Pressure sensors

For pressures up to 1800 bar (180 Mpa)

- Ratiometric signal evaluation (referred to supply voltage).
- Self-monitoring of offset and sensitivity.
- Protection against polarity reversal, overvoltage, and short circuit of output to supply voltage or ground.
- High level of compatibility with media since this only comes into contact with stainless steel.
- Resistant to brake fluids, mineral oils, water, and air.

Application
Pressure sensors of this type are used to measure the pressures in automotive braking systems, or in the fuel-distributor rail of a gasoline direct-injection engine, or in a diesel engine with Common Rail injection.

Design and function
Pressure measurement results from the bending of a steel diaphragm on which are located polysilicon strain-gauge elements. These are connected in the form of a Wheatstone bridge. This permits high signal utilisation and good temperature compensation.
The measurement signal is amplified in an evaluation IC and corrected with respect to offset and sensitivity. At this point, temperature compensation again takes place so that the calibrated unit comprising measuring cell and ASIC only has a very low temperature-dependence level.
Part of the evaluation IC is applied for a diagnostic function which can detect the following potential defects:
– Fracture of a bonding wire to the measuring cell.
– Fracture anywhere on any of the signal lines.
– Fracture of the bridge supply and ground.

Only for 0 265 005 303
This sensor differs from conventional sensors due to the following diagnostic functions:
– Offset errors
– Amplification errors
can be detected by comparing two signal paths in the sensor.

Storage conditions

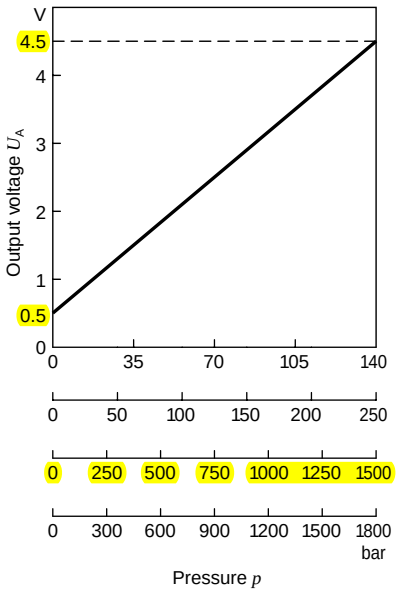
Temperature range	–30...+60 °C
Relative air humidity	0...80 %
Maximum storage period	5 years

Through compliance with the above storage conditions, it is ensured that the sensor functions remain unchanged.
If the maximum storage conditions are exceeded, the sensors should no longer be used.

Explanation of symbols

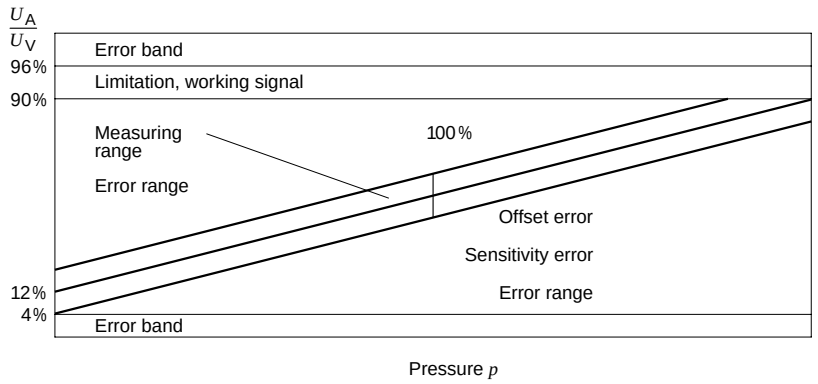
U_A	Output voltage
U_V	Supply voltage
bar	Pressure

Characteristic curve.
$U_A = (0.8 \cdot p / p_{Nom.} + 0.1)U_V$

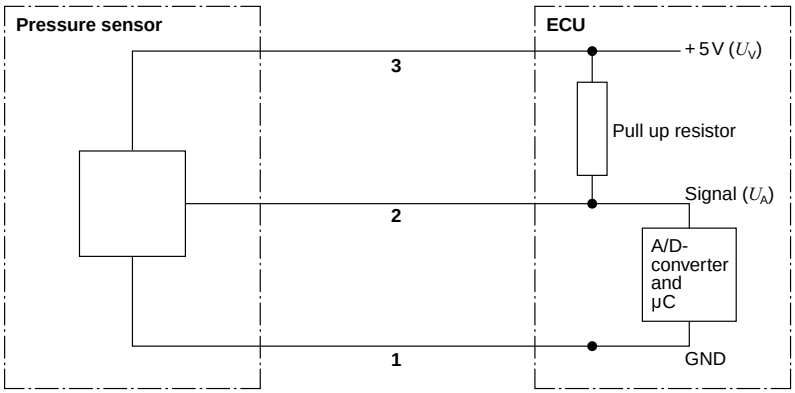


Pressure sensors (contd.)
For pressures up to 1800 bar (180 MPa)

Self-monitoring. Offset and sensitivity. Only for 0 265 005 303.



Measuring circuit.



Diagnostic function during self-test (following switch-on). Only for 0 265 005 303.
– Correctness of the calibration values
– Function of the sensor signal path from the sensor to the A/D converter of the evaluation unit
– Check of the supply lines.
Diagram:
Characteristic of the output voltage following switch-on
– Function of the signal and alarm paths
– Detection of offset errors
– Detection of short circuits in wiring harness
– Detection of overvoltage and undervoltage
– If an error is detected during the sensor's self-test, the signal output is switched to the voltage range > 96% U_V.

Diagnostic function during normal operation.
Only for 0 265 005 303.
– Detection of offset errors
– Detection of sensitivity errors (with pressure applied)
– Wiring-harness function, detection of wiring-harness short circuits
– Detection of overvoltage and undervoltage
– If an error is detected during the sensor's self-test, the signal output is switched to the voltage range >96% U_V.

Range

Pressure range bar	(MPa)	Sensor Type	Thread	Connector	Pin	Dimens. drawing	Page	Part number
140	(14)	KV2 BDE	M 10x1	Compact 1.1	Gold-plated	1	47	**0 261 545 006**
250	(25)	–	M 10x1	PSA	–	2	48	**0 265 005 303**
1500	(150)	RDS2	M 12x1.5	Working circuit	Silber-plated	3	48	**0 281 002 238**
			M 12x1.5	Compact 1.1	Gold-plated	4	48	**0 281 002 405**
		RDS3	M 12x1.5	Working circuit	Silber-plated	5	48	**0 281 002 498**
			M 12x1.5	Compact 1.1	Gold-plated	6	49	**0 281 002 522**
1800	(180)	RDS2	M 12x1.5	Compact 1.1	Gold-plated	4	48	**0 281 002 398**
			M 18x1.5	Compact 1.1	Gold-plated	7	49	**0 281 002 472**
		RDS3	M 18x1.5	Compact 1.1	Gold-plated	8	49	**0 281 002 534**
			M 18x1.5	Working circuit	Silber-plated	9	49	**0 281 002 504**

Accessories

For 0 265 005 303

Plug housing	–	Quantity required: 1	AMP No.	**2-967 642-1** [1])
Contact pins	for 0.75 mm²	Quantity required:3	AMP No.	**965 907-1** [1])
Gaskets	for 1.4...1.9 mm²	Quantity required: 3	AMP No.	**967 067-1** [1])

[1]) To be obtained from AMP Deutschland GmbH, Amperestr. 7–11, D-63225 Langen,
Tel. 0 61 03/7 09-0, Fax 0 61 03/7 09 12 23, E-Mail: AMP.Kontakt@tycoelectronics.com

Technical data

Pressure sensor		0 261 545 006	0 265 005 303	0 281 002 238 0 281 002 405	0 281 002 498 0 281 002 522	0 281 002 398 0 281 002 472	0 281 002 534 0 281 002 504
Pressure-sensor type		KV2 BDE	–	RDS2	RDS3	RDS2	RDS3
Application/Medium		Unlead. fuel	Brake fluid	Diesel fuel or RME [1]	Diesel fuel or RME [1]	Diesel fuel or RME [1]	Diesel fuel or RME [1]
Pressure range	bar (MPa)	140 (14)	250 (25)	1500 (150)	1500 (150)	1800 (180)	1800 (180)
Offset accuracy	U_V	0.7 % FS	2.0 %	1.0 % FS 1.5 % FS	0.7 % FS	1.0 % FS	0.7 % FS
Sensitivity accuracy at 5 V							
In range 0...35 bar	FS [2] of	–	≤ 0.7 %	1.0 % FS 1.5 % FS	0.7 % FS	1.0 % FS	0.7 % FS
In range 35...140 bar	meas-	1.5 %	–	–	–	–	–
In range 35...250 bar	ured	–	≤ 5.0 % [3]	–	–	–	–
In range 35...1500 bar	value	–	–	2.0 % FS 2.5 % FS	1.5 % FS	–	–
In range 35...1800 bar		–	–	–	–	2.3 % FS	1.5 % FS
Input voltage, max. U_s	V	16	–	16	16	16	16
Power-supply voltage U_V	V	5 ±0.25	5 ±0.25	5 ±0.25	5 ±0.25	5 ±0.25	5 ±0.25
Power-supply current I_V	mA	9...15	≤ 20	9...15	9...15	9...15	9...15
Output current I_A	µA...mA	–	–100...3	2.5 mA [4]	–	2.5 mA [4]	–
Load capacity to ground	nF	13	–	10	13	10	13
Temperature range	°C	–40...+130	–40...+120	–40...+120 [5]	–40...+130	–40...+120 [5]	–40...+130
Overpressure max. p_{max}	bar	180	350	1800	2200	2100	2200
Burst pressure p_{burst}	bar	> 300	> 500	3000	4000	3500	4000
Tightening torque M_a	Nm	22 ±2	20 ±2	35 ±5	35 ±5	70 ±2	70 ±2
Response time $T_{10/90}$	ms	2	–	5	2	5	2

Note: All data are typical values

[1]) RME = Rapeseed methyl ester

[2]) FS = Full Scale

[3]) Of measured value

[4]) Output current with pull-up resistor

[5]) +140 °C for max. 250 h

Dimension drawings

Space required by plug, approx. 25 mm

Space required when plugging/unplugging, approx. 50 mm

SW = A/F size

Connector-pin assignment

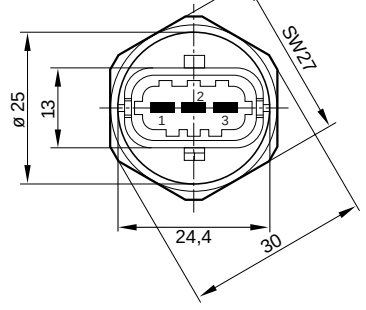
Pin 1 Ground

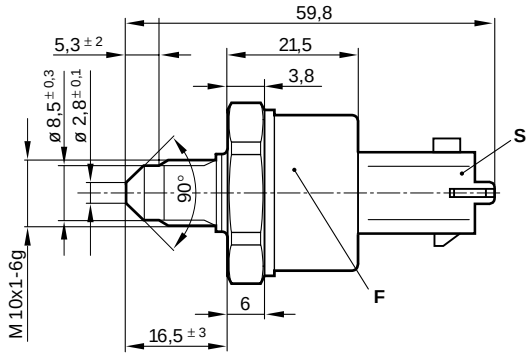
Pin 2 Output voltage U_A

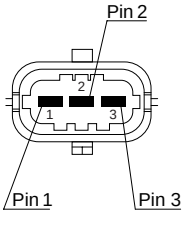
Pin 3 Supply voltage U_V

0 261 545 006 ①

140 bar







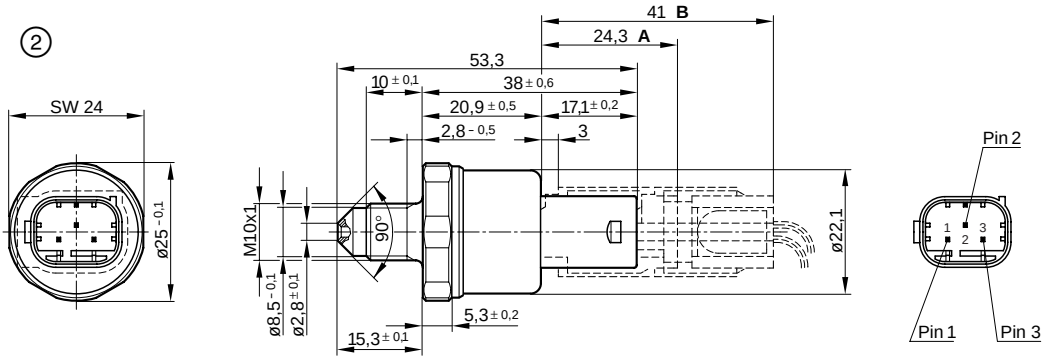
Pressure sensors (contd.)
For pressures up to 1800 bar (180 MPa)

Dimension drawings
Space required by plug, approx. 25 mm
Space required when plugging/unplugging, approx. 50 mm
SW = A/F size

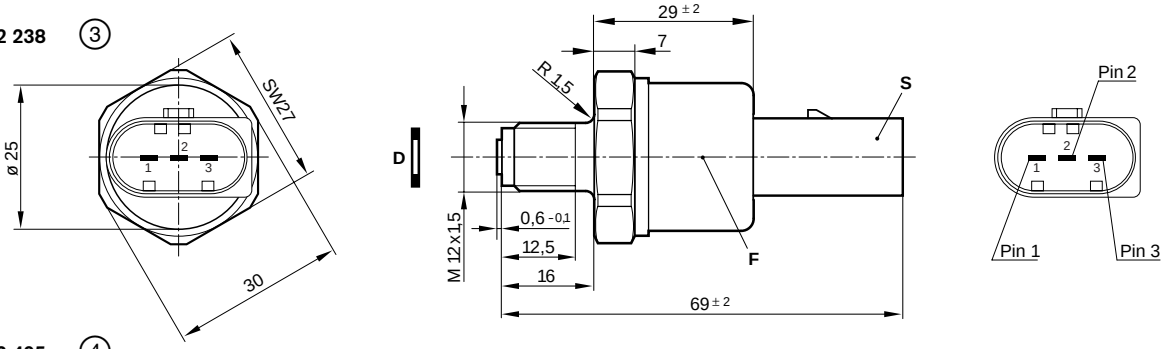
D Gasket
F Date of manufacture
S 3-pin plug

Connector-pin assignment
Pin 1 Ground
Pin 2 Output voltage U_A
Pin 3 Supply voltage U_V

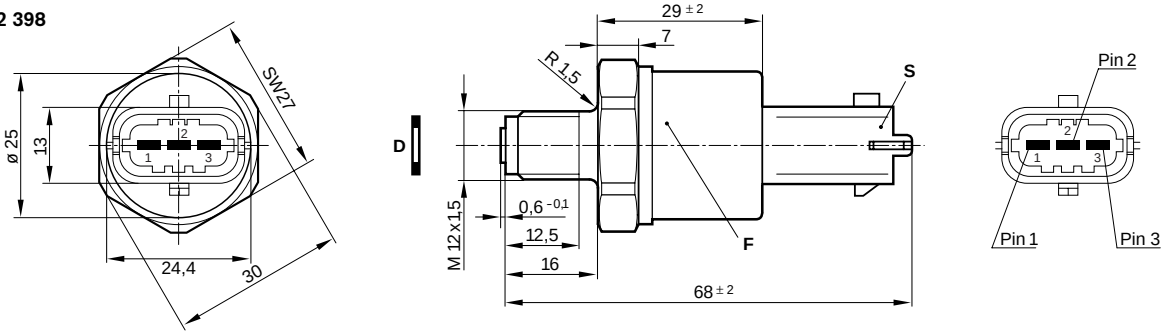
0 265 005 303 ②
250 bar



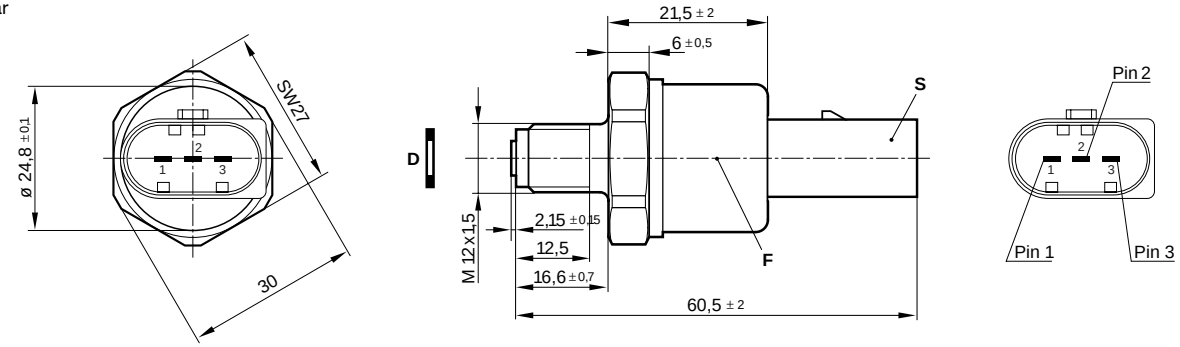
0 281 002 238 ③
1500 bar



0 281 002 405 ④
1500 bar
0 281 002 398
1800 bar



0 281 002 498 ⑤
1500 bar

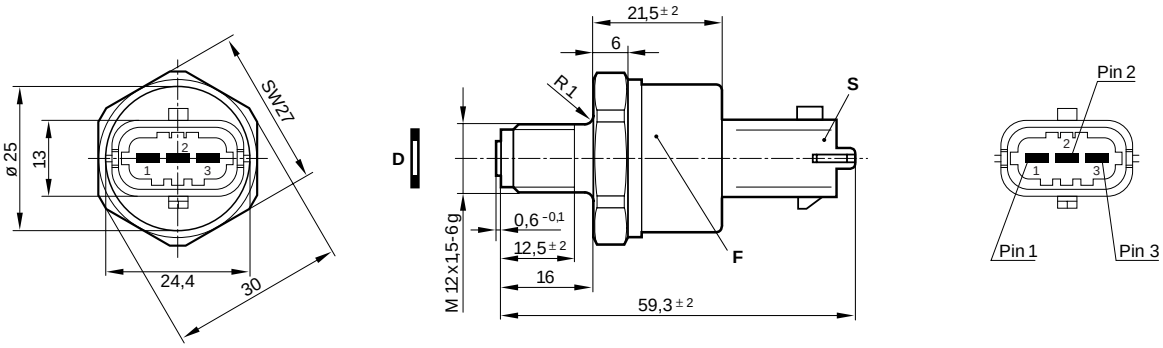


Dimension drawings
Space required by plug, approx. 25 mm
Space required when plugging/unplugging, approx. 50 mm
SW = A/F size

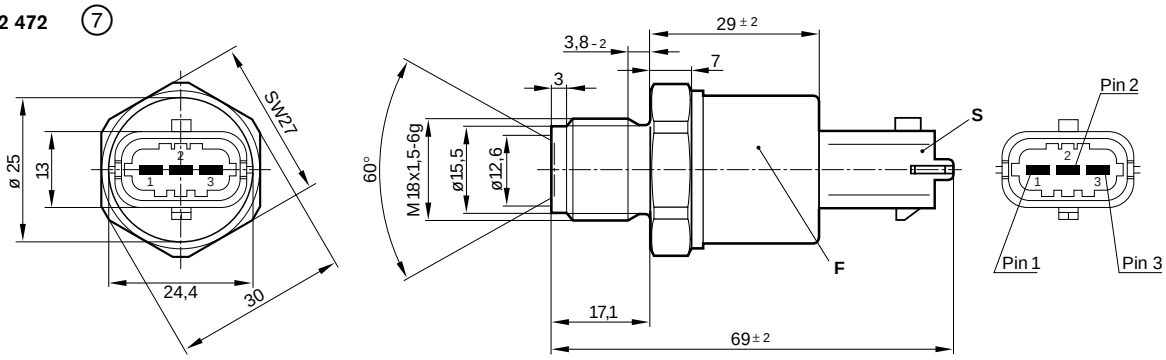
D Gasket
F Date of manufacture
S 3-pin plug

Connector-pin assignment
Pin 1 Ground
Pin 2 Output voltage U_A
Pin 3 Supply voltage U_V

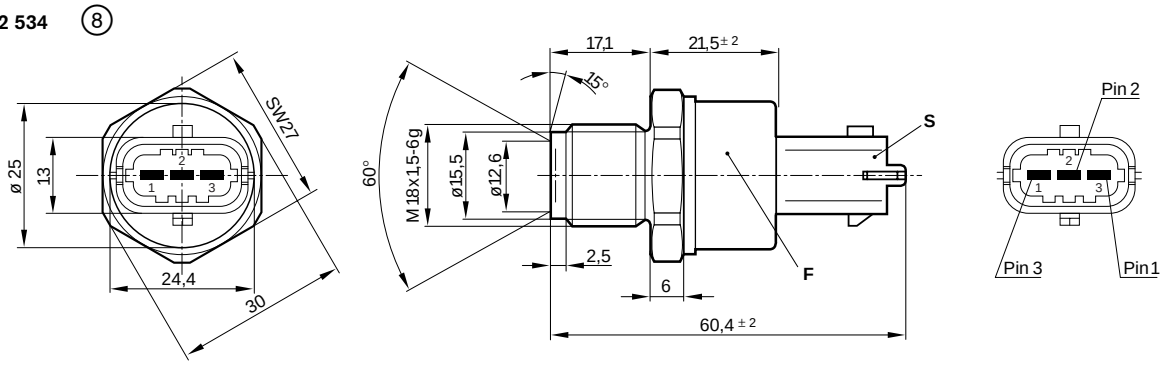
0 281 002 522 (6)
1500 bar



0 281 002 472 (7)
1800 bar



0 281 002 534 (8)
1800 bar



0 281 002 504 (9)
1800 bar