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The addresses of our distribution partners are listed on our homepage www.bdsensors.com. It is possible to download data sheets, operating manuals, ordering codes and certificates, as well.

1. General information

1.1 Information on the operating manual

This operating manual contains important information on proper usage of the device. Read this operating manual carefully before installing and starting up the pressure measuring device.

Adhere to the safety notes and operating instructions which are given in the operating manual. Additionally applicable regulations regarding occupational safety, accident prevention as well as national installation standards and engineering rules must be complied with!

This operating manual is part of the device and must be kept at a, for the personnel always accessible location, close to the installation position of the device.

This operating manual is copyrighted. The contents of this operating manual reflect the version available at the time of printing. It has been issued to our best knowledge and belief. However, errors may have occurred. For incorrect statements and their consequences, liability cannot be assumed by BD SENSORS.

– Technical modifications reserved –

1.2 Symbols used

- ⚠ DANGER! – Dangerous situation, which may result in serious or fatal injuries
- ⚠ WARNING! - Potentially dangerous situation, which may result in fatal or serious injuries
- ⚠ CAUTION! – Potentially dangerous situation, which may result in minor injuries
- ! CAUTION! – Potentially dangerous situation, which may result in damage of objects
- 🔧 NOTE – Tips and information for the user to ensure good conditions for the operation.

1.3 Target group

- ⚠ WARNING! To avoid hazards for the operator and damages of the device, following described instructions have to be worked out by qualified technical personnel.

1.4 Limitation of liability

No liability is assumed and warranty claims are excluded in case of non-observance of the operating manual, improper application, modification of or damage to the device.

1.5 Intended use

- The battery powered digital pressure gauge DM 1X has been exclusively designed for applications in hydraulics and pneumatics as well as for mechanical engineering. It can be easily and quickly installed in situ.
- It is in the responsibility of the user to verify whether the chosen device is suitable for the intended application. In case of any doubts, contact our sales department to eliminate any indistinctness. BD SENSORS does not assume any liability for an incorrect selection and its consequences!
- Permissible media are gases or liquids, specified in the data sheet. Additionally the operator has to ensure that the medium is compatible with the media wetted parts, for the intended application.
- The technical data listed in the current data sheet are engaging and must be complied with. If the data sheet is not available, please order or download it from our homepage. (<http://www.bdsensors.com>)

- ⚠ WARNING! – Danger through improper usage!

1.6 Package contents

Please verify that all listed parts are undamaged included in the delivery and check for consistency specified in your order:

- digital pressure gauge DM 10 or DM 17
- this operating manual

1.7 UL – Approval (for devices with UL-identification)

The UL – Approval was done with respect to U.S. standards norms which also correspond with the applicable Canadian standards norms for safety.

Note the following points, so that devices fulfils the demands of UL approval:

- The transmitter shall be supplied by Limited Energy Source (per UL 61010) or NEC Class 2 Power Source.
- only indoor use
- maximum operating voltage: see technical data
- use only batteries with UL certification

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. For identification of the firmware the program version will appear for about 1 second in the display after starting up the device. Please hold it ready for inquiry calls.

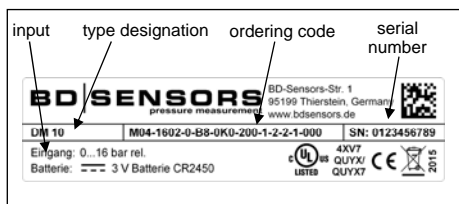


Abb. 1 manufacturing label

- ! The manufacturing label must not be removed from the device!

3. Installation

3.1 General mounting and safety instructions

- ⚠ WARNING! Install the device only when depressurized and currentless!

- ⚠ WARNING! This device may only be installed by qualified technical personnel who has read and understood the operating manual!

! Handle this electronic precision measuring device carefully in packed as well as in unpacked condition!

! The device must not be subject to any changes or modifications.

! The device may not be thrown!

! To avoid damaging the diaphragm, remove packaging and protective cap only directly before starting up the device. A delivered protective cap must be stored!

! Place the protective cap on the pressure port again immediately after disassembling.

! Handle the unprotected diaphragm very carefully - it is very sensitive and may be easily damaged.

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

🔧 Take care that no mechanical stresses occur at the pressure port as a result of the installation, since this may cause a shifting of the characteristic curve.

🔧 In hydraulic systems, position the device in such a way that the pressure port points upward (venting).

🔧 Provide a cooling line when using the device in steam lines.

3.2 Mounting and safety instructions oxygen

- ⚠ DANGER! When used improperly, special versions of devices suitable for oxygen applications may explode! To ensure a usage without danger, the following points must be adhered to:

- Make sure that your device has been ordered as a special version for oxygen applications and that it has been delivered conformably. You can check this easily by reading the manufacturing label (see figure 1).
- If your ordering code ends with the numbers "007", your device is suitable for the oxygen application.
- When being dispatched the device is packed into a plastic bag to keep it from impurity. The indication label with the text "Device for oxygen, unpack only directly before assembling" has to be observed! Furthermore any skin contact must be avoided during unpacking and installing the device, so that no fatty residue remains on the device!
- For installing the respective regulations for explosion protection have to be fulfilled. Please check if an ATEX-approval is necessary for the application in addition to the acceptability for oxygen. (the delivered device has no ATEX-approval)
- Consider that the entire construction must correspond to the standards of BAM (DIN 19247).
- For oxygen applications over 25 bar are recommended pressure transmitter without seals.
- Transmitters with o-rings of FKM Vi 567: permissible maximum values: 25 bar / 150° C (BAM approval)

3.3 General installation steps

- Carefully remove the pressure measuring device from the package and dispose of the package properly.
- Then go ahead as detailed in the specific instructions below.

3.4 Installation steps for DIN 3852

- ⚠ DO NOT USE ANY ADDITIONAL SEALING MATERIALS, LIKE YARN, HEMP OR TEFLON TAPE!

- Check to ensure the proper groove fitting of the o-ring and additionally to ensure no damage to the o-ring.
- Ensure that the sealing surface of the taking part is perfectly smooth and clean. (Rz 3.2)
- Screw the device into the corresponding thread by hand.
- If you have a device with a knurled ring, the transmitter has to be screwed in by hand only.
- Devices with a spanner flat have to be tightened with an open-end wrench (wrench size of steel: G1/4": approx. 5 Nm; G1/2": approx. 10 Nm; G3/4": approx. 15 Nm; G1": approx. 20 Nm; G1 1/2": approx. 25 Nm; wrench size of plastic: max. 3 Nm).

- **The indicated tightening torques must not be exceeded!**

3.5 Installation steps for EN 837

- Use a suitable seal, corresponding to the medium and the pressure input (e. g. a cooper gasket).
- Ensure that the sealing surface of the taking part is perfectly smooth and clean. (Rz 6.3)

- Screw the device into the corresponding thread by hand.

- Tighten it with a wrench (for G1/4": approx. 20 Nm; for G1/2": approx. 50 Nm).

- **The indicated tightening torques must not be exceeded!**

3.6 Installation steps for NPT

- Use a suitable seal (e. g. a PTFE-strip).

- Screw the device into the corresponding thread by hand.

- Tighten it with a wrench (for 1/4" NPT: approx. 30 Nm; for 1/2" NPT: approx. 70 Nm).

- **The indicated tightening torques must not be exceeded!**

3.7 Installation steps for 7/16"-20 UNF (DM 17)

- Do NOT use any additional sealing materials!
- Screw the device into the corresponding thread by hand.

- Tighten it with a wrench (approx. 20 Nm).

- **The indicated tightening torques must not be exceeded!**

3.8 Positioning of the display module

The display module of the pressure gauge is rotatable so that clear readability is guaranteed even on unusual installation positions.



Abb. 2 display module

4. Initial start-up

- ⚠ **WARNING!** Before start-up, the user has to check for proper installation and for any visible defects.
- ⚠ **WARNING!** The device can be started and operated by authorized personnel only, who have read and understood the operating manual!
- ⚠ **WARNING!** The device has to be used within the technical specifications, only (compare the data in the data sheet)!

5. Operation

5.1 Operating and display elements

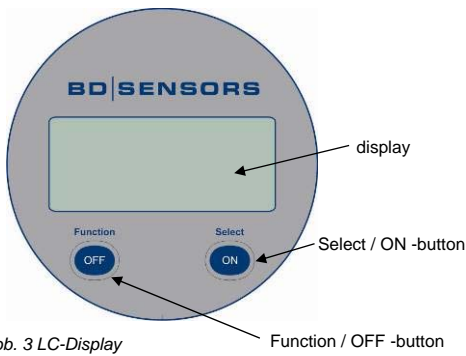


Abb. 3 LC-Display

Select / ON-button:

- switch-on of the device
- choosing of the pressure units
- calibration of starting point
- configuration of the switch-off automatic

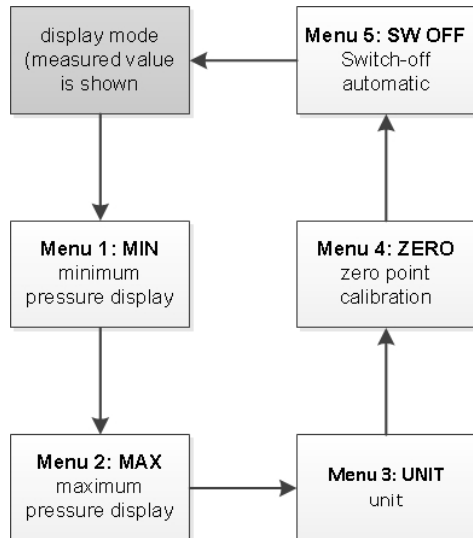
Function / OFF-button:

- switch-off of the device
- scrolling in the menu system

The indication of the measured value as well as the configuration of the individual parameters occurs menu-driven via the LC display. The individual functions can be set with the help of two miniature push buttons located in the front.

The menu system is a closed system allowing you to scroll forward through the individual set-up menus to navigate to the desired setting item. All settings are permanently stored in an Flash-EPRROM and therefore available again even after a battery change.

5.2 Structure of the menu system



5.3 Menu list

1 MIN	Minimum pressure display The minimum pressure during the measurement process will be shown in the display. To delete the stored value push the Select/ON-button. It appears SEt in the display, the value has been recessed.
2 MAX	Maximum pressure display The maximum pressure during the measurement process will be shown in the display. To delete the stored value push the Select/ON-button. It appears SEt in the display, the value has been recessed.
3 UNIT	Setting of the pressure unit Possible units are: bar, mbar, psi, MPa, mH ₂ O The desired unit may be selected and activated with the Select/ON-button. ⚠ Depending on the nominal pressure range and the accuracy of the device, perhaps not all available units could be used.
4 ZERO	Zero point If you detect a shifting of the measured value deviating from the offset, the display can be re-calibrated via pushing the Select/ON-button. The display shows SEt , the value has been recessed. Differs the zero point from the ambient pressure, it is a pressure reference necessary.
5 SW OFF	Configuration of the switch-off automatic The desired switch-off automatic may be selected through the Select/ON-button. Allocation of the programmable values: "0": switch-off automatic is not active "1" – "5": switch-off automatic after 1 up to 5 minutes

The menu system will be leaved automatically after 10 seconds; the last setted value has been saved. If you scroll all menu points you will leave the menu system after **SW OFF**.

⚠ After configuring the unit, the conversion of the pressure range into the new unit will only occur after leaving the menu system. Depending on the pressure range, probably not all available units can be used.

6. Supply / changing the batteries

The digital pressure gauge is supplied by a 3 V lithium-battery (type CR 2450). Stored values/parameters are also kept after changing the battery.

If the symbol for low batteries is indicated in the display, it is necessary to replace them as soon as possible with two new ones of the same type in order to ensure a good readability of the values. This has only to be done in switched-off condition.

The battery case is located in the removable display of the digital pressure gauge DM 10 / DM 17.

- ! change the battery goes ahead as follows:
- Remove the cap and change the battery.
- Lock the device after that properly.



Abb. 4 battery case

- ! An incorrect usage may cause a leak out of batteries and so a damage the device!
- ! Make sure that the batteries are connected correctly with the corresponding contacts in the battery tray.
- ! Never try to charge batteries, demount them, or short-circuit them!
- ! Keep the battery away from heat and unshielded flame.
- ! use only batteries with UL certification

7. Placing out of service

- ⚠ **WARNING!** When dismantling the device, it must always be done in the depressurized and currentless condition! Check also if the medium has to be drained off before dismantling!
- ⚠ **WARNING!** Depending on the medium, it may cause danger for the user. Comply therefore with adequate precautions for purification.

8. Maintenance

In principle, this device is maintenance-free. If desired, the housing of the device can be cleaned when switched of using a damp cloth and non-aggressive cleaning solutions.

Depending on the measuring medium, however, the diaphragm may be polluted or coated with deposit. If the medium is known for such tendencies, the user has to set appropriate cleaning intervals. After placing the device out of service correctly, the diaphragm can usually be cleaned carefully with a non-aggressive cleaning solution and a soft brush or sponge. If the diaphragm is calcified, it is recommended to send the device to BD SENSORS for decalcification. Please read therefore the chapter "Repair" below.

- ! An incorrect cleaning can cause irreparable damages on diaphragm. Never use spiky objects or pressured air for cleaning the diaphragm.

9. Return

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 www.bdsensors.com. Should you dispatch a device without a declaration of decontamination and if there are any doubts in our service department regarding the used medium, repair will not be started until an acceptable declaration is sent.

- ⚠ **If the device came in contact with hazardous substances, certain precautions have to be complied with for purification!**

10. Disposal

The device must be disposed according to the European Directives 2002/96/EG and 2003/108/EG (on waste electrical and electronic equipment). Waste of electrical and electronic equipment may not be disposed by domestic refuse!



- ⚠ **WARNING!** Depending on the medium, it may cause danger for the user. Comply therefore with adequate precautions for purification.

11. Warranty conditions

The warranty conditions are subject to the legal warranty period of 24 months from the date of delivery. In case of improper use, modifications of or damages to the device, we do not accept warranty claims. Damaged diaphragms will also not be accepted. Furthermore, defects due to normal wear are not subject to warranty services.

12. 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.com>. Additionally, the operational safety is confirmed by the CE sign on the manufacturing label.