

## Operating Manual

Electronic OEM Pressure Switch Pneumatics

DS 4



READ THOROUGHLY BEFORE USING THE DEVICE  
KEEP FOR FUTURE REFERENCE

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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.

**Complementary to this operating manual the current data sheet has to be adhered to.**

Download this by accessing [www.bdsensors.cz](http://www.bdsensors.cz) or request it: info@bdsensors.cz / phone: +420 572 411 011

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

	- Type and source of danger - Measures to avoid the danger
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Warning word	Meaning
	- Imminent danger! - Non-compliance <b>will result in</b> death or serious injury.
	- Possible danger! - Non-compliance <b>may result in</b> death or serious injury.
	- Hazardous situation! - Non-compliance <b>may result in</b> 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 devices are used to convert the physical parameter of pressure into an electric signal.

The electronic pressure switch DS 4 has been designed for pneumatics and vacuum applications. Due to the materials aluminium for the pressure port and silicon for the pressure sensor, the DS 4 is suited for use with non-aggressive gases or compressed air. The housing for the switching electronics consists of PA 6.6. The new microcontroller switching electronics offer – besides the standard functions – many additional features for an optimal adaptation to the measuring requirements. The one or two freely programmable contacts whose status is indicated by differently coloured LEDs can be quickly and comfortably configured either by means of the optionally available configuration kit CIS 680 or CIS 681 or the programming device P6.

The user must check whether the device is suited for the selected use. In case of doubt, please contact our sales department: info@bdsensors.cz | phone: +420 572 411 011 BD SENSORS assumes no liability for any wrong selection and the consequences thereof!

Permissible media are compressed air and non-aggressive gases, which are compatible with the media wetted parts described in the data sheet.

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.cz>

	<b>Danger through incorrect use</b> - In order to avoid accidents, use the device only in accordance with its intended use.
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#### 1.4 Limitation of liability and warranty

Failure to observe the instructions or technical regulations, improper use and use not as intended, and alteration of or damage to the device will result in the forfeiture of warranty and liability claims.

#### 1.5 Safe handling

**NOTE** - Do not use any force when installing the device to prevent damage of the device and the plant!

**NOTE** - Treat the device with care both in the packed and unpacked condition!

**NOTE** - The device must not be altered or modified in any way.

**NOTE** - Do not throw or drop the device!

**NOTE** - Excessive dust accumulation (over 5 mm) and complete coverage with dust must be prevented!

**NOTE** - The device is state-of-the-art and is operationally reliable. Residual hazards may originate from the device if it is used or operated improperly.

#### 1.6 Scope of delivery

Check that all parts listed in the scope of delivery are included free of damage, and have been delivered according to your purchase order:

- DS 4
- mounting instructions

#### 2. Product identification

The device can be identified by its manufacturing label. It provides the most important data. By the ordering code the product can be clearly identified.

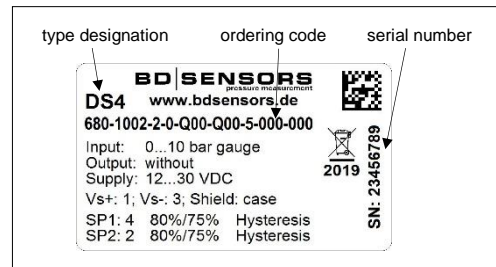


Fig. 1: Manufacturing label

**NOTE** - The manufacturing label must not be removed!

### 3. Mounting

#### 3.1 Mounting and safety instructions

	<b>Danger of death from airborne parts, leaking fluid, electric shock</b> - Always mount the device in a depressurized and de-energized condition!
	<b>Danger of death from improper installation</b> - Installation must be performed only by appropriately qualified persons who have read and understood the user manual.

**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 and the threads! 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** - Provide a cooling line when using the device in steam piping.

**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 specified tightening torques must not be exceeded!

**NOTE** - Install the device in such a way, that the gauge reference (little hole in the housing) 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.

**NOTES - for mounting outdoors or in a moist environment:**

- 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.)
- 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.

#### 3.2 Mounting steps for Internal thread G1/8"

✓ A suitable seal (e.g. Teflon strip, flat gasket or O-ring) for the medium and the pressure to be measured is used on the screwed end of the counterpart.

✓ The surface of the taking part is perfectly smooth and clean.

- 1 Screw the counterpart (e.g. screw connection, quick coupling) by hand into the pressure switch.
- 2 Tighten the counterpart with a wrench (max. torque 3 Nm).

#### 3.3 Installation steps for internal thread M5

- ✓ The O-ring is undamaged and seated in the designated groove. (O-ring is not included in the scope of delivery)
  - ✓ The surface of the taking part is perfectly smooth and clean.
- 1 Screw the counterpart (e.g. screw connection, quick coupling) by hand into the pressure switch.
  - 2 Tighten the counterpart with a wrench (max. torque 1 Nm).

#### 3.4 Installation steps for flange mounting (only possible with internal thread M5)

- ✓ The O-ring is undamaged and seated in the designated groove. (O-ring is not included in the scope of delivery)
  - ✓ The surface of the taking part is perfectly smooth and clean.
- 1 There are 4 threads (M3) for flange mounting.
  - 2 Install the device with 2 or 4 screws on the intended flange. When using low pressure ranges and usual conditions for the application are given, 2 screws will suffice.
  - 3 Tighten the screws; the surfaces of pressure switch and counterpart must bear on each other.

### 4. Electrical connection

#### 4.1 Connection and safety instructions

	<b>Danger of death from electric shock</b> - Always mount the device in a depressurized and de-energized condition!
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✓ The supply corresponds to protection class III (protective insulation).

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

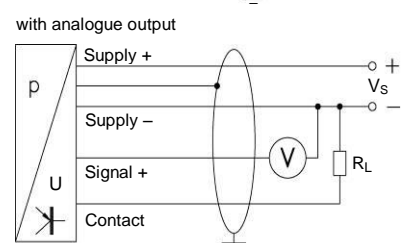
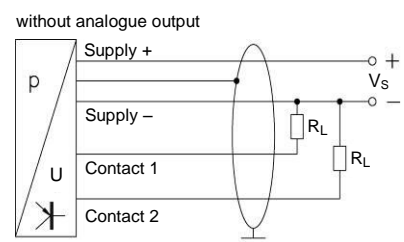
#### 4.2 Electrical installation

Establish the electrical connection of the device according to the technical data shown on the manufacturing label, the following table and the wiring diagram.

Pin configuration:

Electrical connection	M8x1 / metal (4-pin)
Supply +	1
Supply -	3
Signal + (for analogue output)	2
Contact 1	4
Contact 2	2
	Shield housing

Wiring diagrams:



### 5. Commissioning

	<b>Danger of death from airborne parts, leaking fluid, electric shock</b> - Operate the device only within the specification! (according to data sheet)
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- ✓ The device has been installed properly.
- ✓ The device does not have any visible defect.
- ✓ The device is operated within the specification. (see data sheet)

### 6. Operation

**Set point adjustment – factory set**

The set points are factory set either to ordered values or to the following BD SENSORS standard:

Switching function	n/o (normally opened)
Switching mode	hysteresis mode
Switch on point	80 % FSO
Switch off point	75 % FSO
Switch on/switch off delay	off

**Set point adjustment – user specific**

Every DS 4 can be quickly and comfortably configured either by means of the optionally available configuration kits CIS 680 or CIS 681 as well as the programming device P6. These devices can be ordered as accessories from BD SENSORS. In the following, a short description of these possibilities is given:

**Configuration via configuration kit**

The DS 4 can be connected to a PC via the programming adapter and configured by the programming-software P-Set. The setting of the following parameters for both set points is possible:

- operation mode (hysteresis or window mode)
- switch-on and switch-off point
- set point inverting
- switch on and switch off delay

The programming adapter is part of the programming kits CIS 680 and CIS 681 which contains i.e. a CD-ROM with the configuration software P-Set. All cables required for connecting the pressure switch have to be plugged to the programming adapter (included in scope of delivery). The user only requires a Windows® PC with serial interface (CIS 680) or USB-interface (CIS 681). Installing the configuration software P-Set is very easy. P-Set runs on all Windows® PC's (95, 98, ME, 2000, NT, XP).

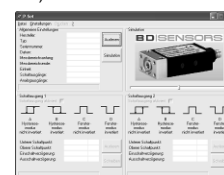


Fig. 2 Programming software



Fig. 3 Programming adapter

#### Configuration via programming device P6

The programming device P6 is simply plugged between pressure switch and the female connector. Via two push-buttons and a 4-digit LED display, all possible settings can be realized. The menu system of the device includes 27 menus and is easy to handle. The following menus are – among others – available for configuration:

- read and store of all parameters
- switching mode
- switch-on and switch-off point
- inverting of switching signal
- switch on and switch off delay
- teach switch-on and switch-off point
- load of stored configurations
- storage of current configurations
- showing the current pressure value
- showing the limits of the measuring range



Fig. 4 Programming device P6

### 7. Maintenance

	<b>Danger of death from airborne parts, leaking fluids, electric shock</b> - Always service the device in a depressurized and de-energized condition!
	<b>Danger of injury from aggressive fluids or pollutants</b> - 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.

The cleaning medium for the media wetted parts (pressure port/diaphragm/seal) may be gases or liquids which are compatible with the selected materials. Also observe the permissible temperature range according to the data sheet.

Deposits or contamination may occur on the diaphragm/pressure port in case of certain media. Depending on the quality of the process, suitable maintenance intervals must be specified by the operator. As part of this, regular checks must be carried out regarding corrosion, damage to the diaphragm and signal shift.

**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. Troubleshooting

	<b>Danger of death from airborne parts, leaking fluids, electric shock</b> - If malfunctions cannot be resolved, put the device out of service (proceed according to chapter 9 up to 11)
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In case of malfunction, it must be checked whether the device has been correctly installed mechanically and electrically. Use the following table to analyse the cause and resolve the malfunction, if possible.

Fault: no analogue output signal	
<b>Possible cause</b>	<b>Fault detection / remedy</b>
Conductor/wire breakage	Checking of all line connections
Defective measuring device (signal input)	Checking of ammeter (miniature fuse) or of analogue input of your signal processing unit

Fault: analogue output signal too low	
<b>Possible cause</b>	<b>Fault detection / remedy</b>
Load resistance too low	Checking of load resistance (value)
Supply voltage too low	Checking of power supply output voltage

Fault: no switch signal although LEDs are working	
<b>Possible cause</b>	<b>Fault detection / remedy</b>
Conductor/wire breakage	Checking of all line connections of the contacts (including the connecting plugs)

Fault: no switch signal and LEDs are not working	
<b>Possible cause</b>	<b>Fault detection / remedy</b>
Wrong setting of the set points	Verify that all switch parameters are useful and within the applied range

Fault: shift of the output signal	
<b>Possible cause</b>	<b>Fault detection / remedy</b>
Diaphragm is severely contaminated or damaged	Please send the device to BD SENSORS for cleaning or repair

Fault: device does not respond to pressure change	
<b>Possible cause</b>	<b>Fault detection / remedy</b>
Defective sensor	Please send the device to BD SENSORS for inspection

### 9. Removal from service

	<b>Danger of death from airborne parts, leaking fluids, electric shock</b> - Disassemble the device in a depressurized and de-energized condition!
	<b>Danger of injury from aggressive media or pollutants</b> - 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.

