

PBST

SICK
Sensor Intelligence.



Described product

PBST

Manufacturer

SICK AG
Erwin-Sick-Str. 1
79183 Waldkirch
Germany

Legal information

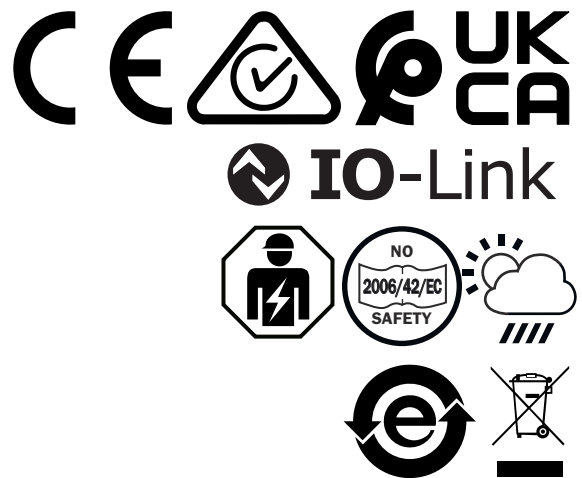
This work is protected by copyright. Any rights derived from the copyright shall be reserved for SICK AG. Reproduction of this document or parts of this document is only permissible within the limits of the legal determination of Copyright Law. Any modification, abridgment or translation of this document is prohibited without the express written permission of SICK AG.

The trademarks stated in this document are the property of their respective owner.

© SICK AG. All rights reserved.

Original document

This document is an original document of SICK AG.



For product variants with a measuring range ≤ 150 bar



Contents

1	About this document.....	5
1.1	Information on the operating instructions.....	5
1.2	Target group.....	5
1.3	Further information.....	5
1.4	Symbols and document conventions.....	5
2	Safety information.....	7
2.1	Basic safety notes.....	7
2.2	Intended use.....	7
2.3	Cybersecurity.....	8
2.4	Qualification of personnel.....	8
3	Product description.....	9
3.1	Product identification.....	9
3.2	Overview of the product.....	9
3.3	Product characteristics.....	10
3.4	Description of operation.....	13
4	Mounting.....	18
4.1	Mounting requirements.....	18
4.2	Mounting the device.....	18
5	Electrical installation.....	20
5.1	Notes on electrical installation.....	20
5.2	Notes on UL approval.....	21
5.3	Integration of the sensor in IO-Link mode.....	21
5.4	Electrical connection.....	21
6	Commissioning.....	23
6.1	Commissioning.....	23
6.2	Configuration via IO-Link.....	23
7	Operation.....	24
7.1	Status display.....	24
7.2	Structure of the main screen.....	24
7.3	Display messages.....	25
8	Parameterization.....	26
8.1	Configuration via touch screen.....	26
8.2	“Settings” menu tree.....	26
8.3	Description of the settings under “Settings”.....	29
8.4	Easy mode.....	35
8.5	Configuration via IO-Link.....	36
8.6	Locking via IO-Link.....	36
9	Troubleshooting.....	37
9.1	Troubleshooting integrated IO-Link devices.....	37
10	Deinstallation.....	38
10.1	Sensor replacement/data storage.....	38
11	Maintenance/de-commissioning.....	39
12	Repair/return.....	40

13	Disposal.....	41
14	Technical data.....	42
14.1	Technical data.....	42
14.2	Dimensional drawings.....	44
15	Annex.....	46
15.1	Conformities and certificates.....	46
15.2	Licenses.....	46

1 About this document

1.1 Information on the operating instructions

Read these operating instructions carefully before starting any work in order to familiarize yourself with the product and its functions.

The operating instructions are an integral part of the product and should remain accessible to the personnel at all times. When handing this product over to a third party, include these operating instructions.

These operating instructions do not provide information on the handling and safe operation of the machine or system in which the product is integrated. Information on this can be found in the operating instructions for the machine or system.

1.2 Target group

This document is intended for persons who commission, install, operate and maintain the product.

1.3 Further information

You can find the product page with further information via the SICK Product ID: pid.sick.com/{P/N}/{S/N} (see "Product identification via the SICK product ID", page 9).

The following information is available depending on the product:

- This document in all available language versions
- Data sheets
- Other publications
- CAD files and dimensional drawings
- Certificates (e.g., declaration of conformity)
- Software
- Accessories

1.4 Symbols and document conventions

Warnings and other notes



DANGER

Indicates a situation presenting imminent danger, which will lead to death or serious injuries if not prevented.



WARNING

Indicates a situation presenting possible danger, which may lead to death or serious injuries if not prevented.



CAUTION

Indicates a situation presenting possible danger, which may lead to moderate or minor injuries if not prevented.



NOTICE

Indicates a situation presenting possible danger, which may lead to property damage if not prevented.



NOTE

Highlights useful tips and recommendations as well as information for efficient and trouble-free operation.

Instructions to action

- ▶ The arrow denotes instructions to action.
- 1. The sequence of instructions is numbered.
- 2. Follow the order in which the numbered instructions are given.
- ✓ The tick denotes the results of an action.

2 Safety information

2.1 Basic safety notes

Please observe the safety notes and the warnings listed here and in other sections of this product documentation to reduce the possibility of risks to health and avoid dangerous situations.

- Only use the PBST pressure sensors in applications that are within their technical performance limits (e.g. max. ambient temperature, material compatibility, ...).
- The overload pressure must not be exceeded at any time, even when errors in the end application occur. Strains exceeding the overload protection can cause measurement errors.
- The product complies only with the EMC requirements for the industrial sector
- Only professionally trained personnel may assemble, install, operate, parameterize and maintain the product.
- Only use the product in accordance with the applicable national and international regulations, directives, standards and laws.



CAUTION

Failure to observe the relevant work safety regulations may lead to physical injury or cause damage to the system.

Maintenance/de-commissioning



DANGER RISK OF DEATH

Risk to death from flying parts, escaping medium and electric shock.

- Only remove pressure sensors when in a depressurized and de-energized state!
- Before removing, check whether it is necessary to drain the medium.



CAUTION RESIDUES

Residues of the medium on the device may pose a risk to the operator and the environment.

- Wear suitable protective clothing, e.g., gloves or safety goggles.



CAUTION DAMAGE TO THE MEASURING CHAMBER

Incorrect cleaning can lead to irreparable damage to the measuring chamber.

- Do not use compressed air or sharp objects for cleaning!

2.2 Intended use

The product is intended exclusively for use in industrial applications.

The PBST pressure sensors measure the pressure of Fluid Group 2 media and show the measured values on a TFT touch display. You can optionally also output either a switching signal and/or an analog signal.

The product is vacuum-proof and may only be used as described in these instructions. Any other use is considered improper.

The PBST pressure sensors are not safety components.

The product must only be used within the prescribed limits and the specified technical specifications and operating conditions.

Incorrect use, improper modification or manipulation of the product will invalidate any warranty from SICK; in addition, any responsibility and liability of SICK for damage and secondary damage caused by this is excluded.

2.3 Cybersecurity

Overview

To protect against cybersecurity threats, the operator must have a comprehensive cybersecurity concept, which must be continuously monitored and maintained. A suitable concept consists of organizational, technical, procedural, electronic, and physical levels of defense and considers suitable measures for different types of risks. The measures implemented in this product can only support protection against cybersecurity threats if the product is used as part of such a concept.

You will find further information at www.sick.com/psirt, e.g.:

- General information on cybersecurity
- Contact option for reporting vulnerabilities
- Information on known vulnerabilities (security advisories)

2.4 Qualification of personnel

Any work on the product may only be carried out by personnel qualified and authorized to do so.

Qualified personnel are able to perform tasks assigned to them and can independently recognize and avoid any potential hazards. This requires, for example:

- technical training
- experience
- knowledge of the applicable regulations and standards

3 Product description

3.1 Product identification

3.1.1 Product identification via the SICK product ID

SICK product ID

The SICK product ID uniquely identifies the product. It also serves as the address of the web page with information on the product.

The SICK product ID comprises the host name pid.sick.com, the part number (P/N), and the serial number (S/N), each separated by a forward slash.

For many products, the SICK product ID is displayed as text and QR code on the type label and/or on the packaging.



Figure 1: SICK product ID

3.2 Overview of the product

3.2.1 Overview of the product

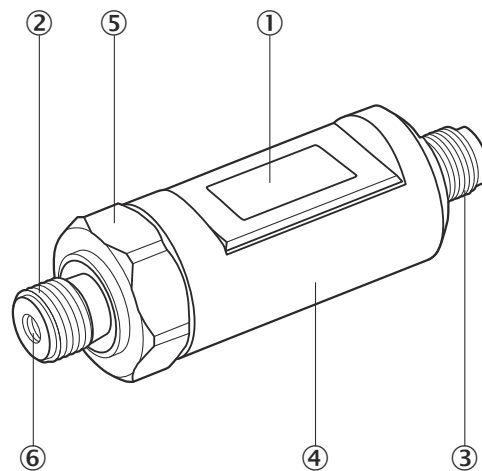
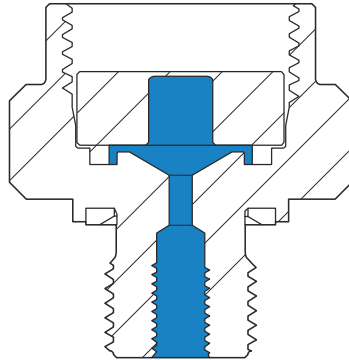


Figure 2: Overview of the product

- ① 160x80px touch display
- ② Process connection
- ③ Electrical connection
- ④ 350° rotatable housing
- ⑤ Process connection spanner flat
- ⑥ M5 internal thread for pressure spike restrictor

3.3 Product characteristics

3.3.1 Design and function



The PBST pressure sensor records pressures using a ceramic measuring chamber. The effect of pressure on the resistance bridge of the ceramic measuring chamber results in a proportional change in resistance, which is conditioned and further processed within the sensor and finally made available to the user via the display or via the electrical output signal by means of a standardized industrial signal.

3.3.2 Characteristics

The PBST pressure sensor is an Industry 4.0-capable IO-Link sensor with a TFT touch screen and a novel and innovative operating concept that does not require any pushbuttons. It is operated exclusively via swipe gestures.

The extremely compact design makes the sensor ideal for use in the tightest of spaces. The IP67 / IP68 housing is made entirely of stainless steel and shatterproof glass. Other key features include fully configurable outputs (switching output/analog output/IO-Link), extended display and diagnostics options thanks to the 160x80px display, and a virtual, two-part scroll wheel.

- Recording the pressure of Fluid Group 2 media
- IO-Link 1.1 communication (as per Smart Sensor Profile)
- 0.96" TFT touch display, shatterproof
- Virtual, two-part scroll wheel
- Extended display and diagnostics options thanks to 160x80px display
- 2 configurable outputs (switching output/analog/IO-Link)
- Enclosure rating IP65 / IP67 / IP68
- 350° rotatable housing incl. display after installation
- Stainless-steel housing 1.4404/1.4305/1.4301
- Extremely compact design

3.3.3 Leak tightness

Assignment of leak tightness to leakage rate:

The PBST pressure sensor is tested for leaks in the end-of-line test using a helium vacuum leak test system and, at nominal pressure, exceeds at least the “gas-tight” leakage group $Q < 10^{-6}$ mbarl/s

Water-tight	$Q < 10^{-2} \text{ mbar l/s}$	(Surface tension prevents seepage)
Steam-tight	$Q < 10^{-3} \text{ mbar l/s}$	(Steam-tight, tight against sweating)
Bacteria-tight	$Q < 10^{-4} \text{ mbar l/s}$	(Diameter of bacteria approx. $0.5 \mu\text{m}$)
Gasoline-/oil-tight	$Q < 10^{-5} \text{ mbar l/s}$	
“Gas-tight”	$Q < 10^{-6} \text{ mbar l/s}$	($\sim 1 \text{ cm}^3$ gas loss in 12 days)
Viral-tight	$Q < 10^{-8} \text{ mbar l/s}$	(Diameter of small viruses approx. 10 nm)
Techn. absolutely tight	$Q < 10^{-10} \text{ mbar l/s}$	
Atom-tight	$Q < 10^{-12} \text{ mbar l/s}$	(Hole diameter = atomic radius)

3.3.4 User interface

The user interface was completely redeveloped for this sensor. Instead of using the customary (capacitive or mechanical) buttons to navigate through a menu, usually displayed using 3 or 4 digits, the user interface of the PBST pressure sensor consists of a 160x80px TFT touch display.

The menu items are displayed in cleartext, often with helpful additional information or color highlighting. Navigation through the menu is intuitive and considerably simplified by swiping left/right and up/down.

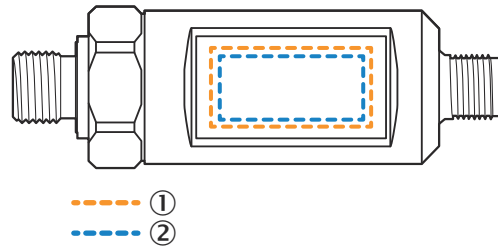


Figure 3: User interface

- ① Touch area
- ② Display area

3.3.5 Operation

3.3.5.1 Navigating through the menu

The available swipe gestures are:

- **UP/DOWN**
Switch between vertically arranged screens and scroll up or down the menu items or numerical values.
- **LEFT/RIGHT**
Switch between horizontally arranged screens and change the menu depth, i.e., enter or exit a submenu item.



NOTE

When you exit a submenu item, the set or adjusted value of the relevant menu item is automatically saved.

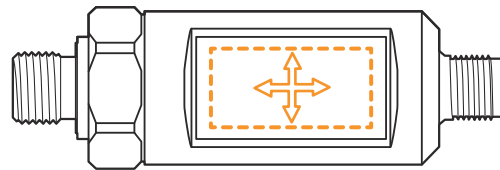


Figure 4: Swipe gestures

3.3.5.2 Confirming changed menu items

It is not necessary to confirm changed menu items; the changes are automatically saved the moment the respective submenu is exited again with a swipe gesture to the left or right.

If you are still in the menu item and accidentally change values that should not be saved, the sensor must be disconnected from the power supply before exiting the menu item. In this case, the change is not saved.

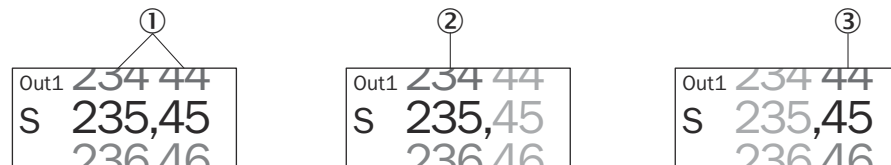


NOTE

To reset the settings to the factory settings, a factory reset can be carried out via the Settings menu, see ["Factory settings/"Fact. reset" main menu item](#), page 35

3.3.5.3 Virtual scroll wheel

A 2-part virtual scroll wheel has been implemented to quickly and conveniently adjust numerical values such as the switching point.



- ① Two separate scroll wheels
- ② Left scroll wheel
- ③ Right scroll wheel

Regardless of the displayed unit of the number or the number of digits and decimal places of the displayed number, the scroll wheel is always divided after the first two digits from the right. In the default setting with pressure values in bar, the division corresponds to the decimal point, but this is not necessarily the case with other units or display settings.

Scrolling behavior

The scroll wheel can be operated in several stages, ensuring maximum convenience and speed when adjusting numerical values.

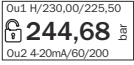
- Swiping up or down once moves the scroll wheel exactly one position.
- If you swipe up or down twice within approx. 0.5 s, the scroll wheel starts to move slowly on its own.
- A further swipe in the scroll direction accelerates the wheel. There are a total of 3 speed levels.
- A tap on the touch display or the moving wheel stops the wheel.

Both scroll wheels can be operated independently of each other. Depending on where the swipe gesture is made, the corresponding scroll wheel is set in motion.

3.4 Description of operation

3.4.1 Main screens (normal operation)

After switching on or connecting the supply voltage, the main screen that was last used appears. In the default factory setting, this is the 3rd main screen, i.e., the pressure display with Out1 / Out2 details. After unlocking the screen lock (see Section 8), you can switch between the 4 main screens by swiping up or down.

①		Energy-saving mode: Display OFF (in 30 s)
②		Pressure value display
③		Pressure display with Out1 / Out2 details
④		Settings

While one of the main screens 1-3 is displayed, the sensor is in normal operation. Main screen 4 is intended for entering the Settings menu.

3.4.2 Settings menu

When you are on the 4th main screen, you can access the Settings menu by swiping to the left. This contains the following main menu items, which can be selected by scrolling up or down using the swipe gesture. The selected main menu item can then be entered again by swiping to the left, and exited again by swiping to the right.

		All settings for the outputs
		Options for what appears on the display
		Settings for the measurement signal
		Zero the sensor to the current atmosphere
		Diagnostic settings and information

	Diagnosis Info Fact. reset Settings	Information about the sensor
	Info Fact. reset Settings	Factory settings



NOTE

If you reach the lowest menu level by swiping to the left, you can either return by swiping to the right several times, or you can swipe to the left again to return directly to the main menu item.

3.4.3 Behavior of the digital switching outputs

For the digital switching outputs SSC1 and SSC2, the following selection options are available for the operating mode (**Mode**):

Deactivated

The switching output is disabled. The output state is “inactive” or set to “0”, regardless of the measured value

Single Point mode

In Single Point mode, the switching behavior is defined via a limit value SP1 and a hysteresis. The output changes its output state at the limit value SP1. The hysteresis is defined in the corresponding menu item and must be within the measuring range. If the measured value increases, the switching output is inactive as long as the measured value is between the start of the measuring range and the limit value SP1. If the measured value rises above the SP1 limit value, the switching output becomes active. If the measured value falls, the switching output is active as long as the measured value is between the end of the measuring range and the limit value SP1 minus the set hysteresis (SP1-Hyst). If the measured value falls below the limit value (SP1-Hyst), the switching output becomes inactive.

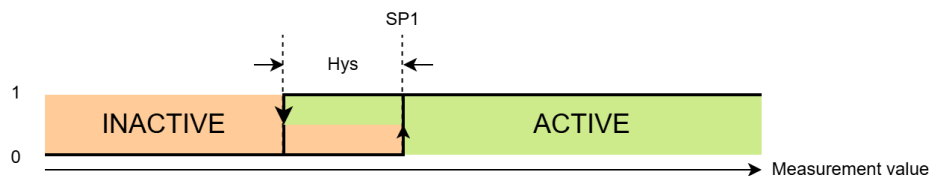


Figure 5: Single Point mode

Window mode (window function)

In Window mode, an upper and lower window limit are set for the switching output. A hysteresis can be set for the SP1 and SP2 window limits. The switching window must be within the measuring range. The hysteresis is defined in the corresponding menu item and must be within the measuring range. If the measured value rises, the switching output is inactive as long as the measured value is between the start of the measuring range and the window limit SP2. If the measured value continues to rise above SP2, it changes its state and switches to “active”. The switching output remains active until the measured value rises above the window limit SP1 plus the hysteresis (SP1+Hyst). If the measured value rises above (SP1+Hyst), the switching output becomes inactive again. If the measured value falls, the switching output is inactive as long as the measured value is between the end of the measuring range and the window limit SP1. The switching output remains active until the process value falls below the window limit SP2 minus the hysteresis (SP2-Hyst). If the measured value falls below (SP2-Hyst), the switching output becomes inactive again.

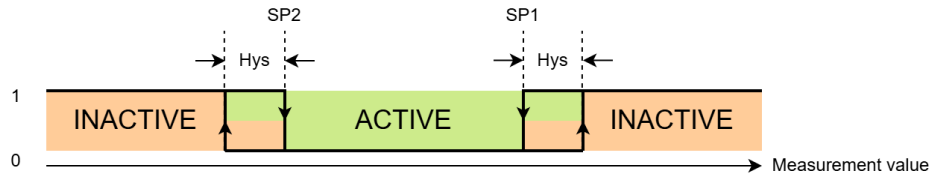


Figure 6: Window mode (window function)

Two Point mode

In Two Point mode, the switching behavior is defined via a switch-on point SP1 and a switch-off point SP2. In this mode, the hysteresis is therefore defined via the two switching points. If the measured value rises, the switching output is inactive as long as the measured value is between the start of the measuring range and the switch-on point SP1. If the measured value rises above the switch-on point SP1, the switching output becomes active. If the process value falls, the switching output is active as long as the measured value is between the end of the measuring range and the switch-off point SP2. If the measured value falls below the switch-off point SP2, the switching output becomes inactive.

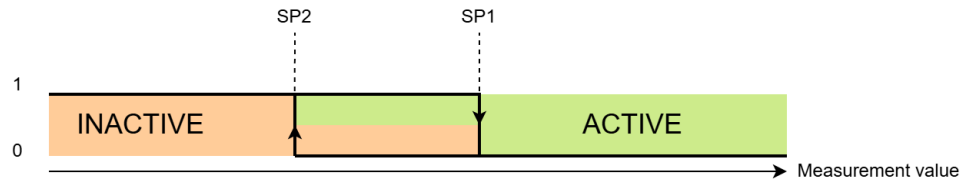


Figure 7: Two Point mode

3.4.4 Behavior of the analog output

The analog output of the PBST pressure sensor can be set as either a current or voltage output. The measuring range is freely adjustable. An inverted output signal with identical behavior can also be selected.

The configured output signal (e.g., between 4 and 20 mA or 0 to 10 V) is output in the defined measuring range between Range Lo (analog start point) and Range Hi (analog end point). The minimum distance between the start and end point is 20 % of the available measuring range. This allows a maximum turn down ratio of 5:1.

By default, Range Lo corresponds to the lower and Range Hi to the upper nominal value of the sensor.

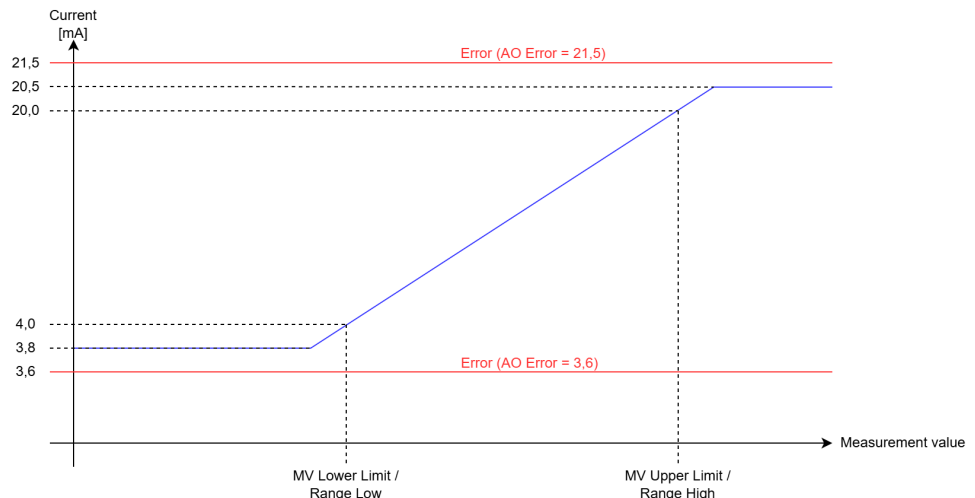


Figure 8: Behavior of the analog output

Behavior of the current output 4...20 mA

* < 3.6 mA or > 21 mA corresponds to failure information as per NAMUR NE43.

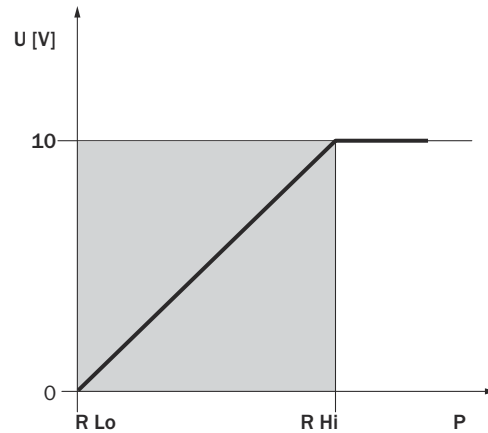


Figure 9: Behavior of the voltage output 0-10 V

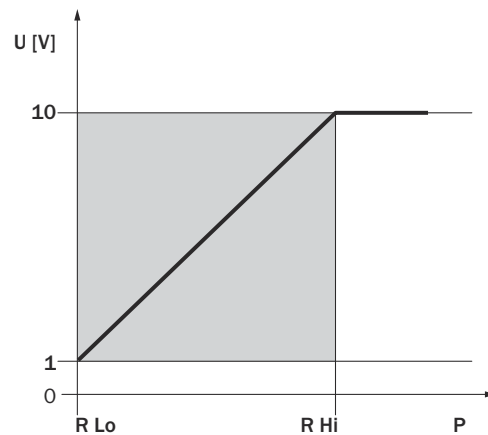


Figure 10: Behavior of the voltage output 1-10 V

3.4.5 IO-Link communication interface

The product has the IO-Link communication interface.

IO-Link communication is a **master-device** communication system.

The product can be operated in standard I/O mode (SIO) or IO-Link mode (IOL). All automation functions and other parameter settings are effective in IO-Link mode and in standard I/O mode.

The following functions are supported via the standard IO-Link communication interface:

- Flexible sensor settings
- Digital transmission of sensor signals to the **IO-Link Master**
- Visualization and parameterization of the sensor
- Diagnostics/**condition monitoring**
- Device identification
- Easy device replacement
- **Events**

A detailed description of the configurable functions and associated indices can be found in the "IO-Link description" technical information.

3.4.5.1 Documentation and accessories

Accessory components and additional information are available for integrating and setting the IO-Link device. You can find documentation and software, accessories and links using the **SICK Product ID**.

Documentation and software

- IODD: Device description file
- IODD overview: List of IODD contents
- IO-Link description: Detailed description of the process, service data and events of the IO-Link device

4 Mounting

4.1 Mounting requirements

- For the typical space requirements for the device, see the type-specific dimensional drawing, [see "Dimensional drawings", page 44](#).
- Comply with technical data, such as the permitted ambient conditions for operation of the device (e.g., temperature range, EMC interference emissions, ground potential) [see "Technical data", page 42](#)
- To prevent condensation, avoid exposing the device to rapid changes in temperature.
- Protect the device from direct sunlight, spotlights, or flashlights.
- The device must only be mounted using the pairs of fixing holes provided for this purpose.
- Shock and vibration resistant mounting.

4.2 Mounting the device



DANGER
BEFORE INSTALLING AND REMOVING THE DEVICE: ENSURE THAT THE SYSTEM IS DE-PRESSURIZED.

The mounting location must fulfill the following conditions:

- Protected from weather influences.
- At high ambient temperatures and high UV radiation, the pressure switch must be installed with additional shading.
- Do not expose the sensor housing directly to aggressive media.
- Sealing surfaces are clean and undamaged.
- Permissible ambient and measuring material temperatures remain within the performance limits. Note possible limitations of the ambient temperature range due to derating.

4.2.1 Process connection

- First screw the pressure sensor hand-tight into the mounting location in any installation direction (make sure the mating part is suitable).
- Then tighten firmly via the wrench flat using a suitable tool and with a maximum recommended tightening torque of 35 Nm. (Torque depends on lubrication, seal and pressure load!)
- The display can be rotated 180° in the Settings menu (see Sect. 8).
- The housing can be rotated 350° after installation.

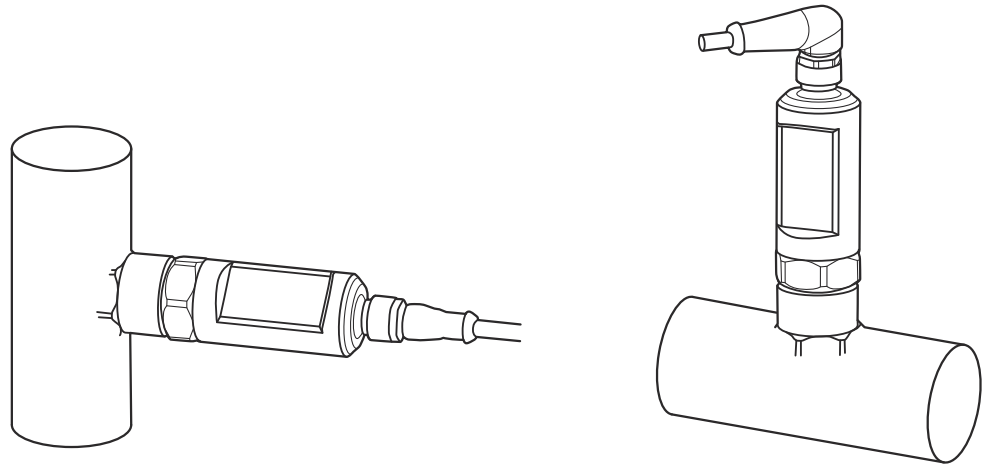


Figure 11: Process connection

The sophisticated housing design that provides maximum compactness enables the device to be installed even in confined spaces.

When using a straight plug connector, the installation diameter is limited to 30 mm, whereas a low installation height can be achieved by using an angled plug connector. Installation directly in front of a wall is possible without any problems as the sensor has no components protruding from the side, and an angled plug connector always protrudes to the front left when viewed from the display.

5 Electrical installation

5.1 Notes on electrical installation

**NOTICE****Equipment damage due to incorrect supply voltage!**

An incorrect supply voltage may result in damage to the equipment.

- Only operate the device with safety/protective extra-low voltage (SELV/PELV).
- The sensor is a device of protection class III.
- Only operate the device with an LPS (limited power source) in accordance with IEC 62368-1 or an NEC Class 2 power supply unit.

**NOTICE****Equipment damage or unpredictable operation due to working with live parts!**

Working with live parts may result in unpredictable operation.

- Only carry out wiring work when the power is off.
- Only connect and disconnect electrical connections when the power is off.

- **The electrical installation must only be performed by electrically qualified personnel.**
- **Standard safety requirements must be observed when working on electrical systems!**
- Only switch on the supply voltage for the device when the connection tasks have been completed and the wiring has been thoroughly checked.
- When using extension cables with open ends, ensure that bare wire ends do not come into contact with each other (risk of short-circuit when supply voltage is switched on!). Wires must be properly insulated from each other.
- Wire cross-sections in the supply cable from the user's power system must be selected in accordance with the applicable standards.

**NOTE****Layout of data cables**

- Use shielded data cables with twisted-pair wires.
- Implement proper and complete shielding concept.
- To avoid interference, e.g., from switching power supplies, motors, clocked regulators and contactors, always use cables and layouts that are suitable for EMC.
- Do not lay cables over long distances in parallel with power supply cables and motor cables in cable ducts.

The IP enclosure rating for the device is only achieved under the following conditions:

- The cables plugged into the connections are screwed tight.

If these instructions are not complied with, the IP enclosure rating for the device is not guaranteed!

5.2 Notes on UL approval



NOTE

Only applies to variants with measuring range ≤ 150 bar.

The device shall be supplied from an isolating transformer having a secondary overcurrent protective device that complies with UL 248 to be installed in the field rated either:

- a) max 5 amps for voltages 0 ~ 20 V (0 ~ 28.3 V peak), or
- b) 100 / Vp for voltages of 20 ~ 30 V (28.3 ~ 42.4 V peak).
- c) for pressure ranges <150 bar.

Alternatively, they can be supplied from a Class 2 power supply.

UL Environmental Rating: Enclosure type 1

5.3 Integration of the sensor in IO-Link mode

To operate the product in IO-Link mode, it must be connected to a suitable **IO-Link Master**. This is used for further integration into the control system.



NOTE

The cable length between the **IO-Link Master** and **IO-Link device**: maximum 20 m.

Details on integration can be found in the detailed IO-Link description.



NOTE

After successful connection of the product to the **IO-Link Master**, the green LNK LED flashes to indicate a functioning IO-Link communication between the **master** and **device**.

5.4 Electrical connection



CAUTION THE DEVICE MAY ONLY BE INSTALLED BY A QUALIFIED ELECTRICIAN.

Follow the national and international regulations for the installation of electrical systems.

The pressure sensor must be supplied by a power supply in accordance with EN 50178, SELV, PELV.

For applications with UL approval, the supply must be provided by an energy-limited circuit in accordance with Class 2 of the UL1310 / UL1585 standard (NEC or CEC).

- Disconnect the power to the system.
- Plug in the socket of the 4-pin M12 (A-coded) connecting cable and tighten with approx. 0.6 Nm.
- Connect the open end of the connecting cable as follows.

Pin	Pin assignment	Wire colors
1	Ub+	BN/brown
3	0 V	BU/blue
4	Out 1 / IO-L	BK/black
2	Out 2	WH/white

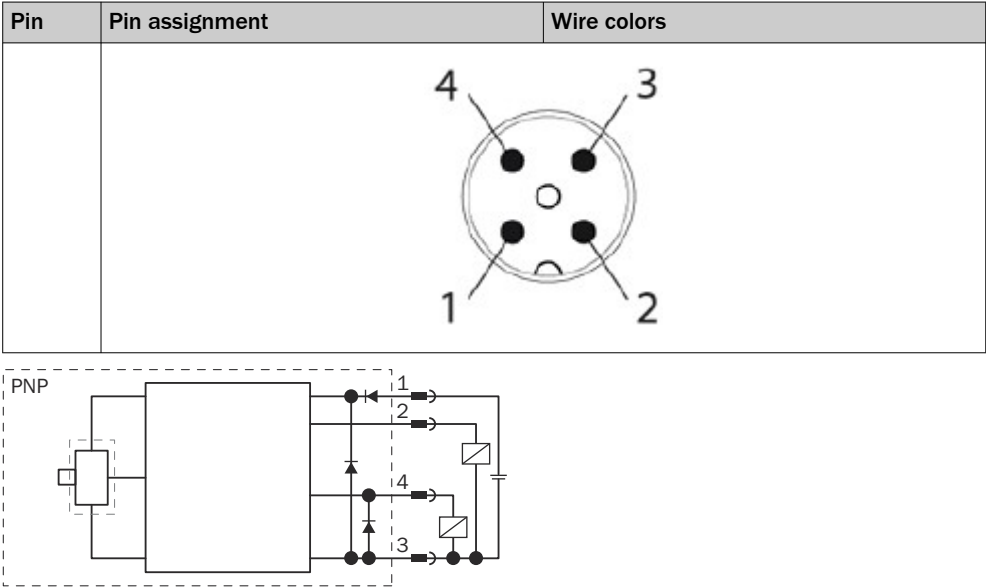


Figure 12: Example circuit

6 Commissioning

6.1 Commissioning

When the supply voltage is switched on, the device automatically goes into operation.

**DANGER**

During commissioning, check the zero point shown on the digital display. If a zero point offset is displayed due to installation or thermal changes in the environment of the sensor, this can be adjusted to the current atmosphere in the menu (see Section 8).

**CAUTION**

The display may only be calibrated to zero when de-pressurized.

6.2 Configuration via IO-Link

In addition to the manual setting on the device, the sensor can also be configured via IO-Link.

Configuration via IO-Link can be performed via an IO-Link master (PLC), e.g. SIG350

Details on configuration can be found in the detailed IO-Link description.

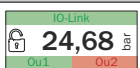
7 Operation

7.1 Status display

In the delivery state, the 3rd main screen with details of the output settings and the “only detail” setting for the output state indication is displayed by default after initial commissioning. This display is explained below.

Display	Object	Display	Meaning
	upper color bar	Green	OUT 1 switched
		Red	OUT 1 not switched
	lower color bar	Green	OUT 2 switched
		Red	OUT 2 not switched
		without color	OUT 2 = analog output

While the sensor is in IO-Link mode, the display looks as follows:

Display	Object	Display	Meaning
	upper color bar	flashing green	IO-Link communication
	lower color bar, left half	Green	OUT 1 switched
		Red	OUT 1 not switched
	lower color bar, right half	Green	OUT 2 switched
		Red	OUT 2 not switched
		without color	OUT 2 = analog output

7.2 Structure of the main screen

The 3rd main screen with details of the output settings is structured as follows:

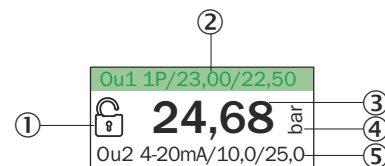


Figure 13: Structure of the 3rd main screen

- ① Screen lock status
- ② Settings for output 1
- ③ Current measured pressure
- ④ Pressure unit
- ⑤ Settings for output 2

Explanation of the settings shown in the example

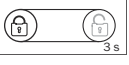
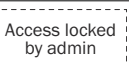
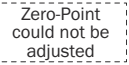
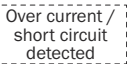
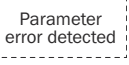
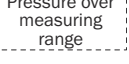
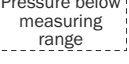
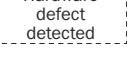
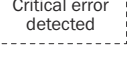
Table 1: Explanation of the settings shown in the example

	Setting	Explanation
Upper bar	Ou1	Output 1
	1P	Single Point mode
	23.00	Switching point SP1 at 23 bar
	22.5	Hysteresis value at 22.5 bar

	Setting	Explanation
Lower bar	Ou2	Output 2
	I	4-20 mA analog output
	10.0	Range Lo at 10.0 bar (analog start point)
	25	Range Hi at 25.0 bar (analog end point)

7.3 Display messages

Table 2: Display messages

Display	Display	Meaning	Recommended action
	Unlock bar	Screen locked, "simple" mode	Swipe to the right to unlock the screen.
	Unlock bar with added "3 s"	Screen locked, "safe" mode	Press and hold the screen for 3 seconds and then swipe to the right to unlock the screen.
	Input lock message	Input on the touch screen has been blocked by the admin	Contact your local administrator, who has actively blocked the input via IO-L.
	Zero-point adjustment error message	The zero-point adjustment was unsuccessful	Depressurize the system. The zero-point adjustment only works between -1 and +1 bar and +3 % of the pressure range.
	OC message	Overcurrent (> 250 mA) or short-circuit on Out 1 and/or Out 2	Reduce the load on Out 1/2 or, if necessary, search for and eliminate the short-circuit.
	OT message	Overheating detected at the Out 2 analog output.	Reduce the load on the Out 2 analog output, observe the technical data and temperature derating.
	Parameter error message	An invalid parameter was written via IO-Link	Observe the validity table/value range of the [product name] IO-Link description file.
	Overpressure message	The measured pressure is > 1 % above the max. nominal pressure range	Operate the sensor within the nominal pressure range. CAUTION: Excess pressure can cause serious damage.
	Underpressure message	The measured pressure is > 1 % below the min. nominal pressure range	Operate the sensor within the nominal pressure range.
	Hardware defect message	A defect was detected in the electronics of the sensor	The sensor is no longer functional and must no longer be operated. It must be repaired or replaced.
	Critical defect message	An undefined, critical defect was detected on the sensor	The sensor is no longer functional and must no longer be operated. It must be repaired or replaced.
	No display	Sensor is in power save mode (main screen 1)	Tap, unlock and select another main screen by swiping up/down.

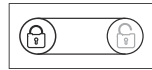
8 Parameterization

8.1 Configuration via touch screen

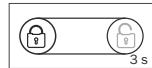
8.1.1 Unlocking the touch screen

There are two screen lock modes that can be selected in the Settings menu. The “simple” mode is set at the factory.

Table 3: Unlocking the touch screen



In “simple” mode, the screen is unlocked with a simple swipe gesture to the right while the unlock bar is displayed.



In “safe” mode, the screen is protected against accidental unlocking. To unlock it, press and hold the screen for 3 seconds before swiping to the right to open the screen

8.1.2 Locking the touch screen

The screen is automatically locked if one of the following conditions occurs:

- If you are on a main screen, the screen is locked after 60 seconds of not being touched. The time can be set in the menu between 0...3,600 s.
- If you are in the Settings menu, the screen is locked after 2 minutes of not being touched and the display returns to the last used main screen. In this case, any menu item that has been adjusted but not actively exited will not be saved.

The last main screen used is always the one from which the sensor last switched to screen lock.

8.2 “Settings” menu tree

The menu tree is displayed in the same way as the individual screens are arranged in the menu. This means that you can change screens or scroll the scroll list by swiping in the corresponding direction

If you swipe to the left on the 4th main screen “Settings”, the following menu structure appears:

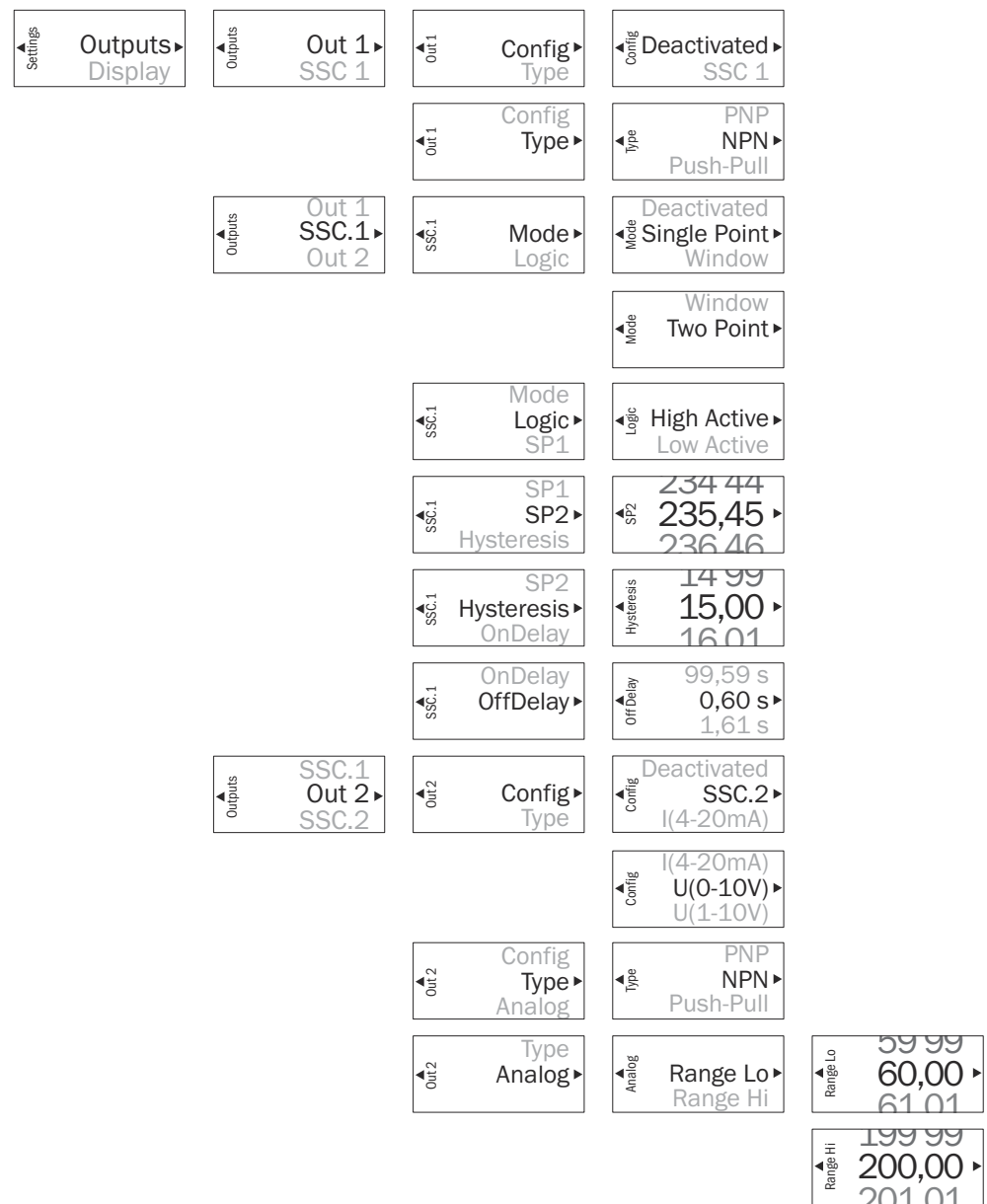


Figure 14: “Settings” 1 menu tree

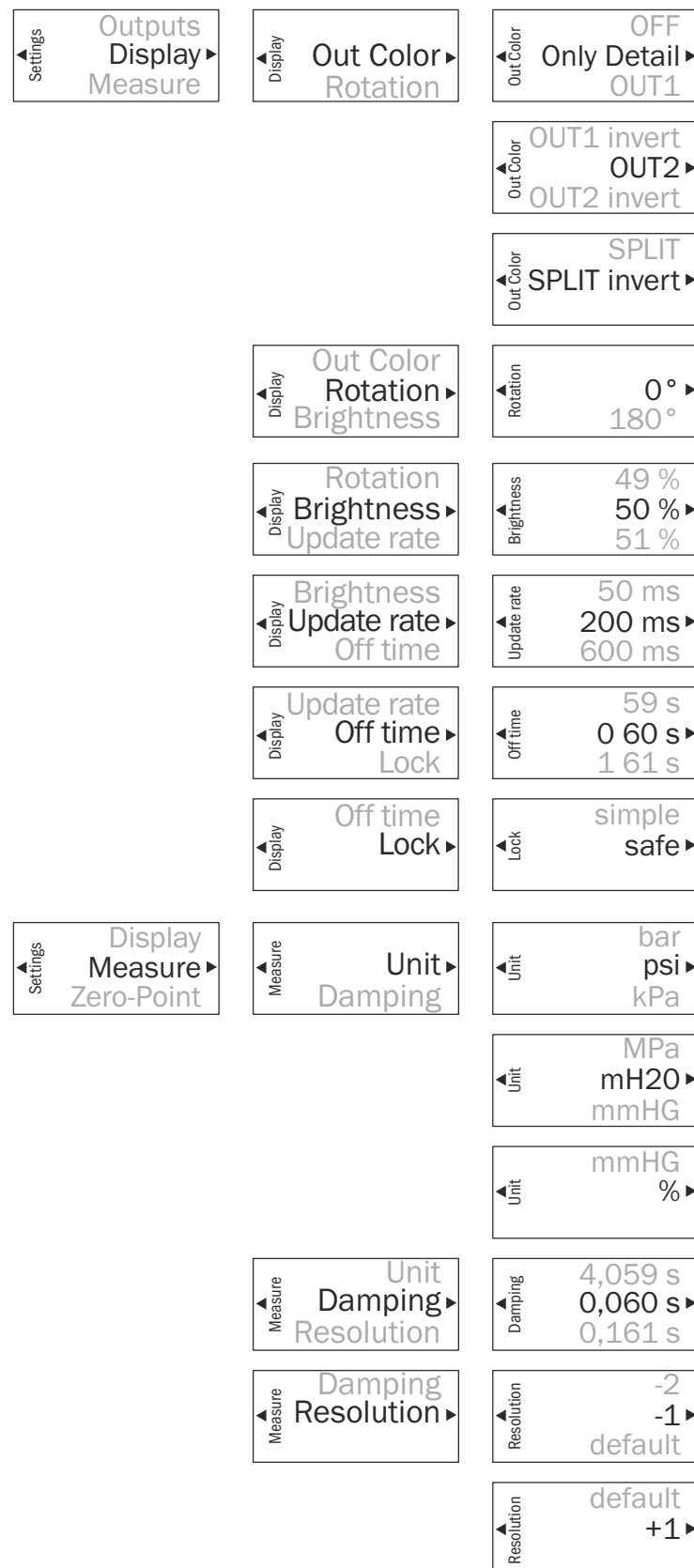


Figure 15: "Settings" 2 menu tree

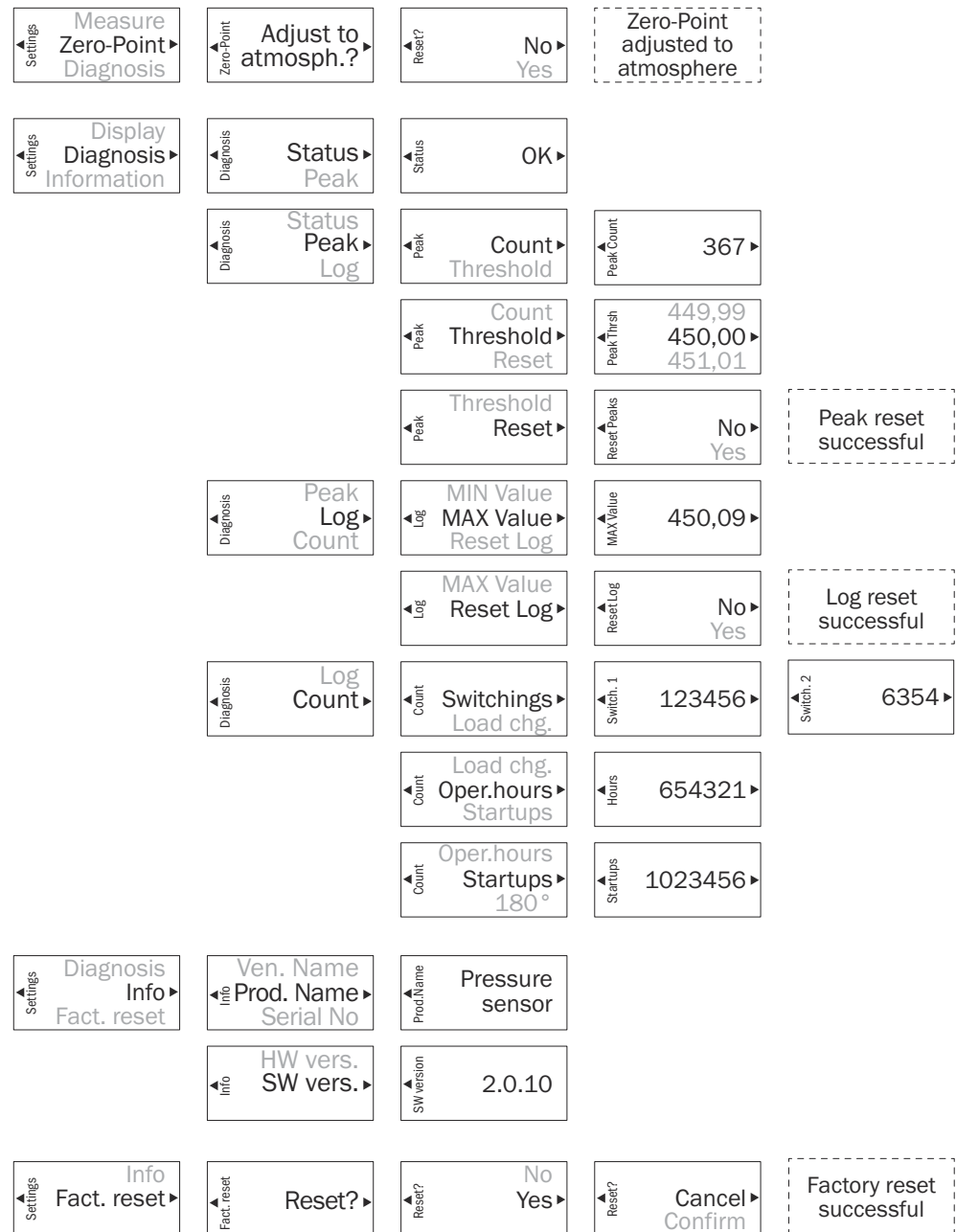


Figure 16: "Settings" 3 menu tree

8.3 Description of the settings under "Settings"

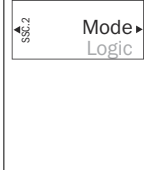
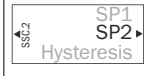
8.3.1 "Outputs" main menu item

The "Outputs" main menu item contains all the settings for the two outputs. These can be configured here, or switching points changed.

Table 4: "Outputs" main menu item

Parameter	Value range/options	Explanation
Outputs Out 1 SSC.1	The submenu shown below appears when the Out1 output is set.	

Parameter	Value range/options	Explanation
Out 1 Config Type	Deactivated	Switching output 1 is deactivated.
	SSC.1	Switching output 1 is activated and can be configured.
Out 1 Config Type	PNP	Digital, p-switching
	NPN	Digital, n-switching
	Push/pull	Digital, p- and n-switching
Outputs Out 1 SSC.1 Out 2	The submenu shown below appears when an Out 1 digital output is set (digital options are available for Out 1 only).	
SSC.1 Mode Logic	Deactivated	Switching channel 1 is deactivated.
	Single Point	Single Point mode
	Window	Window mode
	Two Point	Two Point Mode
SSC.1 Mode Logic SP1	High Active	N/O contact (normally open)
	Low Active	N/C contact (normally closed)
SSC.1 Logic SP1 SP2	Adjustable in 0.01 increments	Defines switching point 1 for the switching channel.
SSC.1 SP1 SP2 Hysteresis	Adjustable in 0.01 increments	Defines switching point 2 for the switching channel.
SSC.1 SP2 Hysteresis OnDelay	Adjustable in 0.01 increments	Specifies the hysteresis at the switching point. A higher hysteresis can contribute to greater stability in critical applications.
SSC.1 Hysteresis OnDelay OffDelay	0-600 seconds / 0.01 s increments	Switch-on delay When SP1 is reached, the status of SSC1 does not change until the OnDelay Time has expired.
SSC.1 OnDelay OffDelay	0-600 seconds / 0.01 s increments	Switch-off delay When SP2 is reached, the status of SSC1 does not change until the OffDelay Time has expired.
Outputs SSC.1 Out 2 SSC.2	The submenu shown below appears when an Out 2 digital output is set.	
Out 2 Config Type	Deactivated	Switching output 2 is deactivated.
	SSC.2	Switching output 2 is activated and can be configured.
	I (4-20 mA)	Analog, current signal 4-20 mA
	U (0-10 V)	Analog, voltage signal 0-10 V
	U (1-10 V)	Analog, voltage signal 1-10 V
Out 2 Config Type Analog	PNP	Digital, p-switching
	NPN	Digital, n-switching
	Push/pull	Digital, p- and n-switching
Out 2 Type Analog	Range Low 0-80 % of the nominal pressure range	Analog start point at which the lower limit point of the analog signal is output. Must be min. 20 % below "Range Hi".
	Range Hi 20-100 % of the nominal pressure range	Analog end point at which the upper limit point of the analog signal is output. Must be min. 20 % above "Range Lo"

Parameter	Value range/options	Explanation
	The submenu shown below appears when an analog output is set (for the menu for digital options - see "Setting 1" description)	
	Deactivated	Switching channel 2 is deactivated.
	Single Point	Single Point mode Possibly link to corresponding section
	Window	Window mode
	Two Point	Two Point Mode
	High Active	N/O contact (normally open)
	Low Active	N/C contact (normally closed)
	Adjustable in 0.01 increments	Defines switching point 1 for the switching channel.
	Adjustable in 0.01 increments	Defines switching point 2 for the switching channel.
	Adjustable in 0.01 increments	Specifies the hysteresis at the switching point. A higher hysteresis can contribute to greater stability in critical applications.
	0-600 seconds / 0.01 s increments	Switch-on delay When SP1 is reached, the status of SSC1 does not change until the OnDelay Time has expired.
	0-600 seconds / 0.01 s increments	Switch-off delay When SP2 is reached, the status of SSC1 does not change until the OffDelay Time has expired.

8.3.2 “Display” main menu item

The “Display” main menu item contains all the settings for the touch screen and the display itself, such as color behavior, brightness, or the screen lock.

Table 5: “Display” main menu item

Parameter	Value range/options	Explanation
Display Out Color Rotation	OFF	No color indication of the output states of Out 1 or Out 2
	Only detail	Color bar at the top (for Out 1) and bottom (for Out 2), only active on main screen 3. Green = output switched Red = output not switched
	OUT 1	The entire display lights up depending on Out 1 Green = output 1 switched Red = output 1 not switched
	OUT 1 invert	The entire display lights up depending on Out 1 Green = output 1 not switched Red = output 1 switched
	OUT 2	The entire display lights up depending on Out 2 Green = output 2 switched Red = output 2 not switched
	OUT 2 invert	The entire display lights up depending on Out 2 Green = output 2 not switched Red = output 2 switched
	SPLIT	The display lights up in two parts. The left half lights up depending on Out 1, the right half depending on Out 2. Green = output switched Red = output not switched
	SPLIT invert	The display lights up in two parts. The left half lights up depending on Out 1, the right half depending on Out 2. Green = output not switched Red = output switched
Display Out Color Rotation Brightness	0°	Standard orientation of the display
	180°	Display rotated by 180°
Display Rotation Brightness Update rate	0-125 % / 1 % increments	Brightness of the display. A maximum setting of 100 % is recommended; beyond this, the service life of the LED illumination is reduced.
Display Brightness Update rate Off time	50ms	The update rate of the display is 50 ms
	200ms	The update rate of the display is 200 ms
	600ms	The update rate of the display is 600 ms
Display Update rate Off time Lock	0-3,600 seconds / 1 s increments	Time until automatic screen lock on main screen 2 and 3 or until the screen is switched off on main screen 1.
Display Off time Lock	simple	Unlock the screen with a simple swipe gesture to the right.
	safe	Unlock the screen with a swipe gesture to the right after pressing and holding the touchscreen for 3 s.

8.3.3 “Measure” main menu item

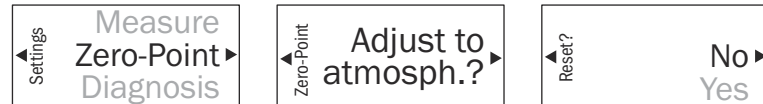
The “Measure” main menu item contains all settings for the measurement signal, such as pressure unit, damping and resolution.

Table 6: “Measure” main menu item

Parameter	Value range/options	Explanation
Measure Unit Damping	bar	Pressure unit: bar
	psi	Pressure unit: psi
	kPa	Pressure unit: Kilo Pascal
	MPa	Pressure unit: Mega Pascal
	mH2O	Pressure unit: meter water column
	mmHG	Pressure unit: millimeter mercury column
	%	Pressure unit: Percent of the nominal pressure range
Measure Damping Resolution	0-4 seconds / 0.001 s increments	Damping of the measurement signal: Time for averaging the measured pressure.
Measure Damping Resolution	-2	Measured value reduced by two decimal places.
	-1	Measured value reduced by one decimal place.
	default	Default setting. 2 decimal places for pressure unit “bar”.
	+1	Measured value increased by one decimal place.

8.3.4 “Zero-Point” main menu item

The sensor can be adjusted to the current atmosphere via the “Zero point” main menu item. This may be necessary if a zero point offset (i.e. not exactly 0.00) is displayed due to installation or thermal changes in the environment of the sensor.



If “Yes” is selected when prompted, the sensor adjusts itself to the current atmosphere by swiping to the left and will then display exactly 0.00.

Table 7: Zero Point

Zero-Point adjusted to atmosphere	A confirmation message appears for a few seconds that the zero point has been recalibrated.
Zero-Point could not be adjusted	This error message appears if the zero point deviation is greater than 3 %. For safety reasons, the sensor can only be calibrated up to a deviation of max. 3 % of the nominal pressure range (but in any case in the range of -1...+1 bar).

8.3.5 “Diagnosis” main menu item

All diagnostic functions of this sensor can be accessed via the “Diagnosis” main menu item.

Table 8: “Outputs” main menu item

Parameter	Value range/options	Explanation
Diagnosis Status Peak	Device is OK	The sensor works perfectly
	Maintenance required	The sensor requires maintenance
	Out of specification	Parameters outside valid range
	Functional check	Measured value or load outside valid range
	Failure	Hardware defect, replacement required
Diagnosis Status Peak Log	The “Peak” submenu item contains settings and information on pressure peaks.	
Peak Count Threshold	1 – 2 147 483 647	Peak Count = counter for how often the pressure has exceeded the value set under “Peak Threshold”.
Peak Count Threshold Reset	Nominal pressure range of the sensor	Peak Threshold = threshold at which the “Peak Count” counter is to be triggered.
Peak Threshold Reset	Reset function	When executed, the “Peak Count” counter is set to zero.
Diagnosis Peak Log Count	The “Log” submenu item contains settings and information on pressure peaks and pressure drops.	
Log MIN Value MAX Value	Technically measurable range	Log function, which saves the lowest pressure value ever measured.
Log MIN Value MAX Value Reset Log	Technically measurable range	Log function, which saves the highest pressure value ever measured.
Log MAX Value Reset Log	Reset function	When executed, the two loggers “MIN Value” and “MAX Value” are cleared.
Diagnosis Log Count	The “Count” submenu item contains all available counters for the sensor.	
Count Switchings Load chg.	1 – 2 147 483 647 (Out1) 1 – 2 147 483 647 (Out2)	Counter that records the number of output state changes at Out1 and Out2 separately.
Count Switchings Load chg. Oper.hours	1 – 2 147 483 647	Counter that records the number of pressure load changes. The algorithm only increments the counter if the direction is reversed by > 20 %.
Count Load chg. Oper.hours Startups	1 – 2 147 483 647	Operating hours counter. Short switch-on times in the minute range may not be added.
Count Oper.hours Startups	1 – 2 147 483 647	Counter that records the number of start processes.

8.3.6 “Info” main menu item

All available information about this sensor can be accessed via the “Info” main menu item.

Table 9: “Info” main menu item

Parameter	Value range/options	Explanation
	Ven. Name	Vendor name = name of the manufacturer: “SICK AG”
	Prod. name	Product Name = name of the product: “Type-code”
	Serial no	Serial Number = serial number
	HW Version	Hardware version = version of the hardware
	SW Version	Software version = version of the software

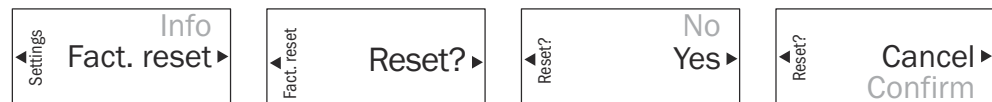
8.3.7 Factory settings/“Fact. reset” main menu item

A factory reset can be performed via the “Fact. reset” main menu item, i.e., the sensor can be reset to the factory settings.

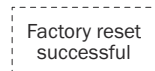


CAUTION

All previously set values are irrevocably lost. Saving and restoring of the values via IO-Link is nevertheless still possible.



The reset is performed if you respond to the prompt with “Yes” and the confirmation prompt with “Confirm” by swiping to the left in each case.



A confirmation message appears for a few seconds to confirm that the factory reset was successful.

8.4 Easy mode

Easy mode is an additional, very simple and quick way of setting the switching points (or analog points) for both outputs.

To do so, simply swipe to the left while on main screen 2 or 3 as shown below. You can adjust the 2 points of an output by swiping to the left on the following 4 screens.

As described above, these settings can also be parameterized via the menu, so the use of Easy mode is optional, e.g., for frequently recurring changes or for commissioning tests.



Figure 17: Easy mode

Swiping to the left on the last Easy mode screen takes you back to the original main screen.

8.5 Configuration via IO-Link

General device information

Table 10: General device information

IO-Link revision	V1.1
SIO mode	ja
Process data	4 bytes: 16-bit pressure value, 4-bit device status, 2-bit Out1 / Out2 output state
Baud rate	COM2 (38.4 kBaud)
Minimum cycle time	3.5 ms
ISDU	ja

The device can be parameterized via the IO-Link communication interface within the technical specification – both offline, e.g. via a PC with configuration software, and online via the controller. An overview of the various functions and parameters that can be set and used for the IO-Link or SIO mode can be found in the document “IO-Link Interface Description”, which can be downloaded from the product download area on our homepage.

In IO-Link mode, all parameters can be changed both during commissioning and during operation via the controller. In SIO mode, the device acts as it was last set in IO-Link mode.

Using IO-Link, it is possible to save a configuration and transfer it to another sensor of the same design. Further information about these and many other advantages of IO-Link can also be found on the official IO-Link homepage <https://io-link.com/de/>.

8.6 Locking via IO-Link

Using the write protection IO-Link parameter (index 12, subindex 0), it is possible to lock the input on the sensor both on the touch screen and via IO-Link (up to index 12).

Index 12, subindex 0	Value 0	unlocked, normal operation
Index 12, subindex 0	Value 1	locked, the input lock is active

Access locked
by admin

This error message appears on the display when the input lock is active.

9 Troubleshooting

If the device does not work as expected, first check whether there are any environmental interferences. Environmental interference can be all those factors that exceed or fall below the performance limits defined in the data sheet.

If there are no environmental interferences, check the connections to the device for errors. In particular, the power supply and the load on the outputs. If no error is present, a device fault exists.

The device fault can, if necessary, be identified and rectified using the instructions in section 7.3. If this is not the case, take the sensor out of operation and replace it with a new sensor of the same type.

9.1 Troubleshooting integrated IO-Link devices

Notes on malfunctions can be found in the service data.

Details of the available service data can be found in the detailed IO-Link description.

10 Deinstallation

10.1 Sensor replacement/data storage

All IO-Link devices have a backup and restore functionality - **Data Storage (DS)**. The IO-Link **Data Storage** function can be used to save previous parameters and transmit them to the replacement device.

The prerequisite for this is connection of the device to an **IO-Link Master**, and activation of the **storage** function in the **IO-Link Master**.

Details on sensor replacement can be found in the detailed IO-Link description.

11 Maintenance/de-commissioning



DANGER RISK TO DEATH FROM FLYING PARTS, ESCAPING MEDIUM AND ELECTRIC SHOCK.

Only remove pressure sensors when in a depressurized and de-energized state!
Before removing, check whether it is necessary to drain the medium.



CAUTION RESIDUE

Residues of the medium on the device may pose a risk to the operator and the environment.

Wear suitable protective clothing, e.g., gloves or safety goggles.



NOTICE DAMAGE TO THE MEASURING CHAMBER

Incorrect cleaning can lead to irreparable damage to the measuring chamber.

Do not use compressed air or sharp objects for cleaning!

The device is basically maintenance-free. If necessary, the housing of the device can be cleaned with a dry or damp cloth and a non-aggressive cleaning solution while switched off.

Depending on the measured medium, however, deposits or contamination may develop on the membrane. If this is known to occur, the operator must specify appropriate cleaning intervals. After the device has been properly decommissioned, the membrane can be carefully cleaned with a non-aggressive cleaning solution and a soft brush or sponge.

12 Repair/return

The sensor is not intended to be repaired by the user. If the sensor is defective, take it out of operation. When returning the PBST pressure sensor, it must be carefully cleaned and packaged in a break-proof manner.

If the sensor has come into contact with a medium, a clearance certificate (Unbedenklichkeitserklärung) is also required. In case of doubt, devices without a clearance certificate will not be examined with regard to the medium used until a suitable certificate has been received.

You will find a suitable return form and the associated clearance certificate in the download area of the product on our homepage.

13 Disposal

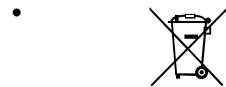
The product must be disposed of in line with applicable country-specific regulations. When disposing of them, you should try to recycle them (especially the precious metals).



NOTE

Disposal of batteries, electric and electronic devices

- According to international directives, batteries, accumulators and electrical or electronic devices must not be disposed of in general waste.
- The owner is obliged by law to return this devices at the end of their life to the respective public collection points.



WEEE: This symbol on the product, its packaging or in the document indicates that a product is subject to the specified regulations.

14 Technical data

14.1 Technical data

General data

Table 11: General data

Display	0.96" TFT touch display, shatterproof
Output state indication	1x color indicator per output
IO-Link status indicator	Color indicator
Enclosure rating	IP65 / IP67 / IP68
Protection class	III
Service life	100 million load cycles
Pressure type	Gauge pressure
Measuring chamber type	Ceramics
MTTF (40 °C)	478 years

Electrical data

Table 12: Electrical data

Electrical connection	Plug connector, M12x1, 4-pin
Supply voltage	9...30 VDC
Intrinsic power consumption	< 30 mA
Short-circuit/reverse polarity protection	yes/yes

Outputs

Table 13: Outputs

Output 1 (pin 4)	PNP/NPN/PP or IO-Link
Output 2 (pin 2)	PNP/NPN/PP or analog (0-10 V / 1-10 V / 4-20 mA)
Max. output current	max. 200 mA per output
Response time	< 3 ms

Accuracy

Table 14: Accuracy

Overall accuracy (23 °C)	± 0.5 % FSO
Max. temperature error (-25...+80 °C)	± 1.5 % (< 100 bar); ± 2.5 % (≥ 100 bar)
Long-term drift	≤ 0.1 % / a

Programming options

Table 15: Programming options

Outputs	Switching/reset points; start/end value for analog output; hysteresis/Window mode; normally closed/normally open contact; switch-on/switch-off delay
Display	Display mode (simple/detailed / off) color behavior; rotation; brightness; update rate; screen lock
Measured value	Units; damping; resolution

Diagnostics

Table 16: Diagnostics

Pressure peaks	Counter, adjustable threshold, reset
Counter	Switching operations; load cycles; operating hours; start operations

Materials (wetted parts)

Table 17: Materials (wetted parts)

Fluid connection material	Stainless steel 1.4404
Measuring chamber material	Ceramic Al ₂ O ₃ 96 %
Seals material	see part number key (NBR / FKM / EPDM)

Materials (non-wetted parts)

Table 18: Materials (non-wetted parts)

Housing material	Stainless steel 1.4301/1.4305
Display material	Glass (shatterproof)
Display seal	PE

Mechanical data

Table 19: Mechanical data

Width across flats for pressure connection	27
Weight	191 g (G1/4" M); 244 g (G1/4" F)

Pressure ranges

Table 20: Pressure ranges

Measuring range [bar]	Overload pressure [bar]	Burst pressure [bar]
-1...1	2	3
-1...10	20	35
0...10	20	35
0...16	40	60
0...25	40	60
0...40	100	140
0...100	150	300
0...250	375	500
0...400	500	650
0...600	750	900

Ambient data

Table 21: Ambient data

Ambient temperature	Operation: -25 ° ... +80 °C ¹⁾ Medium: -25 ° ... +100 °C ¹⁾ Storage: -30 ° ... +85 °C
Application	Fluid Group 2 media
EMC/noise immunity	EN 61000-6-2 & DIN EN 61326-2-3
EMC/radiated emission	EN 61000-6-4 & DIN EN 61326-2-3
Vibration resistance	DIN EN 60068-2-6: 20 G, 10-2,000 Hz, XYZ
Shock resistance	DIN EN 60068-2-27: 50 G, 11 ms, XYZ

¹⁾ Display switches off at a displayed temperature of 80 °C

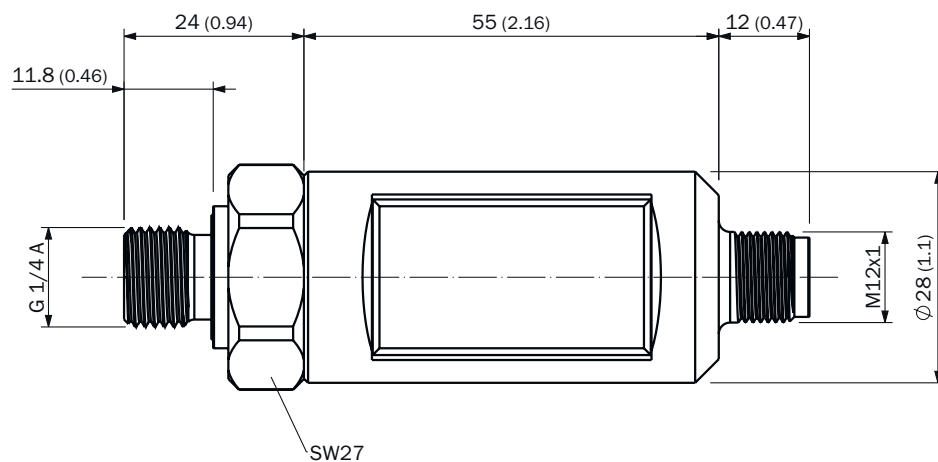
14.2 Dimensional drawings

Figure 18: Dimensioned drawing for PBST-xxxxxG1xxxxxxx

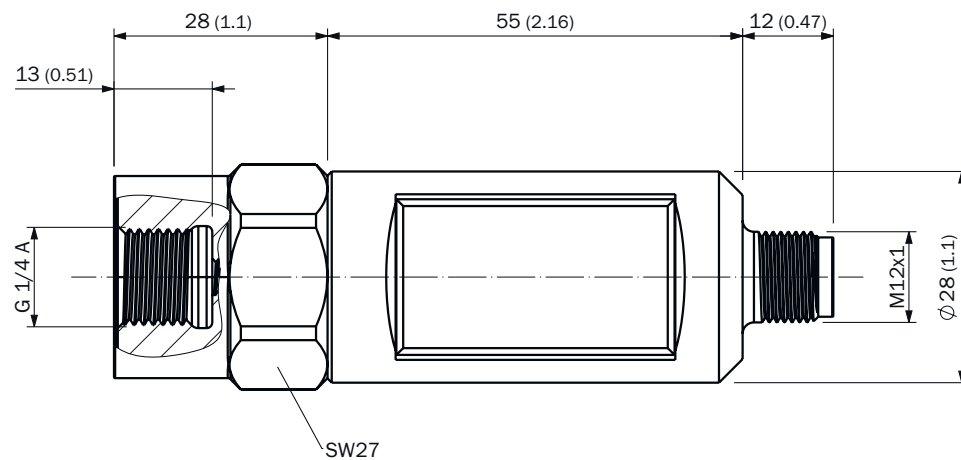


Figure 19: Dimensioned drawing for PBST-xxxxxxG2xxxxxxx

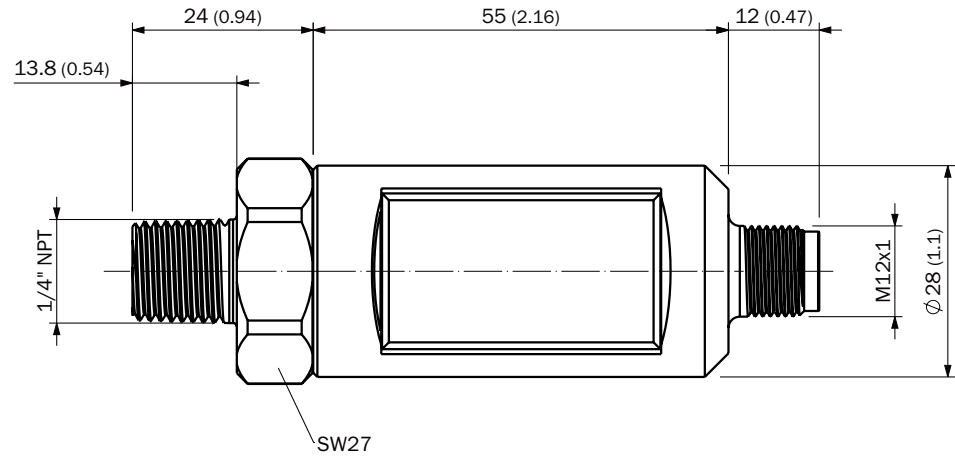


Figure 20: Dimensioned drawing for PBST-xxxxxxN1xxxxxxx

15 Annex

15.1 Conformities and certificates

You can obtain declarations of conformity, certificates, and the current operating instructions for the product at www.sick.com. To do so, enter the product part number in the search field (part number: see the entry in the “P/N” or “Ident. no.” field on the type label).

15.2 Licenses

SICK uses open-source software. This software is licensed by the rights holders using the following licenses among others: the free licenses GNU General Public License (GPL Version2, GPL Version3) and GNU Lesser General Public License (LGPL), the MIT license, zlib license, and the licenses derived from the BSD license.

This program is provided for general use, but WITHOUT ANY WARRANTY OF ANY KIND. This warranty disclaimer also extends to the implicit assurance of marketability or suitability of the program for a particular purpose.

More details can be found in the GNU General Public License. For complete license texts, see www.sick.com/licensesetexts. Printed copies of the license texts are also available on request.