SPAU
Pressure sensor

FESTO

Festo AG & Co. KG
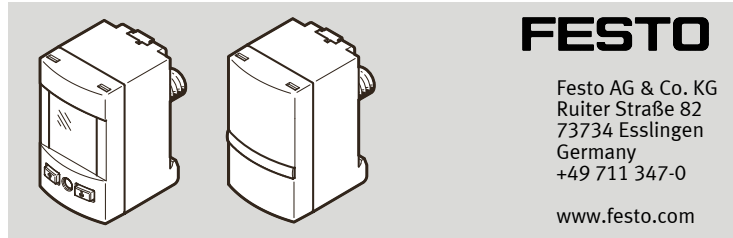Ruiter Straße 82
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Instructions | Operating

8035290
2018-06a
[8035292]

CE

8035290

Translation of the original instructions

1 About this document

The operating instructions describe the entire function range. The function range is limited, depending on the product variant. You can find detailed specifications for the product, the device description file (IODD) with a description of the IO-Link parameters and the declaration of conformity at ➔ www.festo.com.

1.1 Further applicable documents

All available documents for the product ➔ www.festo.com/pk.

2 Safety

2.1 Intended use

The pressure sensor SPAU is intended for monitoring pressure of compressed air and inert gases in the piping.

2.2 General safety instructions

– The product may only be used in its original status without unauthorised modifications.
– Only use the product if it is in perfect technical condition.
– Take into consideration the ambient conditions at the location of use.
– Operate the product only with compressed air of the specified air quality class ➔ 13 Technical data
– Observe the specifications on the product labelling.
– Comply with all applicable national and international regulations.

2.3 Area of application and approval

The information in this section, in combination with the UL marking on the product, must be observed in order for there to be compliance with the certification conditions of Underwriters Laboratories Inc. (UL) for USA and Canada.

UL approval information	
Product category code	QUYX, QUYX7
File number	E322346
Standards taken into account	UL 61010-1 CAN/CSA C22.2 No. 61010-1
UL symbol	c(UL)US LISTED

Tab. 1

The unit must be powered by a power source that fulfils the requirements of an energy-limited circuit in accordance with IEC/EN/UL/CSA 61010-1 or a power source with limited power (LPS) in accordance with IEC/EN/UL/CSA 60950-1 or IEC/EN/UL/CSA 62368-1 or a Class 2 circuit in accordance with NEC or CEC.

3 Service

– If you have technical questions, contact the regional Festo contact at ➔ www.festo.com.

4 Accessories

– Accessories ➔ www.festo.com/catalogue.

5 Product overview

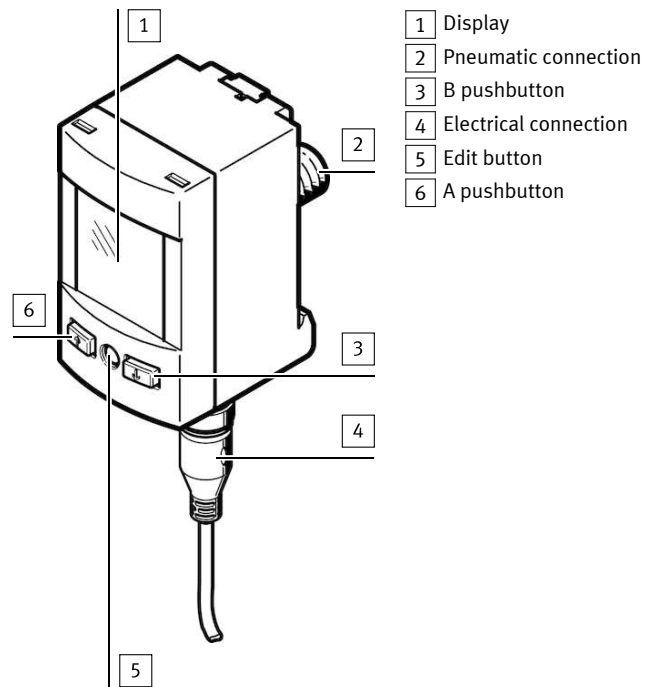|	
1	Display
2	Pneumatic connection
3	B pushbutton
4	Electrical connection
5	Edit button
6	A pushbutton

Fig. 1 Display variant without front panel mounting. Representation of other variants can deviate from this.

6 Function

The sensor converts pneumatic pressure values (relative pressure) into electrical signals, which can be used for control or regulating functions. Measurements are carried out using a piezoresistive sensor element with a following electronic evaluation unit. Connection to the higher-level system is provided by 1 or 2 switching outputs, an analogue output and/or an IO-Link interface. The switching outputs can be configured for monitoring of a threshold value, a pressure range or a differential pressure. For each output, PNP or NPN and normally open (NO) or normally closed (NC) can optionally be set. Through the IO-Link interface, process values can be read out and parameters changed and transmitted to additional devices.

6.1 Operating statuses

Operating status	Function
RUN mode	– Basic status after the operating voltage is switched on – Display of the current measured value
SHOW mode	– Display of the current settings – Display and resetting of the minimum and maximum values
EDIT mode	Setting or modification of parameters
TEACH mode	Acceptance of the current measured value to determine switching points

Tab. 2

6.2 Switching functions

6.2.1 Threshold value comparator for monitoring of a pressure threshold _⌐

Function	NO (normally open)	NC (normally closed)
Switching function: – 1 switching point (SP) TEACH mode: – 2 Teach points (TP1, TP2) – SP = ½ (TP1+TP2)		

Tab. 3

6.2.2 Window comparator for monitoring of a pressure range _⌐⌐_

Function	NO (normally open)	NC (normally closed)
Switching function: – 2 switching points (SP.Lo, SP.Hi) TEACH mode[1]: – 2 Teach points (TP1, TP2) – TP1 = SP.Lo, TP2 = SP.Hi		

1) SP.Lo = smaller pressure/vacuum value, SP.Hi = larger pressure/vacuum value, dependent on the Teach sequence

Tab. 4

6.2.3 Auto difference monitoring d_⌐⌐_

This function permits monitoring of a pressure value for constancy. The applied pressure is constant in the range between [SP.Lo] and [SP.Hi], so the reference pressure P_{Ref} is automatically determined. The result is a switching operation at

the output. The signal change signals the start of pressure monitoring. If the pressure remains in the monitoring range [d.SP] around P_{Ref}, the pressure is stable. When the monitoring range is left (e.g. caused by a leakage in the system), the output switches back.

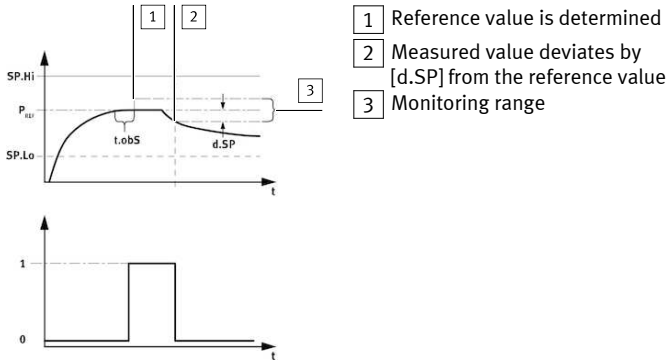| 1 | Reference value is determined |
| 2 | Measured value deviates by [d.SP] from the reference value |
| 3 | Monitoring range |

Fig. 2

The parameters [SP.Lo], [SP.Hi], [t.obS] and [d.SP] can be configured by the user. The greater [t.obS] is set, the more constant the pressure signal must be to establish the reference value P_{Ref}.

Function	NO (normally open)	NC (normally closed)
Switching function: – 2 switching points (SP.Lo, SP.Hi) for setting the valid work range – 1 switching point (d.SP) for determination of the monitoring area TEACH mode[1]: – 2 Teach points (TP1, TP2) – TP1 = SP.Lo, TP2 = SP.Hi		

1) SP.Lo = smaller pressure value, SP.Hi = larger pressure value, independent of the Teach sequence

Tab. 5

7 Installation

Work on the product should only be conducted by qualified personnel.
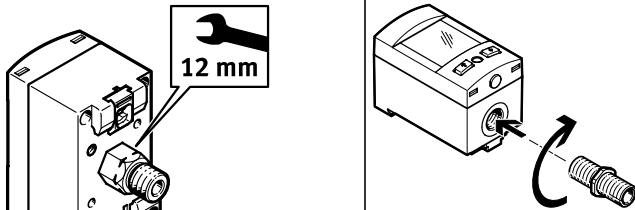
7.1 Mechanical and pneumatic

NOTICE!

An unfavourable mounting position can impair the function of the product.
- Mount the sensor so that no condensation from the compressed air lines can gather in the device.
- Install the sensor so that it cannot be heated above the maximum permissible operating temperature (plan for convection possibilities).
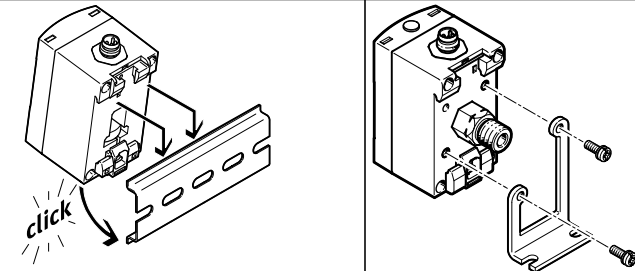
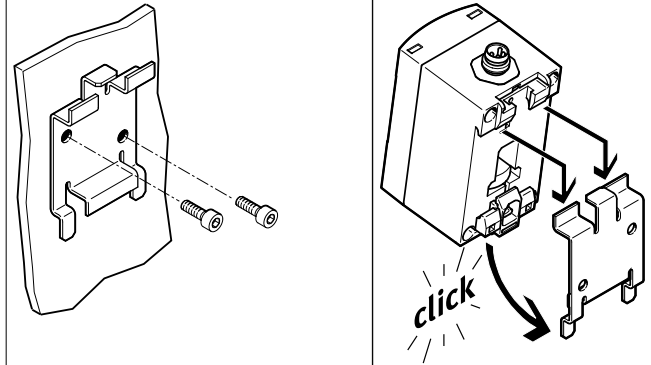| Installation	
SPAU-...-T	
 – Seal connecting thread. Tightening torque: max. 10 Nm (tightening torque M5 female thread: max. 2 Nm)	 Tightening torque: max. 7 Nm
SPAU-...-H	SPAU-...-A
	 Screws: M3 Tightening torque: max. 0.5 Nm Mounting bracket hole pattern ➔ Fig.3

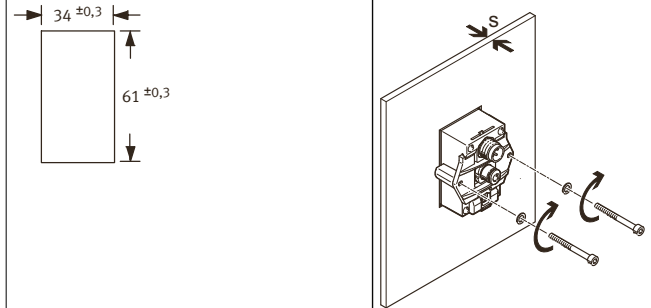| Installation	
SPAU-...-W	
 1. Wall mounting hole pattern ➔ Fig.3	 2.
SPAU-...-F	
 Front panel cut-out in mm	 – Guide sensor from the front into the cut-out on the front panel. – Attach the clamping plate and press until the fastening slide clips in. Screws: M3 Tightening torque: max. 0.7 Nm s < 2 mm: remove 1 washer s < 1 mm: remove 2 washers
SPAU-...-MS...	
 1.	 2. Tightening torque: max. 1 Nm
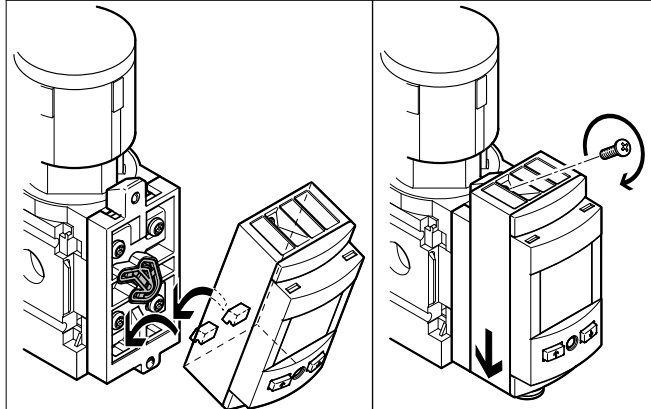
Tab. 6

7.1.1 Hole patterns

Fig. 3 Left wall mounting, right mounting bracket

7.2 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.

Long signal lines reduce the resistance to interference.
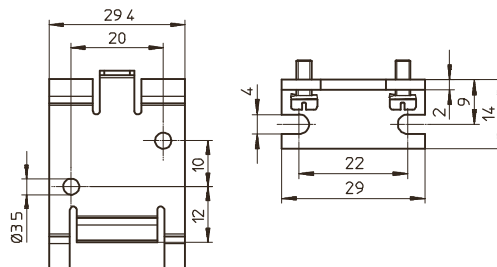- Adhere to the maximum permissible cable length of 30 m (20 m for IO-Link).

Maximum tightening torque of plug connector: M8 = 0.3 Nm, M12 = 0.5 Nm

| Connection -M8	Connection -M12	Pin	Function	Core colour
		1	Operating voltage +24 V DC	Brown (BN)
		2	Switching output OutB or analogue output OutD	White (WH)
		3	0 V DC	Blue (BU)
		4	Switching output OutA IO-Link (C/Q line)	Black (BK)

Tab. 7

Circuit diagrams

SPAU-...-L-... with display	SPAU-...-LK-V-.../SPAU-...-LK-B-... without display, analogue voltage output on pin 2	SPAU-...-LK-A-... without display, analogue current output on pin 2
● Usable output according to factory setting		

Tab. 8

8 Commissioning

8.1 LCD display
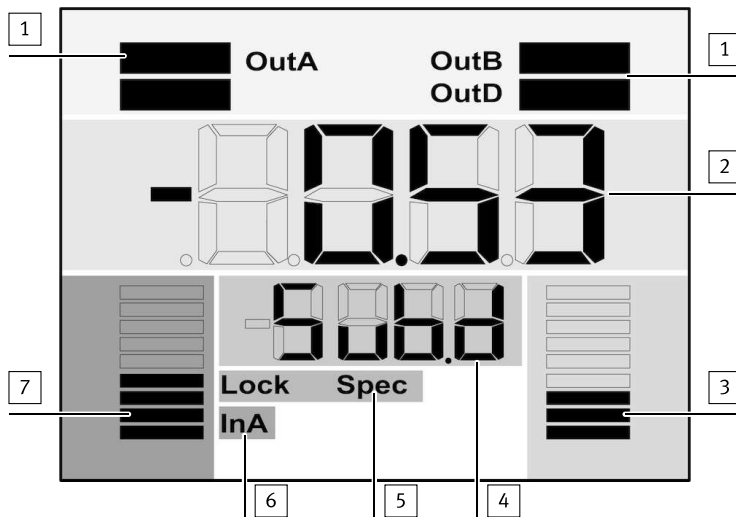
1 Output display
2 Main display (e.g. measurement value)
3 Bar graph for analogue output (only visible for scaled analogue output)
4 Lower display (e.g. unit)
5 Status information
6 Input display
7 Bar graph for input signal

Fig. 4

Example for LCD display	Meaning
Output display	
[OutA]	Switching output OutA selected
[OutA]	Switching output OutA set
[OutB]	Switching output OutB selected
[OutB]	Switching output OutB set
[OutD]	Analogue output OutD selected
Information / input display	
	Input signal InA: graphic display of the current measured value related to the maximum measured value of the measuring range
[InA]	

Example for LCD display	Meaning
	Analogue output OutD with activated scaling
[Lock]	Security code activated
[Spec]	Special menu activated

Tab. 9

Example for LCD display

Main display	Lower display	Meaning
Measured value indicator and unit in the RUN mode		
[– 0.53]	[bar]	Measured value indicator (here: negative value) and unit
Menu for the switching outputs (OutA and OutB)		
[Edit]	[bin]	Edit menu for the switching outputs (binary)
_l¯	[Fctn]	Threshold value comparator
d_l¯l_	[Fctn]	Auto difference monitoring
_l¯l_	[Fctn]	Window comparator
[1.80]	[SP]	Switchpoint value
[2.45]	[SP.Lo]	Value of lower switching point
[6.45]	[SP.Hi]	Value of upper switching point
[0.50]	[HY]	Hysteresis value
[18]	[t.obS] / [MSEC]	Time interval for determination of a mean value, which is used to determine the pressure change and establish the reference value.
[0.25]	[d.SP]	Threshold value of the differential pressure with auto difference monitoring
[NO]	[logic]	Switching characteristics: [NO] = normally open contact, [NC] = normally closed contact
[bLUE]	[COLR]	Display colour: [bLUE] = blue, colour change function is deactivated [R.ON] = red when switching output set [R.OFF] = red when the switching output is not set Note: Independent of the settings [COLR], the red colour change appears with some malfunctions.
Extreme values (only SHOW mode)		
[1.64]	[MIN]	Minimum measured pressure since switch-on or the last reset
[8.50]	[MAX]	Maximum measured pressure since switch-on or the last reset
Menu for the analogue output (OutD)		
[Edit]	[ANLG]	Edit menu for the analogue output
[1 _ 5]	[Out] / [V]	Output function of the analogue output
[93]	[In.Hi] / [%]	Scaling of the analogue output in percent of the final value of the pressure measuring range
[3]	[In.Lo] / [%]	Scaling of the analogue output in percent of the initial value of the pressure measuring range
Menu for device settings (Spec)		
[Edit]	[MENU]	Edit menu for additional settings
[16]	[Filt] / [MSEC]	Value of the filter time constant for the pressure measurement signal
[bar]	[Unit]	Unit for the pressure indicator
[OFF]	[Z.AdJ]	[OFF] = zero point synchronisation (zero adjust) deactivated [ON] = offset correction for measured value indicator, switching points and analogue output possible
[Unit]	[Sub.d]	Settings of the lower display in RUN mode: selected unit or switching point of OutA or bar graph
[40]	[Eco] / [SEC]	Economy mode: period after which the display background lighting is switched off
[PNP]	[bin] / [Out]	Shift of the switching outputs (binary) between PNP and NPN
[bin]	[Pin2] / [Out]	Shift between switching output (binary) and analogue output (InA) at Pin 2
[OFF]	[Code]	Activation and determination of the security code (lock)
[OFF]	[MASt]	Activation of the IO-Link master function for replication of parameters

Tab. 10

i

For device variants without LCD display:
- LED illuminated green: normal operation
- LED illuminated or flashes red: malfunction

8.2 Switch on sensor (RUN mode)
- Switch on the operating voltage.
  - ↳ Current measured value is displayed. The sensor is in the basic status (RUN mode).

The basic status can be reached from other modes by:
- Pressing Edit button for 3 seconds
- Expiration of a monitoring time (timeout)

8.3 Displaying parameters (SHOW mode)

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

8.3.1 Switching output OutA

• Press the A pushbutton.
  ↳ The first parameter set is displayed. [Fctn] flashes.

The following parameters can be displayed by repeatedly pressing the A pushbutton ➔ Fig.5. At the end, the min. and max. values are displayed. This can be reset with the Edit pushbutton.

8.3.2 Switching output OutB or analogue output OutD

• Press B pushbutton.
  ↳ The first parameter set is displayed. [Fctn] with OutB or [Out] with OutD flashes.

The following parameters are displayed by repeatedly pressing the B pushbutton ➔ Fig.5.
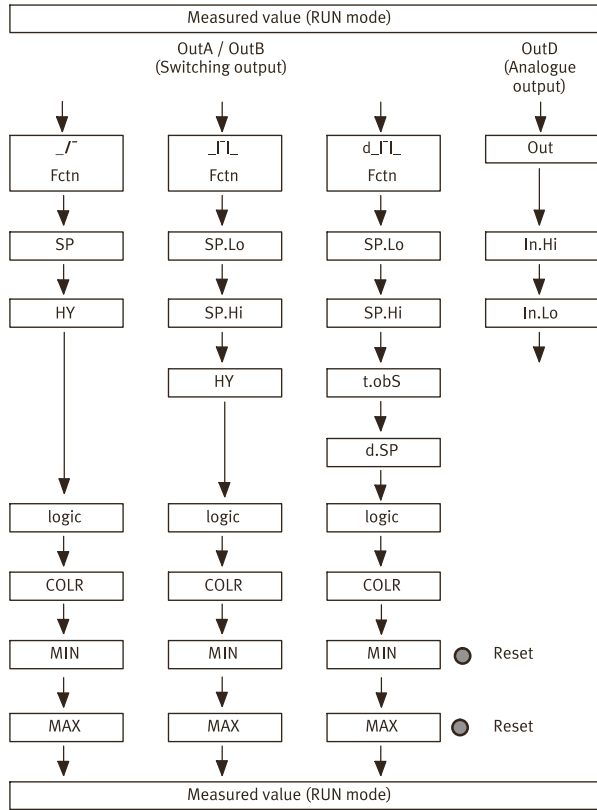

Fig. 5

Legend for ➔ Fig.5

MIN, MAX	Parameter is displayed only for switching output OutA, without Timeout
⬤	Edit button
↓	A or B pushbutton

Tab. 11

8.4 Entering the security code

The security code must be entered when "Lock" is active.

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

1. Press the Edit button.
   ↳ The EDIT mode is active. If the security code is activated, the parameter entry option is blocked: [Lock] flashes.
2. Enter security code set with A or B pushbutton.
3. Press the Edit button briefly.
   ↳ [OutA] flashes. The parameter entry option is unblocked.

8.5 Configuring switching output (EDIT mode)

ⓘ

The process is the same for configuring the switching outputs for OutA and OutB. In the following, the process is described using the switching output OutA. Menu structure ➔ Fig.7

ⓘ

Changing the switching behaviour of the switching outputs in the EDIT mode is effective immediately.

Requirement: The sensor is ready for operation (RUN mode).
Switching functions ➔ 6 Function
1. Press the Edit button briefly.
   ↳ [Edit] appears. [OutA] flashes.
2. Press the Edit button briefly.
   ↳ [Fctn] flashes.
3. With A or B pushbutton, select _I⁻ or _I⁻I_ or d_I⁻I_.

4. Press the Edit button briefly.
   ↳ – The set value is saved.
      – The next adjustable parameter is shown.
5. Set the parameter with A or B pushbutton.
6. Repeat points 4 and 5 until all parameters are set ➔ Fig.5.
7. Press the Edit button.
   ↳ Switch to the RUN mode.

8.6 Set analogue output (EDIT mode)

Requirement: The sensor is ready for operation (RUN mode).
1. Press the Edit button briefly.
   ↳ [Edit] appears. [OutA] flashes.
2. Select [OutD] with the A pushbutton or B pushbutton.
   ↳ [Edit] appears. [OutD] flashes.
3. Press the Edit button briefly.
   ↳ [Out] flashes.
4. Set the parameter with A or B pushbutton.
5. Press the Edit button briefly.
   ↳ – The set value is saved.
      – The next adjustable parameter is shown.
6. Repeat points 4 and 5 until all parameters are set.
7. Press the Edit button.
   ↳ Switch to the RUN mode.

8.7 Change device settings (EDIT mode)

Requirement: The sensor is ready for operation (RUN mode).
1. Press the Edit button briefly.
   ↳ [Edit] appears. [OutA] flashes.
2. With A or B pushbutton, select special menu [Spec].
   ↳ [Spec] flashes.
3. Press the Edit button briefly.
   ↳ [Filt] flashes.
4. Set the parameter with A or B pushbutton.
5. Press the Edit button briefly.
   ↳ – The set value is saved.
      – The next adjustable parameter is shown.
6. Repeat points 4 and 5 until all parameters are set.

8.8 Replicating parameters (EDIT mode)

Requirements:
– The pre-configured master sensor is ready for operation (RUN mode).
– Master sensor and device sensor have the same design regarding the parameters (same device ID).
– The master sensor is connected with the device sensor ➔ Fig.6.
– Parameterisation of the device sensor must not be blocked via IO-Link.
– The device sensor is in an unswitched status (switching output PNP, display OutA off).
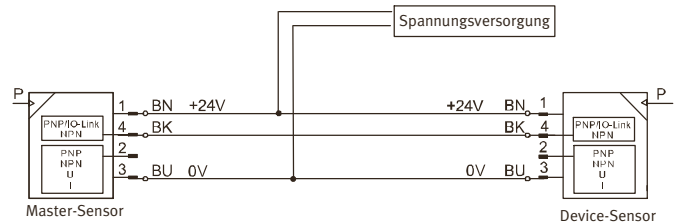
Fig. 6

1. Select special menu [Spec] at the master sensor via device settings.
2. Press the Edit button briefly until [MASt] appears.
3. With A or B pushbutton, select [ON].
4. Press the Edit button.
   ↳ [REPL] / [RedY] appears.
5. Press A or B pushbutton.
   ↳ – [REPL] / [RUN] appears briefly.
      – The parameters are transmitted to the device sensor.
      – [REPL] / [RedY] appears.
        If an error occurs, an error message appears ➔ 12 Fault clearance.
6. Repeat point 5 if an additional sensor should be parameterised.
7. Press the Edit button briefly.
   ↳ Switch to the RUN mode.

8.9 Menu structure (EDIT mode)

Some menu options or setting values are not applicable, depending on the selected switching function.

If [Z.AdJ] [OFF] is set for a later time, the device takes over the factory setting calibration values.

8.11 Teach switching points (TEACH mode)

i

The process for teaching the switching outputs for OutA (A pushbutton) and OutB (B pushbutton) is the same. In the following, the process is described using the switching output OutA.

i

There is no timeout in the TEACH mode. The sensor changes to the RUN mode only after the entire teach process is ended.

Requirement: The sensor is ready for operation (RUN mode).
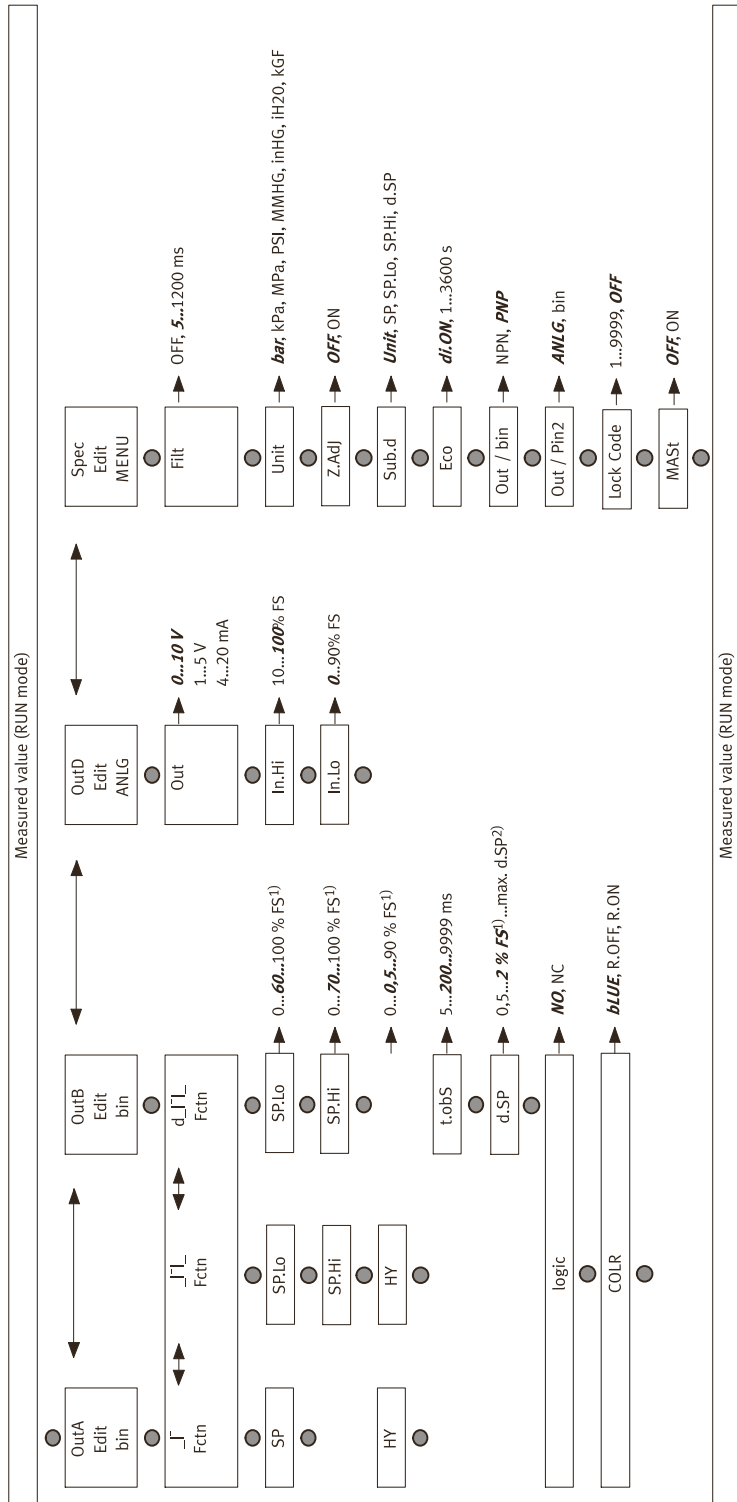If the security code is activated, the parameter entry option is blocked: [Lock] flashes.
- Entering the security code ➜ 8.4 Entering the security code
1. Establish switching function in the EDIT mode
   ➜ 8.5 Configuring switching output (EDIT mode)
2. Create pressure value 1.
3. Press the A pushbutton and Edit button.
   ↳ – The current pressure value will then be adopted as the first teaching point (TP1).
   – [t-IN] flashes.
4. Create pressure value 2
5. Press the A pushbutton and Edit button.
   ↳ – The current pressure value is adopted as the second teaching point (TP2).
   – Switch to the RUN mode.

9 Operation

NOTICE!

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

9.1 Restoring factory settings (restore)

i

By restoring the factory settings, the current settings are lost.

1. Switch off operating voltage.
2. Keep the A and B pushbuttons pressed down simultaneously.
3. Switch on the operating voltage.
4. Additionally, press the Edit button.
   ↳ [Rsto PARM] appears. All parameters are reset to the factory settings ➜ Fig.7

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

11 Expansion
1. Switch off the energy sources (operating voltage, compressed air).
2. Separate connections from the sensor.
3. Loosen the mountings.

12 Fault clearance
12.1 General

Fault description	Cause	Remedy
No display	No operating voltage or impermissible operating voltage	Apply permissible operating voltage.
	Electrical connections swapped	Connect the device in accordance with the circuit diagram.
	Device defective	Replace device.
Indicator or switching output does not react in accordance with the settings	Short circuit or overload at the output	Eliminate short circuit/overload.
	Incorrect switching point taught (e.g. at 0 bar)	Repeat teaching.
	Device defective	Replace device.
	Parameter incorrect	Reset to factory settings.

Tab. 13

Fig. 7

Measured value (RUN mode)

Spec Edit MENU:
- Filt: OFF, **5**...1200 ms
- Unit: **bar**, kPa, MPa, PSI, MMHG, inHG, iH2O, kGF
- Z.AdJ: **OFF**, ON
- Sub.d: **Unit**, SP, SP.Lo, SP.Hi, d.SP
- Eco: **di.ON**, 1...3600 s
- Out / bin: NPN, **PNP**
- Out / Pin2: **ANLG**, bin
- Lock Code: 1...9999, **OFF**
- MASt: **OFF**, ON

OutD Edit ANLG:
- Out: **0...10 V**, 1...5 V, 4...20 mA
- In.Hi: 10...**100**% FS
- In.Lo: **0**...90% FS

OutB Edit bin → d_⌐L Fctn:
- SP.Lo: 0...**60**...100 % FS [1]
- SP.Hi: 0...**70**...100 % FS [1]
- t.obS: 5...**200**...9999 ms
- d.SP: 0.5...**2 % FS** [1]...max. d.SP [2]
- logic: **NO**, NC
- COLR: **bLUE**, R.OFF, R.ON

⌐L Fctn:
- SP.Lo
- SP.Hi
- HY

OutA Edit bin → _⌐ Fctn:
- SP
- HY

Legend for ➜ Fig.7

[1]	The values refer to the respective measuring range. The display takes place in the selected unit.
[2]	The maximum value depends on SP.Lo and SP.Hi.
⬤	Edit button
→	A or B pushbutton
Bold, cursive	Factory setting

Tab. 12

8.10 Zero point synchronisation (zero adjust)
Requirement:
- The sensor is ready for operation (RUN mode).
- [Z.AdJ] [ON] is set ➜ 8.7 Change device settings (EDIT mode).
- The measured value lies in the range 0 bar ± 3 % FS.
1. Press the A pushbutton and B pushbutton simultaneously.
2. Press the EDIT pushbutton also.
   ↳ [OK] appears. The zero point synchronisation was successful.
If [FAIL] appears: the zero point synchronisation was not successful. Check requirements.

12.2 Device variants with LCD display

Fault description	Cause	Remedy
[Er01] / [FAIL][1]	Device error	Replace device.
[Er02] / [ASIC][1]	Device error	Replace device.
[Er10] / [OVER][2]	Measuring range exceeded	Comply with the measuring range.
[Er17] / [SUPL][2]	Undervoltage	Apply permissible operating voltage.
[Er20] / [tEMP][2]	Temperature fault	– Check operating conditions. – Replace device.
[Er21] / [SHRt][2]	Short circuit at OutA	Eliminate short circuit.
[Er22] / [SHRt][2]	Short circuit at OutB	Eliminate short circuit.
[Err] / [BUSY]	OutA is switched active in the device sensor.	Check device settings.
[Err] / [ID]	Device ID error, devices do not have the same design.	When replicating, use sensors with the same pressure range / type (same device ID).
[Err] / [COMM]	IO-Link communication error	– Check line OutA. – Check settings of the device sensor.

1) Display flashes.
2) Display illuminates red.

Tab. 14

12.3 Device variants without LCD display

Fault description	Cause	Remedy
LED flashes red	Device error	Replace device.
LED illuminated red	Temperature error, undervoltage, measuring range exceeded, short circuit	Checking operating conditions.

Tab. 15

13 Technical data

SPAU-

General	
Approvals	RCM Mark, c UL us – Listed (OL)
CE marking (➔ declaration of conformity)	In accordance with EU EMC Directive In accordance with EU RoHS directive
Note on materials	RoHS-compliant

Input signal/measuring element		
Operating medium		Compressed air to ISO 8573-1:2010 [7:4:4] Inert gases Lubricated operation possible
Temperature of medium	[°C]	0 … +50

Output, general		
Accuracy		
P16	[% FS]	± 2 at room temperature
B2, B11, V1, P1, P2, P6, P10, P025, P05, V025, V05, P12	[% FS]	±1.5 at room temperature
B2, B11, V1, P1, P2, P6, P10	[% FS]	±3 in the entire temperature range
P025, P05, V025, V05, P12, P16	[% FS]	±4 in the entire temperature range
Repetition accuracy	[% FS]	±0.3 (short-time), with [Filt] = [OFF]
Temperature coefficient	[%FS/K]	typ. ± 0.05

Switching output		
Switch-on time	[ms]	max. 4.4 with [Filt] = [OFF]
Switch-off time	[ms]	max. 5.3 with [Filt] = [OFF]
Max. output current	[mA]	100
Capacitive load maximum DC	[nF]	100
Voltage drop	[V]	Max. 1.6
Pull-down/pull-up resistor		PNP: integrated; NPN: not integrated
Inductive protective circuit		Available

Analogue output		
Output characteristic curve initial value … end value		
SPAU-…-V	[V]	0 … 10
SPAU-…-B	[V]	1 … 5
SPAU-…-A	[mA]	4 … 20
Rise time	[ms]	3, at [Filt] = [OFF]
Max. load resistance of current output (SPAU-…-A)	[Ω]	500
Min. load resistance of voltage output (SPAU-…-V, SPAU-…-B)	[kΩ]	10

SPAU-

Output, additional data	
Short circuit protection	Yes
Overload protection	Available

Electronics		
Operating voltage range	[V]	20 … 30
Idle current	[mA]	typ. 35
Max. current consumption	[mA]	240
Ready-state delay	[ms]	typ. 160
Reverse polarity protection		All connections against each other

Mechanics	
Mounting position	Any, avoid condensation gathering in the sensor
Housing material	PA-reinforced
Material of keypad	TPE-O
Material of plug housing	Brass (nickel-plated)

Display/operation		
Displayable units		bar, kPa, MPa, psi, mmHg, inchHg, inchH2O, kgf/cm2
Threshold value setting range	[% FS]	0 … 100 (recommended range 1 … 99)
Threshold value setting range, auto difference monitoring	[% FS]	0.5 … 100
Hysteresis setting range	[% FS]	0 … 90

Immissions/emissions		
Storage temperature	[°C]	−20 … +80
Ambient temperature	[°C]	0 … +50
Degree of protection by EN 60529		
SPAU-…-T/H/W/A		IP65/IP67
SPAU-…-F/MS4/MS6		IP65
Protection class by DIN VDE 0106-1		III
Resistance to shocks by EN 60068-2		30 g acceleration with 11 ms duration (half-sine)
Vibration resistance by EN 60068-2		10 … 60 Hz: 0.35 mm / 60 … 150 HZ: 5g

Tab. 16

SPAU-…		-B2	-B11	-V025	-V05	-V1	-P025	-P05
Pressure measuring range initial value	[bar] [MPa]	−1 −0.1		0 0				
Pressure measuring range end value	[bar] [MPa]	1 0.1	10 1	−0.25 −0.025	−0.5 −0.05	−1 −0.1	0.25 0.025	0.5 0.05
Overload range initial value	[bar] [MPa]	−1 −0.1						
Overload range end value	[bar] [MPa]	5 0.5	15 1.5	1 0.1	2 0.2	5 0.5	1 0.1	2 0.2

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SPAU-…		-P1	-P2	-P6	-P10	-P12	-P16
Pressure measuring range initial value	[bar] [MPa]	0 0					
Pressure measuring range end value	[bar] [MPa]	1 0.1	2 0.2	6 0.6	10 1	12 1.2	16 1.6
Overload range initial value	[bar] [MPa]	−1 −0.1					
Overload range end value	[bar] [MPa]	5 0.5	6 0.6	15 1.5			20 2.0

Tab. 18

IO-Link

Protocol version	Device V1.1
Profile	Smart Sensor Profile
Function classes	Binary data channel (BDC) Process data variable (PDV) Identification, diagnostics Teach channel
Communication mode	COM2 (38.4 kBaud)
SIO mode support	Yes
Port class	A
Process data width OUT	0 bytes
Process data width IN	2 bytes
Process data content	2 bit BDC (pressure monitoring), 14 bit PDV (pressure measurement value)
Minimum cycle time	3 ms
Data memory required	< 2 kByte
IODD, IO-Link device description	➔ www.festo.com

Tab. 19