

Calculation example for the selection of the Zener barrier

The nominal voltage of the power supply in front of the Zener barrier is $24 V_{DC} \pm 5\%$. This results in:

- maximum supply voltage:
 $V_{Sup\ max} = 24 V * 1.05 = 25.2 V$
- minimum supply voltage:
 $V_{Sup\ min} = 24 V * 0.95 = 22.8 V$

The series resistance of the Zener barrier is listed with 295 ohm. The following values must still be calculated:

- voltage drop at the barrier (with full conduction):
 $V_{ab\ barrier} = 295 \Omega * 0.02 A = 5.9 V$
- terminal voltage at the transmitter with Zener barrier:
 $V_{KI} = V_{Sup\ min} - V_{ab\ barrier} = 22.8 V - 5.9 V = 16.9 V$
- minimum supply voltage of the transmitter:
 $V_{KI\ min}$ corresponding to $V_{S\ min}$ (according to data sheet)

Condition:

$$V_{KI} \geq V_{KI\ min}$$

Result:

The terminal voltage of the transmitter with Zener barrier lies at 16.9 V and is therefore higher than the minimum supply voltage of the transmitter. This means, the Zener barrier has been selected correctly regarding the supply voltage.

NOTE - Note that no line resistances have been listed in this calculation. However, these will lead to an additional voltage drop that must be taken into account.

4.3 Electrical Installation

Establish the electrical connection of the device according to the technical data shown on the manufacturing label, the following table and the wiring diagram.

NOTE - After the installation it is recommended to adjust the offset of the pressure transmitter (see chapter "5.2. offset and span configuration"). The calibration is not affected by adjustment of the offset.

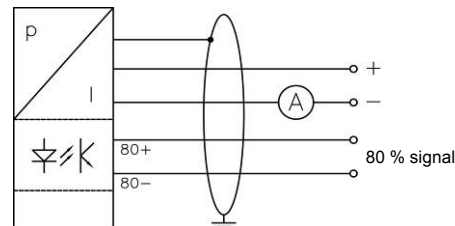
Pin configuration:

Electrical connections	ISO 4400	Binder 723 (5-pin)
Supply +	1	3
Supply -	2	4
Shield	ground pin \oplus	5

Electrical connections	M12x1 (4-pin)	cable colours (IEC 60757)
Supply +	1	WH (white)
Supply -	2	BN (brown)
Shield	4	GYNE (green-yellow)

Electrical connections	MIL-/Bendix-connection
Pin A	supply + / signal +
Pin B	supply - / signal -
Pin C	-
Pin D	-
Pin E	calibration + (80+)
Pin F	calibration - (80-)

Wiring diagram:



5. Commissioning

DANGER	Danger of death from explosion <ul style="list-style-type: none"> - if the operating voltage is too high (max. 28 V_{DC})! - Operate the device only within the specification! (according to data sheet)
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- ✓ The device has been installed properly.
- ✓ The device does not have any visible defect.
- ✓ The device is operated within the specification. (see data sheet and EC-type examination certificate)

5.1 Generation of the 80 % Calibration Signal

For the generation of the 80 % calibration signal you have to put on the connection contacts 80+ and 80- a voltage about minimal 5 V in the pressureless condition. The maximum voltage has to be the same as the maximum supply voltage of the device. By feeding the voltage on 80+ and 80- an additional current about 12.8 mA is given out and there flows a complete current about 16.8 mA.

5.2 Offset and Span Configuration

DANGER	Danger of death from explosion <ul style="list-style-type: none"> - Explosion hazard when device is opened in an explosive atmosphere - Do not open or adjust the device while an explosion hazard exists!
GEFAHR	Danger of death from electric shock <ul style="list-style-type: none"> - Always configurate offset and span in a depressurized and de-energized condition! - For the configuration of offset and / or span the device has to be opened. Therefore, this only may be done by persons who have appropriate experience in this sector and who are familiar with the danger of this.

NOTE - When opening your transmitter sensitive electronic components are exposed. These are very sensitive and can be easily damaged. Handle the opened device carefully and properly so that no damage occurs.

NOTE - By the adjustment of offset and / or span the characteristic of the transmitter changes.

NOTE - You are responsible for the precision of the adjustment.

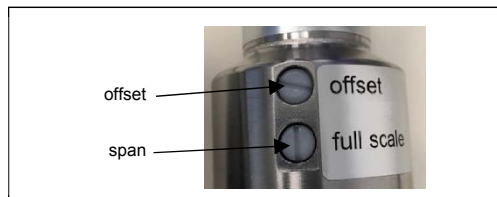


Fig. 4 Configuration on the side of the device

You have the possibility to change the output signal within the following limits.

configuration approx. $\pm 5\%$ FSO	output signal
offset	± 0.8 mA
span	± 0.8 mA

¹ no negative voltage possible

The configuration of offset and / or span is possible via potentiometers. Loosen and open the respective lock screw, which is on the side of the device. (see fig. 4)

Go ahead as follows:

1. Connect a multimeter to the device to control the electrical output signal during configuration.
2. Then the transmitter has to be supplied again.
3. Turn the screw of the respective potentiometer carefully by a screw driver until the desired value is given out by the multimeter.

NOTE - Use for the configuration a clockmaker screwdriver 0.5 mm.

NOTE - For the configuration of span and for an offset with a value differing from 0 bar it is necessary to pressurize the device by using a pressure reference. This pressure must correspond to the offset signal for the offset configuration or to the span signal for the span configuration. The reference pressure for the span signal must correspond to the indicated nominal pressure of the transmitter. Note that for adjustment in vacuum the corresponding low pressure must be on the device.

4. The plug which supplies the device during the configuration must be disconnected.
5. Close the lock screw(s) and tighten it properly.

6. Maintenance

DANGER	Danger of death from airborne parts, leaking fluids, electric shock <ul style="list-style-type: none"> - Always service the device in a depressurized and de-energized condition!
WARNING	Danger of injury from aggressive fluids or pollutants <ul style="list-style-type: none"> - Depending on the measured medium, this may constitute a danger to the operator. - Wear suitable protective clothing e.g. gloves, safety goggles.

If necessary, clean the housing of the device using a moist cloth and a non-aggressive cleaning solution.

The cleaning medium for the media wetted parts (pressure port/diaphragm/seal) may be gases or liquids which are compatible with the selected materials. Also observe the permissible temperature range according to the data sheet.

Deposits or contamination may occur on the diaphragm/pressure port in case of certain media. Depending on the quality of the process, suitable maintenance intervals must be specified by the operator. As part of this, regular checks must be carried out regarding corrosion, damage to the diaphragm and signal shift.

If the diaphragm is calcified, it is recommended to send the device to BD SENSORS for decalcification. Please note the chapter "Service/Repair" below.

NOTE - Wrong cleaning or improper touch may cause an irreparable damage on the diaphragm. Therefore, never use pointed objects or pressured air for cleaning the diaphragm

7. Troubleshooting

DANGER	Danger of death from airborne parts, leaking fluids, electric shock <ul style="list-style-type: none"> - If malfunctions cannot be resolved, put the device out of service.
DANGER	Danger of death from explosion <ul style="list-style-type: none"> - As a matter of principle, work on energized parts, except for intrinsically safe circuits, is prohibited while there is an explosion hazard.

In case of malfunction, it must be checked whether the device has been correctly installed mechanically and electrically. Use the following table to analyse the cause and resolve the malfunction, if possible.

Fault: no output signal	
Possible cause	Fault detection / remedy
Connected incorrectly	Checking of connections
Conductor/wire breakage	Checking of all line connections.
Defective measuring device (signal input)	Checking of ammeter (miniature fuse) or of analogue input of your signal processing unit

Fault: analogue output signal too low	
Possible cause	Fault detection / remedy
Load resistance too high	Checking of load resistance (value)
Supply voltage too low	Checking of power supply output voltage
Defective energy supply	Checking of the power supply and the supply voltage being applied to the device

Fault: slight shift of the output signal	
Possible cause	Fault detection / remedy
Diaphragm of sensor is severely contaminated, calcified or crusted	Checking of diaphragm; if necessary, send the device to BD SENSORS for cleaning

Fault: large shift of the output signal	
Possible cause	Fault detection / remedy
Diaphragm of sensor is damaged (caused by overpressure or mechanically)	Checking of diaphragm; when damaged, send the device to BD SENSORS for repair

Fault: wrong or no output signal	
Possible cause	Fault detection / remedy
Cable damaged mechanically, thermally or chemically	Checking of cable; pitting corrosion on the stainless-steel housing as a result of damage on cable; when damaged, send the device to BD SENSORS for repair

8. Removal from Service

DANGER	Danger of death from airborne parts, leaking fluids, electric shock <ul style="list-style-type: none"> - Disassemble the device in a depressurized and de-energized condition!
WARNING	Danger of injury from aggressive media or pollutants <ul style="list-style-type: none"> - Depending on the measured medium, this may constitute a danger to the operator. - Wear suitable protective clothing e.g. gloves, goggles.

NOTE - After dismounting, mechanical connections must be fitted with protective caps.

9. Service/Repair

Information on service / repair:

- www.bdsensors.de
- info@bdsensors.de
- Service phone: +49 (0) 92 35 98 11 0

9.1 Recalibration

During the life-time of a transmitter, the value of offset and span may shift. As a consequence, a deviating signal value in reference to the nominal pressure range starting point or end point may be transmitted. If one of these two phenomena occurs after prolonged use, a recalibration is recommended to ensure furthermore high accuracy.

9.2 Return

WARNING	Danger of injury from aggressive media or pollutants <ul style="list-style-type: none"> - Depending on the measured medium, this may constitute a danger to the operator. - Wear suitable protective clothing e.g. gloves, goggles.
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12. EU Declaration of Conformity / CE

The delivered device fulfils all legal requirements. The applied directives, harmonised standards and documents are listed in the EC declaration of conformity, which is available online at: <http://www.bdsensors.de>. Additionally, the operational safety is confirmed by the CE sign on the manufacturing label.

EU-Konformitätserklärung
 EC Declaration of Conformity

BD SENSORS GmbH erklärt hiermit in alleiniger Verantwortung, dass die Produkte
 BD SENSORS GmbH declares on its own responsibility that the products

DMP 303; DMP 304

mit den aufgeführten Richtlinien und Normen übereinstimmen.
 fulfil the below mentioned requirements and standards.

2014/30/EU (EMC)	EN 61326-1:2013
2011/65/EU (RoHS)	

Für Geräte mit Ex-Zulassung:
 For devices with IS approval:

2014/34/EU (ATEX)	DX17 DMP 303; DX17 DMP 304
IBExU09ATEX1144 X	EN 60079-0:2006, EN 60079-11:2007, EN 60079-26:2007
Benannte Stelle / Kennnummer Notified Body / identification number:	IBExU Institut für Sicherheitstechnik GmbH / 0637
IBExU19ATEXQ013	EN ISO/IEC 80079-34:2012
Benannte Stelle / Kennnummer Notified Body / identification number	IBExU Institut für Sicherheitstechnik GmbH / 0637

In Erfüllung der Druckgeräterichtlinie 2014/68/EU und als Ergebnis des darin geforderten Konformitätsbewertungsverfahrens wird folgendes Modul gewählt:
 In conformance to the Pressure Equipment Directive 2014/68/EU and as result of therein demanded conformity assessment procedures the following module has been chosen:

Für Geräte mit maximal zulässigem Überdruck > 200 bar: For devices with maximum permissible overpressure > 200 bar:	Bewertungsverfahren Modul A Assessment procedure Module A
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Thierstein, 2019-09-16

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