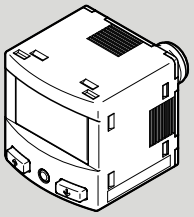
SPAN-B
Pressure sensor



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Operating instructions

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[8143727]

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Translation of the original instructions

1 About this document

1.1 Applicable Documents

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

2 Safety

2.1 General safety instructions

- Only use the product in original status without unauthorised modifications.
- Only use the product if it is in perfect technical condition.
- Only use media in accordance with the specifications ➔ Technical data.
- Observe labelling on the product.
- Note that changes to the switching status (EDIT mode) become effective immediately.

2.2 Intended use

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

2.3 Training of qualified personnel

Work on the product should only be conducted by qualified personnel.

3 Service

Contact your regional Festo contact person if you have technical questions ➔ www.festo.com.

4 Product overview

4.1 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 downstream electronic evaluation unit. The connection to the higher-level system is established via a switching output.
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.

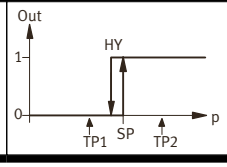
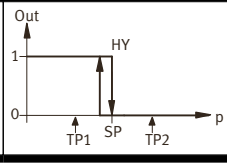
4.1.1 Operating statuses

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
EDIT mode	– Setting or modification of parameters
TEACH mode	– Acceptance of the current measured value to determine switching points

Tab. 1

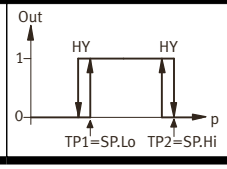
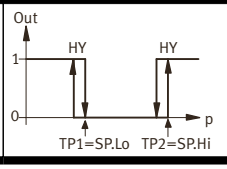
4.1.2 Switching functions

Threshold value comparator for monitoring of a pressure threshold _|‾

Function	N/O (normally open)	N/C (normally closed)
Switching function: – 1 switching point (SP) TEACH mode: – 2 teach points (TP1, TP2) – SP = ½ (TP1+TP2)		

Tab. 2

Window comparator for monitoring of a pressure range _|‾|_

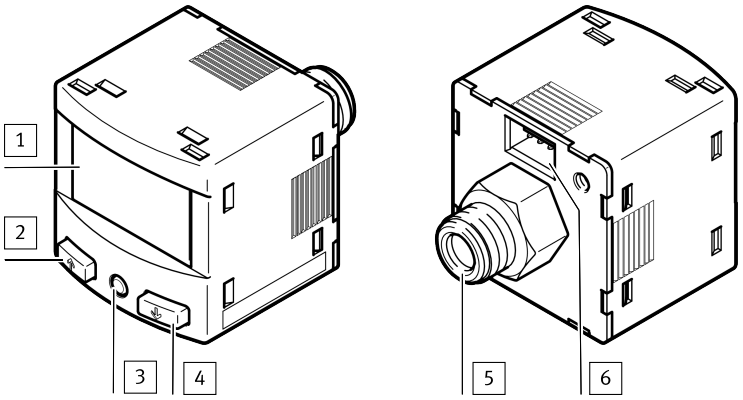
Function	N/O (normally open)	N/C (normally closed)
Switching function: – 2 switching points (SP.Lo, SP.Hi) TEACH mode[1]: – 2 teach points (TP1, TP2) – TP1 = SP.Lo, TP2 = SP.Hi		

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

Tab. 3

4.2 Configuration

4.2.1 Product design



1 Display
2 A pushbutton
3 EDIT pushbutton
4 B pushbutton
5 Pneumatic port
6 Electrical connection

Fig. 1 Product design

5 Installation

5.1 Mechanical and pneumatic

NOTICE!

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

- Mount the sensor so that condensation from the compressed air lines cannot accumulate in the device.
- Install the sensor so that it cannot be heated above the maximum permissible operating temperature (plan for convection possibilities).

- Remove all transport packaging. The material used in the packaging has been specifically chosen for its recyclability.
- Avoid applying force to the sensor housing during mechanical and pneumatic assembly.

SPAN-B-...-G18M/R18M

- Seal connecting thread.

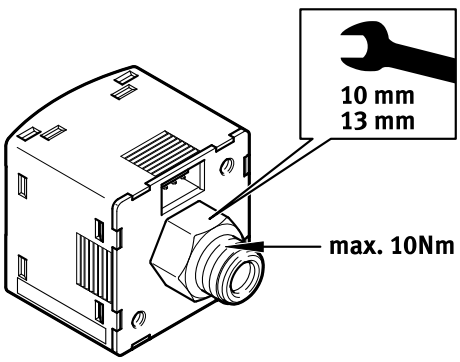


Fig. 2 Example with G18M

SPAN-B -...- G18FPM/M5FAL with mounting bracket

– Recommendation for the variant "SPAN-B-...-G18FPM..": use type OL-1/8 sealing ring at the pneumatic connection.

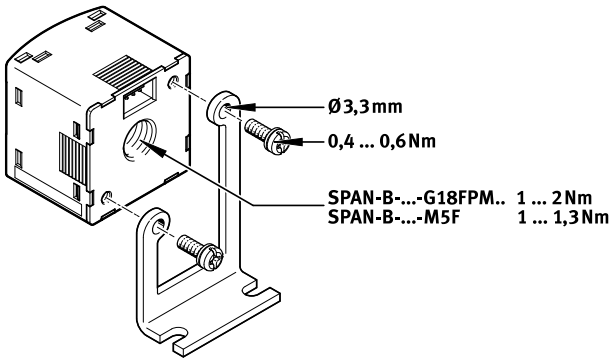


Fig. 3 Example with G18FPM

Front panel insert SAMH-PN-F

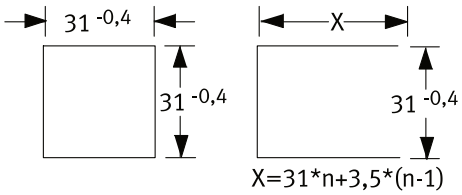
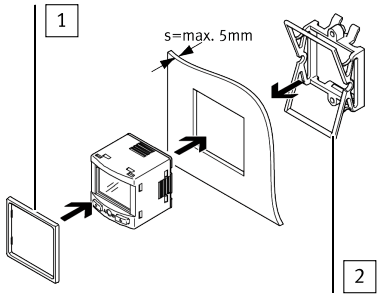


Fig. 4 Size of the front panel cut-out in mm



1 Panel frame 2 Clamping element

Fig. 5

1. Fasten panel frame to the sensor.
2. Guide sensor into the cut-out on the front panel from the front.
3. Attach the clamping element and press until the clamping element clicks into place.

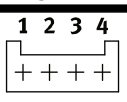
5.2 Electrical

⚠ 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.

- Connect sensor.
  – Take the maximum permissible line length into account: 30 m.

Pin	Colour[1)]	Allocation	Plug L1
1	Brown (BN)	Operating voltage +24 V DC	
2	Black (BK)	Switching output OutA	
3	White (WH)	NC (not connected)	
4	Blue (BU)	0 V	

1) Colours apply for connecting cables NEBS-L1... or electrical adapter SASC-P4... with NEBU-M8...

Tab. 4

Circuit diagram SPAN-B-PN

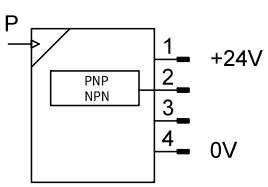
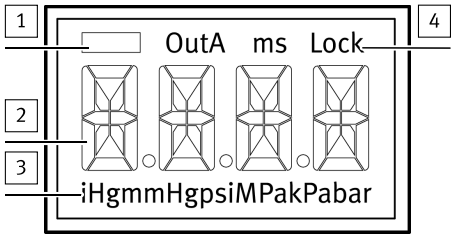


Fig. 6 SPAN-B-PN

6 Commissioning

6.1 LCD display



1 Switching status indication
2 Main display (e.g. measurement value)
3 Pressure units
4 Status information

Fig. 7 LCD display

Example for LCD display	Meaning
Output display	
[OutA]	Switching output OutA selected
■ [OutA]	Switching output OutA set
Status information/signal indicator	
[Lock]	Security code activated
[SPEC]	Special menu selected

Tab. 5

Example for LCD display Main display	Example for LCD display Alternating display	Meaning
Measured value indicator and unit in the RUN mode		
[– 0.53]	[bar]	Measured value indicator (here: negative value) and unit
Menu for switching output OutA		
_I¯	[Fctn]	Threshold value comparator
_I¯I_	[Fctn]	Window comparator
[1.80]	[SP]	Switching point value
[2.45]	[SP.Lo]	Value of lower switching point
[6.45]	[SP.Hi]	Value of upper switching point
[0.50]	[HY]	Hysteresis value
[NO]	[LOGC]	Switching behaviour: [N/O] = normally open, [N/C] = normally closed
[PNP]	[Out]	Shift of the switching outputs (binary) between PNP and NPN
[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 device settings (SPEC)		
[16]	[Filt]/[ms]	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 and switching points possible
[40]	[Eco]/[s]	Economy mode: period after which the display background lighting is switched off
[OFF]	[Code]/[Lock]	Activation and determination of the security code
[OFF]	[MASt]	Activation of the IO-Link master function for replication of parameters

Tab. 6

6.2 Switching on the 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:

– Press and hold Edit pushbutton for 3 seconds
– Expiration of a monitoring time (time-out)

6.3 Displaying parameters (SHOW mode)

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

Switching output OutA

1. Press the A pushbutton.
   ↳ The first parameter set is displayed. [Fctn] flashes.
2. Press the A pushbutton to display each of the following parameters.

SPEC menu parameters

1. Press B pushbutton.
   ↳ The first parameter set is displayed. [Filt] flashes.
2. Press the B pushbutton to display each of the following parameters.
3. The minimum and maximum values are displayed at the end. To reset the values, press the EDIT key.

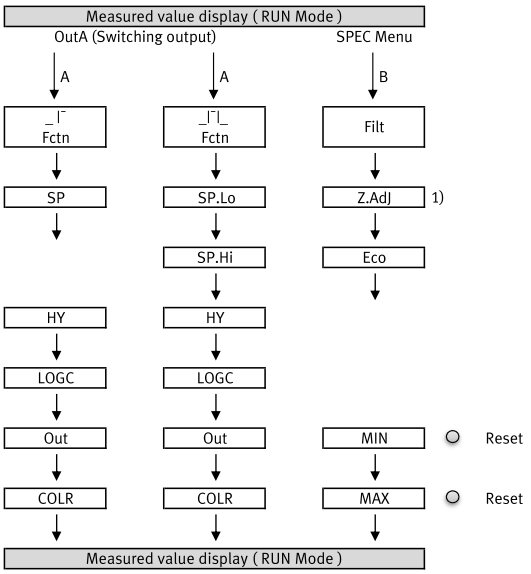


Fig. 8 SHOW mode

Legend	Meaning
MIN, MAX	Parameter is displayed without time-out
○	EDIT pushbutton
↓	A pushbutton, B pushbutton
1)	This menu item is not applicable for SPAN-B-B2 and SPAN-B-B11. With these variants the Zero Adjust function is always switched on.

Tab. 7

6.4 Setting parameters (EDIT mode)

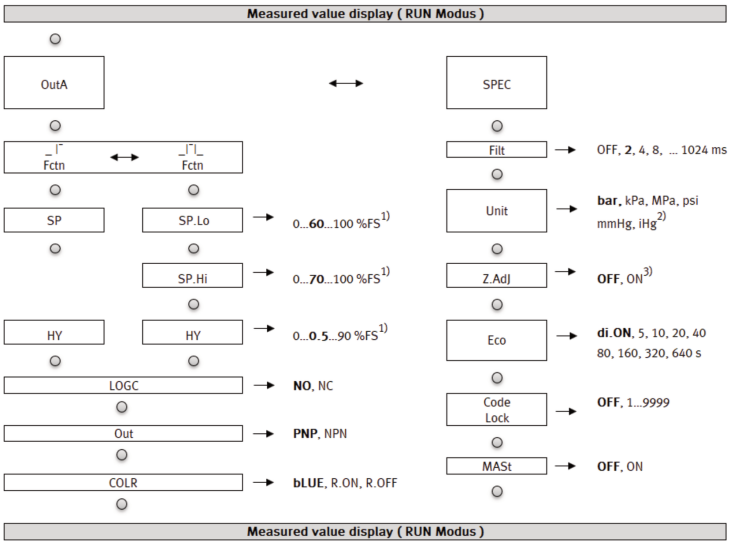


Fig. 9 EDIT mode

Legend	Meaning
○	EDIT pushbutton
→	A pushbutton, B pushbutton
bold value	Factory setting
1)	The values refer to the relevant measuring range and the selected unit.
2)	Dependent on the selected measuring range
3)	This menu item is not applicable for SPAN-B-B2 and SPAN-B-B11. With these variants the Zero Adjust function is always switched on.

Tab. 8

6.4.1 Entering the security code

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

1. Press Edit pushbutton.
   ↳ 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. Briefly press Edit pushbutton.
   ↳ [OutA] flashes. The parameter entry option is unblocked.

6.4.2 Configuring switching output

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

Set threshold value comparator _I¯ and window comparator _I¯I_

1. Briefly press Edit pushbutton.
   ↳ [OutA] flashes.
2. Briefly press Edit pushbutton.
   ↳ [Fctn] flashes.
3. Select _I¯ or _I¯I_ with A or B pushbutton.
4. Briefly press Edit pushbutton.
   ↳ – 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.
7. Press Edit pushbutton.
   ↳ Switch to the RUN mode.

6.4.3 Changing device settings

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

1. Briefly press Edit pushbutton.
   ↳ [OutA] flashes.
2. Select special menu [SPEC] with A or B pushbutton.
   ↳ [SPEC] flashes.
3. Briefly press Edit pushbutton.
   ↳ [Filt] flashes.
4. Set the parameter with A or B pushbutton.
5. Briefly press Edit pushbutton.
   ↳ – The set value is saved.
   – The next adjustable parameter is shown.
6. Repeat points 4 and 5 until all parameters are set.
7. Press Edit pushbutton.
   ↳ Switch to the RUN mode.

6.4.4 Replicating parameters

Requirements:

– The pre-configured sensor (master sensor) is ready for operation (RUN mode).
– Master sensor and device sensor have the same design with reference to the parameters (same device ID).
– The master sensor is connected with the device sensor ➔ Fig.10.
– The device sensor is in an unswitched status (switching output PNP, display OutA off).

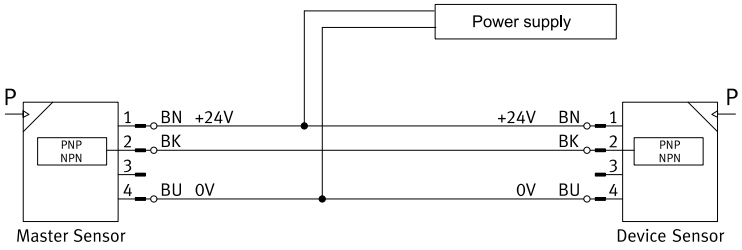


Fig. 10 Pin allocation

Replicating parameters

1. Select the special menu [SPEC] from the device settings on the master sensor.
2. Press Edit pushbutton repeatedly until [MASt] appears.
3. Select [ON] using the A or B pushbutton.
4. Press Edit pushbutton.
   ↳ [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 ➔ 9.1 Fault clearance.
6. If an additional sensor is to be parameterised, connect the additional sensor to "➔ Fig.10" and repeat step 5.
7. Press Edit pushbutton.
   ↳ RUN mode is active.

6.5 Zero point synchronisation (zero adjust)

Requirement:

– The sensor is ready for operation (RUN mode).
– [Z.AdJ] [ON] is set (factory setting for bipolar variants).
– The measured value lies in the range 0 bar ± 3% FS.

Perform zero point synchronisation

1. Hold down the A and B pushbutton.
2. Also press the Edit key.
   ↳ – [OK] appears. The zero point synchronisation was successful.
   – If [FAIL] appears: the zero point synchronisation was not successful. Check requirements.

i

If [Z.AdJ] [OFF] is set for a later time, the device accepts the factory-set calibration values.

6.6 Teaching the switching points (TEACH mode)

i

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

i

If the security code is activated, the parameter entry option is blocked: [Lock] flashes.

- Enter the security code ➔ 6.4.1 Entering the security code.

Requirement:

– The sensor is ready for operation (RUN mode).

Teach-in switching points

1. Establish the switching function in EDIT mode
   ➔ 6.4.2 Configuring switching output.
2. Create pressure value 1.
3. Press A pushbutton and Edit pushbutton simultaneously.
   ↳ The current pressure value will then be adopted as the first teaching point (TP1).
   [t-IN] flashes.
4. Create pressure value 2.
5. Press A pushbutton and Edit pushbutton.
   ↳ The current pressure value is adopted as the second teaching point (TP2).
   Switch to the RUN mode.

7 Operation and use

NOTICE!

Property damage due to high temperatures.

Extreme pneumatic conditions (high switching frequency with high pressure amplitude) can heat the product above 80° C.

- Select the operating conditions (in particular the ambient temperature, pressure amplitude, switching frequency, current consumption) such that the product does not heat up above the maximum permitted operating temperature.

7.1 Restoring Factory Settings (Restore)

i

By resetting to the factory settings, the current settings are lost. Note down current settings before resetting.

1. Switch off operating voltage.
2. Hold down the A and B pushbutton.
3. Switch on the operating voltage.
4. Additionally, press the Edit button.
   ↳ [RSto PArM] appears. All parameters are reset to the factory settings.

8 Maintenance and Care

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

9 Malfunctions

9.1 Fault clearance

Malfunction	Possible 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 faulty	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 kPa)	Repeat teach-in
	Device faulty	Replace device
	Parameter incorrect	Reset to factory settings
[Er01]/[FAIL] 1)	Device faulty	Replace device
[Err10]/[OVER]	Measuring range exceeded	Hold measuring range
[Er21]/[SHRt] 2)	Short circuit at OutA	Eliminate short circuit
[Err]/[BUSY]	OutA is switched active	Check device settings ➔ 6.4.4 Replicating parameters.
[Err]/[ID]	Device ID error, replication function failed	Use sensors with the same type when replicating (same Device ID)
[Err]/[COMM]	Communication errors	Check wiring

1) Display flashes red
2) Display is red

Tab. 9

10 Disassembly

1. Switch off operating voltage and compressed air.
2. Disconnect pneumatic and electrical connections from the device.
3. Loosen mountings and remove device.

11 Disposal

ENVIRONMENT!

Send the packaging and product for environmentally sound recycling in accordance with the current regulations ➔ www.festo.com/sp.

12 Technical data

SPAN-B-		
General information		
Approval		RCM compliance mark
Input Signal/Measuring Element		
Operating medium		Compressed air in accordance with ISO 8573-1:2010 [7:4:4]; inert gases, operation with lubricated medium possible
Temperature of medium	[°C]	0 … +50
Ambient temperature	[°C]	0 … +50
Output, general		
Accuracy	[% FS]	± 1.5 at room temperature
	[% FS]	± 3 over complete temperature range
Repetition accuracy	[% FS]	± 0.3, at [Filt] = [OFF]
Temperature coefficient	[% FS/K]	typ. 0.1
Switching output		
Switching output		1x PNP or 1x NPN, switchable
Switching function		Threshold value comparator, window comparator
Switch-on/switch-off time	[ms]	max. 1
Max. output current	[mA]	80
Capacitive load maximum DC	[nF]	100
Voltage drop	[V]	max. 2
Pull-down resistor		integrated (PNP)
Pull-up resistor		not integrated (NPN)
Inductive protective circuit		present
Output, additional data		
Short circuit current rating		yes
Overload protection		present
Electronics		
Operating voltage range DC	[V]	10.8 … 30 (nominal voltage 12 … 24)
No-load supply current	[mA]	max. 30
Ready-state delay	[ms]	typ. 30
Reverse polarity protection		all connections against one other
Mechanics		
Housing material		PA-reinforced
Inspection window material		PC
Keypad material		TPE-O
Materials in contact with the medium 1)		FPM, NBR, PA reinforced, brass (nickel-plated)
Display/operation		
Displayable units 1)		bar, kPa, MPa, psi, mmHg, inchHg
Setting range threshold values	[%FS]	1 … 99
Hysteresis setting range	[%FS]	0 … 90
Immissions/emissions		
Storage temperature	[°C]	–20 … +80
Max. permissible relative humidity	[%RH]	85
Degree of protection in accordance with EN 60529		IP40
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/60 … 150 HZ: 5 g

1) depending on the variant

Tab. 10

SPAN-B		-B2	-B11	-V1
Pressure measuring range	[bar]	–1 … 1	–1 … 10	0 … –1
	[MPa]	–0.1 … 0.1	–0.1 … 1	0 … –0.1
Overload range	[bar]	–1 … 5	–1 … 15	–1 … 5
	[MPa]	–0.1 … 0.5	–0.1 … 1.5	–0.1 … 0.5

Tab. 11