

Operating Manual

Electronic Pressure Switch DS 4XX for IS-areas

AX14-DS400, AX14-DS400P, AX14-DS401, AX14-DS401P



DS 400P:



READ THOROUGHLY BEFORE USING THE DEVICE
KEEP FOR FUTURE REFERENCE

ID: BA_DS4XX_EX_E | Version: 08.2021.0

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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.

The following documents are an important part of the operating manual:

- data sheet
- type-examination certificate

For specific data on the individual device, please refer to the respective data sheet.

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

The IS versions of our products are variants of the standard products.

Example: Standard: DS400 → IS version: AX14-DS400

In addition, the applicable accident prevention regulations, safety requirements, and country-specific installation standards as well as the accepted engineering standards must be observed.

For the installation, maintenance and cleaning of the device, the relevant regulations and provisions on explosion protection (VDE 0160, VDE 0165 and/or EN 60079-14) as well as the accident prevention regulations must absolutely be observed. The device was designed by applying the following standards:

EN IEC 60079-0:2018 EN 60079-11:2012

1.1 Symbols used

	- Type and source of danger - Measures to avoid the danger
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 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 device is intended for converting the physical parameter of pressure into an electric signal. The current system pressure is shown in a 4-digit LED-display.

The **electronic pressure switch DS 4XX** has been developed, according to the type for applications, for absolute, vacuum and overpressure measurement. Depending on the device and the mechanical connection it is suitable for various areas of use.

The device has to be used only for this purpose, considering the following information.

Devices with 3-A and / or EHEDG certified process connection have been developed especially for applications in food and pharmaceutical industry. The process connection is hygienic and can be sterilized.

Permissible measuring and cleaning media are gases or liquids, which are compatible with the media wetted parts of the device (according to data sheet) and your system. This must be ensured for the application.

This operating manual applies to devices with explosion protection approval and is intended for the use in IS-areas. A device has an explosion-protection approval if this was specified in the purchase order and confirmed in our order acknowledgement. In addition, the manufacturing label includes a sign.

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
BDSENSORS 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>

1.4 Incorrect use

	Danger through incorrect use - Only use the device in permissible media and in accordance with its intended use. - Do not use the device as a ladder or climbing aid. - The device must not be altered or modified in any way. - BDSENSORS is not liable for damage caused by improper or incorrect use.
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1.5 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.

1.6 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 - Do not throw or drop the device!

NOTE - Excessive dust accumulation 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.

1.7 Safety technical maximum values AX 14 - DS 4XX

U_i = 28 V, I_i = 93 mA, P_i = 660 mW, C_i ≈ 0 nF, L_i ≈ 0 μH
plus cable inductivities 1 μH/m and cable capacities 100 pF/m (for cable by factory)

Permissible temperatures for environment:

- application in zone 0 (p_{am} 0.8 bar up to 1.1 bar): -20 ... 60 °C
- application in zone 1 and higher: -25 ... 70 °C

1.8 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:

- electronic pressure switch series DS 4XX
- for mechanical pressure ports DIN 3852: O-Ring (pre-mounted)
- this operating manual

1.9 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.

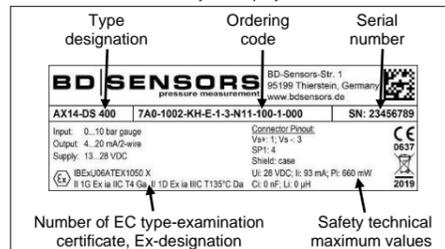


Fig. 1 Example of manufacturing label

NOTE - The manufacturing label must not be removed!

The marking for devices with explosion-protection approval has to include following information:

AX 14: EC-type examination certificate IBExU06ATEX1050 X

Ex-designation:

- II 1G Ex ia IIC T4 Ga or II 1G Ex ia IIB T4 Ga
- II 1D Ex ia IIC T135 °C Da

3. Mounting

3.1 Mounting and safety instructions

	Danger of death from explosion, airborne parts, leaking fluid, electric shock - Always mount the device in a depressurized and de-energized condition! - Do not install the device while there is a risk of explosion.
	Danger of death from improper installation - Installation must be performed only by appropriately qualified persons who have read and understood the operating manual.

NOTE - The technical data listed in the EC-type examination certificate are binding. Download this by accessing www.bdsensors.de or request it by e-mail or phone: info@bdsensors.de | phone: +49 (0) 92 35 98 11 0

NOTE - Make sure that the entire interconnection of intrinsically safe components remains intrinsically safe. The owner-operator is responsible for the intrinsic safety of the overall system (entire circuitry).

NOTE - Make sure that an equipotential bonding is in place for the entire course of the line, both inside and outside the intrinsic area.

NOTE - Do not mount the device in a pneumatic flow rate!

NOTE - The external circuit must prevent an external power-inflow to the contacts. Suitable signal separating devices which fulfill this demand have to be used.

NOTE - If there is increased risk of damage to the device by lightning strike or overvoltage, increased lightning protection must additionally be provided!

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

NOTE - Treat any unprotected diaphragm with utmost care; this can be damaged very easily.

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

NOTE - Provide a cooling line when using the device in steam piping and clarify the material compatibility.

NOTE - The measuring point must be designed in such a way that cavitation and pressure surges are avoided.

NOTE - When installing the device, avoid high mechanical stresses on the pressure port! This will result in a shift of the characteristic curve or to damage, in particular in case of very small pressure ranges.

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

NOTE - The permissible tightening torque depends on the conditions on site (material and geometry of the mounting point). The specified tightening torques for the pressure switch must not be exceeded!

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. Dust and dirt must be removed from the edge of the screwed joint of the electrical connection.

NOTE - Please check the conditions of use and operation of the device at regular intervals. If the properties are changed, initiate appropriate measures.

NOTES - for mounting outdoors / in a humid environment and for cleaning:

- Please note that your application does not show a dew point, which causes condensation and can damage the device. There are specially protected devices for these operating conditions. Please contact us in such case.
- Connect the device electrically straightaway after mounting or prevent moisture penetration, e.g. by a suitable protective cap. (The ingress protection specified in the data sheet applies to the connected device.)
- For devices with gauge reference in the housing (small hole next to the electrical connection), install the device in such a way, that the gauge reference is protected from dirt and moisture. Should the device be exposed to fluid admission, the functionality will be blocked by the gauge reference. An exact measurement in this condition is not possible. Furthermore, this can lead to damages on the device.
- Select the mounting position such that splashed and condensed water can drain off. Stationary liquid on sealing surfaces must be excluded!
- If the device has a cable outlet or cable gland, the outgoing cable must be routed downwards. If the cable needs to be routed upwards, this must be done in an initially downward curve.
- 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 is prohibited for applications in IS-areas!

3.2 Conditions for devices with 3-A symbol

The device or its connecting piece must be installed in such a way that the surfaces are self-draining (permissible installation position 273° ... 87°).

Make sure that the welding socket is mounted flush inside the tank.

The user is responsible for:

- the correct size of the seal and the choice of an elastomeric sealing material that complies with the 3-A standard
- an easy to clean installation position of the pressure transmitter with little dead space, as well as definition / verification / validation of a suitable cleaning process
- defining adequate service intervals

3.3 Conditions for devices, with EHEDG certificate

Install the device according to the requirements given in EHEDG Guidelines 8, 10 and 37. That is to mount the device in a self-draining orientation. The device should be installed flush to the process area. If mounting in a T-piece, the ratio between the depth of the upstand (L) and the diameter (D) of the upstand shall be L/D < 1. If welded adapters are used, the food contact surface must be smooth, and the welding has to be done according to EHEDG Guideline 9 and 35. Suitable pipe couplings and process connections must be applied according to the EHEDG Position Paper. (List the available ones.)

3.4 Conditions for oxygen applications

	Danger of death from explosion - when used improperly
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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 BAM (DIN 19247)!

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

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

3.5 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. (R_z 3.2)

- 1 Screw the device into the corresponding thread by hand.
- 2 Devices with a spanner flat must be tightened using a suitable open-end wrench. Permissible tightening torques for pressure switch:

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	

3.6 Mounting steps for connections according to EN 837

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

- 1 Screw the device into the corresponding thread by hand.
- 2 Then tighten it using an open-end wrench. Permissible tightening torques for pressure switch:

G1/4": approx. 20 Nm; G1/2": approx. 50 Nm

NOTE - note the permitted pressure according to EN 837:

G1/4" EN 837	p ≤ 600 bar	Counterpart has to be of steel according to DIN 17440 with strength R _{0.2} ≥ 190 N/mm ²
G1/2" EN 837	p ≤ 1000 bar	

NOTE - Please refer to data sheet or contact sales department at BDSENSORS regarding max. permitted pressure of device.

3.7 Mounting steps for NPT connections

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

- 1 Screw the device into the corresponding thread by hand
- 2 Then tighten it using an open-end wrench. Permissible tightening torques for pressure switch:

1/4" NPT: approx. 30 Nm; 1/2" NPT: approx. 70 Nm

3.8 Mounting steps for G1" cone connection

- 1 Screw the device into the mating thread by hand (seal produced metallically)
- 2 Then tighten it using an open-end wrench. Permissible tightening torques for pressure switch:
p_N < 10 bar: 30 Nm; p_N ≥ 10 bar: 60 Nm

3.9 Mounting steps for dairy pipe connections

- ✓ The O-ring is undamaged and seated in the designated groove.
 - ✓ Chapter "3.2 and/or 3.3" have been noticed. EHEDG conformity is only ensured in combination with an approved seal for codes M73, M75, M76. This is e.g.: ASEPTO-STAR k-flex upgrade seal by Kieselmann GmbH
- 1 Centre the dairy pipe connection in the counterpart.
 - 2 Screw the cup nut onto the mounting part.
 - 3 Then tighten it using a hook wrench.

3.10 Mounting steps for Clamp and Varivent® connections

- ✓ A suitable seal for the measured fluid and the pressure to be measured is available.
- ✓ Chapter "3.2 and/or 3.3" have been noticed. EHEDG conformity is only ensured in combination with an approved seal. This is e.g.: for Clamp connections - codes C61, C62, C63: T-ring seal from Combifit International B.V. for Varivent® connections - codes P40, P41: EPDM-O-ring which is FDA-listed

Note, that P40 can only be used for tank flanges.

- 1 Place the seal onto the corresponding mounting part.
- 2 Centre the clamp connection or Varivent® connection above the counterpart with seal.
- 3 Then fit the device with a suitable fastening element (e. g. semi-ring or retractable ring clamp) according to the supplier's instructions

3.11 Positioning of the display

	Danger of death from explosion - Do not open the housing while an explosion hazard exists!
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In order to ensure easy readability even when the device is installed in an awkward location, the display and operating module as well as the housing can be rotated into the desired position. Note rotation limits.

To rotate the display and operating module proceed as follows to change the position:

- Unscrew the housing cap by hand.
- Rotate the display and operating module carefully by hand into the desired position. The module is equipped with a turning limiter.
- Before screwing on the cap again, the o-ring and sealing surfaces of the housing have to be checked for damage and if necessary, have to be changed!
- Afterwards screw the housing cap on by hand and make sure that the housing is firmly locked again.

NOTE - Ensure that moisture cannot enter the device! The seals and sealing surfaces must not get dirty, as (depending on application and location) fouling can cause a reduced degree of protection and therefore lead to device failure or irreparable damage to the device.

4. Electrical connection

4.1 Connection and safety instructions

	Danger of death from electric shock or explosion - Explosion hazard if the operating voltage is too high (max. 28 V _{DC}). - Always mount the device in a depressurized and de-energized condition! - Do not install the device while there is a risk of explosion. - Operate the device only within the specification! (data sheet and EC-type examination certificate)
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- ✓ The limit values listed in the EC-type examination certificate are observed. (Capacity and inductance of the connection cable are not included in the values.)

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

- ✓ It was noted, that using the pressure switch in combination with a transmitter repeater with linear limit, the supply of the device could fall below the minimum when completely conducting the transmitter part. Please compare the specification of your transmitter repeater with the current data sheet of the pressure switch.

NOTE - for devices with cable outlet

- When routing the cable, following bending radiuses have to be complied with:

cable without ventilation tube:

static installation: 8-fold cable diameter

dynamic application: 12-fold cable diameter

cable with ventilation tube:

static installation: 10-fold cable diameter

dynamic application: 20-fold cable diameter

- In case of devices with **cable outlet** and integrated ventilation tube, the PTFE filter located at the cable end on the ventilation tube must neither be damaged nor removed! Route the end of the cable into an area or suitable connection box which is as dry as possible and free from aggressive gases, in order to prevent any damage.

- For a clear identification, the intrinsically safe cables are marked with light blue shrink tubing (over the cable insulation). If the cable has to be modified (e. g. shortened) and the marking at the cable end has been lost in the process, it must be restored (for example, by marking it again with light blue shrink tubing or an appropriate identification sign).

NOTE - Use a shielded and twisted multicore cable for the electrical connection.

4.2 Conditions for the IS-area

Danger generated by electrostatic charging

	Danger of death from explosion - Explosion hazard due to spark formation from electrostatic charging of plastic components. - For devices with cable, the cable must be installed tightly. - Do not clean the device and, if applicable, the connection cable, in a dry state! Use a moist cloth, for example.
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The following warning sign is affixed on devices with plastic components.

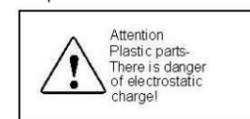


Fig. 2: Warning sign

NOTE - The warning sign must not be removed from the device!

Overvoltage protection

If the pressure switch is used as electrical equipment of category 1 G or 2 G, a suitable overvoltage protection device must be connected in series (attend the valid regulations for operating safety as well as EN60079-14).

Schematic circuit

The operation of an intrinsically safe device in intrinsic safe areas requires special care when selecting the necessary Zener barrier or transmitter repeater devices to be able to use the device's characteristics to the full extent. The following diagram shows a typical arrangement of power supply, Zener barrier and pressure switch.

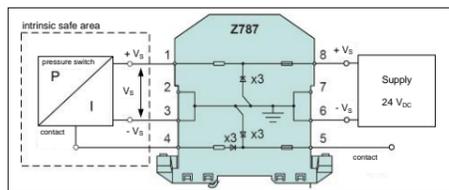


Fig. 3 Circuit diagram

Exemplary circuit description

The supply voltage of e. g. 24 V_{DC} provided by the power supply is led across the Zener barrier. The Zener barrier contains series resistances and Zener diodes as protective components. Subsequently, the operating voltage is applied to the pressure switch and, depending on the pressure, a particular signal current will flow.

Functional selection criteria for Zener barriers and galvanic power supply

The minimum supply voltage V_{S min} of the pressure switch must not fall short since a correct function of the device can otherwise not be guaranteed. The minimum supply voltage has been defined in the respective product-specific data sheet under "Analogue output (optional) / Supply".

When using a galvanically insulated amplifier with a linear bonding, please attend that the terminal voltage of the device will decrease like it does with a Zener barrier. Furthermore, it has to be attended that the supply of the pressure switch will also decrease with an optionally used signal amplifier.

Test criteria for the selection of the Zener barrier

In order not to fall below V_{S min} it is important to verify which minimum supply voltage is available at full level control of the pressure switch.

The technical data of the barrier will usually provide you with the information needed for the selection of the Zener barrier. However, the value can also be calculated. If a minimum supply of 16 V is assumed, then – according to Ohm's law – a particular voltage drop will result on the series resistance of the Zener barrier. If, for a pressure switch with PNP contact, the contact is also activated, the additional current flowing from the contact to the load resistor will also flow through the Zener barrier or the output of a transmitter repeater. The higher the load current, the lower the available minimum operating voltage. In the diagram shown, the maximum current can be calculated from the voltage difference (V_{ab Barrier max}) between input and output of the Zener barrier divided by the series resistance of the Zener barrier. The maximum signal current must be subtracted from this value. If the available residual current is smaller than the current required at the contact, either a different barrier or a higher supply voltage before the barrier should be chosen.

NOTE - When selecting the power supply, the maximum operating conditions according to the EC type-examination certificate must be observed. When assessing the power supply, please refer to their current data sheets to ensure that the entire interconnection of intrinsically safe components will remain intrinsically safe.

Calculation example for the selection of the Zener barrier

The nominal voltage of the power supply in front of the Zener barrier is 24 V_{DC} ± 2%. This results in:

- greatest supply voltage: V_{sup max} = 24 V * 1.02 = 24.48 V
- smallest supply voltage: V_{sup min} = 24 V * 0.98 = 23.52 V

The minimum supply can be taken from the data sheet. It is for example 16 V.

The series resistance of the Zener barrier is listed with 295 Ω. The maximum voltage drop at the Zener barrier may reach the following value:

$$V_{ab Barrier max} = 23.52 V - 16 V = 7.52 V$$

To ensure that this condition is observed, the maximum current may not exceed the following value:

$$I_{max} = 7.52 V : 295 \Omega = 25.49 mA$$

With pressure switches, the maximum current is made up of the sum of signal current and switching current. There are two approaches:

1. The measuring range of the pressure switch shall be utilized in the range 0...100%. A maximum signal current of 20 mA is thereby generated. Based on the facts above, the available residual current through the contact is calculated as follows:

$$I_{Res1} = 25.49 mA - 20 mA = 5.49 mA$$

2. The measuring range of a pressure switch at an analogue output of 4...20 mA shall only be used in a specific range of e. g. 0...70%. This results in a maximum signal current:

$$I_{signal max} = \Delta i * 0.7 + I_{offset} = 16 mA * 0.7 + 4 mA = 15.2 mA$$

$$(with \Delta i = 20 mA - 4 mA \text{ and } I_{offset} = 4 mA)$$

The available residual current through the contact amounts to:

$$I_{Res2} = 25.49 mA - 15.2 mA = 10.29 mA$$

Condition: I_{Res} ≥ I_{contact}

The switching current (current through the contact) may not exceed the determined residual current since this will impair the functionality of the device.

NOTE - The switching current must be determined separately by the user since it depends on the respective use case. The switching current can either be calculated or measured at the contact.

NOTE - Note that no line resistances have been listed in this calculation. However, these will lead to an additional voltage drop that must be taken into account.

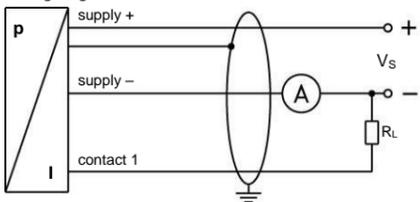
4.3 Electrical Installation

Establish the electrical connection of the device according to the technical data shown on the manufacturing label, the pin configuration and the respective wiring diagram shown in the data sheet.

Pin configuration

Electrical connections	M12x1, metal (5-pin)	cable colours (IEC 60757)
Supply +	1	WH (white)
Supply -	3	BN (brown)
Contact 1	4	GY (grey)
Shield	plug-housing / pressure port	GNYE (green/yellow)

Wiring diagram



5. Commissioning

DANGER

Danger of death from explosion, airborne parts, leaking fluid, electric shock

- Explosion hazard if the operating voltage is too high (max. 28 V_{DC})!
- Operate the device only within the specification! (according to data sheet and EC-type examination certificate)

- ✓ The device has been installed properly.
- ✓ The device does not have any visible defect.

6. Operation

6.1 Display and operating module

DANGER

Danger of death from explosion

- Explosion hazard when device is opened in an explosive atmosphere.
- Do not open or configure the device while an explosion hazard exists!
- After configuration it must be ensured that the device is completely closed again outside the explosion hazard area.

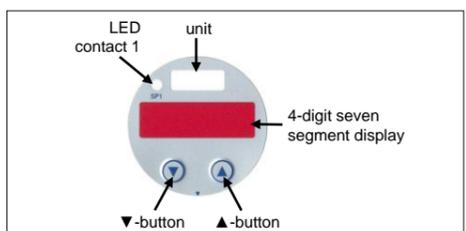


Fig. 4 Touchpad

The device has, according to the order max. one LED which is allocated to the contact. The LED will light up when the 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

	<ul style="list-style-type: none"> • 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
	<ul style="list-style-type: none"> • 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

To configure the device, unscrew the housing cap by hand.

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

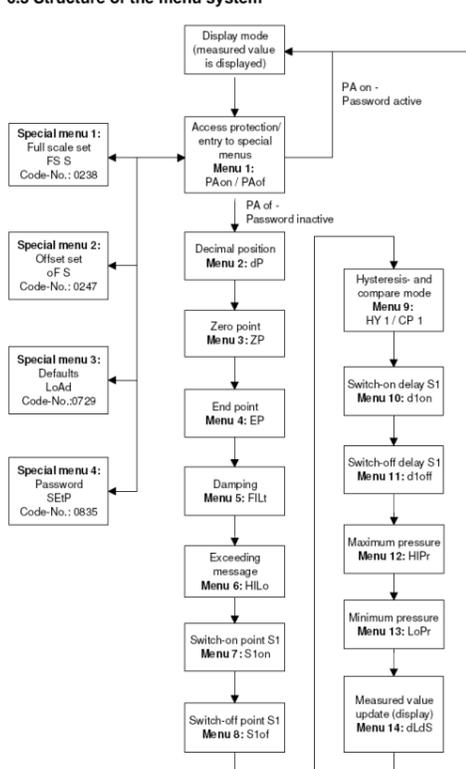
Before screwing on the cap again, the o-ring and sealing surfaces of the housing have to be checked for damage and if necessary, have to be changed! Afterwards screw the housing cap on by hand and make sure that the housing is firmly locked again.

NOTE - Ensure that moisture cannot enter the device! The seals and sealing surfaces must not get dirty, as (depending on application and location) fouling can cause a reduced degree of protection and therefore lead to device failure or irreparable damage to the device.

6.2 Configuration

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 Structure of the menu system



6.4 Menu list

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
ZP	menus 3 and 4 – set zero point / end point the device has been configured correctly before delivery, so a later setting 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)
HI.Lo	menu 6 – exceeding message set "on" or "off"
S1on	menu 7 – set switch-on point set the values, for the activation of contact 1
S1of	menu 8 – set switch-off point set the values, for the deactivation of contact 1
HY 1 CP 1	menu 9 – select hysteresis or compare mode select hysteresis mode (HY 1) or compare mode (CP 1) for contact 1
d1on	menu 10 – set switch-on delay set the value of the switch-on delay after reaching contact 1 (0 up to 100 sec permissible)
d1of	menu 11 – set switch-off delay set the value of the delay after reaching switch-off point 1 (0 up to 100 sec permissible)
HI Pr Lo Pr	menu 12 and 13 – maximum / minimum pressure display view high pressure (HI Pr) or low pressure (Lo Pr) 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 14 – 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

7. Maintenance

DANGER

Danger of death from explosion, airborne parts, leaking fluids, electric shock

- Working on supplied (active) parts, except for intrinsically safe circuits, is principally prohibited during an explosion hazard!
- 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.

During the cleaning processes, note the compatibility of the cleaning media used in combination with the media-wetted materials of the pressure measuring devices. Permissible concentrations and temperatures must be observed. Verification/validation by the user is essential.

For EHEDG certified devices in tanks, the cleaning device must be positioned in such a way that the sensor is directly assessed and wetted for cleaning. The device has been developed for Cleaning in Place (CIP) applications and must not be dismantled for cleaning.

Deposits or contamination may occur on the diaphragm/ pressure port in case of certain media. Depending on kind and quality of the process, suitable cyclical maintenance intervals must be specified by the operator. As part of this, regular checks must be carried out regarding corrosion, damage of diaphragm/seal(s) and signal shift. A periodical replacement of the seal(s) may be necessary.

If the diaphragm is calcified, it is recommended to send the device to BD|SENSORS for decalcification. Please note the chapter "Service / repair" below.

NOTE - Wrong cleaning or improper touch may cause an irreparable damage on the diaphragm. Therefore, never use pointed objects or pressured air for cleaning the diaphragm.

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.

NOTE - After dismantling, mechanical connections must be fitted with protective caps.

9. Service / repair

Information on service / repair:

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

9.1 Recalibration

During the life-time of a device, the value of offset and span may shift. As a consequence, a deviating signal value in reference to the nominal pressure range starting point or end point may be transmitted. If one of these two phenomena occurs after prolonged use, a recalibration is recommended to ensure further more high accuracy.

9.2 Return

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.

EU-Konformitätserklärung
EU Declaration of Conformity

BD|SENSORS GmbH erklärt hiermit in alleiniger Verantwortung, dass die Produkte BD|SENSORS GmbH declares on its own responsibility that the products

DS 101P; DS 200; DS 200P; DS 201; DS 201P; DS 202; DS 210; DS 214; DS 217; DS 226; DS 230; DS 233; DS 300; DS 300P; DS 301; DS 302; DS 320; DS 350; DS 360P; DS 381; DS 400; DS 400P; DS 401; DS 401P; PA 430

mit den aufgeführten Richtlinien und Normen übereinstimmen.
Full the below mentioned requirements and standards.

2014/53/EU (ATEX) EN 61326-1:2013

2011/65/EU (RoHS) EN 60779-1:2012

Für Geräte mit Ex-Zulassung
For devices with Ex approval

<small>2014/34/EU (ATEX)</small>	<small>AX14-DS 200; AX14-DS 200P; AX14-DS 201; AX14-DS 201P; AX14-DS 202; AX14-DS 210; AX14-DS 214; AX14-DS 217; AX14-DS 230; AX14-DS 400; AX14-DS 400P; AX14-DS 401; AX14-DS 401P; AX14-PA 430</small>
<small>IECEx IATEx 1050 X</small>	<small>EN IEC 60779-1:2012, EN 60779-11:2012</small>
<small>Benannte Stelle / Kennnummer Notified body / identification number:</small>	<small>IEBU Institut für Sicherheitstechnik GmbH / 0637</small>
<small>IEBU IATEx 0013</small>	<small>EN ISO/IEC 60779-34:2012</small>
<small>Benannte Stelle / Kennnummer Notified body / identification number:</small>	<small>IEBU Institut für Sicherheitstechnik GmbH / 0637</small>

In Erfüllung der Druckgeräterichtlinie 2014/68/EU und als Ergebnis des darin geforderten Konformitätsbewertungsverfahrens wird folgendes Modul gewählt.
In accordance to the Pressure Equipment Directive 2014/68/EU and as result of therein demanded conformity assessment procedure the following module has been chosen.

Für Geräte mit maximal zulässigem Überdruck > 200 bar
For devices with maximum permissible overpressure > 200 bar:

<small>Bewertungsverfahren Modul A Assessment procedure Module A</small>	
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Therstein, 2020-09-18

(Signature)

D. Saranero
Leiter Konstruktion
Mechanical Design Manager

(Signature)

M. Martin
Leiter Elektrische Entwicklung
Electrical Design Manager