



Operating Manual



Digital gauge DM01, DM01-500, DM01-500 HD



DM01

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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!

For the installation, maintenance and cleaning of the device, you must absolutely observe the relevant regulations and stipulations on explosion protection (VDE 0160, VDE 0165 or EN 60079-14) as well as the occupational safety provisions. The device was constructed acc. to standards EN60079-0:2009, EN60079-11:2012.

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 maintenance 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 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.
- 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, 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.
- The technical data listed in the current data sheet are engaging. If the data sheet is not available, please order or download it from our homepage. (<http://www.bdsensors.com>)

WARNING! - Danger through improper usage!

WARNING! - Danger by not designated use. By any changes, as for example: unscrewing the battery case cap, the decreasing of the protection screwing of the communication interface, device **may not** be used in explosive atmospheres.

WARNING! - The operation of the communication interface is not allowed in the explosive atmospheres.

WARNING! - Battery operation: Use only the prescribed batteries!

1.6 Safety technical maximum values

AX16-DM01, AX16-DM01-500, AX16-DM01-500 HD:
zone 1: II 2G Ex ia IIC T4 Gb
Permissible temperature: -10 ... 55°C
Supply: 3x 1.5 V / AA: Duracell Plus Power batteries

1.7 Package contents

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

The batteries are already used. The circuit is interrupted by an insulation foil. Take this before first introduction, see in addition battery change!

1.8 UL – Approval (for equipment 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 manufacturing label serves for the identification of the device for the display and the pressure transmitter module. It provides the most important data. By the ordering code, the product can be clearly identified.

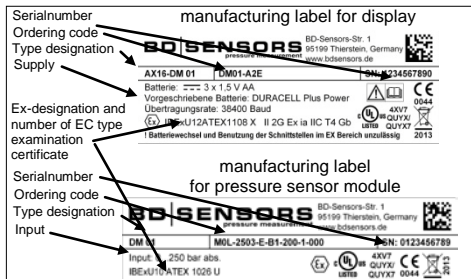


Fig. 1 Manufacturing label

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

3. Mechanical Installation

3.1 Mounting and safety instructions

Warning: Operation of the display AX16-DM01 with the EC-Type Examination certificate IBExU12ATEX1108 X is permitted only in combination with the accompanying pressure transmitter with the EC-Type Examination certificate IBExU10ATEX 1026U

Warning! If both equipments have not been used in the scheduled combination (display AX16-DM01/pressure transmitter with certificate IBExU10 ATEX 1026 U), then the complete system has to be put immediately out of operation! A potentially damage of one or both devices could have been occurred! The device's consequently lose the IS-certification when using not for intended purpose.

WARNING! Mount the device (pressure transmitter module) always in the state without pressure and apart from the display!

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

WARNING! Do not use the display to tighten or solve to the mechanical connection of the pressure transmitter module!

! 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 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. This is especially important for very small pressure ranges as well as for devices with a pressure port made of plastic.

! 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 General installation steps

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

3.3 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 fully tightened with an open-end Devices (G1/4": approx. 5 Nm; G1/2": approx. 10 Nm).
- **The indicated tightening torques must not be exceeded!**

3.4 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!**

3.5 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!**

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

- Screw the high pressure connection into the internal thread of the pressure port and tighten it properly with approx. 160 Nm.

- DANGER! The high pressure tube seals metal-to-metal in the chamfer of the pressure port. No further seal is allowed with this high pressure connection. A wrong installation can cause enormous danger!

4. Connection display with pressure transmitter module

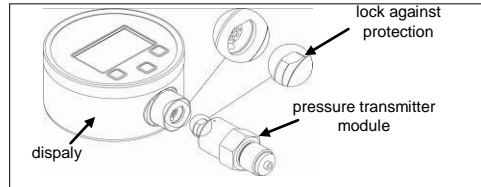


Fig. 2 Lock against protection

Connect display with pressure transmitter module as follows:

- bring together carefully the display with pressure transmitter module.
- press the display sturdy pressure transmitter module to this engages.

5. Supply / changing the batteries

As soon as in the display the announcement of "battery" is shown, carry out battery change as follows:

- unscrew three fixing screws with a suitable screwdriver.
- take the battery case cap and exchange the batteries 3 x 1.5 V AA (remove the insulation foil before first introduction).
- lock the device after that properly

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

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

! 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.

! use only batteries with UL certification

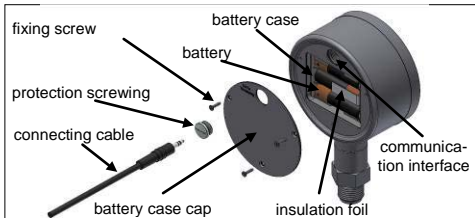


Fig. 3 Battery case cap and communication interface

6. 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 BD|LOG (included in delivery)..

6.1 PC - connection

Connect 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 (included in delivery) with the interface socket of the device. Connect the side with the USB plug with a free USB connection on the computer.
- install the COM driver and data logger software BD|LOG, receive available on CD (included in delivery).
- after the use, disconnect the connection and lock the protection screwing again properly.

WARNING! The connection of the device with a computer via the communication interface is not allowed in explosive atmospheres.

7. Initial start-up

remove the insulation foil before first introduction.

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)!

8. 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.

9. Operation

9.1 Operating and display elements

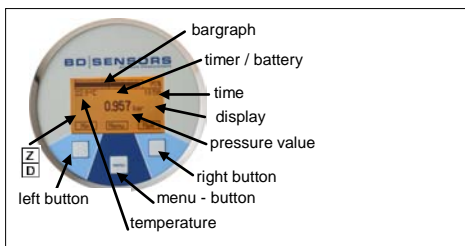
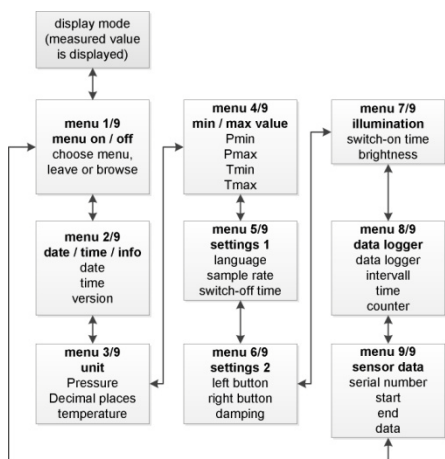


Fig. 4 Display and operating foil

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.

9.2 Structure of the menu system



9.3 Menu list

SWITCH ON	The device can be switched on with every button (left button, menu button, right button).
MENU 1/9 ON / OFF	By push the menu button the operating mode will be selected / left / ("Menu" / "Exit").
MENU 2/9 DATE / TIME / INFO	Setting of topical time and the topical date. Software version will be showed.
MENU 3/9 UNITS	Setting of the pressure unit adjustable units: [bar], [mbar], [PSI], [inHg], [cmHg], [mmHg], [hPa], [kPa], [MPa], [mmH2O], [mH2O], [kg/cm ²] or [user] (the user-defined unit can be programmed only by means of the software BD LOG), a conversation of all pressure related parameters is carried out automatically Setting of decimal places adjustable decimal place: standard [Std], [+1], [+2] Setting of the temperature unit the unity is not adjustable. Factory setting [°C]
MENU 4/9 MIN / MAX VALUES	Displaying of Min / Max Values P _{min} - Minimum pressure display: The minimum pressure applied during measuring is shown in the display. P _{max} - Maximum pressure display: The maximum pressure applied during measuring is shown in the display. T _{min} - Minimum temperature display: The minimum temperature during measuring is shown in the display. T _{max} - Maximum temperature display: The maximum pressure applied during measuring is shown in the display. Possible options: reset value [Reset ?] (Resetting of a value: select the menu point with "Edit" → button ">>" operate. There appears the question "Reset?" → once more operate the button ">>". It seems "Sure?" additional confirmation whether the value should be put back → repeated confirming with the button ">>" takes over topically adjoining pressure as a minimum value.)
MENU 5/9 CONFIGURATION 1	Language: Setting of user languages German [DE] or English [EN] Measuring rate: here it is put how often the measurement is carried out and is indicated. Possible settings are: a measurement per second [1/sec] or two measurements per second [2/sec] Auto Off Time: Setting of the automatic switch off in minutes. The automatic switch off is able in steps from [1 min], [2 min], [3 min], [4 min] or [5 min]; 30 seconds before switching off the timer is activated and indicated in the display. By the option [Off] the device can be deactivated. After deactivation, the precision digital gauge is in the continuous operation.
MENU 6/9 CONFIGURATION 2	Button settings: left button / right button Left Button: function configurations: [Min], [Light], [Zero], [Reset] Right Button: function configurations: [Max], [Light], [Zero], [Reset] Function descriptions: - [Min] / [Max] minimum / maximum pressure value will be showed - [Light] the display backlight is activated - [Zero] the zero point is automatically put, in the display appears - [Reset] the opposed zero is put back, goes out Damping: the damping can be put in 1 second steps between [1 sec] and [10 sec] or be deactivated by option [Off]
MENU 7/9 BACKLIGHT	Backlight settings of display On Time: the backlight duration can be put in 1 second steps between [1 sec] and [10 sec] or be deactivated by option [Off] Brightness: the brightness can be put into 5% of steps between [0%] and [100%]
MENU 8/9 DATA LOGGER	Data Logger configuration Data Logger: the following settings are possible: linearly [Linear] (value admission to the counter level 8500 is reached), cyclically ([Loop] (after the value is reached in 8500, the data logger automatically begins the values once more to grasp and, besides, headlines the old values) or [Off] (in the display appears if the data logger is activated and goes out if the data logger is off) Interval: Intervals to the memory of the measuring values (pressure / temperature) second [1-99 sec], minute [1-99 min], hour [1-99 hour] or day [1-99 days] Time: Measuring value admission: in which time the measuring value admission should occur (is only efficiently for the setting "daily"). Counter: Number of the grasped measuring values is indicated. Maximum value: 8500 (Put back counter reading: menu point with "Edit" select → button "Next" four times operate → button ">>" operate. There appears the question "Reset?" → once more operate the button ">>". It seems "Sure?" additional confirmation whether the value should be reset → repeated confirming with the button ">>" reset the grasped measuring values. Display announcement "Counter: 0/8500")
MENU 9/9 SENSOR DATA	[SN:] the standard number is indicated [Upper] Measuring area end [Lower] Measuring area beginning [Date] Production date Values are put by factory and are not adjustable.
ERROR	Display "No Sensor": display and pressure sensor module are separated.

- **Left Button:** if is a functional button and can be configured in the menu 6. Light-, Zero-, Reset- or Min- function can be assigned to the button. The configured function is active in the display mode. Hold the button during approx. 2 seconds to activate the function. In the operating mode you move in the menu system backward "<<" or you reduce the set value.

- **Right Button:** if is a functional button and can be configured in the menu 6. Light-, Zero-, Reset- or Max- function can be assigned to the button. Hold the button during approx. 2 seconds to activate the function. In the operating mode you move in the menu system forward ">>" or you raise the set value.

- **Menu-Button:** by pressure of this button "menu" you reach in the operating mode; moreover, she serves for the choice of the single menu points "Edit" or in the confirmation the opposed worth "Next".

To the configuration of the single menu points the desired menu point is to be put with the help of the left button "<<" or right button ">>". Confirm this afterwards with the menu button "Edit" the menu point is marked and the configuration can begin.

To store an opposed value the menu button "Next" must be also pressed. To leave the menu press the menu button so often to the mark of the single menu point and choose with the left button "<<" or right button ">>" the menu 1 and press the menu button once more "Exit". The operating mode will also leave after approx. 1 min automatically.

Changes become first after activity of the menu button "Next" and after abandonment of the menu point effective. With the abandonment of the whole menu system the opposed parameters are checked once again in dependence to each other and concerning the characteristics of the device. With the configuration of the unity a conversion of the measuring area occurs in the new unity only after abandonment of the menu system. According to pressure area not all units can be also used if necessary.

10. 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.

With certain media, however, the diaphragm may be polluted or coated with deposit. It is recommended to define corresponding service intervals for control. 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.

! A false cleaning of the device can cause an irreparable damage on the diaphragm. Therefore never use pointed objects or pressured air for cleaning the diaphragm.

11. Service / Repair

We recommend that the instrument is regularly recalibrated by BD SENSORS, with timeintervals of approx. 12 months. Before you return, the device 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.

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

12. 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 measuring medium, deposit on the device may cause danger for the user and the environment. Comply with adequate precautions for purification and dispose of it properly.

13. 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.

14. 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/products/download/certificates>. Additionally, the operational safety is confirmed by the CE sign on the manufacturing label.