

Pressure Transmitters with IO-Link

BSP-Bxxx-xx004-xxxS1A-xx, BSP-Vxxx-xx004-xxxS1A-xx



EU Directive 2004/108/EC (EMC Directive) and EMC Law
Generic Standards: EN 61000-6-4 (Emissions), EN 61000-6-2 (Interference Immunity)
Emissions testing: Radio interference emissions EN 55011 Group 1, Class A and B

Validity

This guide is valid for the following pressure transmitters:

- BSP-Bxxx-xx004-xxxS1A-xx
- BSP-Vxxx-xx004-xxxS1A-xx



Intended use

The pressure transmitter has been developed to monitor the pressure of gases or fluids compatible with stainless steel, ceramics and fluoroelastomers. Pressure transmitters are suited to different types of application depending on the device and mechanical connection.

The pressure transmitter is installed in a machine or integrated into a system. Flawless function in accordance with the specifications in the technical data is ensured only when using original BALLUFF accessories, and use of any other components will void the warranty.

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

Safety instructions



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 are to be performed only by trained specialists.

The **operator** is responsible for ensuring that local safety regulations are observed.

In particular, the operator must take measures to ensure that a defect in the pressure detection system will not result in hazards to persons or equipment.

If defects or non-clearable faults in the sensor occur, take it out of service and secure against unauthorized use.

Downloading the user's guide

The user's guide can also be found on the Internet at www.balluff.com.

Installation



Caution!

Do not allow the pressure transmitter to be exposed to high temperatures or rapid increases in pressure that extend beyond specific limits (see Technical Data for limit values).

- Always depressurize and disconnect pressure transmitters from the power supply before installing!
- Observe the following when installing outdoors or in a damp environment:
Select a installation location that allows splash and condensation water to drain away. Fluids must not be allowed to accumulate on sealing surfaces!
Connect the device to the power supply immediately after installation to prevent moisture from entering the connector. Otherwise fit a suitable protective cap to prevent the ingress of moisture. The degree of protection specified on the data sheet only applies if the device is connected!

If there is a risk of damage from lightning or excess voltage, mount overvoltage protection between the power supply unit or switching cabinet and device.

- On hydraulic systems, position the device so that the pressure connection faces upwards (venting).
- If the device is installed on a steam pipeline, provide a cooling section.
- Mount the device in a location protected from direct sunlight. Sunlight can damage or affect the functional capability of the device.
- When installing devices with a gauge reference in the housing (small hole in the transmitter housing), make sure that the gauge reference required for the measurement is protected against dirt and moisture. If the device is exposed to fluids, the gauge reference blocks the air pressure compensator. Accurate measurements are not possible when this happens. and the device may be damaged.
- No mechanical tension should be placed on the pressure connection during installation as this may shift the characteristic curve. This applies in particular to extremely small pressure ranges and devices with a plastic pressure connection.

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Installation

Installation of connections according to DIN 3852

Make sure that:

- The sealing surface on the relevant part is perfectly clean and free of residue.
 - The O-ring seated in the slot provided is undamaged.
1. Screw the device into the mounting thread by hand.
 2. Secure devices to the steel pressure connection using a flat wrench. Observe the following torque values:

Torque 1/4"			
Connec- tion per EN 3852	Connection per EN 837	NPT con- nection	R connec- tion
approx. 5 Nm	approx. 20 Nm	approx. 30 Nm	approx. 30 Nm

Torque 1/2"			
Connec- tion per EN 3852	Connection per EN 837	NPT con- nection	R connec- tion
approx. 10 Nm	approx. 50 Nm	approx. 70 Nm	approx. 70 Nm

Electrical connections



Caution!

Always depressurize and disconnect devices from the power supply before establishing an electrical connection.

Establish the electrical connection to the device according to the specifications indicated on the type plate, the pin assignment table below and the wiring diagram.

Electrical connections	SIO Mode	IO-Link Mode
Pin 1	Supply +	Supply +
Pin 2	n.c.	n.c.
Pin 3	Power supply - /	Power Supply -
Pin 4	Out 1	IO-Link

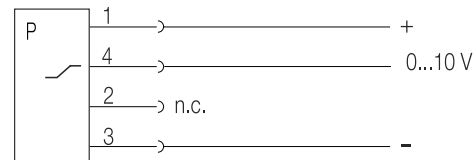
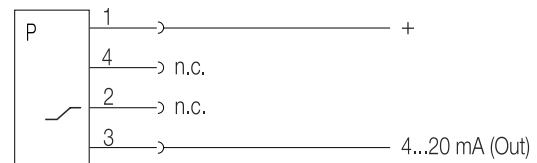


Image 1: Wiring diagram

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Dimensional drawings

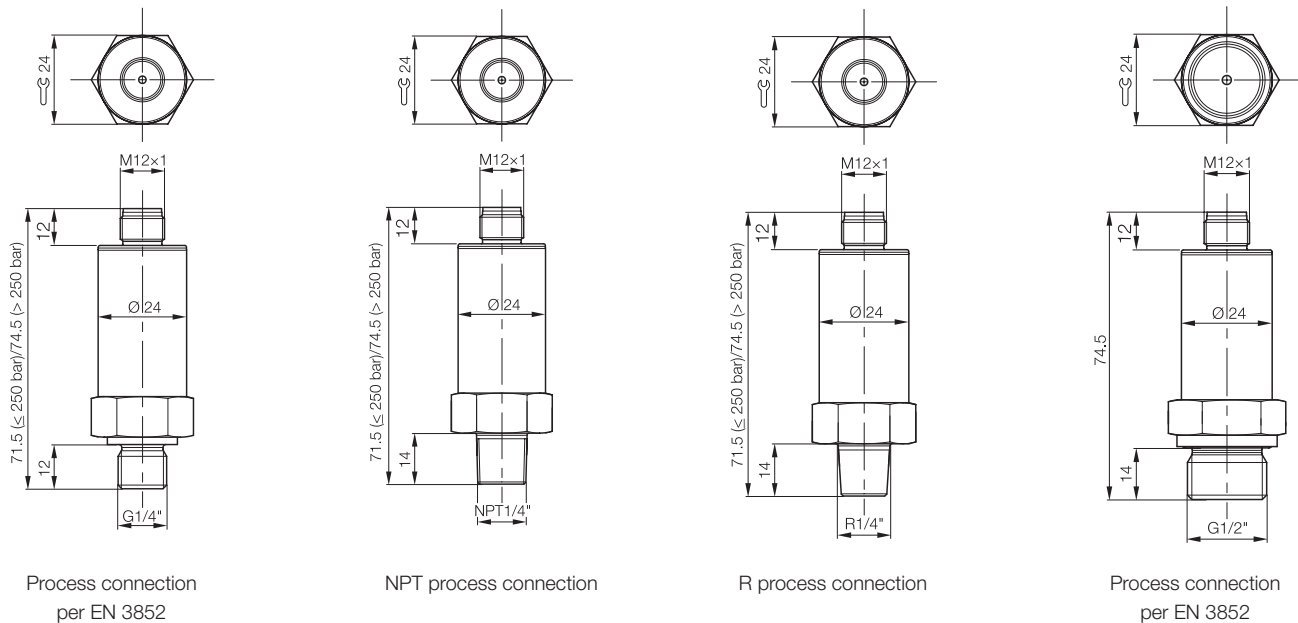


Image 2: Dimensioned drawing of pressure transmitter

Maintenance



Incorrect cleaning can cause irreparable damage to the measuring cell. Therefore never use pointed objects or compressed air to clean the membrane.

The device is maintenance-free in principle. If required, the housing can be cleaned with a damp cloth and mild cleaning solution provided the device is switched off. The membrane may become covered with deposits and contamination, depending on the measuring material. If the nature of the material is known, the operator must define appropriate cleaning intervals. When the device is decommissioned correctly, the membrane can be cleaned carefully with a mild cleaning solution and a soft brush or sponge.

Decommissioning



The measuring material may pose a risk to the operator. Therefore always take appropriate protective measures.

Always depressurize and disconnect the device from the power supply before removing and check whether material must be drained first!

Disposal



Residual material on the device may pose a risk to the operator and a danger to the environment. Therefore always take appropriate protective measures and dispose of the device correctly.

The device must be disposed of according to European Directives 2002/96/EC and 2003/108/EC (Waste Electrical and Electronic Equipment). Equipment should be disposed of separately from household waste!

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IO-Link interface

General device info

Baud rate	COM 2 (38.4 kbaud)
Input of process data length	2 bytes
Minimum cycle time	5 ms
IO-Link version	V1.1
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) of the M12 plug is always a digital output. An additional digital output or an analog output is available on pin 2 (output 2), depending on the selected version.

IO-Link Mode (communication mode)

If the sensor operates subordinate to an IO-Link master, then the pressure sensor switches to IO-Link communication mode. The IO-Link communication now runs via pin 4 of the M12 plug.

Process data

The process data length of the pressure sensor is 16 bits. The switching statuses of the two switching outputs (BCD1 and BCD2) are transmitted in the process data, as well as the current measured value.

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

15....2	1	0
Measured value		BDC1/Output 1

Measuring range	Value range	Multiplier
-1...2 bar	-1000...2000	x0.001
-1...10 bar	-100...1000	x0.01
0...2 bar	0...2000	x0.001
0...5 bar	0...5000	x0.001
0...10 bar	0...1000	x0.01
0...20 bar	0...2000	x0.01
0...50 bar	0...5000	x0.01
0...100 bar	0...1000	x0.1
0...250 bar	0...2500	x0.1
0...400 bar	0...4000	x0.1
0...600 bar	0...6000	x0.1

Error and event codes

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	Event codes IO-Link 1.1	Event codes IO-Link 1.0	Device status	Type
No malfunction	0x0000	0x0000	0	Notification
General malfunction. Unknown error	0x1000	0x1000	4	Error
Process variable range overrun. Process data uncertain	0x8C10	0x8C10	2	Warning
Process variable range underrun. Process data uncertain	0x8C30	0x8C10	2	Warning

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IO-Link interface

Parameterization data

The pressure sensor parameter data corresponds to the smart sensor profile.

Index hex	Subindex hex	Object name	Single Value	Default	Comment
0x02	0x00	System Commands	0x81 = Deleting Min./Max. value 0x82 = res 0xA0 = Set0		The action is carried out by writing in the subindex.
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: IO-Link Lock 0x02: Datastorage Lock 0x03: IO-Link Lock + Datastorage Lock	0x00: Unlocked	
0x24	0x00	Device status	0x00 Device is operating properly 0x02 Out-of-Specification 0x04 Failure		
0x3D	0x02	SwitchPoint mode	0x80: Hysteresis NO 0x81: Hysteresis NC 0x82: Window NO 0x83: Window NC	0x80: HNo	

Index hex	Subindex hex	Object name	Access	Length	Value Range	Gradient	Unit	Default
0x3C	0x01	SetPoint 1 = SP1	R/W	2 Byte	Process Data			100%
0x3C	0x02	SetPoint 2 = rP1	R/W	2 Byte	Process Data			0%
0xD0	0x00	Delay Switching Time 1	R/W	2 Byte	0..500	0.1	sec	0
0xD1	0x00	Delay Back Switching Time 1	R/W	2 Byte	0..500	0.1	sec	0
0xD2	0x00	Delay Switching Time 2	R/W	2 Byte	0..500	0.1	sec	0
0xD3	0x00	Delay Back Switching Time 2	R/W	2 Byte	0..500	0.1	sec	0
0xD5	0x00	Min Pressure Value	R	2 Byte	Process Data			
0xD6	0x00	Max Pressure Value	R	2 Byte	Process Data			
0xD7	0x00	Measure damping	R/W	2 Byte	0...1000 in 10 ms steps	1	ms	0

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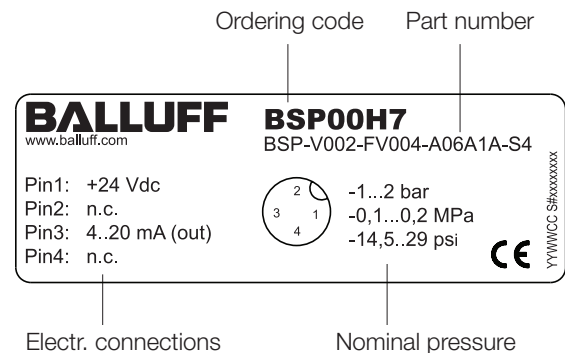
Technical data

Electrical data	
Supply voltage U_s	12...32 V DC
No-load supply current I_0 max	≤ 30 mA
Interface	IO-Link V1.1
Polarity reversal protected	Yes
Short-circuit protected	Yes
Switching frequency f	200 Hz
Accuracy according to IEC 60770	$\leq \pm 0.5\%$ FSO BFSL
Temperature error up to 250 bar from 400 bar	$\leq \pm 0.5\%$ FSO/10 K $\leq \pm 0.3\%$ FSO/10 K
Mechanical data	
Housing material	Stainless steel 1.4301
Measuring cell material up to 250 bar from 400 bar	Ceramics Al2O3 Stainless steel 1.4542
Sealing ring material	Fluoroelastomer
Plug connector socket	M12, 4-pin
Process connection for material up to 250 bar from 400 bar	Stainless steel 1.4301 Stainless steel 1.4571
Process connection	G 1/4", G 1/2", 1/4" NPT, R 1/4"
Weight	Approx. 120 g
Ambient conditions	
Ambient temperature range	-40...+85 °C
Material temperature	-40...+125 °C
Degree of protection as per IEC 60529	IP 67 when connected

rel. nominal pressure	Overload pressure	Cracking pressure
Sensor -1...2 bar	5 bar	10 bar
Sensor -1...10 bar	20 bar	35 bar
Sensor 0...2 bar	5 bar	10 bar
Sensor 0...5 bar	12 bar	15 bar
Sensor 0...10 bar	20 bar	35 bar
Sensor 0...20 bar	50 bar	70 bar
Sensor 0...50 bar	120 bar	150 bar
Sensor 0...100 bar	200 bar	300 bar
Sensor 0...250 bar	400 bar	750 bar
Sensor 0...400 bar	1200 bar	1500 bar
Sensor 0...600 bar	1200 bar	1800 bar

Your pressure transmitter type

The type plate contains the exact designation and most important technical data so that the device can be identified clearly.



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Type code for pressure transmitters

BSP - V 002 - F V 004 - D 06 S 1 A - S4 - T

Physical unit

M = millibar
 W = millibar, vacuum (from -1 bar)
 B = bar
 V = bar, vacuum (from -1 bar)
 K = kilobar

Max. pressure range (value correlates with phys. unit)

001 = 1
 010 = 10
 100 = 100
 999 = 999

Process connection and housing

D = external thread G1/4"
 F = external thread NPT 1/4"
 H = external thread G1/2"
 K = external thread G1/4"

Seal/sealing system (see BHS code)

V = Viton sealing ring (ISO: FKM, DIN: FPM)

Housing type

004 = pressure transmitter

Interface to PLC

D = digital data

Output function/output technology

05 = 1 x NPN, NO/NC selection
 06 = 1 x PNP, NO/NC selection

Variant/options

S = IO-Link with SIO Mode

Subversions based on main version

1 = Basic variant

Operating elements

A = no display, no buttons

Connector system

S4 = M12, 4-pin

Special characteristics or design (optional)

Z = General special design
 T = Temperature-resistant
 0 = Basic special design



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