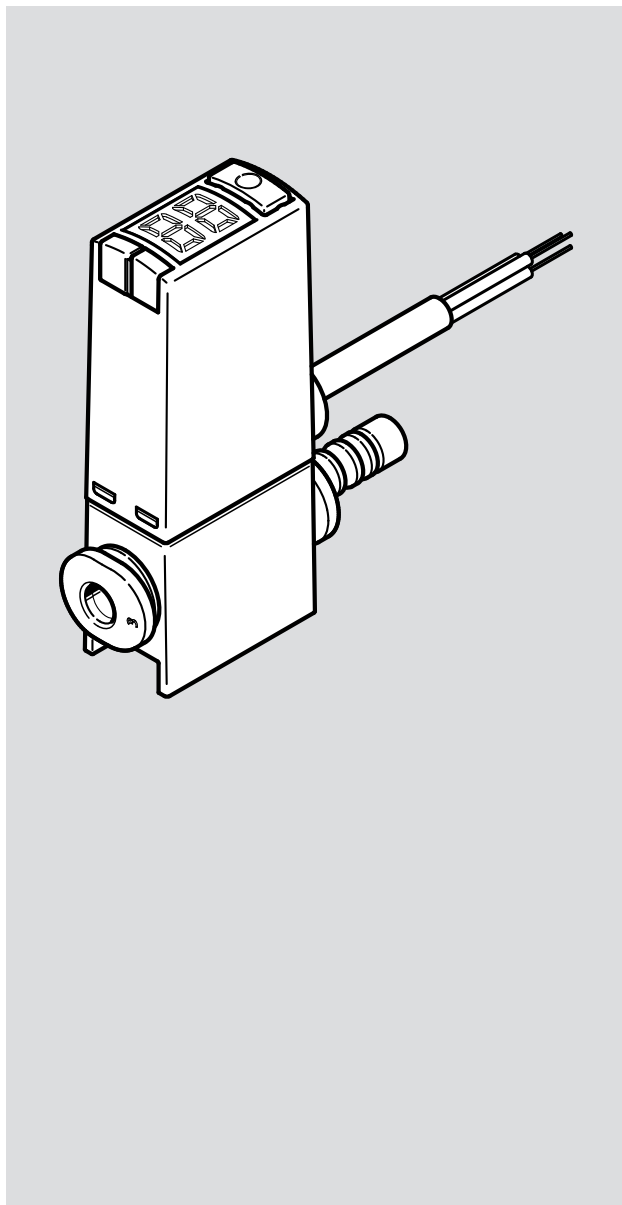


# SPAE

Pressure sensor



# FESTO

Operating instruc-  
tion



8185191

8185191  
2022-12c  
[8185193]

Translation of the original instructions

IO-Link is a registered trademark of its respective trademark holder in certain countries.

# Table of contents

|           |                                         |           |
|-----------|-----------------------------------------|-----------|
| <b>1</b>  | <b>Applicable Documents</b>             | <b>4</b>  |
| <b>2</b>  | <b>Safety</b>                           | <b>4</b>  |
| 2.1       | Safety instructions                     | 4         |
| 2.2       | Intended use                            | 4         |
| 2.3       | Training of qualified personnel         | 4         |
| 2.4       | Range of application and certification  | 4         |
| <b>3</b>  | <b>Additional information</b>           | <b>5</b>  |
| <b>4</b>  | <b>Product overview</b>                 | <b>5</b>  |
| 4.1       | Product overview                        | 5         |
| 4.1.1     | Display components                      | 5         |
| 4.1.2     | Operating key                           | 7         |
| 4.2       | Function                                | 7         |
| 4.2.1     | Operating statuses                      | 7         |
| 4.2.2     | Switching functions                     | 8         |
| <b>5</b>  | <b>Assembly</b>                         | <b>9</b>  |
| 5.1       | Mounting sensor on mounting clip        | 9         |
| 5.2       | Mounting sensor on plate                | 10        |
| 5.3       | Mounting sensor on QS plug connector    | 10        |
| <b>6</b>  | <b>Installation</b>                     | <b>11</b> |
| 6.1       | Installation, electrical                | 11        |
| <b>7</b>  | <b>Commissioning</b>                    | <b>11</b> |
| 7.1       | Displaying parameters in SHOW mode      | 11        |
| 7.2       | Setting sensor in EDIT mode             | 11        |
| 7.3       | Teaching switching point in TEACH mode  | 12        |
| 7.4       | Replicating parameters                  | 13        |
| 7.5       | Menu structure                          | 15        |
| <b>8</b>  | <b>Operation</b>                        | <b>16</b> |
| 8.1       | Restoring factory settings (Restore)    | 16        |
| <b>9</b>  | <b>Fault clearance</b>                  | <b>16</b> |
| <b>10</b> | <b>Removal</b>                          | <b>17</b> |
| <b>11</b> | <b>Technical data</b>                   | <b>17</b> |
| 11.1      | Technical data for UL/CSA certification | 20        |

# 1      Applicable Documents



All available documents for the product → [www.festo.com/sp](http://www.festo.com/sp).

## 2      Safety

### 2.1      Safety instructions

- Only use the product in its original condition without unauthorised modifications.
- Only use the product if it is in perfect technical condition.
- Observe the identifications on the product.
- Before working on the product, switch off the compressed air supply and lock it to prevent it from being switched on again.
- Only use media in accordance with the specifications → Technical data.
- The product may generate high frequency interference, which may require interference suppression measures in residential areas.

### 2.2      Intended use

The sensor records the relative pressure in pneumatic applications.

### 2.3      Training of qualified personnel

Work on the product may only be carried out by qualified personnel who can evaluate the work and detect dangers.

The qualified personnel have skills and experience in dealing with electropneumatic (open-loop) control technology.

### 2.4      Range of application and certification

In combination with the UL inspection mark on the product, the information in this section must also be observed in order to comply with the certification conditions of Underwriters Laboratories Inc. (UL) for USA and Canada.

| UL approval information |                                                                                     |
|-------------------------|-------------------------------------------------------------------------------------|
| Product category code   | QUYX2 (USA)<br>or QUXY8 (Canada)                                                    |
| File number             | E322346                                                                             |
| Considered standards    | UL 61010-1<br>CAN/CSA 22.2 No. 61010-1                                              |
| UL mark                 |  |

Tab. 1: UL certification information

Conditions of Acceptability

For use only in or with complete equipment where the acceptability of the combination is determined by UL LLC. When installed in an end-product, consideration must be given to the following:

- This component has been judged on the basis of the creepage and clearances required in the indicated Standards, which would cover the component itself if submitted for Listing: CAN/CSA 22.2 No. 61010-1-12 3rd Ed., UL 61010-1 3rd Ed.
- The end-product shall consider that: The enclosure does not serve as a fire/electrical/mechanical enclosure.
- The output connectors are: Not investigated for field wiring.
- The unit is considered acceptable for use in a max ambient of: 50 °C.

3 Additional information

- Contact the regional Festo contact if you have technical problems → [www.festo.com](http://www.festo.com).
- Accessories and spare parts → [www.festo.com/catalogue](http://www.festo.com/catalogue).

4 Product overview

4.1 Product overview

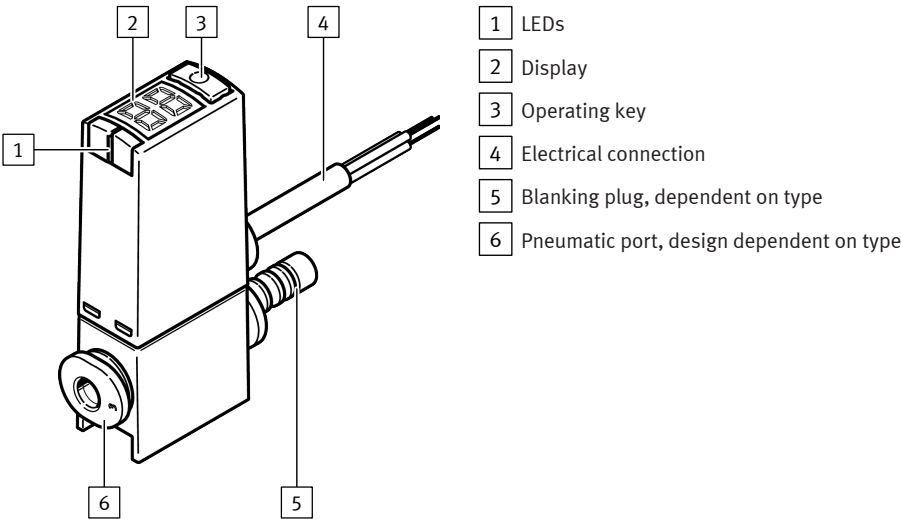


Fig. 1: Design

4.1.1 Display components

| LED           | Display         | Meaning                                 |
|---------------|-----------------|-----------------------------------------|
| Both LEDs on  | Continuously on | RUN mode: switching output switched     |
| Both LEDs off | Continuously on | RUN mode: switching output not switched |

| LED                            | Display                              | Meaning                                     |
|--------------------------------|--------------------------------------|---------------------------------------------|
| One LED flashes                | Continuously on                      | RUN mode: IO-Link communication active      |
| Both LEDs off                  | Function and Value flash alternately | SHOW mode                                   |
| Both LEDs flash alternately    | Continuously on or flashing          | EDIT mode: first menu option                |
| Both LEDs flash simultaneously | Continuously on or flashing          | EDIT mode: second menu option or TEACH mode |

Tab. 2: LEDs

| Display | Meaning                                                                                                                                |
|---------|----------------------------------------------------------------------------------------------------------------------------------------|
| <Value> | In RUN mode: current measured value in % FS<br>Single-digit pressure display values are displayed with a preceding underscore, e.g. _1 |
| 'F0'    | Switching function F0 → 4.2.2 Switching functions                                                                                      |
| 'F1'    | Switching function F1 → 4.2.2 Switching functions                                                                                      |
| 'F2'    | Switching function F2 → 4.2.2 Switching functions                                                                                      |
| 'F3'    | Switching function F3 → 4.2.2 Switching functions                                                                                      |
|         | Threshold value comparator                                                                                                             |
|         | Window comparator                                                                                                                      |
| 'P1'    | Switching point P1 in % FS                                                                                                             |
| 'P2'    | Switching point P2 in % FS; not with switching function F0 and F1                                                                      |
| 'HY'    | Hysteresis in % FS:<br>Adjustable from 0 ... 99, corresponds to 0 to 9.9% FS; not with switching function F2                           |
| 'Lo'    | Minimum measured value in % FS                                                                                                         |
| 'Hi'    | Maximum measured value in % FS                                                                                                         |
| 'Pn'    | PNP switching output                                                                                                                   |
| 'nP'    | NPN switching output                                                                                                                   |
| 'nc'    | Switching logic normally closed contact                                                                                                |
| 'no'    | Switching logic normally open contact                                                                                                  |
| 'di'    | Switch display on and off:<br>'On' = always on; '1' ... '20' = switch off after 1 ... 20 minutes                                       |
| 'do'    | Aligning the numeric indicator on the display:                                                                                         |
| 'op'    | 'do' = default alignment; 'op' = rotated 180°                                                                                          |

| Display | Meaning                                                                                                                                          |
|---------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| 'LC'    | Enabling and disabling the security code:<br>'OF' = security coded deactivated; 'On' = security coded activated;<br>'1' ... '99' = security code |
| 'rP'    | IO-Link master function to replicate parameters:<br>'On' = replicate on; 'OF' = replicate off                                                    |

Tab. 3: Display

#### 4.1.2 Operating key

The operating key is used to select switching functions and set parameters. The function of the operating key is time and context-dependent. If the operating key is not actuated for approx. 12 seconds during the setting procedure, the sensor will automatically switch to the RUN mode. Changed setting values are accepted. Exceptions: TEACH mode and display min./max. measured values.

### 4.2 Function

The sensor converts pneumatic pressure values into a voltage proportional to the pressure. The measurement is made using a piezoresistive sensor element.

The connection to the higher-level system is established via a switching output or a IO-Link interface. The switching output can be configured to monitor a threshold value or a pressure range. The PNP or NPN and the normally open (N/O) or normally closed (N/C) output can be optionally set in this process.

The process values can be read out and parameters changed and transmitted to additional devices through the IO-Link interface.

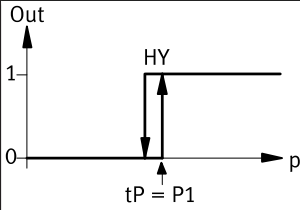
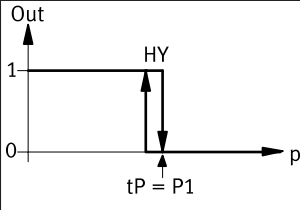
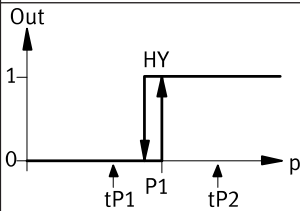
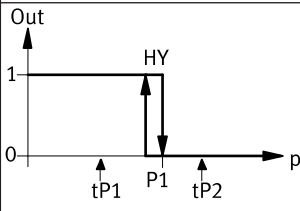
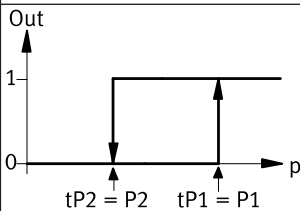
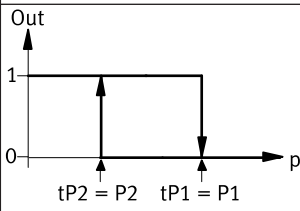
#### 4.2.1 Operating statuses

| Operating status | Function                                                                                                                                                                                                             |
|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| RUN mode         | <ul style="list-style-type: none"> <li>– Basic state after the operating voltage has been applied.</li> <li>– Display of the current measured value.</li> <li>– Display of the selected switching status.</li> </ul> |
| SHOW mode        | – Display of the current settings.                                                                                                                                                                                   |
| EDIT mode        | – Setting or modification of parameters.                                                                                                                                                                             |
| TEACH mode       | – Acceptance of the current measured value to determine the switching point.                                                                                                                                         |

Tab. 4: Operating statuses

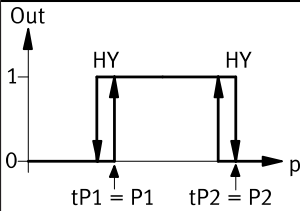
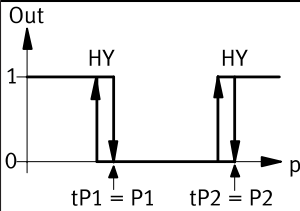
### 4.2.2 Switching functions

#### Threshold value comparator

| Function                                                                                                                                                                           | Normally open contact (N/O)                                                       | Normally closed (N/C contact)                                                     |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| <b>F0:</b><br>Switching function:<br>– Threshold value comparator<br>– 1 switching point (P1)<br>TEACH mode:<br>– 1 teach-in point (tP)<br>– $tP = P1$                             |  |  |
| <b>F1:</b><br>Switching function:<br>– Threshold value comparator<br>– 1 switching point (P1)<br>TEACH mode:<br>– 2 teach-in points (TP1, TP2)<br>– $P1 = \frac{1}{2} (tP1 + tP2)$ |  |  |
| <b>F2:</b><br>Switching function:<br>– Threshold value comparator<br>– 2 switching points (P1, P2)<br>TEACH mode:<br>– 2 teach-in points (TP1, TP2)<br>– $tP1 = P1, tP2 = P2$      |  |  |

Tab. 5: Threshold value comparator

#### Window comparator

| Function                                                                                                                                                             | Normally open contact (N/O)                                                         | Normally closed (N/C contact)                                                       |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| <b>F3:</b><br>Switching function:<br>– Window comparator<br>– 2 switching points (P1, P2)<br>TEACH mode:<br>– 2 teach-in points (TP1, TP2)<br>– $tP1 = P1, tP2 = P2$ |  |  |

Tab. 6: Window comparator

## 5 Assembly

### NOTICE

**An unfavourable mounting position may impair the function of the product.**

- When selecting the mounting position, make sure that condensate from the compressed air lines cannot accumulate in the sensor.

### 5.1 Mounting sensor on mounting clip

Product variant SPAE-...-Q... and mounting clip SAMH

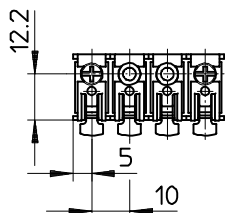


Fig. 2: Mounting clip SAMH

1. Slide the sensor into the mounting clip with the cable outlet at the top or with the cable outlet at the bottom.
2. If the tubing is on one side, close the unused pneumatic port with a blanking plug.

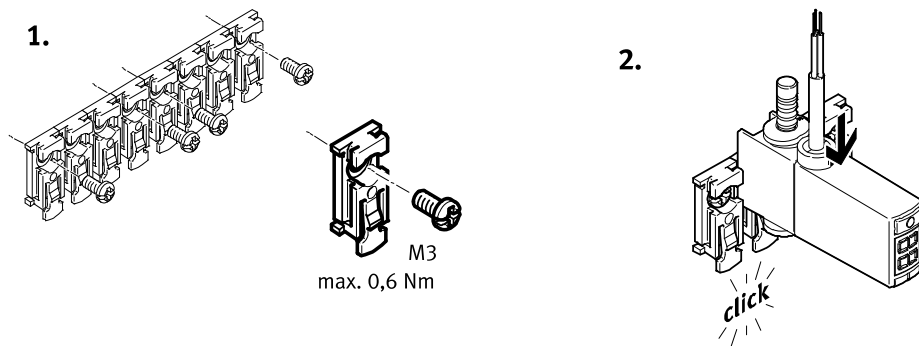


Fig. 3: SPAE-...-Q...

## 5.2 Mounting sensor on plate

### Product variant SPAE-...-F

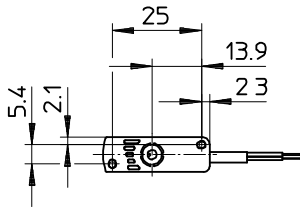


Fig. 4: Flange hole pattern SPAE-...-F<sup>1)</sup>

- <sup>1)</sup> Pressure port hole: maximum  $\varnothing$  2 mm  
– Check that the sealing ring is correctly seated.

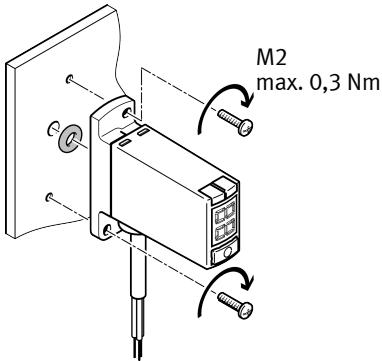


Fig. 5: SPAE-...-F

## 5.3 Mounting sensor on QS plug connector

### Product variant SPAE-...-S...

- Insert the sensor into the QS plug connector to the stop.

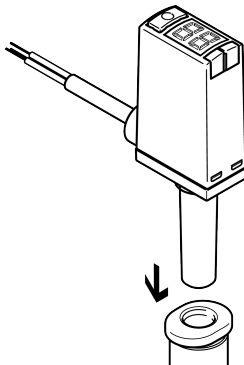


Fig. 6: SPAE-...-S...

## 6 Installation

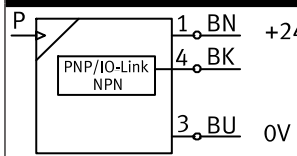
### 6.1 Installation, electrical

#### WARNING

##### **Risk of injury due to electric shock.**

- For the electric power supply, use only PELV circuits that ensure a reliable electric disconnection from the mains network.
  - Observe IEC 60204-1/EN 60204-1.
- 
- Connect the sensor.
    - Note maximum permissible cable lengths → 11 Technical data.
    - Only route the signal line and power supply in a common line.

##### **Circuit diagram and wire assignment**

| Circuit diagram                                                                   | Core colour | Allocation                             |
|-----------------------------------------------------------------------------------|-------------|----------------------------------------|
|  | Brown (BN)  | Operating voltage +24 V DC             |
|                                                                                   | Black (BK)  | Switching output or IO-Link (C/Q line) |
|                                                                                   | Blue (BU)   | 0 V                                    |

Tab. 7: Circuit diagram

## 7 Commissioning

### 7.1 Displaying parameters in SHOW mode

Requirement: the sensor is ready for operation and is in RUN mode.

1. Press the operating key briefly.
  - ↳ The sensor is in SHOW mode. The first parameter set is displayed.
2. Press the operating key to display each of the following parameters.
  - ↳ The other parameters are displayed.

### 7.2 Setting sensor in EDIT mode

Requirement: the sensor is ready for operation and is in RUN mode.

#### **Entering security code**

If the security code is enabled, the parameter entry option is blocked: 'LC' flashes briefly, then the value 1 appears.

1. Press the operating key repeatedly until the security code is set.
2. Press and hold the operating key.
  - ↳ The parameter entry option is unblocked.

### Setting the switching function

1. Press the operating key once.
  - ↳ The display alternates between the designation and the symbol of the currently set switching function.
2. Press and hold the operating key to switch to EDIT mode.
  - ↳ The LEDs flash alternately.
3. Press the operating key repeatedly until the desired switching function appears in the display.
4. Press and hold the operating key.
  - ↳ The setting is saved.
  - ↳ The RUN mode is active.

### Setting switching points and hysteresis

- The hysteresis display value corresponds to 10 times the actual value, e.g. the value of the value 10 corresponds to a hysteresis of 1.0% FS.
  - Parameters 'P2' and 'HY' are only displayed if they are intended for the set switching function  
➔ 4.2.2 Switching functions.
  - The values can be set in two stages with a rough adjustment in steps of ten and a precision adjustment in steps of one.
1. Press the control button repeatedly until the required parameter appears on the display.
    - ↳ The display alternately shows the designation and the value of the currently set switching function.
  2. Press and hold the operating button to switch to the EDIT mode and make the rough adjustment.
    - ↳ The LEDs flash alternately.
  3. Press the operating key repeatedly until a value is displayed that is equal to, or slightly less than, the desired value.
  4. Press and hold the operating key to make the precision adjustment.
    - ↳ The LEDs flash simultaneously.
  5. Press the operating key repeatedly until the desired value is displayed.
  6. Press and hold the operating key to save the setting.
    - ↳ The RUN mode is active.

## 7.3 Teaching switching point in TEACH mode

Requirement: the sensor is ready for operation and is in RUN mode.

### Entering security code

The teach function is blocked when the security code is activated.

- Enable parameter entry ➔ Entering security code.

### Setting switching point with a teach pressure at F0

1. Apply the teach pressure to the sensor.

2. Press and hold the operating key to accept the teach pressure as the switching point.



The display alternates between 'P1' and the value of the set switching point while the operating key is pressed.

---

↗ The teach pressure is applied as the switching point.

3. Release the operating key.

↗ The RUN mode is active.

### Setting switching point with two teach pressures

1. Apply the first teach pressure to the sensor.
2. Press and hold the operating key to accept the teach pressure as the switching point.



The display alternates between 'tP' and the value of the set switching point while the operating key is pressed.

---

↗ The teach pressure is set as the switching point.

3. Release the operating key.
4. Apply the second teach pressure to the sensor.
5. Press and hold the operating key to accept the teach pressure as the switching point.



The display alternates between 'tP' and the value of the set switching point while the operating key is pressed.

---

↗ The teach pressure is set as the switching point.

6. Release the operating key.
- ↗ Switching function F1 only: 'P1' and the value of the switching point P1 briefly appear.
- ↗ The RUN mode is active.

## 7.4 Replicating parameters

Requirements:

- The previously configured sensor (master sensor) is ready for operation and is in RUN mode.
- The switching output on the device sensor is configured to PNP and is in an unswitched status; the LED is off.
- The master sensor and device sensor have the same design with reference to the parameters, i.e. they have the same device ID.
- The master sensor is connected to the device sensor and the power supply → Fig. 7.
- Parameterisation of the device sensor must not be blocked via IO-Link.

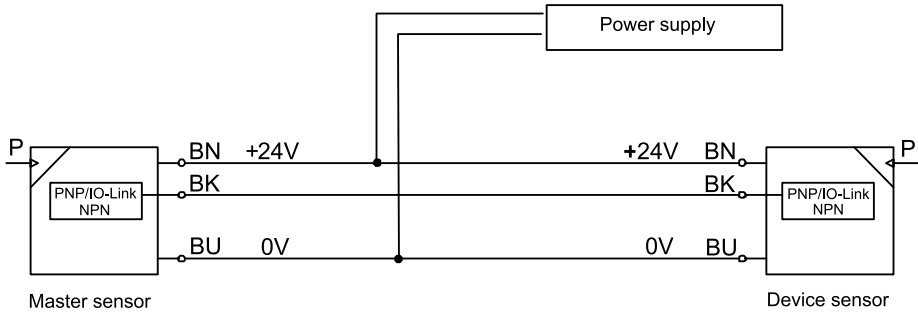


Fig. 7: Terminal allocation

On the configured sensor (master):

1. Press the operating key repeatedly until 'rP'/'OF' appears.
2. Press and hold the operating key.
  - ↳ 'rP'/'On' briefly appears.
  - ↳ After successful replication 'rP'/'OF' appears. If an error occurs, an error message will appear briefly → 9 Fault clearance.
3. If an additional sensor is to be parameterised, connect the additional sensor and repeat step 1 and step 2.
4. Press the operating key briefly.
  - ↳ The RUN mode is active.

## 7.5 Menu structure

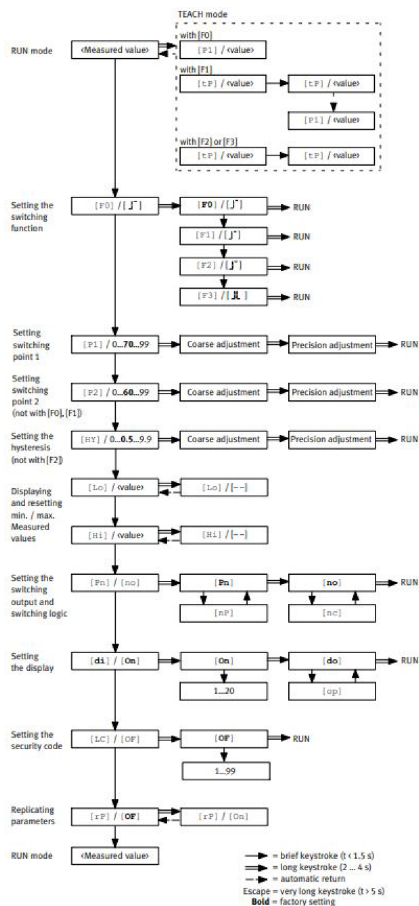


Fig. 8: Menu structure

If the value 'nP' is selected when setting the switching output, operation of the IO-Link is not possible.

## 8 Operation

### 8.1 Restoring factory settings (Restore)



Restoring the factory settings will delete the current settings.

1. Switch off the operating voltage.
2. Press and hold the operating key.
3. Switch on the operating voltage.
  - ↗ A value appears.
  - ↗ ‘..’ appears.
  - ↗ ‘rS’ appears.
4. Release the operating key.

## 9 Fault clearance

| Malfunction                                                                    | Cause                                                | Remedy                                                                        |
|--------------------------------------------------------------------------------|------------------------------------------------------|-------------------------------------------------------------------------------|
| No display                                                                     | No operating voltage or unreliable operating voltage | – Apply permissible operating voltage                                         |
|                                                                                | Electrical connections swapped                       | – Connect the device in accordance with the circuit diagram                   |
|                                                                                | Device faulty                                        | – Replace device                                                              |
| No measured value indicator in the RUN mode                                    | Display switch-off activated                         | – Press the operating key<br>– Set ‘On’ value                                 |
| Display flashes in the RUN mode                                                | Measuring range exceeded                             | – Hold measuring range                                                        |
| Implausible measured value                                                     | Wrong display orientation                            | – Check the orientation of the display                                        |
| Indicator or switching output does not respond in accordance with the settings | Short circuit or overload at output                  | – Eliminate short circuit/overload                                            |
|                                                                                | Incorrect switching point set                        | – Repeat teach-in                                                             |
|                                                                                | Device faulty                                        | – Replace device                                                              |
| Display ‘Er’/‘LC’                                                              | Incorrect security code                              | – Entering security code                                                      |
| Display ‘Er’/‘Co’                                                              | IO-Link communication error                          | – Check setting of the device sensor (Pn)<br>– Check line                     |
| Display ‘Er’/‘Id’                                                              | Device ID error, devices do not have the same design | – When replicating, use sensors with the same pressure range (same device ID) |

| Malfunction       | Cause                      | Remedy                                           |
|-------------------|----------------------------|--------------------------------------------------|
| Display 'Er'/'bY' | Switching output is active | – Check device settings                          |
| Display 'Er'/'01' | Device error               | – Replace device                                 |
| Display 'Er'/'17' | Undervoltage               | – Apply permissible operating voltage            |
| Display 'Er'/'20' | Temperature fault          | – Check operating conditions<br>– Replace device |
| Display 'Er'/'21' | Short circuit              | – Eliminate short circuit                        |

Tab. 8: Fault clearance

## 10 Removal

1. Switch off the operating voltage and the compressed air.
2. Disconnect the electrical and pneumatic connections from the sensor.
3. Release the fasteners and remove the sensor.
  - Release the latch when using mounting clips.

## 11 Technical data

| General                   |                                                          |
|---------------------------|----------------------------------------------------------|
| Certification             | RCM Mark, c UR us – Recognized                           |
| Declaration of conformity | → <a href="http://www.festo.com/sp">www.festo.com/sp</a> |

Tab. 9

| Input signal/measuring element |                                                                                          |
|--------------------------------|------------------------------------------------------------------------------------------|
| Operating medium               | Compressed air in accordance with ISO 8573-1:2010 [7:4:4], lubricated operation possible |
| Temperature of medium [°C]     | 0 ... 50                                                                                 |
| Ambient temperature [°C]       | 0 ... 50                                                                                 |

Tab. 10

| Output, general                              |       |
|----------------------------------------------|-------|
| Accuracy at room temperature [% FS]          | ± 1.5 |
| Accuracy in ambient temperature range [% FS] | ± 2.5 |

| Output, general         |          |             |
|-------------------------|----------|-------------|
| Repetition accuracy     | [% FS]   | ± 0.3       |
| Temperature coefficient | [% FS/K] | Typ. ± 0.05 |

Tab. 11

| Switching output             |      |                                                   |
|------------------------------|------|---------------------------------------------------|
| Switch-on time               | [ms] | Typ. 1, with filter time constant = Off (default) |
| Switch-off time              | [ms] | Typ. 1, with filter time constant = Off (default) |
| Max. output current          | [mA] | 100                                               |
| Capacitive load maximum DC   | [nF] | 100                                               |
| Voltage drop                 | [V]  | Max. 1.2                                          |
| Inductive protective circuit |      | Present                                           |

Tab. 12

| Output, additional data      |         |
|------------------------------|---------|
| Short circuit current rating | Yes     |
| Overload protection          | Present |

Tab. 13

| Electronics                 |      |                                   |
|-----------------------------|------|-----------------------------------|
| Operating voltage range DC  | [V]  | 18 ... 30                         |
| No-load supply current      | [mA] | < 11                              |
| Ready-state delay           | [ms] | < 30                              |
| Reverse polarity protection |      | All connections against one other |

Tab. 14

| Electromechanics             |     |                        |
|------------------------------|-----|------------------------|
| Electrical connection        |     | Cable 3-wire, open end |
| Max. permissible line length | [m] | 30, with IO-Link 20    |
| Cable sheath material        |     | PVC                    |

Tab. 15

| <b>Mechanics</b>  |                                                    |
|-------------------|----------------------------------------------------|
| Mounting position | Any, avoid condensation accumulation in the sensor |
| Housing material  | Reinforced PA                                      |
| Key material      | POM                                                |

Tab. 16

| <b>Immission/Emission</b>                          |                                                   |
|----------------------------------------------------|---------------------------------------------------|
| Storage temperature [°C]                           | −20 ... +80                                       |
| Degree of protection in accordance with EN 60529   | IP 40                                             |
| Protection class in accordance with DIN VDE 0106-1 | III                                               |
| Shock resistance in accordance with EN 60068-2     | 30 g acceleration with 11 ms duration (half-sine) |
| Vibration resistance in accordance with EN 60068-2 | 10 ... 60 Hz: 0.35 mm/<br>60 ... 150 Hz: 5 g      |
| Pollution degree                                   | 3                                                 |

Tab. 17

| <b>SPAE</b>          |       | <b>-B2</b>     | <b>-B11</b>     | <b>-V025</b>   | <b>-V05</b>  | <b>-V1</b>     |
|----------------------|-------|----------------|-----------------|----------------|--------------|----------------|
| Pressure gauge range | [MPa] | −0.1 ... 0.1   | −0.1 ... 1      | 0 ... −0.025   | 0 ... −0.05  | 0 ... −0.1     |
|                      | [bar] | −1 ... 1       | −1 ... 10       | 0 ... −0.25    | 0 ... −0.5   | 0 ... −1       |
|                      | [psi] | −14.5 ... 14.5 | −14.5 ... 145   | 0 ... −3.625   | 0 ... −7.25  | 0 ... −14.5    |
| Overload range       | [MPa] | −0.1 ... 0.5   | −0.1 ... 1.5    | −0.1 ... 0.1   | −0.1 ... 0.2 | −0.1 ... 0.5   |
|                      | [bar] | −1 ... 5       | −1 ... 15       | −1 ... 1       | −1 ... 2     | −1 ... 5       |
|                      | [psi] | −14.5 ... 72.5 | −14.5 ... 217.5 | −14.5 ... 14.5 | −14.5 ... 29 | −14.5 ... 72.5 |

Tab. 18

| SPAE                 |       | -P025          | -P05         | -P1            | -P2          | -P6             | -P10            |
|----------------------|-------|----------------|--------------|----------------|--------------|-----------------|-----------------|
| Pressure gauge range | [MPa] | 0 ... 0.025    | 0 ... 0.05   | 0 ... 0.1      | 0 ... 0.2    | 0 ... 0.6       | 0 ... 1         |
|                      | [bar] | 0 ... 0.25     | 0 ... 0.5    | 0 ... 1        | 0 ... 2      | 0 ... 6         | 0 ... 10        |
|                      | [psi] | 0 ... 3.625    | 0 ... 7.25   | 0 ... 14.5     | 0 ... 29     | 0 ... 87        | 0 ... 145       |
| Overload range       | [MPa] | -0.1 ... 0.1   | -0.1 ... 0.2 | -0.1 ... 0.5   | -0.1 ... 0.6 | -0.1 ... 1.5    | -0.1 ... 1.5    |
|                      | [bar] | -1 ... 1       | -1 ... 2     | -1 ... 5       | -1 ... 6     | -1 ... 15       | -1 ... 15       |
|                      | [psi] | -14.5 ... 14.5 | -14.5 ... 29 | -14.5 ... 72.5 | -14.5 ... 87 | -14.5 ... 217.5 | -14.5 ... 217.5 |

Tab. 19

| IO-Link                             |                                                                                                                                                                |
|-------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| IO-Link protocol                    | V1.1                                                                                                                                                           |
| IO-Link profile                     | Smart Sensor Profile<br>Function classes: 0x8000, 0x8001, 0x8002, 0x8003, 0x8004                                                                               |
| Communication mode                  | COM2 (38.4 kbaud)                                                                                                                                              |
| Port type                           | A                                                                                                                                                              |
| Process data length IN              | 2 bytes                                                                                                                                                        |
| Process data content IN             | Pressure monitoring BDC1 (BinaryDataChannel1)<br>Pressure monitoring BDC2 (BinaryDataChannel2)<br>Pressure measurement value PDV 14 bit (Process-DataVariable) |
| IODD and IO-Link device description | ➔ <a href="http://www.festo.com">www.festo.com</a>                                                                                                             |

Tab. 20: General IO-Link specification

## 11.1 Technical data for UL/CSA certification

| Ambient conditions UL/CSA |                            |
|---------------------------|----------------------------|
| Pollution degree          | 2                          |
| Operating temperature     | 0 ... 50 °C/ 32 ... 122 °F |
| Relative humidity         | 0 ... 100%                 |
| For use in wet locations  | No                         |

Tab. 21: Ambient conditions UL/CSA



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