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Operating Manual

Differential pressure transmitter

DMD 331 and DMD 341

DMD 331

READ THOROUGHLY BEFORE USING THE DEVICE
KEEP FOR FUTURE REFERENCE

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1. General and safety-related information on this operating manual

This operating manual enables safe and proper handling of the product, and forms part of the device. It should be kept in close proximity to the place of use, accessible for staff members at any time.

All persons entrusted with the mounting, installation, putting into service, operation, maintenance, removal from service, and disposal of the device must have read and understood the operating manual and in particular the safety-related information.

Complementary to this operating manual the current data sheet has to be adhered to.

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In addition, the applicable accident prevention regulations, safety requirements, and country-specific installation standards as well as the accepted engineering standards must be observed.

1.1 Symbols used

Warning word	- Type and source of danger - Measures to avoid the danger

Warning word	Meaning
DANGER	- Imminent danger! - Non-compliance **will result in** death or serious injury.
WARNING	- Possible danger! - Non-compliance **may result in** death or serious injury.
CAUTION	- Hazardous situation! - Non-compliance **may result in** minor or moderate injury.

NOTE - draws attention to a possibly hazardous situation that may result in property damage in case of non-compliance.

✓ Precondition of an action

1.2 Staff qualification

Qualified persons are persons that are familiar with the mounting, installation, putting into service, operation, maintenance, removal from service, and disposal of the product and have the appropriate qualification for their activity.

This includes persons that meet at least one of the following three requirements:

- They know the safety concepts of measuring and automation technology and are familiar therewith as project staff.
- They are operating staff of the measuring and automation systems and have been instructed in the handling of the systems. They are familiar with the operation of the devices and technologies described in this documentation.
- They are commissioning specialists or are employed in the service department and have completed training that qualifies them for the repair of the system. In addition, they are authorized to put into operation, to ground, and to mark circuits and devices according to the safety engineering standards.

All work with this product must be carried out by qualified persons!

1.3 Intended use

The devices are used to convert the physical parameter of pressure into an electric signal.

The differential pressure transmitter DMD 331 and DMD 341 are intended for industrial applications. For both sided pressure admission, the difference of the pressure between positive and negative side is established and converted into a proportional electrical signal. They are intended e.g. in engineering and plant construction for filter controlling and flow measurement as well as in hydraulic applications.

The user must check whether the device is suited for the selected use. In case of doubt, please contact our sales department: info@bdsensors.de | phone: +49 (0) 92 35 / 98 11 0

BD|SENSORS assumes no liability for any wrong selection and the consequences thereof!

Permissible media for DMD 331 are gases and liquids or for DMD 341 non-aggressive gases and pressured air are, which are compatible with the media wetted parts described in the data sheet.

The technical data listed in the current data sheet are engaging and must absolutely be complied with. If the data sheet is not available, please order or download it from our homepage: http://www.bdsensors.de

WARNING	**Danger through incorrect use** - In order to avoid accidents, use the device only in accordance with its intended use.

1.4 Limitation of liability and warranty

Failure to observe the instructions or technical regulations, improper use and use not as intended, and alteration of or damage to the device will result in the forfeiture of warranty and liability claims.

1.5 Safe handling

NOTE - Do not use any force when installing the device to prevent damage of the device and the plant!

NOTE - Treat the device with care both in the packed and unpacked condition!

NOTE - The device must not be altered or modified in any way.

NOTE - Do not throw or drop the device!

NOTE - Excessive dust accumulation (over 5 mm) and complete coverage with dust must be prevented!

NOTE - The device is state-of-the-art and is operationally reliable. Residual hazards may originate from the device if it is used or operated improperly.

1.6 Scope of delivery

Check that all parts listed in the scope of delivery are included free of damage, and have been delivered according to your purchase order:

- differential pressure transmitter
- mounting instructions

1.7 UL approval (for devices with UL marking)

The UL approval was effected by applying the US standards, which also conform to the applicable Canadian standards on safety.

Observe the following points so that the device meets the requirements of the UL approval:

- The device must be operated via a supply with energy limitation (acc. to UL 61010) or an NEC Class 2 energy supply.
- Maximum operating range: see data sheet

2. Product identification

The device can be identified by its manufacturing label. It provides the most important data. By the ordering code the product can be clearly identified.

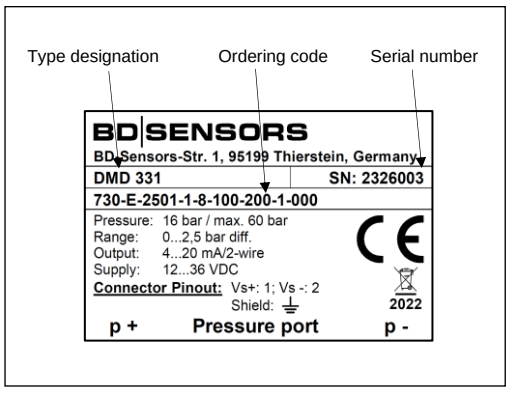


Fig. 1: Example of manufacturing label

NOTE - The manufacturing label may not be removed!

3. Mounting

3.1 Mounting and safety instructions

DANGER	**Danger of death from airborne parts, leaking fluid, electric shock** - Always mount the device in a depressurized and de-energized condition!
DANGER	**Danger of death from improper installation** - Installation must be performed only by appropriately qualified persons who have read and understood the user manual.

NOTE - Treat any unprotected diaphragm with utmost care; this can be damaged very easily.

NOTE - Provide for a cooling section if the device is used in a steam line.

NOTE - Do not mount the device in a pneumatic flow rate!

NOTE - When installing the device, avoid high mechanical stresses on the pressure port! This will result in a shift of the characteristic curve or to damage, in particular in case of very small pressure ranges and devices with pressure ports made of plastic.

NOTE - For the connection of the pressure lines, a sealing has to be installed by the operator.

NOTE - For the pipe assembly, a stress free installation must be observed.

NOTE - Consider for the installation of DMD 331 that the pressure ports must not be turned against the housing!

NOTE - Do not remove the packaging or protective caps of the device until shortly before the mounting procedure, in order to exclude any damage to the diaphragm and the threads! Protective caps must be kept! Dispose of the packaging properly!

NOTE - The permissible tightening torque depends on the conditions on site (material and geometry of the mounting point). The specified tightening torques for the pressure transmitter must not be exceeded!

NOTES - for mounting outdoors or in a moist environment:

- Please note that your application does not show a dew point, which causes condensation and can damage the pressure transmitter. There are specially protected pressure transmitters for these operating conditions. Please contact us in such case.
- Connect the device electrically straightaway after mounting or prevent moisture penetration, e.g. by a suitable protective cap. (The ingress protection specified in the data sheet applies to the connected device.)
- Select the mounting position such that splashed and condensed water can drain off. Stationary liquid on sealing surfaces must be excluded!
- For devices with cable socket, the outgoing cable must be routed downwards. If the cable needs to be routed upwards, this must be done in an initially downward curve.
- Mount the device such that it is protected from direct solar radiation. In the most unfavourable case, direct solar radiation leads to the exceeding of the permissible operating temperature.
- If installing the device outdoor and there is any danger of lightning or overpressure, we suggest putting an overpressure protection unit between the supply / switch cabinet and the device to prevent damage.

3.2 General mounting steps

1. Connect the reference pressures according to the following installation steps. Therefore, keep in mind that
   - the higher pressure has to be connected with input "+" (DMD 331) or "P1" (DMD 341)
   - lower pressure has to be connected with input "-" (DMD 331) or "P2" (DMD 341)
2. Fix the device according to your demands on the holder or holding angle intended for it. For mounting the device, mounting threads (M4 – 10 deep) are provided. For DMD 341, in addition, the possibility is given to mount the device by using the two holes (Ø 4.5 mm). The exact position is defined in the data sheet.

3.3 Installation steps for DMD 331

G 1/2" according to EN 837

✓ The sealing surfaces are perfectly smooth and clean. (R_Z 6.3)

✓ For each pressure port a suitable cooper gaskets, corresponding to the diameter of the threads which should be screwed in, is used. (seals are not included in the scope of delivery)

1 Screw the fittings into the threads by hand.
2 To tighten the fittings properly, hold the DMD 331 on the spanner flat SW 22 of the respective pressure port with one hand and then tighten it (permissible tightening torque for device: max. 50 Nm).

G 1/4" internal thread

✓ Suitable seals for the measured fluid and the pressure to be measured are available.

✓ The sealing surfaces of the fittings are perfectly smooth and clean. (R_Z 6.3)

1 Screw the fittings into the threads by hand.
2 To tighten the fittings properly, hold the DMD 331 on the spanner flat SW 22 of the respective pressure port with one hand and then tighten it. The torque depends on the counterpart (permissible tightening torque for the device is 20 Nm max).

G 7/16" UNF

✓ The pressure ports of the differential pressure transmitter are sealed in a way that is suitable for your application. (seals are not included in the scope of delivery)

1 Screw your fittings by hand onto the threads.
2 To tighten the fittings properly, hold the DMD 331 on the spanner flat SW 22 of the respective pressure port with one hand and then tighten it (permissible tightening torque for device: max. 30 Nm).

3.4 Installation steps for DMD 341

G 1/8" Internal thread

✓ The pressure ports of the differential pressure transmitter are sealed in a way that is suitable for your application. (seals are not included in the scope of delivery)

1 Screw the fittings into the threads as far as possible.
2 Tighten the fittings properly (permissible tightening torque for device: max. 10 Nm).

Tube nozzle Ø 6.6 x 11

Slip your flexible tubes (∅ 6 mm) onto the tube nozzles as far as possible.

4. Electrical connection

4.1 Connection and Safety Instructions

DANGER	**Danger of death from electric shock** - Always mount the device in a depressurized and de-energized condition! - Operate the device only within the specification! (data sheet) - Improper installation may result in electric shock.

✓ The supply corresponds to protection class III (protective insulation).

NOTE - Use a shielded and twisted multicore cable for the electrical connection.

NOTE - for device with ISO 4400 plug and socket

- Please note that the socket has to be mounted properly to ensure the ingress protection mentioned in the data sheet. Please check if the delivered seal is placed between plug and cable socket. After connecting the cable fasten the cable socket on the device by using the screw.
- It must be ensured that the external diameter of the used cable is within the allowed clamping range (Ø 4 … 6 mm). Moreover you have to ensure that it lies in the cable gland firmly and cleftlessly!

NOTE - for devices with **cable outlet** (DMD 341)

- When routing the cable, following bending radiuses have to be complied with (static installation):

  cable without ventilation tube:
  8-fold cable diameter

  cable with ventilation tube:
  10-fold cable diameter

- In case of devices with **cable outlet** and integrated ventilation tube, the PTFE filter located at the cable end on the air tube must neither be damaged nor removed! Route the end of the cable into an area or suitable connection box which is as dry as possible and free from aggressive gases, in order to prevent any damage.

4.2 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.

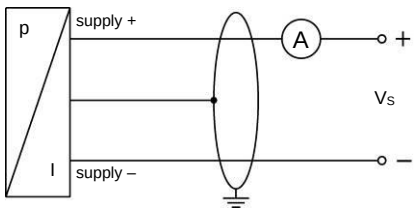
Pin configuration:

Electrical connection	ISO 4400	M12x1 (4-pin)
Supply + Supply – Signal + (only 3-wire)	1 2 3	1 2 3
Shield	ground pin ⏚	4

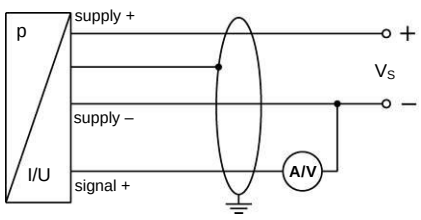
Electrical connection	Brad Harrison® Mini Change	cable colour (IEC 60757)
Supply + Supply – Signal + (only 3-wire)	A B -	WH (white) BN (brown) GN (green)
Shield	C	GNYE (green-yellow)

Wiring diagrams:

2-wire-system (current)



3-wire-system (current/voltage)



5. Commissioning

DANGER	**Danger of death from airborne parts, leaking fluid, electric shock** - Operate the device only within the specification! (according to data sheet)

✓ 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)

Please note that for starting up, the device has to be stressed by pressure simultaneously at both pressure ports. Otherwise the sensor could be damaged. For one-sided pressure admission, the permissible static pressure (one-sided) must be attended. Please take this out of the current data sheet.

6. Maintenance

DANGER	**Danger of death from airborne parts, leaking fluids, electric shock** - Always service the device in a depressurized and de-energized condition!
WARNING	**Danger of injury from aggressive fluids or pollutants** - 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** - If malfunctions cannot be resolved, put the device out of service (proceed according to chapter 8 up to 10)

NOTE- Improper action and opening can damage the device. Therefore, repairs on the device may only be executed by the manufacturer!

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	inspect the connection
line break	inspect of all line connections
defective ampere meter (signal input)	inspect the ampere meter (fine-wire fuse) or the analogue input of the PLC

Fault: analogue output signal too low	
Possible cause	Fault detection / remedy
load resistance too high	verify the value of the load resistance
supply voltage too low	verify the output voltage of the power supply
defective energy supply	inspect the power supply and the applied supply voltage at the device

Fault: shift of output signal	
Possible cause	Fault detection / remedy
diaphragm is contaminated or damaged	**recommendation:** send the device to BD SENSORS for service / repair

Fault: wrong or no output signal	
Possible cause	Fault detection / remedy
electrical connection is damaged	check the connections
reverse polarity of the pressure ranges	ensure that the higher pressure has to be connected with input "p+" (DMD 331) or "P1" (DMD 341)

8. Removal from Service

DANGER	**Danger of death from airborne parts, leaking fluids, electric shock** - Disassemble the device in a depressurized and de-energized condition!
WARNING	**Danger of injury from aggressive media or pollutants** - 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** - 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** - 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.

Notes: