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Operating Manual

Plug-On Display

PA 430

READ THOROUGHLY BEFORE USING THE DEVICE
KEEP FOR FUTURE REFERENCE

ID: BA_PA430_E | Version: 06.2020.0

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.

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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

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 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 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 plug-on display PA 430 has been de-signed to equip transmitters with analogue output 4 … 20 mA / 2-wire or 0 … 10 V / 3-wire (pressure, temperature etc.) with a digital display. Additional up to 2 PNP open collector contacts for a limiting value control can be offered. The plug-on display has to be installed between male and female plug and is ready for work immediately. A preferred area of use is e.g. on-site process monitoring.

Programming is performed via two buttons on the front side. The following parameters can be set: scaling, decimal point, damping, switch point, and delay. Moreover, a min./max. value memory is available. The settings will be retained even in case of a power failure. Incidences of range exceedance in both directions can be displayed as messages. The integrated diagnostic system constantly monitors all functions of the display. The housing can be turned by 300° in an infinitely variable manner, the display by 330°.

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!

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:

- plug-on display PA 430
- only with ISO 4400 connector: fastening screw, profiled gasket
- sheet of unit labels
- operating manual

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

2. Product identification

The device can be identified by means of the manufacturing label with ordering code. The most important data can be gathered therefrom. The version of the firmware, (e. g. P07) will appear for about 1 second in the display after starting up the device. Please hold it ready for inquiry calls.

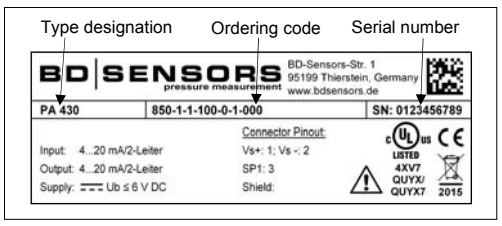


Fig. 1 example of manufacturing label

NOTE - The manufacturing label 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 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 operating manual.

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

NOTE - The display module and the plastic housing are equipped with rotation limiters. Please do not attempt to overtighten it by applying increased force.

3.2 Mounting steps for Binder and M12x1 connectors

1. Plug the plug-on display onto the transmitter.
2. Plug the cable socket or mating plug onto the PA 430 and fasten it properly.

3.3 Mounting steps for ISO-4400 connectors

1. Loosen and carefully pull off the cable socket from the transmitter.
2. Plug the PA 430 onto the transmitter. When doing so, ensure that the profiled gasket premounted on the bottom side is seated correctly.
3. Remove the fastening screw from the cable socket.
4. Replace the pre-assembled profile seal of the cable socket by the delivered seal to ensure an ingress protection of IP 65.
5. Plug the cable socket onto the PA 430.
6. Insert the supplied stainless steel screw through cable socket and plug-on display and tighten the screw hand-tight on the transmitter using a screwdriver.

3.4 Positioning of the display module

In order to ensure easy readability even when the device is installed in an awkward location, the display can be rotated into the desired position. Its rotational capability is illustrated below. Note rotation limits.

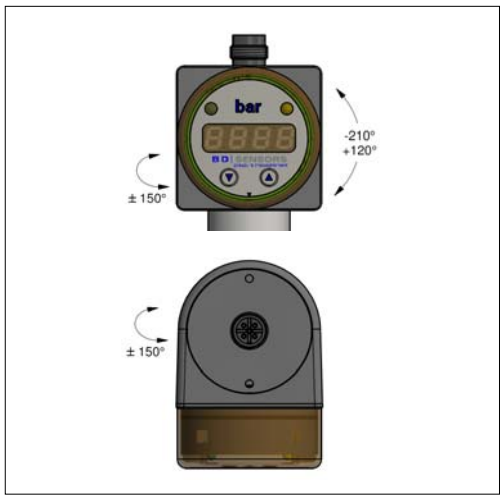


Fig. 2 display module (example with M12x1 and 2 contacts)

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!

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

NOTE - If the device is equipped with a **cable socket** it must be ensured that the external diameter of the used cable is within the permissible clamping range. Moreover you have to ensure that it lies in the cable gland firmly and cleftlessly!

NOTE - Please note that the cable socket or mating plug has to be mounted properly to ensure the ingress protection mentioned in the data sheet

NOTE - For the electrical connection a shielded and twisted multicore cable is recommended.

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:

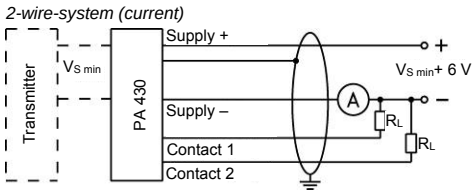
Electrical connection	ISO 4400	M12x1, metal (5-pin)
Supply +	1	1
Supply –	2	2
Signal + (only 3-wire)	3	3
Contact 1	3	5
Contact 2	-	3
Shield	ground pin ⏚	4

Electrical connection	Binder 723 (5-pin)	Binder 723 (7-pin) [1]
Supply +	3	3
Supply –	4	1
Signal + (only 3-wire)	5	-
Contact 1	2	-
Contact 2	1	-
Shield	ground pin	2

[1] intended for usage with DMP 331i, DMP 333i and LMP 331i with electrical connection Binder Series 723 (7-pin); pins 4, 5, 6, 7 are wired through 1:1

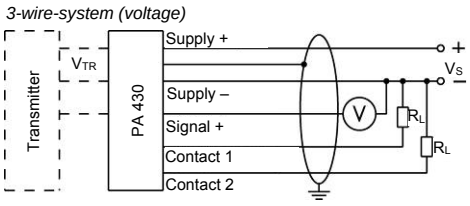
Wiring diagrams:

2-wire-system (current)



$V_{S\ min}$: minimum supply of the used 2-wire transmitter

3-wire-system (voltage)



V_{TR}: supply of the used 3-wire transmitter

4.3 Supply of 2-wire-systems

The supply created by the electronics of the plug-on display is approx. 6 V_{DC}. Please take this into consideration when planning your power supply. The tolerances for the power supply can be calculated as follows:

minimum supply: $V_{S\ min} = V_{TR\ min} + 6\ V$

maximum supply: $V_{S\ max} = V_{TR\ max} + 6\ V$

$V_{TR\ min}$ = minimum supply of the used 2-wire transmitter

$V_{TR\ max}$ = maximum supply of the used 2-wire transmitter

4.4 Supply of 3-wire-systems

minimum supply:

The minimum supply of the plug-on display ($V_{S\ min}$) is 8 V. The connected transmitter is supplied by the PA 430, so the minimum supply of the transmitter must be used for the total appliance if it is higher than 8 V. The following formulas are valid:

if $V_{TR\ min} \geq 8$ V: $V_{S\ min} = V_{TR\ min}$

if $V_{TR\ min} < 8$ V: $V_{S\ min} = 8$ V

$V_{TR\ min}$ = minimum supply of the used 3-wire transmitter

maximum supply:

The maximum supply of the plug-on display ($V_{S\ max}$) is 36 V. As the connected transmitter is also supplied by the plug-on display, the maximum supply does not only depend on the supply of the PA 430. If the maximum supply of the transmitter is lower than 36 V, the maximum supply of the total appliance may not exceed the transmitter's value. The following formulas are valid:

if $V_{TR\ max} \geq 36$ V: $V_{S\ max} = 36$ V

if $V_{TR\ max} < 36$ V: $V_{S\ max} = V_{TR\ max}$

$V_{TR\ max}$ = maximum supply of the used 3-wire transmitter

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.

6. Operation

6.1 Control and display elements

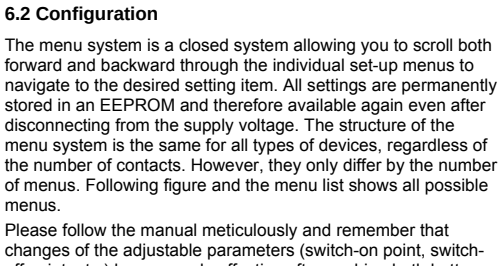


Fig. 3 touch pad (example with two contacts)

The device has, according to the order max. two LEDs which are allocated to the resp. contacts. The LEDs will light up when the respective set point has been reached and the contact is active. The display of the measured value as well as the configuration of the individual parameters occurs menu-driven via the seven-segment display.

Button functions	
▲	• move forward in the menu system (beginning with menu 1) • increase the displayed value note: increase the counting speed by keeping the button pushed for more than 5 second
▼	• move backwards in the menu system (beginning with the last menu) • decrease the displayed value note: increase the counting speed: keep the button pushed for more than 5 second
▼ + ▲	confirm the menu items and set values by pushing both buttons simultaneously

execution of configuration:

- set the desired menu item by pushing the ▲- or ▼-button
- activate the set menu item by pushing both buttons simultaneously
- set the desired value or select one of the offered settings by using the ▲- or ▼-button
- store / confirm the set value/selected setting and exit the menu by pushing both buttons simultaneously

6.2 Configuration

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 disconnecting from the supply voltage. The structure of the menu system is the same for all types of devices, regardless of the number of contacts. However, they only differ by the number of menus. Following figure and the menu list shows all possible menus.

Please follow the manual meticulously and remember that changes of the adjustable parameters (switch-on point, switch-off point, etc.) become only effective after pushing both buttons simultaneously and leaving the menu item.

6.3 Password system

To avoid a configuration by unauthorized persons, the possibility is given to lock the device by an access protection. More information is given in menu 1 of the menu list.

6.4 Unit

The unit of the measured value is already determined at the time of ordering by the desired measuring range. However, the device may also be labelled with another unit at a later time by attaching one of the supplied unit labels.

6.5 Description of hysteresis and compare mode

To invert the respective modes, you have to exchange the values for the switch-on and switch-off points.

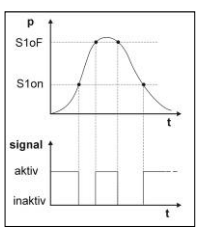


Fig. 4 compare mode

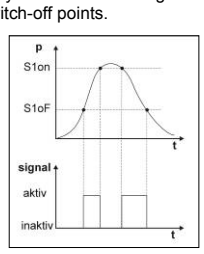


Fig. 5 compare mode inverted

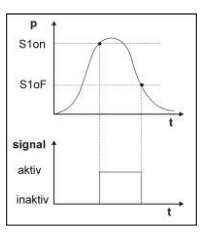


Fig. 6 hysteresis mode

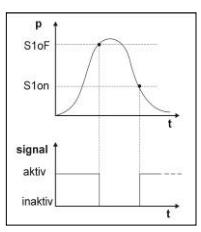


Fig. 7 hysteresis mode inverted

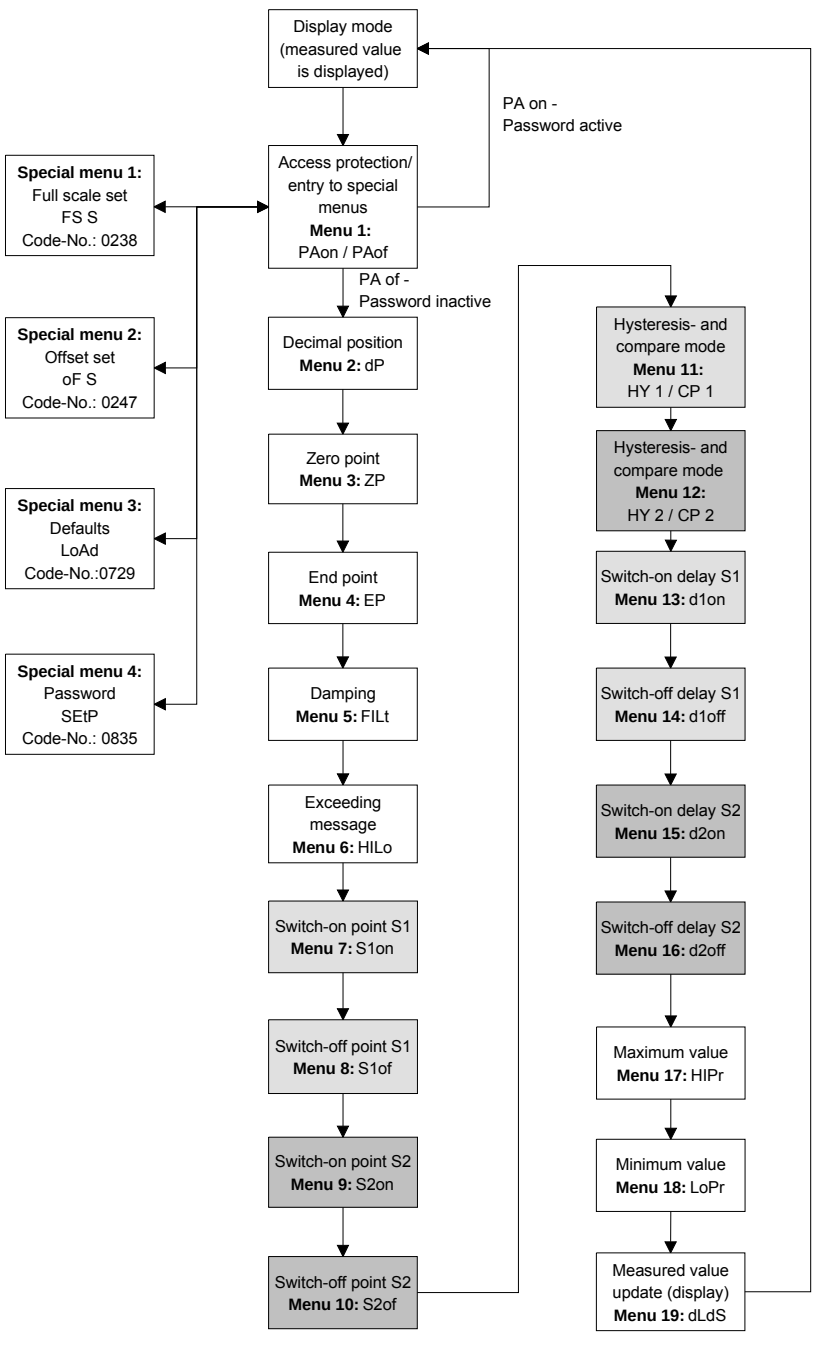
6.6 Menu list

✓ button functions are well known (see "6.1 Control and display elements")

PAon PAoF	**menu 1 – access protection** PAon ➔ password **active** ➔ to deactivate: set password PAof ➔ password **inactive** ➔ to activate: set password default setting for the password is "0005"; modification of the password is described in special menu 4
dP	**menu 2 – set decimal point position**
2P EP	**menus 3 and 4 – set zero point / end point** the device has been configured correctly before delivery, so a later setting of a 2-wire device is only necessary, if a differing displayed value is desired (e. g. 0 ... 100 %)
FILt	**menu 5 – set damping** this function allows getting a constant display value although the measuring values may vary considerably; the time constant for a simulated low-pass filter can be set (0.3 up to 30 sec permissible)
HiLo	**menu 6 – exceeding message** set "on" or "off"
S1on	**menus 7 and 9 – set switch-on points** set the particular values, for the activation of contact 1 (S1on) up to 2 (S2on)
S1oF	**menus 8 and 10 – set switch-off points** set the particular values, for the deactivation of contact 1 (S1oF) up to 2 (S2oF)
HY 1 CP 1	**menus 11 and 12 – select hysteresis or compare mode** select the hysteresis mode (HY 1 up to HY 2) or compare mode (CP 1 up to CP 2) for the contacts 1 up to 2 (no. corresponds to the contact)
d1on	**menus 13 and 15 – set switch-on delay** set the particular value of the switch-on delay after reaching switch-on point 1 (d1on) up to 2 (d2on) (0 up to 100 sec permissible)
d1oF	**menus 14 and 16 – set switch-off delay** set the particular value of the delay after reaching the switch-off point 1 (d1oF) up to 2 (d2oF) (0 up to 100 sec permissible)
HiPr LoPr	**menus 17 and 18 – maximum / minimum pressure display** view high pressure (HIPr) or low pressure (LoPr) during the measurement process (the value will not remain stored if the power supply is interrupted) to erase: push both buttons again within one second
dLdS	**menu 19 – measured value update (display)** set the length of the update cycles for the display (0.0 up to 10 sec permissible)
special menus (to access a special menu, select the menu item "PAof" with the ▲- or ▼-button and confirm it; "1" appears in the display)	
FS S	**special menu 1 – full scale compensation** for full scale compensation, which is necessary if the indicated value for full scale differs from the real full scale value in the application; a compensation is only possible with a respective reference source, if the deviation of the measured value is within defined limits; set "0238"; confirm with both buttons; "FS S" will appear in the display; now it is necessary to place the device under pressure (the pressure must correspond to the end point of the pressure measuring range); push both buttons, to store the signal being emitted from the pressure switch as full scale; in the display the set end point will appear although the full scale sensor signal is displaced. The analogue output signal (for devices with analogue output) is not affected by this change.
oF S	**special menu 2 – offset compensation / position correction** set "0247";confirm menu item; if offset ≠ ambient pressure it is necessary to place the device under pressure (pressure reference has to corresponding to the zero point of the pressure measuring range); push both buttons to store the signal being emitted from the pressure switch as offset; in the display the set zero point will appear although the sensor signal in the offset is displaced A position correction is necessary, if the installation position differs from the calibration position (otherwise this can cause a little deviation of the signal, which gives a wrong value indication). The analogue output signal (for devices with analogue output) is not affected by this change; when displacing the offset, the full scale will also be displaced.
LoAd	**special menu 3 – load defaults** set "0729; to load the defaults, push both buttons simultaneously any changes carried out will be reset (password will be set on "0005")
SEtP	**special menu 4 – set password** set "0835"; confirm with both buttons; "SEtP" appears in the display; set the password using the ▲- or ▼-button (0 ... 9999 are permissible, the code numbers 0238, 0247, 0729, 0835 are exempt); confirm the password by pushing both buttons simultaneously

6.7 Structure of the menu system

version P07



7. 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.

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.

9. Service / repair

Information on service / repair:

- www.bdsensors.de
- info@bdsensors.de
- service phone: +49 (0) 92 35 / 98 11 0

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.