

Operating Manual

Electronic OEM Pressure Switch

DS 5, DS 6



**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.**

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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
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 devices are used to convert the physical parameter of pressure into an electric signal.

The electronic pressure switches DS 5 and DS 6 have been designed for universal applications. Preferred areas of use for DS 5 are in mobile hydraulics, presses and oxygen applications. The DS 6 is suitable, among others, for applications in plant and machine engineering, hydraulics, measurement and controls.

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 685 or CIS 686 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.de | phone: +49 (0) 92 35 / 98 11 0

BDSENSORS assumes no liability for any wrong selection and the consequences thereof!

Permissible media are gases or liquids, 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.de>

	Danger through incorrect use - 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:

- electronic OEM pressure switch
- 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.

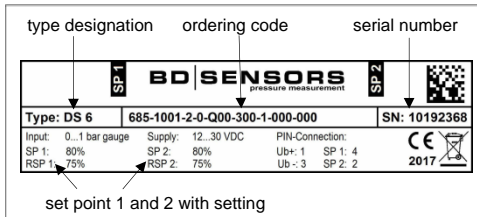


Fig. 1 example of manufacturing label

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 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!

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. Direct solar irradiation can lead to the permissible operating temperature being overstepped in the worst case. By this the operability of the device can be affected or damaged. If the internal pressure increases due to solar irradiation, measurement errors may be caused.

3.2 Conditions for oxygen applications

	DANGER 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.

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

3.3 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. (Rz 3.2)
- 1 Screw the device into the corresponding thread by hand.
 - 2 Then tighten it using a suitable open-end wrench. G1/4": approx. 5 Nm

3.4 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. (Rz 6.3)
- 1 Screw the device into the corresponding thread by hand.
 - 2 Then tighten it using an open-end wrench: G1/4": approx. 20 Nm

3.5 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: 1/4" NPT: approx. 30 Nm

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!
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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.

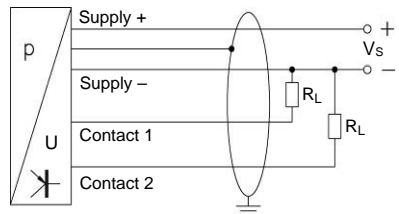
4.2 Electrical installation

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 (4-pin), metal	M12x1 (4-pin), metal
Supply +	1	1
Supply -	3	3
Contact 1	4	4
Contact 2	2	2
Shield	plug housing	plug housing

Wiring diagram:



5. Commissioning

	DANGER Danger of death from airborne parts, leaking fluid, electric shock - 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

The electronic pressure switches DS 5 and DS 6 can be quickly and comfortably configured either by means of the optionally available configuration kits CIS 685 or CIS 686 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 device 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 685 and CIS 686 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 685) or USB-interface (CIS 686). 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

	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.

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

	DANGER Danger of death from airborne parts, leaking fluids, electric shock - 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 switch signal although LEDs are working	Possible cause	Fault detection / remedy
	Conductor/wire breakage	Checking of all line connections of the contacts (including the connecting plugs)
Fault: no switch signal and LEDs are not working	Possible cause	Fault detection / remedy
	Wrong setting of the set points	Verify that all switch parameters are useful and within the applied range
Fault: shift of the output signal	Possible cause	Fault detection / remedy
	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	Possible cause	Fault detection / remedy
	Defective sensor	Please send the device to BD SENSORS for inspection

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 dismantling, mechanical connections must be fitted with protective caps.

