GB

Operating instructions
Electronic pressure sensor
PQSxxx

11440928 / 01 06 / 2024

Contents

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 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

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.

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).
- Only use the product for permissible media.
- 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.

3 Intended use

The unit measures and monitors the system pressure of machines and installations.

3.1 Application area

Type of pressure: relative pressure

CAUTION

Static and dynamic overpressure

▷ Destruction of the device even if the indicated bursting pressure is exceeded only for a short time. Risk of injury!

▶ Make sure that the pressure rating and bursting pressure specified in the data sheet are not exceeded.

The units are vacuum resistant.

Pressure Equipment Directive (PED):

The devices comply with the Pressure Equipment Directive and are designed for stable gases of fluid group 2 and manufactured in accordance with the sound engineering practice.

If the cable length exceeds 30 m or if used outside buildings, there is a risk of overvoltage pulses from external sources. We recommend to use the unit in protected operating environments and to limit overvoltage pulses to max. 500 V.

4 Function

- The device monitors the system pressure through a silicon measuring cell.
- The device measures the medium temperature and the internal device temperature and provides these two values acyclically via the IO-Link interface.
- The device can be operated in SIO mode (standard input-output) or in IO-Link mode. The basic operation mode is SIO. When connected to an IO-Link master, the device automatically switches to IO-Link mode. Additional manual switching is not required.
- The device indicates the current process value in the display.
- The unit generates two output signals according to the parameter setting.

Output OUT1:

- Switching signal pressure
- IO-Link

Output OUT2:

- Switching signal pressure

Further functions:

- Memory (→ 🗋 45)
- Operating hours counter (→ 🗋 46)
- Counter overpressure events (→ 🗋 46)
- Switching cycles counter (→ 🗋 47)
- Temperature (→ 🗋 47)
- Simulation (→ 🗋 47)
- Device information (→ 🗋 48)
- Optical localisation (→ 🗋 49)
- Binary data transmission (BLOB) (→ 🗋 49)
- Lock / unlock (→ 🗋 50)
- Reset the device (→ 🗋 50)
- Display settings (→ 🗋 40)
- Application configuration (→ 🗋 37): standard unit of measurement, switching delay, output polarity, zero point calibration, switch-point logic, measured value damping.

4.1 IO-Link

IO-Link is a communication system for connecting intelligent sensors and actuators to automation systems. IO-Link is standardised in the IEC 61131-9 standard.

General information on IO-Link at io-link.ifm

Input Output Device Description (IODD) with all parameters, process data and detailed descriptions of the device at documentation.ifm.com

IO-Link offers the following advantages:

- Interference-free transmission of all data and process values
- Parameter setting in the running process or presetting outside the application
- Parameters for identifying the connected devices in the system
- Additional parameters and diagnostic functions

- Automatic backup and restore of parameter sets in case of device replacement (data storage)
- Logging of parameter sets, process values and events
- Device description file (IODD - Input Output Device Description) for easy project planning
- Standardised electrical connection
- Remote maintenance

5 Installation

CAUTION

Danger from escaping compressed air.

▷ Injury during installation of the device

▶ Ensure that no pressure is applied to the system before installing or removing the device.

ATTENTION

The device can be damaged by spanners.

▷ Fixing the device with a spanner when screwing in the process connection or the sealing plug may damage the device housing.

▶ For screwing, hold the rear part of the device near the pressure connection tightly by hand.

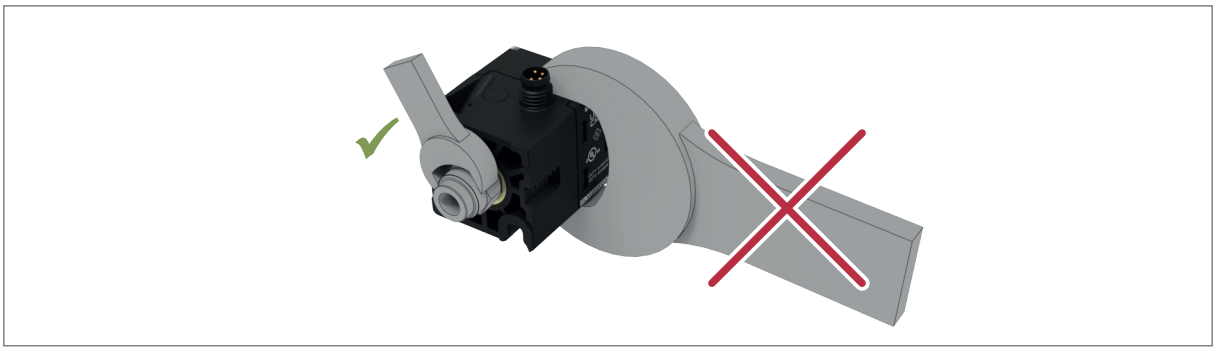
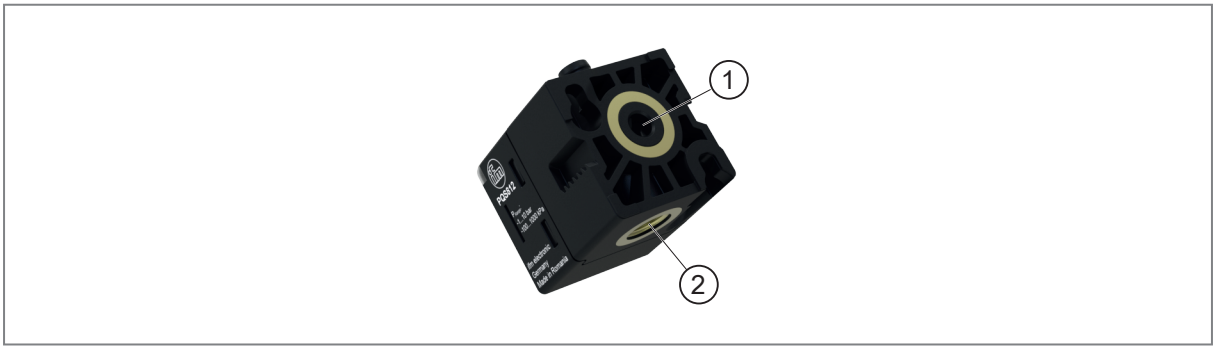


Fig. 1: Avoid damage to the device

Information about available accessories at www.ifm.com

5.1 Process connection

The device has two process connections that both lead to the same side of the silicon measuring cell. This means that the device can be screwed into the process facing backwards or downwards. The unused device connection is covered with a sealing plug.



1: Integrated process connection at the rear (threaded connection → data sheet under documentation.ifm.com)
2: Process connection at the bottom (threaded connection → data sheet under documentation.ifm.com)

On delivery, a sealing plug is screwed into the rear process connection.

▶ Change the position of the sealing plug if necessary:

- Make sure the seal is seated correctly.
- Maximum tightening torque: 0.8 Nm.

▶ Screw the pressure connection of the process or adapter into the process connection of the device and tighten it.

- Maximum tightening torque: 8 Nm.
- Maximum thread length: 6.8 mm.

▶ Cover the unused process connection of the device with a sealing plug.

5.1.1 Connection as pneumatic distributor

By connecting both process connections, the device can be used as a pneumatic distributor.

▶ Unscrew the sealing plug.

▶ Screw the pressure connections of the process or adapter into both process connections of the device and tighten them.

- Maximum tightening torque: 8 Nm.
- Maximum thread length: 6.8 mm

Fig. 2: Connection for use as a pneumatic distributor

5.2 Installation examples

5.2.1 Installation on a pipe

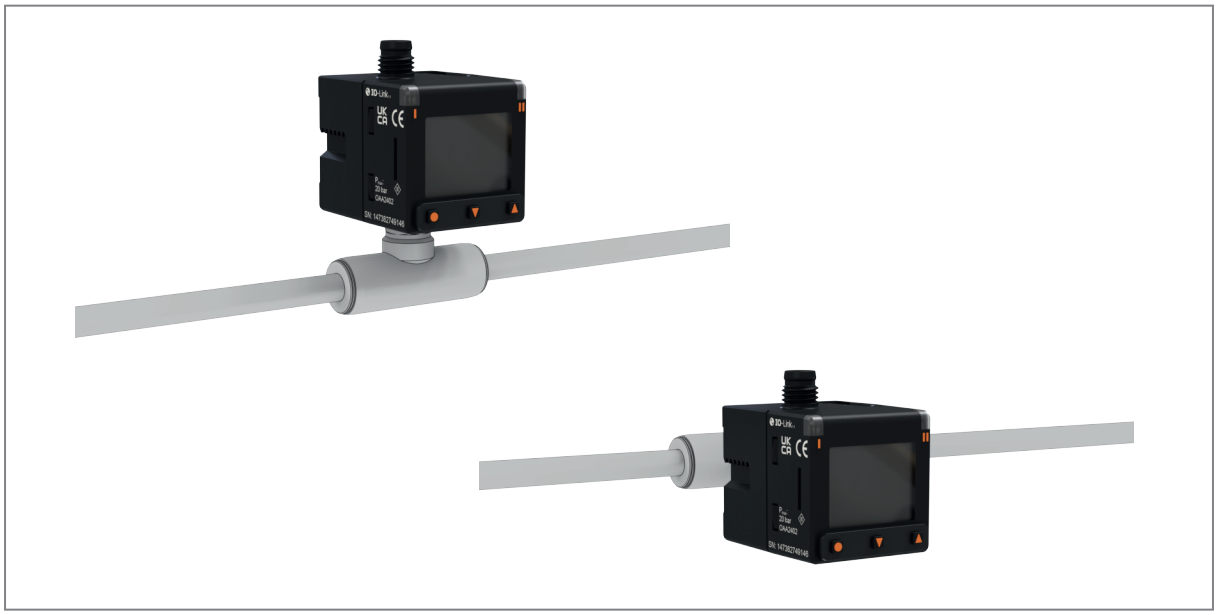


Fig. 3: Installation on a pipe

5.2.2 Maintenance unit

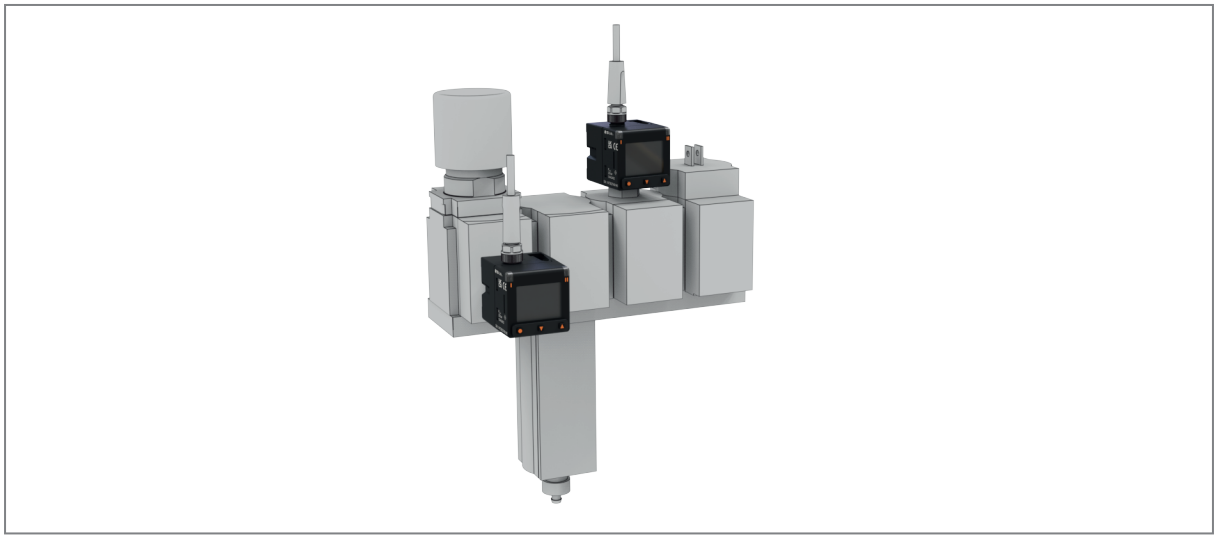


Fig. 4: Maintenance unit

5.2.3 Wall mounting

The device is fixed to the rear panel using two M3 x 8 mm cylinder screws (included).

▶ Prepare two M3 internal threads with the following dimensions in the rear panel:

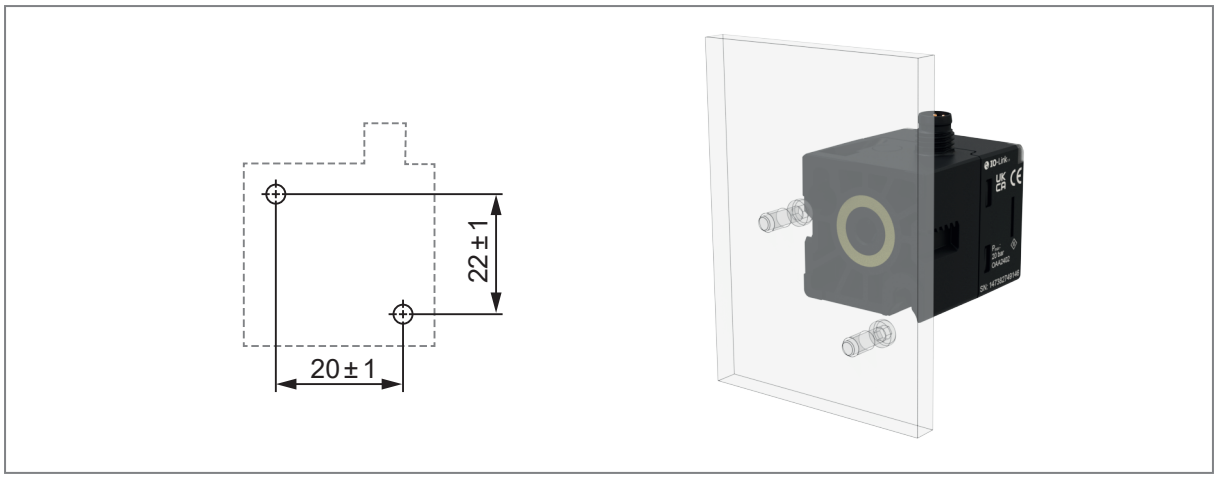


Fig. 5: Prepare rear panel

▶ Screw the cylinder screws into the panel until the screw heads stick out approx. 4 mm from the panel.

▶ Place the device and push it downwards until it locks into place:

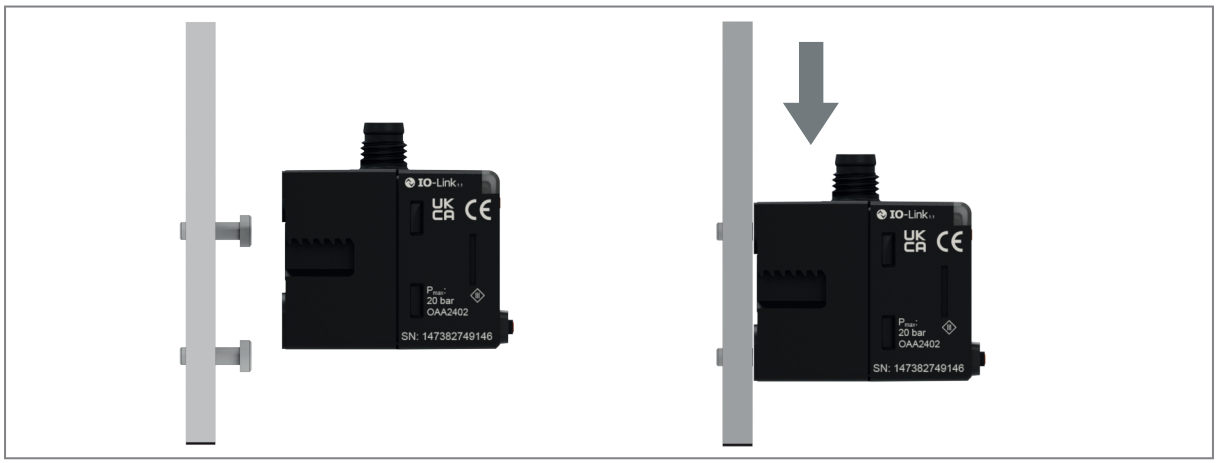


Fig. 6: Place device

▶ Tighten the cylinder screws alternately until the device is flush with the rear panel. Maximum tightening torque: 0.4 Nm.

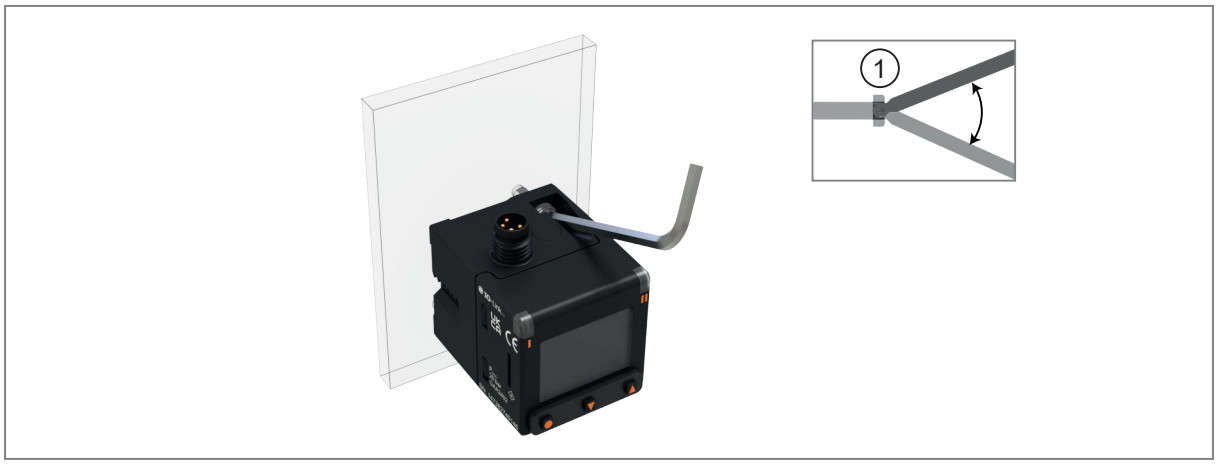


Fig. 7: Fix the device. Use a 2.5 mm Allen key with ball head (1).

▶ Use the supplied cylinder screws and observe the maximum tightening torque.

5.2.4 Rear wall mounting with mounting bracket

The device can be attached to a rear wall using a mounting bracket.

Information about available accessories at www.ifm.com

▶ Hold the mounting bracket to the rear wall and mark the position of the drill holes:

- A: Use the two upper holes if the device is to be attached to the rear wall with a bracket for better visibility when mounted low.
- B: Use the two lower holes if the device is to be mounted flat on the rear wall.

▶ Prepare two M4 internal threads at the marked positions in the rear wall.

▶ Fasten the mounting bracket to the rear wall using two M4 cylinder screws (not included).

▶ Place the device onto the attachment pins (1) of the mounting bracket and push it downwards until it locks into place.

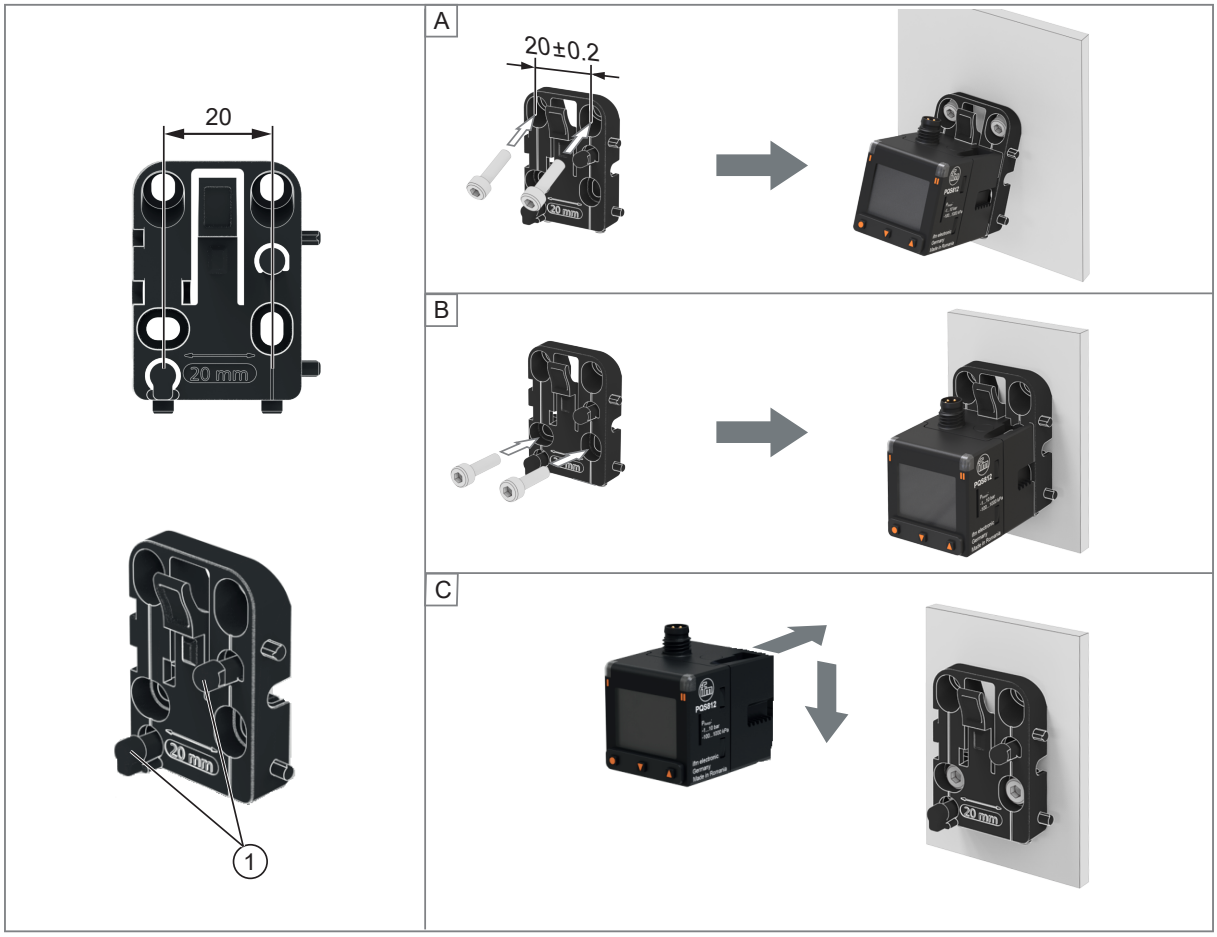
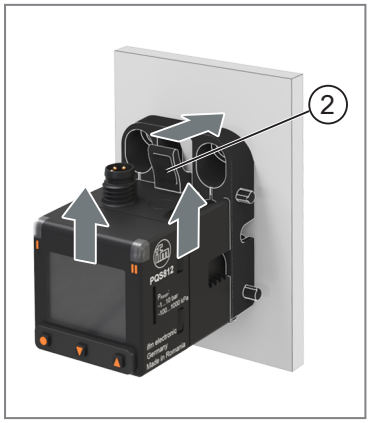


Fig. 8: Rear wall mounting with mounting bracket

Removal



Press the upper lever of the mounting bracket (2) in the direction of the arrow and pull the device upwards.

Fig. 9: Removal

Mounting of multiple devices in a row

The mounting brackets can be fitted into each other by means of lateral pins. This stabilises the fit of the brackets and eliminates the need to drill holes in the rear wall.

- ▶ Attach the first mounting bracket to the rear wall.
- ▶ Insert further mounting brackets into each other via the lateral pins (3) and holes (4).
- ▶ Attach the other mounting brackets to the rear wall with one or two drill holes as required.
- ▶ Place the device onto the attachment pins (1) of the mounting bracket and push it downwards until it locks into place.

Additional stabilisation may be required for a long row of devices:

- ▶ Guide an M4 threaded suspension rod (not included) through the recess (5). Tighten both sides using a washer and a nut.

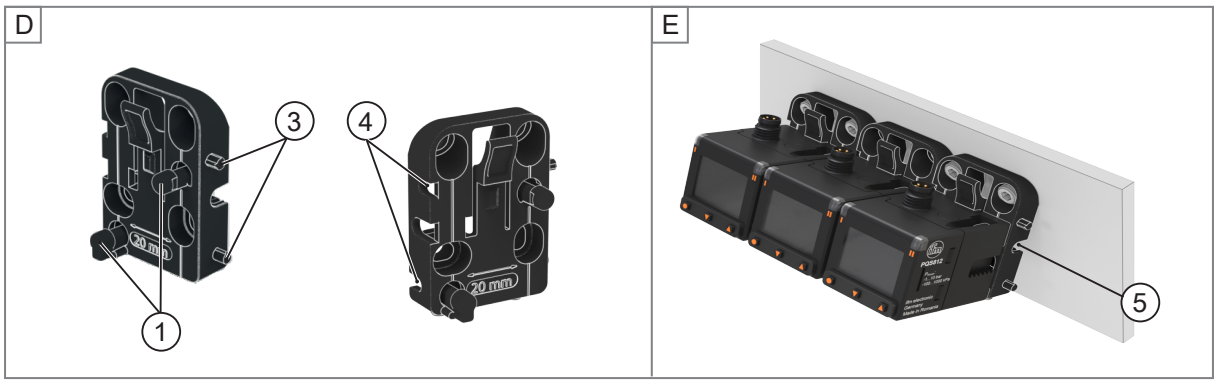


Fig. 10: Rear wall mounting with multiple mounting brackets

5.2.5 Table mounting

The device can be attached to a table top using a mounting bracket.

Information about available accessories at www.ifm.com

- ▶ Prepare three drill holes in the table top:
- • Two drill holes for the lower pins (2) at a distance of 20 mm and with a diameter of 4 mm.
- • One M4 internal thread in the centre of the two drill holes (3).
- ▶ Insert the mounting bracket with the two lower pins (2) into the prepared drill holes.
- ▶ Fasten the mounting bracket to the table top using an M4 cylinder screw (not included) (3).

▶ Place the device onto the attachment pins (1) of the mounting bracket and push it downwards until it locks into place.

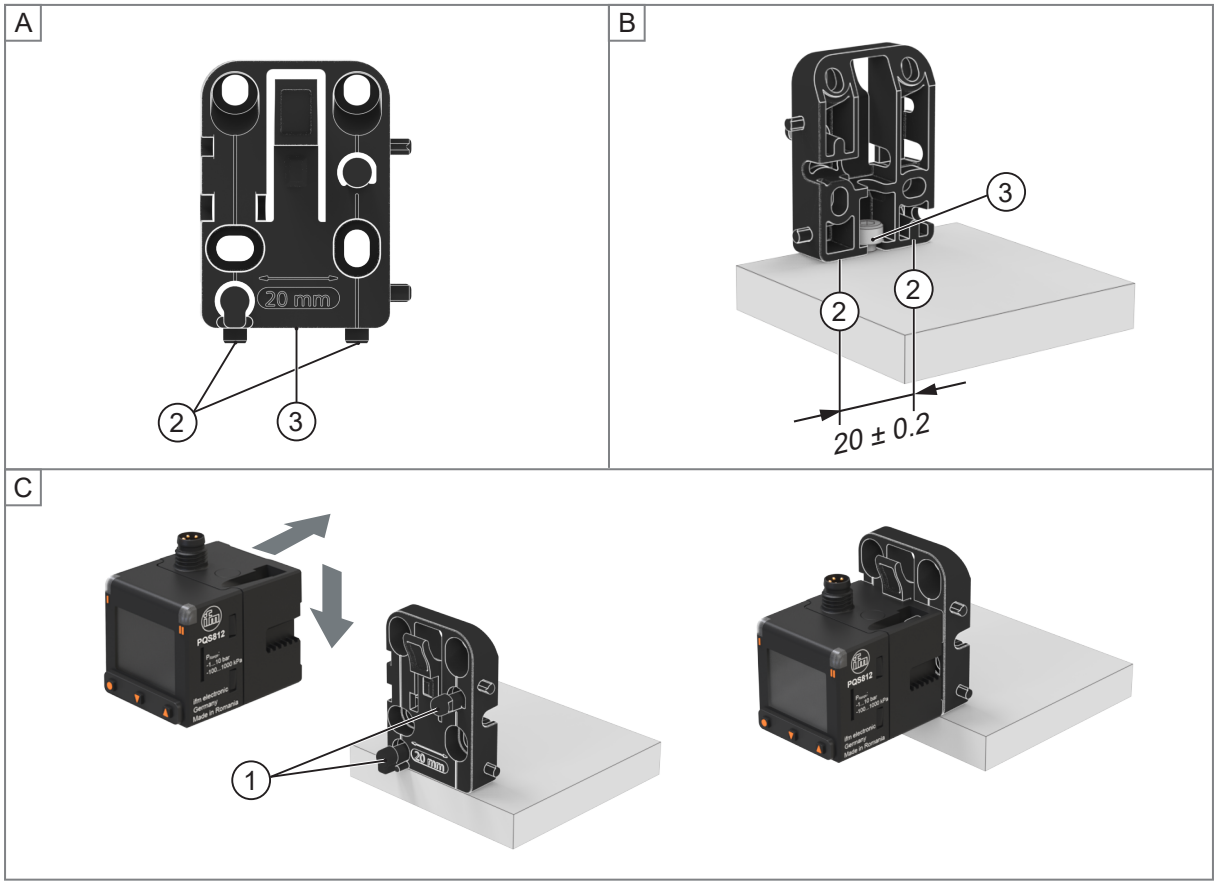
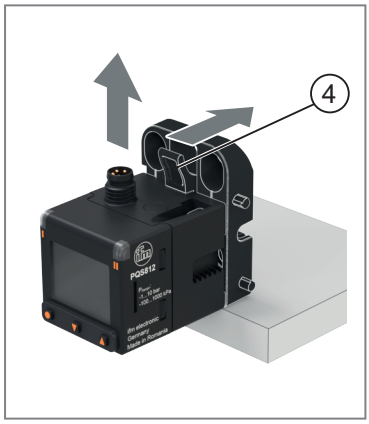


Fig. 11: Table mounting with mounting bracket

Removal



Press the upper lever of the mounting bracket (4) in the direction of the arrow and pull the device upwards.

Fig. 12: Removal

5.2.6 DIN rail mounting

The device can be attached to a DIN rail using a mounting bracket.

Information about available accessories at www.ifm.com

▶ Hook the device into a 35 mm DIN rail and clip it into place.

▶ Place the device onto the attachment pins (1) of the mounting bracket and push it downwards until it locks into place.

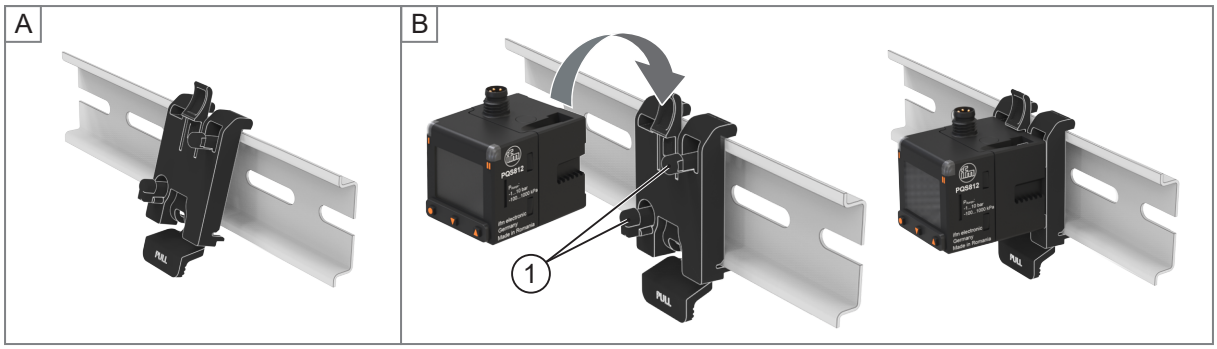


Fig. 13: DIN rail mounting with mounting bracket

Removal

- ▶ Press the upper lever of the mounting bracket (2) in the direction of the arrow and pull the device upwards.
- ▶ Press the lower lever of the mounting bracket (3) upwards and remove the mounting bracket from the DIN rail.

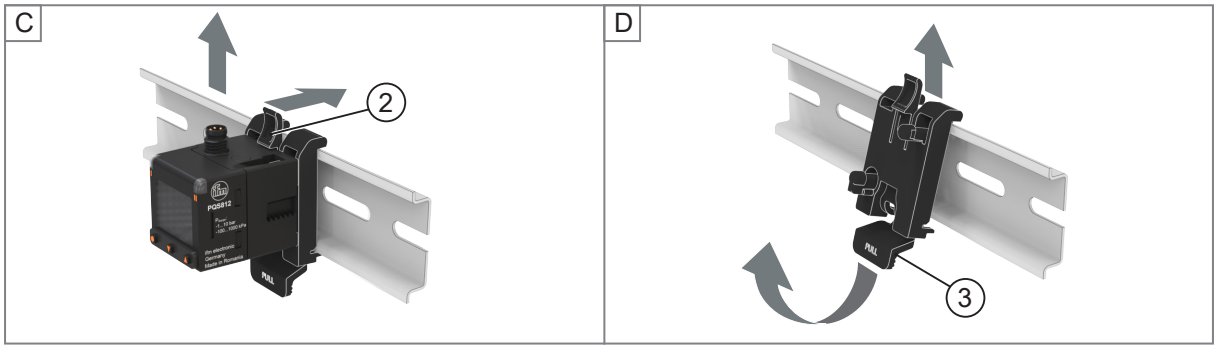


Fig. 14: Removal

5.2.7 Panel mounting

The device can be installed in a panel using a mounting set. The mounting set is not supplied with the device.

Information about available accessories at www.ifm.com

- ▶ In a panel with a maximum thickness of 6 mm, make a 31 mm x 31 mm cutout (-0.4 mm tolerance each).

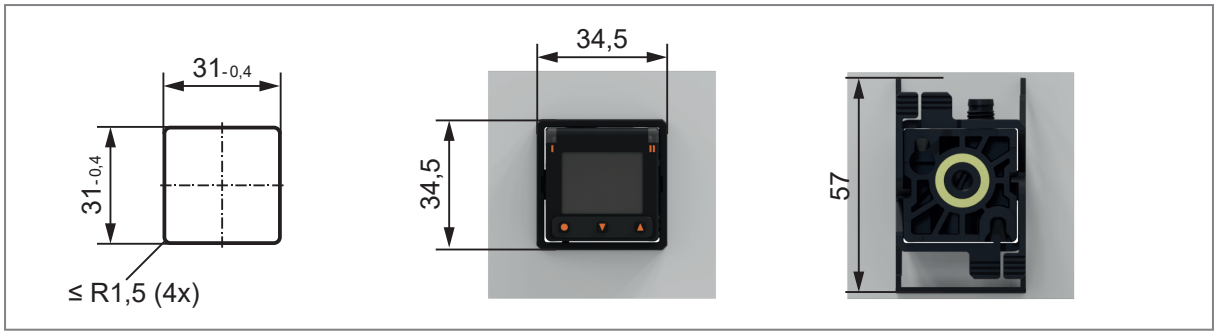


Fig. 15: Panel mounting using a fixing clamp (panel cutout; front view; rear view)

- ▶ Insert the device into the cutout in the panel from the back.
- ▶ Slide the frame of the mounting set (1) over the device from the front and attach it by engaging the two lateral protruding sections (2) into the recesses (3) on both sides of the device.

▶ Slide the fixing clamp of the mounting set onto the device from behind. The locating lugs of the fixing clamp (4) will latch in the jagged recesses on both sides of the device (5). Push until the device is firmly in place.

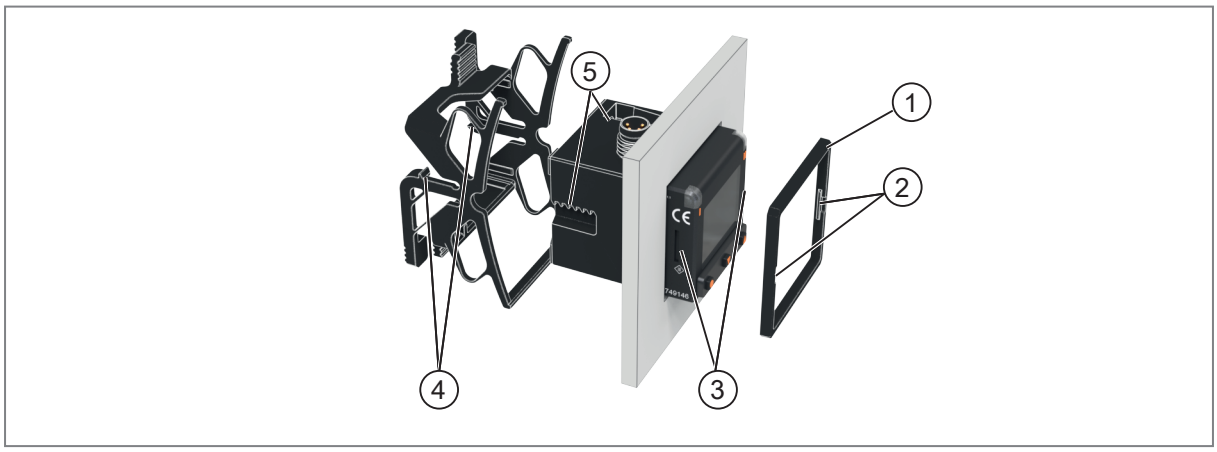


Fig. 16: Panel mounting with mounting set

Removal:

▶ Press the levers (6) and (7) of the fixing clamp together on both sides in the direction of the arrows and remove the fixing clamp.

▶ Lever off the frame (1) at the front.

▶ Remove the device from the wall fixture.

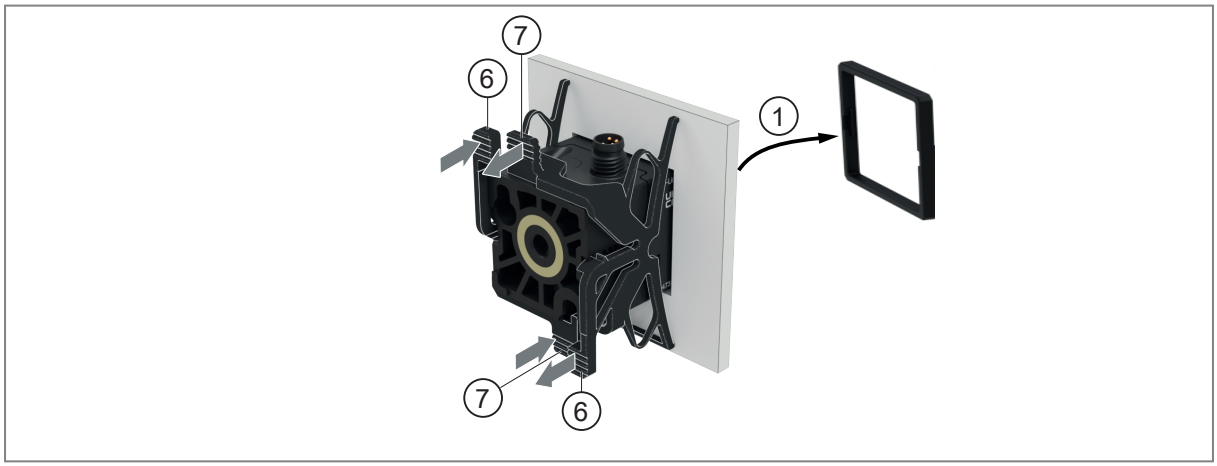


Fig. 17: Removal

Panel mounting of multiple devices:

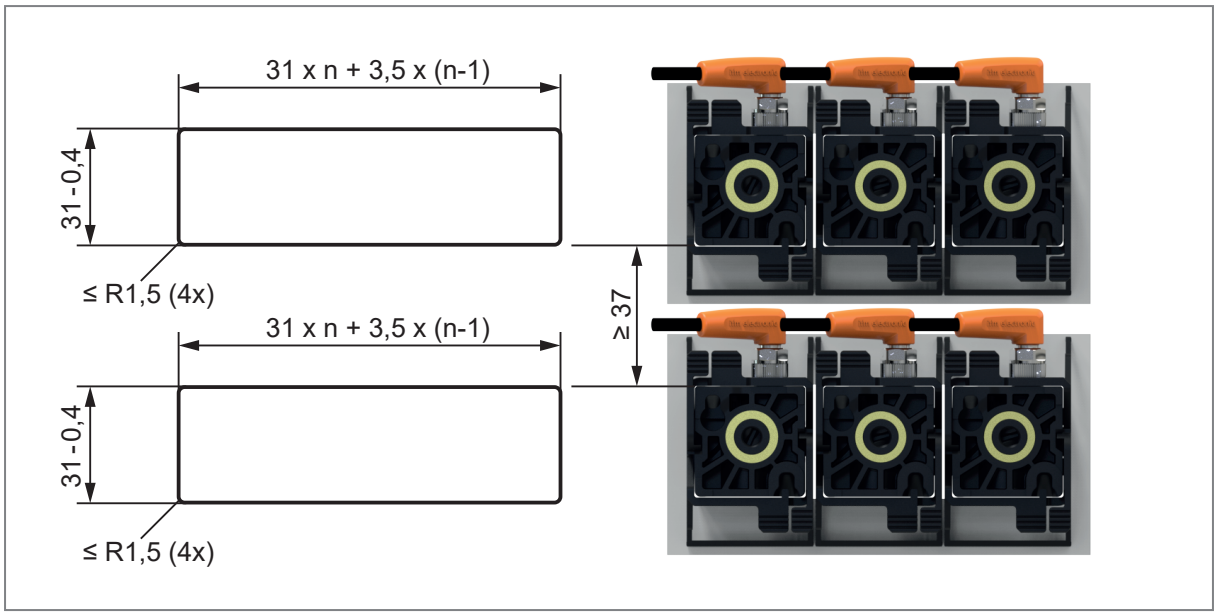


Fig. 18: Horizontal installation for devices with M8 connector; n = number of devices

The dimensions apply to the use of ifm connectors with angled M8 sockets. If straight cable sockets are used, the distance must be increased.

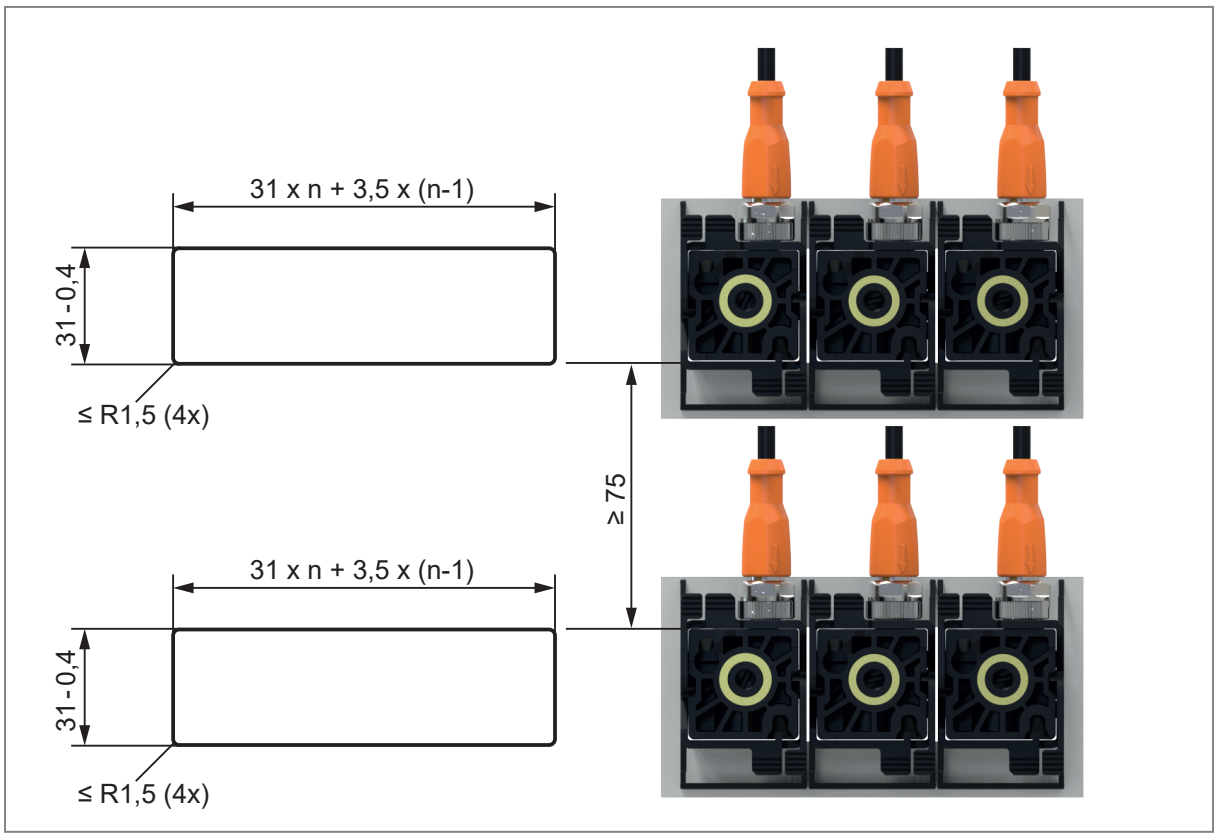


Fig. 19: Horizontal installation for devices with M8 connector; n = number of devices

The dimensions apply to the use of ifm connectors with straight M8 sockets. Angled sockets cannot be used.

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.

▶ Disconnect power.

▶ Connect the unit as follows:

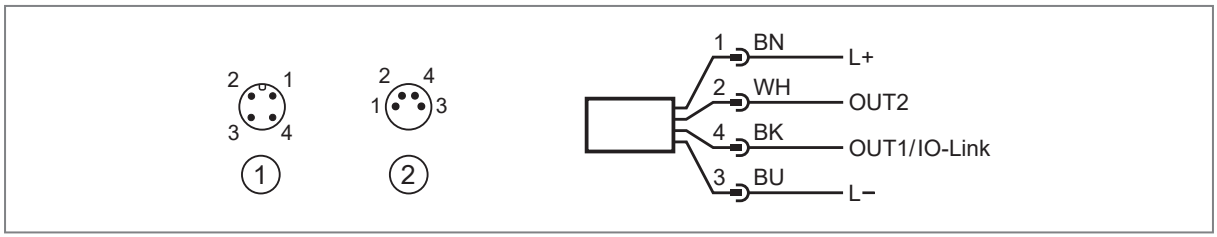
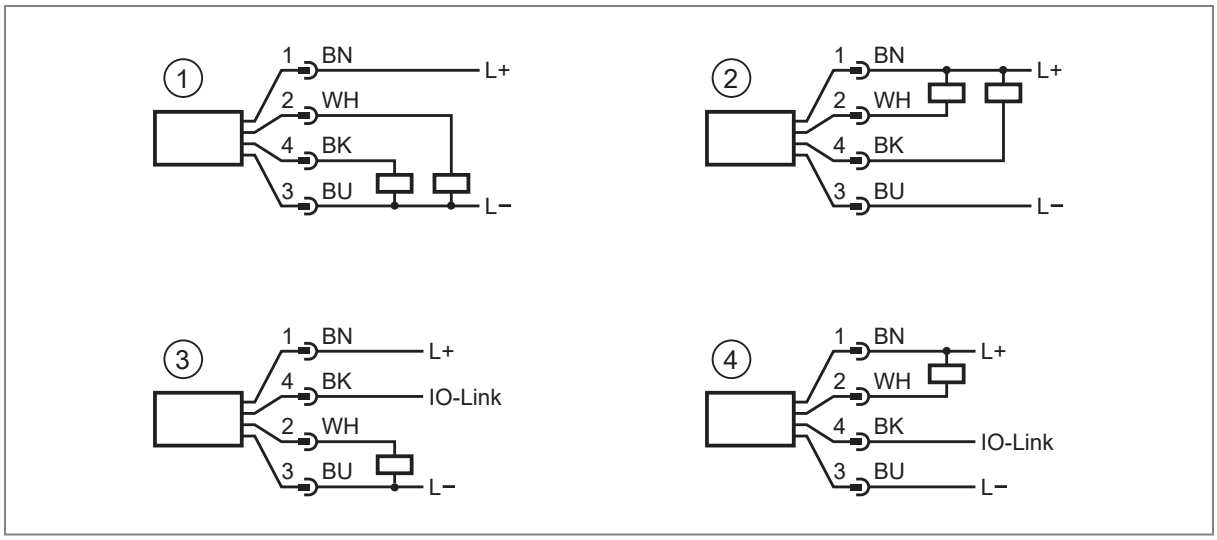


Fig. 20: Wiring diagram (colours to DIN EN 60947-5-2)

1: Device types with M12 connector
2: Device types with M8 connector
BK: Black
BN: Brown
BU: Blue
WH: White

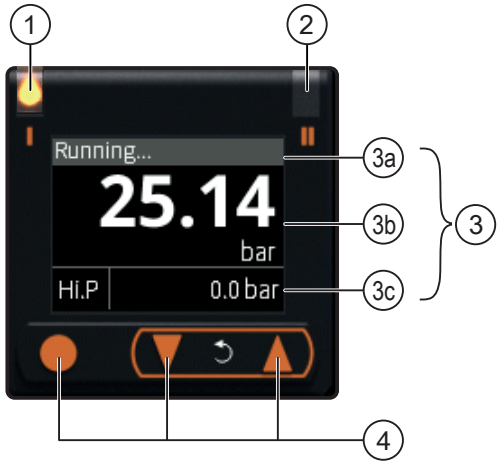
Pin	Connection
1	L+
3	L-
4 (OUT1)	• Switching signal pressure • IO-Link
2 (OUT2)	• Switching signal pressure

Circuit examples:



1: 2 x positive switching
2: 2 x negative switching
3: IO-Link / 1 x positive switching
4: IO-Link / 1 x negative switching

7 Operating and display elements



1: Switching status LED for OUT1 (lights if output 1 is active)
2: Switching status LED for OUT2 (lights if output 2 is active)
3: TFT display
3a: title line
3b: process value line
3c: additional information depending on the setting of [dis.L] (→ Display layout 🗋 40)
4: Keys for display change and parameter setting (→ Parameter setting via device keys 🗋 30)

If the device measures a high internal temperature, the display brightness is automatically adjusted:
Internal temperature > 67 °C: The brightness is reduced to 25%.
Internal temperature > 80 °C: The display is switched off. Activation by key touch. See also Warning messages (→ 🗋 53) and Error messages (→ 🗋 54).

Switching between display screens:

Use the device keys to view additional information during operation:

▶ Press the [▲] or [▼] key repeatedly.

▷ The display alternates between different screens.

▷ After 30 seconds, the device returns to the user-defined display layout.

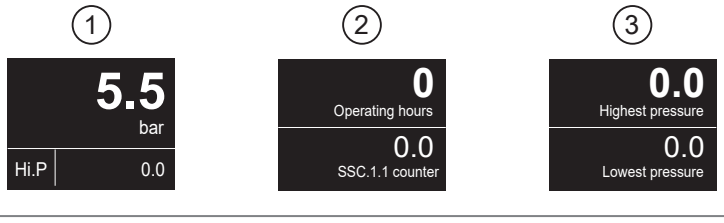


Fig. 21: Switching between display screens

1: User-defined display layout (→ Display layout 🗋 40)
2: Indication of operating hours and SSC1.1 counter value
3: Indication of highest and lowest measured pressure value

8 Menu

The figures in which the menus are displayed show the parameters that can be set on the unit by key input. These parameters and other functions are also available via the IO-Link interface.

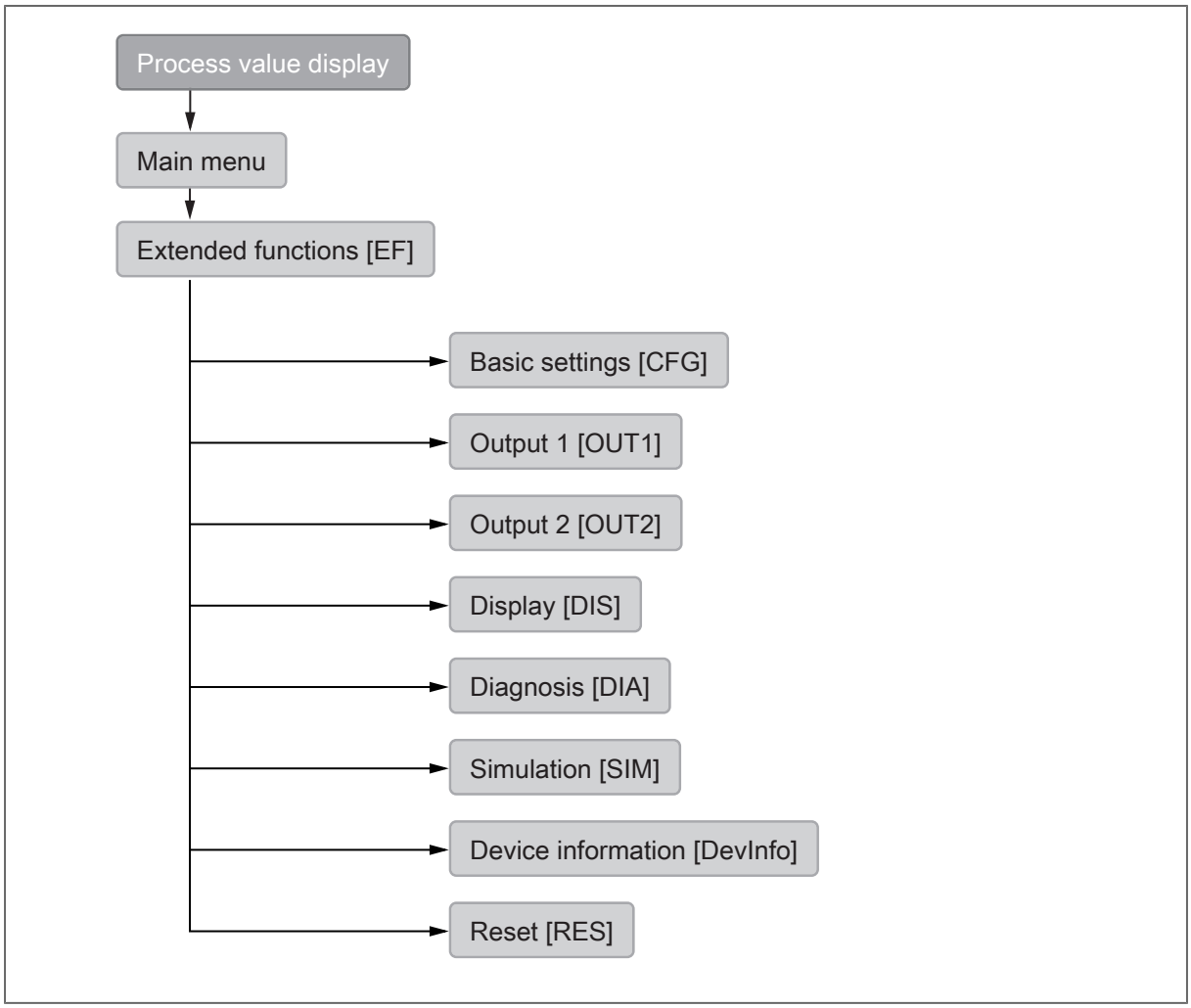


Fig. 22: Menu overview

8.1 Main menu and submenus

The displayed parameters change when the factory setting is changed. The following menu displays show the maximum available parameters.

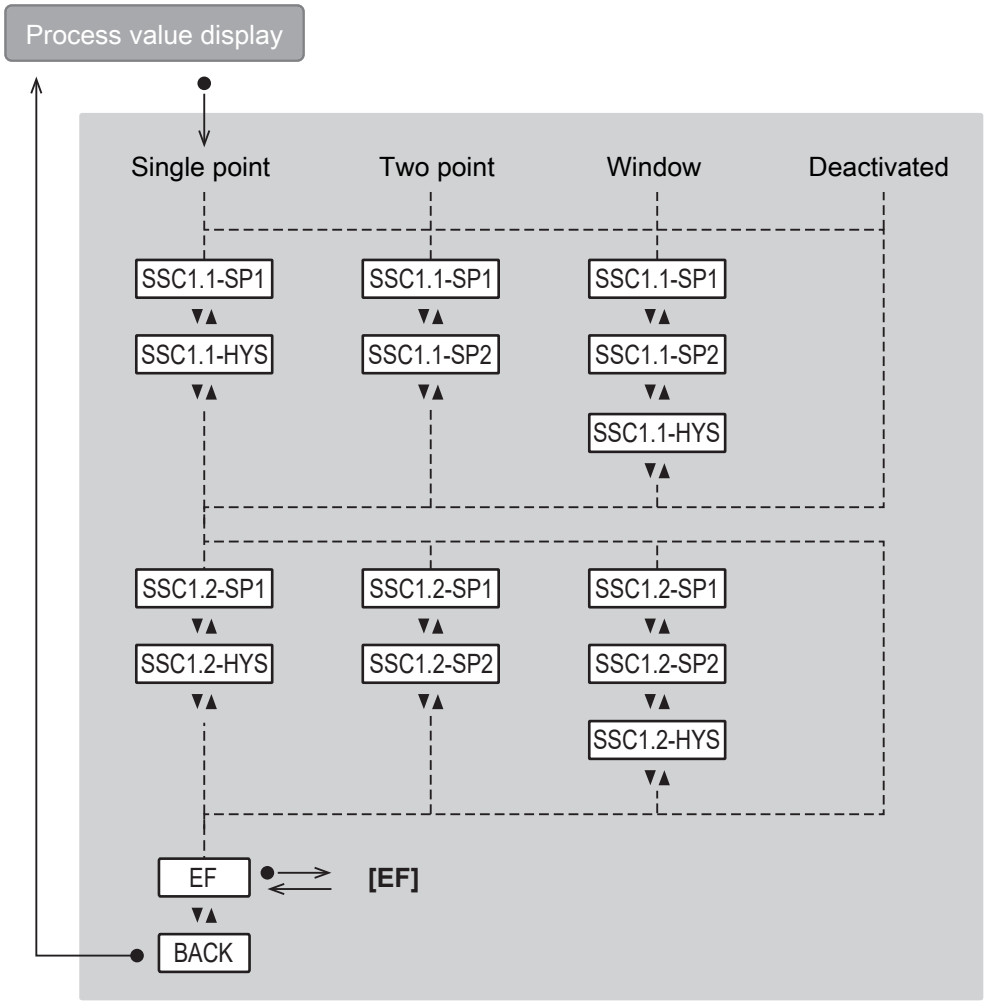
In the main menu, the set limit values for compressed air monitoring are displayed. Which parameters are displayed depends on the selected switch-point mode (→ Digital switching signal 31).

If the switch-point mode [OFF] is set, no parameters are displayed for the relevant switching signal channel.

The switch-point mode is set in the [OUTx] submenu.

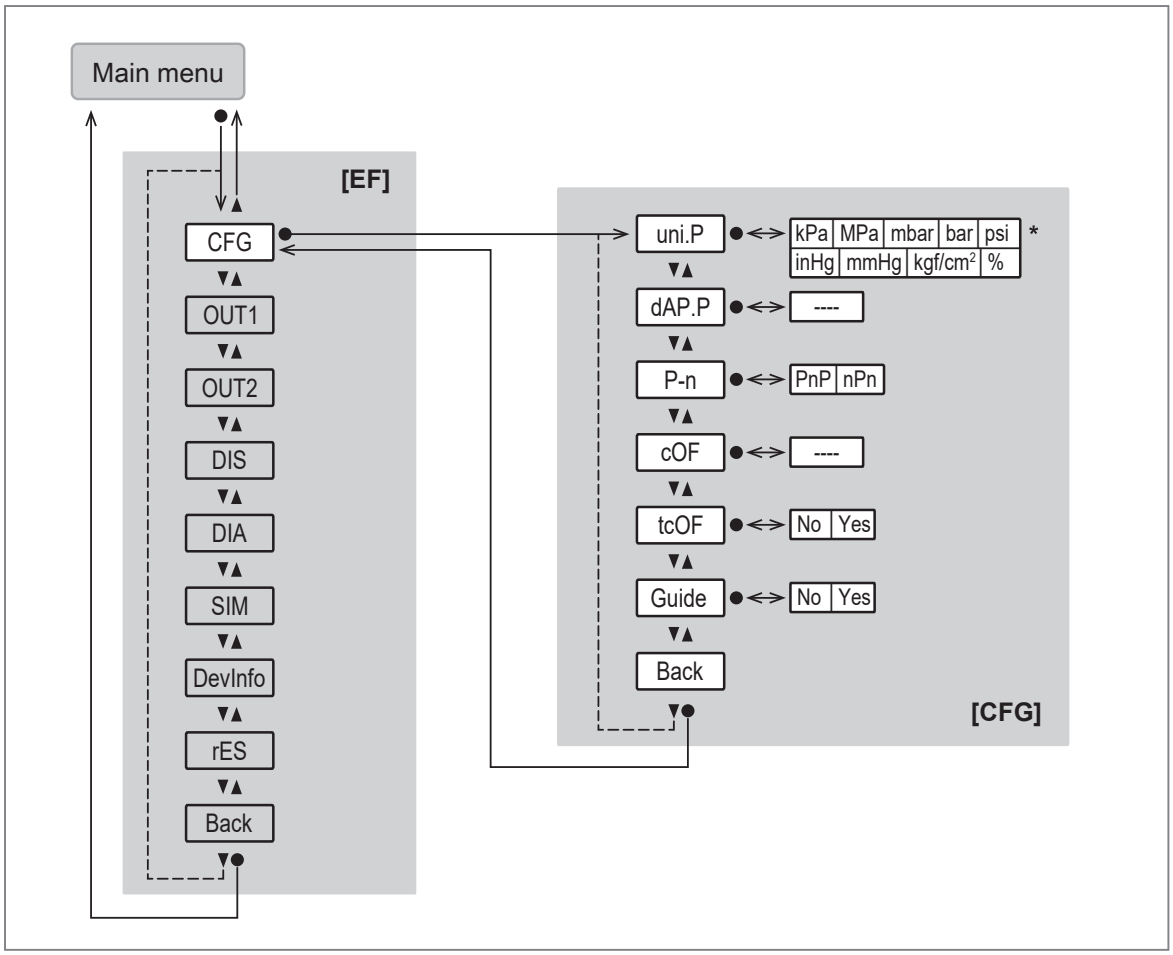
The switch points and the hysteresis can be changed in the [OUTx] submenu or in the main menu if indicated there.

Main menu:



Parameter	Explanation
SSC1.x-SP1	Switch point 1 for switching signal channel SSC1.x
SSC1.x-SP2	Switch point 2 for switching signal channel SSC1.x
SSC1.x-HYS	Hysteresis for switching signal channel SSC1.x
EF	Change to the EF (extended functions) submenu

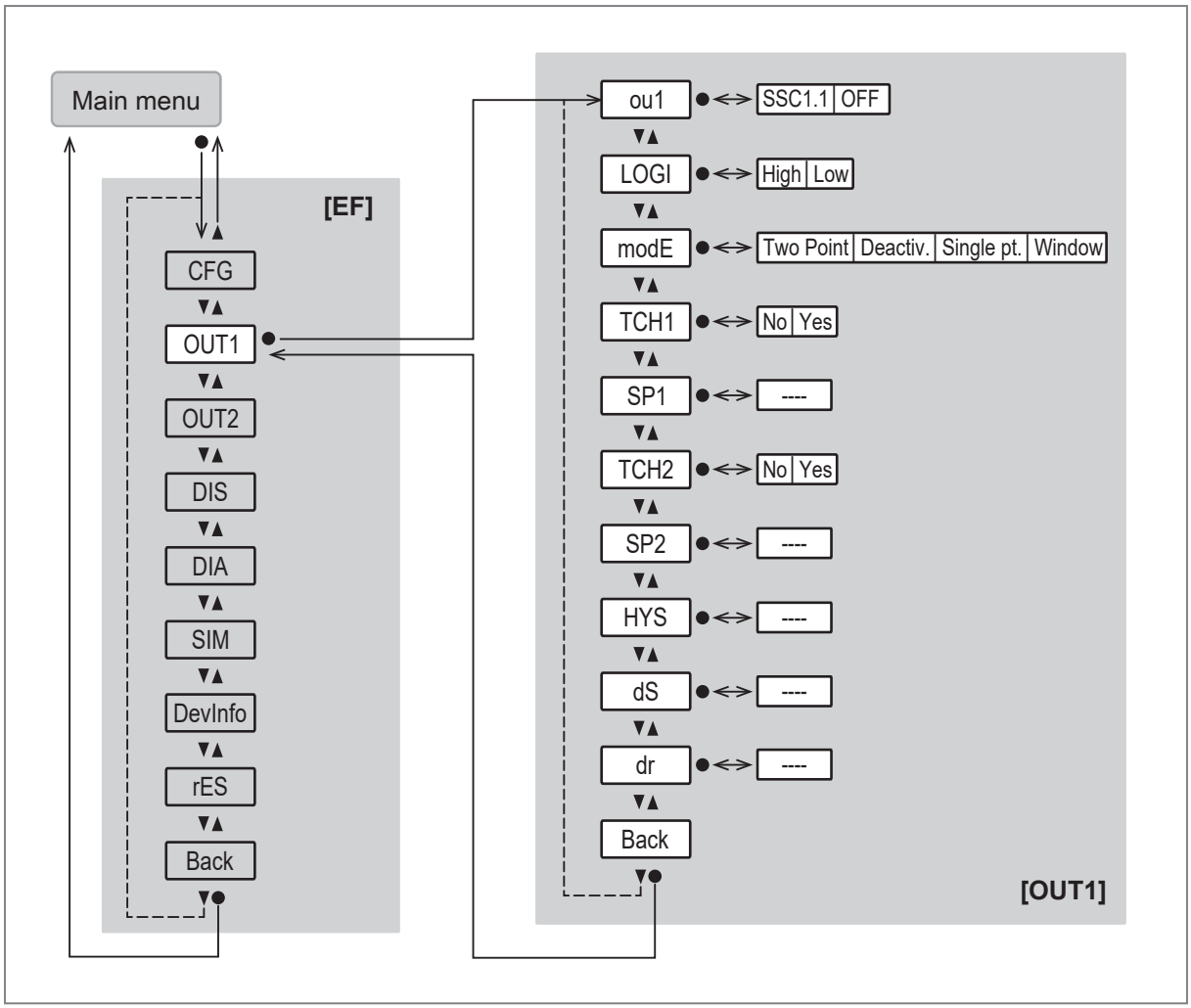
Configuration [CFG] menu:



* The choice of units depends on the device type. See Standard unit of measurement (→ 🗋 37).

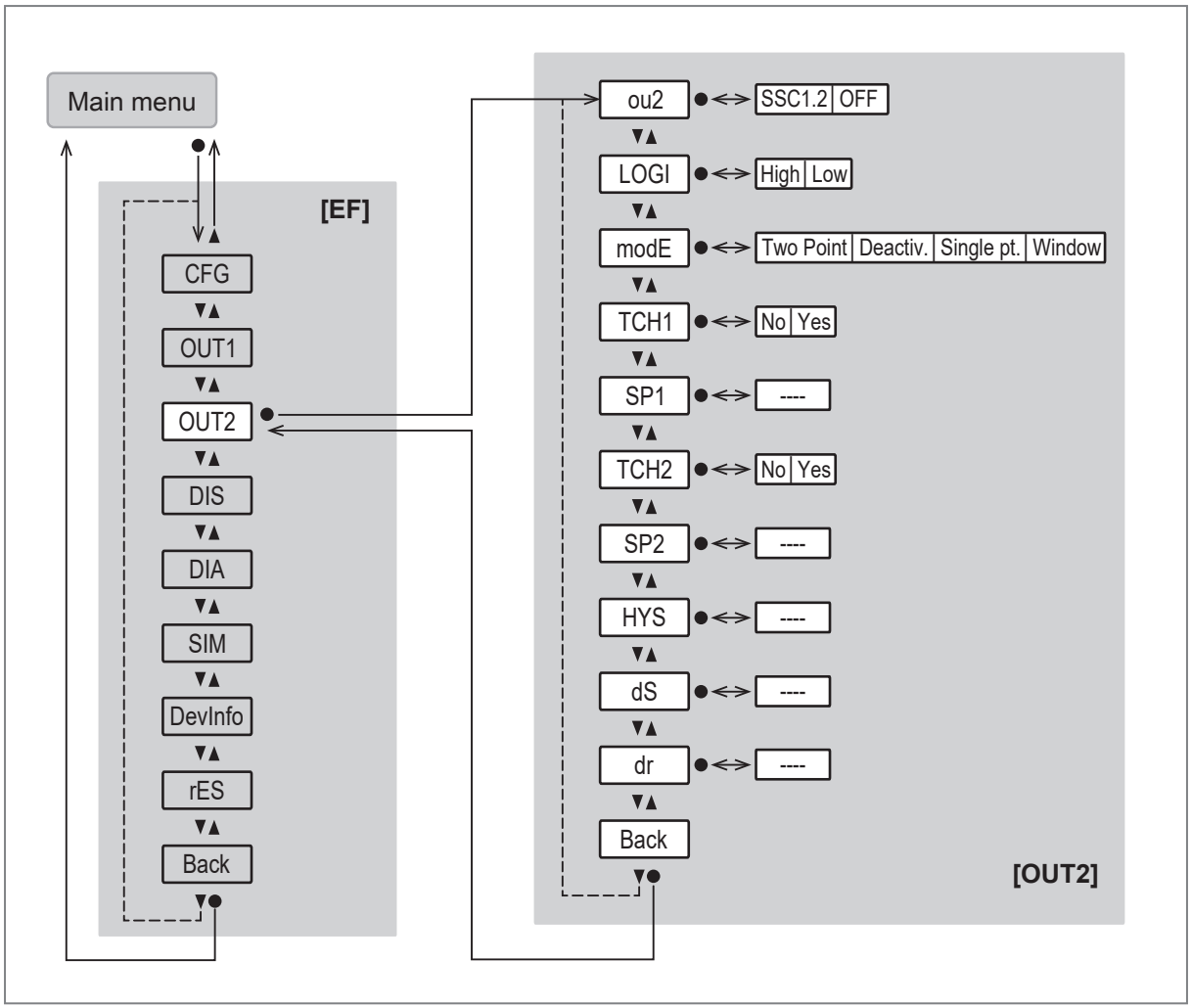
Parameter	Explanation
CFG	Change to the submenu CFG (basic settings)
uni.P	Standard unit of measurement for pressure
dAP.P	Damping constant in seconds for pressure (63 % rise time τ)
P-n	Output polarity for the switching outputs
coF	Correction factor for zero point calibration
tcOF	Teach correction factor for zero point calibration
Guide	Activation of the guided installation (wizard)

Menu Output configuration [OUT1]:



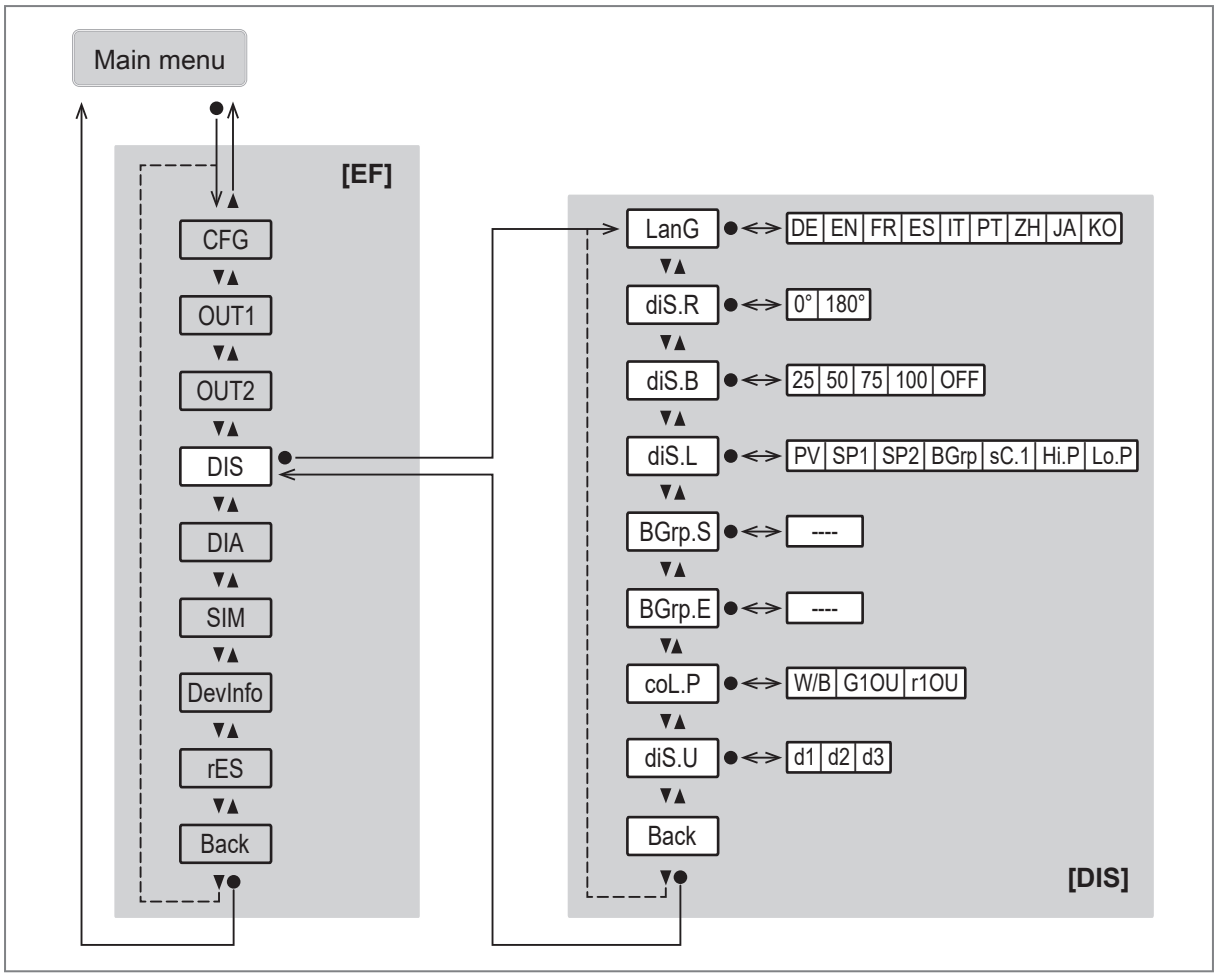
Parameter	Explanation
OUT1	Change to submenu OUT1 (output configuration of output 1)
ou1	Output function for output OUT1
LOGI	Switch-point logic: [high active] or [low active]
modE	Switch-point mode: [Single Point], [Two Point], [Window], [Deactivated]
TCH1	Teach switch point SP1
TCH2	Teach switch point SP2
SP1	Switch point 1
SP2	Switch point 2
HYS	Hysteresis
dS	Switching delay for change into active state (in seconds)
dr	Switch-off delay for change into inactive state (in seconds)

Menu Output configuration [OUT2]:



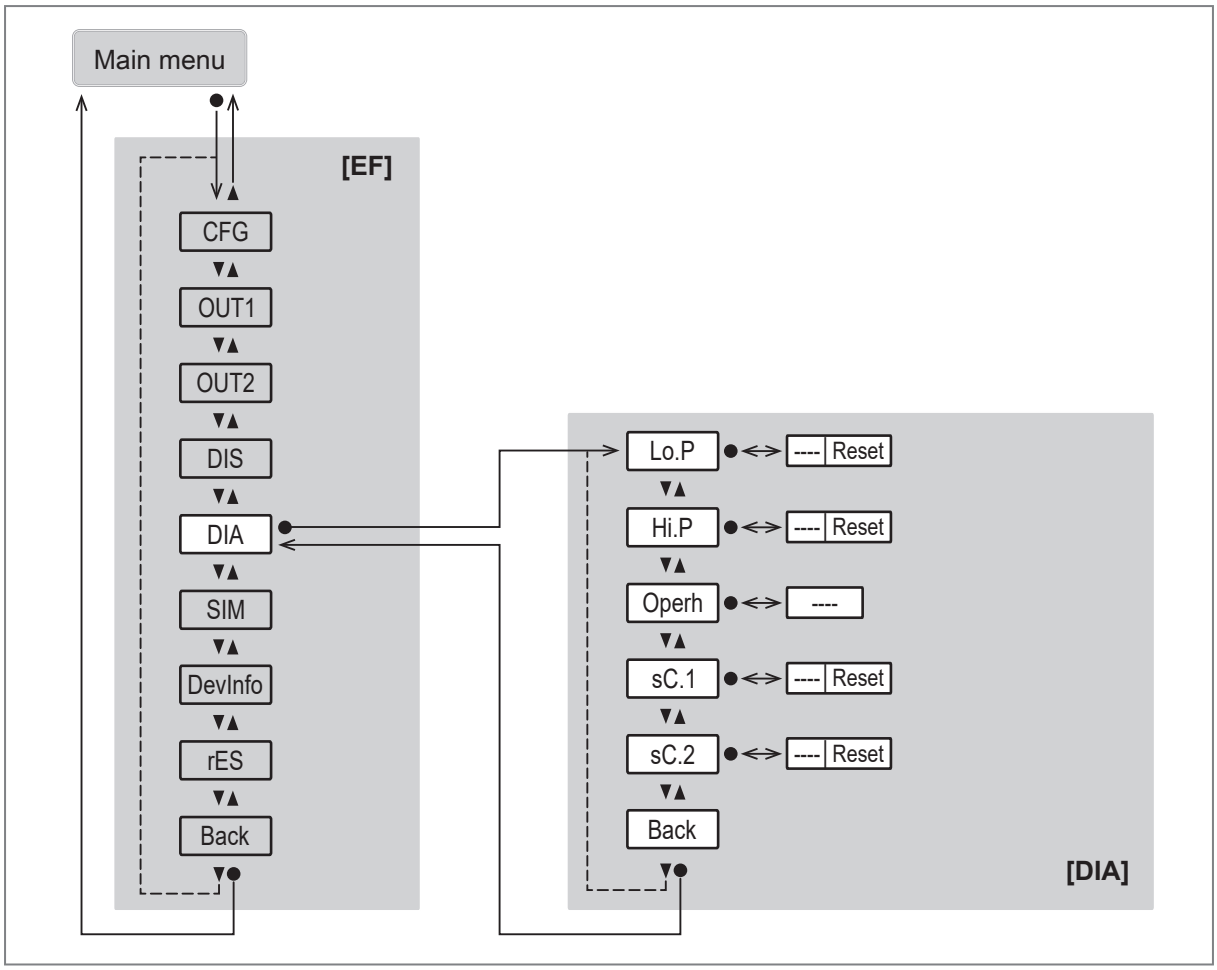
Parameter	Explanation
OUT2	Change to submenu OUT2 (output configuration of output 2)
ou2	Output function for output OUT2
LOGI	Switch-point logic: [high active] or [low active]
modE	Switch-point mode: [Single Point], [Two Point], [Window], [Deactivated]
TCH1	Teach switch point SP1
TCH2	Teach switch point SP2
SP1	Switch point 1
SP2	Switch point 2
HYS	Hysteresis
dS	Switching delay for change into active state (in seconds)
dr	Switch-off delay for change into inactive state (in seconds)

Display menu [DIS]:



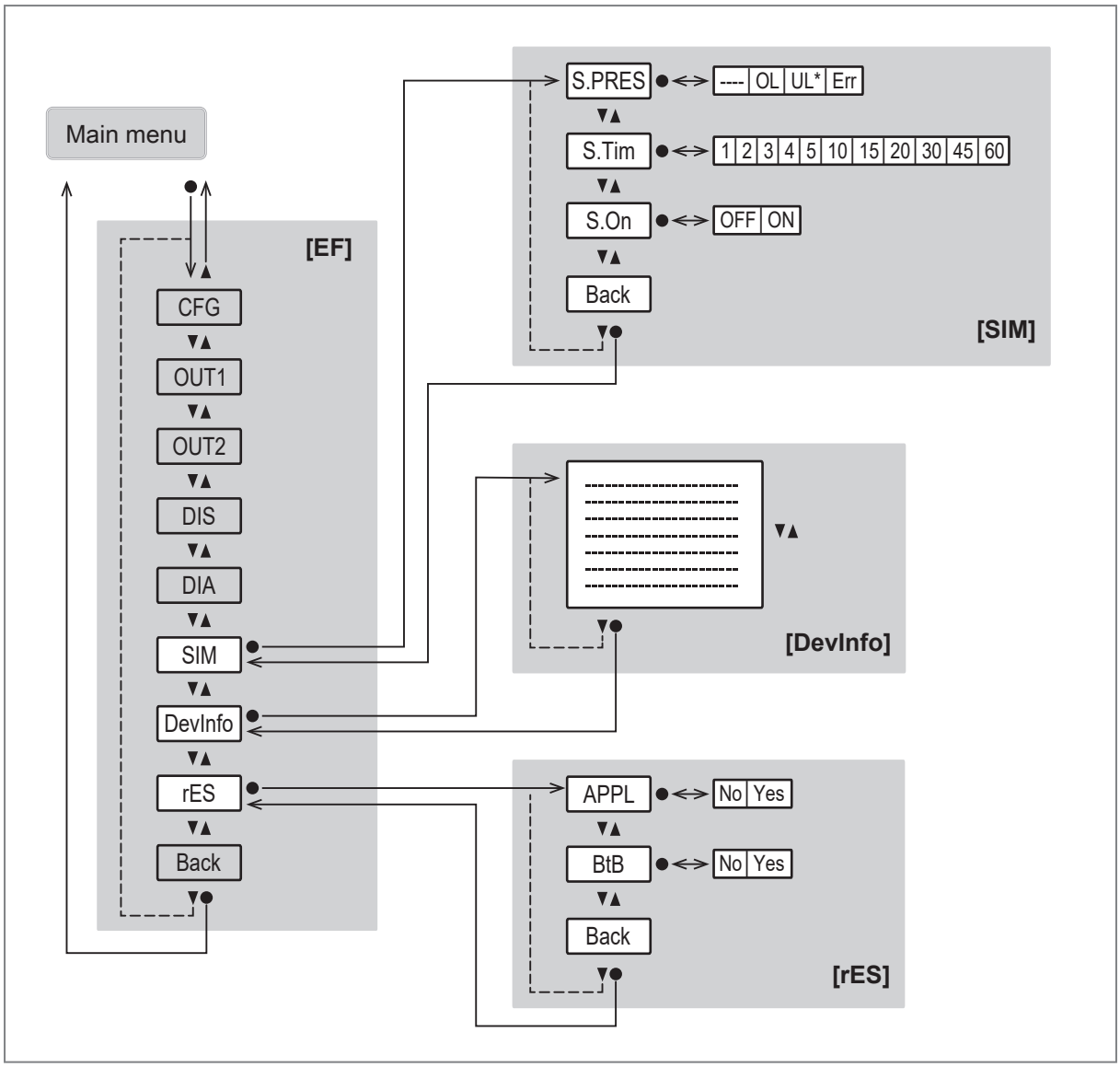
Parameter	Explanation
DIS	Change to the DIS (display) submenu.
LanG	Language selection for the display
diS.R	Orientation of the display
diS.B	Brightness of the display
diS.L	Display layout
BGrp.S	Start point of the bar graph scaling
BGrp.E	End point of the bar graph scaling
col.P	Font colour for pressure
diS.U	Update rate of the display

Diagnostics [DIA] menu:



Parameter	Explanation
DIA	Change to the submenu DIA (diagnostics)
Lo.P	Lowest pressure value measured
Hi.P	Maximum pressure value measured
Operh	Operating hours since first set-up
sC.x	Counter for switching cycles at output OUTx

Simulation [SIM], Device information [DevInfo] and Reset device [rES] menu:



Parameter	Explanation
SIM	Change to the submenu SIM (simulation)
S.PRS	Simulated pressure value in simulation mode
S.Tim	Duration of the simulation in minutes
S.On	Starts the simulation mode
DevInfo	Change to submenu DevInfo: Device information (→ 🗋 48)
rES	Change to Reset submenu (reset device)
APPL	Application reset (reset of application-specific parameter settings)
BtB	Back-to-Box reset (reset to factory settings)

* only for device type PQSxx0

9 Commissioning

After power on and expiry of the power-on delay time, the unit is in the normal operating mode. It carries out its measurement and evaluation functions and generates output signals according to the set parameters.

During the power-on delay time, the outputs are in the following status according to the set parameters:

- Active (“high” with normally open function; “low” with normally closed function)

When an IO-Link master is connected, the device automatically goes from SIO mode (standard input-output) into IO-Link mode if the port of the master is set to IO-Link mode.

9.1 Guided installation via an installation wizard

New unboxed and factory reset devices – setup via main menu. When changing from process value display to main menu you will be given the option to use the guided installation wizard (if the device has been set up using IO-Link this option is no longer available).

▶ Select [Yes] or [No].

▷ If [Yes] is selected, parameters, questions and instructions appear in succession. Use the [▲] and [▼] keys to choose from the available options and the [●] key to confirm the selection.

▷ If [No] is selected, the main menu appears and the sensor functions according to the factory settings. If necessary, change the parameter settings, see chapter Parameter setting.

The guided installation can be called up again at any time via the parameter [EF] > [CFG] > [Guide].

After the message that the guided installation is completed, you are asked whether you want to start the measurement.

▶ Select [Yes], [No] or [Info].

▷ If [Yes] is selected, the display indicates the successful completion of the installation and switches to the process value display.

▷ If [No] is selected, individual parameters can be accessed and modified again, or the guided installation can be restarted from the beginning using the [Restart Guide] command.

▷ If [Info] is selected, the device displays the previously set device configuration.

10 Parameter setting

Parameter setting can be carried out via the IO-Link interface or via the operating elements on the unit.

Parameters can be set before installation or during operation.

If you change parameters during operation, this will influence the function of the plant.

▶ Ensure that there will be no malfunctions in your plant.

During parameter setting the unit remains in the operating mode. It continues to monitor with the existing parameter until the parameter setting has been completed.

Depending on the parameter setting, the parameters available in the menu may change.

10.1 Parameter setting via device keys

CAUTION

With high medium or ambient temperatures, parts of the housing may get hot.

▷ Risk of burns

▶ Do not touch the device with your hands.

▶ If necessary, use a blunt object to make settings on the device.

Parameter setting process in general:

Intention	Action
Change from the process value display to the main menu	[●]
Change to the submenu	Use [▼] to navigate to the submenu, e.g. [EF], then [●]
Select the required parameter	[▲] or [▼]
Change to the setting mode	[●]
Modify the parameter value	[▲] or [▼]
Apply the set parameter	[●]
Exit parameter setting without saving	[▲] + [▼]
Return to the next higher menu level (repeat several times to reach process value display)	[▲] + [▼] - or - Use [▲] or [▼] to navigate to [Back], then [●]
Return to the process value display	> 30 seconds (timeout)

See also: Guided installation via an installation wizard (→ 🗋 29).

10.2 Parameter setting via IO-Link

Requirements for parameter setting via the IO-Link interface:

✓ A suitable parameter setting software, e.g. ifm moneo|configure

✓ The Input Output Device Description (IODD) for the device, see documentation.ifm.com

✓ One IO-Link master

▶ Connect the IO-Link master to a parameter setting software.

▶ Set the port of the master to the IO-Link operating mode.

▶ Connect the device to a free port of the IO-Link master.

▷ The unit switches to IO-Link mode.

▶ Change parameter settings in the software.

▶ Write parameter settings to the unit.

Notes on parameter setting → Manual of the parameter setting software

10.3 Output configuration

10.3.1 Digital switching signal

The device provides digital switching signals via switching signal channels (SSC = Switching Signal Channel).

The device has two digital switching signal channels SSC1.1 and SSC1.2 which can be used to output the process value.

Explanation of the numbering of the switching signal channels SSCx.y:
x = process value; y = switching signal channel

The switching channels can be analysed via the IO-Link interface and the hardware outputs.

The switching signal channels are permanently assigned to the physical hardware outputs:

- SSC1.1 to OUT1
- SSC1.2 to OUT2

The parameters for each switching signal channel can be set individually.

The switch point mode, switch points and the switch point logic are set when the switching signal channel parameters are set.

Switch point mode

You can choose between the following switch point modes according to the IO-Link smart sensor profile – Function Class “Object Detection”:

- [Deactivated]
- [Single Point Mode]
- [Two Point Mode]
- [Window Mode]

The switching signal channel changes to the active state depending on the process data value (PDV).

The active state is above the switch point in [Single Point Mode] and [Two Point Mode] and within the window section in [Window Mode].

Switch point logic

By setting the switch point logic [High active] or [Low active], you can specify which value the switching signal channel has in the active state:

- [High active]: The switching signal channel is “high” in the active state (= ON = normally open = 1)
- [Low active]: The switching signal channel is “low” in the active state (= OFF = normally closed = 0)

The following figures show the status of the switching signal channels depending on the switch point mode, switch point logic and process data value (PDV).

Deactivated

If the [Deactivated] switch point mode is set for a switching signal channel, then the switching signal channel will permanently have the following value regardless of the process value:

- For switch point logic [High active]: permanently “low”.
- For switch point logic [Low active]: permanently “high”.

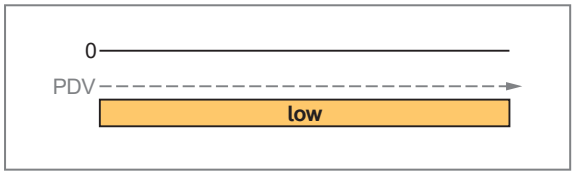


Fig. 23: [Deactivated] / [High active]

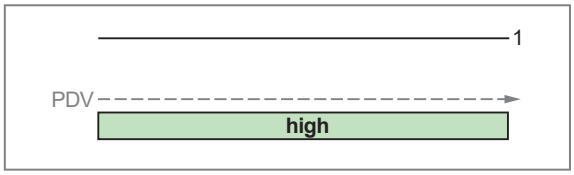


Fig. 24: [Deactivated] / [Low active]

Single Point Mode

Only one switch point (SP1) is manually set or taught.

The reset point (SP1-H) results from the switch point and the set hysteresis.

When teaching, the switch point is set below the taught process value (TP1) by the hysteresis.

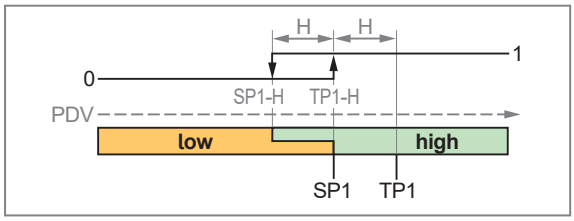


Fig. 25: [Single Point Mode] / [High active]

H: Hysteresis
SP1: Switch point
TP1: Teach point
TP1-H: Switch point during teach (= SP1)
SP1-H Reset point

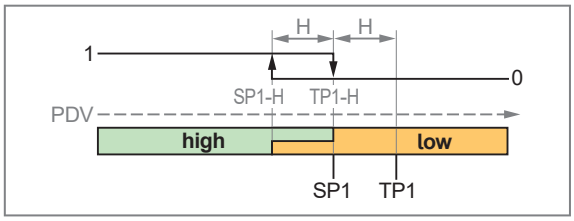


Fig. 26: [Single Point Mode] / [Low active]

H: Hysteresis
SP1: Switch point
TP1: Teach point
TP1-H: Switch point during teach (= SP1)
SP1-H Reset point

For devices with a negative measuring range to zero (vacuum devices PQxxx9 with measuring range -1 bar...0 bar), the following applies in contrast to all other devices: The switch point logic is factory preset to [Low active].

Two Point Mode

One switch point SP1 and one switch point SP2 are manually set or taught.

When parameter setting via IO-Link, the position of the switch points can be freely selected: SP1 can be below or above SP2. The lower switch point is the reset point. In the example shown, SP1 is the switch point and SP2 is the reset point.

When parameter setting via the device keys, SP1 must be greater than SP2.

When teaching, the switch point is set directly to the taught process value. The following applies: [Teach SP1] sets SP1, [Teach SP2] sets SP2.

The hysteresis will be ignored in Two Point Mode.

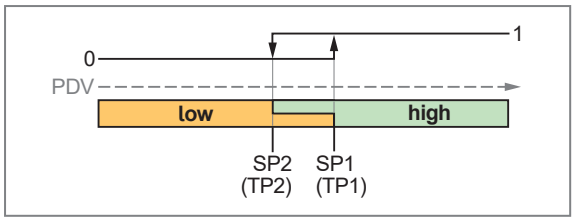


Fig. 27: [Two Point Mode] / [High active]

SP1: Switch point 1
SP2: Switch point 2
TP1: Teach point 1 (= SP1)
TP2: Teach point 2 (= SP2)

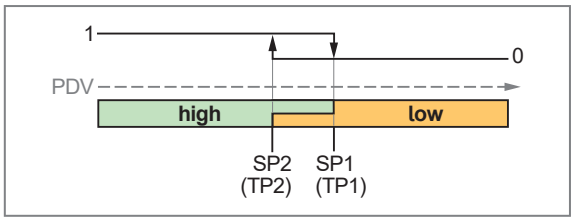


Fig. 28: [Two Point Mode] / [Low active]

SP1: Switch point 1
SP2: Switch point 2
TP1: Teach point 1 (= SP1)
TP2: Teach point 2 (= SP2)

For devices with a negative measuring range to zero (vacuum devices PQxxx9 with measuring range -1 bar...0 bar), the following applies in contrast to all other devices: The switch point logic is factory preset to [Low active].

Window mode

Two switch points (SP1) and (SP2) are manually set or taught.

The two switch points define a window area.

The position of the switch points is freely selectable: SP1 can be below or above SP2. The lower switch point is the lower limit value, the higher switch point is the upper limit value of the window area.

When teaching, the switch point is set directly to the taught process value. The following applies: [Teach SP1] sets SP1, [Teach SP2] sets SP2.

When the process data value enters the window area, the status of the switching signal channel changes immediately when the switch points are exceeded/not reached.

If the process data value leaves the window area, the status of the switching signal channel changes when the switch point plus hysteresis (SP1+H or SP2-H) is exceeded/not reached.

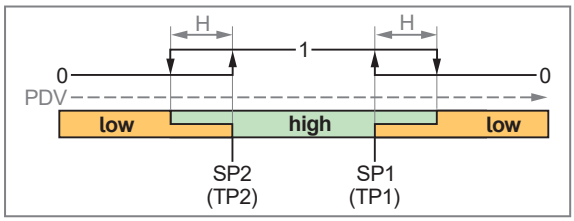


Fig. 29: [Window Mode] / [High active]

H: Hysteresis
SP1: Switch point 1
SP2: Switch point 2
TP1: Teach point 1 (= SP1)
TP2: Teach point 2 (= SP2)

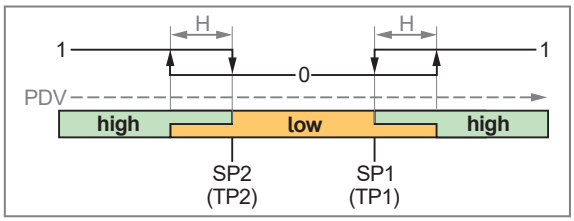


Fig. 30: [Window Mode] / [Low active]

H: Hysteresis
SP1: Switch point 1
SP2: Switch point 2
TP1: Teach point 1 (= SP1)
TP2: Teach point 2 (= SP2)

For devices with a negative measuring range to zero (vacuum devices PQxxx9 with measuring range -1 bar...0 bar), the following applies in contrast to all other devices: The switch point logic is factory preset to [Low active].

Note on the hysteresis

The hysteresis must be no greater than 10% of the final value of the measuring range. If this means that the set and reset points are not far enough apart for the application in [Single Point] mode, the [Two Point] mode should be selected.

If the [Auto] setting is chosen for the hysteresis, the following value will be set for the hysteresis:

Measuring range	Hysteresis [Single Point]	Hysteresis [Window]
-1…0 bar	0.02 bar	0.002 bar
-1…1 bar	0.04 bar	0.004 bar

Measuring range	Hysteresis [Single Point]	Hysteresis [Window]
-1…10 bar	0.2 bar	0.02 bar
0…16 bar	0.32 bar	0.03 bar

Tab. 1: Hysteresis with [Auto] setting depending on the measuring range of the device and the selected switch-point mode

10.3.1.1 Parameter setting via device keys: Switching signal

You can only set switching signal channel SSC1.1 via the device keys.

✓ The standard unit of measurement is selected: [EF] > [CFG] > [uni.P].
✓ For output 1, the switching signal is selected: [EF] > [OUT1] > [ou1] = [SSC1.1]
✓ The switch-point logic is selected: [EF] > [OUT1] > [LOGI]
▶ Go to [EF] > [OUT1] to configure output OUT1.

Single point mode:

▶ Select [modE] and set the switch-point mode: [Single Point].
▶ Select [SP1] and set switch point 1.
▶ Select [HYS] and set the hysteresis.

Two-point mode:

▶ Select [modE] and set the switch-point mode: [Two Point].
▶ Select [SP1] and set switch point 1.
▶ Select [SP2] and set switch point 2.

Window mode:

▶ Select [modE] and set the switch-point mode: [Window].
▶ Select [SP1] and set switch point 1.
▶ Select [SP2] and set switch point 2.
▶ Select [HYS] and set the hysteresis.

10.3.1.2 Teach via device keys: Switching signal

You can only set switching signal channel SSC1.1 via the device keys.

✓ The standard unit of measurement is selected: [EF] > [CFG] > [uni.P].
✓ For output 1, the switching signal is selected: [EF] > [OUT1] > [ou1] = [SSC1.1]
✓ The switch-point logic is selected: [EF] > [OUT1] > [LOGI]
▶ Go to [EF] > [OUT1] to configure output OUT1.

Single point mode:

▶ Select [modE] and set the switch-point mode: [Single Point].
▶ Approach the system pressure at which the output is to switch and keep it constant.
▶ Select [TCH1] and set [Yes].
  ▷ The current value minus the hysteresis is adopted as switch point SP1.
▶ Select [HYS] and set the hysteresis.

Two-point mode:

- ▶ Select [modE] and set the switch-point mode: [Two Point].
- ▶ Approach the system pressure at which the output is to switch and keep it constant.
- ▶ Select [TCH1] and set [Yes].
  - ▷ The current value is adopted as switch point SP1.
- ▶ Approach the system pressure at which the output is to reset and keep it constant.
- ▶ Select [TCH2] and set [Yes].
  - ▷ The current value is adopted as switch point SP2.

Window mode:

- ▶ Select [modE] and set the switch-point mode: [Window].
- ▶ Select [HYS] and set the hysteresis.
- ▶ Approach the system pressure for the upper limit of the window section and keep it constant.
- ▶ Select [TCH1] and set [Yes].
  - ▷ The current value is adopted as switch point SP1.
- ▶ Approach the system pressure for the lower limit of the window section and keep it constant.
- ▶ Select [TCH2] and set [Yes].
  - ▷ The current value is adopted as switch point SP2.

10.3.1.3 Parameter setting via IO-Link: Switching signal

Both switching signal channels can be set via the IO-Link interface.

- ✓ The standard unit of measurement is selected: [Parameters] > [Basic settings] > [uni.P].
- ✓ For output x, the switching signal is selected: [Parameters] > [Ausgangskonfiguration] > [oux] = [SSC1.x]
- ✓ The switch-point logic is selected: [Parameters] > [SSC1.x] > [SSC1.1 Config.Logic]
- ▶ Select [Parameters] > [SSC1.x] to configure output OUT1.

Single point mode:

- ▶ [SSC1.x Config.]Select [Mode] and set the switch point mode: [Single Point].
- ▶ [SSC1.x Param.]Select [SP1] and set switch point 1.
- ▶ [SSC1.x Config.]Select [Hyst] and set the hysteresis.

Two-point mode:

- ▶ [SSC1.x Config.]Select [Mode] and set the switch point mode: [Two Point].
- ▶ [SSC1.x Param.]Select [SP1] and set switch point 1.
- ▶ [SSC1.x Param.]Select [SP2] and set switch point 2.

Window mode:

- ▶ [SSC1.x Config.]Select [Mode] and set the switch point mode: [Window].
- ▶ [SSC1.x Param.]Select [SP1] and set switch point 1.
- ▶ [SSC1.x Param.]Select [SP2] and set switch point 2.
- ▶ [SSC1.x Config.]Select [Hyst] and set the hysteresis.

10.3.1.4 Teach via IO-Link: Switching signal

Both switching signal channels can be set via the IO-Link interface.

✓ The standard unit of measurement is selected: [Parameters] > [Basic settings] > [uni.P].

✓ For output x, the switching signal is selected: [Parameters] > [Ausgangskonfiguration] > [oux] = [SSC1.x]

✓ The switch-point logic is selected: [Parameters] > [SSC1.x] > [SSC1.1 Config.Logic]

▶ Select [Parameters] > [SSC1.x] to configure output OUT1.

Single point mode:

▶ [SSC1.x Config.]Select [Mode] and set the switch point mode: [Single Point].

▶ [SSC1.x Config.]Select [Hyst] and set the hysteresis.

▶ Approach the system pressure for the desired switch point and keep it constant.

▶ Select [Parameters] > [Teach].

▶ Select [TI Select] and determine the switching signal channel: [SSC1.1] or [SSC1.2].

▶ Execute command: [Teach SP1].

▷ The current value minus the hysteresis is adopted as switch point SP1.

Two-point mode:

▶ [SSC1.x Config.]Select [Mode] and set the switch point mode: [Two Point].

▶ Approach the system pressure for the desired switch point and keep it constant.

▶ Select [Parameters] > [Teach].

▶ Select [TI Select] and determine the switching signal channel: [SSC1.1] or [SSC1.2].

▶ Execute command: [Teach SP1].

▷ The current value is adopted as switch point SP1.

▶ Approach the system pressure for the desired switch point and keep it constant.

▶ Execute command: [Teach SP2].

▷ The current value is adopted as switch point SP2.

Window mode:

▶ [SSC1.x Config.]Select [Mode] and set the switch point mode: [Window].

▶ [SSC1.x Config.]Select [Hyst] and set the hysteresis.

▶ Approach the system pressure for the desired switch point and keep it constant.

▶ Select [Parameters] > [Teach].

▶ Select [TI Select] and determine the switching signal channel: [SSC1.1] or [SSC1.2].

▶ Execute command: [Teach SP1].

▷ The current value is adopted as switch point SP1.

▶ Approach the system pressure for the desired switch point and keep it constant.

▶ Execute command: [Teach SP2].

▷ The current value is adopted as switch point SP2.

10.3.2 Output off

The output signal for output OUT1 or output OUT2 can be switched off in two ways:

- [OFF]: The physical output OUTx becomes highly resistive so that no signal can be output. The status of the switching signal channels SSC1.x is still transmitted via the IO-Link interface.
- [Deactivated]: The switching signal channel is deactivated, i.e. the switching state is permanently in the inactive state: With [High active] setting permanently "low", with [Low active] setting permanently "high".

10.3.2.1 Parameter setting via device keys: Output off

▶ Go to the [EF] > [OUTx] menu.

▶ Select [oux] and set [OFF].

- or -

▶ Select [modE] and set [Deactivated].

10.3.2.2 Parameter setting via IO-Link: Output off

▶ Call up [Parameters] > [Output Configuration].

▶ Select [oux] and set [OFF].

- or –

▶ Select [Parameter] > [SSC1.x].

▶ [SSC1.x Config.]Select [Mode] and set [Deactivated].

10.4 Application configuration

10.4.1 Standard unit of measurement

A unit of measurement can be selected with which the process value is shown in the display by default. All further parameter settings are based on this unit.

Changing the unit has no effect on the IO-Link process value, which is always transmitted in the SI unit.

Selectable values:

- Pressure:
  - PQx6x0 and PQx6x2 = MPa, bar, psi, inHg, mmHg, kgf/cm²
  - PQx6x6 = kPa, mbar, psi, inHg, mmHg, kgf/cm²
  - PQx6x9 = kPa, mbar, psi, inHg, mmHg, kgf/cm², %
  - PQx5x9, PQx7x9, PQx8x9, = kPa, mbar, mmHg, kgf/cm², %
  - PQx5x6, PQx7x6, PQx8x6 = kPa, mbar, mmHg, kgf/cm²
  - PQx5x0, PQx5x2, PQx7x0, PQx7x2, PQx8x0, PQx8x2 = MPa, bar, mmHg, kgf/cm²;
- Temperature:
  - PQx6xx: °C or °F (can only be set via IO-Link)
  - All other device types: °C only

The temperature unit can only be set via the IO-Link interface.

The standard unit of measurement for temperature affects both the medium temperature and the internal device temperature. Both values are only available acyclically via the IO-Link interface.

10.4.1.1 Parameter setting via unit keys: Standard unit of measurement

▶ Call up the menu [EF] > [CFG].

▶ Select [uni.P] and set the unit of measurement.

10.4.1.2 Parameter setting via IO-Link: Standard unit of measurement

▶ Select [Parameters] > [Basic settings].

▶ Select [uni.P] and set the unit of measurement.

▶ Select [uni.T] and set the unit of measurement.

10.4.2 Damping

The set damping constant stabilises the output signals. Abrupt changes in the physical process values are smoothed out.

This concerns the outputs, the display and the process value transmission via the IO-Link interface.

The damping constant is added to the response time of the sensor (→ Technical data).

The UL and OL signals are defined under consideration of the damping time.

Measured value damping only has an effect on the process value pressure.

10.4.2.1 Parameter setting via device keys: Damping

▶ Call up the menu [EF] > [CFG].

▶ Select [dAP.P] and set the damping time in seconds (τ value 63%).

10.4.2.2 Parameter setting via IO-Link: Damping

▶ Call up [Parameters] > [Damping].

▶ Select [dAP.P] and set the damping time in seconds (τ value 63%).

10.4.3 Output polarity of the switching outputs

The parameter [P-n] can be used to select whether the outputs are plus-switching or negative-switching.

10.4.3.1 Parameter setting via unit keys: Output polarity

▶ Call up the menu [EF] > [CFG].

▶ Select [P-n] and set [PnP] or [nPn].

10.4.3.2 Parameter setting via IO-Link: Output polarity

▶ Select [Parameters] > [Basic settings].

▶ Select [P-n] and set [PnP] or [nPn].

10.4.4 Zero calibration

If there is a systematic deviation between the measured value and the actual process value, this measurement inaccuracy can be corrected using the correction factor [cOF] or [tcOF].

- [cOF]: set correction factor for zero point calibration

- [tcOF]: taught correction factor for zero point calibration

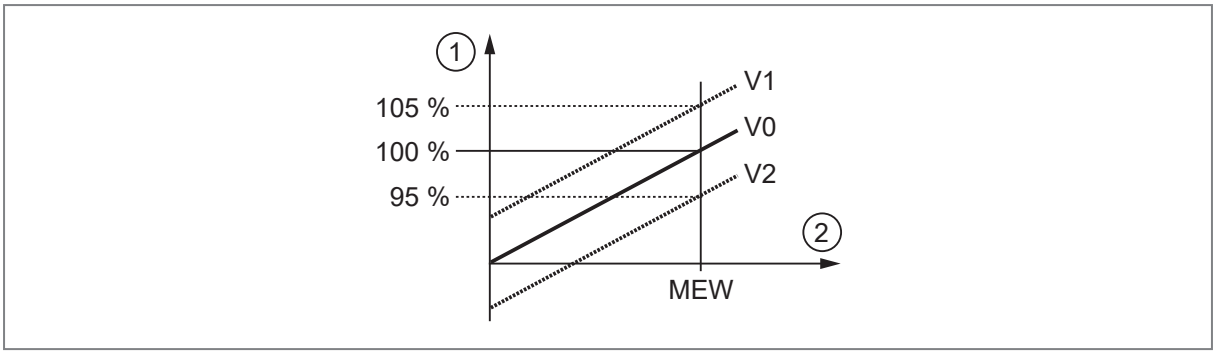


Fig. 31: Zero point calibration (calibration offset)

1: Output signal
2: Process value
V0: Curve of measured values at factory setting
V1: Curve of measured values after offset by +5% measuring range end value
V2: Curve of measured values after offset by -5% measuring range end value

The value for [cOF] or [tcOF] may be in the following range:

Measuring range	[cOF] or [tcOF]
-1…0 bar	-0.05 bar…+0.05 bar
-1…1 bar	-0.1 bar…+0.1 bar
-1…10 bar	-0.5 bar…+0.5 bar
0…16 bar	-0.8 bar…+0.8 bar

Tab. 2: Setting range of the correction factor depending on the measuring range of the device

10.4.4.1 Parameter setting via unit keys: Zero calibration

▶ Call up the menu [EF] > [CFG].

▶ Select [cOF] and set the value.

▷ The internal zero point is shifted by the set value.

Teach zero point calibration:

▶ Maintain the plant pressure constantly at 0.

▶ Call up the menu [EF] > [CFG].

▶ Select [tcOF] and set [Yes].

▷ The current measured value is taken as internal zero point if the deviation lies within a range of ±5% of the final value of the measuring range.

10.4.4.2 Parameter setting via IO-Link: Zero calibration

▶ Select [Parameter] > [Application].

▶ Select [cOF] and set the value.

▷ The internal zero point is shifted by the set value.

Teach zero point calibration:

▶ Maintain the plant pressure constantly at 0.

▶ Select [Parameter] > [Application].

▶ Execute command: [Teach tcoF].

▷ The current measured value is taken as internal zero point if the deviation lies within a range of ±5% of the final value of the measuring range.

10.4.5 Switch-point logic

The switch point logic of the switching outputs can be set.

Selectable values:

- [High active] = normally open
- [Low active] = normally closed

10.4.5.1 Parameter setting via device keys: Switch-point logic

▶ Go to the [EF] > [OUTx] menu.

▶ Select [LOGI] and set the switch-point logic.

10.4.5.2 Parameter setting via IO-Link: Switch-point logic

▶ Select [Parameter] > [SSC1.x].

▶ Select [SSC1.x Config. Logic] and set the switch point logic for the switching signal channel SSC1.x.

10.4.6 Switching delay

For the switching output, a separate delay time can be set for the output to switch and to be reset.

10.4.6.1 Parameter setting via device keys: Switching delay

▶ Go to the [EF] > [OUTx] menu.

▶ Select [dSx] and set the delay for switching OUTx in seconds.

▶ Select [drx] and set the delay for resetting OUTx in seconds.

10.4.6.2 Parameter setting via IO-Link: Switching delay

▶ Select [Parameter] > [SSC1.x].

▶ Select [SSC1.x Delay dS] and set the delay in seconds for switching OUTx.

▶ Select [SSC1.x Delay dr] and set the delay in seconds for resetting OUTx.

10.5 Display settings

10.5.1 Display layout

The standard display can be set via the parameter [diS.L].

If PV is set, only the process value for pressure is displayed. For all other settings, additional information is displayed below the process value depending on the selection.

	Device keys	IO-Link	Description
1	[PV]	[PV]	Current process value for pressure
2	[SP1]	[SSC1.1-Param_SP1]	Set switch point 1 for switching signal channel SSC1.1
3	[SP2]	[SSC1.1-Param_SP2]	Set switch point 2 for switching signal channel SSC1.1. Not available if [Single Point] is set
4	[BGrp]	[Bargraph SSC1.1]	Switching signal channel SSC1.1 as bar graph
5	[sC.1]	[SSC Counter1]	Switching cycles counter SSC1.1
6	[Hi.P]	[Hi.P]	Indication of the highest measured process value for pressure
7	[Lo.P]	[Lo.P]	Indication of the lowest measured process value for pressure
8	Not available	[App.Spec.Tag]	Indication of the application-specific tag. See Device information (→ 🗋 48)

Tab. 3: Display layouts (DIS.L)

10.5.1.1 Parameter setting via unit keys: display layout

▶ Call up the menu [EF] > [DIS].

▶ Select [diS.L] and set layout.

10.5.1.2 Parameter setting via IO-Link: display layout

▶ Call up [Parameters] > [Display Setting].

▶ Select [diS.L] and set layout.

10.5.2 Display bar graph scaling

If the [BGrp] setting is selected as display layout, the switching signal channel SSC1.1 is displayed as a bar graph: Display layout (→ 🗋 40).

In the factory setting the bar graph bar shows the entire measuring range. However, it may be useful to restrict the measuring range to be displayed so that the switch points and the process value bar are better resolved:

Fig. 32: Scaling of the bar graph display

1: Bar graph with factory setting*. Example:
- [BGrp.S] = 0 bar = initial value of the measuring range MAW
- [BGrp.E] = 16 bar = final value of the measuring range MEW

For devices with a negative measuring range to zero (vacuum devices PQSxx9 with measuring range -1 bar...0 bar), the factory setting is reversed:
- [BGrp.S] = 0 bar **=** final value of the measuring range MEW
- [BGrp.E] = -1 bar = initial value of the measuring range MAW

2: Bar graph for scaling. Example:
- [BGrp.S] = 3 bar
- [BGrp.E] = 8 bar

10.5.2.1 Parameter setting via the device keys: Bar graph scaling

▶ Call up the menu [EF] > [DIS].

▶ Select [BGrp.S] and set the minimum pressure value for the bar graph bar.

▶ Select [BGrp.E] and set the maximum pressure value for the bar graph bar.

10.5.2.2 Parameter setting via IO-Link: Bar graph scaling

▶ Call up [Parameters] > [Display Setting].

▶ Select [BGrp.S] and set the minimum pressure value for the bar graph bar.

▶ Select [BGrp.E] and set the maximum pressure value for the bar graph bar.

10.5.3 Display update rate

The update rate of the display can be set via the parameter [diS.U].

Selectable values:

- d1: fast
- d2: medium
- d3: slow

10.5.3.1 Parameter setting via unit keys: display update rate

▶ Call up the menu [EF] > [DIS].

▶ Select [diS.U] and set the update rate.

10.5.3.2 Parameter setting via IO-Link: display update rate

▶ Call up [Parameters] > [Display Setting].

▶ Select [diS.U] and set the update rate.

10.5.4 Display language

The display language can be set via the parameter [LanG].

Selectable languages:

- DE: German
- EN: English
- FR: French
- ES: Spanish
- IT: Italian
- PT: Portuguese
- ZH: Chinese
- JA: Japanese
- KO: Korean

10.5.4.1 Parameter setting via unit keys: display language

▶ Call up the menu [EF] > [DIS].

▶ Select [LanG] and set the language.

10.5.4.2 Parameter setting via IO-Link: display language

▶ Select [Parameters] > [Basic settings].

▶ Select [LanG] and set the language.

10.5.5 Display brightness

The display brightness can be set via the parameter [diS.B].

Selectable values:

- 25%
- 50%
- 75%
- 100%
- OFF: energy-saving mode. the display is switched off in the operating mode.
  Display activation by pressing any key. After 30 s of inactivity, the display is switched off again.

In case of warnings or error messages and in case of optical localisation, the display will come back on even with the setting [OFF].

If the device measures a high internal temperature, the display brightness is automatically adjusted:
Internal temperature > 67 °C: The brightness is reduced to 25%.
Internal temperature > 80 °C: The display is switched off. Activation by key touch. See also Warning messages and Error messages.

10.5.5.1 Parameter setting via unit keys: display brightness

▶ Call up the menu [EF] > [DIS].

▶ Select [diS.B] and set the brightness of the display.

10.5.5.2 Parameter setting via IO-Link: display brightness

▶ Call up [Parameters] > [Display Setting].

▶ Select [diS.B] and set the brightness of the display.

10.5.6 Display rotation

Use the parameter [diS.R] to rotate the text in the display clockwise for better readability.

Selectable values:

- [0°] not rotated
- [90°] *
- [180°]
- [270°] *

* With the settings [90°] and [270°], in contrast to the setting [180°], only the process value display is rotated, but not the parameter display.

10.5.6.1 Parameter setting via unit keys: display rotation

▶ Call up the menu [EF] > [DIS].

▶ Select [diS.R] and set the display rotation.

10.5.6.2 Parameter setting via IO-Link: display rotation

▶ Call up [Parameters] > [Display Setting].

▶ Select [diS.R] and set the display rotation.

10.5.7 Display colour setting

The display colours can be set via the parameter [coL.P].

This function is only available for output OUT1.

The parameter setting [W/B] permanently sets the display to white text and black background.

With the parameter settings [r1ou] and [G1ou], the font colour is black and the background changes colour depending on the process value:

In [Single Point Mode] and [Two Point Mode], the colour changes if the process value is above the switch point:

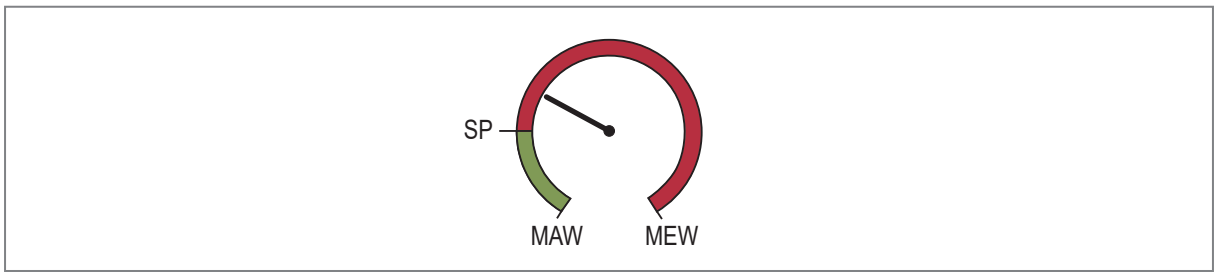


Fig. 33: Colour change in [Single Point] / [Two Point] mode; example: coLr = r1ou; normally open

In [Window Mode], the colour changes if the process value is within the window section:

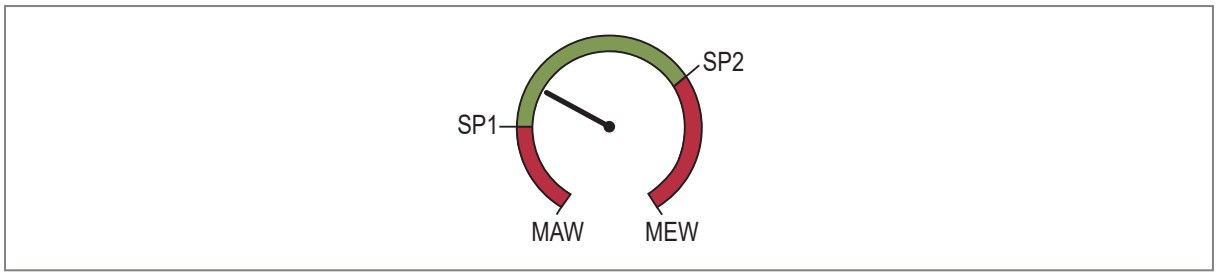


Fig. 34: Colour change in [Window] mode; example: coLr = G1ou; normally open

Selectable values:

- [W/B]: The font colour is always white and the background black, regardless of the switching status.
- [r1ou]: The display background changes from green to red.
- [G1ou]: The display background changes from red to green.

The colour change occurs taking into account the switch-point logic and the hysteresis.

10.5.7.1 Parameter setting via unit keys: Display colour setting

▶ Call up the menu [EF] > [DIS].

▶ Select [coL.P] and set the display colour.

10.5.7.2 Parameter setting via IO-Link: Display colour setting

▶ Call up [Parameters] > [Display Setting].

▶ Select [coL.P] and set the display colour.

10.6 Diagnostic functions

10.6.1 Memory

The device stores the highest and lowest process value measured.

The current value can be read from the unit's display or via the IO-Link interface.

Selectable values:

- [Lo.P]: minimum value memory for pressure
- [Hi.P]: maximum value memory for pressure

It makes sense to delete the memories as soon as the unit operates under normal operating conditions for the first time.

10.6.1.1 Reading via device keys: Memory

▶ Go to the menu [EF] > [DIA].

▶ Select [Lo.P] or [Hi.P] and read the minimum or maximum stored process value.

Clear memory:

▶ Go to the menu [EF] > [DIA].

▶ Select [Lo.P] or [Hi.P] and set [Reset] > [Yes].

10.6.1.2 Reading via IO-Link: Memory

▶ [Parameters] > Call up [memory] .

▶ Select [Lo.P] or [Hi.P] and read the minimum or maximum stored process value.

Clear memory:

▶ [Parameters] > Call up [memory] .

▶ Execute command:

- [Reset Hi.x and Lo.x memory]
- [Reset Lo.x memory]
- [Reset Hi.x memory]

10.6.2 Operating hours counter

The operating hours since the first set-up are stored by the unit.

The current value can be read from the unit's display or via the IO-Link interface.

In case of a voltage interruption, no more than the count of the last hour will be lost.

10.6.2.1 Reading via unit keys: operating hours

▶ Go to the menu [EF] > [DIA].

▶ Select [Operating hours] and read value.

10.6.2.2 Reading via IO-Link: Operating hours

▶ Select [Diagnosis].

▶ Select [Operating hours] and read value.

10.6.3 Counter overpressure events

The device has a counter for overpressure events. The value above which a pressure is considered to be overpressure (pressure limit) can be set with the parameter [HIPS]. The limit must be exceeded for at least 0.5 ms.

The number of pressure limit violations can be displayed using the [HIPC] parameter.

This function is only available via the IO-Link interface.

In case of a voltage interruption, the events of the last 10 minutes can be lost.

10.6.3.1 Parameter setting via IO-Link: Pressure limit

▶ Select [Diagnosis] > [Pressure].

▶ Select [HIPS-PRES] and set the value for the pressure limit.

10.6.3.2 Reading via IO-Link: Overpressure events

▶ Select [Diagnosis] > [Pressure].

▶ Select [HIPC] to display the number of overpressure events.

Clear memory:

▶ Execute command: [Reset HIPC].

10.6.4 Switching cycles counter

The device stores the number of switching cycles of the two switching signal channels SSC1.1 and SSC1.2.

The current value can be read from the unit's display or via the IO-Link interface.

In case of a voltage interruption, the events of the last 10 minutes can be lost.

10.6.4.1 Reading via device keys: Switching cycles

▶ Go to the menu [EF] > [DIA].

▶ Select [sC.x] and read the number of switching cycles of switching signal channel SSC1.x.

Clear memory:

▶ Go to the menu [EF] > [DIA].

▶ Select [sC.x] and set [Reset] > [Yes].

10.6.4.2 Reading via IO-Link: Switching cycles

▶ Select [Parameters] > [Counter configuration].

▶ Select [SSC Counter.SSC1.x] and read the number of switching cycles of switching signal channel SSC1.x.

Clear memory:

▶ Select [Parameters] > [Counter configuration].

▶ Execute command: [Reset counter to zero].

10.6.5 Temperature

The device measures the internal device temperature and the medium temperature.

Both values are provided acyclically via the IO-Link interface and can only be read via IO-Link:

▶ Select [Parameters] > [Diagnosis] > [Temperature].

▶ Read [internal temperature] or [medium temperature].

10.7 Service functions

10.7.1 Simulation

With this function, process values are simulated and their signal path is checked.

Process values that lead to an error message or warning can be simulated (e.g. OL).

The title line of the display shows that the simulation is active.

10.7.1.1 Parameterisation via unit keys: Simulation

▶ Go to the [EF] > [SIM] menu.

▶ Select [S.PRS] and set the pressure value to be simulated or a diagnostic case (e.g. OL).

▶ Select [S.Tim]and set the time of the simulation in minutes.

▶ Select [S.On] and set the function:

- [On]: The simulation starts. The values are simulated for the time set under [S.Tim]. Abort by pressing any key.
- [OFF]: The simulation is not active.

10.7.1.2 Parameterisation via IO-Link: Simulation

▶ Select [Parameters] > [Simulation] > [Temperature].

▶ Select [S.PRS] and set the pressure value to be simulated or a diagnostic case (e.g. OL).

▶ Select [Parameter] > [Simulation].

▶ Select [S.Tim] and set the time of the simulation in minutes.

▶ Select [Write to device].

▷ The changed values are transferred to the unit.

▶ Select [Parameter] > [Simulation].

▶ Execute command: [Start Simulation].

▷ The simulation starts with the set values.

▶ To end the simulation: Execute command: [Stop Simulation].

10.7.2 Device information

The following device information is stored:

Reading on device	Reading via IO-Link
Article number	Product name
---	Family
---	Description
---	Manufacturer
---	Manufacturer ID
---	Device ID
---	Hardware revision
---	Firmware revision
EEPROM version	---
Software version	---
Serial number	
Application tag *	
Location tag *	
Function tag *	

* freely editable via IO-Link, maximum length of 32 characters.

10.7.2.1 Reading via the unit keys: device information

▶ Go to the menu [EF] > [DevInfo].

▶ Read the unit information.

10.7.2.2 Reading or parameter setting via IO-Link: device information

▶ Select [Identification].

▶ Read device information or edit editable parameters.

10.7.3 Binary data transmission (BLOB)

The device offers a function for reading binary data from the device as one large file (BLOB = Binary Large Object).

The data is exported as a CSV file.

This requires a software tool (e.g. ifm moneo) that supports the IO-Link BLOB interface.

The CSV file contains the following logbook information:

- device information for identification
- number of operating hours
- event logging:
  - event history with time stamp
  - event code
  - event description
  - event frequency
  - device restarts

Only the last 50 events are saved.

In case of a voltage interruption, the events of the last 10 minutes can be lost.

10.7.3.1 Export binary data

The following section describes the parameter setting procedure using ifm moneo. If other software is used, the parameter setting procedure can differ.

✓ The [Configure devices] view is open.

✓ The connection to the device has been established.

✓ The parameter value editor for the device is open.

✓ The device supports the BLOB function.

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

▶ Select the [File transfer (BLOB)] tab.

▶ From the [Selected function] list, select the desired BLOB function.

▶ Execute command: [Export data from device].

▶ Click [Save file] and select file name and file path.

▷ moneo saves the selected data on the PC.

10.7.4 Optical localisation

The sensor can be located remotely in the system via the IO-Link interface.

When the command is used, the switching status LEDs will flash and IO-Link will flash on the display.

▶ Select [Identification].

▶ Execute command: [Locator Start].

▶ To end the flashing process: Execute command: [Locator Stop].

The flashing can also be stopped by pressing any key on the device.

10.7.5 Lock / unlock

The unit can be locked electronically to prevent unauthorised setting.

This lock prevents the settings from being changed via the keys on the unit.

Factory setting: not locked.

10.7.5.1 Parameter setting via unit keys: lock / unlock

Locking:

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

▶ Press [▲] and [▼] simultaneously for 10 s until [Loc] is displayed.

▷ The device is locked for parameter setting via the device keys. When trying to change a parameter value, the symbol appears in the display.

The locking can only be removed via the device keys. Changing the parameter setting is still possible via the IO-Link interface.

Unlocking:

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

▶ Press [▲] and [▼] simultaneously for 10 s until [uLoc] is displayed.

▷ The locking of the device keys is removed.

10.7.5.2 Parameter setting via IO-Link: lock / unlock

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

▶ Select [Parameter] > [Other settings].

▶ Select [Device Access Locks.Local User Interface] and set [Locked].

▷ The device is locked for parameter setting via the device keys. When trying to change a parameter value, the symbol appears in the display.

The locking can be removed via the IO-Link parameter [Unlocked].

10.7.6 Reset the device

The device can be reset in two ways.

With both reset applications, the operating hours since the first set-up are not reset.

[APPL] = application reset

The following is reset:

- All changed application-specific parameters

If IO-Link data storage is activated, this triggers a parameter update in the master. This writes the parameters configured in the master to the device again. An application reset may therefore be ineffective.

[BtB] = Back to Box

The following is reset:

- All changed application-specific parameters
- All writeable unit identification parameters such as [Application Specific Tag], [Function Tag] or [Location Tag].
- Diagnostic parameters, status parameters, events.
- Number of switching cycles
- Minimum and maximum memory value for pressure

After the Back to Box reset, the sensor suspends communication and measurement operation until the voltage is interrupted. The IO-Link data storage is not triggered.

10.7.6.1 Parameter setting via unit keys: reset the unit

▶ Select [EF] > [rES].

▶ Select [APPL] or [BtB] and set [Yes].

Only if [BtB] is selected:

▶ Disconnect and reconnect the voltage supply.

▷ The device carries out a reboot.

10.7.6.2 Parameter setting via IO-Link: reset the unit

▶ Select [Parameters] > [Basic settings].

▶ Execute command: [Application reset] or [Back to Box].

Only if BtB is selected:

▶ Disconnect and reconnect the voltage supply.

▷ The device carries out a reboot.

11 Operation

After power on and expiry of the power-on delay time, the unit is in the normal operating mode. It carries out its measurement and evaluation functions and generates output signals according to the set parameters.

Use the device keys to view additional information during operation:

▶ Press the [▲] or [▼] key repeatedly.

▷ The display alternates between different screens.

▷ After 30 seconds, the device returns to the user-defined display layout.

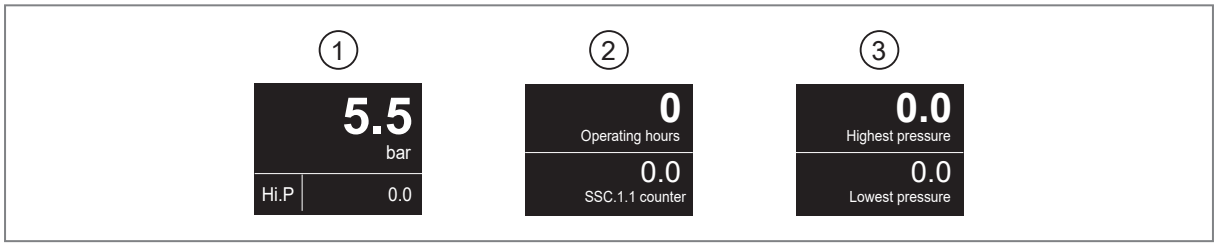


Fig. 35: Switching between display screens

1: User-defined display layout (→ Display layout 🗋 40)
2: Indication of operating hours and SSC1.1 counter value
3: Indication of highest and lowest measured pressure value

12 Troubleshooting

The device provides self-diagnostic options. It monitors itself automatically during operation.

Warnings and error states are displayed even if the display is switched off.

If several diagnostic events occur simultaneously, only the diagnostic message of the event with the highest priority is displayed.

Additional diagnostic functions are available via IO-Link → IO-Link interface description at documentation.ifm.com.

12.1 Warning messages

Display	LEDs*	Problem	Corrective measures
Title line: Internal temperature ⚠ Display with reduced brightness.	Indication of the switching states	Internal device temperature over 67 °C.	▶ Allow device to cool down.
Display off. ▶ Activated by key touch ▷ Process value line: Message "🌡" for 5 s. ▷ After 10 s of inactivity, the display will turn off again.	Indication of the switching states	Internal device temperature over 80 °C.	▶ Allow device to cool down.
Display off. ▶ Activated by key touch ▷ Title line: Internal temperature ⚠ ▷ After 10 s of inactivity, the display will turn off again.	Indication of the switching states	Internal device temperature over 92 °C.	▶ Allow device to cool down.
Title line: Over limit ⚠ Process value line: OL	Indication of the switching states	Measuring range exceeded: measured value > 105% of the final value of the measuring range.	▶ Check measuring range (see data sheet).
Title line: Under limit ⚠ Process value line: UL	Indication of the switching states	Value below measuring range: measured value < -5% of the initial value of the measuring range.	▶ Check measuring range (see data sheet).
Title line: Lock via key Process value line: 🔒	Indication of the switching states	Setting keys on the unit locked, parameter change rejected.	▶ Unlock the device using the keys.
Title line: Lock via system Process value line: 🔒	Normal indication of the switching states	Setting keys locked via parameter setting software, parameter change rejected.	▶ Unlock the unit via IO-Link interface using the parameter setting software.
Title line: Lock via communication Process value line: 🔒	Indication of the switching states	Parameter setting via keys locked, parameter setting via IO-Link communication active.	▶ Finish parameter setting via IO-Link communication.
Title line: Locator Process value line: IO-Link (green flashing)	Both LEDs flash	IO-Link function for optical identification of the device is active.	▶ Deactivate optical localisation via IO-Link.
Title line: Simulation active ▼	Indication of the switching states according to the simulated parameters	Simulation mode is active.	▶ Terminate the simulation mode.

* LED1 and LED2 (→ Operating and display elements 20)

12.2 Error messages

Display	LEDs*	Problem	Corrective measures
Display off.	Off	Supply voltage too low.	▶ Check/correct supply voltage.
Display off. ▶ Activation by key touch. ▷ Title line: Temperature error ▲ ▷ After 10 s of inactivity, the display will turn off again.	Off	Internal device temperature over 97 °C. The outputs are switched off.	▶ Allow device to cool down.
	Off	Internal device temperature over 102 °C. IO-Link communication is disabled.	▶ Allow device to cool down.
Title line: ⊗ ERROR	Both LEDs light	Device faulty / hardware error / malfunction	▶ Replace the device.
Title line: Parameter setting fault ● Process value line: ⊗ PARA	Both LEDs light	Parameter setting outside the valid range.	▶ Check parameter settings.
Title line: Short circuit ⚠ Process value line: ---	Both LEDs flash	Short circuit at OUT1 and OUT2.	▶ Check OUT1 and OUT2 for short circuit or excessive current.
Title line: Short circuit OUT1 ⚠ Process value line: ---	LED1 flashes	Short circuit at OUT1.	▶ Check OUT1 for short circuit or excessive current.
Title line: Short circuit OUT2 ⚠ Process value line: ---	LED2 flashes	Short circuit at OUT2.	▶ Check OUT2 for short circuit or excessive current.

* LED1 and LED2 (→ Operating and display elements 20)

In the event of a fault, both inputs are closed (ON).

13 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.

14 Factory setting

Parameter		Factory setting		User settings
	uni.P	Depends on device type (→ technical data at www.ifm.com): MPa, kPa, bar, mbar, psi, inHg, mmHg, kgf/cm², %		
	P-n	Depends on device type (→ technical data at www.ifm.com)		
	dAP.P	0.06		
	cOF	0		
	S.Tim	3		
	S.On	OFF		
	S.PRES	**Measuring range**	**S.PRES**	
		-1…0 bar	-0.5 bar	
		-1…1 bar	0 bar	
		-1…10 bar	5 bar	
		0…16 bar	8 bar	
	Loc	ULoc		
	HIPS	**Measuring range**	**HIPS**	
		-1…0 bar	0.05 bar	
		-1…1 bar	1 bar	
		-1…10 bar	10 bar	
		0…16 bar	16 bar	
	LanG	EN		
	diS.R	0		
	diS.B	75		
	diS.L	PV		
	diS.U	d2		
	coL.P	W/B		
	BGrp.S	MAW Vacuum devices (measuring range -1...0 bar): MEW		
	BGrp.E	MEW Vacuum devices (measuring range -1...0 bar): MAW		
	Teach Select	SSC1.1		
SSC1.1 (OUT1)	ou1	SSC1.1		
	Switch-point logic	High active (no) PQSxx9: Low active (nc)		
	Switch-point mode	Single point		
	SP1	**Measuring range**	**SP1**	
		-1…0 bar	-0.25 bar	
		-1…1 bar	-0.5 bar	
		-1…10 bar	2.5 bar	
		0…16 bar	4 bar	
	HYS	Auto (→ Digital switching signal 🗋 33)		
	Switch-on delay	0.0		
	Switch-off delay	0.0		

Parameter		Factory setting		User settings
SSC1.2 (OUT2)	ou2	SSC1.2		
	Switch-point logic	High active (no) PQSxx9: Low active (nc)		
	Switch-point mode	Single point		
	SP1	**Measuring range**	**SP1**	
		-1…0 bar	-0.75 bar	
		-1…1 bar	0.5 bar	
		-1…10 bar	7.5 bar	
		0…16 bar	12 bar	
	HYS	Auto (→ Digital switching signal 🗋 33)		
	Switch-on delay dS	0.0		
	Switch-off delay dr	0.0		

MAW = initial value of the measuring range

MEW = final value of the measuring range