

Operating Manual 

Digital pressure gauge BAROLI 02, 05, 02 P, 05 P



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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!

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.

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 *BAROLI* 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, 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!

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 *BAROLI*
- mounting instructions

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.

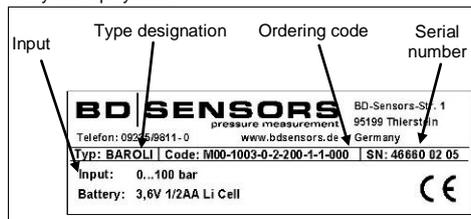


Fig. 1 manufacturing label

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

3. Mechanical installation**3.1 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!

! The display and the plastic housing are equipped with rotational limiters. Please do only rotate the display or the housing within the limit.

 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 the damage.

 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 detailed 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. (R_z 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 with a spanner flat have to be tightened with an open-end wrench (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).
- **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. (R_z 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 dairy pipe

- Check to ensure that the O-ring fits properly into the intended groove in the mounting part.
- Center the dairy pipe connection in the counterpart.
- Screw the cup nut onto the mounting part.
- Then tighten it with a hook wrench.

3.7 Installation steps for Clamp and Varivent®

- Use a suitable seal corresponding to the medium and the pressure input.
- Put the seal onto the corresponding mounting part.
- Center the Clamp or Varivent® connection on the fitting counterpart with seal.
- Then fit the device with a suitable fastening element (e. g. semi-ring or retractable ring clamp) according to the supplier's instructions.

3.8 Installation steps for connecting flanges

- Use a suitable seal corresponding to the medium and pressure input. (e. g. a fiber gasket).
- Put the seal between connecting flange and counter flange.
- Install the device with 4 resp. 8 screws (depending on flange version) on the counter flange.

3.9 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.

4. Supply / changing the batteries

The digital pressure gauge is supplied by two 3.6 V-lithium-batteries (Type 1/2 AA). Stored values/parameters are also kept after changing the batteries.

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 under the black, circular plastic cap on the top of the housing. To change the batteries go ahead as follows:

- turn the plastic cap 45° anti clockwise by a coin (e.g. 2 € coin) as far as possible
- hold the count tight and lever the plastic cap out of the housing with help of the count
- take the cap off and change the batteries
- lock the device after that properly



Fig. 2 battery case

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

5. 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!)

6. 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.

7. Operation

7.1 Operating and display elements

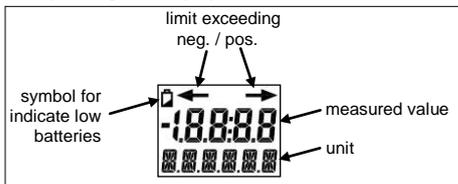
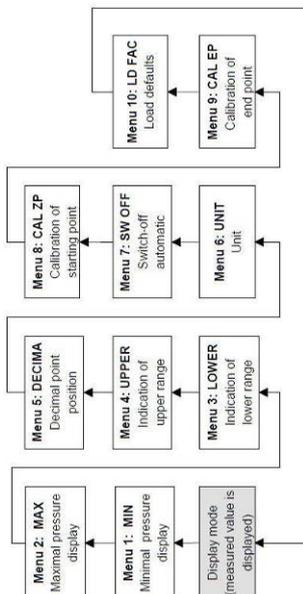


Fig. 3 LC-display

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 three miniature push buttons located in the front.

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

7.2 Structure of the menu system



7.3 Menu list

1 P MIN	Minimum pressure display ▼-button: puts the current pressure as minimum value ▲-button: puts the value on zero
2 P MAX	Maximum pressure display ▼-button: puts the current pressure as maximum value ▲-button: puts the value on zero
3 LOWER	Displaying of the lower range This value was determined on the order and cannot be changed.
4 UPPER	Displaying of the upper range This value was determined on the order and cannot be changed.
5 DECIMA	Setting of the decimal point position Depending on the nominal pressure range and on the set unit, only a limited number of positions after the decimal point can be displayed.
6 UNIT	Setting of the pressure unit Permissible units: bar, mbar, PSI, InHg, cmHg, mmHg, hPa, kPa, Mpa, mH ₂ O, InH ₂ O. Along with the unit, the decimal point position has probably to be changed in order to get a correct indication of the measured value. Besides, depending on the nominal pressure range, perhaps not all available units can be used.
7 SW OFF	Configuration of the switch-off automatic Meaning of the permissible number: "0": switch-off automatic is turned off "1" - "5": automatic switch-off in 1 to 5 minutes
8 CAL ZP	Calibration of initial point If you detect a shifting of the measured value deviating from the offset, the display can be re-calibrated. For this, a pressure reference is necessary if the offset differs from the ambient pressure. The used pressure must be identical to the starting point of the pressure measuring range. For reading the new pressure into the device, push the ▲ button. Please note the following deviation: -1...x bar: the offset is calibrated at -0.9 bar; during calibration we check whether the device will be within tolerance at -1 bar (in theory); for re-calibration a pressure reference of -0.9 bar is necessary 0...x bar abs.: the offset is calibrated at 0.1 bar abs.; during calibration we check whether the device will be within tolerance at 0 bar abs.; for re-calibration a pressure reference of 0.1 bar is necessary If the re-calibration leads to a worsening of the original calibration, e. g. as a result of a defect pressure reference, the defaults can be re-set by the menu item "LD FAC" according to your order
9 CAL EP	Calibration of end point If you detect a shifting of the measured value deviating from the end point, the display can be re-calibrated. For this, a pressure reference is necessary if the offset differs from the ambient pressure. The used pressure must be identical to the end point of the pressure measuring range. For reading the new pressure into the device, push the ▲ button. If the re-calibration leads to a worsening of the original calibration, e. g. as a result of a defect pressure reference, the defaults can be re-set by the menu item "LD FAC" according to your order.
10 LD FAC	Load defaults To load the defaults you have to push the ▲-button. After the action "LOADED" and "OK" appears in the display for a short time. The configuration mode will be left automatically.

- **▲ / on button:** with this button you turn the device on; in the operating mode you move forward in the menu system or increase the displayed value
- **▼ / off button:** with this button you turn the device off; in the operating mode you move backwards in the menu system or decrease the displayed value
- **OK-button:** with this button you enter the operating mode; besides, it is used to activate the different menu items and to confirm the set values

To configure the different menu items, set the desired values by pushing the "▼" or "▲" buttons. Confirm the setting with the "OK" button and the menu item will start blinking to indicate that you can start the configuration.

To save the configured values or to leave a menu item, you also have to push the "OK" button.

Changes of the adjustable parameters become only effective after pushing the OK button and leaving the menu item. After leaving the menu system, all parameters will be checked against each other and in reference to the characteristics of the device. If the message "OK" appears in the display for some seconds, the configuration was successfully. If the message "ERROR" appears, at least one of the set values is out of the permissible range. For example, an error will occur if a device with a nominal pressure range of 400 bar should be set on 4 positions after the decimal point. If an error has been detected, the lastly runnable parameters will be set again.

After configuring the unit, the conversion of the pressure range (in menus UPPER and LOWER) into the new unit will only occur after leaving the complete menu system. Besides, depending on the number of displayed figures of the respective nominal pressure range, probably not all available units (in menu UNIT) can be used.

8. Maintenance

In principle, this device is maintenance-free. If desired, the housing of the device can be cleaned when switched off 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.

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 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.

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 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 fulfills 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.