

BD SENSORS®

Operating instructions for Pressure sensor, PCB+ type, three wires

Description

Pressure sensors of the PCB+ type are used to measure very small pressures (relative and differential ones). The measured pressure is sensed by a semiconductor strain-gauge sensor or a ceramic capacitive sensor. The sensors are designed for gases. In case of a semiconductor sensor, gases have to be non-aggressive and dry. The sensors are adjusted at the factory. The sensors are not manufactured in the EX design.

Selected technical parameters:

Pressure ranges:	0.6 kPa to 100 kPa		
Accuracy:	0.5% (1%) of range according to range and type of used sensor		
Supply voltage range:	19 to 31 VDC or 230 V / 50Hz (optional)		
Max. power consumption:	1.2 VA, replaceable internal fuse T32 mA		
Influence of supply voltage on accuracy:	max 0.05% of range / 10 V		
Output signal:	0 to 10 V	three-wire	load min. 1 MΩ (standard)
	0 (4) to 20 mA	three-wire	load max. 500 Ω
Influence of load resistance:	max. 0.05% / 500 Ω.		
Power polarity reversal resistance and short circuit resistance at the output:	permanent.		

	<u>semicond. sensor</u>	<u>capacit. sensor</u>	
Operating range of temperatures:	-20°C to 70°C	0°C to 60°C	(DC power supply 119 to 31 V)
	-20°C to 50°C	0°C to 50°C	(AC power supply 230 V / 50 Hz)
Compensated range of temperatures:	0°C to 60°C	10°C to 40°C	

Influence of temperature in the compensated range of temperatures

- a. zero: 0.1 ... 1.8% / 10°C depends on the pressure range and the sensor type
- b. range: 0.1 ... 1.8% / 10°C depends on the pressure range and the sensor type

Switching of limits, only for versions with display:

- a. the number of limits: 1 to 2
 - b. output: 1 switching contact, load capacity 5A / 230V AC
- Material of the box: ABS

Fig. 1 Mechanical dimensions:

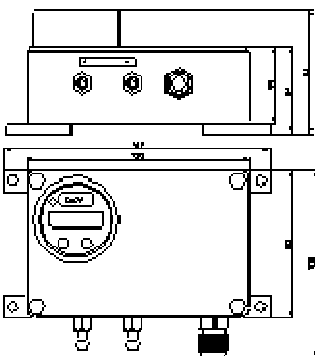
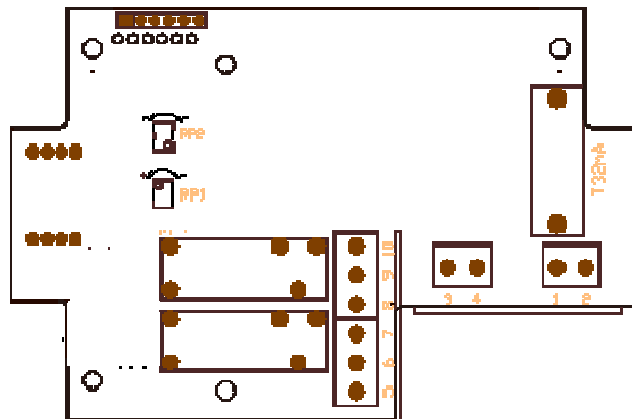


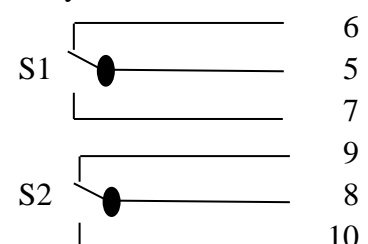
Fig. 2: Location of terminal blocks on the printed circuit board
(view with the removed cover of the sensor in a vertical position)



Power supply

230V / 50Hz:	L: 1
	N: 2
19 ... 31 VDC:	+U: 2
	0: 4
	Output +: 3
	Output -: 4

Relay contacts:



Mechanical assembly

The sensor should be fixed using four clips on the housing. The sensor cannot be placed in an immediate proximity of interference sources (transformers, transmitters, motors) and heat sources. Shocks or vibrations at the installation site can cause an error. Correctly, the sensor has to be mounted in a vertical position (pressure inlets oriented down). In this position, the sensors are adjusted at the factory. This position prevents a condensate from the penetration into the sensor. **WARNING!** Prior to mounting, make sure that there is no liquid in the threaded insert of the closed valve. Remaining liquid has to be removed properly. The sensor cannot be mounted if there is liquid in the thread.

Connection of the measured pressure (using 1/4" hose)

The higher pressure is connected to the "+" inlet, the lower pressure to the "-" inlet. In case of a risk of water vapor condensation, condensation loops have to be created on the hoses. The version of the sensor for measuring the relative pressure includes only a single inlet. Blowing into pressure inlets is not allowed. Sensors to be used up to 100 mbar can be damaged or destroyed by air pressure from lungs.

Commissioning

Remove the cover of housing. Connect electrical power using the connection terminals (see Fig. 2). Thread the outlets through the cable gland. The sensor is equipped with the polarity reversal protection.

! The version with 230 V / 50 Hz power supply may only be connected by an authorized person according to the notice No. 50/78 Coll. §6 and above!

The 230 V / 50 Hz power supply has to be connected using a cable VM05VV-F 2 x 0.75mm² or equivalent. The same type of the cable or the equivalent one with the cross-section of 0.75 mm² has to be used also for switching outputs when 230 V / 50 Hz is switched. The power supply has to be connected through a 6A circuit breaker serving for the disconnection.

Outlets have to be threaded through cable glands. For 230V / 50Hz power supply, a separate cable and a separate cable gland (the first one from the right) have to be used. A separate cable gland (the first one from the left) has to be also be used for outputs of switching levels if 230 VAC is switched.

The third cable gland (the bottom center one) is used for the output signal. After removing the outer insulation of the cable, separate wires have to be threaded through the appropriate catch loops forward to the terminal board. This is unconditionally true for all the wires of the version with 230 V / 50 Hz supply or even where only the switching outputs are connected to 230 V / 50 Hz.

Display

The display shows data in pressure units or according to user's request. The user can adjust the range of the display.

After switching on, the output signal can be measured. When changing the output signal, two circumstances have to be taken into account.

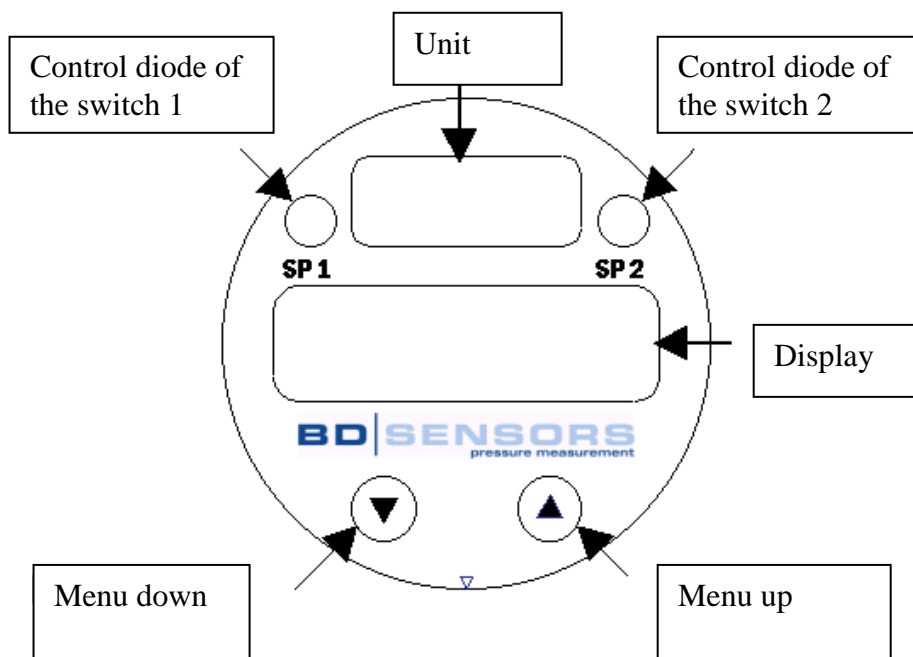
- 1) The starting time is 5 minutes. After that time, the output signal has to be stable at the zero differential pressure and the constant temperature.
- 2) For measuring ranges below 100 mbar, the shift of zero occurs due to the change of the sensor position. After passing the starting time, the error can be reset by the zero-setting potentiometer RP1.

Settings

In general

When designing the display, a simple operation and a customer control were primarily emphasized. Particular functions are set by two buttons on the front side via the system of menus. The settings are permanently saved in the Flash-EPROM memory and can be password-protected against an unauthorized manipulation. The indicator of measured values (or individual menus) comprises a four-digit seven-segment display with the height of digits being 7.62 mm.

Location of control elements and the display:



Unit

The unit of the quantity to be displayed has to be selected when ordering the display. Later, the unit can be changed using the supplied self-adhesive stickers with the units.

Displaying status of the switch

A LED diode is used to display the status of the switch. The diode shines if the switching point is reached and the switching output is switched on.

Displaying measured values and adjusting display functions

A four-digit display is used to display the measured value and to adjust functions. The measured value is displayed in units defined by the user and depends on the range and adjusted settings.

Control elements for setting the functions

For the control, two buttons located under a foil can be used. The user moves forward in the menu or increases the values on the display by the "▲" button. The "▼" button is used to decrease the values and to move backward in the menu.

The menu system is closed. By scrolling the particular menu items forward and backward, the desired set-point can be achieved.

If the buttons are pressed for a longer time (> 5 seconds), the rate of change of the value on the display is gradually increased in two steps.

By simultaneous pressing of both the buttons,

- the display mode is changed to the configuration mode
- the adjusted value is saved
- the display is returned to the display mode

☞ **ATTENTION: Change of adjusted parameters** (switching point, hysteresis, etc.) becomes effective after returning to the display mode.

Calibration of the lower limit of the display using a reference

During the lifetime of the pressure sensor, the lower limit may shift. The lower limit of the display is calibrated for the value of 0 mA or 4 mA (or 0 V in the version 0 ... 10 V). Therefore, the value on the display can differ from the adjusted beginning of the measuring range.

For the calibration, a pressure reference has to be used.

The PAof in the menu should be selected. Both the buttons should simultaneously be pressed.

- The number 0247 should be entered to select the special function.
- Both the buttons should be pressed simultaneously again. The following value appears on the display:

of 5

- Now, the pressure sensor has to be pressurized via the pressure reference. The pressure has to correspond to the lower limit of the measuring range.
- When both the buttons are pressed again, the output signal of the sensor is saved as the lower limit. From this moment, the entry adjusted as the beginning of the measuring range appears on the display, although the sensor signal is shifted.

⚠ **ATTENTION:** Please note that the output signal of the converter remains unaffected by this change.

Calibration of the upper limit of the display using a reference

During the lifetime of the pressure sensor, the upper limit may shift. The upper limit of the display is calibrated for the value of 20.000 mA (or 10 V in the version 0 ... 10 V). Therefore, the value on the display can differ from the adjusted end of the measuring range.

- The PAof menu should be selected.
- Both the buttons should simultaneously be pressed.
- The number 0238 should be entered to select the special function.
- Both the buttons should be pressed simultaneously again. The following value appears on the display:

FS 5

- Now, the pressure sensor has to be pressurized via the pressure reference. The pressure has to correspond to the upper limit of the measuring range.
- When both the buttons are pressed again, the output signal of the sensor is saved as the upper limit. From this moment, the entry adjusted as the end of the measuring range appears on the display, although the sensor signal is shifted.

⚠ **ATTENTION:** Please note that the output signal of the converter remains unaffected by this change.

Return to factory calibration

The control system of the display is equipped with the ability to restore the factory calibration. That way, all the calibrations performed by the user are canceled.

- To load the factory adjustment, the PAof in menu should be selected.
- Then, both the buttons should be pressed.
- The number 0729 should be entered to select the special function.
- Both the buttons should be pressed simultaneously again. The following value appears on the display.

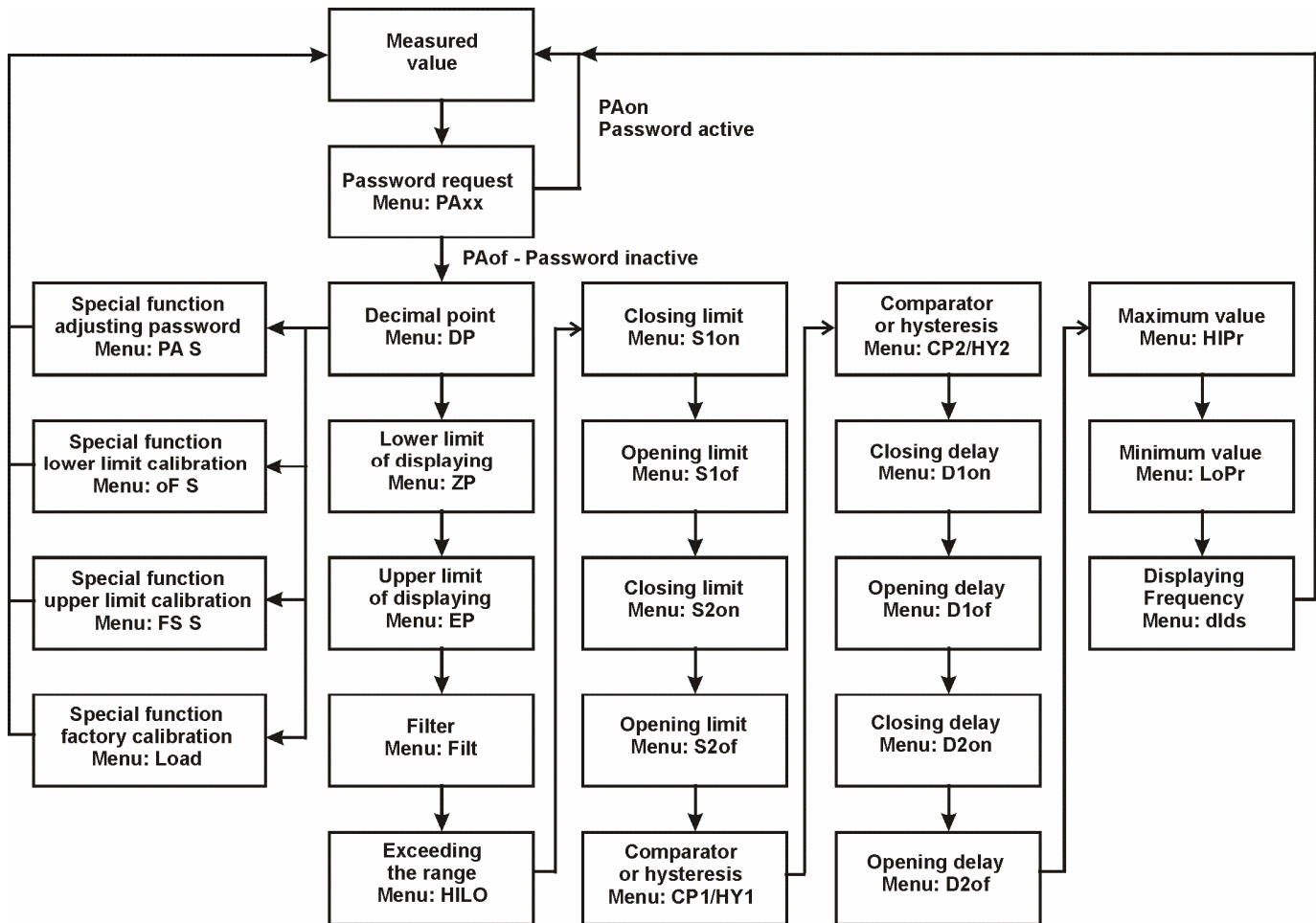
Load

- If both the buttons are simultaneously pressed again, the factory adjustment is activated again.

Restrictions on entering a password

⚠ **ATTENTION:** Due to special functions, the numbers 0247, 0238, 0729 cannot be used for the password.

Structure of the menu



Adjustment of password protection - password active

PAon

If the password is activated, the user is asked after pressing both the control buttons for the password to make settings in the menu system.

Adjustment of the password protection - password inactive

PAof

If not activate, the password can be activated by pressing both the buttons simultaneously and entering a predetermined secret number. In factory setting, 5 is the corresponding number. To change this number, both the buttons should be pressed simultaneously. Then, the number 0835 should be adjusted. Afterwards, both the buttons should be pressed simultaneously again, and the password within 0 and 9999 should be adjusted by buttons. The number is confirmed by pressing both the buttons simultaneously. That way, the new password is adjusted. To activate password protection, both the buttons should be simultaneously pressed and the password can be adjusted. Then, both the buttons should be pressed simultaneously again.

Adjustment of decimal point

DP

After pressing of both the buttons simultaneously, position of the decimal point can be adjusted. The desired position can be selected using "▲" or "▼" buttons. Pressing both the buttons simultaneously, the settings are closed.

Adjustment of zero

Pressing both the buttons simultaneously, the lower limit of the range can be adjusted. The adjusted value appears on the display when the output signal of the sensor is 4 mA / 0 V. Pressing both the buttons simultaneously, the settings are saved.

Adjustment of the upper limit of the range

Pressing both the buttons simultaneously, the upper limit of the range can be adjusted. The adjusted value appears on the display when the output signal of the sensor is 20 mA / 10 V. Pressing both the buttons simultaneously, the settings are saved.

Adjustment of attenuation (filter)

After pressing both the buttons simultaneously, the time interval of the attenuation can be adjusted. The range of the adjustment is from 0.3 to 30 seconds. Pressing both the buttons simultaneously, the settings are saved.

Activation of report about exceeding the range

After pressing both the buttons simultaneously, the report about exceeding the lower or upper limit of the range can be activated. The status "ON" or "OFF" can be selected. Pressing both the buttons simultaneously, the settings are saved.

Adjustment of the closing limit of the switch 1

After pressing both buttons simultaneously, the closing value of the switch 1 can be adjusted. Pressing both the buttons simultaneously, the settings are closed.

Adjustment of the opening limit of the switch 1

After pressing both the buttons simultaneously, the opening of the switch 1 can be adjusted. Pressing both the buttons simultaneously, the settings are saved.

Adjustment of the closing limit of the switch 2

After pressing both buttons simultaneously, the closing value of the switch 1 can be adjusted. Pressing both the buttons simultaneously, the settings are closed.

Adjustment of the opening limit of the switch 2

After pressing both the buttons simultaneously, the opening of the switch 1 can be adjusted. Pressing both the buttons simultaneously, the settings are saved.

Adjustment of the comparator mode and the hysteresis of the switch 1

After pressing both the buttons simultaneously, the hysteresis mode and the comparator mode of the switch 1 can be switched. The difference between both the modes of operation is given by the illustration given in the note. Pressing both the buttons simultaneously, the settings are saved.

Adjustment of the comparator mode and the hysteresis of the switch 2

After pressing both the buttons simultaneously, the hysteresis mode and the comparator mode of the switch 1 can be switched. The difference between both the modes of operation is given by the illustration given in the note. Pressing both the buttons simultaneously, the settings are saved.

Adjustment of the closing delay of the switch 1

After pressing both the buttons simultaneously, we can adjust the closing delay of the switch 1 after reaching the closing limit. The range of the adjustment is from 0 to 100 seconds. Pressing both the buttons simultaneously, the settings are saved.

Adjustment of the opening delay of the switch 1

After pressing both the buttons simultaneously, we can adjust the opening delay of switch 1 after reaching the opening limit. The range of adjustment is from 0 to 100 seconds. Pressing both the buttons simultaneously, the settings are saved.

Adjustment of the closing delay of the switch 2

After pressing both the buttons simultaneously, we can adjust the closing delay of the switch 1 after reaching the closing limit. The range of the adjustment is from 0 to 100 seconds. Pressing both the buttons simultaneously, the settings are saved.

Adjustment of the opening delay of the switch 2

After pressing both the buttons simultaneously, we can adjust the opening delay of switch 1 after reaching the opening limit. The range of adjustment is from 0 to 100 seconds. Pressing both the buttons simultaneously, the settings are saved.

Maximum value - since version 6.00

After pressing both the buttons simultaneously, the maximum value occurred during the measurement is shown on the display. If both the buttons are within one-second interval pressed again, the saved value is deleted. Please note that the value does not stay saved when the power supply is interrupted (current loop).

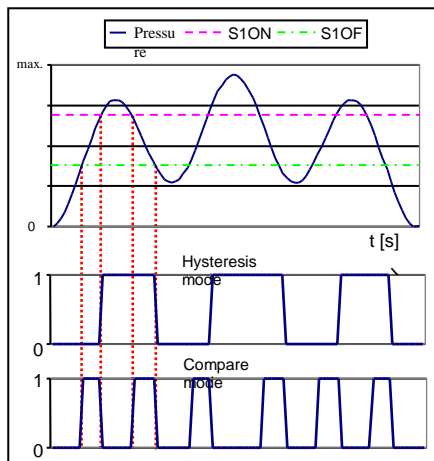
Minimum value - since version 6.00

After pressing both the buttons simultaneously, the minimum value occurred during the measurement is shown on the display. If both the buttons are within one-second interval pressed again, the saved value is deleted. Please note that the value does not stay saved when the power supply is interrupted (current loop).

Frequency of value recovery on the display - since version 7.00

After pressing both the buttons simultaneously, we can adjust the frequency of value recovery on the display. The range of adjustment is from 0 ... 10 s. When adjusting 0 s, the function is not active. The adjusted value does not affect the function of the switches. Pressing both the buttons simultaneously, the settings are saved.

Note:



Certificate of quality and completeness

Type :
Serial number :
Power supply :
Range :
Pressure overload :
Accuracy :
Technical inspection of offset :
Technical inspection of range :
Display data :
Manufacture date :
Warranty period :
Signature :