BSP Pressure Sensor

BSP Pressure Sensor

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Pressure Sensor Vacuum
2-wire FSO Burst pressure
Transducer flush-mounted
Overpressure 3-wire BFSL

Standard Pressure Sensor with display

Overview

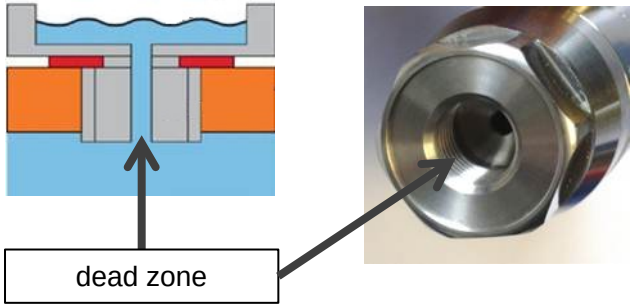
Pressure Range	Relative nominal pressure	Overload pressure	Burst pressure ≥	Permitted negative pressure
-1..2 bar	2 bar	4 bar	10 bar	Vacuum proof
-1..10 bar	10 bar	20 bar	35 bar	
0..2 bar	2 bar	4 bar	10 bar	
0..5 bar	5 bar	10 bar	15 bar	
0..10 bar	10 bar	20 bar	35 bar	
0..20 bar	20 bar	40 bar	75 bar	
0..50 bar	50 bar	100 bar	150 bar	
0..100 bar	100 bar	200 bar	250 bar	
0..250 bar	250 bar	400 bar	450 bar	
0..400 bar	400 bar	650 bar	700 bar	
0..600 bar	600 bar	750 bar	800 bar	

Upgrading with flush-mounted Pressure Sensor

Overview

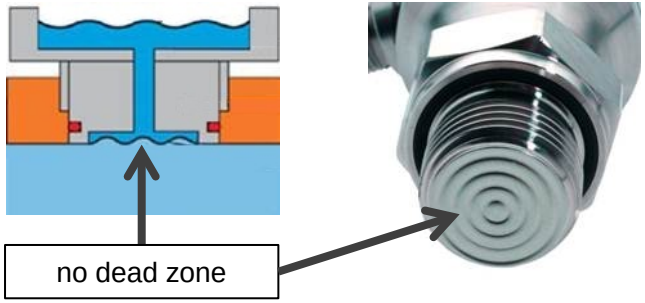
Pressure Range	Relative nominal pressure	Overload pressure	Burst pressure ≥	Permitted negative pressure
-1..2 bar	2 bar	10 bar	15 bar	Vacuum proof
-1..10 bar	10 bar	40 bar	50 bar	
0..2 bar	2 bar	10 bar	15 bar	
0..5 bar	5 bar	40 bar	50 bar	
0..10 bar	10 bar	40 bar	50 bar	
0..20 bar	20 bar	80 bar	120 bar	
0..50 bar	50 bar	100 bar	150 bar	
0..100 bar	100 bar	200 bar	300 bar	
0..250 bar	250 bar	400 bar	750 bar	
0..400 bar	400 bar	600 bar	1000 bar	

Differences between standard and flush-mounted



Standard process connection

Is suitable for normal liquid media and air/gas. And if the media will not change in the application, means no cleaning process is necessary in the system. Like for oil in hydraulic, water for cooling system,…



Flush-mounted process connection

Is suitable for viscous and crystallized media or media containing solids. Like in Food & Beverage or ink, color, glue… where the system have to be cleaned before changing media.

Where to use a flush-mounted version

Flush-mounted pressure sensors are ideally suited for pressure measurement in viscous, paste-like, crystallizing or solids-containing media. This makes them suitable for pressure measurement of for example:

- adhesives
- greases
- sealants
- often changing media

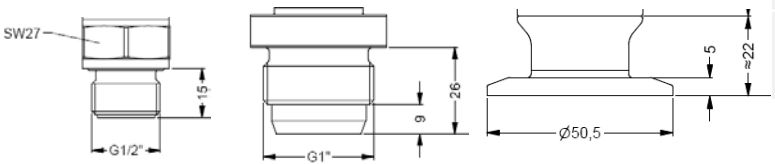
And where the system have to be cleaned before changing the media. Like for ink, color, glue,… or especially for Food & Beverage.

With their flush-mounted, welded stainless steel membrane, they have no dead spaces and can be easily cleaned in the application.

BSP Pressure Sensor

Technical features

Other Process connections like Tri-Clamp,.. are possible



Overview		
Supply voltage UB		18..36 V DC
Switching frequency f max.		200 Hz
Accuracy		≤ ± 0.5 % BFSL
Response time		< 12 ms
Temperature error		≤ ± 0.2 % FSO/10 K
Ambient/media temperature		-40...+85 °C/-40…+125 °C
Degree of protection per IEC60529		IP67 (when connected)
Load cycles		> 100 Mio.
Material	Housing	PA 6.6, stainless steel
	Membranes	Stainless steal 1.4435
	Internal filling media	Silicon oil
	Seal	Fluorelastomer
Connection	Plug connector	M12 connector, 4-pin
	Process connection	G ½", flush-mounted

Possibilities and Options

Possibilities

- Other process connection possible
- Internal filling media also with FDA approval for Food & Beverage available
- Other pressure ranges possible

Options

- Pressure range for hydrostatic (for example 400 mbar)
- Media temperature to max. 200°C with cooling section

Upgrading with Pressure Transmitter

Overview

Pressure Range	Relative nominal pressure	Overload pressure	Burst pressure ≥	Permitted negative pressure
-1..2 bar	2 bar	4 bar	7 bar	Vacuum proof
-1..10 bar	10 bar	20 bar	30 bar	
0..2 bar	2 bar	4 bar	7 bar	
0..5 bar	5 bar	10 bar	15 bar	
0..10 bar	10 bar	20 bar	30 bar	
0..20 bar	20 bar	40 bar	70 bar	
0..50 bar	50 bar	100 bar	150 bar	
0..100 bar	100 bar	200 bar	300 bar	
0..250 bar	250 bar	400 bar	750 bar	
0..400 bar	400 bar	1200 bar	1500 bar	
0..600 bar	600 bar	1200 bar	1800 bar	

Differences between Display and Transmitter

Transmitter

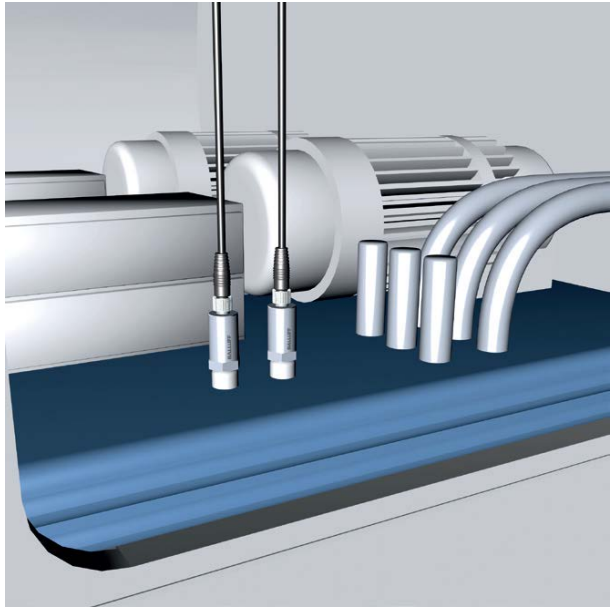
No display and smaller housing therefore mountable somewhere in the machine/system. Without switch points and only with fix analog signals. And the 2 standard signals are:

- 0..10V
- 4..20mA (2-wire on Pin1=+ and Pin3=out)

Pressure sensor with Display

Actual pressure always readable and showed on display. User can adjust directly switch points, window/hysteresis function, delay time,… via 2 buttons. Available with 2xPNP, 2xNPN or 1xPNP/1xNPN + analog output 4..20mA or 0..10V

Where to use a Transmitter



Compact pressure transmitters stand for continuously reliable pressure measurement. They are compact and installed right where the action is. Our pressure transmitters feature an impressive price/performance ratio and solve a wide variety of tasks in factory automation.

Applications

- machine tools
- hydraulics and pneumatics
- pumps and compressors

Used when no access or HMI is needed and therefore mountable somewhere in the machine where.

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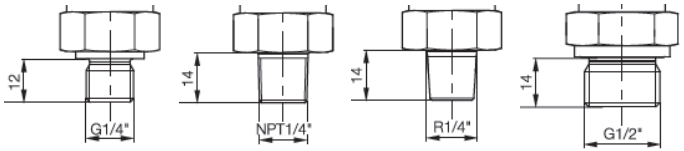
Technical features

We have 4 different standard process connection



Overview		≤250 bar	≥400 bar
Supply voltage UB		14..36 V DC	
Accuracy		≤ ± 0.5 % BFSL	
Response time		2-wire ≤ 10 ms / 3-wire ≤ 3 ms	
Temperature error		≤ ± 0.5 % FSO/10 K	≤ ± 0.3 % FSO/10 K
Ambient/media temperature		-25...+85 °C/-40…+125 °C	-40...+85 °C/-40…+125 °C
Load cycles		> 100 Mio.	
Material	Housing	stainless steel 1.4301	
	Connector housing material	Brass nickel-plated	
	Membranes	Ceramic AL_2O_3 96%	Stainless steel 1.4542
	Seal	FKM	Non, welded
	Process connection	stainless steel 1.4301	stainless steel 1.4571
Connection	Plug connector	M12 connector, 4-pin	
	Process connection	G¼" / NPT¼" / R¼" / G½"	

Possibilities and Options

Possibilities

- Other process connection possible
- Different pin configuration to standard is possible
- Other pressure ranges possible
- A 5-point factory calibration (only for analog output)

Options

- Higher accuracy for measurements application
- Faster response time for quick applications
- Higher burst pressure for high pressure peaks

Upgrading Pressure Sensor with IO-Link V1.1

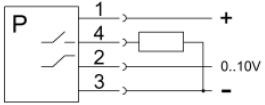
IO-Link

Overview

Pressure Range	Relative nominal pressure	Overload pressure	Burst pressure ≥	Permitted negative pressure
-1..2 bar	2 bar	4 bar	10 bar	Vacuum proof
-1..10 bar	10 bar	20 bar	35 bar	
0..2 bar	2 bar	4 bar	10 bar	
0..5 bar	5 bar	10 bar	15 bar	
0..10 bar	10 bar	20 bar	35 bar	
0..20 bar	20 bar	40 bar	70 bar	
0..50 bar	50 bar	100 bar	150 bar	
0..100 bar	100 bar	200 bar	300 bar	
0..250 bar	250 bar	400 bar	750 bar	
0..400 bar	400 bar	650 bar	1000 bar	
0..600 bar	600 bar	750 bar	1100 bar	

Differences between Standard and IO-Link

Standard



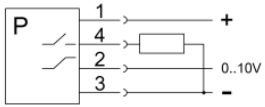
Standard

We offer our Standard in 6 different configurations in each pressure range.

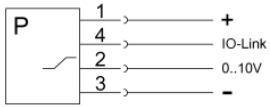
2xPNP, 1xPNP+analog 0..10V, 1xPNP+analog 4..20mA

2xNPN, 1xNPN+analog 0..10V, 1xNPN+analog 4..20mA

SIO-Mode



IO-Link



IO-Link with SIO-Mode

We offer the same range with the IO-Link versions. Additional with a SIO-Mode (SIO-Mode = Standard IO). If the Sensor get a IO-Link communication during power on, the sensor will switch into IO-Link communication. If not the sensor run as a normal Standard sensor (SIO-Mode).
So we can cover both "worlds" with one device.

Where to use a IO-Link

Standard pressure sensors with IO-Link can be positioned in the machine right where the action is from a process technology standpoint. That is because the accessibility of the sensors loses its significance through IO-Link. Process monitoring, configuration and error analysis of the IO-Link devices now take place in the controller and this way processes are optimized chronologically. Signal delays and distortions are eliminated reliably. Digital transmission of data also ensures high signal quality.

- Reduced downtimes (replacement with plug-and-play)
- Maximum flexibility (system conversion during ongoing operation)
- Simple commissioning (parameter can be duplicated using IO-Link)
- In-process diagnostics (errors are reported directly via IO-Link)

Technical features

IO-Link

Overview		Standard	High-End
Supply voltage UB		18..36 V DC	
Accuracy		≤ ± 0.5 % BFSL	
IO-Link Specification		V 1.1	
Temperature error		≤ ± 0.3 % FSO/10 K	
Ambient temperature		-25...+85 °C	-40...+85 °C
Load cycles		> 100 Mio.	
Material	Housing	stainless steel 1.4301	
	Connector housing material	Brass nickel-plated	
	Membranes	Ceramic AL_2O_3 96%	
	Seal	FKM	
	Process connection	stainless steel 1.4301	
Connection	Plug connector	M12 connector, 4-pin	
	Process connection	G¼" internal threat	

Possibilities and Options

IO-Link

Possibilities

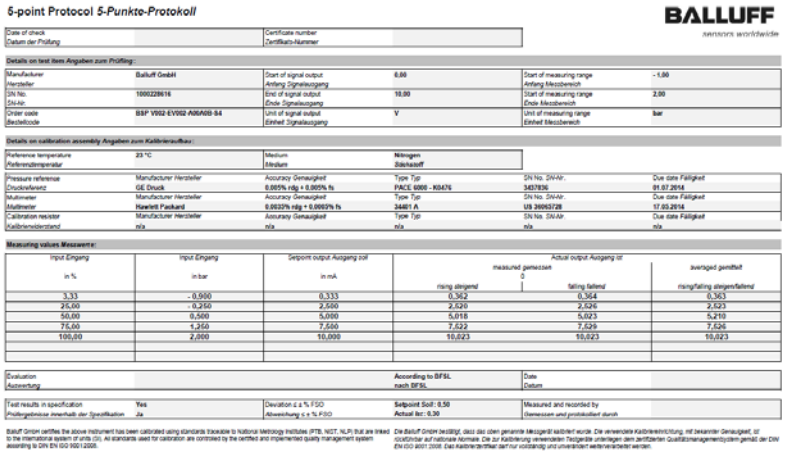
- Other process connection possible
- Other pressure ranges possible

Options

- With presetting if needed (switch point, password,..)
- A 5-point factory calibration (only with analog output)

5-Point-Protocol - 2 ways to get it

5-Point-Protocol (only for analog output)



5-point Protocol *5-Punkte-Protokoll*

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Date of check / Datum der Prüfung		Certificate number / Zertifikats-Nummer			
Details on test item Angaben zum Prüfling:					
Manufacturer / Hersteller	Balluff GmbH	Start of signal output / Anfang Signalausgang	0,00	Start of measuring range / Anfang Messbereich	- 1,00
SN No. / SN-Nr.	1000228616	End of signal output / Ende Signalausgang	10,00	Start of measuring range / Ende Messbereich	2,00
Order code / Bestellcode	BSP V002-EV002-N6A0S-S4	Unit of signal output / Einheit Signalausgang	V	Unit of measuring range / Einheit Messbereich	bar
Details on calibration assembly Angaben zum Kalibrieraufbau:					
Reference temperature / Referenztemperatur	23 °C	Medium / Medium	Nitrogen / Stickstoff		
Pressure reference / Druckreferenz	Manufacturer Hersteller: GE Druck	Accuracy Genauigkeit: 0,005% rdg + 0,005% fs	Type Typ: PACE 6000 - K0476	SN No. SN-Nr.: 3437836	Due date Fälligkeit: 01.07.2014
Multimeter / Multimeter	Manufacturer Hersteller: Hewlett Packard	Accuracy Genauigkeit: 0,0023% rdg + 0,0003% fs	Type Typ: 34401 A	SN No. SN-Nr.: US 36053728	Due date Fälligkeit: 17.03.2014
Calibration resistor / Kalibrierwiderstand	Manufacturer Hersteller: n/a	Accuracy Genauigkeit: n/a	Type Typ: n/a	SN No. SN-Nr.: n/a	Due date Fälligkeit: n/a

Measuring values Messwerte:

Input /Eingang in %	Input /Eingang in bar	Setpoint output /Ausgang soll in mA	Actual output /Ausgang ist measured gemessen: 0 rising /steigend	0 falling /fallend	averaged /gemittelt rising/falling /steigen/fallend
3,33	- 0,900	0,333	0,362	0,364	0,363
25,00	- 0,250	2,500	2,520	2,526	2,523
50,00	0,500	5,000	5,018	5,023	5,210
75,00	1,250	7,500	7,522	7,529	7,526
100,00	2,000	10,000	10,023	10,023	10,023

Evaluation / Auswertung			According to BFSL / nach BFSL	Date / Datum	
Test results in specification / Prüfergebnisse innerhalb der Spezifikation	Yes / Ja	Deviation ≤ ± % FSO / Abweichung ≤ ± % FSO	Setpoint Soll: 0,50 Actual Ist: 0,30	Measured and recorded by / Gemessen und protokolliert durch	

Balluff GmbH certifies the above instrument has been calibrated using standards traceable to National Metrology Institutes (PTB, NIST, NLP) that are linked to the international system of units (SI). All standards used for calibration are controlled by the certified and implemented quality management system according to DIN EN ISO 9001:2008.

Die Balluff GmbH bestätigt, dass das oben genannte Messgerät kalibriert wurde. Die verwendete Kalibriereinrichtung, mit bekannter Genauigkeit, ist rückführbar auf nationale Normale. Die zur Kalibrierung verwendeten Testgeräte unterliegen dem zertifizierten Qualitätsmanagementsystem gemäß der DIN EN ISO 9001:2008. Das Kalibrierzertifikat darf nur vollständig und unverändert weiterverbreitet werden.

Please note:

This measurement is an extra step and not a stored production information. It's not possible to get this protocol afterwards without sending back the sensor.

Before

If it's known that a 5-point-protocoll is needed: We will setup a generate a new product with the extension BSP …-**Z03**. At this pressure sensor is the protocol already included.

Afterwards

If the 5-point-protocoll will be needed afterwards:

The sensor have to be send back and our service BSS CAL-I-BSP-001 (order code BSW004W) have to be ordered, too.

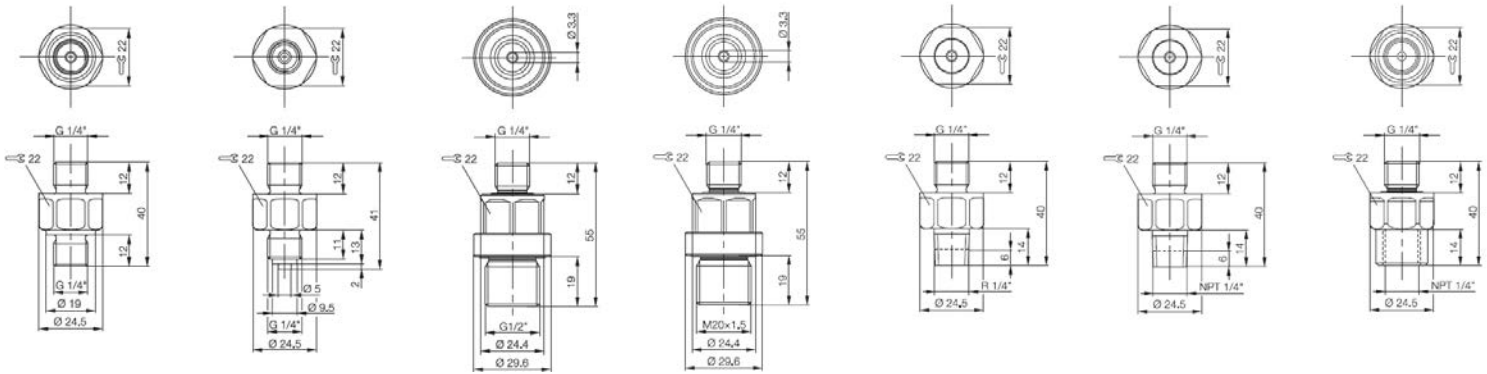
BSP Pressure Sensor

Accessories - Adapter





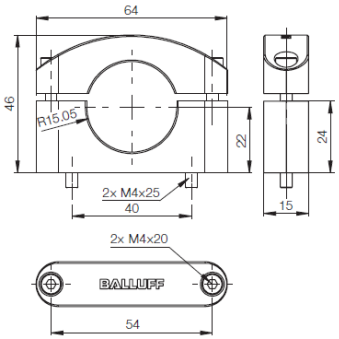

Description		Adapter G¼"	Adapter G¼"	Adapter G½"	Adapter M20×1.5	Adapter R¼"	Adapter NPT¼"	Adapter NPT¼"
Ordering code		**BAM01KP**	**BAM01KR**	**BAM01UJ**	**BAM0209**	**BAM01RP**	**BAM01KT**	**BAM01TR**
Part number		BAM AD-SP-008-1G4/1G4-4	BAM AD-SP-008-1G4/1G4-4-EN837	BAM AD-SP-008-1G4/1G2-4	BAM AD-SP-008-1G4/M20X1.5-4	BAM AD-SP-008-1G4/1R4-4	BAM AD-SP-008-1G4/1N4-4	BAM AD-SP-011-1G4/1N4-4
Housing material		Stainless steel	Stainless steel	Stainless steel	Stainless steel	Stainless steel	Stainless steel	Stainless steel
Connection	Sensor-side	G¼" per DIN EN 3852	G¼" per DIN EN 3852	G¼" per DIN EN 3852	G¼" per DIN EN 3852	G¼" per DIN EN 3852	G¼" per DIN EN 3852	G¼" per DIN EN 3852
	Process-side	G¼" per DIN EN 3852	G¼" per DIN EN 837	G½" per DIN EN 3852	M20×1.5	R¼"	NPT¼"	Internal thread NPT¼"

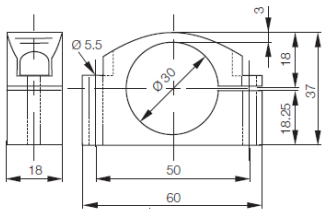


other adapter are possible if needed

Accessories - Mounting clamp

Description	Wall mount for BSP pressure sensors	Wall mount for BSP pressure sensors
Version	Two-piece retaining clip, metal	One-piece retaining clip, plastic
Ordering code	**BAM01U0**	**BAM0110**
Part number	BAM MC-XA-017-D30.0-1	BTL6-A-MF03-K-50
Housing material	Anodized aluminum	PA 6.6 (fiberglass reinforced)





Limits - be careful with following

Medias

- Oxygen (chem. O)
- Hydrogen (chem. H)
- Sulfur (chem. S)
- Phosphor (chem. P)
- Halogens like fluorine, chlorine, bromine,.. (chem. F, Cl, Br,..)
- Acid (hydrochloric acids,..)
- Lye (potash lye, caustic soda,..)
- Salt water (Offshore)
- Explosive gases
- …

Some media are chemically very aggressive and can destroy the process connection, measuring cell, seals,… Some of them are very dangerous under pressure like Hydrogen in combination with oil. So be always careful with those or similar medias in an application.

Limits - be careful with following

Applications with high pressure peaks

- **Die casting machine**
  - Here are very high pressure peaks in the system
  - They can destroy the measuring cell
  - Causes over a longer time an zero offset
  - ➢ **Solution: welded stainless steel measuring cell and/or a peak protector inside the process connection thread**

- **Magnetic valve in the system**
  - Same as "die casting" but additional with cavitation
  - Cavitation destroys over the time every component
  - Causes the "Water Hammer" effect (which acts in the complete system!)
  - ➢ **Solution: Same as with "die casting" but additional place the BSP as far away as possible from magnetic valve and the magnetic valve have to be installed against the flow-to-close direction to reduce the pressure peaks.**