Operating Manual

Electronic Pressure Switch

DS 350, DS 350P, DS 351

CE

IO-Link

RoHS   REACH

DS 350P:

3 74-07   CERTIFIED EHEDG

**READ THOROUGHLY BEFORE USING THE DEVICE
KEEP FOR FUTURE REFERENCE**
ID: BA_DS35X_E | Version: 03.2022.0

1. General and safety-related information on this operating manual

This operating manual enables safe and proper handling of the product, and forms part of the device. It should be kept in close proximity to the place of use, accessible for staff members at any time.

All persons entrusted with the mounting, installation, putting into service, operation, maintenance, removal from service, and disposal of the device must have read and understood the operating manual and in particular the safety-related information. **Complementary to this operating manual the current data sheet has to be adhered to.**

Download this operating manual by accessing *www.bdsensors.com* or request it: info@bdsensors.de | phone: +49 (0) 92 35 / 98 11 0

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

1.1 Symbols used

Warning word	Meaning
⚠ **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 electronic pressure switch DS 35X is used to detect a pressure and can output actions via the various interfaces. The integrated display facilitates the handling of the device. The DS 35X is equipped with an IO-Link interface to exchange process data, diagnostic and status messages with a higher-level control system. Parameterization is carried out either via the VDMA-compliant menu system, which can be operated locally using two buttons or via the control level. The electronic pressure switches DS 35X are designed for use in machine tools, hydraulic and pneumatic plants.

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.

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 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 it.

1.4 Incorrect use

⚠ **WARNING**	**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. - BD|SENSORS is not liable for damage caused by improper or incorrect use.

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 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
- for DIN 3852, external thread: O-Ring (pre-mounted)
- this operating manual

1.8 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 is to 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 order code. The most important data can be gathered therefrom.
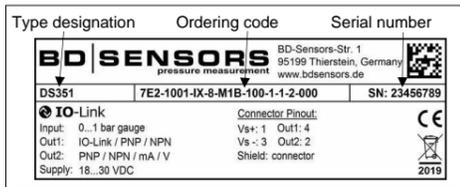
Type designation	Ordering code	Serial number

BD|SENSORS
pressure measurement
BD-Sensors-Str. 1
95199 Thierstein, Germany
www.bdsensors.de

DS351   7E2-1001-IX-8-M1B-100-1-1-2-000   SN: 23456789

IO-Link
Input: 0...1 bar gauge
Out1:   IO-Link / PNP / NPN
Out2:   PNP / NPN / mA / V
Supply: 18...30 VDC

Connector Pinout:
Vs+: 1   Out1: 4
Vs -: 3   Out2: 2
Shield: connector

CE   2019

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

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

NOTE - The display and the plastic housing are equipped with a rotation limiter. Please do not attempt to overtighten the display or the housing by applying increased force.

NOTE - Never use the display as a mounting / dismounting aid, otherwise the device may be irreparably damaged. For mounting or dismounting the device, only use the hexagon on the pressure port.

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

NOTE - The measuring point has to 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 at 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 and 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!
- 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, which can then damage the device or affect its ability to function correctly. If the internal pressure in the device rises, this could also cause temporary measurement errors.

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 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:
   - Wrench flat made of steel:
     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
   - Wrench flat made of plastic: max. 3 Nm

3.5 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 $R_{p0.2} \geq 190$ N/mm²
G1/2" EN 837	p ≤ 1000 bar	
G1/4" EN 837	p > 600 bar, p ≤ 1000 bar	counterpart has to be of steel according to DIN 17440 with strength $R_{p0.2} \geq 260$ N/mm²
G1/2" EN 837	p > 1000 bar, p ≤ 1600 bar	

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

3.6 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

3.7 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

3.8 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 clamp with a suitable fastening element (e. g. semi-ring or retractable ring clamp) according to the supplier's instructions

3.9 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.

-210°
+100°

±170°

Fig. 2 Display module

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

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.
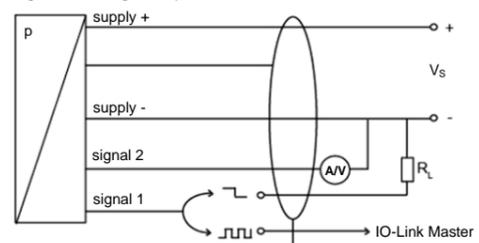
Pin configuration M12x1 (4-pin):

| Electrical connections	Description	M12x1 (4-pin)
Supply +	supply	1
Supply –	supply	3
Output signal 1	IO-Link / SIO (PNP / NPN)	4
Output signal 2	4 … 20 mA – 3-wire / 0 …10 V – 3-wire (PNP / NPN)	2
Shield	shielding	plug housing

Wiring diagrams:

3-wire-system / configuration of analogue output:
signal 1: IO-Link or contact
signal 2: analogue output

3-wire-system / configuration of contact:
signal 1: IO-Link or contact
signal 2: contact
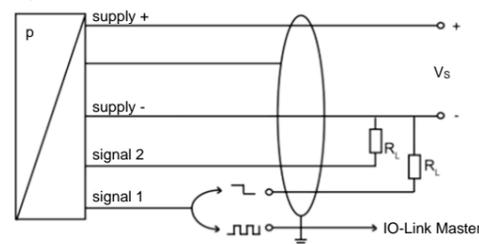
5. Commissioning

⚠ **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

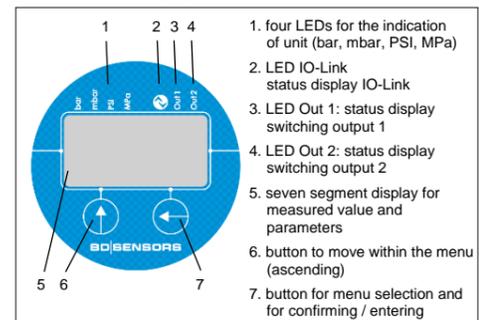1. four LEDs for the indication of unit (bar, mbar, PSI, MPa)
2. LED IO-Link status display IO-Link
3. LED Out 1: status display switching output 1
4. LED Out 2: status display switching output 2
5. seven segment display for measured value and parameters
6. button to move within the menu (ascending)
7. button for menu selection and for confirming / entering

Fig. 3 Touch pad

LED status in normal mode		
LED IO-Link	on	IO-Link active (while master-slave operation)
	off	IO-Link inactive (without master-slave operation)
LED Out 1	on	switching point 1 reached, switching output active
	off	switching point 1 not reached
LED Out 2	on	switching point 2 reached, switching output active
	off	switching point 2 not reached

Button functions		
⬆	short press	scroll from menu 1 to menu 5, and then back to the display
	long press	rapidly increment parameter value
⬅	short press	select the menu item within a menu
	long press	apply the set parameter and return to the current menu item
⬆⬅	press both buttons simultaneously	return to the display

The device is configured according to VDMA 24574-1.
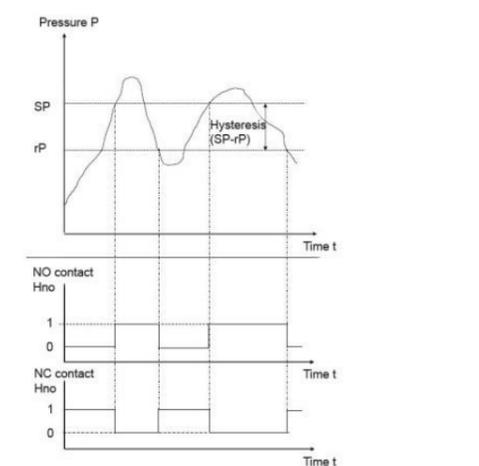
6.2 Switching / resetting behaviour

Fig. 4 Switching and resetting behaviour for hysteresis function in pressure-time graph
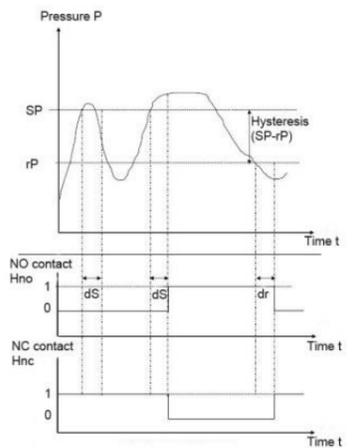
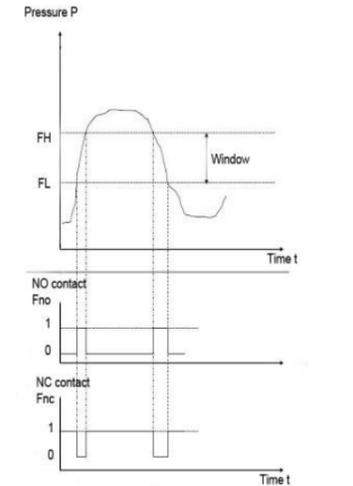*Fig. 5 Switching and resetting delay for hysteresis function in pressure-time graph*

Fig. 6 Switching and resetting behaviour for window function in pressure-time graph

6.3 Menu list

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

Display (the firmware version e. g. n011 will appear for about 1 second in the display after starting up the device)	
First menu level (display)	
SP1 / SP2 **FH1 / FH2** menu: **1 and 3**	**Set switch-on points** Set the particular values, for the activation of switching point 1 and 2. If the window function is enabled in menu 5/6 and 5/7 the value of the switch-on point is the upper pressure limit of the window (**F**enster**H**igh).
rP1* / rP2* **FL1 / FL2** menu: **2 and 4**	**Set switch-off points** Set the particular values, for the deactivation of switching point 1 and 2. If the window function is enabled in menu 5/6 and 5/7, the switch-off point of the contact is the lower pressure limit of the window (**F**enster**L**ow).
ASt2/AEn2 ***additional menu**	only if output signal 2 is active (5/17) analogue output 2 (possibility to change ± 5% at start value and 90% -100% at end value of measuring range)
EF menu: **5**	**Extended functions** (pass to menu level two)
Second menu level	
rES menu: **5/1**	**Reset** restores all settable parameters to their delivery state and deletes the minimum and maximum values
dS 1 / dS 2 menu: **5/2 and 5/4**	**Set switch-on delay** set the particular values, for the activation of switch-on point1 and 2 (setting range: 0.0 ... 50.0 sec)
dr 1 / dr 2 menu: **5/3 and 5/5**	**Set switch-off delay** set the particular value of the delay after reaching the switch-off point 1 and 2 (setting range: 0.0 ... 50.0 sec)
ou1 / ou2 menu: **5/6 and 5/7**	**Set contacts 1 and 2** switching function of the contacts: Hno = hysteresis function, normally open Hnc = hysteresis function, normally closed Fno = window function, normally open Fnc = window function, normally closed
Uni menu: **5/8**	**Change unit** selects the physical units for the displayed and set pressure values: bAr = bar nnBa = mbar PSi = PSI mPA = MPa
FLIP menu: **5/9**	**Rotation of display view to 180°**
Lo menu: **5/10**	**Min. value** (only display) displays the minimum pressure that was recorded during the measurement period (the value is lost if the voltage supply is interrupted)
Hi menu: **5/11**	**Max. value** (only display) displays the maximum pressure that was recorded during the measurement period (the value is lost if the voltage supply is interrupted)
---- menu: **5/12**	**Delete min. and max. values** the execution of the value deletion process is confirmed on the display
SEt0 menu: **5/13**	**Zero point adjustment** corrects the zero point of the display and the analogue output signal by up to ± 3 % of the nominal pressure range
dAP menu: **5/14**	**Measurement damping** sets the value for damping (0...1000 msec in 10 msec steps)
codE menu: **5/15**	**Access protection** sets the password for protecting access to the menu 0000 = no password (deactivated) setting range 1111 ... 9999 (activated) To reset the password, contact BD|SENSORS.
o1 menu: **5/16**	**Output signal 1** switching option between PNP and NPN function
o2 menu: **5/17**	**Output signal 2** switching option between PNP or NPN function, 4 … 20 mA and 0 … 10 V
hcnt menu: **5/18**	**Device operating hours counter in [h]**
Pcnt menu: **5/19**	**Device operating peaks counter**
Display	

6.4 Default settings

Menu item	Description	Factory setting	Own setting
menu 1 **SP1 / FH1**	switch-on point 1 / window high 1	80 % of nominal pressure	
menu 2 **rP1 / FL1**	switch-off point 1 / window low 1	75 % of nominal pressure	
menu 3 **SP2 / FH2**	switch-on point 2 / window high 2	80 % of nominal pressure	
menu 4 **rP2 / FL2**	switch-off point 2 / window low 2	75% of nominal pressure	
menu 5:2 **dS1**	switch-on delay 1	0.0 sec	
menu 5:3 **dr1**	switch-off delay 1	0.0 sec	
menu 5:4 **dS2**	switch-on delay 2	0.0 sec	
menu 5:5 **dr2**	switch-off delay 2	0.0 sec	
menu 5:6 **ou1**	switching function of contact 1	Hno	
menu 5:7 **ou2**	switching function of contact 2	Hno	
menu 5:8 **Uni**	unit	bar	
menu 5:14 **dAP**	damping	0 msec	
menu 5:15 **codE**	password	0000	
menu 5:16 **o1**	output signal 1	PNP	
menu 5:17 **o2**	output signal 2	PNP	

7. Setting of offset and full scale

Nominal pressure	Offset ± 5%		Full scale 90% - 100%	
	min.	max.	min.	max.
0 … 10 bar	-0.5 bar	+0.5 bar	9 bar	10 bar
-1 … 50 bar	-1 bar	+1.55 bar	44.9 bar	50 bar
0 … 400 bar	-1 bar	+ 20 bar	360 bar	400 bar

8. 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.

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.

9. 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 dismounting, mechanical connections must be fitted with protective caps.

10. Service/repair

Information on service / repair:

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

10.1 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 furthermore high accuracy.

10.2 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!

11. 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!

12. 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.

13. 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.

14. IO-Link interface

14.1 General device information

Baud rate	COM 2 (38.4 kbit/sec)
Input process data length	2 bytes
Minimum cycle time	5 msec
IO-Link version	V 1.1 (backward compatible V1.0)
SIO mode	yes

14.2 SIO mode (standard IO mode)

In this mode the sensor operates like a normal pressure sensor with standard output signals. The digital output is always on pin 4 (Output 1) of the M12 connector plug. Depending on the design, pin 2 (Output 2) can be an analogue or an additional digital output.

14.3 IO-Link mode (communication mode)

The pressure sensor switches to the IO-Link communication mode, if it operates under an IO-Link master. IO-Link communication is only possible via pin 4 of the M12 connector plug.

14.4 Process data

The process data length of the sensor is 16 bits. The switching states (BCD1 and BCD2) as well as the current measured values are transmitted. The 14 bits of the measured value are scaled according to the measuring range.

15 bit	14…2	1	0
Signed bit	Measured value	BDC2 / Output 2	BDC1 / Output 1

NOTE - Please note the bit sequence, otherwise there will be a misinterpretation of the process value.

14.5 Error codes

Error code	Description
0x8011	Index not available
0x8012	Subindex not available
0x8023	Access denied
0x8030	Parameter value out of range
0x8033	Parameter length overrun
0x8034	Parameter length underrun

14.6 Event codes

	Event codes for IO-Link 1.1	Event codes for IO-Link 1.0	Device status	Type
No malfunction	0x0000	0x0000	0	Notification
General malfunction Unknown error	0x1000	0x1000	4	Error
Process variable range overrun Process data uncertain	0x8C10	0x8C10	2	Warning
Process variable range underrun Process data uncertain	0x8C30	0x8C10	2	Warning

14.7 Parameter data

The parameter data for the pressure sensor correspond to the Smart Sensor profile (V1.0).

Index hex	Subindex hex	Object name	Single value				Default	Comment
0x02	0x00	System commands	0x81 = Delete min/max value 0x82 = res 0xA0 = Set0					The action is executed by writing in the subindex
0x03	0x00	Data Storage Index	0x01: Upload Start 0x02: Upload End 0x03: Download Start 0x04: Download End 0x05: Data Storage Break					
0x0C	0x00	Device Access Lock	0x00: Unlocked 0x01: Parameter access - Lock 0x02: Data Storage - Lock 0x04: Local parameterization - Lock 0x08: Local user interface - Lock 0x03: Parameter access & Data Storage - Lock 0x05: Parameter access & Local parameterization - Lock 0x09: Parameter access & Local user interface - Lock 0x06: Data Storage & Local parameterization - Lock 0x0A: Data Storage & Local user interface - Lock 0x07: Data Storage & Parameter access & Local parameterization - Lock 0x0B: Data Storage & Parameter access & Local user interface - Lock				0x00: Unlocked	
0x24	0x00	Device status	0x00 Device is operating properly 0x02 Out-of-Specification 0x04 Failure					
0x3D	0x01	SwitchPoint Logic 1	0x00: Value as specified					
0x3D	0x02	SwitchPoint Mode 1	0x80: Hysteresis NO 0x81: Hysteresis NC	0x82: Window NO 0x83: Window NC			0x80: HNo	
0x3D	0x03	SwitchPoint Hysteresis 1	0x0000: No Hysteresis					
0x3F	0x01	SwitchPoint Logic 2	0x00: Value as specified					
0x3F	0x02	SwitchPoint Mode 2	0x80: Hysteresis NO 0x81: Hysteresis NC	0x82: Window NO 0x83: Window NC			0x80: HNo	
0x3F	0x03	SwitchPoint Hysteresis 2	0x0000: No Hysteresis					
0x93	0x00	SwitchPoint Typ 1	0x01 – NPN Output 0x00 – PNP Output					
0x97	0x00	SwitchPoint Typ 2	0x01 – NPN Output 0x00 – PNP Output	0x02 – 0 … 10 V Output 0x03 – 4 … 20 mA				
0xD4	0x00	Unit	0x00 bar 0x01 mbar 0x02 PSI 0x03 MPa				0x00: bar	Pressure units for the display are changed; the IO-Link process data are not changed

Index hex	Subindex hex	Object name	Access	Length	Value Range	Gradient	Unit	Default
0x3C	0x01	SetPoint 1 = SP1	R/W	2 Byte	Process Data			100%
0x3C	0x02	SetPoint 2 = rP1	R/W	2 Byte	Process Data			0%
0x3E	0x01	SetPoint 1 = SP2	R/W	2 Byte	Process Data			100%
0x3E	0x02	SetPoint 2 = rP2	R/W	2 Byte	Process Data			0%
0x52	0x00	Temperature	R	2 Byte	-40 … 150	1	°C	0
0x57	0x00	Operating hours	R	4 Byte	0 … 4294967295	1	h	0
0x60	0x00	Password	W	2 Byte	0000 … 9999			0
0x98	0x00	Pressure peaks	R	4 Byte	0 … 4294967295	1		0
0xD0	0x00	Delay Switching Time 1	R/W	2 Byte	0 … 500	0.1	sec	0
0xD1	0x00	Delay Back Switching Time 1	R/W	2 Byte	0 … 500	0.1	sec	0
0xD2	0x00	Delay Switching Time 2	R/W	2 Byte	0 … 500	0.1	sec	0
0xD3	0x00	Delay Back Switching Time 2	R/W	2 Byte	0 … 500	0.1	sec	0
0xD5	0x00	Min Pressure Value	R	2 Byte	Process Data			
0xD6	0x00	Max Pressure Value	R	2 Byte	Process Data			
0xD7	0x00	Measure damping	R/W	2 Byte	0 … 1000 in 10 msec steps	1	msec	0
0x0010	0	Get Vendor Name	R	64 Byte	Process Data			
0x0011	0	Get Vendor Text	R	64 Byte	Process Data			
0x0012	0	Get Product Name	R	64 Byte	Process Data			
0x0013	0	Get Product ID	R	64 Byte	Process Data			
0x0014	0	Get Product Text	R	64 Byte	Process Data			
0x0015	0	Get Serial Number	R	64 Byte	Process Data			
0x0016	0	Get Hardware Revision	R	64 Byte	Process Data			
0x0017	0	Get Software Revision	R	64 Byte	Process Data			