

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 (according to data sheet):
 $V_{KI\ min} = 12 V_{DC}$ (corresponding to $V_{S\ min}$)

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 which lies at 12 V_{DC}. 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 considered.

4.3 Electrical installation

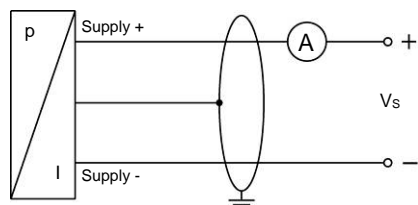
Establish the electrical connection of the device according to the technical data shown on the manufacturing label, the following table and the wiring diagram.

Pin configuration:

Electrical connection	ISO 4400	M12x1 (4-wire)
Supply +	1	1
Supply -	2	2
Shield	ground contact	4

Electrical connection	field housing	cable colours (IEC 60757)
Supply +	VS +	WH (white)
Supply -	VS -	BN (brown)
Shield	GND	GYE (yellow-green)

Wiring diagram:



5. Commissioning

DANGER	Danger of death from explosion, airborne parts, leaking fluid, electric shock
	<ul style="list-style-type: none"> - Explosion hazard if the operating voltage is too high (max. 28 V_{DC})! - Operate the device only within the specification! (according to data sheet and EU-type examination certificate)

- ✓ The device has been installed properly.
- ✓ The device does not have any visible defect.

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 (proceed according to chapter 8 up to 10)
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, contact BD SENSORS

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, contact BD SENSORS

Fault: wrong or no output signal	
Possible cause	Fault detection / remedy
Cable damaged mechanically, thermally or chemically	Checking of cable; pitting corrosion on the housing as a result of damage on cable; when damaged, contact BD SENSORS

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 dismantling, 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.

Before every return of your device, whether for recalibration, decalcification, modifications or repair, it has to be cleaned carefully and packed shatter-proofed. You have to enclose a notice of return with detailed defect description when sending the device. If your device came in contact with harmful substances, a declaration of decontamination is additionally required.

Appropriate forms can be downloaded from our homepage. Download these by accessing www.bdsensors.de or request them:

info@bdsensors.de | phone: +49 (0) 92 35 / 98 11 0

In case of doubt regarding the fluid used, devices without a declaration of decontamination will only be examined after receipt of an appropriate declaration!

10. Disposal

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.

The device must be disposed of according to the European Directive 2012/19/EU (waste electrical and electronic equipment). Waste equipment must not be disposed of in household waste!

NOTE - Dispose of the device properly!

11. Warranty terms

The warranty terms are subject to the legal warranty period of 24 months, valid from the date of delivery. If the device is used improperly, modified or damaged, we will rule out any warranty claim. A damaged diaphragm will not be accepted as a warranty case. Likewise, there shall be no entitlement to services or parts provided under warranty if the defects have arisen due to normal wear and tear.

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.

DX14A-DMK 456; DX14A-DMK 458:



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

DMK 456	DMK 458	LMK 458
---------	---------	---------

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)	DX14A-DMK 456	DX14A-DMK 458	DX14A-LMK 458
IBExU07ATEX1180 X	EN 60079-0:2012+A11:2013, EN 60079-11:2012		

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

Thierstein, 2019-09-16

	
D. Sanvenero	M. Martin
Leiter Konstruktion/ Mechanical Design Manager	Leiter Elektronikentwicklung/ Electronics Design Manager

DX19-DMK 457; DX19-DMP 457:



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

DMK 331	DMK 331P	DMK 457	DMP 311	DMP 311P	DMP 320	DMP 321	DMP 321P	DMP 321PT	DMP 331
DMP 331i	DMP 331_561	DMP 331P	DMP 331Pi	DMP 333	DMP 333i	DMP 334	DMP 334i	DMP 334i	DMP 335
DMP 339	DMP 343	DMP 457	LMK 331	LMP 331	LMP 331i	EP 500			

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)	DX19-DMK 331	DX19-DMK 331P	DX19-DMK 457	DX19-DMP 311	DX19-DMP 321
	DX19-DMP 321P	DX19-DMP 321PT	DX19-DMP 331	DX19-DMP 331i	DX19-DMP 331P
	DX19-DMP 331Pi	DX19-DMP 333	DX19-DMP 333i	DX19-DMP 334	DX19-DMP 335
	DX19-DMP 339	DX19-DMP 343	DX19-DMP 457	DX19-LMK 331	DX19-LMP 331
	DX19-LMP 331i				

IBExU10ATEX1068 X
EN IEC 60079-0:2018, EN 60079-11:2012

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
--	--

Thierstein, 2020-07-03

	
D. Sanvenero	M. Martin
Leiter Konstruktion/ Mechanical Design Manager	Leiter Elektronikentwicklung/ Electronics Design Manager



APPLIED MEASUREMENTS LTD.

Transducer Specialists...

appmeas.co.uk | info@appmeas.co.uk | +44 (0) 118 981 7339