BALLUFF

BSP B_ _ _-_ _ _ _ _-P00S2B-S4(-_ _ _)
BSP M_ _ _-_ _ _ _ _-P00S2B-S4(-_ _ _)
BSP V_ _ _-_ _ _ _ _-P00S2B-S4(-_ _ _)

User's guide



IO-Link

english

www.balluff.com

Validity	4
Intended use	4
Downloading further instructions	4
Scope of delivery	4
Safety notes	4
Installation	5
Electrical connection	9
Display and operating elements	10
Menu operation	10
Configurable parameters	11
Output functions	11
Adjustable hysteresis	11
Variable window	11
Variable delay time	11
Menu functions	12
IO-Link interface	13
Maintenance / Decommissioning	16
Returns	16
Disposal	16
Technical data	17
Accessories	18
Type code	19
Part label	20

BSP B/M/V_ _ _-_ _ _ _ _-P00S2B-S4(-_ _ _)
Pressure Sensors with IO-Link

With the CE marking we declare that our products are in conformity with the current EMC and pressure equipment directive.

c UL us LISTED File No. E227256

Validity

This guide is valid for the following pressure sensors:
- BSP B/M/V_ _ _-_ _ 009-P00S2B-…
- BSP B/M/V_ _ _-_ _ 010-P00S2B-…



IP67, not front flush | IP67, front flush | IP67 and IP69K, front flush

Fig. 1: Product illustrations

Intended use

The pressure sensor was developed for pressure monitoring of gases or liquids which are compatible with stainless steel, ceramic and fluoroelastomer (FKM). Depending on the device and mechanical connection, pressure sensors are suitable for various application areas.

The pressure sensor is intended to be installed into a machine or system. Flawless function in accordance with the specifications in the technical data is ensured only when using original Balluff accessories. Use of any other components will void the warranty.

Modifications to the sensor or non-approved use are not permitted and will result in the loss of warranty and liability claims against the manufacturer.

Downloading further instructions

This guide can also be downloaded from the Internet at **www.balluff.com**.

Scope of delivery

- Pressure sensor
- Condensed guide

Safety notes

Before commissioning, read the user's guide carefully!

These sensors must not be used in applications in which the safety of persons is dependent on the function of the device (not a safety component acc. to EU Machinery Directive).

Installation and **startup** may only be performed by trained specialists with basic electrical knowledge.

Qualified personnel are persons whose technical training, knowledge and experience as well as knowledge of the relevant regulations allows him to assess the work assigned to him, recognize possible hazards and take appropriate safety measures.

The **operator** is responsible for ensuring that local safety regulations are observed. In particular, the operator must take steps to ensure that a defect in the measuring system will not result in hazards to persons or equipment.

If defects and unresolvable faults occur in the sensor, it should be taken out of service and secured against unauthorized use.

The pressure sensor must be operated using a power limited supply (per UL61010) or NEC Class 2 supply.

Always observe the warnings in these instructions and the measures described to avoid hazards.

Explanation of the warnings

The warnings used here contain various signal words and are structured as follows:

SIGNAL WORD
Type and source of the hazard Consequences if not complied with ► Measures to avoid hazards

The individual signal words mean:

NOTICE
Identifies a danger that could **damage** or **destroy the product**.
⚠ CAUTION
The general warning symbol together with the signal word CAUTION indicates a danger which can lead to **slight or moderate injury**.
⚠ DANGER
The general warning symbol in conjunction with the signal word DANGER identifies a hazard which, if not avoided, will certainly result in **death or serious injury**.

Installation

Important installation information

⚠ DANGER

Risk of death

Risk of death from flying parts, escaping medium and electrical shock.

- ► Always install pressure sensors with pressure and power turned off!
- ► Operate the device only within specifications (as per data sheet)!

NOTICE

Damage to the sensor

High temperatures and rapid pressure spikes beyond the specified limits can result in damage to the sensor.

- ► Do not exceed limits (see Technical Data)!

i See Accessories for pressure connection adapters.

When installing outdoors or in damp surroundings observe the following:

- – Select an installation orientation which allows spray and condensed water to run out. Avoid standing liquid at the sealing surfaces!
- – To prevent moisture from entering the connector, make the electrical connection as soon as the device is installed. Otherwise prevent moisture entry using an appropriate cover cap or similar.
- – The protection rating indicated in the data sheet applies to a connected device only!
- – Install the device so that it is protected from direct sunlight. Sunlight can impair the function of the device or damage it.
- – Devices with gauge reference in the housing (IP67 version with visible small hole next to the electrical connection) must be installed so that the gauge reference required for the measurement is protected against dirt and moisture. If the device is subject to exposure to liquids, the air pressure compensation provided by the gauge reference will be blocked. Precise measurement is not possible in this condition. Damage to the device can also occur.
- – In damp surroundings and when the device is wet, do not turn the display to the desired position or operate the buttons.

Other installation notes

- – If there is a risk of damage from lightning strike or overvoltage, insert an overvoltage protection between the feed device resp. control cabinet and the device.
- – For hydraulic systems position the device so that the pressure connection faces up (venting).
- – When using in steam lines provide a cooling line.
- – Depending on the model the device will provide the following protection:

BSP_ _ _ _-_ _**009**-P00S2B-…

Degree of protection: IP67



BSP_ _ _ _-_ _**010**-P00S2B-…

Degree of protection:
IP67 and IP69K



- – Installation must not cause any mechanical stress at the pressure connection, since this could result in shifting of the output curve. This applies in particular to very small pressure ranges as well as to devices with a plastic pressure connection. Observe the permissible tightening torques.

Installation (continued)

Important installation information for the front flush sensors

NOTICE
Damage to the membrane The membrane on the front flush sensor is very sensitive to mechanical stresses. ► Do not touch the membrane!

- Wait until shortly before installation to remove the packaging and cover cap, to ensure that the membrane is not damaged. Retain the cover cap.
- After disassembly immediately replace the cover cap over the membrane.
- When installing the sensor do not use any force, since this could damage the device and equipment.
- Attach clamp fittings using a suitable connecting element (e.g. half-ring or snap ring connection) per manufacturer specifications.

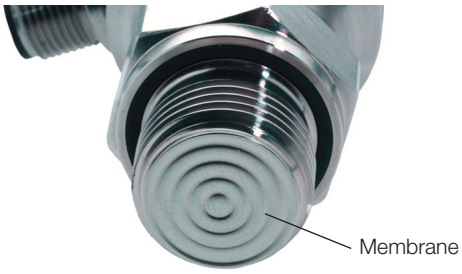


Fig. 2: Unprotected membrane on front flush sensor

Installation

Check before installation:
- Is a seal provided which is appropriate to the measured material and the measurement pressure?
- Does the sealing surface of the receiving part have a flawless surface?
- Is any residue present on this surface?
- Is the O-ring seated and in perfect condition in the provided groove (for sensors with external thread and process adapters)?

For pressure sensors with external threads do not use any additional sealing material such as tow, hemp or Teflon tape!

► Tighten the device by hand in the holding threads. Use an appropriate open-end wrench to tighten and observe the following tightening torques:

Tightening torque	Connection per DIN 3852	Connection per EN 837	NPT connection
1/4"	approx. 5 Nm	approx. 20 Nm	approx. 30 Nm
1/2"	approx. 10 Nm	approx. 50 Nm	approx. 70 Nm

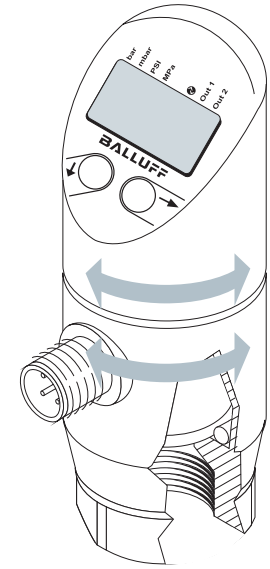


Fig. 3: Display and connection housings rotate by 320°

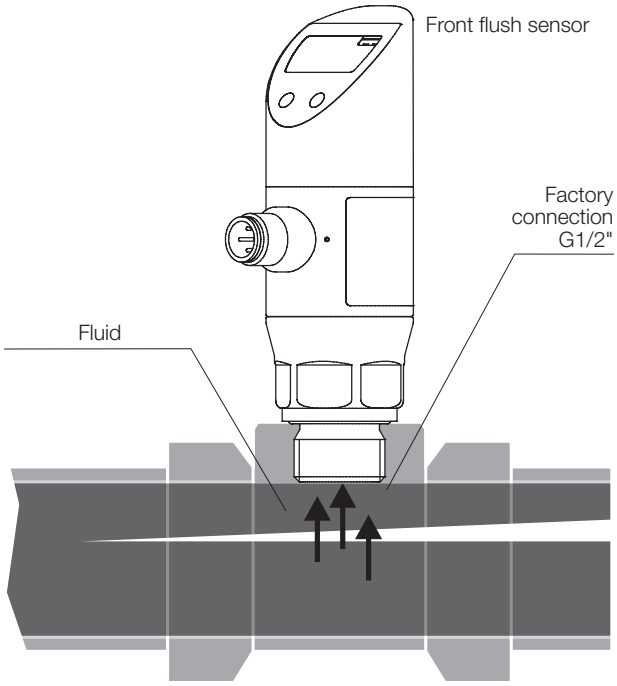


Fig. 4: Process connection for front flush sensor (G1/2" per DIN 3852)

Installation (continued)

Dimensional drawings

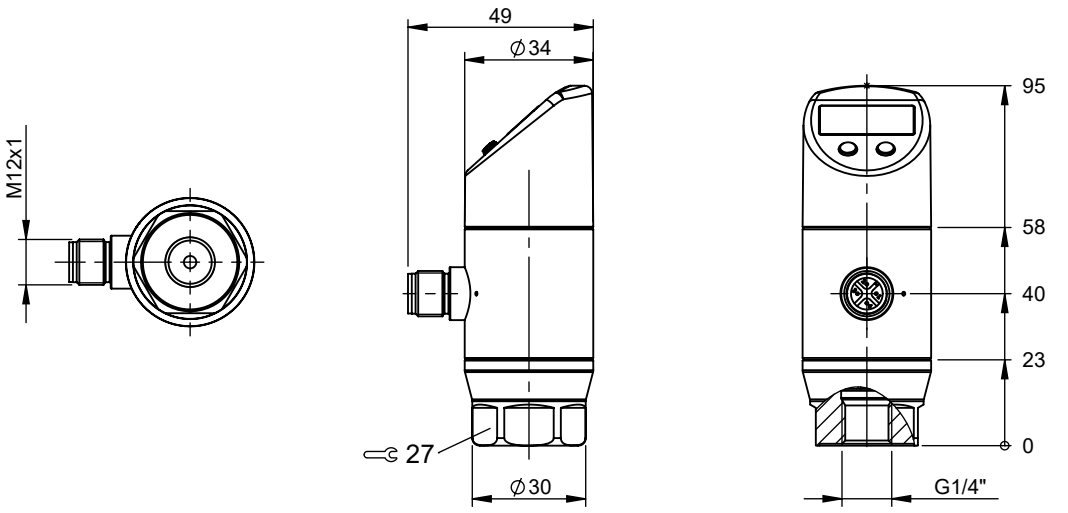


Fig. 5: BSP_ _ _ _-**EV009**-P00S2B-S4…, not front flush, G1/4", internal threads, IP67

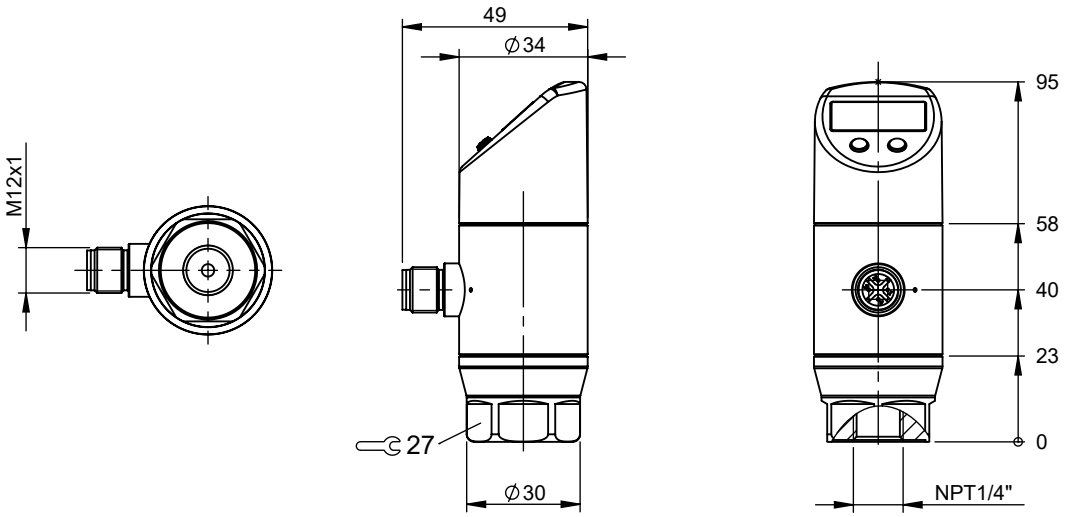


Fig. 6: BSP_ _ _ _-**GV009**-P00S2B-S4…, not front flush, NPT 1/4", internal threads, IP67

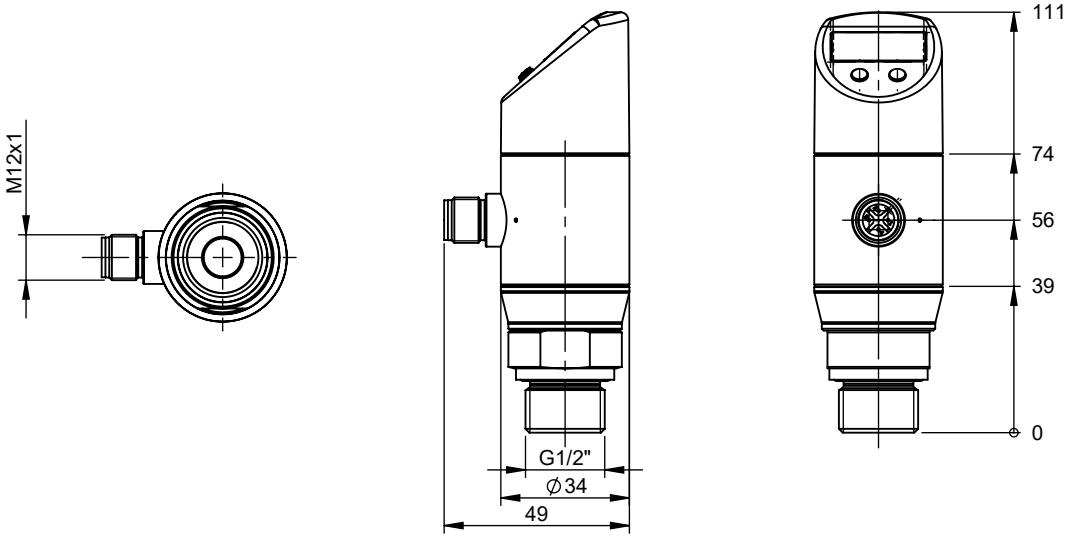


Fig. 7: BSP_ _ _ _-**HV009**-P00S2B-S4…, not front flush, G1/2", PVDF, IP67

Installation (continued)

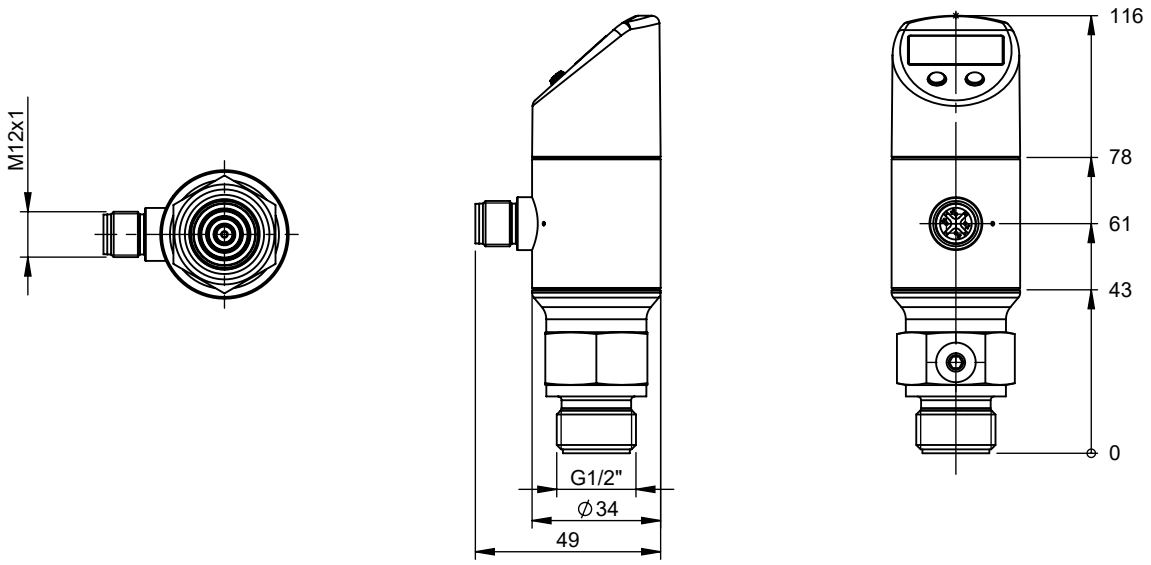


Fig. 8: BSP_ _ _ _-**IV009**-P00S2B-S4…, front flush, G1/2", IP67

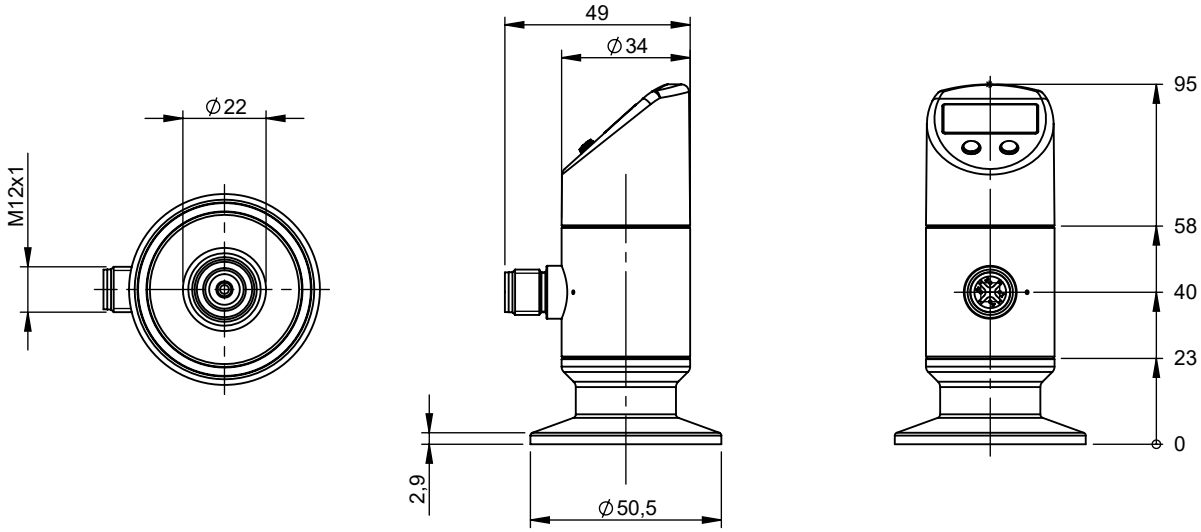


Fig. 9: BSP_ _ _ _-**ZT009**-P00S2B-S4…, front flush, Triclamp 1 1/2", IP67

Installation (continued)

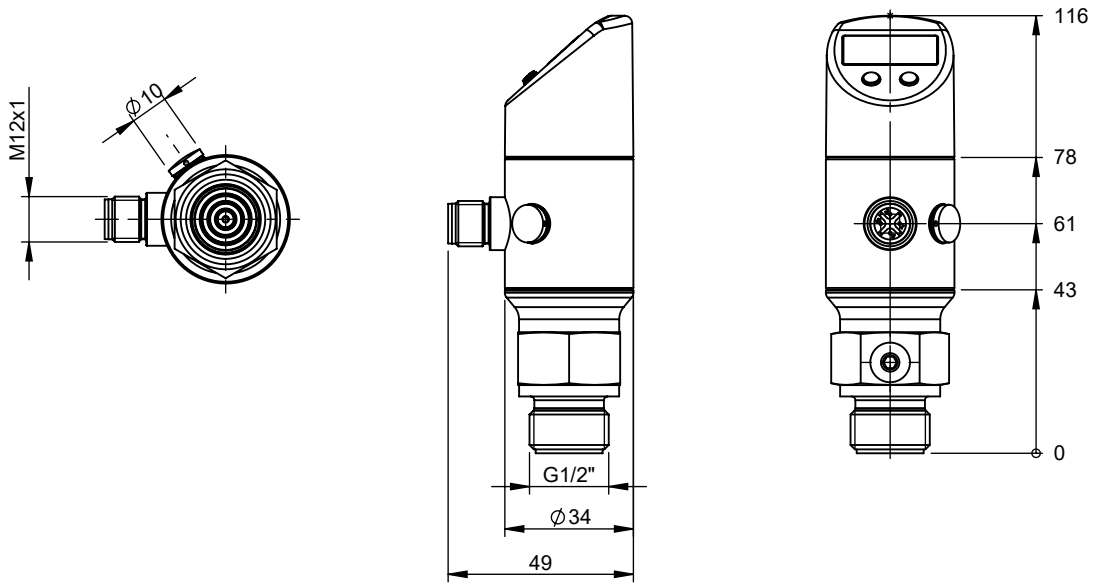


Fig. 10: BSP_ _ _ _-**IV010**-P00S2B-S4…, front flush, G1/2", IP67 and IP69K

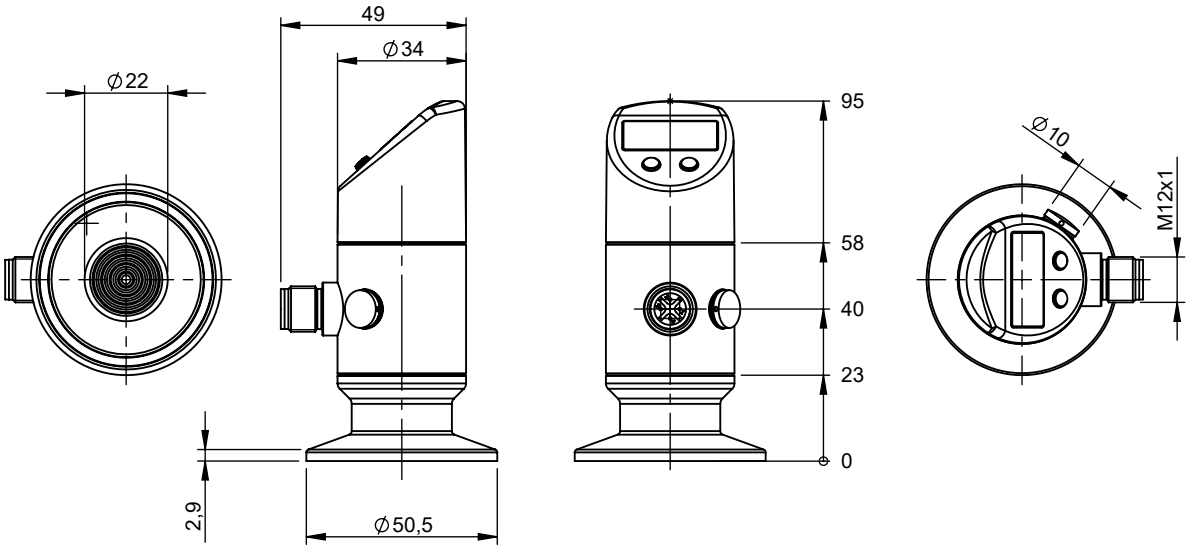


Fig. 11: BSP_ _ _ _-**ZT010**-P00S2B-S4…, front flush, Triclamp 1 1/2", IP67 and IP69K

Electrical connection

The units come with selectable outputs which can be configured either on the unit or via IO-Link.

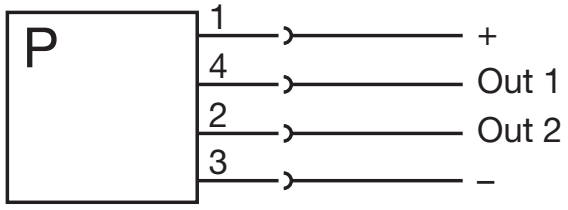


Fig. 12: Wiring diagram, sensor with selectable outputs

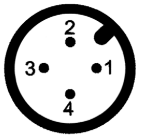
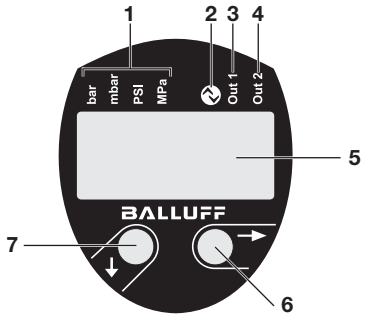


Fig. 13: Round connector M12x1 A-coded (4-pin)

Pin	Signal
1	Supply +
2	(Out 2) PNP/NPN/4…20 mA/0…10 V (selectable)
3	Supply –
4	(Out 1) PNP/NPN/IO-Link (selectable)

Display and operating elements



1 Four red LEDs for units selection (bar, mbar, PSI, MPa)

2 LED IO-Link (red): Status indicator for IO-Link

3 LED Out 1 (yellow): Status indicator for Switching Output 1

4 LED Out 2 (yellow): Status indicator for Switching Output 2

5 Red 7-segment display for measurement value and parameters

6 Button for menu selection and confirming/entering

7 Button for moving within the menu

Fig. 14: Overview of display and operating elements

Status LED		
LED IO-Link (red)	for	IO-Link active (Master-Slave mode)
	off	IO-Link inactive (Master-Slave mode)
LED Out 1 (yellow)	for	Switchpoint 1 reached, switching output active
	off	Switchpoint not reached
LED Out 2 (green)	for	Switchpoint 2 reached, switching output active
	off	Switchpoint not reached

Button functions		
↓	Short press	Scroll from Menu 1 to Menu 5, then return to display.
	Long press	Quickly increment parameter values.
→	Short press	Select menu item within a menu.
	Long press	Apply set parameters and jump to current menu item.
↓ + →	Hold down both buttons simultaneously	Jump back to display.

The pressure sensor is configured according to VDMA 24574-1.

Menu operation

Example using menu items 1 to 5:

1. Press ↓ to open Menu 1.
2. Press → to display the values for Switchpoint 1. The selected value flashes.
3. Press ↓ to select a value. Press → to confirm the selected value and return to Menu 1.
4. Press ↓ to open the next menu and set the value as described under 2 and 3.
5. Press ↓ to open Menu 5.
6. Press → to open the first submenu 5/1 and set the value as described under 2 and 3.

Hold down both buttons to exit the menu.

> **i** If no button is pressed within 60 sec., the program returns to the display without saving the changed value.

Configurable parameters

Menu point	Designation	Factory setting	User setting
Menu 1 SP 1/FH 1	Switchpoint 1/ WindowHigh 1	75 % of measuring range	
Menu 2 rP 1/FL 1	Reset point 1/ WindowLow 1	74 % of measuring range	
Menu 3 SP 2/FH 2	Switchpoint 2/ WindowHigh 2	85 % of measuring range	
Menu 4 rP 2/FL 2	Reset point 2/ WindowLow 2	84 % of measuring range	
Menu 5/2 dS1	Turn-on delay 1	0.0 s	
Menu 5/3 dr 1	Turn-off delay 1	0.0 s	
Menu 5/4 dS 2	Turn-on delay 2	0.0 s	
Menu 5/5 dr 2	Turn-off delay 2	0.0 s	
Menu 5/6 ou 1	Switching function Output 1	Hno	
Menu 5/7 ou 2	Switching function Output 2	Hno	
Menu 5/8 un	Units	bar	
Menu 5/14 dAP	Measurement value damping	0 ms	
Menu 5/15 code	Password	0000	
Menu 5/16 o1	Output signal 1	PNP	
Menu 5/17 o2	Output signal 2	PNP	

Output functions

Possible parameterization of the outputs:

– 1 × PNP, NO/NC selectable, 1 × 0…10 V
– 1 × NPN, NO/NC selectable, 1 × 0…10 V
– 1 × PNP, NO/NC selectable, 1 × 4…20 mA
– 1 × NPN, NO/NC selectable, 1 × 4…20 mA
– 2 × PNP, NO/NC selectable
– 2 × NPN, NO/NC selectable

Adjustable hysteresis

The difference between switchpoint (SP) and reset point (rP) is called hysteresis. For electronic pressure sensors it is freely selectable within the measuring range.

Hysteresis function: The hysteresis holds the switching state of the output stable even when the temperature fluctuates by the nominal value. As system pressure increases the output switches when the respective switchpoint (SP) is reached. If the pressure drops again, the output only switches back when the reset point (rP) is reached.

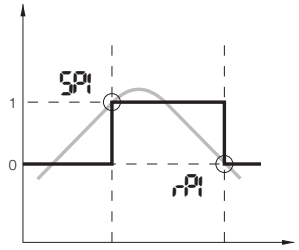


Fig. 15: Hysteresis function

Variable window

The output function is activated when the measured value falls between the preset switching and return point.

Window function: The range between a defined lower pressure limit and a defined upper limit is known as a window. A switching operation is initiated as soon as the upper or lower limit of the programmed pressure range is exceeded.

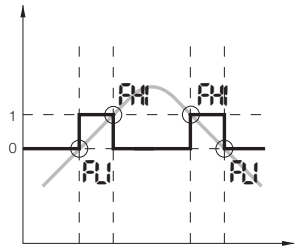


Fig. 16: Window function

Variable delay time

The delay time can be used to reliably filter out undesired pressure spikes of short duration. The switching output does not change its state immediately when a switching event is reached, but rather only after a freely selectable delay time of 0...50 s has expired. If the switching event no longer exists by the time the delay has elapsed, the switching output does not change.

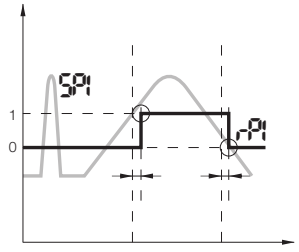


Fig. 17: Delay function

Menu functions

Display
(The firmware version (e.g. N007) is displayed for approx. 2 seconds after the device is turned on.)

First menu level	
Menu 1 and Menu 3 SP 1 / SP 2 FH 1 / FH 2	**Setting the switchpoints** Setting the respective value starting at which Switchpoint 1 or 2 should be activated. If the window function is enabled in Menu 5/6 or 6/7, the value of the switchpoint is the pressure upper limit of the window (WindowHigh).
Menu 2 and Menu 4 rP 1 / rP 2 FL 1 / FL 2	**Setting the reset points** Setting the respective value starting at which Reset Point 1 or 2 should be activated. If the window function is enabled in Menu 5/6 or 6/7, the value of the reset point is the pressure lower limit of the window (WindowLow). The reset point must always lie below the value of the associated switchpoint.
(Auxiliary menu) ASt2 / AEn2	If Output Signal 2 is active (5/17)
	Analog Output 2 (Offset ±5 % of measuring range) / Analog Output 2 (End Point 90…100 % of measuring range), e.g. for a sensor with measuring range 0…10 bar: – Measuring range start ASt2 can be set between –0.5 and +0.5 bar (≙ 4 mA/0 V). – Measuring range end AEn2 can be set between 9 and 10 bar (≙ 20 mA/10 V).
Menu 5 EF	Expanded functions (Transition to menu level two) →

Second menu level	
Menu 5/1 rES	**Resetting** Resetting all changeable parameters to factory defaults and clearing min. and max. values. YES = yes no = no
Menu 5/2 and Menu 5/4 dS 1 / dS 2	**Setting the switch-on delay** Setting the value for the switch-on delay after reaching the switch-on point 1 or 2 (0.0…50.0 s)
Menu 5/3 and Menu 5/5 dr 1 / dr 2	**Setting the switch-off delay** Setting the value for the switch-off delay after reaching the switch-off point 1 or 2 (0.0…50.0 s)
Menu 5/6 and Menu 5/7 ou 1 / ou 2	**Setting switching outputs 1 and 2** Switching function for the switching outputs: Hno = Hysteresis function, normally open Hnc = Hysteresis function, normally closed Fno = Window function, normally open Fnc = Window function, normally closed

Second menu level (continued)	
Menu 5/8 un	**Changing units** Select physical measuring unit for displayed and set pressure values: bAr = bar mbA = mbar PSI = PSI MPA = MPa
Menu 5/9 FLIP	Rotate display by 180°
Menu 5/10 Lo	**Min. value** (display only) Display minimum pressure present during the measurement (value is lost if power is interrupted)
Menu 5/11 Hi	**Max. value** (display only) Display maximum pressure present during the measurement (value is lost if power is interrupted)
Menu 5/12 ----	**Clearing Min. and Max. values** Execution of the clear values action is confirmed on the display
Menu 5/13 SEt0	**Zero point adjustment** Setting/correcting the zero point of the display and of the analog output signal by up to ±3% of the nominal pressure range. YES = yes no = no
Menu 5/14 dAP	**Measurement value damping** Setting the value for measurement value damping (0…1000 ms in 10 ms increments)
Menu 5/15 codE	**Access protection** Setting the password for menu access protection 0000 = no password (disabled) 0000…9999 selectable (enabled)
Menu 5/16 o1	**Output signal 1** Options: PnP = PNP nPn = NPN
Menu 5/17 o2	**Output signal 2** Options: PnP = PNP nPn = NPN I = 4...20 mA current output U = 0…10 V voltage output
Menu 5/18 Pcnt	**Displays number of pressure peaks**

Display

IO-Link interface

General device information

Baud rate	COM 2 (38.4 kBaud)
Process data length input	2 bytes
Minimum cycle time	5 ms
IO-Link version	V1.1 (downward compatible V1.0)
SIO mode	yes

SIO mode

Balluff pressure sensors with IO-Link support both SIO mode and IO-Link mode.

SIO mode (standard IO mode)

In SIO mode the sensor works like a normal pressure sensor with standard output signals.

Pin 4 (Output 1) on the M12 plug is always a digital output, Pin 2 (Output 2) carries an additional output or an analog output depending on the version.

IO-Link mode (communication mode)

If the sensor is operating under an IO-Link master, the pressure sensor switches to IO-Link communication mode.

IO-Link communication is through Pin 4 of the M12 connector.

Diagnostics capabilities

The pressure sensors feature additional diagnostics capabilities which can be read out either in IO-Link mode or in part using the display (operating hours and pressure peaks).

- **Sensor operating hours**
  When power is present the device counts the operating hours of the pressure sensor. The operating hours cannot be reset.
- **Pressure peak counter**
  When a pressure peak occurs (both positive and negative), this is detected by the pressure peak counter. It counts the number of pressure peaks, since these are outside the measuring range, but the value itself is not determined.
- **Temperature value**
  The device is able to output the internal temperature value of the controller.
  This is not a calibrated measuring system and thus does not provide an actual temperature.
  The values should be used only for comparison purposes for drawing conclusions about the process or the life expectancy of the device.

Process data

The process data length of the pressure sensor is 16 bits.

The process data include the switching states of the two switching outputs (BCD1 and BCD2) as well as the current measurement value.

The 14 bits of the measurement value are scaled corresponding to the measuring range of the sensor.

Bit 15	Bits 14 to 2	Bit 1	Bit 0
Signed Bit	Measured value	BDC2/ Output 2	BDC1/ Output 1

Please note the bit sequence, since otherwise the process value could be misinterpreted.

Measuring range	Value range	Multiplier
–1…2 bar	–1000…2000	× 0.001
–1…10 bar	–100…1000	× 0.01
0…2 bar	0…2000	× 0.001
0…5 bar	0…5000	× 0.001
0…10 bar	0…1000	× 0.01
0…20 bar	0…2000	× 0.01
0…50 bar	0…5000	× 0.01
0…100 bar	0…1000	× 0.1
0…250 bar	0…2500	× 0.1
0…400 bar	0…4000	× 0.1
0…600 bar	0…6000	× 0.1

Error codes

Error Code	Description
0x8011	Index not available
0x8012	Subindex not available
0x8023	Access denied
0x8030	Parameter Value out of Range
0x8033	Parameter length overrun
0x8034	Parameter length underrun

Event Codes

Definition	EventCodes IO-Link 1.1	EventCodes IO-Link 1.0	Device Status	Type
No malfunction	0x0000		0	Notification
General malfunction. Unknown error	0x1000		4	Error
Process variable range over-run. Process Data uncertain	0x8C10		2	Warning
Process variable range under-run. Process Data uncertain	0x8C30	0x8C10	2	Warning

IO-Link interface (continued)

Parameter data

The pressure sensor parameter data corresponds to the Smart Sensor profile (V1.0).

Index Hex	Subindex Hex	Object name	Single Value	Default	Comment
0x02	0x00	System Commands	0x81: Delete Min-/Max value 0x82: res 0xA0: Set0		
0x03	0x00	Data Storage Index	0x01: Upload Start 0x02: Upload End 0x03: Download Start 0x04: Download End 0x05: Datastorage Break		
0x0C	0x00	Device Access Lock	0x00: Unlocked 0x01: Parameter Access Lock 0x02: Datastorage Lock 0x04: Parameterization Lock 0x08: User Interface Lock 0x03: Parameter Access Lock + Datastorage Lock 0x05: Parameter Access Lock + Parameterization Lock 0x09: Parameter Access Lock + User Interface Lock 0x06: Datastorage Lock + Parameterization Lock 0x0A: Datastorage Lock + User Interface Lock 0x07: Datastorage Lock + Parameter Access Lock + Parameterization Lock 0x0B: Datastorage Lock + Parameter Access Lock + User Interface Lock	0x00: Unlocked	
0x24	0x00	Device Status	0x00: Device is operating properly 0x02: Out-of-Specification 0x04: Failure		
0x3D	0x01	SwitchPoint Logic 1	0x00: Value as specified		
	0x02	SwitchPoint Mode 1	0x80: Hysteresis NO 0x81: Hysteresis NC 0x82: Window NO 0x83: Window NC	0x80: HNo	
	0x03	SwitchPoint Hysteresis 1	0x0000: No Hysteresis		
0x3F	0x01	SwitchPoint Logic 2	0x00: Value as specified		
	0x02	SwitchPoint Mode 2	0x80: Hysteresis NO 0x81: Hysteresis NC 0x82: Window NO 0x83: Window NC	0x80: HNo	
	0x03	SwitchPoint Hysteresis 2	0x0000: No Hysteresis		
0x93	0x00	SwitchPoint Type 1	0x00: PNP Output 0x01: NPN Output		
0x97	0x00	SwitchPoint Type 2	0x00: PNP Output 0x01: NPN Output 0x02: 0...10 V Output 0x03: 4...20 mA Output		

IO-Link interface (continued)

Index Hex	Subindex Hex	Object name	Single Value	Default	Comment
0x50	0x00	Rotate Display	0x00: 180° 0x01: 0°	0x01: 0°	
0xD4	0x00	Unit	0x00: bar 0x01: mbar 0x02: PSI 0x03: MPa	0x00: bar	Pressure unit of the display is changed, the IO-Link process data are not changed.

Other parameter data

Index Hex	Subindex Hex	Object name	Access	Length	Value Range	Gradient	Unit	Default
0x3C	0x01	SetPoint 1 = SP1	R/F	2 bytes	Process Data			75 %
	0x02	SetPoint 2 = rP1	R/F	2 bytes	Process Data			74 %
0x3E	0x01	SetPoint 1 = SP2	R/F	2 bytes	Process Data			85 %
	0x02	SetPoint 2 = rP2	R/F	2 bytes	Process Data			84 %
0x52	0x00	Temperature	R	2 bytes	–40…150	1	°C	0
0x57	0x00	Operating Hours	R	4 bytes	0…4294967295	1	H	0
0x60	0x00	Password	F	2 bytes	0000…9999			0
0x98	0x00	Pressure peaks	R	4 bytes	0…4294967295	1		0
0xD0	0x00	Delay Switching Time 1	R/F	2 bytes	0…500	0.1	s	0
0xD1	0x00	Delay Back Switching Time 1	R/F	2 bytes	0…500	0.1	s	0
0xD2	0x00	Delay Switching Time 2	R/F	2 bytes	0…500	0.1	s	0
0xD3	0x00	Delay Back Switching Time 2	R/F	2 bytes	0…500	0.1	s	0
0xD5	0x00	Min Pressure Value	R	2 bytes	Process Data			
0xD6	0x00	Max Pressure Value	R	2 bytes	Process Data			
0xD7	0x00	Measure damping	R/F	2 bytes	0…1000 in 10 ms steps	1	ms	0

Negative values are represented in complement format.

Maintenance / Decommissioning

⚠ DANGER

Risk of death

Risk of death from flying parts, escaping medium and electrical shock.

- ► Always uninstall pressure sensors with pressure and power turned off!
- ► Before uninstallation check whether releasing the medium is required.

⚠ CAUTION

Residues

Medium remnants on the device may result in a hazard to the operator and the environment.

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

NOTICE

Damage to the measuring cell

Improper cleaning can result in irreparable damage to the measuring cell.

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

The device is essentially maintenance-free. The housing can be cleaned as needed using a damp cloth and non-corrosive cleaning solution when the device is switched off.

Depending on the measuring medium, deposits or dirt on the membrane can occur. If this is known, the operator must define appropriate cleaning intervals. After taking the device out of service properly, the membrane can be carefully cleaned using a non-aggressive cleaning solution and a soft brush or sponge.

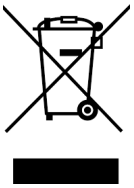
Returns

Before returning the pressure sensor clean it carefully and pack appropriately to prevent shipping damage.

More information about the RMA process can be found at www.balluff.com.

If your device has come into contact with harmful materials, a decontamination declaration will also be required. Devices without a decontamination declaration will, if there is doubt as to the medium used, be checked only after receipt of a corresponding declaration.

Disposal



This product falls under the current EU Directive for WEEE, waste of electrical and electronic equipment for protecting you and the environment from possible hazards and responsible handling of natural resources.

Dispose of the product properly and not as part of the normal waste stream. Observe the regulations of the respective country. Information can be obtained from the national authorities. Or return the product to us for disposal.

Technical data

Electric data	
Operating voltage U_B	18 …30 V DC
Output current	≤ 150 mA
Interface	IO-Link V1.1
No-load current I_0	≤ 50 mA
Polarity reversal protected	yes
Short circuit protected	yes
Switching frequency	≤ 170 Hz
Accuracy per IEC 60770	≤ ±0.5% FSO BFSL
Temperature error BSP not front flush BSP front flush	 ≤ ±0.3% FSO/10 K ≤ ±0.15% FSO/10 K

Mechanical data	
Connector	M12 male, 4-pin
Housing material	PE, stainless steel (1.4301)
Process connection BSP not front flush BSP front flush	 G1/4", ¼" NPT, G1/2"PVDF G1/2", Triclamp 1 ½"
Process connection material BSP not front flush BSP front flush	 Stainless steel (1.4301) Stainless steel (1.4404)
Measuring cell material BSP not front flush BSP front flush	 Ceramic with FKM seal (internal) Welded stainless steel
Sealing ring material (only versions with external G-thread)	Fluoroelastomer

Displays	
Function displays	LEDs
Display	7-segment display

Ambient conditions	
Ambient temperature	–40…+85 °C
Medium temperature Triclamp sensors Not front flush and front flush G1/2" sensors	 –10…+125 °C –40…+125 °C
Protection class for all sensors: BSP…-_ _**009**-P00S2B-…	IP67 when threaded on
Protection class for all sensors: BSP…-_ _**010**-P00S2B-…	IP67 and IP69K when threaded-on

Pressure data BSP Triclamp BSP _ _ _ _-ZT…		
Nominal pressure	**Overload pressure**	**Burst pressure**
0…100 mbar	0.5 bar	1.5 bar
0…250 mbar	1 bar	1.5 bar
0…500 mbar	5 bar	7.5 bar
0…750 mbar	5 bar	7.5 bar
0…1 bar	5 bar	7.5 bar
0…2 bar	10 bar	15 bar

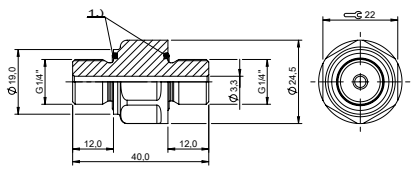
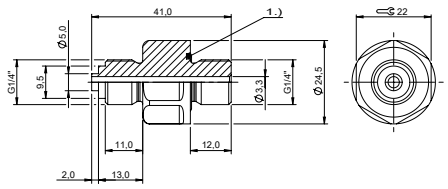
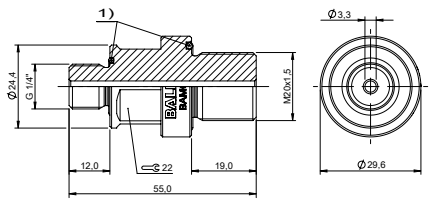
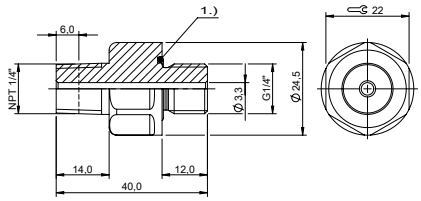
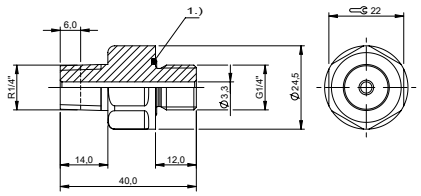
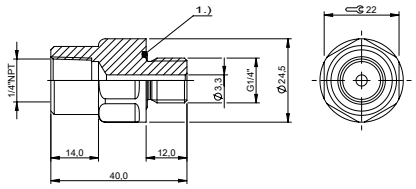
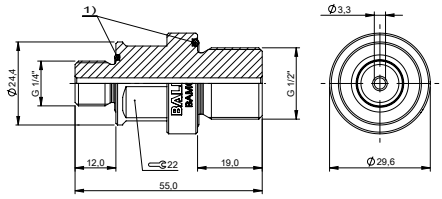
Pressure data BSP without clamp connection BSP _ _ _ _-EV/FV/HV/IV…			
		BSP	
		not front flush	**front flush**
Relative nominal pressure	Sensor –1…2 bar	2 bar	2 bar
	Sensor –1…10 bar	10 bar	10 bar
	Sensor 0…2 bar	2 bar	2 bar
	Sensor 0…5 bar	5 bar	5 bar
	Sensor 0…10 bar	10 bar	10 bar
	Sensor 0…20 bar	20 bar	20 bar
	Sensor 0…50 bar	50 bar	50 bar
	Sensor 0…100 bar	100 bar	100 bar
	Sensor 0…250 bar	250 bar	250 bar
	Sensor 0…400 bar	400 bar	400 bar
	Sensor 0…600 bar	600 bar	600 bar
Overload pressure	Sensor –1…2 bar	4 bar	10 bar
	Sensor –1…10 bar	20 bar	40 bar
	Sensor 0…2 bar	4 bar	10 bar
	Sensor 0…5 bar	10 bar	40 bar
	Sensor 0…10 bar	20 bar	40 bar
	Sensor 0…20 bar	40 bar	80 bar
	Sensor 0…50 bar	100 bar	100 bar
	Sensor 0…100 bar	200 bar	200 bar
	Sensor 0…250 bar	400 bar	400 bar
	Sensor 0…400 bar	650 bar	600 bar
	Sensor 0…600 bar	1000 bar	800 bar
Burst pressure	Sensor –1…2 bar	10 bar	15 bar
	Sensor –1…10 bar	35 bar	50 bar
	Sensor 0…2 bar	10 bar	15 bar
	Sensor 0…5 bar	15 bar	50 bar
	Sensor 0…10 bar	35 bar	50 bar
	Sensor 0…20 bar	70 bar	120 bar
	Sensor 0…50 bar	150 bar	180 bar
	Sensor 0…100 bar	300 bar	300 bar
	Sensor 0…250 bar	750 bar	750 bar
	Sensor 0…400 bar	1000 bar	1000 bar
	Sensor 0…600 bar	1570 bar	1570 bar
Permitted vacuum		vacuum-tight	

Accessories

Adapter for process connection BSP _ _ _ _-E...

Using the optional adapters (accessories) the BSP pressure sensors can be adapted to various process connections. Please order adapters separately.

Adapters for other process connections on request.

Adapters	Order code	Dimensional drawing	Features
Adapter G 1/4" per DIN 3852	BAM01KP		Stainless steel Connection: – Sensor side: G 1/4" per DIN 3852 – Process side: G 1/4" per DIN 3852 Tightening torque approx. 5 Nm
Adapter G 1/4" per EN 837 (for manometer fitting)	BAM01KR		Stainless steel Connection: – Sensor side: G 1/4" per DIN 3852 – Process side: G 1/4" per EN 837 Tightening torque approx. 20 Nm
Adapter M20x1.5	BAM0209		Stainless steel Connection: – Sensor side: G 1/4" per DIN 3852 – Process side: M20x1.5 Tightening torque approx. 30 Nm
Adapter NPT 1/4"	BAM01KT		Stainless steel Connection: – Sensor side: G 1/4" per DIN 3852 – Process side: NPT 1/4" Tightening torque approx. 30 Nm
Adapter R 1/4"	BAM01RP		Stainless steel Connection: – Sensor side: G 1/4" per DIN 3852 – Process side: R 1/4" Tightening torque approx. 30 Nm
Adapter NPT 1/4" internal threads	BAM01TR		Stainless steel Connection: – Sensor side: G 1/4" per DIN 3852 – Process side: internal threads NPT 1/4" Tightening torque approx. 30 Nm
Adapter G 1/2"	BAM01UJ		Stainless steel Connection: – Sensor side: G 1/4" per DIN 3852 – Process side: G 1/2" per DIN 3852 Tightening torque approx. 30 Nm

1) O-ring made of FKM

Type code

BSP B010 - EV009 - P00S2B - S4 - 003

Physical unit
M = Millibar
B = Bar
V = Bar, vacuum (from –1 bar)

Max. pressure range (value correlated to physical unit)
001 = 1 010 = 10 100 = 100 999 = 999

Process connection
E = Not front flush, G1/4", internal threads
G = Not front flush, NPT 1/4", internal threads
H = Not front flush, G 1/2", external threads
I = Front flush, G1/2", external threads
Z = Special connection

Gasket/sealing system
T = None, seal via triclamp
V = Viton seal ring (ISO: FKM, DIN: FPM)

Housing version
009 = IP67 version
010 = IP67 and IP69K version with filter housing

Interface to PLC
P00S2 = Programmable outputs, IO-Link option with SIO mode

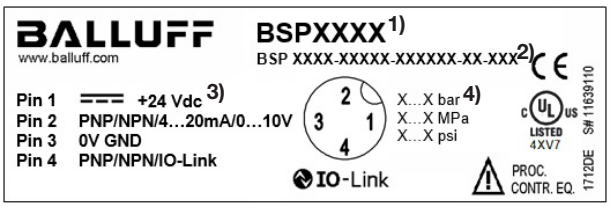
Operating elements
B = Display, 2 buttons

Connector system
S4 = M12, 4-pole

Special properties/special version (optional)
001 = Process connection PVDF (only with process connection H)
003 = Configuration/display without psi unit
006 = Front flush, Triclamp 1 1/2", FDA conformal liquid, 3.1 inspection certificate (only with process connection Z)
Z03 = With 5-point measurement protocol

Part label

The part label contains the exact part number and key technical data for uniquely identifying the device.



1) Order code
2) Type
3) Electrical connections
4) Nominal pressure

Fig. 18: Part label (example)

No. 942819-726 EN · 01.Vorserie · C19; subject to modification. Replaces A19.