital inputs and implement a window function.

Voltage supply (pin 1 and 3) can be done via the input modules. With standard input modules, pins 1 and 3 are used for voltage supply (→ Electrical connection).

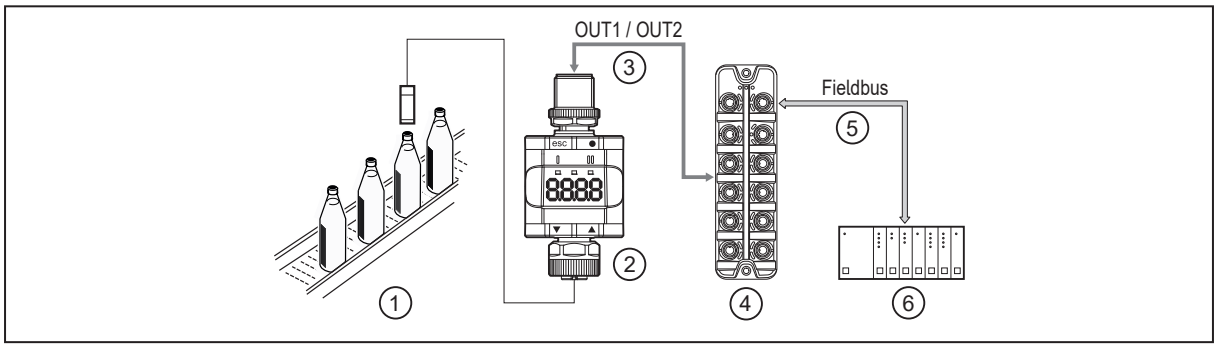


Fig. 2: Application example with a fieldbus system (e.g. AS-i)

1: Conveyor belt and counting pulse generator
2: Counter
3: Digital outputs
4: Digital fieldbus module
5: Fieldbus (e.g. Profibus, Profinet, AS-i etc.)
6: PLC

3.3 Supported sensors

Any suitable 3- and 2-wire sensors (e.g. inductive, optical, etc) are supported. The sensors must meet the following requirements:

- PNP switching
- compatibility with 24 V supply voltage

The mark-to-space ratios of the sensor used must be taken into account.

4 Function

The unit supports three adjustable counting modes. The counter can be permanently defined as an up counter or as a down counter or be flexibly switched between up and down counter via IN2: Function diagrams (counting behaviour) (→ 🗋 9). A display indicates the current counter reading. The unit generates output signals according to the parameter setting. Moreover, it provides the process data via IO-Link.

The unit is designed for half-duplex communication. So the following options are possible:

- Remote display: reading and displaying the current counter readings
- Remote parameter setting: reading and changing the current parameter setting
- IO-Link parameter setting: IO Device Description (IODD) (→ 🗋 9)

4.1 Application as an IO-Link device

4.1.1 General information

The unit has an IO-Link communication interface which requires an IO-Link capable module (IO-Link master).

The IO-Link interface allows direct access to the process and diagnostic data and enables setting of the parameters of the unit during operation.

You will find further information about IO-Link and all the necessary information about the required IO-Link hardware and software at:
www.ifm.com/gb/io-link

4.1.2 Application example

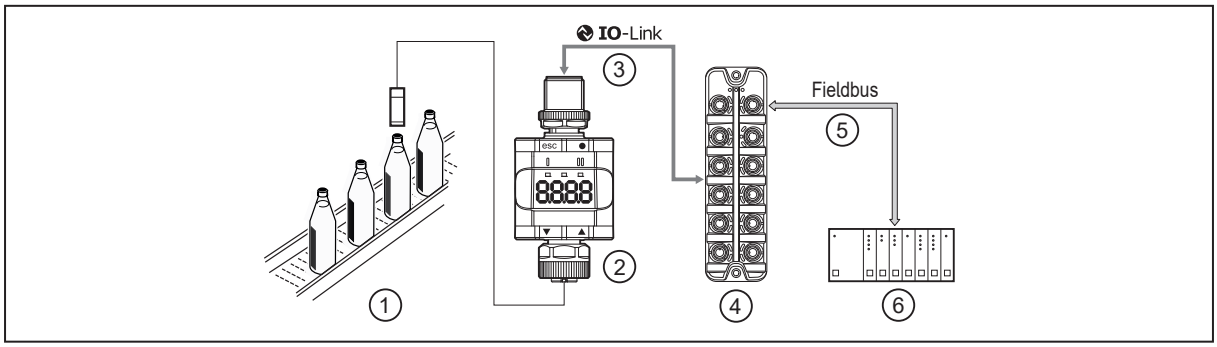


Fig. 3: Application example with IO-Link master

1: Conveyor belt and counting pulse generator
2: Counter
3: Fully bidirectional IO-Link communication
- remote parameter setting: reading and changing the parameter setting
4: IO-Link master
5: Fieldbus (e.g. Profibus, Profinet, AS-i etc.)
6: PLC

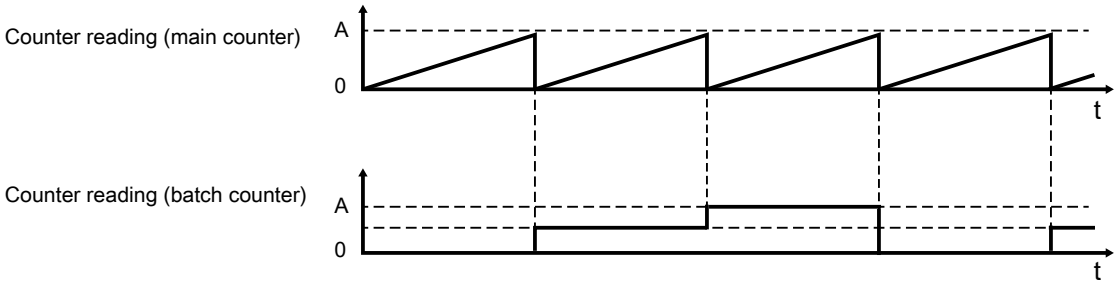
4.1.3 IO Device Description (IODD)

You will find the IODDs necessary for the configuration of the IO-Link device and detailed information about process data structure, diagnostic information and parameter addresses at:
www.ifm.com

4.2 Function diagrams (counting behaviour)

The counting direction is set via the parameter [dIn1] and, in case of counting direction control by IN2, via [dIn2].

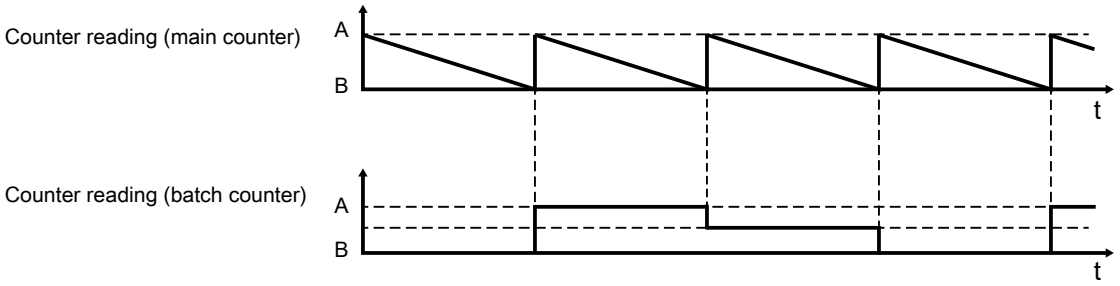
4.2.1 Up counter (InC)



A: overflow

- Overflow condition: current counter value >= maximum permissible counter value
- The maximum permissible counter value depends on the switch point mode.
- If during overflow the counter value is equal to the maximum permissible counter value, the counter is immediately reset to 0.
- If during overflow the counter value is greater than the maximum permissible counter value, the counter is immediately reset to the resulting positive amount.

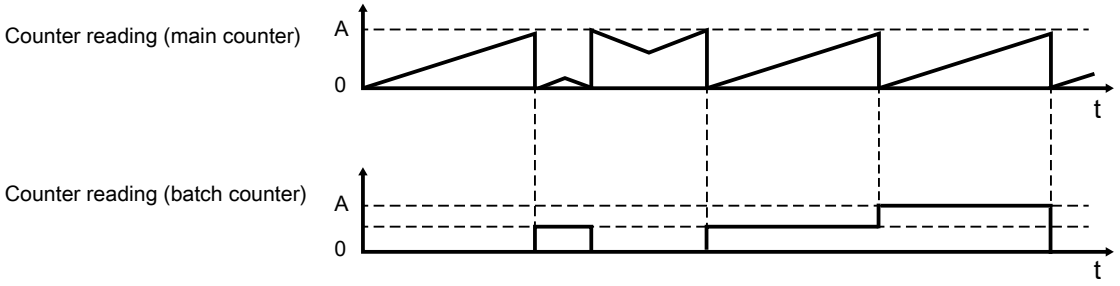
4.2.2 Down counter (dEC)



A: maximum counter value
B: underflow

- Underflow condition: current counter value < 0
- The maximum permissible counter value depends on the switch point mode.
- Upon triggering of an underflow, the counter is immediately reset to the maximum permissible counter value minus the negative amount.

4.2.3 Counting direction control by IN2 (dLr)



A: overflow
B: underflow

- Overflow condition: current counter value >= maximum permissible counter value
- Underflow condition: current counter value < 0

- The maximum permissible counter value depends on the switch point mode.
- If during overflow the counter value is equal to the maximum permissible counter value, the counter is immediately reset to 0.
- If during overflow the counter value is greater than the maximum permissible counter value, the counter is immediately reset to the resulting positive amount.
- Upon triggering of an underflow, the counter is immediately reset to the maximum permissible counter value minus the negative amount.

[dIn1]	[dIn2]	IN2 = low	IN2 = high
[dLr]	[InC]	Up counter	Down counter
[dLr]	[dEC]	Down counter	Up counter

Tab. 1: Counting direction control

4.3 Function diagrams (output behaviour)

Function diagram display is based on the up counter. The down counter and the counter with flexible counting direction behave in the same way.

4.3.1 Single point mode

When the set switching value is reached, the output is set, in accordance with the counter (main and/ or batch counter), for the time of the switch-off delay. After expiry of the switch-off delay, the output resets automatically. During the delay, the input signals continue to be evaluated without restrictions.

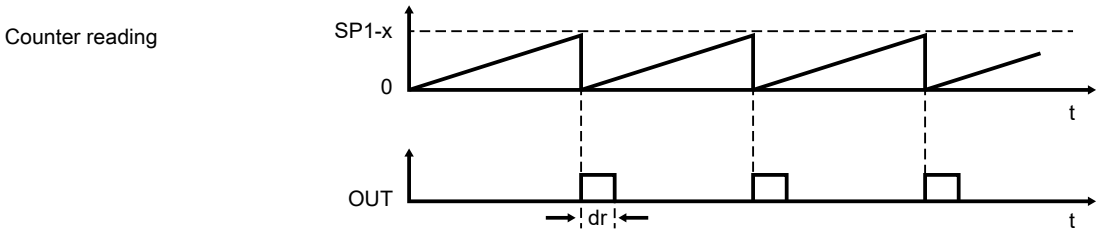


Fig. 4: NO (IO-Link parameter LoGc: no / high active)

SP1: switch-on point / maximum value of the counter
x: integer rounded up value of the set scaling factor:
c.nu / c.dno ─ scaling factor for the main counter (→ 🗋 23)
dr: switch-off delay:
dr ─ switch-off delay (→ 🗋 23)

If a counter value is exceeded, this is signalled by the switching signal as closed.

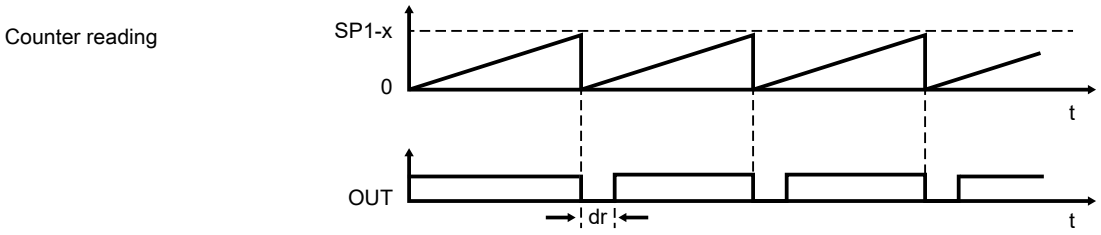


Fig. 5: NC (IO-Link parameter LoGc: nc / low active)

SP1: switch-off point / maximum value of the counter
x: integer rounded up value of the set scaling factor:
c.nu / c.dno ─ scaling factor for the main counter (→ 🗋 23)
dr: switch-off delay:
dr ─ switch-off delay (→ 🗋 23)

If a counter value is exceeded, this is signalled by the switching signal as open.

4.3.2 Window mode

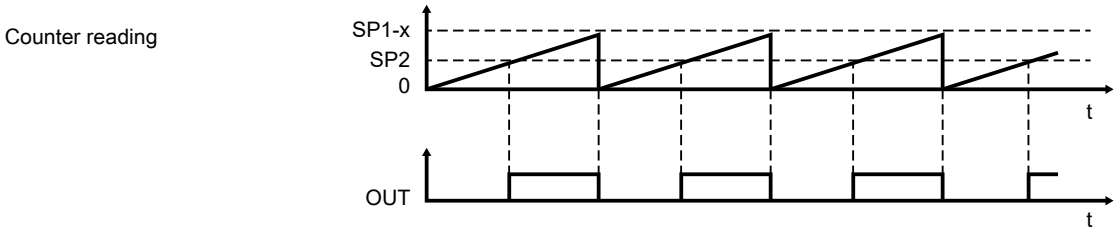


Fig. 6: NO (IO-Link parameter LoGc: no / high active)

SP1: switch-off point window
x: integer rounded up value of the set scaling factor:
c.nu / c.dno ─ scaling factor for the main counter (→ 🗋 23)
SP2: switch-on point window

If a counter value is not reached, this is signalled by the switching signal as open.

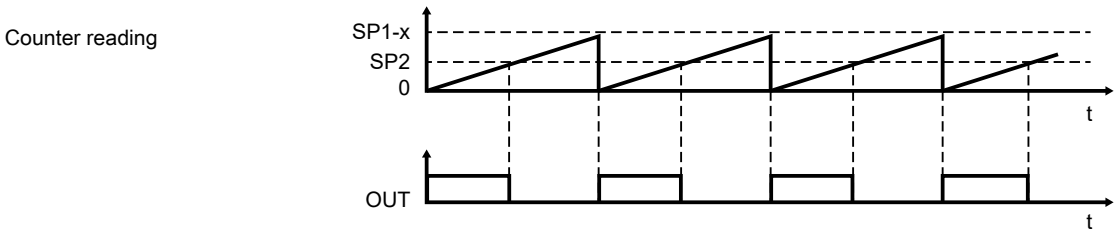


Fig. 7: NC (IO-Link parameter LoGc: nc / low active)

SP1: switch-on point window
x: integer rounded up value of the set scaling factor:
c.nu / c.dno ─ scaling factor for the main counter (→ 🗋 23)
SP2: switch-off point window

If a counter value is exceeded, this is signalled by the switching signal as open.

4.3.3 Deactivated mode

NO (IO-Link parameter LoGc: no / high active)
The switching signal is always signalled as open.

NC (IO-Link parameter LoGc: nc / low active)
The switching signal is always signalled as closed.

Maximum value of the main counter (SSC1) = 1,000,000

Maximum value of the batch counter (SSC2) = 9,999

4.3.4 Latch mode

After activating the latch mode, the output is permanently set when the overflow or underflow value is reached and must be actively reset. As long as the output is set, evaluation of the input signals is deactivated.

Latch mode can only be activated if

1. the device is configured as an up counter ([dIn]=[InC]) or a down counter ([dIn]=[dEC]) only.
2. the parameter [LTC1] is set to the desired counter.
3. the corresponding counter (main or batch counter) is operated in single point mode.

The setting under [LTC1] is ignored as soon as one of the specified conditions is not fulfilled.

The output can only be released by the following measures:

- PDO: To the rising edge of the PDO bits “Release_Latch_Counter” or “Release_Latch_Batch_Counter”.
- IO-Link: system command “RELEASE_LATCH_COUNTER” or “RELEASE_LATCH_BATCH_COUNTER”
  Parameters adjustable via IO-Link (→ 🗋 25)
- Standard IO: rising edge signal at IN2

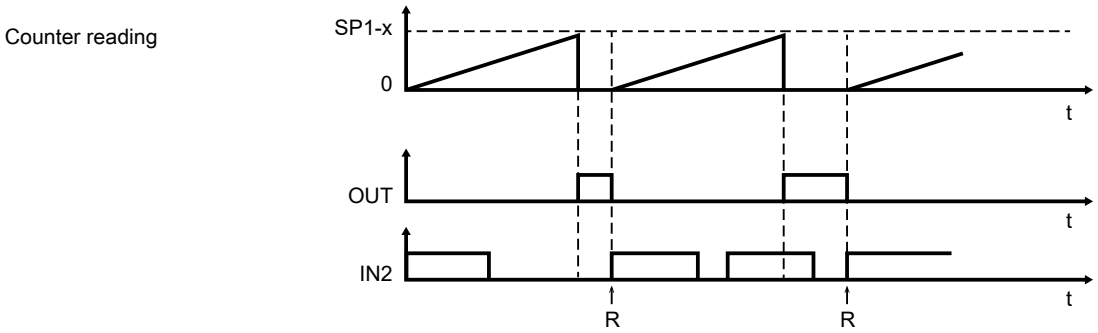


Fig. 8: NO (IO-Link parameter LoGc: no / high active)

SP1: switch-on point / maximum value of the counter
x: integer rounded up value of the set scaling factor:
c.nu / c.dno – scaling factor for the main counter (→ 🗋 23)

If a counter value is exceeded, this is signalled by the switching signal as closed.

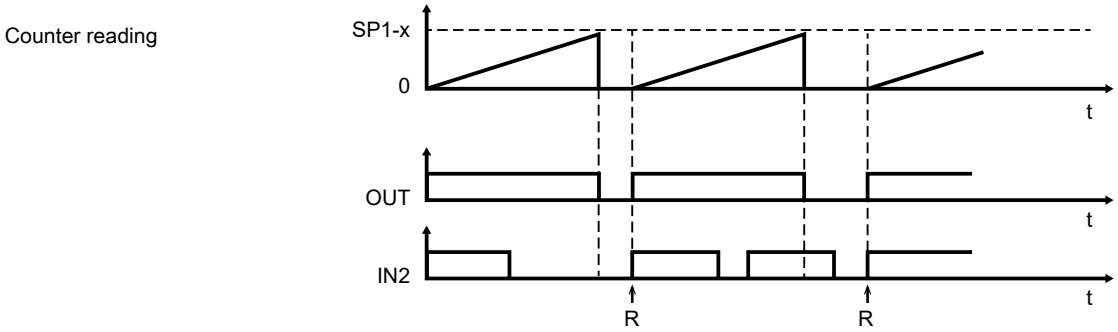


Fig. 9: NC (IO-Link parameter LoGc: nc / low active)

SP1: switch-off point / maximum value of the counter
x: integer rounded up value of the set scaling factor:
c.nu / c.dno – scaling factor for the main counter (→ 🗋 23)

If a counter value is exceeded, this is signalled by the switching signal as open.

4.3.5 Standard IO mode

The yellow LEDs indicate the switching status of the device.

Switching function NO:

Transistor output	LED yellow	Description
closed	on	counter reading ≥ SP1
open	off	counter reading < SP1

Switching function NC:

Transistor output	LED yellow	Description
closed	on	counter reading < SP1
open	off	counter reading ≥ SP1

4.4 Scaling of the counters

The scaling of the counters is configured via [c.nu] and [c.dno] (main counter) or [b.nu] and [b.dno] (batch counter), with *.nu indicating the value by which the corresponding counter is to be increased in *.dno steps.

The counters only count in whole numbers. In case of non-integer ratios of *.nu/*.dno, the non-integer residual value is stored and taken into account in the next counting step.

	[c.nu] = 5; [c.dno] = 4		**[c.nu] = 2; [c.dno] = 5**	
Counting step	Theoretical counter reading	Current counter reading	Theoretical counter reading	Current counter reading
0	0	0	0	0
1	1.25	1	0.4	0
2	2.5	2	0.8	0
3	3.75	3	1.2	1
4	5	5	1.6	1
5	6.25	6	2	2

Tab. 2: Examples

Calculation formula:

$$z_n = \frac{*.nu + r_{n-1}}{*.dno} = \frac{c_n \; *.dno}{*.dno} + \frac{r_n}{*.dno}$$

$$r_n = *.nu + r_{n-1} - c_n \; *.no$$

z_n: Theoretical count value with decimal place in counting step n
c_n: Number of increments (increase/decrease) in counting step n
r_n: Non-integer share in counting step n; is taken into account in the next counting step

The maximum limit of the scaling factor is SP1.

5 Installation

- ▶ Install the unit so that the M12 connection parts and the unit are protected from mechanical stress such as shock and vibration.
- ▶ If necessary, fix the unit with a clamp (use M4 screw or cable tie).

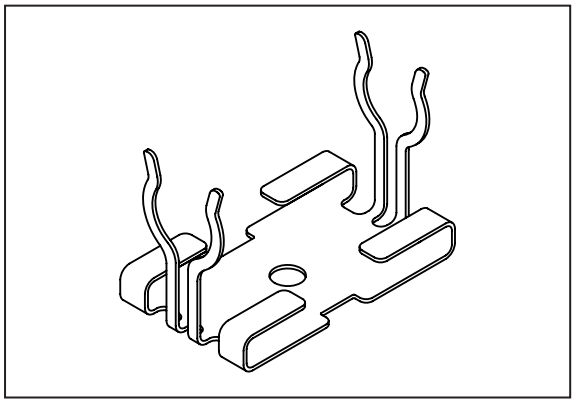


Fig. 10: Mounting clip

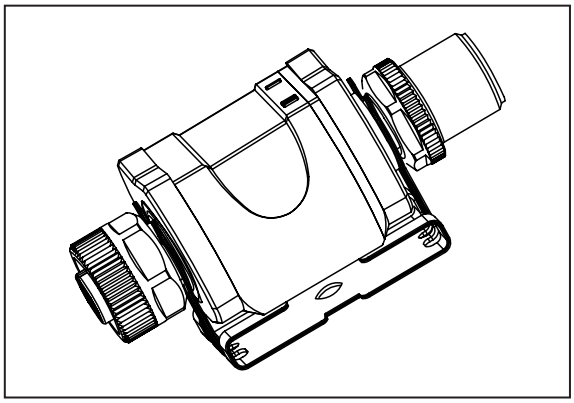


Fig. 11: Mounting clip with attached unit

The mounting clip is not supplied with the unit. More information about available accessories at www.ifm.com.

6 Electrical connection

The unit must be connected by a qualified electrician.

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

Voltage supply according to SELV, PELV.

By means of basic insulation according to EN61010-1, the circuits are isolated from each other and from device surfaces that could be touched (secondary circuit with max. 30 V DC, supplied from mains circuit up to 300 V overvoltage category II).

CAUTION

Input current is not limited.

▷ No fire protection.

▶ Protect circuits.

▶ Protect circuits.

Potential	M12 connector ①	Fuse
L+ / supply voltage	Pin 1	≤ 2 A

Required tripping characteristic of the fuses:

T_{fuse} ≤ 120 s at max. 6.25 A (fire protection)

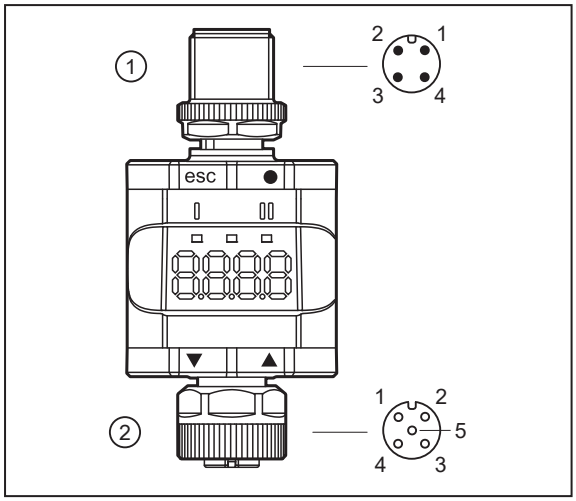
▶ Alternatively supply the unit via a limited energy circuit according to IEC 61010-1 or class 2 according to UL1310.

Output reaction to overload or short circuit:

For self-protection of the output in case of excessive thermal load (due to short circuit or overload), the output driver starts clocking. If a short circuit / overload continues for several hours, the driver may be damaged!

▶ Disconnect power.

▶ Connect the unit as follows:



1: 4-pole M12 connector
(output side)
- Pin 1: L+ / supply voltage
- Pin 2: OUT2 / digital output 2
- Pin 3: L- / supply voltage
- Pin 4: OUT1 / digital output 1/ IO-Link (C/Q)

2: 5-pole M12 socket
(input side)
- Pin 1: L+
- Pin 2: IN2 / digital input 2
- Pin 3: L-
- Pin 4: IN1 / digital input 1
- Pin 5: not used

Fig. 12: Electrical connection

The unit must not be externally supplied via the 5-pole M12 input socket ② .

Always use the provided connection cables to connect other devices.

See also application examples (→ Intended use)

6.1 Mounting the connector

To achieve the protection rating indicated in the data sheet, the following has to be observed:

▶ Use IO-Link cable with IP class.

▶ Use M12 connectors with gold-plated contacts.

▶ Connect the connector with the unit. The arrow indicates the position of the coding.

▶ Carry out the fitting according to the indications of the cable manufacturer.

- Maximum tightening torque on the connector side ①: 1.8 Nm
- Maximum tightening torque o the socket side ②: 1.3 ±0.1 Nm

6.2 Removing the connector

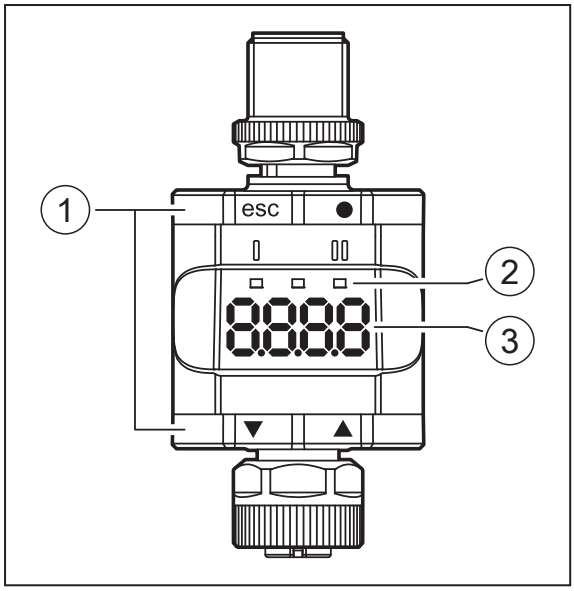
▶ Press the connector against the unit and simultaneously loosen the coupling nut.

6.3 Cable length

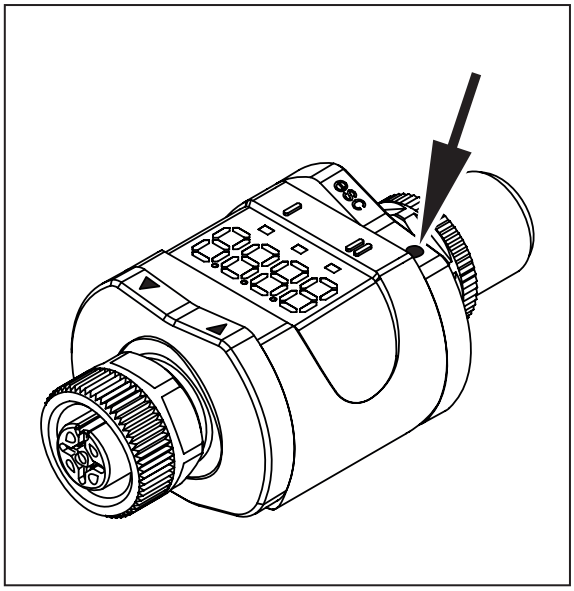
- Without IO-Link communication: 30 m on each side
- With IO-Link communication: 20 m on the master side

▶ Provide all input and output side cables with a strain relief approx. 200 mm behind the connectors.

7 Operating and display elements



1: Push rings (pushbuttons)
2: LEDs
3: Display



Here, the Enter button [●] is shown pressed, as an example.

7.1 Push rings (pushbuttons)

To execute an [esc], [●], [▼] or [▲] command, press the corresponding corner of a push ring.

Button		Function
[esc]	Escape	Return to the previous menu. Exit parameter setting without saving the new value.
[●]	Enter	Open menu mode. Selection of the parameter and acknowledgement of a parameter value.
[▼]	Down	Selection of a parameter. Setting a parameter value (scrolling by holding down, incrementally by pressing repeatedly).
[▲]	Up	

To ensure correct operation of the push rings (buttons), do not install or place the unit directly on a metal surface.

For the installation use the mounting clip → Installation.

7.2 LEDs

LED		Colour	Status	Designation
I	OUT1	yellow	on	Output 1 switched.
Power		green	on	Voltage supply OK. Unit in operating mode.
			off	Unit in programming mode.
II	OUT2	yellow	on	Output 2 switched.

Error signals and diagnosis: Troubleshooting (→ 🗋 30)

7.3 Display

Colour	Designation
Red/green	7-segment LED display, 4 digits, with colour change

Error signals and diagnosis: Troubleshooting (→ 🗋 30)

In operating mode, the counter reading is displayed.

If [▼] or [▲] is pressed for 1 second during operating mode, the designation of the standard counter, the counter reading of the secondary counter and the designation of the secondary counter are displayed one after the other. The designation and the counter reading of a counter are displayed in the same colour.

More information: SELd ─ selection of the primary counter (→ 🗋 24) and coLr ─ display colours (→ 🗋 24).

8 Menu

8.1 General

Irrespective of the operating mode (standard IO mode or IO-Link device) there are two options to set the parameters of the unit:

- directly on the unit via the menu Parameter setting (→ 🗋 27)
- or via an IO-Link tool

Access via an IO-Link tool has a higher priority than parameter setting via the menu.

Parameter cloning and parameter setting backup is possible with an IO-Link tool.

Some parameters can only be set via the IO-Link interface:
Parameters adjustable via IO-Link (→ 🗋 25).

If the unit was locked via IO-Link, it can also only be unlocked via the IO-Link interface:
Locking / unlocking (→ 🗋 28).

8.2 Menu structure

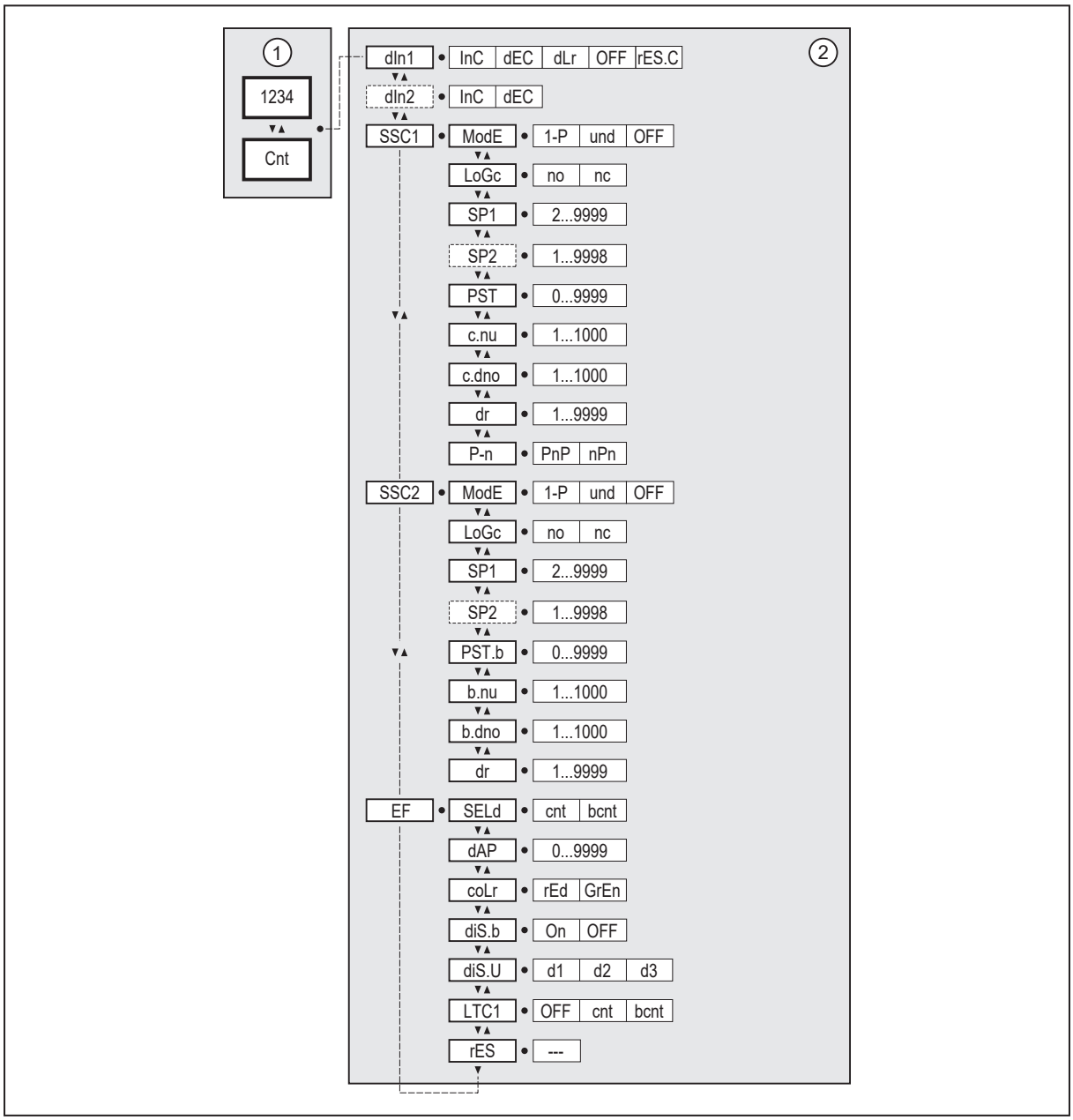


Fig. 13: Parameter

1: Operating mode: Menu (→ 🗋 20)
2: Main menu: Parameters of the main menu (→ 🗋 21)
and extended functions: Parameters of the extended functions (EF) (→ 🗋 24)
Parameter list and factory settings: Factory settings (→ 🗋 32)

8.3 Parameters of the main menu

8.3.1 dIn1 – counter configuration 1

The parameter defines the counting mode of the counters:

- [InC] = Up counter: Up counter (InC) (→ 🗋 10)
- [dEC] = Down counter: Down counter (dEC) (→ 🗋 10)
- [dLr] = Switching of counting direction possible via IN2: Counting direction control by IN2 (dLr) (→ 🗋 10)

- [OFF] = Counting function deactivated
- [rES.C] = Reset the counters to initial values: PST ─ initial value of the counter (→ 🗋 23)

After pressing [rES.C], the setting of dIn1 is automatically reset to the last active setting.

8.3.2 dIn2 ─ counter configuration 2

The parameter defines the counting direction of the counters if [dIn1] is set to [dLr]. The counting direction can be changed by the input signal at IN2 during operation.

Options	IN2 = low	IN2 = high
[InC]	Up counter	Down counter
[dEC]	Down counter	Up counter

[dIn2] is only active if dIn1 is set to [dLr].

8.3.3 SSC1 ─ main counter OUT1

The parameter opens the menu of the settings for OUT1 of the counter (main counter).

8.3.4 SSC2 ─ batch counter OUT2

The parameter opens the menu of the settings for OUT2 of the counter (batch counter).

8.3.5 EF ─ extended functions

The parameter opens the extended functions menu.

8.4 Parameters for OUT1 (SSC1 / main counter / cnt)

8.4.1 ModE ─ switch point mode

Setting of the switch point mode.

- [1-P] = single point mode: Single point mode (→ 🗋 11)
- [und] = window mode: Window mode (→ 🗋 12)
- [OFF] = deactivated mode: Deactivated mode (→ 🗋 12)

8.4.2 LoGc ─ switch point logic

Setting of the switch point logic: Function diagrams (output behaviour) (→ 🗋 11).

- [no] = switch is closed when activated.
- [nc] = switch is opened when activated.

8.4.3 SP1 ─ switch point 1

Permissible maximum value of the counter.

In “Single point mode” SP1 is adjustable over its entire value range. In “Window mode” the lower limit is restricted by SP2. It always applies:

SP1> SP2.

Set SP2 to an integer multiple of the scaling factor.
Otherwise, the overflow only occurs after SP2 has been exceeded.

8.4.4 SP2 ─ switch point 2

Count value for setting of the output.

Only active in “Window Mode” switch point mode.

In “Single point mode” the existing setting of SP2 is ignored. When changing to “Window mode”, SP2 is automatically adjusted.

It always applies: SP2 < SP1.

SP1 limits the maximum setting value of SP2.

Set SP1 to an integer multiple of the scaling factor.
Otherwise, the overflow only occurs after SP1 has been exceeded. The difference between the real value and SP1 is taken into account in the following counting step.

8.4.5 PST ─ initial value of the counter

The parameter defines the value to which the counter is to be reset when executing [rES.C] (dIn1 ─ counter configuration 1 (→ 🗋 21)) or the system command "RESET_COUNTER".

8.4.6 c.nu / c.dno ─ scaling factor for the main counter

The scaling factor is composed of the numerator [c.nu] and the denominator [c.dno] and defines the main counter’s increment.

If the scaling factor is odd, the counter reading is rounded down to an integer value. The resulting deviation between the displayed and the actual counter reading is taken into account in the following counting step.

8.4.7 dr ─ switch-off delay

Delay when the output changes to the idle state.

8.4.8 P-n ─ output configuration

- [PnP] = load connected to ground
- [nPn] = load connected to VBB

8.5 Parameters for OUT2 (SSC2 / batch counter / bcnt)

8.5.1 ModE ─ switch point mode

Identical to SSC1: ModE ─ switch point mode (→ 🗋 22)

8.5.2 LoGc ─ switch point logic

Identical to SSC1: LoGc ─ switch point logic (→ 🗋 22)

8.5.3 SP1 ─ switch point 1

Identical to SSC1: SP1 ─ switch point 1 (→ 🗋 22)

8.5.4 SP2 – switch point 2

Identical to SSC1: SP2 – switch point 2 (→ 🗋 23)

8.5.5 PST.b – initial value of the counter

The parameter defines the value to which the counter is to be reset when executing [rES.C] (dIn1 – counter configuration 1 (→ 🗋 21)) or the system command "RESET_BATCH_COUNTER".

8.5.6 b.nu / b.dno – scaling factor for the batch counter

Identical to SSC1 (but with regard to the batch counter): c.nu / c.dno – scaling factor for the main counter (→ 🗋 23)

8.5.7 dr – switch-off delay

Identical to SSC1: dr – switch-off delay (→ 🗋 23)

8.6 Parameters of the extended functions (EF)

8.6.1 SELd – selection of the primary counter

The parameter defines which counter is permanently shown on the display.

- [cnt] = main counter
- [bcnt] = batch counter

For quick display of the secondary counter: Push rings (pushbuttons) (→ 🗋 18).

8.6.2 dAP – switching delay for debouncing the input

Delays the change of the output from the idle state to the active switching status.

8.6.3 coLr – display colours

- [rEd] = Primary counter / menu continuously red (independent of the measured value)
- [GrEn] = Primary counter / menu continuously green (independent of the measured value)

The secondary counter is automatically displayed with the colour that differs from the primary counter.

8.6.4 diS.b – display power on

- [OFF] = the measured value display is switched off in the operating mode.
- [On] = the measured value display is switched on in the operating mode.

Press any button to activate the display for at least 30 s in the switched-off state.

8.6.5 diS.U – refresh rate of the displayed measured value

- [d1] = update of the measured values every 50 ms.
- [d2] = update of the measured values every 200 ms.
- [d3] = update of the measured values every 600 ms.

Even with an unsteady frequency, [d1] provides optimum readability.

8.6.6 LTC1 ─ latch

The parameter activates the latch mode for the main or batch counter. When deactivated, the switch-off delay automatically takes effect: dr ─ switch-off delay (→ 🗋 23).

- [OFF] = Latch mode deactivated
- [cnt] = Latch mode on output of the main counter
- [bcnt] = Latch mode on output of the batch counter

8.6.7 rES ─ restore factory setting

Resets all parameters to the Factory settings (→ 🗋 32).

▶ Select [rES].

▶ Press [●].

▶ Press and hold [▲] or [▼] until [----] is displayed.

▶ Briefly press [●].

8.7 Parameters adjustable via IO-Link

The following functions or parameters are only available via IO-Link tools.

8.7.1 RESET_COUNTER ─ reset main counter

The main counter is reset to its initial value: PST ─ initial value of the counter (→ 🗋 23).

If the counter is in latch, it must be released separately via "RELEASE_LATCH_COUNTER".

8.7.2 RESET_BATCH_COUNTER ─ reset batch counter

The batch counter is reset to its initial value: PST.b ─ initial value of the counter (→ 🗋 24).

If the counter is in latch, it must be released separately via "RELEASE_LATCH_BATCH_COUNTER".

8.7.3 RELEASE_LATCH_COUNTER - release latch of the main counter

If the main counter is in latch, execution of this parameter resumes input signal evaluation.

8.7.4 RELEASE_LATCH_BATCH_COUNTER - release latch of the batch counter

If the batch counter is in latch, execution of this parameter resumes input signal evaluation.

8.7.5 FLASH_ON – activate flashing of the display

Used to identify a unit. Display flashes and shows [dEVC].

8.7.6 FLASH_OFF – deactivate flashing of the display

Deactivates the flashing of the display.

8.7.7 internal_temperature – operating temperature microcontroller

Reads the data from the internal temperature sensor of the microcontroller.

8.7.8 operation_hours – operating hours

Only counts full operating hours. Operating times of less than one full hour are not saved. Counter readings are saved permanently.

8.7.9 Application-specific tag

Customer-specific application description, max. 32 characters long.

Default value: “ *** ” / can be freely defined by the customer

8.7.10 Location tag

Customer-specific location tag of the unit, max. 32 characters long.

Default value: “ *** ” / can be freely defined by the customer

8.7.11 Function tag

Customer-specific function tag of the unit, max. 32 characters long.

Default value: “ *** ” / can be freely defined by the customer

9 Parameter setting

During parameter setting the unit remains in the operating mode. It continues its monitoring functions with the existing parameters until the parameter setting has been completed.

9.1 Parameter setting in general

Each parameter setting consists of 6 steps:

Step		Button
1	Change from operating mode to parameter setting mode.	[●]
2	Select the required parameter: [SP1], [dr], …	[▲] or [▼]
3	Change to the programming mode of the parameter.	[●]
4	Select or change the parameter value.	[▲] or [▼] > 2 s
5	Acknowledge the set parameter value.	[●]
6	Return to the operating mode.	[esc]

9.1.1 Example [ModE] - switch point mode for OUT2

Step		Display
1	Change from operating mode to parameter setting mode.	
	▶ Press [●] to get to the menu. ▷ The first parameter is displayed.	
2	Select the requested parameter, here [SSC2].	
	▶ Press [▼] until [SSC2] is displayed. ▶ Press [●] to get to the extended functions menu. ▷ The first parameter of the extended functions is displayed.	
3	Change to the programming mode of the parameter.	
	▶ Press [●] to change to the programming mode. ▷ The currently set parameter value is displayed.	
4	Select or change the parameter value, here e.g. [und].	
	▶ Press [▼] or [▲] for at least 2 s. ▷ The currently set parameter value flashes, here e.g. [1-P]. ▷ After 2 s: - value is changed continuously by keeping the button pressed. - value is changed incrementally by pressing the button once. Numerical values (→ 9.2.3)	
5	Acknowledge the set parameter value.	
	▶ Briefly press [●]. ▷ The parameter is displayed again. ▷ The new setting value is saved.	
	Setting of other parameters: ▶ Press [▼] or [▲] until the requested parameter is displayed.	
6	Return to the operating mode.	
	▶ Press [esc]. ▶ - Press [▼] or [▲] several times until the current measured value is displayed. - Or wait for the timeout function (approx. 30 s). ▷ The unit has returned to the operating mode. ▷ The current value is displayed.	

9.2 Notes on programming

9.2.1 Locking / unlocking

The unit can be locked electronically to prevent unauthorised setting. Set parameter values and settings can be displayed but not changed.

To lock the unit:

▶ Make sure that the unit is in normal operating mode.

▶ Press [esc] + [▲] simultaneously for 10 s.

▷ [Loc] is displayed.

▷ The unit is locked.

▷ [Loc] is briefly displayed if you try to change parameter values.

To unlock the unit:

▶ Press [esc] + [▲] simultaneously for 10 s.

▷ [uLoc] is displayed.

On delivery the unit is not locked.

Customer locking

If [C.Loc] is displayed when an attempt is made to modify a parameter value, an IO-Link communication is active (temporary locking).

Software locking

If [S.Loc] is displayed, the sensor is permanently locked via software. This locking can only be removed using an IO-Link parameter setting software.

9.2.2 Timeout

If no button is pressed for 30 s during parameter setting, the unit returns to the operating mode with the unchanged value.

9.2.3 Numerical entries with [▼] or [▲]

▶ Press [▼] or [▲] for at least 2 s.

▷ After 2 s:
- value is changed continuously by keeping the button pressed.
- value is changed incrementally by pressing the button once.

Value is incrementally reduced with [▼] and increased with [▲].

10 Operation

After power on, the unit is in the operating mode (SIO). It carries out its measurement and evaluation functions and provides output signals according to the set parameters: Menu (→ 🗋 20).

11 Troubleshooting

Display	LED			Error	Troubleshooting
	I	Power	II		
OFF	off	off	off	Supply voltage too low.	Check/correct the supply voltage: Electrical connection (→ 🗋 16).
SC	flashes	any	flashes	Excessive current at the switching output OUTx (see LED I/II).	Check switching output for short circuit or excessive current. Remove the fault.
C.Loc	any	any	any	Parameter setting via pushbuttons locked due to active IO-Link transmission.	Wait until parameter setting via IO-Link is finished.
S.Loc	any	any	any	Parameter setting via pushbuttons disabled by software.	Unlocking only possible via IO-Link interface/IO-Link parameter setting software.
Loc	any	any	any	Parameter setting via pushbuttons disabled.	Unlock pushbuttons: Locking / unlocking (→ 🗋 28).
d_OL	any	on	any	Count value for the display too high (from counter readings > 9999).	Check the value range if the value should be readable on the display.
F_OL	any	on	any	Frequency of the input signal too high.	Check the frequency of the input signal.
Rotating segment	any	any	any	Temperature in housing exceeds limit value.	Press any button to switch the display on for 30 s.
DEUC	any	on	any	Device identification activated (system command: FLASH_ON)	Deactivate device identification (system command: FLASH_OFF)

12 Maintenance, repair and disposal

The operation of the unit is maintenance-free.

Only the manufacturer is allowed to repair the unit.

▶ After use dispose of the device in an environmentally friendly way in accordance with the applicable national regulations.

Cleaning the unit:

▶ Disconnect the unit from the voltage supply.

▶ Clean the unit from dirt using a soft, chemically untreated and dry micro-fibre cloth.

13 Factory settings

Parameter		Factory settings	User settings
dIn1	Counting configuration 1	InC	• InC • dEC • dLr • OFF • rES.C
dIn2	Counting configuration 2	InC	• InC • dEC
SSC1.ModE	Switch point mode OUT1	OFF	• 1-P • und • OFF
SSC1.LoGc	Switch point logic OUT1	no	• no • nc
SSC1.SP1	Switch point 1 OUT1	120	
SSC1.SP2	Switch point 2 OUT1	60	
PST	Initial value of the main counter	0	
c.nu	Numerator of the scaling factor for the batch counter	1	
c.dno	Denominator of the scaling factor for the batch counter	1	
SSC1.dr	Switch-off delay OUT1	100 ms	
P-n	Output configuration	PnP	• PnP • NPN
SSC2.ModE	Switch point mode OUT2	OFF	• 1-P • und • OFF
SSC2.LoGc	Switch point logic OUT2	no	• no • nc
SSC2.SP1	Switch point 1 OUT2	24	
SSC2.SP2	Switch point 2 OUT2	12	
PST.b	Initial value of the batch counter	0	
b.nu	Numerator of the scaling factor for the batch counter	1	
b.dno	Denominator of the scaling factor for the batch counter	1	
SSC2.dr	Switch-off delay OUT2	100 ms	
SELd	Selection of the primary counter	cnt	• cnt • bcnt
dAP	Switching delay for debouncing the input	100 µs	
coLr	Display: colour setting of the primary counter	rEd	• rEd • GrEn
diS.b	Display power on	On	• On • OFF
diS.U	Refresh rate of the displayed value	d1 (50 ms)	• OFF • d1 (50 ms) • d2 (200 ms) • d3 (600 ms)

Parameter		Factory settings	User settings
LTC1	Latch	OFF	• OFF • cnt • bcnt
rES	Factory setting		