

Operating Manual

Digital Gauge DM01, DM01-500, DM01-500HD



**READ THOROUGHLY BEFORE USING THE DEVICE
 KEEP FOR FUTURE REFERENCE**

ID: BA_DMXX_E | Version: 01.2022.0

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.

Download the data sheet by accessing www.bdsensors.de or request it: info@bdsensors.de | phone: +49 (0) 92 35 / 98 11 0

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

	- Type and source of danger - Measures to avoid the danger
Warning word	
Warning word	Meaning
	- Imminent danger! - Non-compliance will result in death or serious injury.
	- Possible danger! - Non-compliance may result in death or serious injury.
	- 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 metrology 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 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.

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

1.3 Intended use

The battery powered digital gauge has been designed for extremely high demands in the sector of calibration and test technology. It can be easily and quickly installed in situ.

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) 9235 9811 0). BDSSENSORS assumes no liability for any wrong selection and the consequences thereof!

Permissible media are gases or liquids, which are compatible with the media wetted parts described in the data sheet. In addition, it has to be ensured, that this medium is compatible with the media wetted parts.

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 - 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:

- digital gauge (display / pressure sensor module)
- this operating manual
- accessories (option)

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:

- 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.

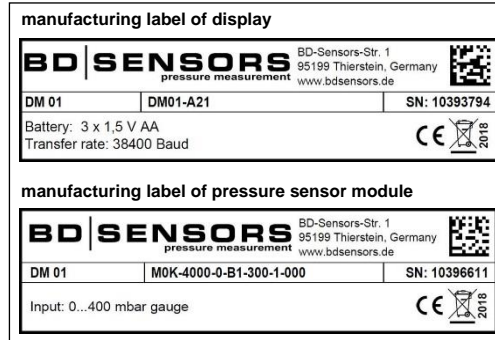


Fig. 1 Example of manufacturing labels

NOTE - The manufacturing labels must 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 (pressure transmitter module) in a depressurized condition and apart from the display!
	WARNING Danger of death from improper installation - This device may only be installed by qualified technical personnel who has read and understood the operating manual! - Do not use the display to tighten or solve to the mechanical connection of the pressure transmitter module!

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

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

NOTE - The device may not be thrown!

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

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

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

NOTE - Never use the display as a mounting / dismantling aid, otherwise the device or the plug-in connections will be irreparably damaged. For mounting or dismantling the device, only use the hexagon on the pressure port.

NOTE - Take note that no inadmissibly high mechanical stresses occur at the pressure port as a result of the installation, since this may cause a shifting of the characteristic curve or to the damage.

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

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

NOTE - If the device is installed with the pressure port pointing upwards, ensure that no liquid drains off on the device. This could result in humidity and dirt blocking the gauge reference in the housing, and could lead to malfunctions. If necessary, dust and dirt must be removed from the edge of the screwed joint of the electrical connection

NOTE - The specified tightening torques 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 this case.
- Connect the device electrically straightaway after mounting or prevent moisture penetration, e.g. by a suitable protective cap. (The protection rating specified on 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!
- 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. This must be excluded if the device is used in any explosion-hazardous area!
- A device with gauge reference in the housing (small hole next to the electrical connection) must be mounted such that the gauge reference is protected against dirt and humidity. If the transducer is exposed to liquid admission, the gauge reference will be blocked, and the equalization of air pressure will be prevented. In this condition, a precise measurement is impossible and damage to the transducer may occur.

3.2 Conditions for oxygen applications

Make sure that your device was ordered for oxygen applications and delivered accordingly. (see manufacturing label – ordering code ends with the numbers "007")

Unpack the device directly prior to the installation.

Skin contact during unpacking and installation must be avoided to prevent fatty residues remaining on the device. Wear safety gloves!

The entire system must meet the requirements of the German Federal Agency for Material Testing [BAM] (DIN19247)!

For oxygen applications > 25 bar, transducer types without seals are recommended.

Transmitters with o-rings of FKM Vi 567: permissible maximum values: 25 bar / 150° C (BAM approval)

3.3 Mounting steps for connections according to DIN 3852

NOTE - Do not use any additional sealing material such as yarn, hemp or Teflon tape!

- ✓ The O-ring is undamaged and seated in the designated groove.
- ✓ The sealing face of the mating component has a flawless surface. (Rz 3.2)

- 1 Screw the device into the mating thread by hand.
- 2 Devices with a wrench flat must be tightened using a suitable open-end wrench.
G1/4": approx. 5 Nm; G1/2": approx. 10 Nm;
G3/4": approx. 15 Nm; G1": approx. 20 Nm

3.4 Mounting steps for connections according to EN 837

- ✓ A suitable seal for the measured fluid and the pressure to be measured is available. (e.g. a copper seal)
- ✓ The sealing face of the mating component has a flawless surface. (Rz 6.3)

- 1 Screw the device into the mating thread by hand.
- 2 Then tighten it using an open-end wrench:
G1/4": approx. 20 Nm; G1/2": approx. 50 Nm

3.5 Mounting steps for NPT connections

- ✓ Suitable fluid-compatible sealing material, e.g. PTFE tape, is available.

- 1 Screw the device into the mating thread by hand
- 2 Then tighten it using an open-end wrench:
1/4" NPT: approx. 30 Nm; 1/2" NPT: approx. 70 Nm

3.6 Installation steps for internal threads M20x1.5 and 9/16" UNF (for DM01-500 HD)

	Danger of injury - Due to wrong installation - Do not use any seal!
WARNING	

NOTE - The high-pressure tube will seal metal-to-metal in the chamfer of the pressure port. (sealing cone 60°)

- 1 Screw the high-pressure fitting into the internal thread of the pressure transmitter.
- 2 Then tighten it using an open-end wrench. The required tightening torque depends on the manufacturer's specifications for the high-pressure pipe you are using. (permissible tightening torque for pressure transmitter: max 120 Nm)

4. Connecting display / pressure sensor module

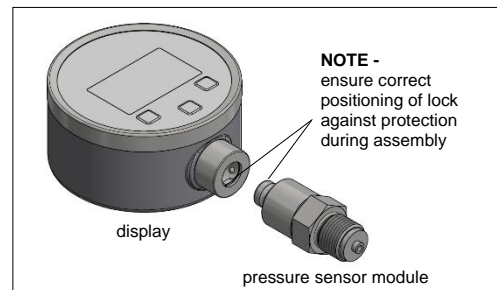


Fig. 2 Lock against protection

Connect display with pressure sensor module as follows:

- bring together carefully the display with the pressure sensor module
- press the display hand-tight onto the pressure sensor module until it lock in place

NOTE - Make sure the device is switched off before disconnecting display and pressure sensor module.

NOTE - While the data logger is active, the display and pressure sensor module may not be disconnected!

5. Supply / changing the batteries

Before initial start-up, remove the insulating foil in the battery case. Perform steps 1 - 3 and 5 in this regard.

As soon as in the display the announcement of "battery" is shown, a battery change is necessary. Perform steps 1, 2, 4, and 5 in this regard.

- 1 Unscrew three fixing screws with a suitable screwdriver.
- 2 Take the battery case cap.
- 3 Remove the insulation foil before initial start-up.
- 4 Exchange the batteries (3 x 1.5 V AA).
- 5 Lock the device after that properly.

NOTE - An incorrect usage may cause a leak out of batteries and so a damage the device!

NOTE - Only use batteries of type 1.5 V AA.

NOTE - Never combine batteries of different types or old with new ones!

NOTE - Make sure that the batteries are connected correctly with the corresponding contacts in the battery tray.

NOTE - Never try to charge batteries, demount them, or short-circuit them.

NOTE - use only batteries with UL certification

NOTE - Keep the batteries away from heat and unshielded flame.

NOTE - For devices with a user-defined unit, select [user] unit under menu 6/11 after commissioning / changing the battery.

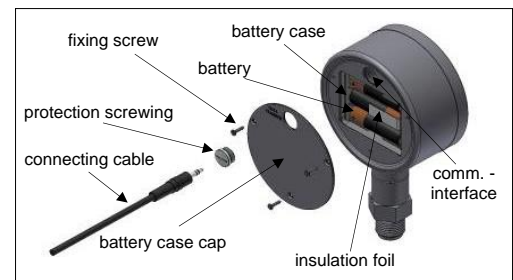


Fig. 3 Battery case and communication interface

6. Commissioning

- ✓ The device has been installed properly.
- ✓ The device does not have any visible defect.
- ✓ The device is operated within the specification (according to the data sheet).
- ✓ The insulation foil in the battery case has been removed.

6.1 Data logger

The battery powered digital gauge disposes of an integrated data logger. The measuring values stored away in the device can be selected above the communication interface by means of software DAQ (optionally included in delivery). Free version DAQ software is available via homepage <https://www.bdsensors.com>.

6.2 PC-connection

Connect the device with a computer as follows:

- Unscrew the protective screwing of the communication interface with a suitable slit screwdriver.
- Connect the handle plug of the connecting cable (optionally included in delivery) with the interface socket of the device. Connect the USB plug with a free USB connection on the computer.
- Install COM driver and data logger software DAQ, receive available on USB plug (optionally included in delivery). Free version DAQ software is available via homepage <https://www.bdsensors.com>.
- After the use, disconnect the connection and lock the protection screwing again properly.

7. Operation

7.1 Operating- and display elements (display)

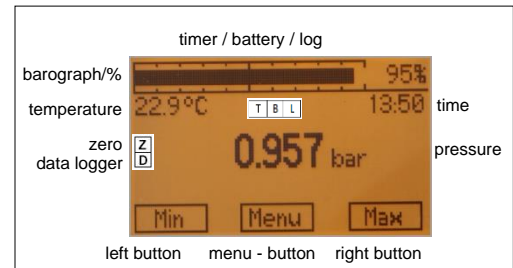


Fig. 4 Display and operating foil

The display of the measuring value as well as configuring the single parameters occurs menu-steered about a LC display capable of graphic arts. The single functions are regulated on the basis of three-front-sided arranged push buttons.

The menu system is closed, thereby one can "browse" forward as well as backward by the single setting menus to reach to the desired setting point.

7.2 Structure of the menu system

