Operating instructions 8048045 1511h [8048047]

Pressure sensor SDE1-...

Festo AG & Co. KG
Postfach
73726 Esslingen
Germany
+49 711 347-0
www.festo.com

1 Product description
The operating instructions describe the entire function range. The function range is limited, depending on the product variant.

1.1 Structure

1 Pneumatic connection (design type-dependent)
2 Electrical connection (design type-dependent)
3 B key
4 Edit button
5 A key
6 Display

2 Security
Intended use
The pressure sensor SDE1 is intended for monitoring pressure in piping or terminals.

General safety information
– The product may only be used in its original status without unauthorised modifications.
– Only use the product if it is in an excellent technical status.
– The product is intended for use in industrial environments. Measures may need to be implemented in residential areas for radio interference suppression.
– Take into consideration the operating conditions at the location of use.
– Observe the specifications on the rating plate.
– Comply with all applicable national and international regulations.

Disposal
– Observe the local specifications for environmentally friendly disposal.

Range of applications and certifications
In combination with the UL mark on the product, the information included in this section is also applicable for compliance with the certification requirements of Underwriters Laboratories Inc. (UL) for USA and Canada. Observe the following English-language remarks from UL:

UL approval information
Product category code NRNT2 (USA) NRNT8 (Canada)
File number E253738
Considered standards UL 508, 17th edition, C22.2 No. 14-95
UL mark

2 Only for connection to an NEC/CEC Class 2 supply.
Raccorder uniquement a un circuit NEC/CEC Classe 2.

Technical data
Max. surrounding air temperature 50 °C / 122 °F

This device is intended to be used with a Class 2 power source or Class 2 transformer in accordance with UL1310 or UL1585. As an alternative, an LV/C (Limited Voltage/Current) power source with one of the following properties can be used:
– This device shall be used with a suitable isolating source such that the maximum open circuit voltage potential available to the product is not more than 30 V DC and the current is limited to a value not exceeding 8 amperes measured after 1 minute of operation.
– This device shall be used with a suitable isolating source in conjunction with a fuse in accordance with UL248. The fuse shall be rated max. 3.3 A and be installed in the 30 V DC power supply to the device in order to limit the available current.

Note that, when more than one power supply or isolating device is used, connection in parallel is not permitted.
3 Function and application

The pressure sensor SDE1 converts pneumatic pressure values into electrical signals. Measurements are carried out using a piezoresistive sensor element with a following electronic evaluation unit. Depending on the type, interfacing to the higher-level systems is provided by 1 or 2 switching outputs and an analogue output. Depending on the type and application, the differential pressure or relative pressure is measured.

The switching outputs can be configured as normally closed or normally open contacts. The switching points can be determined as threshold value or window comparator.

3.1 Operating statuses

<table>
<thead>
<tr>
<th>Operating status</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>RUN mode</td>
<td>– Basic status after the operating voltage is switched on</td>
</tr>
<tr>
<td>SHOW mode</td>
<td>– Display of the current measured value</td>
</tr>
<tr>
<td>EDIT mode</td>
<td>– Display of the current settings</td>
</tr>
<tr>
<td>TEACH mode</td>
<td>– Acceptance of the current measured value to determine switching points</td>
</tr>
</tbody>
</table>

3.2 Switching functions

3.2.1 Switching functions for monitoring of a pressure threshold

<table>
<thead>
<tr>
<th>Function</th>
<th>NO (normally open)</th>
<th>NC (normally closed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switching function:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>– 1 switching point (SP)</td>
<td>Out</td>
<td>HY</td>
</tr>
<tr>
<td>TEACH mode:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>– 2 teach-in points (TP1, TP2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>– SP = ½ (TP1 + TP2)</td>
<td>TP1</td>
<td>SP</td>
</tr>
</tbody>
</table>

3.2.2 Window comparator for monitoring of a pressure range

<table>
<thead>
<tr>
<th>Function</th>
<th>NO (normally open)</th>
<th>NC (normally closed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switching function:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>– 2 switching points (SP_{min}, SP_{max})</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TEACH mode:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>– 2 teach-in points (TP1, TP2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>– TP1 = SP_{min} + TP2 = SP_{max}</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Fig. 5

4 Installation

Installation to be carried out only by qualified personnel in accordance with the operating instructions.

- Remove all transport packaging. The material used in the packaging has been specifically chosen for its recyclability.
- Install the sensor so that condensation from the compressed air lines cannot collect in it.

4.1 Mechanical

SDE1-…-R14/-R18

1. 2. 3.

- R14: max. 12 Nm
- R18: max. 7 Nm

Fig. 8

SDE1-…-H

Fig. 9

SDE1-…-W

– Wall mounting hole pattern ➔ Fig. 32

1. 2.

Fig. 10

SDE1-…-FQ4

– Size of the front panel cut-out in mm ➔ Fig. 11
1. Guide sensor from the front into the cut-out on the front panel.
2. Attach the clamping plate and press until the fastening slide clips in.

Fig. 11

Fig. 12

4.2 Pneumatic

SDE1-…-H18/-W18

Max. 7 Nm

Fig. 13

SDE1-…-HQ4/-WQ4/-FQ4

– Insert tube (outside diameter 4 mm) into the push-in fitting.
– Observe connection of p1 and p2 (relative pressure p1 / differential pressure p1 - p2).

Fig. 14

4.3 Mechanical and pneumatic (SDE1-…-MS4/-MS6)

The sensor can be mounted to the following MS-series devices:
– DE, DL, EE, EM1, FRM, LFR, LR, LRB

Mounting adapter

1. Seal either the trunnion (a) or drill hole (b) with O-ring.
2. Push the mounting screws at the mounting brackets outwards and tighten.

Fig. 15
Mounting sensor

The sensor can be rotated 180°.

- Check moulded seal (c) for proper seating.
- Make sure the sealing surfaces between the sensor and adapter are clean.

1.  
2.  

Fig. 16

4.4 Electrical

⚠️ Warning

Use only power sources which guarantee reliable electrical isolation of the operating voltage in accordance with IEC/EN 60204-1. Consider also the general requirements for PELV circuits in accordance with IEC/EN 60204-1.

- Connect sensor.
  - Maximum permissible cable length: 30 m
  - Maximum tightening torque of plug connector: M8 = 0.3 Nm, M12 = 0.5 Nm

SDE1-... (1 output)

<table>
<thead>
<tr>
<th>Pin / wire colour</th>
<th>Allocation</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-pin M8</td>
<td>4-pin M12</td>
</tr>
</tbody>
</table>

1 / brown (BN) Operating voltage +24 V
2 / - not connected
3 / blue (BU) 0 V
4 / black (BK) Switching output OutA

Fig. 17

Circuit diagrams

SDE1-...-P1

Fig. 18

SDE1-...-...-P2

Fig. 20

5 Commissioning

Commissioning is to be carried out only by qualified personnel in accordance with the operating instructions.

5.1 Symbols on the display

The design of the display is type-dependent.

<table>
<thead>
<tr>
<th>Type</th>
<th>SDE1-...-C</th>
<th>SDE1-...-L</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>LCD display with backlighting</td>
<td>Illuminated LCD display</td>
</tr>
<tr>
<td>Display</td>
<td>[Diagram]</td>
<td>[Diagram]</td>
</tr>
</tbody>
</table>

Fig. 21

Symbols on the display

<table>
<thead>
<tr>
<th>SDE1-...-C</th>
<th>SDE1-...-L</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td></td>
</tr>
<tr>
<td>[ ]</td>
<td>Switching output OutA / switching output OutB</td>
</tr>
<tr>
<td>[ ]</td>
<td>Switching output set / not set</td>
</tr>
<tr>
<td>[ ]</td>
<td>Threshold value comparator</td>
</tr>
<tr>
<td>[ ]</td>
<td>Window comparator</td>
</tr>
<tr>
<td>[ ]</td>
<td>Switching point</td>
</tr>
<tr>
<td>[ ]</td>
<td>Lower switching point</td>
</tr>
<tr>
<td>[ ]</td>
<td>Upper switching point</td>
</tr>
<tr>
<td>[ ]</td>
<td>Hysteresis</td>
</tr>
<tr>
<td>[ ]</td>
<td>Contact (normally open)</td>
</tr>
<tr>
<td>[ ]</td>
<td>Contact (normally closed)</td>
</tr>
<tr>
<td>[ ]</td>
<td>Minimum measured pressure since switch-on or the last reset</td>
</tr>
<tr>
<td>[ ]</td>
<td>Maximum measured pressure since switch-on or the last reset</td>
</tr>
</tbody>
</table>

Fig. 19
Symbols on the display | Description
---|---
SDE1-…-C | Security code active (blocked against unauthorized parameterisation)
SDE1-…-L | Segments illuminated: Graphic display of the current measured value related to the maximum measured value of the measuring range
[lock] | Display flashes: Minimum/maximum value is reset.
[min]/[max] | Segments flash: Hysteresis value is displayed.
| | Segment 5 flashes: Value of switching point SP or SPH is displayed.
| | Segment 8 flashes: Value of switching point SPH is displayed.
| | Segment 1 flashes: Minimum value min or P.L is displayed.
| | Segment 10 flashes: Maximum value max or P.HI is displayed.

Fig. 22

5.2 Switch on sensor (RUN mode)
- **Switch on the operating voltage.**
  - The current measured value is displayed. The sensor is in the basic status (RUN mode).

5.3 Displaying parameters (SHOW mode)
**Requirement:** The sensor is ready for operation (RUN mode).

- **Press the A key for the switching output OutA and also the Edit button.**
- **Enter security code set with A key or B key.**
- **Press the Edit button.**
  - The parameter entry option is unblocked. [OutA] flashes.
  - **Press the Edit button.**
  - The currently set unit flashes.
  - **Enter security code with A key or B key.**
  - **Press the Edit button.**
  - The parameter entry option is unblocked. [OutA] flashes.
  - **With [A], the security code is deactivated.**
  - **Press the Edit button.**
  - **Switch to the RUN mode.**

5.5 Configuring switching output (EDIT mode)

**Requirement:** The sensor is ready for operation (RUN mode).

1. **Press the Edit button.**
   - If the security code is activated: [Lock] flashes.
2. **Enter security code set with A key or B key.**
3. **Press the Edit button.**
   - **The parameter entry option is unblocked. [OutA] flashes.**
4. **Press the Edit button.**
   - The next adjustable parameter flashes.
5. **Enter security code with A key or B key, select the parameter or value.**
6. **Press the Edit button.**
   - Switch to the RUN mode.

5.6 Set the display unit and security code (EDIT mode)

5.7 Teach switching points (TEACH mode)

**Requirement:** The sensor is ready for operation (RUN mode).

1. **Determine switching function**
2. **Create pressure value 1.**
3. **Press the A key for the switching output OutA and also the Edit button.**
   - With active security blocking: [lock] flashes.
4. **Enter security code set with A key or B key.**
5. **Press the Edit button.**
   - **The parameter entry option is unblocked. [OutA] flashes.**
6. **Create pressure value 2.**
7. **Press the A key for the switching output OutA and also the Edit button.**
   - **The current pressure value is adopted as the second teaching point (TP2).**
8. **Press the Edit button.**
   - **Switch to the RUN mode.**

5.4 Displaying minimum/maximum value

**Requirement:** The sensor is ready for operation (RUN mode).

1. **Press the A key and B key simultaneously.**
   - The lowest pressure value since the last switch-on or reset is displayed.
2. **Press the A key and B key simultaneously.**
   - The highest pressure value since the last switch-on or reset is displayed.
3. **Press the A key and B key simultaneously.**
   - **Switch to the RUN mode.**

The following options exist for resetting from the minimum and maximum values:
- Press the A key and B key simultaneously for longer than 2 seconds.
- Switch off the operating voltage.
6 Operation

Note

Property damage due to high temperatures.
Extreme pneumatic conditions (high cycle rate with large pressure amplitude) can heat the device over 80 °C.
- Select the operating conditions (in particular the ambient temperature, pressure amplitude, cycle rate, current consumption) such that the device does not heat up above the maximum permitted operating temperature.

Restore factory settings

Restoring the factory settings causes the current settings to be lost.

1. Switch off the operating voltage.
2. Keep the A key and B key pressed down simultaneously.
3. Switch on the operating voltage.
4. Additionally press the Edit button.

All parameters are reset to the factory settings.

7 Maintenance and care

1. Switch off the energy sources (operating voltage, compressed air).
2. Clean sensor with non-abrasive cleaning agents.

8 Disassembly

1. Switch off the energy sources (operating voltage, compressed air).
2. Allow the sensor to cool off.
3. Separate connections from the sensor.
4. Loosen the mountings ➔ Fig. 25 to Fig. 28

9 Fault clearance

<table>
<thead>
<tr>
<th>Malfunction</th>
<th>Possible cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>No display</td>
<td>No operating voltage or impermissible operating voltage.</td>
<td>• Apply permissible operating voltage.</td>
</tr>
<tr>
<td>No display</td>
<td>Electrical connections swapped.</td>
<td>• Connect the device in accordance with the circuit diagram.</td>
</tr>
<tr>
<td>Incomplete display</td>
<td>Pressure failure</td>
<td>• Eliminate pressure failure.</td>
</tr>
<tr>
<td>Incorrect pressure display</td>
<td>Only with SDE1-...-Q4: Pneumatic connections swapped.</td>
<td>• Reconnect tubing to device (4.2 Pneumatic).</td>
</tr>
<tr>
<td>Pressure indicator flashes.</td>
<td>Measuring range exceeded.</td>
<td>• Comply with the measuring range.</td>
</tr>
<tr>
<td>Switching output does not react in accordance with the settings.</td>
<td>Short circuit or overload at the output.</td>
<td>• Eliminate short circuit or overload.</td>
</tr>
<tr>
<td>Device defective.</td>
<td>Incorrect switching point taught (e.g. at 0 bar)</td>
<td>• Repeat teaching.</td>
</tr>
</tbody>
</table>

10 Accessories

Accessories ➔ www.festo.com/catalogue
### Technical data

**General information**
- Certification: RCM Mark, c UL us - Recognized (DL) 1)
- CE marking: Declaration of conformity

**Input signal / measuring element**
- Operating medium: Compressed air in accordance with ISO 8573-1:2010 [7:4:4], lubricated operation possible

**Output, general**
- Accuracy [% FS]: ±2 at room temperature, ±3 in the entire temperature range
- Repetition accuracy [% FS]: ±0.3 (short time)

**Switching output**
- Switch-on time [ms]: Typical 5 / max. 10
- Switch-off time [ms]: Typical 5 / max. 10
- Max. output current [mA]: 150
- Capacitive load maximum DC [nF]: 100
- Inductive protective circuit: Present

**Analogue output**
- Analogue output [V]: 0 ... 10
- Analogue output [mA]: 4 ... 20

**Electronics**
- Operating voltage range DC [V]: 15 ... 30
- Idle current [mA]: SDE1-...-C: Max. 35 (approx. 30 typ.)
- Ready-state delay [ms]: Max. 450 (with suppression of incorrect switch-on pulse)

**Mechanics**
- Mounting position: Any, avoid condensation gathering in the sensor
- Housing material: PA, POM reinforced
- Material of keys: PA
- Material of display: PC

**Display / operation**
- Switching pressure setting range [bar]: -0.020 ... 0.999
- Hysteresis setting range [bar]: 0.000 ... 0.900

**Immissions / emissions**
- Storage temperature [°C]: -20 ... +80

**1** Front panel built-in devices SDE1-...-FQ4-... have no UL certification.