Operating instructions

Pressure switch model B7, differential pressure switch model D7 and temperature switch model T7

for potentially explosive atmospheres within the European Union according to Directive 2014/34/EU (ATEX) / IEC

In the following version:

- B7##CN## Pressure switch
- D7##CN## Differential pressure switch
- T7##CN## or temperature switch

B7

Pressure switch

D7

Differential pressure switch

T7

Temperature switch

Table of contents:

1 General

The pressure and temperature switches described in these operating instructions have been designed using the latest standards, guidelines and findings. During the manufacturing process, all components are subject to our high quality and environmental criteria. For this purpose, we maintain certified management systems according to ISO 9001 and ISO 14001. For the special requirements of devices for intended use in potentially explosive atmospheres, we maintain a management system according to ISO 80079-34.

1.1 Purpose of this manual

These operating instructions contain basic instructions for the installation, operation and maintenance of the unit. It must be read by the installer, the operator and the specialist personnel responsible for the unit before installation and commissioning. These operating instructions must always be available at the place of use.

The following sections on general safety instructions 2 as well as the following special instructions on intended use 2.2 to disposal 11 contain important safety instructions which, if not followed, may cause health and safety hazards to people, especially workers, and possibly to domestic and farm animals and goods.

1.2 Symbols

Warning.

...indicates a potentially hazardous situation, the non-observance of which may cause risks to the health and safety of people, in particular workers, and, where appropriate, to domestic and farm animals and property.

Information.
... highlights important information for efficient and trouble-free operation.

1.3 Limitation of liability

Improper use of the units, failure to observe the operating instructions, the use of unqualified personnel for installation and maintenance work and unauthorized modifications to these units will inevitably result in the loss of liability claims against the unit manufacturer.

1.4 Copyright

1.5 Warranty

For the product described here, we grant a warranty in accordance with § 6 Warranty for Defects of our General Terms and Conditions of Delivery and Payment (AGB - https://www.ashcroft.eu/de/terms-conditions/index.html).

1.6 Manufacturer's address, customer service

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2 Security

2.1 General sources of danger

Pressure and temperature switches are usually components of a control and measurement system. These devices have parts that are subject to pressure or temperature, the failure of which can lead to dangerous situations. The switches should be selected in accordance with the applicable standards and regulations and the rules of technology.

2.2 Intended use

The intended use of the devices, as determined by the manufacturer, is the measurement / control of pressure and temperature with electrotechnical or electronic components for the evaluation of switching states in potentially explosive atmospheres.

According to the Pressure Equipment Directive 2014/68/EU, the equipment is classified as pressure-maintaining equipment without safety function, module A in accordance with Article 4(3) of the Directive.

When operating the unit, it must be ensured that the process medium used is harmless to the selected unit material. Process media that show changes in the state of aggregation within an application area can influence the functionality. Negative influences are to be avoided for this reason. The application areas of these process media must be within the technical limits of the unit.

Further technical data for the intended use are summarized in the product data sheets (chapter 12.1).

2.3 Responsibility of the operator

The safety instructions for proper operation of the unit must be observed. They must be made available by the operator to the respective qualified personnel for installation, maintenance, inspection and operation. Hazards due to electrical energy and released energy of the medium, due to escaping media and due to improper connection of the unit must be excluded. For details, refer to the relevant applicable regulations such as DIN EN, UVV (accident prevention regulations) and, in the case of industry-specific applications (DVWG, Ex- GL, etc.), the VDE guidelines and the regulations of the local utility companies.

The unit must be taken out of operation and secured against unintentional operation if it must be assumed that safe operation is no longer possible (chapter 10 Malfunctions).

The unit may only be opened in a non-explosive atmosphere.

The operational safety of the unit and the manufacturer's warranty are only guaranteed if the unit is used as intended. The unit design must be adapted to the medium and potentially explosive atmosphere used in the system. The limit values specified in the technical data must not be exceeded. When planning systems in potentially explosive atmospheres, IEC 60079-14 Project planning, selection and installation of electrical systems must be applied.

The safety instructions listed in this operating manual, existing national regulations for accident prevention and internal working, operating and safety regulations must be observed by the operator. Furthermore, he is responsible for ensuring that all prescribed maintenance, inspection and installation work is carried out by authorized and qualified personnel.

The unit is to be regarded as a pressure-maintaining piece of equipment (except for the T7 temperature switch) within a system in a potentially explosive atmosphere. The operator of this installation is obliged to carry out an ignition hazard analysis and a zone classification.

The T7 temperature switch may only be used in pressureless processes. If process pressure is present, the use of a protective sleeve is necessary.

2.4 Personnel qualification (target group assessment)

The unit may only be installed and commissioned by trained specialist personnel.

Qualified personnel are persons who are able to carry out the work assigned to them on the basis of their technical training, their experience and their knowledge of the country-specific regulations, applicable standards and directives. In the case of explosion-protected equipment, the persons must have received training or instruction or be authorized to work on explosion-protected equipment in potentially explosive atmospheres.

2.5 Signage/safety labelling

The switch is provided with labels. The type designation, measuring range, serial number, certificate number, Ex marking (including X for special conditions of use) and the manufacturer are visible on the type plate. In addition, the warning "Do not open when an explosive gas / dust atmosphere present" is noted. The serial number is composed as follows:

- The first two digits indicate the last two digits of the year of manufacture
- The digits three and four indicate the month of manufacture
- The numbers five and six indicate the day of manufacture
- The digits seven to 10 are a sequential number starting at 0001 with each production day.

The legibility of the type plate, which is important for use in potentially explosive atmospheres, must be checked by the operator at regular intervals.

If the unit is delivered with a switching point setting (option FS), a label with the set switching point is mounted on the back of the unit.

The outer box is labelled with the type designation, order number, item number, measuring range and manufacturer's details.

2.6 Safety devices

This unit is equipped with anti-rotation devices on the housing cover as well as on the cable line inlet and earth connections. The measuring element secures the actuating rod in case of leakage and contains two vent holes.

2.7 Environmental protection

This appliance contains electrical components. The requirements listed in the WEEE Directive of the European Union (2012/19/EU) on "Waste Electrical and Electronic Equipment" and by the Electrical and Electronic Equipment Act (ElektroG) have been taken into account and are applicable.

The European Directives (RoHS) 2011/65/EU "On the restriction of the use of certain hazardous substances in electrical and electronic equipment" and the Delegated Directive 2015/863/EU on the extension of the list of hazardous substances in Annex II of Directive 2011/65/EU were taken into account in the manufacture of the products. Compliance with the requirements of these directives is confirmed in the Declaration of Conformity in the Annex.

Depending on the configuration of our products, the requirements of the directive (REACH) 2006/1907/EC "Registration, Evaluation, Authorization and Restriction of Chemicals" have to be taken into account; the corresponding safety data sheets of the chemical manufacturers can be downloaded from our website. At the end of the product life cycle, we recommend recycling the units, as they are mostly made of aluminium or stainless steel. Information on disassembly, material separation and disposal can be found in chapter 11.

3 Use in potentially explosive atmospheres according to Directive 2014/34/EU (ATEX).

Our Ex products B7/D7/T7 have equipment protection by flameproof enclosure "Ex d" (EN 60079-1) and dust explosion protection by enclosure "Ex t" (IEC 60079-31).

3.1 Range of use:

Explosive atmosphere	Potentially explosive atmospheres		Equipment category *2014/34/EU*	Subdivision of gases or dusts	EPL *EN 60079-0*
Gases & Vapors	**Zone 1**	Occasionally occurs during normal operation	2G	**IIC**	**Gb**
Gases & Vapors	**Zone 2**	Occurs in normal operation normally does not arise, or only for a short time	2G	**IIC**	**Gb**
Dust	**Zone 21**	forms during normal operation occasionally in the form of a cloud	2D	**IIIC**	**Db**
Dust	**Zone 22**	Occurs in normal operation in the form of a cloud normally does not occur or only for a short time	2D	**IIIC**	**Db**

Permissible ambient conditions

Temperatures within an application	
Ambient temperature	(-20 to 60)°C
Fluid temperature	min. -20°C, max. 60°C
Surface temperature *(without dust cover)*	max. 80°C

Permissible ambient media Air with normal oxygen content (21 %), ambient pressure 80 kPa (0.8 bar) to 110 kPa (1.1 bar)

Warning! With gaseous media, the device temperature can increase due to compression heat. In such cases, the rate of pressure change must be throttled or the permissible medium temperature reduced.

To avoid additional heating, the units must not be exposed to direct sunlight during operation!

EU Type Examination Certificate

SIRA 02ATEX1391X
CSA Group Netherlands B.V., Notified Body number 2813 according to Article 17 and 21 of the Directive 2014/34/EU of the European Parliament and of the Council, of 26 February 2014, certified that this appliance complies with the essential health and safety requirements relating to for the design and construction of equipment intended for use in potentially explosive atmospheres as referred to in Annex II of the Directive.

The Ashcroft® pressure and temperature switches of the B7, D7, T7 series consist of a two-piece cylindrical housing with housing base and cover. The enclosure is made of injection moulded A380 aluminium or 316L stainless steel. The cover is screwed into the lower part of the enclosure and secured. The lower part of the housing contains the various switch elements as well as the mechanical transmission of a pressure change into a displacement change. The lower part of the housing has a ¾-inch NPT cable entry on each side. At the bottom of the housing is the process connection with the measuring elements behind it. The process connection as well as the housing part for holding the measuring element are provided with a pressure relief.

Standards applied for the evaluation of ignition protection	
IECEx	*ATEX*
IEC 60079-0: 2011 Ed 6 IEC 60079-1: 2014 Ed 7 IEC 60079-31: 2013	EN IEC 60079-0: 2018 EN 60079-1: 2014 EN 60079-31: 2014

3.2 Labelling:

CE 2813 Ex II 2GD Ex db IIC T6 Gb
Ex tb IIIC T85°C Db IP 6X

The units must not be operated in potentially explosive atmospheres in a plant where there is an explosive hybrid mixture of gases and dusts in the atmosphere.

3.3 Special conditions of use for safe application in potentially explosive atmospheres

- Maintenance work to be carried out, from chap. 9 by unauthorized personnel may result in damage and lead to loss of approval. The electrical connection may only be carried out by trained and authorized personnel.
- To avoid possible sparking due to static electricity, the appliance should always be cleaned with a damp cloth.
- The legibility of the type plates must be checked at regular intervals. It must remain legible throughout the entire period of use of the unit. If a reliable reading is no longer given, please contact the manufacturer.
- Impacts on the unit must be avoided at all costs. Impacts or shocks can produce sparks.
- It is the operator's responsibility to evaluate attached process components or accessories together with the supplied unit by means of an ignition hazard analysis. The operator must recognize the ignition hazards and prevent them by using appropriate protective measures.
- Only Ex-certified cable entries may be used. A tightening torque of at least 90 Nm must be applied when installing the cable gland. A sealant for the ¾ NPT thread of the cable glands must not be used.
- For the cable glands installed by the manufacturer, the cable cross-sections to be used are specified depending on the version. The user must install the cable glands with a tightening torque of 55 Nm. This tightening torque is necessary to achieve the ignition protection as well as the IP protection according to the requirements of the EU type examination certificate.
  If an Ex-certified cable gland from an external supplier is used, its installation instructions must be followed.
- It is not permissible to attach several threaded adapters to the cable entries.
- The optional measuring point label NH or NH1 may only be attached within the earth bond. Metal parts attached to the outside of the housing can be a source of ignition due to the coating of the housing. For this reason, earthing of the measuring point label is mandatory.
- Temperature switches T7 with a measuring range of (260 to 400)°C that are suitable for use in potentially explosive atmospheres are always manufactured with external capillary sensors. Do not mount the switch housing in the immediate vicinity of the process temperature (convection heat).
- Temperature switches T7 for process temperatures of (175 to 275)°C are manufactured with a minimum length of 102 mm. These may only be mounted using protective sleeves as well as other suitable means for shielding the process temperature.
- When installing all T7 temperature switches on site, measures must be taken to ensure that the maximum surface temperature is not exceeded.

Plastic blind plugs are used to protect the unit during delivery and must be replaced with suitable cable entries in compliance with the above criteria.

4 Technical data

For detailed technical data, please refer to the data sheets (chapter 12).

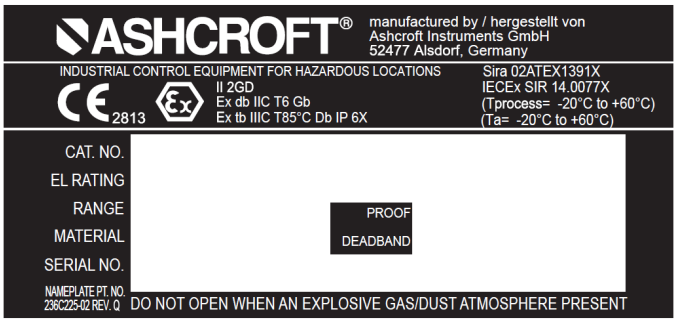
5 Marking of the appliance

The nameplate is located on the casing perimeter and includes:

- Manufacturer
- Marking of the unit for potentially explosive atmospheres (ATEX)
- Type designation
- Electrical nominal values of the switching contact
- Measuring range
- Measuring diaphragm material
- Serial number (YYMMDDxxxx)
- Overload / test pressure
- Reset values of the switching contact
- Warning notice "DO NOT OPEN WHEN AN EXPLOSIVE GAS / DUST ATMOSPHERE PRESENTS".

The units are factory calibrated with a switching point at 90% of the measuring range. Optionally, the units can be specified with a set switching value. In this case, there is a small label on the back of the unit that indicates the switching point and the switching direction (rising or falling).

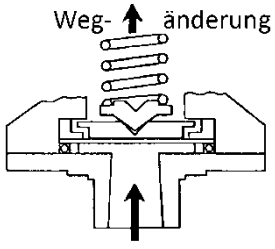
Example nameplate:



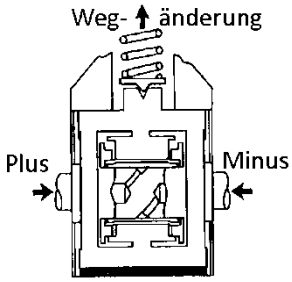
Switch with flameproof enclosure and protection by housing

6 Structure and function

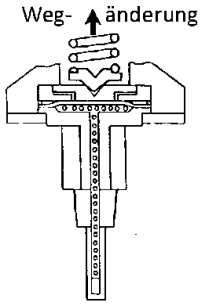
6.1 Overview



B7 Pressure switch



D7 Differential pressure switch



T7 temperature switch

Figure 1

6.2 Functional description

The devices are manufactured within a special quality management system ISO 80079-34 conforming to the EU type examination certificates. The precision switches are equipped with a mechanical micro switch and can be used for operation with positive or negative overpressure, differential pressure or temperature with fixed or variable reset differential. Versions with manual reset for operation with rising or falling switching point are also available. Numerous measuring elements compatible with different pressure media and made of different materials are available.

6.3 Description of the components

6.3.1 Measuring element of the pressure switch B7

B-Series positive or negative overpressure switches use two different measuring elements depending on the switching point requirements. For measuring ranges between 150 mbar and 207 bar (2.2 and 3000) psi, the simple, robust diaphragm-sealed piston actuator is used. This design ensures high reliability and allows a wide choice of wetted materials for almost any application. For optimum reliability, a welded version is also available for ranges up to 1000 psi (70 bar). This version is available in 316 stainless steel or Monel.

For measuring ranges between 4 and 375 mbar (1.5 and 150 inches H2O), a large diaphragm made of suitable elastomers is used for higher sensitivity.

6.3.2 Measuring element of the differential pressure switch D7

Differential pressure switches use a special piston actuator sealed with two diaphragms, which is designed for very high static operating pressures and is very compact at the same time.

For measuring ranges between 12 and 375 mbar (4.5 and 150 inches H2O), a large diaphragm made of suitable elastomers is used for higher sensitivity.

6.3.3 Measuring element of the temperature switch T7

T-Series temperature switches feature a SAMA Class II vapor pressure temperature system. This system responds quickly and accurately to changes in process temperature and is only slightly affected by ambient temperature. This is due to the precisely defined relationship between temperature and pressure according to the vapor pressure laws. A wide range of sensors and armored capillary lines are available. The vapor pressure system uses small probes for easy and cost-effective installation.

6.3.4 Switching point adjustment

The adjustment screw (7/8 inch) for the switching point is located centrally in the bottom of the housing.

6.3.5 Micro switch

An electric SPDT switch is used as standard and is available in different versions. Two SPDT switch elements assembled together are also available, except for versions with variable switch-back value.

Coding microswitch			Electrical ratings			
Simple switch	Double switch	Switch Description	AC		DC	
SPDT	2x SPDT		*I*	*U*	*I*	*U*
20	61	narrow dead band	15 A	125 / 250 / 480 V		
21	65	Ammonia service (Elgiloy spring)	5 A	125 / 250 V	6 A	30 V
22	67	small downshift differential values	5 A	125 / 250 V		
23		high load capacity, with cable	15 A	125 / 250 V		
24	64	General application, low DC load capacity	15 A	125 / 250 V	6 A	30 V
25		High load capacity	10 A	125 V	0.5 A 6 A	125 V 30 V
26	62	Protected from environmental influences, narrow dead zone	15 A	125 / 250 V		
27	63	high temperatures	15 A	125 / 250 V		
31	70	Gold contacts, with cable	1 A	125 V		
32	68	general field of application	11 A	125 / 250 V	5 A	28 V
42	71	Gold contacts	1 A	125 V		
50		Adjustable dead zone	15 A	125 / 250 V		

Table 1: Electrical ratings of the micro switches

6.3.6 Housing

Ashcroft switches have a flameproof enclosure to ATEX "Ex d" (EN 60079-1) and ATEX "Ex t" protection by enclosure - dust (IEC 60079-31). The enclosure is made of epoxy coated cast aluminium A380 or optionally stainless steel 316L (option YW).

Furthermore, the enclosures of these electrical Ex units have an IP rating, regarding their suitability for various environmental conditions (contact protection, dust, water) according to EN 60529 of IP6x as well as an enclosure rating according to NEMA 7 and 9.

7 Transport

The switch must be protected from rough impact. The unit must only be transported in the packaging provided. The transport may only be carried out in a cleaned condition (free of residual measuring material). Plastic blind plugs serve to protect the unit during transport and must be replaced by suitable cable entries.

7.1 Transport inspection

The delivery must be checked for completeness and transport damage. In the event of transport damage, the delivery is not to be accepted or only with reservations, the extent of the damage is to be noted and, if necessary, the complaint is to be initiated. In these cases, please contact our service department.

7.2 Storage

The storage of the units should exclude external influences as far as possible to avoid damage to the units. Vibrations or impacts must be avoided, and the limit values of the storage temperatures must be taken into account.

Permissible storage temperature: -40 to +60°C

8 Assembly

In addition to the measures described here for the installation of the Ex units, IEC 60079-14 must be taken into account.

8.1 Preparation

To ensure safe working during installation and maintenance, suitable shut-off valves must be installed in the system by means of which the unit:

- can be depressurized for the purpose of repair or inspection within the system concerned;
- can be subjected to a function check on site.

During the work of mounting/installing the switch, the system must be secured against being switched on again.

It is recommended to carry out the assembly / installation without an existing explosive atmosphere (e.g. ventilated room).

8.2 Requirements for the installation site

- Check the suitability of the device for the medium to be measured,
- Design of the measuring range to the requirements of the measurement,
- A measuring device holder must be installed if the measuring line does not have sufficient load-bearing capacity.
- Ambient temperature range: -20 to 60 °C
- Medium temperature range: -20 to 60 °C, the temperature limits may vary depending on the diaphragm material
- Please refer to the corresponding data sheets for the materials used and technical data.

- To minimize the risk of injury, the switch must be installed in accordance with the required safety and electrical regulations.
- The switch must be protected from moisture, shocks and/or extreme vibrations.
- Installation position: The switch can be installed in any position. However, it is recommended to set the switch in the intended operating position.

Always fit the enclosure cover after wiring the switch and before switching on the power supply.

- In potentially explosive atmospheres, check that the atmosphere is not explosive and that the power supply is disconnected before removing the cover.
- All anti-twist and earthing connections must be installed before commissioning.
- With the T7 temperature switch, damage to the immersion tube and the sensor must be prevented. In the case of temperature switches with external capillary lines, these must not be kinked or laid in too tight a radius.
- Do not press any objects (e.g. screwdrivers) against the membrane.
- The pressure measuring ranges B7/D7 may only be overloaded according to the specifications in the data sheets.
- The temperature measuring ranges T7 may only be overloaded according to the specifications in the data sheets.
- The electrical load limits of the micro switches must not be exceeded.

8.3 Process connection

As standard, the unit is equipped with a pressure connection piece according to EN 837 for pipeline installation. The unit is adjusted at the factory for vertical installation. If the unit is installed in a different position, position errors may occur and the factory-set switching point may vary. The installation position has no influence on the maximum surface temperature for an EPL Db.

- Connection only by authorized and qualified personnel.
- The three mounting holes around the perimeter of the enclosure allow wall mounting. The hole arrangement is shown in the general overview drawing.
- The switches can also be mounted directly on the pressure line using the process connection. High vibrations must not occur at the selected installation point.
- Use only with the intended mechanical process connection - for the version, see the ordering code on the type plate of the unit with matching thread seal.
- When connecting the unit, the pipes must be depressurized.
- The pressure measurement line must be laid at a gradient so that, for example, no air pockets can occur during liquid measurements and no water pockets during gas measurements. If the necessary gradient is not achieved, water or air separators must be installed at suitable points.
- The pressure measuring line should be kept as short as possible and laid without sharp bends in order to avoid the occurrence of disturbing distortion times.
- With liquid measuring media, the pressure connection line must be vented, as trapped gas bubbles lead to a measurement error.
- If water is used as the measuring medium, the unit must be protected from frost.

To mount the switch on the pressure line, always use the spanner flats on the lower part of the housing, do not turn the unit itself.

8.3.1 Electrical connection

When installing and operating electrical systems in potentially explosive atmospheres, the electrical data in the EU type examination certificate and the locally applicable regulations and directives must be observed (e.g. EN 60079-0 etc.).

- Connection only by authorized and qualified personnel.

- The electrical connection of the unit must be carried out in accordance with the relevant regulations of the VDE directive and the regulations of the local utility company.
- Before wiring the electrical connections, the unit must be disconnected from the power supply.
- Before commissioning the switch, close all cable openings and/or terminal boxes in accordance with the required safety and electrical regulations.

  a) The standard product is provided with two 3/4 NPT cable glands with a permanently inserted plug. If no cable gland is specified the switch is supplied with a plastic blanking plug to protect the unit. This must be replaced with an ATEX-approved cable gland during commissioning.

  b) Available ATEX-approved cable entries can be used, taking into account the specified connection torque (see chapter 3.3) may be used. Here, the instructions of the manufacturer of the externally purchased Ex-certified cable entry must be followed.
- Always follow safety and electrical regulations when connecting these units.
- The system earth of the unit is marked with a green coloured screw and/or with the earth symbol.
- ATEX-approved switches have an external earthing screw that must be connected. The optional measuring point label (NH or NH1) must be mounted at this point and also earthed.

NO (Normally Open) Blue
NC (Normally Closed) Red
C (Common contact) White

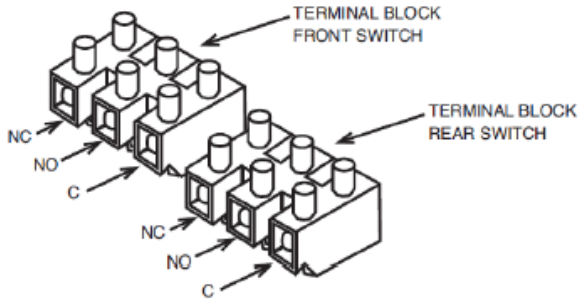


Figure 2: Terminal strips for micro switches and cable colours

- SPDT - direct wiring to the switch according to the wiring diagram.
- 2 SPDT - Wire to front switch terminal block (left) and rear switch terminal block (right) as indicated. Strip 8 mm of cable, insert into the correct terminal and tighten the terminal screw to secure.

8.4 Commissioning and switching point adjustment

A prerequisite for commissioning is the proper installation of all electrical supply and measuring lines. All connection lines must be laid in such a way that no mechanical forces can act on the unit.

Before commissioning, check the tightness of the pressure connection line.

As indicated below, the switch point adjustment is made using a 7/8-inch screw. The micro switch mounting screws and the bracket adjustment screw are factory sealed and must not be broken.

8.4.1 Pressure switch model B7

The adjustment screw (7/8 inch) for the switching point is located centrally in the bottom of the housing.

For precise switch point calibration, the switch must be mounted on a calibration stand. You need a suitable reference standard to be able to observe pressure changes sufficiently accurately.

If no switching point is specified when ordering, the pressure switch is usually set at the factory to approximately 90 % of the specified range. Pressurize the system to the required switching point and turn the adjusting screw until the switch switches. The direction of rotation is indicated on a sticker in the switch housing. Once the switching point is reached, raise and lower the pressure to check the switching point.

After adjusting the switch, screw the housing cover back in to ensure electrical safety and to protect internal parts from environmental influences.

If the ambient parameters are greater than the set switching values, the NO operating circuit is already closed during installation.

8.4.2 Differential pressure switch model D7 (high pressure measuring range)

The adjustment screw (7/8 inch) for the switching point is located centrally in the bottom of the housing.

The direction of rotation is indicated on a sticker in the switch housing.

The following is a typical calibration procedure:

Static working pressure	- 40 bar (600 psig)
Adjustable differential range	- 0.3/14 bar (5/200 psid)
Differential pressure switch point	- 10 bar (150 psi) above static working pressure.

Raise the pressure on the minus and plus side to 40 bar at the same time. Keep the pressure on the minus side at 40 bar. Increase the pressure on the positive side to 50 bar to obtain a difference of 10 bar.

Turn the adjusting screw until the switch switches at 10 bar differential pressure. Once the switching point is reached, raise and lower the pressure on the positive side to check the switching point.

After adjusting the switch, screw the housing cover back in to ensure electrical safety and to protect internal parts from environmental influences.

8.4.3 Differential pressure switch model D7 (low pressure measuring range)

The adjustment screw (7/8 inch) for the switching point is located centrally in the bottom of the housing.

The direction of rotation is indicated on a sticker in the switch housing. For precise switch point adjustment, the switch must be mounted on a calibration stand to obtain the desired pressures under operating conditions. For each pressure, you need a suitable reference standard.

As these switches are extremely sensitive, the volume on the minus side must be large to avoid a switching point shift between calibration and installation on site. If this is not possible, a switch point similar to that under operating conditions can be obtained by leaving the minus side open to the atmosphere during adjustment. After installation, the final setting of the switching point can be made

Approach the pressure on the negative side. Then increase the pressure on the positive side to the desired switching point and turn the adjusting screw until the switch switches. Once the switching point is reached, raise and lower the pressure on the positive side to check the differential pressure between the positive and negative sides.

After adjusting the switch, screw the housing cover back in to ensure electrical safety and to protect internal parts from environmental influences.

8.4.4 Temperature switch model T7

The adjustment screw (7/8 inch) for the switching point is located centrally in the bottom of the housing.

The sensor of the switch must be immersed in a calibration bath at the desired switching point temperature. The highest accuracy is achieved when the sensor is completely immersed. Wait five minutes until the system has thermodynamically stabilized.

If no switching point is specified when ordering, the temperature switch is usually set at the factory to approximately 90% of the specified measuring range. After stabilization, turn the adjustment screw until the switch switches. The direction of rotation is indicated on a sticker in the switch housing. Once the switching point is reached, raise and lower the temperature to check the switching point.

After adjusting the switch, screw the housing cover back in to ensure electrical safety and to protect internal parts from environmental influences.

8.4.5 B750, D750 and T750 - Switch with adjustable reset value

To adjust the switch-back value, turn the adjusting wheel on the precision micro switch. Viewed from the front of the housing, turn to the left to increase the switch-back value and to the right to decrease it. The letters on the dial can be used as a guide. Depending on the measuring range and the type of diaphragm, achievable switch-back values can be between 0.5 % and 9 % of the pressure or temperature range.

Switching point setting - The switch is usually set to about 90 % of the range at the factory. Turn the adjustment wheel on the micro switch fully clockwise to obtain the smallest switch-back value. Apply pressure or increase the temperature

of the calibration bath to the desired switching point and turn the adjustment screw until the switch switches. Lower the pressure or temperature to reset the switch. Turn the adjusting wheel on the micro switch until the desired switch-back value is reached. The upper switch point is increased by this setting. Lower the pressure/temperature to reset the switch. Then raise the pressure/temperature to the desired switching point and turn the adjustment screw until the switch switches. Lower the pressure/temperature and check the switch-back value and switch-back difference.

8.5 Change of installation location.

Do not dismount the switch from one measuring point and mount it at another. There is a risk of mixing media with unpredictable chemical reactions.

9 Maintenance

All maintenance or inspection work shall be carried out in compliance with IEC 60079-17

All ASHCROFT switches are virtually maintenance-free.

- Ensure that the enclosure remains closed at all times to ensure IP and ignition protection.
- If the switch is exposed to process media that may harden and/or accumulate in the pressure port, the switch may need to be removed and cleaned.

However, to ensure reliable operation and a long service life of the Ex unit, we recommend that the unit be checked regularly.

During maintenance work, there must be no potentially explosive atmospheres in the vicinity of the Ex unit, the process lines must be depressurized, in the case of temperature switches, the temperature sensors must cool down to ambient temperature, the electrical connections must be disconnected from the power supply and the system must be secured against being switched on again.

9.1 Functional check and recalibration

Functional testing and recalibration is carried out at regular intervals depending on the application. The exact test cycles must be adapted to the operating and ambient conditions. When different unit components interact, the operating instructions of all other units must also be observed.

- Checking the function in conjunction with other components in the process.
- Check the pressure connection lines for leaks.
- Checking the electrical connections.
- Remove any dust deposits
- Checking the legibility of the type plate
- Possible damage to the housing or the earths

9.2 Cleaning and maintenance

Cleaning is done with a non-aggressive cleaning agent and a damp, soft cloth to avoid electrostatic charging. In the same work process, care can be taken to detect possible damage to the unit at an early stage. If damage is detected, the unit should be returned immediately to the manufacturer's service department.

10 Disruptions

All defective or deficient equipment shall be taken out of service in accordance with ISO 60079-19.

Defective or damaged units should be handed over immediately to the manufacturer's service department. Under no circumstances should repair attempts be made on site. The safety of the unit can no longer be guaranteed.

10.1 Fault table

Disruptions	Possible causes	Possible measures
Switching point shift and impermissible switch-back value	Vibrations of the plant	Check errors during assembly and installation location. Decoupling system --- unit Readjust the unit or replace it if necessary
Random switch function	Damage in transit or external rough impact	Exchange of the unit, Repair is usually no longer possible.
Corrosion at the process connection and at the membrane	Incompatible measuring substance	Check installation location and replace unit
Leakage of process media	Seal not perfect	Errors during assembly
Immersion tube or sensor bent	Errors during assembly	Replace unit
Sharp-edged bent capillary line	Errors during assembly	Replace unit
Damage to housing or cables		Repair by the manufacturer, Replace unit

10.2 Behaviour after rectifying the fault

- See chapter 8.3 Montage/Installation

11 Dismantling & disposal

11.1 Disassembly

- During maintenance work on the unit, the lines must be depressurized, the electrical connections disconnected from the power supply and the system secured against being switched on again.
- Remove the Ex unit with a suitable tool.

Residues of measuring materials in and on dismantled switches can endanger people, the environment and equipment. Sufficient precautionary measures must be taken. If necessary, clean the equipment thoroughly (see instructions in the safety data sheets).

11.2 Disposal

At the end of the product life cycle, do not dispose of this product with normal household waste. Take this product to a collection point or a specialist disposal company for recycling of the components.

With the help of the product coding and our data sheets (see Appendix 12.1 available on our website) you will receive the necessary information on the materials to be able to carry out material separation yourself. Our units described in this manual are mostly made of aluminum (optionally stainless steel) which can be recycled. The switch contact can be removed from the mounting plate and disposed of accordingly. Then the aluminum anti-twist device at the cable inlet can be dismantled and recycled. The removable cable gland and the blind plug are made of stainless steel.

Materials to be recycled:

- Aluminium (housing, cover, anti-twist device)
- Stainless steel (cable gland and dummy plug, optionally housing and cover)
- Seals

Please help to protect our environment!

Some of the product materials can be reused if you drop the product off at a collection point or at a specialist disposal company. By reusing some parts or raw materials from used products, you make an important contribution to protecting the environment.

Our products are delivered in optimized packaging. This essentially means that materials are used that can be recycled as secondary raw materials at the local disposal service. For more information on the disposal of packaging, please contact your local authority.

12 Appendix

12.1 Data sheet for switches B7, D7 and T7

Detailed data sheets are available directly from the manufacturer (see chapter 1.6 Manufacturer's address, customer service)

12.2 The following table contains an overview of the individual documents.

Model	Description	Document
B7	Pressure switch series B4 and B7	DS BDH Series
D7	Differential pressure switch series D4 and D7	DS BDH Series
T7	Temperature switch series T4 and T7	DS SW10-T

12.3 EU Declaration of Conformity

ASHCROFT
Trust the shield.

EU-Konformitätserklärung
EU-Declaration of Conformity
EN ISO / IEC 17050-1:2010

Ashcroft Instruments GmbH
Max-Planck-Straße 1-9
52477 Alsdorf

erklärt in alleiniger Verantwortung, dass die mit CE gekennzeichneten Produkte
declares in sole responsibility that the products marked with CE

Gerät:
Equipment:
Druck- / Temperaturschalter vom Typ B7/D7/T7
die mittels Wegänderung einen Mikroschalter betätigten.
Pressure- / Temperature switch, using a micro switch actuated by movement of a piston cylinder unit.

Kennzeichnung:
Marking:
SIRA 02 ATEX 1391X / IECEx SIR 14.0077X

CE 2813 Ex II 2GD
Ex db IIC T6 Gb
Ex tb IIIC T85° C Db
Ta= -20°C to +60°C

Herstellungsdatum:
Date of manufacture:
ab 13.03.2025
from 13th of March 2025

die grundlegenden Sicherheits- und Schutzanforderungen erfüllen, in Übereinstimmung mit den unten genannten Richtlinien und Normen. Die Konformitätsaussage bezieht sich auf die Konzeption und Fertigung der oben genannten Produkte.
the fundamental safety and protection requirements passed in accordance with the guidelines and standards listed below. This declaration of conformity refers to the design and manufacture of the above products.

Richtlinie *Directive*	2014/34/EU „Geräte und Schutzsysteme zur bestimmungsgemäßen Verwendung in explosionsgefährdeten Bereichen“ *“equipment and protective systems intended for use in potentially explosive atmospheres”*	
Harmonisierte Normen *Used harmonized Standards*	EN IEC 60079-0:2018, EN 60079-1:2014, EN 60079-31:2014	Die Anforderungen der Revison der Zulassung EN 60079-0:2012 wurden mit den Anforderungen der neuen Revison EN IEC 60079-0:2018 verglichen, es ergaben sich keine zündgefahrenrelevanten Änderungen. Damit entspricht unser Produkt dem derzeit gültigen Revisonsstand. *The requirements of the revision of the approval EN 60079-0:2012 were compared with the requirements of the new revision EN IEC 60079-0:2018; there were no changes relevant to ignition hazards. Our product therefore complies with the currently valid revision status.*
Benannte Stelle 2813 *Notification Body 2813*	CSA Group Netherlands B.V. Utrechtseweg 310 (B42) 6812AR Arnhem, Netherlands	
Bericht zur Bewertung *Assessment Report*	R80111264A	
Richtlinie *Directive*	2014/35/EU „Niederspannungsrichtlinie“ *“Electrical equipment designed for use within certain voltage limits”*	
Harmonisierte Normen *Used harmonized Standards*	IEC 61010-1:2010 + COR:2011, EN 60947-7-1 to 3:2010	
Richtlinie *Directive*	(1)2014/68/EU „Druckgeräterichtlinie“ *„Pressure Equipment Directive“*	
(1) PS >200 bar und V <0,1l, Artikel 4 Drucktragende Ausrüstungsteile, Modul A *PS >200 bar and V <0,1l, Article 4 Pressure Accessories, Module A*		
Richtlinie *Directive*	2011/65/EU „Richtlinie zur Beschränkung der Verwendung bestimmter gefährlicher Stoffe in Elektro- und Elektronikgeräten“ *“Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment”* 2015/863/EU „Änderung von Anhang II der Richtlinie 2011/65/EU“ *“Amending Annex II to Directive 2011/65/EU”*	
Bewertung *Evaluation*	Das oben benannte Produkt erfüllt die Anforderungen der derzeit gültigen EU Richtlinien. *The above-mentioned product comply with the currently valid provisions of EU Directive.*	

Alsdorf, den 13.03.2025
Ort und Datum
Place and date

ASHCROFT
ATEX Verantwortlicher
ATEX Manager

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