



# Pressure switches and sensors

Key features



Sensors  
Sensors for pressure and vacuum  
1.2

## Basic principles of pressure measurement

Sensors used for pressure measurement are equipped with an internal pressure-sensitive element. They convert

changes in pressure to an electrical signal or initiate switching operations when a threshold value is ex-

ceeded. The type of pressure to be measured must be noted. A distinc-

tion is made between the following types of pressure:

### Absolute pressure

Pressure in comparison with absolute vacuum as a zero value ( $p_{abs} = 0$ ). It can be measured directly using the pressure balance, for example.

### Differential pressure

Pressure representing the difference between 2 absolute pressures.

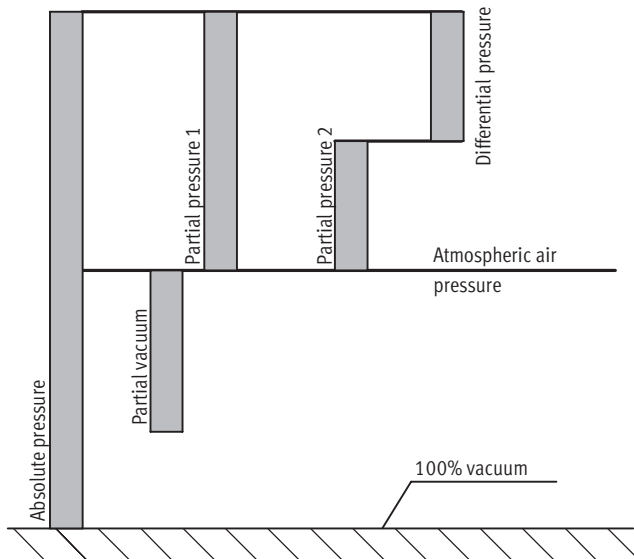
### Excess pressure (relative pressure)

Pressure that refers to the prevailing atmospheric pressure and uses it as a zero value. Sensors that detect this are known as relative pressure sensors.

Atmospheric air pressure depends on

altitude. Standard pressure refers to sea level (= 0 metres) and is 1013 mbar (DIN 1343). For every 100 m increase in altitude, the air pressure drops by approximately 12.5 mbar.

## Representation of pressure ranges



## Operating principles of pressure sensors

### Mechanical operating principle

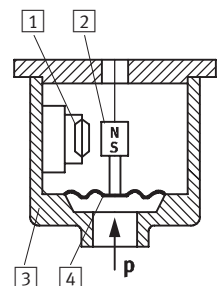
The pressure acting on the inside of a curved Bourdon tube causes the Bourdon tube to arch or contract. This deformation is converted into a needle deflection using precision mechanical components.

### Electronic operating principle

The pressure acts on a highly flexible diaphragm, whose deflection is measured. Various physical principles can be used to detect this deflection, e.g. inductive, capacitive, piezoresistive, ceramic, monolithic (composed of very small, inseparable electronic components) and ohmic in the form of strain gauge.

## Electronic operating principles of pressure sensors

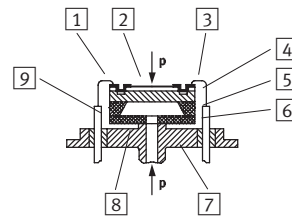
### Pressure sensor with Hall element



A small permanent magnet, which is connected to the diaphragm, causes a change in the Hall voltage when there is a deflection of the diaphragm.

- 1 Hall generator
- 2 Permanent magnet
- 3 Sensor housing
- 4 Diaphragm

### Piezoresistive pressure sensor



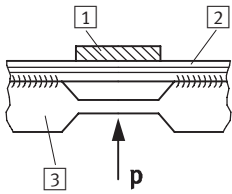
The measuring element in the piezoresistive pressure sensor is a clamped plate, into which resistances were introduced through diffusion or ion implantation, with these resistances in turn being 'cut out' by gradual etching from silicon. They change their electrical resistance under load.

- 1 Aluminium contact
- 2 Passivation
- 3 Piezoresistor
- 4 Epitaxy layer
- 5 Silicon substrate
- 6 Glass support
- 7 Sensor housing
- 8 Metallic connecting layer
- 9 Connecting layer

# Pressure switches and sensors

Key features

## Capacitive pressure sensor



- 1 Plate
- 2 Glass support
- 3 Silicon substrate

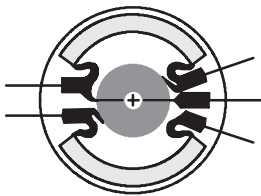
In the capacitive variant, the diaphragm is designed as a capacitor plate. The capacity change in the ceramic diaphragm occurs as a result of deflection relative to a parallel counter-electrode. The sensor element

must not be covered by fluid when it enters the system. The following technologies are used in the case of capacitive ceramic pressure sensors with signal processing:

- Thin-film technology for the elec-

- trode structures
- Thick-film technology for the signal processing hybrid
- Microjoining technology for the ceramics
- ASIC for signal processing

## Pressure sensor with strain gauge



Pressure sensors with a strain gauge can now be produced efficiently thanks to modern technologies. If you have a clamped circular diaphragm (measurement diaphragm, usually made from stainless steel) as a de-

formation element, you can use a film strain gauge with a rosette pattern. These sensor elements are small (diameter of 7 mm, for example) and have a measurement grid with 4 seg-

ments arranged in a circle. These are interconnected to form a Wheatstone bridge. Sizing of the deformation element is based on a tensile stress of  $100 \mu\text{m}/\text{m} = 1\%$  of the nominal load.

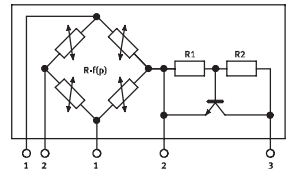
## Monolithic pressure sensor

Silicon pressure sensors are used for pressure ranges from 0 ... 16 bar. Pressure sensors using thin-film and thick-film technology are suitable for the entire pressure range. They can also be made self-learning by combining them with electronic components.

Temperature-sensitive resistors can be integrated in the structure, which makes it possible to use the sensor to detect the temperature of the medium and compensate for temperature errors.

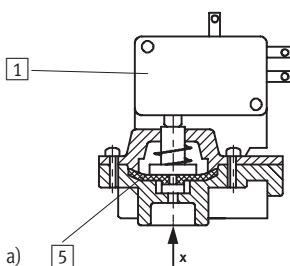
### Internal circuit of a pressure sensor

The strain gauges are combined to form a pressure measuring bridge. A basic temperature compensating circuit is connected ( $R_1, R_2$ ).

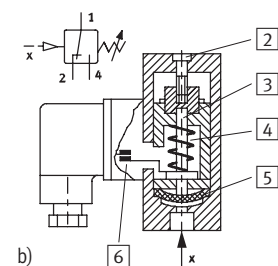


- 1 Bridge output voltage
- 2 Bridge supply voltage
- 3 Temperature compensation

## PE converter / pressure switch



- a) PE converter
- 1 Plunger-operated micro switch
- 5 Diaphragm
- x Pneumatic connection



- b) Pressure switch
- 2 Adjusting screw
- 3 Plunger
- 4 Compression spring
- 5 Diaphragm
- 6 Switch contact
- x Pneumatic connection

In the PE converter, a pneumatic pressure signal switches an electrical signal generator, which is usually designed as a changeover switch. The pressure actuating force can be in-

creased using a suitably large diaphragm surface. A device that lets you adjust the switching pressure is called a pressure switch.

## Conclusion

Pressure sensors are equipped with different setting options. Low-cost devices have a fixed switching point, which cannot be changed. Statically adjustable devices allow the switching points to be defined individually. In

the case of dynamic adjustment, you can adapt the switching points to the current conditions within the process or teach them in during the static teach-in procedure.



# Pressure and vacuum switches PEV/VPEV, PE converters PE/PEN/VPE

Product overview



- Mechanical pressure and vacuum switches with adjustable switching point
- PE converter
- Designs with adjustable hysteresis
- Designs with switching status display
- Variant with scale for pressure adjustment
- Wide range of mounting options

Detailed product information  
 → [www.festo.com/catalogue/pev](http://www.festo.com/catalogue/pev)

Product overview							
Method of measurement	Operating pressure [bar]	Type	Pneumatic connection	Type of mounting	Operating voltage range		→ Page
					[V DC]	[V AC]	
<b>Pressure switches</b>							
Pneumatic/electrical pressure transducer	1 ... 12	PEV-1/4-...-M12	G1/4	With through-holes	0 ... 48	0 ... 48	58
		PEV-1/4			0 ... 250	0 ... 250	
	0 ... 8	PEV-W	M5	Via DIN H-rail	10 ... 30	–	60
	1 ... 10	PEV-1/4-A	G1/4	Screw-in	10 ... 30	–	62
<b>Vacuum switches</b>							
Pneumatic/electrical pressure transducer	-1 ... 1.6	VPEV-1/8-...-M12	G1/8	Via through-hole	0 ... 48	0 ... 48	58
		VPEV-1/8			0 ... 125	0 ... 250	
		-1 ... 0	VPEV-W	M5	Via DIN H-rail	10 ... 30	–
<b>PE converter</b>							
Pneumatic/electrical differential pressure switch	-1 ... +8	PEN-M5	M5	On mounting frame 2N	10 ... 30	–	63
Pneumatic/electrical pressure transducer	0 ... 8	PE-1/8-2N	G1/8	On mounting frame 2N	12 ... 250	12 ... 250	
	-0.95 ... 0	VPE-1/8-2N	G1/8	On mounting frame 2N	12 ... 250	12 ... 250	

# Pressure and vacuum switches PEV/VPEV, with through-holes

Type codes, technical data

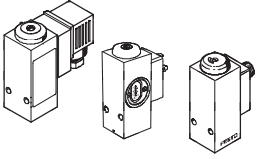



Type codes	
PEV - 1/4 - B - - - - -	
<b>Type</b>	
PEV	Pressure switch
VPEV	Vacuum switch
<b>Pneumatic connection</b>	
1/8	G1/8
1/4	G1/4
<b>Generation</b>	
B	B series
<b>Electrical connection</b>	
-	Plug, square design to EN 43 650, type A
M12	Plug, M12x1, 4-pin, round design
<b>Setting options</b>	
SC	Scale for pressure adjustment
<b>Plug socket</b>	
-	Included in scope of delivery
OD	Not included in scope of delivery
<b>Note on materials</b>	
-	Not free of copper and PTFE
CT	Free of copper and PTFE

Technical data					
Type	PEV-1/4-...-M12	PEV-1/4	VPEV-1/8-...-M12	VPEV-1/8	
<b>Design</b>					
Pneumatic connection	G1/4		G1/8		
<b>Electrical data</b>					
Operating voltage range	[V DC]	0 ... 48	0 ... 250	0 ... 48	0 ... 250
	[V AC]	0 ... 48	0 ... 125	0 ... 48	0 ... 250
Switching element function	Changeover switch				
Max. output current	[mA]	5,000		2,500	
Protection against short circuit	No				
Protection against polarity reversal	Yes				
Protection class	IP65				
<b>Operating and environmental conditions</b>					
Operating medium	Filtered compressed air, lubricated or unlubricated Water Mineral oil		Filtered compressed air, lubricated or unlubricated Vacuum, lubricated or unlubricated		
Operating pressure	[bar]	1 ... 12		-1 ... +1.6	
Ambient temperature	[°C]	-20 ... +80			
CE mark (see declaration of conformity)	Not necessary	In accordance with EU Low Voltage Directive		Not necessary	In accordance with EU Low Voltage Directive
Certification	CCC				
<b>Materials</b>					
Housing	Wrought aluminium alloy				

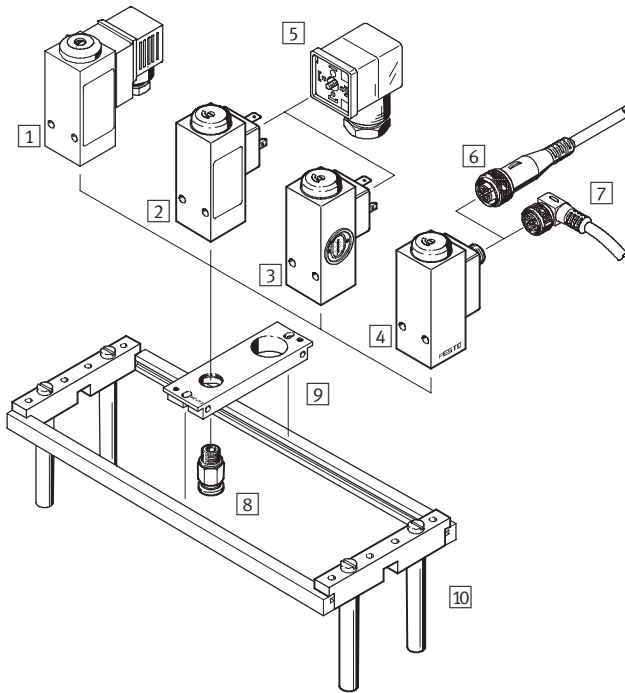
# Pressure and vacuum switches PEV/VPEV, with through-holes

Technical data, peripherals overview


Ordering data						
Description	Electrical connection	Adjustable hysteresis	Visual scale for pressure adjustment	Plug socket in scope of delivery	Part No.	Type
<b>Pressure switches</b>						
	Plug, square design to DIN 43650, type A	■	-	■	10 773	PEV-1/4-B
		■	-	■	165 869	PEV-1/4-B-CT <sup>1)</sup>
		■	-	-	175 250	PEV-1/4-B-OD
		■	-	-	175 251	PEV-1/4-B-OD-CT <sup>1)</sup>
		-	■	-	161 760	PEV-1/4-SC-OD
	Plug M12x1, 4-pin	■	-	-	192 488	PEV-1/4-B-M12
<b>Vacuum switches</b>						
	Plug, square design to DIN 43650, type A	■	-	■	150 261	VPEV-1/8
		■	-	-	192 489	VPEV-1/8-M12



1) Free of copper and PTFE


## Peripherals overview





Accessories	
1	Pressure switch PEV-1/4-B-..., vacuum switch VPEV-1/8
2	Pressure switch PEV-1/4-B-OD-...
3	Pressure switch PEV-1/4-SC-OD-... with scale for pressure adjustment
4	Pressure switch PEV-1/4-B-M12, vacuum switch VPEV-1/8-M12
5	Plug socket PEV-1/4-WD-LED-... with switching status display Plug socket MSSD-C-4P without switching status display
6	Connecting cable NEBU-M12G5-... with straight socket
7	Connecting cable NEBU-M12W5-... with angled socket
8	Push-in fitting QS-...
9	Mounting plate APL-2N-PEV
10	Mounting frame NRRQ-2N

Ordering data – Plug sockets			
Description	Part No.	Type	
	164 274	PEV-1/4-WD-LED-24	
	164 275	PEV-1/4-WD-LED-230	
Without switching status display	171 157	MSSD-C-4P	

Ordering data – Connecting cables				Technical data → 247
Number of wires	Cable length [m]	Part No.	Type	
<b>M12x1, straight socket</b>				
	4	5	541 328	NEBU-M12G5-K-5-LE4
<b>M12x1, angled socket</b>				
	4	5	541 329	NEBU-M12W5-K-5-LE4

Ordering data – Push-in fittings			Technical data → www.festo.com/catalogue/qs
Part No.	Type		
	186 097	QS-G1/4-6	
	186 099	QS-G1/4-8	

Ordering data – Mounting attachments			
Part No.	Type		
	9 349	APL-2N-PEV	
	9 365	NRRQ-2N	
	11 571	NRW-9/1,5-B	

# Pressure and vacuum switches PEV-W/VPEV-W, DIN H-rail mounting

Type codes, technical data



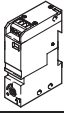
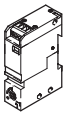
## Type codes

		PEV-W	-	KL	-	LED	-	GH
<b>Type</b>								
PEV-W	Pressure switch							
VPEV-W	Vacuum switch							
<b>Electrical connection</b>								
KL	Screw terminal, 4-pin							
S	Plug, M8x1, 4-pin							
<b>Switching status display</b>								
LED	Yellow LED							
<b>Type of mounting</b>								
GH	Via DIN H-rail or via through-holes							

## Technical data

Type	PEV-W	VPEV-W	
<b>Design</b>			
Pneumatic connection	M5	M5	
<b>Electrical data</b>			
Operating voltage range	[V DC]	10 ... 30	10 ... 30
	[V AC]	-	-
Switching element function	Changeover switch		
Max. output current [mA]	5,000	2,500	
Protection against short circuit	No		
Protection against polarity reversal	Yes		
Protection class	IP65		
<b>Operating and environmental conditions</b>			
Operating medium	Filtered compressed air, lubricated or unlubricated	Filtered compressed air, lubricated or unlubricated Vacuum, lubricated or unlubricated	
Operating pressure [bar]	0 ... 8	0 ... -1	
Ambient temperature [°C]	-20 ... +80		
CE mark (see declaration of conformity)	In accordance with EU EMC directive		
Certification	CCC		
<b>Materials</b>			
Housing	Wrought aluminium alloy		

## Ordering data

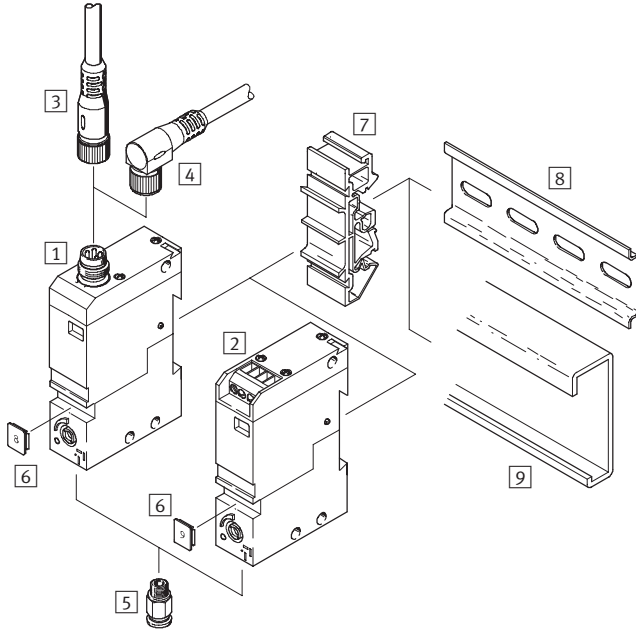
Description	Electrical connection	Plug socket in scope of delivery	Part No.	Type
<b>Pressure switches</b>				
	Screw terminal, 4-pin	-	152 618	PEV-W-KL-LED-GH
	Plug, M8x1, 4-pin	-	152 616	PEV-W-S-LED-GH
<b>Vacuum switches</b>				
	Screw terminal, 4-pin	-	152 619	VPEV-W-KL-LED-GH
	Plug, M8x1, 4-pin	-	152 617	VPEV-W-S-LED-GH



# Pressure and vacuum switches PEV-W/VPEV-W, DIN H-rail mounting



Peripherals overview

## Peripherals overview




Accessories	
1	Pressure switch PEV-W-S-... with plug M8x1 Vacuum switch VPEV-W-S-... with plug M8x1
2	Pressure switch PEV-W-KL-... with screw terminals Vacuum switch VPEV-W-KL-... with screw terminals
3	Connecting cable NEBU-M8G4-... with straight socket
4	Connecting cable NEBU-M8W4-... with angled socket
5	Push-in fitting QSM-M5
6	Identification plate BZ-N...
7	Mounting latch PENV-BGH
8	Mounting rail to DIN EN 50022
9	Mounting rail to DIN EN 50035

### Ordering data – Connecting cables Technical data → 247

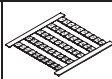

	Number of wires	Cable length [m]	Part No.	Type
<b>M8x1, straight socket</b>				
	4	2.5	541 342	NEBU-M8G4-K-2.5-LE4
		5	541 343	NEBU-M8G4-K-5-LE4
<b>M8x1, angled socket</b>				
	4	2.5	541 344	NEBU-M8W4-K-2.5-LE4
		5	541 345	NEBU-M8W4-K-5-LE4

### Ordering data – Push-in fittings

Technical data → [www.festo.com/catalogue/qsm](http://www.festo.com/catalogue/qsm)

	For tubing O.D. [mm]	Part No.	Type
	3	153 302	QSM-M5-3
	4	153 304	QSM-M5-4
	6	153 306	QSM-M5-6

### Ordering data – Accessories

	Part No.	Type
	6 888	BZ-N1-50
	6 889	BZ-N51-100
	164 597	PENV-BGH

# Pressure switches PEV, screw-in

Type codes, technical data







Sensors for pressure and vacuum

1.2

Type codes	
PEV - 1/4 - A - SW27 -	
<b>Type</b>	
PEV	Pressure switch
<b>Pneumatic connection</b>	
1/4	G1/4
<b>Generation</b>	
A	A series
<b>Width across flats</b>	
SW27	27 mm
<b>Electrical connection</b>	
-	For plug socket PEV-1/4-A-WD
B-OD	For plug socket PEV-1/4-WD-LED-...

Technical data		
Type	PEV-1/4-A-SW27	PEV-1/4-A-SW27-B-OD
<b>Design</b>		
Pneumatic connection	G1/4	
<b>Electrical data</b>		
Operating voltage range	[V DC]	12 ... 250
Switching element function	Changeover switch	
Max. output current	[mA]	4,000
Protection against short circuit	No	
Protection against polarity reversal	No	
Protection class	IP65	
<b>Operating and environmental conditions</b>		
Operating medium	Filtered compressed air, lubricated or unlubricated	
Operating pressure	[bar]	1 ... 10
Ambient temperature	[°C]	-30 ... +100      -20 ... +100
CE mark (see declaration of conformity)	In accordance with EU Low Voltage Directive	
<b>Materials</b>		
Housing	Galvanised steel	

Ordering data			
	Electrical connection	Plug socket in scope of delivery	Part No.    Type
	Plug, 4-pin	-	159 259    PEV-1/4-A-SW27
	Plug, 4-pin	-	175 252    PEV-1/4-A-SW27-B-OD

Ordering data – Plug sockets				
	Description	Operating voltage range		Part No.    Type
		[V DC]	[V AC]	
	For pressure switch PEV-1/4-A-SW27	≤180	≤230	161 209    PEV-1/4-A-WD
	For pressure switch PEV-1/4-A-SW27-B-OD	15 ... 30	-	164 274    PEV-1/4-WD-LED-24
		≤180	≤230	164 275    PEV-1/4-WD-LED-230

# PE converter PE/PEN/VPE

Type codes, technical data

FESTO

## Type codes

		PE	-	1/8	-	2N	-	SW
<b>Type</b>								
PE	PE converter							
PEN	PE converter							
VPE	PE converter for vacuum							
<b>Pneumatic connection</b>								
1/8	G1/8							
M5	Female thread M5							
<b>Type of mounting</b>								
2N	On mounting frame 2N							
<b>Width across flats</b>								
SW	Splash proof design							

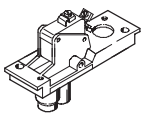
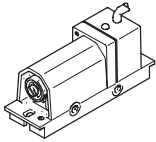
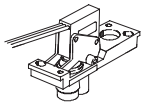
## Technical data

Type	PE-1/8-2N	PE-1/8-2N-SW	PEN-M5	VPE-1/8-2N	VPE-1/8-2N-SW
<b>Design</b>					
Pneumatic connection	G1/8		M5	G1/8	
<b>Electrical data</b>					
Operating voltage range	[V DC]	12 ... 250	12 ... 30	12 ... 250	
	[V AC]	12 ... 250	-	12 ... 250	
Switch output		-	PNP	-	
Switching element function		Changeover switch	N/O contact	Changeover switch	
Max. output current	[mA]	4,000			
Minimum load current	[mA]	100	-	100	
Protection against short circuit		No	Yes	No	
Protection against polarity reversal		No			
Protection class		IP00, IP20 with protective cap	IP67	IP67	IP00, IP20 with protective cap
<b>Operating and environmental conditions</b>					
Operating medium		Filtered compressed air, lubricated or unlubricated, grade of filtration 40 µm			
					Vacuum
Operating pressure	[bar]	0 ... 8	-1 ... +8	-0.95 ... 0	
Ambient temperature	[°C]	0 ... 60	-20 ... +60	0 ... 60	
CE mark (see declaration of conformity)		In accordance with EU Low Voltage Directive	In accordance with EU EMC directive	In accordance with EU Low Voltage Directive	
Certification		CCC	-	CCC	
<b>Materials</b>					
Housing		Die-cast aluminium, polyamide	Die-cast zinc	Die-cast aluminium, polyamide	

# PE converters PE/PEN/VPE

Technical data



Ordering data				
	Operating pressure [bar]	Electrical connection	Part No.	Type
	0 ... 8	Screw terminal	<b>7 860</b>	<b>PE-1/8-2N</b>
		3 wires	<b>7 862</b>	<b>PE-1/8-2N-SW</b>
	-1 ... +8	Cable, 3-wire	<b>8 625</b>	<b>PEN-M5</b>
	-0.95 ... 0	Screw terminal	<b>12 594</b>	<b>VPE-1/8-2N</b>
		3 wires	<b>12 595</b>	<b>VPE-1/8-2N-SW</b>

# Pressure switches SDE5

Product overview



- Programmable and configurable pressure switch for simple pressure sensing tasks
- Teach-in function for programming
- Integrated microprocessor
- Operating status indicated by an LED visible from all sides

Detailed product information

→ [www.festo.com/catalogue/sde5](http://www.festo.com/catalogue/sde5)

Product overview							
Method of measurement	Pressure measuring range [bar]	Type	Switching function	Switching element function	Pneumatic connection	Electrical connection	→ Page
Piezoresistive pressure switch	0 ... -1	SDE5-V1	Threshold value with fixed hysteresis	N/O contact	QS-3	Plug M8x1, 3-pin; cable, 3-wire	67
	0 ... 2	SDE5-D2	Threshold value with variable hysteresis	N/C contact	QS-4		
	0 ... 10	SDE5-D10	Window comparator Freely programmable Switching points set at the factory	Switchable	QS-6		

# Pressure switches SDE5

Type codes

SDE5 - D2 - 0 - Q6 - P - M8 - G5 - - -

Type	
SDE5	Pressure switch
Pressure measuring range	
V1	0 ... -1 bar
D2	0 ... 2 bar
D10	0 ... 10 bar
Switching function	
FP	Freely programmable
Threshold value with fixed hysteresis, 1 teach-in pressure	
O	N/O contact
C	N/C contact
Threshold value with fixed hysteresis, 2 teach-in pressures	
O1	N/O contact
C1	N/C contact
Threshold value with variable hysteresis, 2 teach-in pressures	
O2	N/O contact
C2	N/C contact
Window comparator with fixed hysteresis, 2 teach-in pressures	
O3	N/O contact
C3	N/C contact
Pneumatic connection	
Push-in connector at both ends	
Q3	For 3 mm tubing O.D.
Q4	For 4 mm tubing O.D.
Q6	For 6 mm tubing O.D.
Push-in connector at one end	
Q3E	For 3 mm tubing O.D.
Q4E	For 4 mm tubing O.D.
Q6E	For 6 mm tubing O.D.
Electrical output	
P	1 switch output PNP
Electrical connection	
K	2.5 m cable
M8	3-pin M8 plug
Connecting cable	
SIM cable with straight connection socket	
G	2.5 m long
G5	5 m long
SIM cable with angled connection socket	
W	2.5 m long
W5	5 m long
Teach-in point 1 permanently set	
...X	Permanent switching point setting as per customer's requirement, required switching pressure [bar]
Teach-in point 2 permanently set	
...Y	Permanent switching point setting as per customer's requirement, required switching pressure [bar]

# Pressure switches SDE5

Technical data

FESTO

General technical data		
Operating voltage range	[V DC]	15 ... 30
Max. output current	[mA]	100
Switch output		PNP
Protection against short circuit		Pulsed
Protection against polarity reversal		For all electrical connections
Protection class		IP40
Operating medium		Filtered compressed air, lubricated or unlubricated, grade of filtration 40µm
Ambient temperature	[°C]	0 ... 50
CE mark		In accordance with EU EMC directive
Certification		c UL us - Recognised (OL) C-Tick
Information on housing materials		Polyacetate, reinforced; polyamide; polyphenylene sulphide, reinforced

Ordering data							
Variant	Pressure measuring range [bar]	Switching element function	Electrical connection	Pneumatic connection		Part No.	Type
				At one end	At both ends		
Threshold value with fixed hysteresis, 1 teach-in pressure							
	0 ... -1	N/O contact	Plug, M8x1, 3-pin	QS-3	-	527 459	SDE5-V1-0-Q3E-P-M8
				QS-4	-	527 460	SDE5-V1-0-Q4E-P-M8
				QS-6	-	527 461	SDE5-V1-0-Q6E-P-M8
				-	QS-3	527 456	SDE5-V1-0-Q3-P-M8
				-	QS-4	527 457	SDE5-V1-0-Q4-P-M8
				-	QS-6	527 458	SDE5-V1-0-Q6-P-M8
	0 ... 2	N/O contact	Cable, 3-wire	QS-6	-	542 888	SDE5-D2-0-Q6E-P-K
	0 ... 10	N/O contact	Plug, M8x1, 3-pin	QS-3	-	527 465	SDE5-D10-0-Q3E-P-M8
				QS-4	-	527 466	SDE5-D10-0-Q4E-P-M8
				QS-6	-	527 467	SDE5-D10-0-Q6E-P-M8
-				QS-3	527 462	SDE5-D10-0-Q3-P-M8	
-				QS-4	527 463	SDE5-D10-0-Q4-P-M8	
-				QS-6	527 464	SDE5-D10-0-Q6-P-M8	
Cable, 3-wire			QS-6	-	542 890	SDE5-D10-0-Q6E-P-K	
N/C contact	Plug, M8x1, 3-pin	QS-4	-	542 889	SDE5-D10-C-Q4E-P-M8		
		QS-6	-	542 894	SDE5-D10-C-Q6E-P-M8		
		Cable, 3-wire	QS-6	-	542 895	SDE5-D10-C-Q6E-P-K	
Threshold value with fixed hysteresis, 2 teach-in pressures with mean value calculation							
0 ... -1	N/O contact	Plug, M8x1, 3-pin	QS-6	-	542 886	SDE5-V1-01-Q6-P-M8	
Threshold value with variable hysteresis, 2 teach-in pressures							
0 ... 10	N/O contact	Plug, M8x1, 3-pin	QS-6	-	542 891	SDE5-D10-02-Q6E-P-M8	
			-	QS-6	542 892	SDE5-D10-02-Q6-P-M8	
Window comparator with fixed hysteresis, 2 teach-in pressures							
0 ... 10	N/O contact	Plug, M8x1, 3-pin	QS-6	-	542 893	SDE5-D10-03-Q6E-P-K	
	N/C contact	Plug, M8x1, 3-pin	QS-6	-	542 896	SDE5-D10-C3-Q6E-P-K	
Freely programmable							
0 ... -1	Selectable	Plug, M8x1, 3-pin	-	QS-6	542 887	SDE5-V1-FP-Q6-P-M8	
0 ... 10	Selectable	Plug, M8x1, 3-pin	QS-4	-	542 900	SDE5-D10-FP-Q4E-P-M8	
			QS-6	-	542 897	SDE5-D10-FP-Q6E-P-M8	
			-	QS-6	542 898	SDE5-D10-FP-Q6-P-M8	
		Cable, 3-wire	QS-4	-	542 901	SDE5-D10-FP-Q4E-P-K	
		-	QS-6	542 899	SDE5-D10-FP-Q6-P-K		

Sensors  
Sensors for pressure and vacuum

1.2

# Pressure switches SDE5

Modular product system



Sensors  
Sensors for pressure and vacuum

1.2

M Mandatory data						O Options			
Module No.	Sensor function	Pressure range	Switching function	Pneumatic connection	Electrical output	Electrical connection	Connecting cable	Teach-in point 1 permanently set	Teach-in point 2 permanently set
529 027	SDE5	V1 D2 D10	FP O C O1 C1 O2 C2 O3 C3	Q3 Q4 Q6 Q3E Q4E Q6E	P	K M8	G W G5 W5	...X	...Y
<b>Order example</b>									
529 027	SDE5	- D10	- O2	- Q6	- P	- M8	- G5	- 5,5X	- 5,5Y

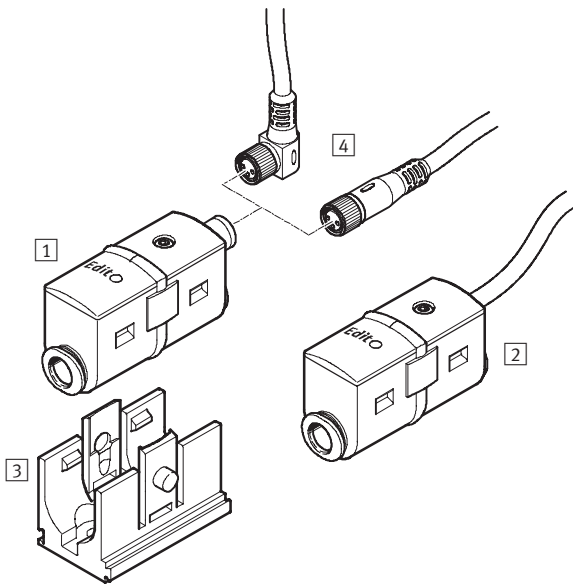
Ordering table							
Size	5	Conditions		Code		Enter code	
M	Module No.	529 027				529 027	
	Sensor function	Pressure switch		SDE5		SDE5	
	Pressure range	Pressure range 0 ... -1 bar (relative)		-V1			
		Pressure range 0 ... 2 bar (relative)		-D2			
		Pressure range 0 ... 10 bar (relative)		-D10			
	Switching function	Freely programmable, N/O contact, N/C contact		-FP			
		Threshold value with fixed hysteresis, 1 teach-in point, N/O contact		-O			
		Threshold value with fixed hysteresis, 1 teach-in point, N/C contact		-C			
		Threshold value with fixed hysteresis, 2 teach-in points, N/O contact		-O1			
		Threshold value with fixed hysteresis, 2 teach-in points, N/C contact		-C1			
		Threshold value with variable hysteresis, N/O contact		-O2			
		Threshold value with variable hysteresis, N/C contact		-C2			
		Window comparator with fixed hysteresis, N/O contact		-O3			
		Window comparator with fixed hysteresis, N/C contact		-C3			
	Pneumatic connection	QS3 connection at both ends		-Q3			
		QS4 connection at both ends		-Q4			
		QS6 connection at both ends		-Q6			
		QS3 connection at one end		-Q3E			
		QS4 connection at one end		-Q4E			
		QS6 connection at one end		-Q6E			
	Electrical output	1 switch output PNP		-P		-P	
	Electrical connection	Cable, 2.5 m		-K			
		3-pin M8 plug		-M8			
O	Connecting cable (accessory)	2.5 m SIM cable with straight connection socket	1	-G			
		2.5 m SIM cable with angled connection socket	1	-W			
		5.0 m SIM cable with straight connection socket	1	-G5			
		5.0 m SIM cable with angled connection socket	1	-W5			
	Teach-in point 1 permanently set [bar]	0 ... 10 (required switching pressure)	2	-...X			
	Teach-in point 2 permanently set [bar]	0 ... 10 (required switching pressure)	2 3	-...Y			

- 1 G, W, G5, W5 Only in combination with M8   
 2 X, Y Not in combination with FP, O1, C1   
 3 Y Not in combination with O, C  
 Must have a value if O2, C2, O3, C3, and X or Y was selected  
 Only one decimal place permissible in combination with D10





# Pressure switches SDE5

Peripherals overview



Accessories	
1	Pressure switch SDE-5-...-M8 with plug M8x1
2	Pressure switch SDE-5-...-K with cable
3	Linkable wall bracket with clip-in facility for switches (included in the scope of delivery)
4	Connecting cable NEBU-M8

Ordering data – Connecting cables			Technical data → 247	
	Number of wires	Cable length [m]	Part No.	Type
<b>M8x1, straight socket</b>				
	3	2.5	541 333	NEBU-M8G3-K-2.5-LE3
		5	541 334	NEBU-M8G3-K-5-LE3
<b>M8x1, angled socket</b>				
	3	2.5	541 338	NEBU-M8W3-K-2.5-LE3
		5	541 341	NEBU-M8W3-K-5-LE3

# Pressure switches SDE5

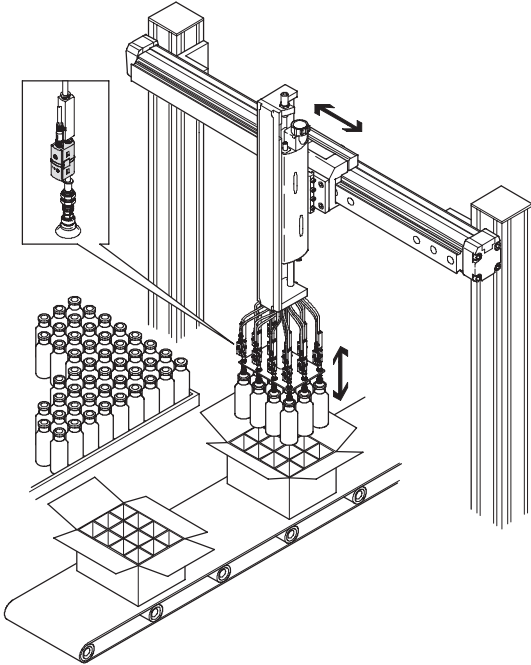
Application examples

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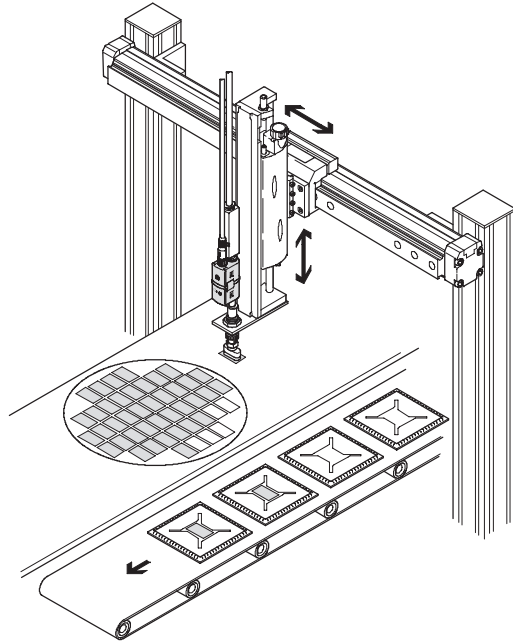
Sensors  
Sensors for pressure and vacuum

1.2

## Vacuum monitoring

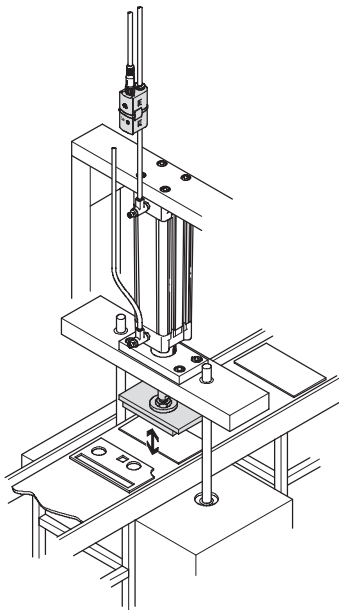


- Vacuum switch SDE5 in combination with a vacuum generator VN for vacuum monitoring in the handling of bottles

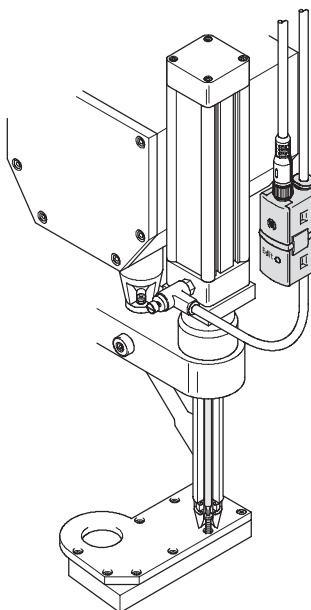


- Vacuum switch SDE5 as suction monitoring in the handling of small parts, such as computer chips

## Pressure monitoring



- Pressure switch SDE5 as pressure monitor for the pressing in of punched parts



- Pressure switch SDE5 as "inline variant" for pressure range monitoring on a pneumatic screw driver.

# Pressure sensors SDE3, with display

Product overview



- Five pressure measuring ranges
- Measurement of relative or differential pressure or 2 independent pressure inputs
- Switch output 2x PNP or 2x NPN
- Numerical and graphical pressure indicator
- Display in bar, psi, kPa, inches of mercury, inches of water
- Wide range of connection and mounting options
- Specified types in accordance with ATEX directive for potentially explosive atmospheres  
→ [www.festo.com/en/ex](http://www.festo.com/en/ex)

Detailed product information

→ [www.festo.com/catalogue/sde3](http://www.festo.com/catalogue/sde3)

Product overview							
Method of measurement	Measured variable	Pressure measuring range [bar]	Switching function	Pneumatic connection	Type of mounting	Electrical output	
						Digital	Analogue
Piezoresistive pressure sensor with display	1x relative pressure	0 ... -1	Freely programmable	Push-in fitting for tubing OD 4 mm	Via DIN H-rail On wall/surface bracket Front panel mounting Via through-hole	2x PNP	-
	2x relative pressure	-1 ... +1					
	1x differential pressure	0 ... 2				2x NPN	-
		0 ... 6					
	0 ... 10						

# Pressure sensors SDE3, with display

Type codes

SDE3 - D10 S - B - HQ4 - 2P - M8 -

**Sensor function**

SDE3	Piezoresistive pressure sensor with display
------	---

**Pressure measuring range**

V1	0 ... -1 bar
B2	-1 ... +1 bar
D2	0 ... 2 bar
D6	0 ... 6 bar
D10	0 ... 10 bar

**Measured variable**

S	1x relative pressure
D	2x relative pressure
Z	1x differential pressure

**Display**

B	Display in bar
P	Display in psi
K	Display in kPa
H	Display in inches of mercury
W	Display in inches of water

**Mounting/pneumatic connection**

HQ4	Via DIN H-rail, 4 mm push-in connector
WQ4	Wall mounting, 4 mm push-in connector
FQ4	Panel mounting, 4 mm push-in connector

**Electrical output**

2P	2 switch outputs PNP
2N	2 switch outputs NPN

**Electrical connection**

M8	Plug M8x1
K	2.5 m cable

**Connecting cable**

SIM cable with straight connection socket	
G	2.5 m long
G5	5 m long
SIM cable with angled connection socket	
W	2.5 m long
W5	5 m long

# Pressure sensors SDE3, with display

Technical data

General technical data						
Design						
Pressure measuring range	[bar]	0 ... -1	-1 ... +1	0 ... 2	0 ... 6	0 ... 10
Measured variable	Relative pressure					
	2x relative pressure					
	Differential pressure					
Pneumatic connection	QS-4					
Type of display	Illuminated LCD					
Accuracy FS <sup>2)</sup>	±2%					
Setting options	Teach-in					
Type of mounting	Via DIN H-rail					
	Via through-hole					
	Front panel mounting					
	With a wall/surface bracket					
Electrical data						
Switch output	2x PNP					
	2x NPN					
Switching element function	Switchable					
Switching function	Freely programmable					
Operating voltage range DC	[V]	15 ... 30				
Max. output current	[mA]	100				
Electrical connection	Plug M8x1, 4-pin, round design to EN 60 947-5-2					
	Cable					
	Cable with plug M8x1, 4-pin, round design to EN 60 947-5-2					
Protection against short circuit	Pulsed					
Protection against polarity reversal	For all electrical connections					
Protection class	IP65					
Operating and environmental conditions						
Operating medium	Filtered compressed air, lubricated or unlubricated, grade of filtration 40µm					
Ambient temperature	[°C]	0 ... 50				
CE mark (see declaration of conformity)	In accordance with EU EMC directive					
Certification	C-Tick					
Materials						
Housing	Polyamide, reinforced; polycarbonate					

1) % FS = % of measuring range's final value (full scale)

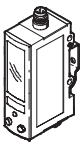
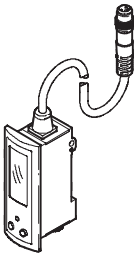
# Pressure sensors SDE3, with display


Technical data

FESTO

Sensors  
Sensors for pressure and vacuum

1.2

Ordering data						
Variant	Pressure measuring range [bar]	Measured variable	Switch output	Display	Part No.	Type
<b>DIN H-rail mounting</b>						
	0 ... -1	Relative pressure	2x PNP	bar	540 193	SDE3-V1S-B-HQ4-2P-M8
				inches of mercury	540 194	SDE3-V1S-H-HQ4-2P-M8
		2x relative pressure	2x PNP	bar	540 196	SDE3-V1D-B-HQ4-2P-M8
				inches of mercury	540 197	SDE3-V1D-H-HQ4-2P-M8
		Differential pressure	2x PNP	bar	540 199	SDE3-V1Z-B-HQ4-2P-M8
				inches of mercury	540 200	SDE3-V1Z-H-HQ4-2P-M8
	0 ... 2	2x relative pressure	2x PNP	bar	540 203	SDE3-D2D-B-HQ4-2P-M8
		Differential pressure			540 205	SDE3-D2Z-B-HQ4-2P-M8
	0 ... 10	Relative pressure	2x PNP	bar	540 207	SDE3-D10S-B-HQ4-2P-M8
		2x relative pressure			540 209	SDE3-D10D-B-HQ4-2P-M8
		Differential pressure			540 211	SDE3-D10Z-B-HQ4-2P-M8
		Differential pressure	2x NPN	bar	540 213	SDE3-D10Z-B-HQ4-2N-M8
<b>Front panel mounting</b>						
	0 ... -1	Relative pressure	2x PNP	bar	540 198	SDE3-V1D-B-FQ4-2P-M8
		2x relative pressure			540 195	SDE3-V1S-B-FQ4-2P-M8
		Differential pressure			540 201	SDE3-V1Z-B-FQ4-2P-M8
	0 ... 2	2x relative pressure	2x PNP	bar	540 204	SDE3-D2S-B-FQ4-2P-M8
		Differential pressure			540 206	SDE3-D2Z-B-FQ4-2P-M8
	0 ... 10	Relative pressure	2x PNP	bar	540 208	SDE3-D10S-B-FQ4-2P-M8
		2x relative pressure			540 210	SDE3-D10D-B-FQ4-2P-M8
		Differential pressure			540 212	SDE3-D10Z-B-FQ4-2P-M8

-  - Note

Additional variants and accessories can be configured and ordered through the SDE3 modular system

→ 75.

Configurator for types acc. to ATEX directive for explosive atmospheres

→ [www.festo.com/catalogue/sde3](http://www.festo.com/catalogue/sde3).

# Pressure sensors SDE3, with display

Modular product system



M Mandatory data							O Options	
Module No.	Function	Pressure measuring range	Pressure input	Display	Mounting/pneumatic connection	Electrical output	Electrical connection	Connecting cable (accessory)
539 679	SDE3	V1 B2 D2 D6 D10	S D Z	B P K H W	HQ4 WQ4 FQ4	2P 2N	M8 K	G W G5 W5
<b>Order example</b>								
539 679	SDE3	- D6	D	- B	- WQ4	- 2N	- K	- W5

Ordering table		Condi- tions	Code	Enter code
M	Module No.	539 679		
	Sensor function	Pressure sensor	SDE3	SDE3
	Pressure measuring range	[bar] 0 ... -1	-V1	
		[bar] -1 ... +1	-B2	
		[bar] 0 ... 2	-D2	
		[bar] 0 ... 6	-D6	
		[bar] 0 ... 10	-D10	
	Pressure input	1x relative pressure	S	
		2x relative pressure, independent	D	
		1x differential pressure	Z	
	Display	Values in bar	-B	
		Values in psi	-P	
		Values in kPa	-K	
		Values in inches of mercury	-H	
		Values in inches of water	-W	
	Mounting/pneumatic connection	Via DIN H-rail, 4 mm push-in connector	-HQ4	
		Wall mounting, 4 mm push-in connector	-WQ4	
		Panel mounting, 4 mm push-in connector	-FQ4	
	Electrical output	2 switch outputs PNP	-2P	
		2 switch outputs NPN	-2N	
	Electrical connection	Plug M8x1	-M8	
		Cable, 2.5 m	-K	
O	Connecting cable (accessory)	Straight socket, 2.5 m	-G	
		Angled socket, 2.5 m	-W	
		Straight socket, 5 m	-G5	
		Angled socket, 5 m	-W5	

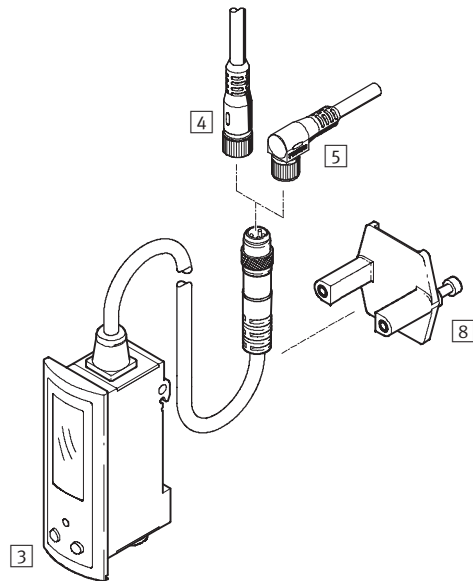
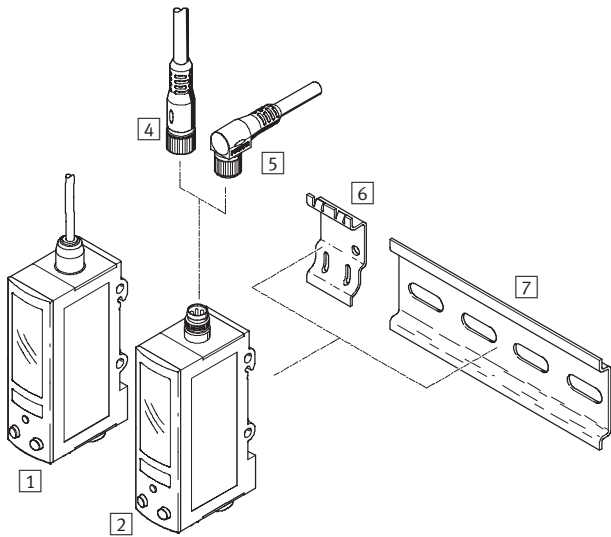
### Transfer order code

539 679 SDE3 - [ ] - [ ] - [ ] - [ ] - [ ] - [ ]

Sensors  
Sensors for pressure and vacuum  
1.2



# Pressure sensors SDE3, with display


Peripherals overview




Accessories	
1	Pressure sensor SDE3-...-K
2	Pressure sensor SDE3-...-M8
3	Pressure sensor SDE3-...-F...-M8
4	Connecting cable NEBU-M8G4 with straight socket

Accessories	
5	Connecting cable NEBU-M8W4 with angled socket
6	Adapter plate SXE3-W (included in the scope of delivery for SDE3-...-W...)
7	Mounting rail to DIN EN 50022
8	Clamping plate (included in the scope of delivery for SDE3-...-F...-M8)

Ordering data – Connecting cables		Technical data → 247	
	Number of wires	Cable length [m]	Part No. Type
<b>M8x1, straight socket</b>			
	4	2.5	541 342 NEBU-M8G4-K-2.5-LE4
		5	541 343 NEBU-M8G4-K-5-LE4
<b>M8x1, angled socket</b>			
	4	2.5	541 344 NEBU-M8W4-K-2.5-LE4
		5	541 345 NEBU-M8W4-K-5-LE4

Ordering data – Adapter plate	
	Part No. Type
	540 214 SXE3-W

Ordering data – Safety clip			
	Size	Part No.	Type
	M8	548 067	NEAU-M8-GD
	M12	548 068	NEAU-M12-GD



# Pressure sensors SDE1, with display

Product overview



- Five pressure measuring ranges
- Measurement of relative or differential pressure
- Switch outputs PNP, NPN and with analogue current or voltage output
- LCD or illuminated LCD display
- Wide range of connection and mounting options

Detailed product information

→ [www.festo.com/catalogue/sde1](http://www.festo.com/catalogue/sde1)

Product overview							
Method of measurement	Measured variable	Pressure measuring range [bar]	Switching function	Pneumatic connection	Type of mounting	Electrical output	
						Digital	Analogue
Piezoresistive pressure sensor with display	Relative pressure Differential and relative pressure	0 ... -1	Freely programmable	Male thread R1/8, R1/4 Female thread G1/8 Push-in fitting for tubing OD 4 mm	On DIN H-rail Via wall/surface bracket On service unit Front panel mounting	PNP	-
		-1 ... +1				2x PNP	-
		0 ... 2				PNP	0 ... 10 V
		0 ... 6				PNP	4 ... 20 mA
		0 ... 10				2x PNP	4 ... 20 mA
						NPN	-
						2x NPN	-
						NPN	0 ... 10 V
	NPN	4 ... 20 mA					

# Pressure sensors SDE1, with display

Type codes

SDE1 - D10 - G2 - W18 - L - P1 - M12 - G5

### Function

SDE1	Pressure sensor with display
------	------------------------------

### Pressure measuring range

V1	0 ... -1 bar
B2	-1 ... +1 bar
D2	0 ... 2 bar
D6	0 ... 6 bar
D10	0 ... 10 bar

### Absolute accuracy

G2	Accuracy 2%
----	-------------

### Pneumatic connection and assembly

R18	Male thread R $\frac{1}{8}$ , mounting on service unit
R14	Male thread R $\frac{1}{4}$ , mounting on service unit
MS4	Direct connection to MS4 series service units
MS6	Direct connection to MS6 series service units
H18	Female thread G $\frac{1}{8}$ , DIN H-rail mounting
W18	Female thread G $\frac{1}{8}$ , wall or surface mounting
FQ4	Push-in connector QS-4, front panel mounting
HQ4	Push-in connector QS-4, DIN H-rail mounting
WQ4	Push-in connector QS-4, wall or surface mounting

### Display and adjustment

C	LCD display with backlighting (optimised operation)
L	Illuminated LCD display (optimised reading)

### Electrical output

P1	1 switch output PNP
P2	2 switch outputs PNP
PU	1 switch output PNP and 0 ... 10 V analogue
PI	1 switch output PNP and 4 ... 20 mA analogue
2I	2 switch outputs PNP and 4 ... 20 mA analogue
N1	1 switch output NPN
N2	2 switch outputs NPN
NU	1 switch output NPN and 0 ... 10 V analogue
NI	1 switch output NPN and 4 ... 20 mA analogue

### Electrical connection

M8	Plug M8x1
M12	Plug M12x1

### Accessories

SIM cable with straight connection socket	
G	2.5 m long
G5	5 m long
SIM cable with angled connection socket	
W	2.5 m long
W5	5 m long

# Pressure sensors SDE1, with display

Technical data

General technical data						
Design						
Pressure measuring range	[bar]	0 ... -1	-1 ... +1	0 ... 2	0 ... 6	0 ... 10
Measured variable		Relative pressure				
		Differential pressure				
Pneumatic connection		R1/8				
		R1/4				
		G1/8				
		QS-4				
Type of display		Back illuminated LCD				
		Illuminated LCD				
Accuracy FS <sup>1)</sup>		±2%				
Setting options		Teach-in				
Type of mounting		Via DIN H-rail				
		Via wall/surface bracket				
		On service unit				
		Front panel mounting				
Electrical data						
Switch output		PNP				
		NPN				
Analogue output	[V]	0 ... 10				
	[mA]	4 ... 20				
Switching element function		Switchable				
Switching function		Freely programmable				
Operating voltage range DC	[V]	15 ... 30				
Max. output current	[mA]	150				
Electrical connection		Plug M8x1, round design to EN 60 947-5-2				
		Plug M12x1, round design to EN 60 947-5-2				
Protection against short circuit		Pulsed				
Protection against polarity reversal		For all electrical connections				
Operating and environmental conditions						
Operating medium		Filtered compressed air, lubricated or unlubricated, grade of filtration 40µm				
Ambient temperature	[°C]	0 ... 50				
CE mark (see declaration of conformity)		In accordance with EU EMC directive				
Protection class		IP65				
Certification		c UL us - Recognised (OL)				
		C-Tick				
Materials						
Housing		Polyacetate, reinforced, polyamide				

1) % FS = % of measuring range's final value (full scale)

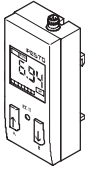
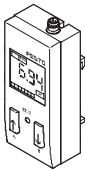

- † - Note: This product conforms with the ISO 1179-1 standard and the ISO 228-1 standard.

# Pressure sensors SDE1, with display

Technical data




Sensors  
Sensors for pressure and vacuum  
**1.2**

Ordering data								
Variant	Pressure measuring range [bar]	Switch output	Analogue output	Electrical connection	Type of display	Part No.	Type	
Female thread G $\frac{1}{8}$ , DIN H-rail mounting, relative pressure measurement								
	0 ... -1	PNP	-	Plug, M8x1, 3-pin	LCD <sup>1)</sup>	192 034	SDE1-V1-G2-H18-C-P1-M8	
					Illuminated LCD	529 973	SDE1-V1-G2-H18-L-P1-M8	
		2x PNP	-	Plug, M8x1, 4-pin	LCD <sup>1)</sup>	192 035	SDE1-V1-G2-H18-C-P2-M8	
					Illuminated LCD	529 974	SDE1-V1-G2-H18-L-P2-M8	
		PNP	0 ... 10 V	Plug, M8x1, 4-pin	LCD <sup>1)</sup>	529 959	SDE1-V1-G2-H18-C-PU-M8	
					Illuminated LCD	529 975	SDE1-V1-G2-H18-L-PU-M8	
	0 ... 10	PNP	-	Plug, M8x1, 3-pin	LCD <sup>1)</sup>	192 030	SDE1-D10-G2-H18-C-P1-M8	
					Illuminated LCD	529 961	SDE1-D10-G2-H18-L-P1-M8	
		2x PNP	-	Plug, M8x1, 4-pin	LCD <sup>1)</sup>	192 031	SDE1-D10-G2-H18-C-P2-M8	
					Illuminated LCD	529 962	SDE1-D10-G2-H18-L-P2-M8	
		PNP	0 ... 10 V	Plug, M8x1, 4-pin	LCD <sup>1)</sup>	529 955	SDE1-D10-G2-H18-C-PU-M8	
					Illuminated LCD	529 963	SDE1-D10-G2-H18-L-PU-M8	
Push-in connector QS-4, for DIN H-rail mounting, differential pressure and relative pressure measurement								
	0 ... -1	PNP	-	Plug, M8x1, 3-pin	LCD <sup>1)</sup>	192 036	SDE1-V1-G2-HQ4-C-P1-M8	
					Illuminated LCD	529 976	SDE1-V1-G2-HQ4-L-P1-M8	
		2x PNP	-	Plug, M8x1, 4-pin	LCD <sup>1)</sup>	192 037	SDE1-V1-G2-HQ4-C-P2-M8	
					Illuminated LCD	529 977	SDE1-V1-G2-HQ4-L-P2-M8	
		0 ... 2	2x PNP	-	Plug, M8x1, 4-pin	LCD <sup>1)</sup>	535 581	SDE1-D2-G2-HQ4-C-P2-M8
		0 ... 10	PNP	-	Plug, M8x1, 3-pin	LCD <sup>1)</sup>	192 032	SDE1-D10-G2-HQ4-C-P1-M8
	Illuminated LCD					529 964	SDE1-D10-G2-HQ4-L-P1-M8	
	2x PNP		-	Plug, M8x1, 4-pin	LCD <sup>1)</sup>	192 033	SDE1-D10-G2-HQ4-C-P2-M8	
					Illuminated LCD	529 965	SDE1-D10-G2-HQ4-L-P2-M8	
	PNP	0 ... 10 V	Plug, M8x1, 4-pin	LCD <sup>1)</sup>	529 956	SDE1-D10-G2-HQ4-C-PU-M8		
	Female thread G $\frac{1}{8}$ , for wall or surface mounting, relative pressure measurement <sup>2)</sup>							
		0 ... -1	PNP	-	Plug M12x1, 3-pin	Illuminated LCD	534 065	SDE1-V1-G2-W18-L-P1-M12
Plug, M8x1, 4-pin					537 022		SDE1-V1-G2-W18-L-PI-M8	
Plug M12x1, 4-pin			537 023	SDE1-V1-G2-W18-L-PI-M12				
0 ... 2		PNP	-	Plug, M8x1, 3-pin	537 024	SDE1-D2-G2-W18-L-P1-M8		
		2x PNP	-	Plug, M8x1, 4-pin	537 025	SDE1-D2-G2-W18-L-P2-M8		
0 ... 6		PNP	-	Plug, M8x1, 3-pin	537 026	SDE1-D6-G2-W18-L-P1-M8		
		2x PNP	-	Plug, M8x1, 4-pin	537 027	SDE1-D6-G2-W18-L-P2-M8		
0 ... 10		PNP	-	Plug M12x1, 3-pin	534 063	SDE1-D10-G2-W18-L-P1-M12		
				0 ... 10 V	Plug, M8x1, 4-pin	530 900	SDE1-D10-G2-W18-L-PU-M8	
		2x PNP	4 ... 20 mA	Plug M12x1, 5-pin	534 062	SDE1-D10-G2-W18-L-2I-M12		
		PNP	4 ... 20 mA	Plug, M8x1, 4-pin	537 020	SDE1-D10-G2-W18-L-PI-M8		
					Plug M12x1, 4-pin	537 021	SDE1-D10-G2-W18-L-PI-M12	

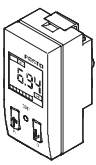
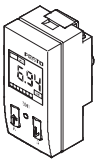
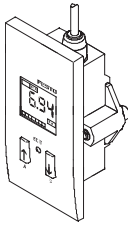
1) Back illuminated

2) Adapter plate SDE1-...-W... included in the scope of delivery.


 Note  
Additional variants and accessories can be configured and ordered through the SDE1 modular system  
→ 82.

# Pressure sensors SDE1, with display

Technical data

Ordering data							
Variant	Pressure measuring range [bar]	Switch output	Analogue output	Electrical connection	Type of display	Part No.	Type
Male thread R1/8, mounting on service unit (D series), relative pressure measurement							
	0 ... 10	PNP	-	Plug, M8x1, 3-pin	LCD <sup>1)</sup>	192 026	SDE1-D10-G2-R18-C-P1-M8
					Illuminated LCD	529 970	SDE1-D10-G2-R18-L-P1-M8
				Plug M12x1, 3-pin	Illuminated LCD	534 064	SDE1-D10-G2-R18-L-P1-M12
		2x PNP	-	Plug, M8x1, 4-pin	LCD <sup>1)</sup>	192 027	SDE1-D10-G2-R18-C-P2-M8
		PNP	0 ... 10 V	Plug, M8x1, 4-pin	LCD <sup>1)</sup>	529 958	SDE1-D10-G2-R18-C-PU-M8
					Illuminated LCD	529 972	SDE1-D10-G2-R18-L-PU-M8
Male thread R1/4, mounting on service unit (D series), relative pressure measurement							
	0 ... 10	PNP	-	Plug, M8x1, 3-pin	LCD <sup>1)</sup>	192 028	SDE1-D10-G2-R14-C-P1-M8
					Illuminated LCD	529 967	SDE1-D10-G2-R14-L-P1-M8
				Plug M12x1, 3-pin	Illuminated LCD	534 157	SDE1-D10-G2-R14-L-P1-M12
		2x PNP	-	Plug, M8x1, 4-pin	LCD <sup>1)</sup>	192 029	SDE1-D10-G2-R14-C-P2-M8
		PNP	0 ... 10 V	Plug, M8x1, 4-pin	Illuminated LCD	529 968	SDE1-D10-G2-R14-L-P2-M8
					LCD <sup>1)</sup>	529 957	SDE1-D10-G2-R14-C-PU-M8
Illuminated LCD	529 969	SDE1-D10-G2-R14-L-PU-M8					
Push-in connector QS-4, for front panel mounting, differential pressure and relative pressure measurement							
	0 ... 10	PNP	-	Plug, M8x1, 3-pin	Illuminated LCD	537 028	SDE1-D10-G2-FQ4-L-P1-M8
				Plug M12x1, 3-pin		537 030	SDE1-D10-G2-FQ4-L-P1-M12
		2x PNP	-	Plug, M8x1, 4-pin		537 029	SDE1-D10-G2-FQ4-L-P2-M8
				Plug M12x1, 4-pin		537 031	SDE1-D10-G2-FQ4-L-P2-M12

1) Back illuminated

 Note  
Additional variants and accessories can be configured and ordered through the SDE1 modular system → 82.

# Pressure sensors SDE1, with display

Modular product system



M Mandatory data								O Options
Module No.	Function	Pressure range	Absolute accuracy	Pneumatic connection and assembly	Display and adjustment	Electrical output	Electrical connection	Accessories: Plug socket
192 766	SDE1	B2, V1, D2, D6, D10	G2	R18, R14, MS4, MS6, H18, W18, HQ4, WQ4, FQ4	C, L	P1, P2, PU, PI, N1, N2, NU, NI	M8, M12	G, W, G5, W5
<b>Order example</b>								
192 766	SDE1	- D6	- G2	- W18	- L	- P2	- M12	- W5

Ordering table		Condi-tions	Code	Enter code
M	Module No.	192 766		
	Function	Pressure sensor	SDE1	SDE1
	Pressure range	Pressure range -1 ... 1 bar	-B2	
		Pressure range 0 ... -1 bar	-V1	
		Pressure range 0 ... 2 bar	-D2	
		Pressure range 0 ... 6 bar	-D6	
		Pressure range 0 ... 10 bar	-D10	
	Absolute accuracy	Accuracy 2%	-G2	-G2
	Pneumatic connection and assembly	Mounting R $\frac{1}{8}$ (service units)	-R18	
		Mounting R $\frac{1}{4}$ (service units)	-R14	
		Direct connection, service units, MS4 series	-MS4	
		Direct connection, service units, MS6 series	-MS6	
		Relative pressure with G $\frac{1}{8}$ connection for DIN H-rail mounting	-H18	
		Relative pressure with G $\frac{1}{8}$ connection for wall or surface mounting	-W18	
		DIN H-rail mounting, 4 mm push-in connector	-HQ4	
		Wall mounting, 4 mm push-in connector	-WQ4	
	Front panel mounting, 4 mm push-in connector	-FQ4		
	Display and adjustment	LCD display (optimised operation)	-C	
		Illuminated LCD (reading optimised)	-L	
	Electrical output	1 switch (PNP)	-P1	
		2 switches (PNP)	-P2	
		1 switch (PNP) and 0 ... 10 V analogue	-PU	
		1 switch (PNP) and 4 ... 20 mA analogue	-PI	
		1 switch (NPN)	-N1	
		2 switches (NPN)	-N2	
		1 switch (NPN) and 0 ... 10 V analogue	-NU	
	1 switch (NPN) and 4 ... 20 mA analogue	-NI		
	Electrical connection	M8 plug	-M8	
		M12 plug	-M12	
O	Accessories		-	-
	Plug socket	2.5 m SIM cable with straight connection socket	G	
		2.5 m SIM cable with angled connection socket	W	
		5 m SIM cable with straight connection socket	G5	
		5 m SIM cable with angled connection socket	W5	

**Transfer order code**

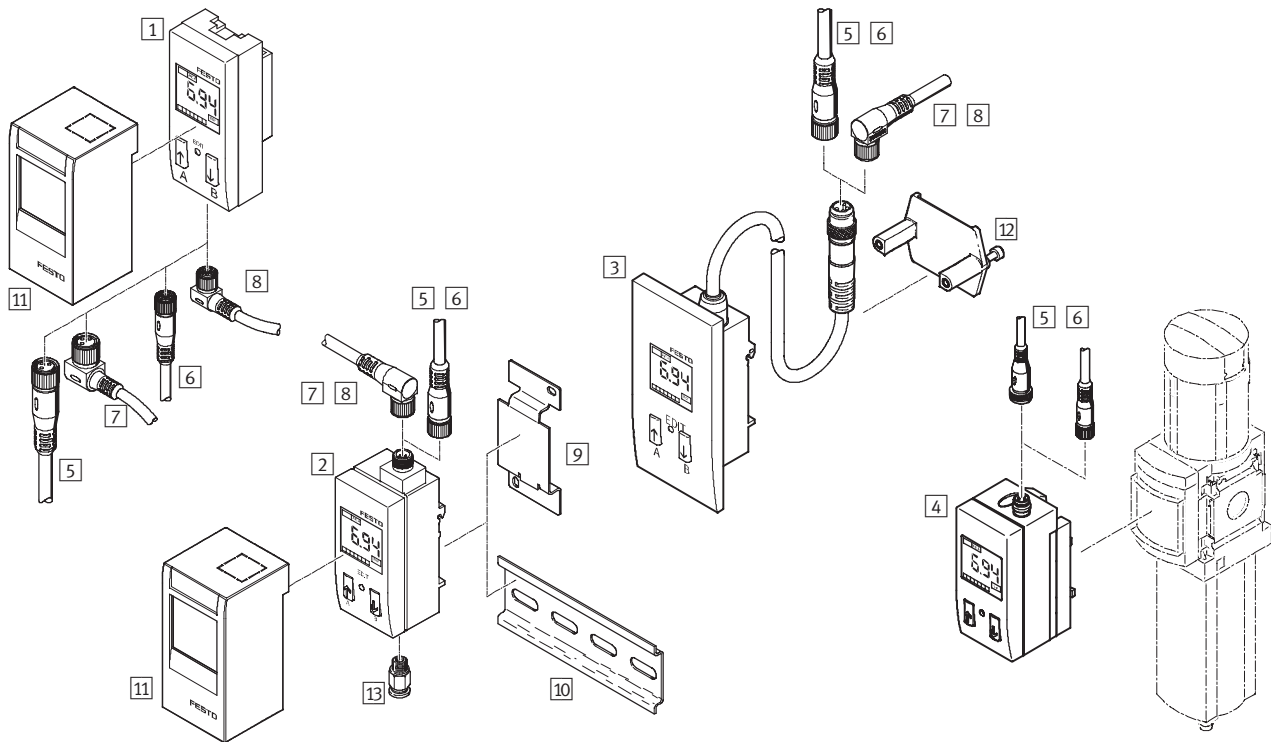
192 766	SDE1	-		-	G2	-		-		-		-		-	
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# Pressure sensors SDE1, with display

Peripherals overview

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Sensors  
Sensors for pressure and vacuum  
1.2



Accessories	
1	Pressure sensor SDE1-...-R14
2	Pressure sensor SDE1-...-H18, SDE1-...-W18
3	Pressure sensor SDE1-...-FQ4
4	Pressure sensor SDE1-...-MS...
5	Connecting cable NEBU-M12G... with straight socket
6	Connecting cable NEBU-M8G... with straight socket
7	Connecting cable NEBU-M12W... with angled socket

Accessories	
8	Connecting cable NEBU-M8W... with angled socket
9	Adapter plate SDE1-...-W-...
10	Mounting rail to DIN EN 50022
11	Safety guard SDE1-SH
12	Clamping plate (included in scope of delivery with SDE1-...-FQ4)
13	Push-in fitting QS-1/8

Ordering data – Connecting cables		Technical data → 247	
	Number of wires	Cable length [m]	Part No. Type
<b>M8x1, straight socket</b>			
	3	2.5	541 333 NEBU-M8G3-K-2.5-LE3
		5	541 334 NEBU-M8G3-K-5-LE3
	4	2.5	541 342 NEBU-M8G4-K-2.5-LE4
		5	541 343 NEBU-M8G4-K-5-LE4
<b>M8x1, angled socket</b>			
	3	2.5	541 338 NEBU-M8W3-K-2.5-LE3
		5	541 341 NEBU-M8W3-K-5-LE3
	4	2.5	541 344 NEBU-M8W4-K-2.5-LE4
		5	541 345 NEBU-M8W4-K-5-LE4

Ordering data – Connecting cables		Technical data → 247		
	Number of wires	Cable length [m]	Part No. Type	
<b>M12x1, straight socket</b>				
	3	2.5	541 363 NEBU-M12G5-K-2.5-LE3	
		5	541 364 NEBU-M12G5-K-5-LE3	
	4	5	541 328 NEBU-M12G5-K-5-LE4	
		5	2.5	541 330 NEBU-M12G5-K-2.5-LE5
			5	541 331 NEBU-M12G5-K-5-LE5
<b>M12x1, angled socket</b>				
	3	2.5	541 367 NEBU-M12W5-K-2.5-LE3	
		5	541 370 NEBU-M12W5-K-5-LE3	
	4	5	541 329 NEBU-M12W5-K-5-LE4	

Ordering data – Push-in fittings		Technical data → www.festo.com	
	For tubing O.D. [mm]	Part No.	Type
	4	186 095	QS-G1/8-4
	6	186 096	QS-G1/8-6
	8	186 098	QS-G1/8-8

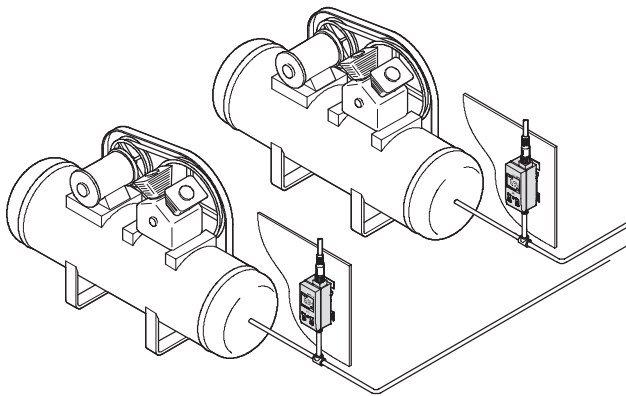
Ordering data – Accessories	
	Part No. Type
	194 297 SDE1-...-W-...
	537 074 SDE1-SH

# Pressure sensors SDE1, with display

Application examples

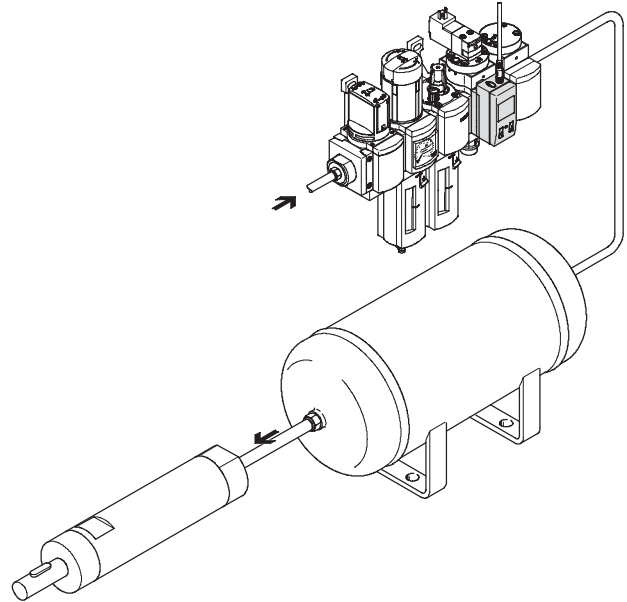


## Basic pressure monitoring



- Pressure sensor SDE1 with display as basic pressure monitoring on the compressors

## Pressure range monitoring



- Pressure range monitoring via a pressure sensor SDE1 with display in combination with an MS series service unit for operation of a pulsed air motor



# Pressure sensors SPAB, with display

Product range overview



- Pressure measuring range –1 ... +1 or 0 ... 10 bar
- Relative pressure measurement
- Pressure supply port G1/8, R1/8 or NPT1/8-27
- Switch output PNP, NPN and analogue output
- Two-part, multi-coloured display
- Copy function (settings can be transferred from device to device)
- Simple commissioning thanks to intuitive operation
- Compact design 30x30 mm

Detailed product information

➔ [www.festo.com/catalogue/spab](http://www.festo.com/catalogue/spab)

Product range overview							
Method of measurement	Measured variable	Pressure measuring range [bar]	Switching function	Pneumatic connection		Electrical output	
				Male thread	Female thread	Digital	Analogue
Piezoresistive pressure sensor with display	1x relative pressure	–1 ... +1 or 0 ... 10	Freely programmable	G1/8, R1/8 or NPT1/8-27	M5	1x PNP	1 ... 5 V
						2x PNP	–
						1x NPN	1 ... 5 V
						2x NPN	–

# Pressure sensors SPAB, with display

Type codes



SPAB - P10 R - G18 - PB - K1

Sensor function	
SPAB	Piezoresistive pressure sensor with multi-coloured display
Pressure measuring range	
B2	-1 ... +1 bar
P10	0 ... 10 bar
Measured variable	
R	Relative pressure
Pneumatic connection	
G18	Male thread G1/8 and female thread M5
R18	Male thread R1/8 and female thread M5
N18	Male thread NPT1/8-27 and female thread M5
Electrical output	
2P	2 switch outputs PNP
2N	2 switch outputs NPN
PB	1 switch output PNP and 1 ... 5 V analogue
NB	1 switch output NPN and 1 ... 5 V analogue
Electrical connection	
K1	Cable, 2.5 m long (included in scope of delivery)
M8	Plug M8x1

# Pressure sensors SPAB, with display

Technical data

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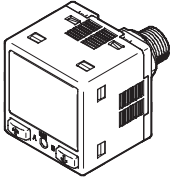
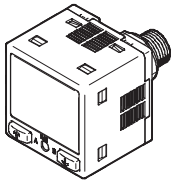
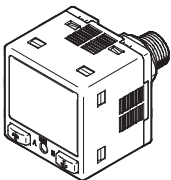
General technical data				
Design				
Pressure measuring range	[bar]	-1 ... +1		0 ... 10
Measured variable	Relative pressure			
Pneumatic connection	Male thread G1/8, R1/8 or NPT1/8-27 Female thread M5			
Type of display	Multi-coloured illuminated LCD			
Accuracy FS <sup>1)</sup>		±1%	±2%	
Setting options	Via display and buttons Teach-in			
Type of mounting	Screw-in Via accessories			
Electrical data				
Switch output		2x PNP or 2x NPN	1x PNP or 1x NPN	2x PNP or 2x NPN
Analogue output	[V]	-	1 ... 5	-
Switching element function	Switchable			
Switching function	Freely programmable			
Operating voltage range	[V DC]	12 ... 24		
Max. output current	[mA]	100		
Electrical connection	Plug M8x1, 4-pin, round design to EN 60 947-5-2 Cable, 4-wire			
Protection against short circuit	Yes			
Protection against polarity reversal	For operating voltage			
Protection class	IP40			
Operating and environmental conditions				
Operating medium	Filtered compressed air, unlubricated, grade of filtration 40 µm			
Ambient temperature	[°C]	-10 ... +50		
CE mark (see declaration of conformity)	In accordance with EU EMC directive			
Certification	C-UL-US listed (OL) C tick			
Materials				
Housing	Reinforced acrylic butadiene styrene, reinforced polybutylene terephthalate			
Note on materials	Conforms to RoHS			

1) % FS = % of measuring range (full scale)

# Pressure sensors SPAB, with display

Technical data

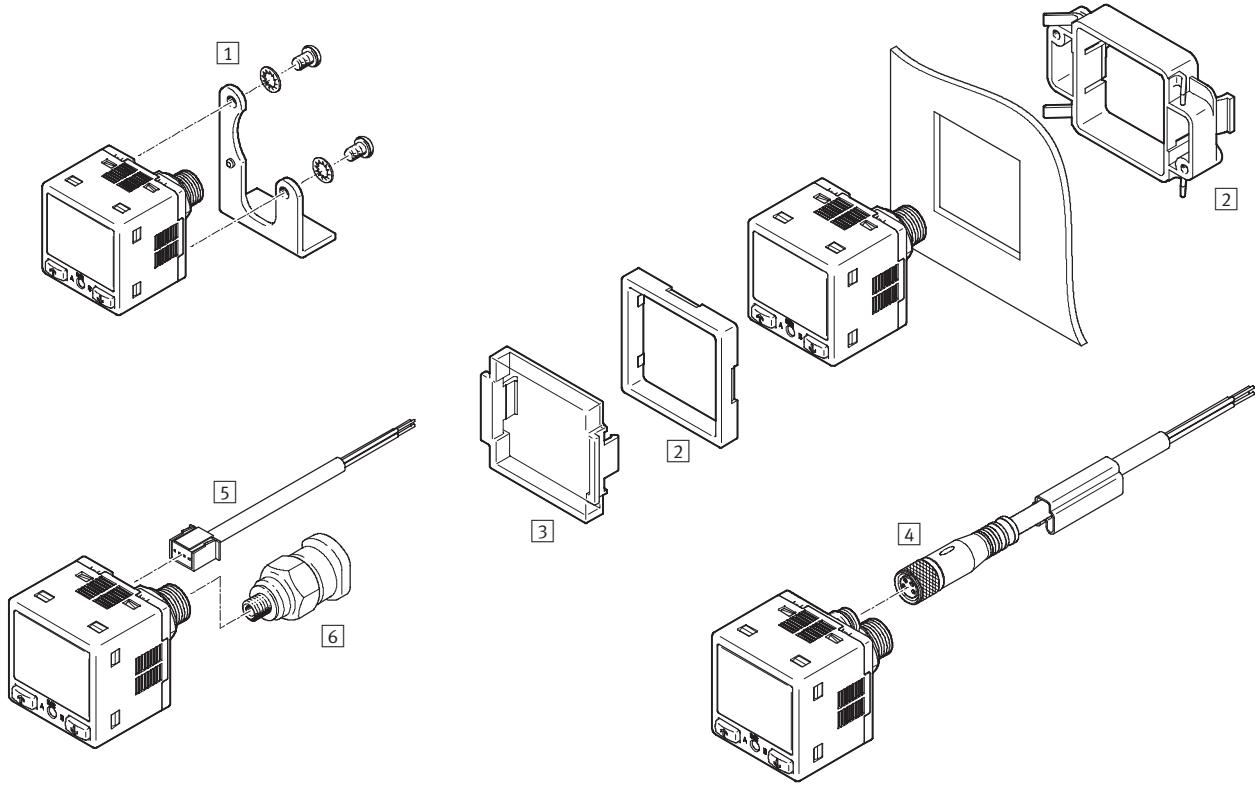


Ordering data							
Version	Pressure measuring range [bar]	Electrical output		Electrical connection			
		Digital	Analogue	Cable <sup>1)</sup>		Plug	
				Part No.	Type	Part No.	Type
<b>Pneumatic connection G<math>\frac{1}{8}</math></b>							
	-1 ... +1	1x PNP	1 ... 5 V	552 356	SPAB-B2R-G18-PB-K1	553 152	SPAB-B2R-G18-PB-M8
		2x PNP	-	552 350	SPAB-B2R-G18-2P-K1	553 146	SPAB-B2R-G18-2P-M8
		1x NPN	1 ... 5 V	552 359	SPAB-B2R-G18-NB-K1	553 155	SPAB-B2R-G18-NB-M8
		2x NPN	-	552 353	SPAB-B2R-G18-2N-K1	553 149	SPAB-B2R-G18-2N-M8
	0 ... 10	1x PNP	1 ... 5 V	552 368	SPAB-P10R-G18-PB-K1	553 164	SPAB-P10R-G18-PB-M8
		2x PNP	-	552 362	SPAB-P10R-G18-2P-K1	553 158	SPAB-P10R-G18-2P-M8
		1x NPN	1 ... 5 V	552 371	SPAB-P10R-G18-NB-K1	553 167	SPAB-P10R-G18-NB-M8
		2x NPN	-	552 365	SPAB-P10R-G18-2N-K1	553 161	SPAB-P10R-G18-2N-M8
<b>Pneumatic connection R<math>\frac{1}{8}</math></b>							
	-1 ... +1	1x PNP	1 ... 5 V	552 357	SPAB-B2R-R18-PB-K1	553 153	SPAB-B2R-R18-PB-M8
		2x PNP	-	552 351	SPAB-B2R-R18-2P-K1	553 147	SPAB-B2R-R18-2P-M8
		1x NPN	1 ... 5 V	552 360	SPAB-B2R-R18-NB-K1	553 156	SPAB-B2R-R18-NB-M8
		2x NPN	-	552 354	SPAB-B2R-R18-2N-K1	553 150	SPAB-B2R-R18-2N-M8
	0 ... 10	1x PNP	1 ... 5 V	552 369	SPAB-P10R-R18-PB-K1	553 165	SPAB-P10R-R18-PB-M8
		2x PNP	-	552 363	SPAB-P10R-R18-2P-K1	553 159	SPAB-P10R-R18-2P-M8
		1x NPN	1 ... 5 V	552 372	SPAB-P10R-R18-NB-K1	553 168	SPAB-P10R-R18-NB-M8
		2x NPN	-	552 366	SPAB-P10R-R18-2N-K1	553 162	SPAB-P10R-R18-2N-M8
<b>Pneumatic connection NPT<math>\frac{1}{8}</math>-27</b>							
	-1 ... +1	1x PNP	1 ... 5 V	552 358	SPAB-B2R-N18-PB-K1	553 154	SPAB-B2R-N18-PB-M8
		2x PNP	-	552 352	SPAB-B2R-N18-2P-K1	553 148	SPAB-B2R-N18-2P-M8
		1x NPN	1 ... 5 V	552 361	SPAB-B2R-N18-NB-K1	553 157	SPAB-B2R-N18-NB-M8
		2x NPN	-	552 355	SPAB-B2R-N18-2N-K1	553 151	SPAB-B2R-N18-2N-M8
	0 ... 10	1x PNP	1 ... 5 V	552 370	SPAB-P10R-N18-PB-K1	553 166	SPAB-P10R-N18-PB-M8
		2x PNP	-	552 364	SPAB-P10R-N18-2P-K1	553 160	SPAB-P10R-N18-2P-M8
		1x NPN	1 ... 5 V	552 373	SPAB-P10R-N18-NB-K1	553 169	SPAB-P10R-N18-NB-M8
		2x NPN	-	552 367	SPAB-P10R-N18-2N-K1	553 163	SPAB-P10R-N18-2N-M8

1) Connecting cable NEBU-L1... (2.5 m long) included in scope of delivery.

# Pressure sensors SPAB, with display

Peripherals overview



### Accessories




1	Mounting bracket
2	Front panel installation kit
3	Safety guard

### Accessories

4	Connecting cable NEBU-M8...4
5	Connecting cable NEBU-L1G4 with square, straight socket
6	Push-in fitting QSM-M5

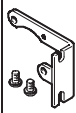


### Ordering data – Connecting cables

Technical data → 247

	Number of cores	Cable length [m]	Part No.	Type
<b>M8x1, straight socket</b>				
	4	2.5	541 342	NEBU-M8G4-K-2.5-LE4
		5	541 343	NEBU-M8G4-K-5-LE4
<b>M8x1, angled socket</b>				
	4	2.5	541 344	NEBU-M8W4-K-2.5-LE4
		5	541 345	NEBU-M8W4-K-5-LE4
<b>Square, straight socket</b>				
	4	2.5	552 374	NEBU-L1G4-K-2.5-LE4 <sup>1)</sup>
		5	552 375	NEBU-L1G4-K-5-LE4


1) Included in the scope of delivery with SPAB-...-K1

### Ordering data – Accessories

	Description	Part No.	Type
	Mounting bracket	552 376	SAMH-P4-A
	Front panel installation kit	552 377	SAMH-P4-F
	Safety guard	552 378	SACC-P4-G

### Ordering data – Push-in fittings

Technical data → [www.festo.com/catalogue/qsm-m5](http://www.festo.com/catalogue/qsm-m5)

	Pneumatic connection	For tubing O.D. [mm]	Part No.	Type
	M5	4	153 304	QSM-M5-4
		6	153 306	QSM-M5-6



# Pressure transmitters SDET

Product overview



- Eight pressure measuring ranges
- Relative pressure measurement
- Analogue output 0.1 ... 10 V or 4 ... 20 mA
- Resistant to water and oils

Detailed product information  
 → [www.festo.com/catalogue/sdet](http://www.festo.com/catalogue/sdet)

## Type codes

SDET - 22T - D2 - G14 - U - M12

### Sensor function

SDET	Pressure transmitter
------	----------------------

### Size

22T	Housing, width across flats 22
-----	--------------------------------

### Pressure measuring range

B2	-1 ... +1 bar
D2	0 ... 2 bar
D6	0 ... 6 bar
D10	0 ... 10 bar
D16	0 ... 16 bar
D25	0 ... 25 bar
D50	0 ... 50 bar
D100	0 ... 100 bar

### Pneumatic connection

G14	Female thread G $\frac{1}{4}$
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### Analogue output

U	0.1 ... 10 V
I	4 ... 20 mA

### Electrical connection

M12	Plug M12x1, 4-pin
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# Pressure transmitters SDET

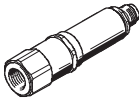
Technical data

FESTO

Sensors  
Sensors for pressure and vacuum

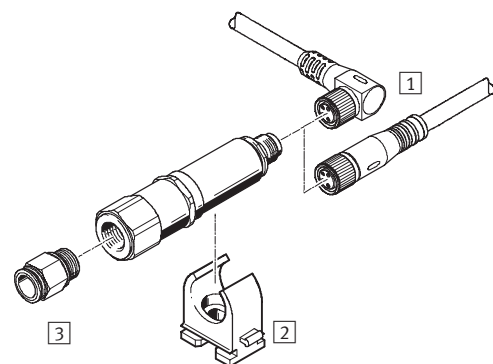
1.2

General technical data			
Analogue output		0.1 ... 10 V	4 ... 20 mA
Design			
Pneumatic connection		G1/4	
Electrical data			
Operating voltage range DC	[V]	14 ... 30	8 ... 30
Electrical connection		Plug M12x1, 4-pin	
Protection against short circuit		Yes	
Protection class		IP65	
Operating and environmental conditions			
Operating medium		Compressed air; liquid media; gaseous media	
Ambient temperature	[°C]	0 ... 80	
Temperature of medium	[°C]	-10 ... 100	
CE mark (see declaration of conformity)		In accordance with EU EMC directive	
Certification		C-Tick	
Materials			
Housing		High-alloy stainless steel	
Pressure supply port		CrNi steel 1.4305	
Sealing ring		Fluorocarbon rubber	
Sensor element		Al2O3 96%	

Ordering data						
Variant	Pressure measuring range [bar]	Accuracy FS <sup>1)</sup>	Analogue output 0.1 ... 10 V		Analogue output 4 ... 20 mA	
			Part No.	Type	Part No.	Type
	-1 ... +1	±1.5%	547 476	SDET-22T-B2-G14-U-M12	547 475	SDET-22T-B2-G14-I-M12
	0 ... 2		547 478	SDET-22T-D2-G14-U-M12	547 477	SDET-22T-D2-G14-I-M12
	0 ... 6	±1 %	547 480	SDET-22T-D6-G14-U-M12	547 479	SDET-22T-D6-G14-I-M12
	0 ... 10		547 482	SDET-22T-D10-G14-U-M12	547 481	SDET-22T-D10-G14-I-M12
	0 ... 16		547 484	SDET-22T-D16-G14-U-M12	547 483	SDET-22T-D16-G14-I-M12
	0 ... 25		547 486	SDET-22T-D25-G14-U-M12	547 485	SDET-22T-D25-G14-I-M12
	0 ... 50		547 488	SDET-22T-D50-G14-U-M12	547 487	SDET-22T-D50-G14-I-M12
	0 ... 100		547 490	SDET-22T-D100-G14-U-M12	547 489	SDET-22T-D100-G14-I-M12

1) % FS = % of measuring range's final value (full scale)



## Peripherals overview



Accessories	
1	Connecting cable NEBU-M12 (signal output)
2	Pipe clamp PQ-RK-22 (included in scope of delivery)
3	Push-in fitting QS-1/4


### Ordering data – Connecting cables

Technical data → 247

	Number of wires	Cable length [m]	Part No.	Type
M12x1, straight socket				
	4	5	541 328	NEBU-M12G5-K-5-LE4
M12x1, angled socket				
	4	5	541 329	NEBU-M12W5-K-5-LE4

### Ordering data – Push-in fittings<sup>1)</sup>

Technical data → www.festo.com

	For tubing O.D.	Part No.	Type
	4 mm	190 644	QS-G1/4-4 <sup>1)</sup>
	6 mm	153 003	QS-G1/4-6 <sup>1)</sup>
	8 mm	153 005	QS-G1/4-8 <sup>1)</sup>

1) Temperature-dependent operating pressure -0.95 ... 14 bar