

# Water cooled absolute pressure sensor

Type 4049B...DS

## High temperature gas pressure measurement

The water cooled piezoresistive absolute pressure sensor Type 4049B...DS is a small, rugged sensor suitable for exposure to hot gaseous media. It is particularly well suited for exhaust pressure measurement in internal combustion engines.

- Rugged design for exhaust pressure measurement for temperatures in excess of 1 100 °C
- Compact size
- Digital temperature compensation
- Media separated measuring element

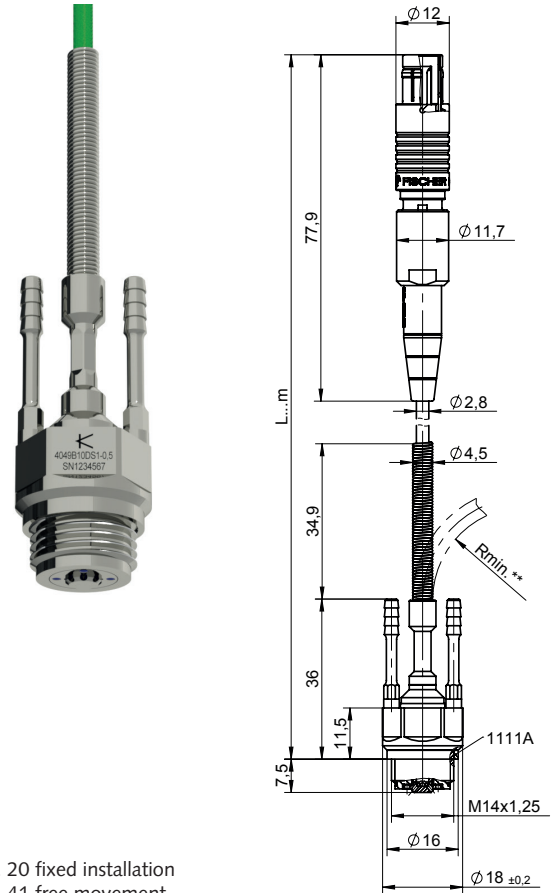
### Description

The piezoresistive pressure sensor Type 4049B...DS with integrated water cooling is capable of continuous high temperature operation. Available in absolute pressure range of 5 bar and 10 bar it is designed for use in varied applications but specifically for exhaust pressure measurement without the use of additional water-cooled adapters.

Sensor Type 4049B...DS uses a Wheatstone bridge implanted in a silicon measuring element to generate an electrical signal, which is proportional to the applied pressure. The measuring element is situated in an oil-filled cavity separated by a steel diaphragm. This core element is placed within a cooling jacket whereby the internal temperature can be suitably managed and is nearly independent of the applied hot gases.

This approach allows the sensor to be exposed to gas temperatures in excess of 1 100 °C. Due to constant water cooling thermal effects are minimized. Therefore, the overall accuracy is improved.

Further performance improvements are achieved using digital compensation, which reduces thermal effect to a minimum without sacrificing signal bandwidth. The digital compensation technique further allows monitoring of the sensor temperatures (amplifier Type 4665B... and Type 4624A...).



\*\* Rmin. 20 fixed installation  
Rmin. 41 free movement

### Technical data

#### Type 4049B...DS

Measuring range	bar	0 ... 5	0 ... 10
Overload	bar	15	25
Electrical connection		Fischer connector 5 pole (S103A054)	
Amplifier compatibility	Type	4665, 4665B, 4624A	
Power supply		amplifier integrated	
Reference temperature (Tref)	°C	60	
Sensor temperature, min./max.	°C	0/120	
Temperature compensation		digital	
Temperature compensation range	°C	0 ... 80	

4049B\_003-145e-11\_19

### Technical data (continuation)

Max. deviation pressure*	%FSO	≤±0.3
Max. deviation temperature*	°C	≤±3
Linearity at Tref (LSQ)	%FSO	≤±0.1
Natural frequency	kHz	>60
Required flow cooling fluid	l/min	0.3 ... 0.5
Sensor mounting torque	N·m	20
Screen mounting torque	N·m	3
Weight (without connector and cable)	g	30
Protective class		IP65

\* Measuring results based on digital compensation with DS-compatible amplifier. The deviations include measuring errors due to sensor characteristics (linearity, hysteresis, thermal effects) and a compensation model.

### Application

The sensor can be used wherever the pressure of high temperature gaseous media has to be measured and limitations are set by conventional uncooled sensors. Applications such as:

- Exhaust manifold pressure
- Turbine pressure measurement (e.g. exhaust turbo charger)
- Measurement in combustion systems

### Installation

Sensor Type 4049B...DS can be installed directly into a measuring port. In order to reduce the effect of heat on the sensor membrane, the sensor has an integrated screen Type 1189A2 (Fig. 3). The special design prevents potential soot foulings.

Machining of the bore (Fig. 1) or of the sensor fitting (Fig. 2) must be according the bore specifications. It is essential to comply with the tightening torque of 20 N·m when installing the sensor. The use of the correct installation tools is mandatory, such as mounting tool Type 1300A19 and torque wrench Type 1300A39.

The sensor requires cooling to avoid damage!

By using Kistler conditioning unit Type 2621G optimal sensor cooling can be assured and the best performance achieved.

### Maintenance

When using the sensor in exhaust gas application soot particles may build up on the protector screen of the sensor. For the best sensor performance it may be necessary to clean or replace the protector screen. For further information please refer to the maintenance manual or contact Kistler.

### Sensor Type 4049B...DS with PiezoSmart®

4049B\_003-145e-11.19

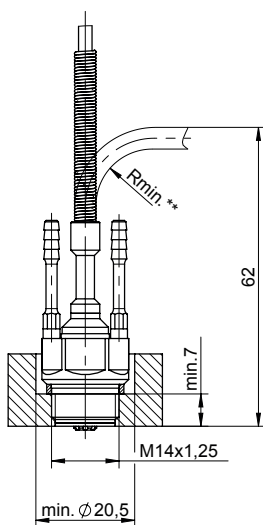


Fig. 1: Bore dimension

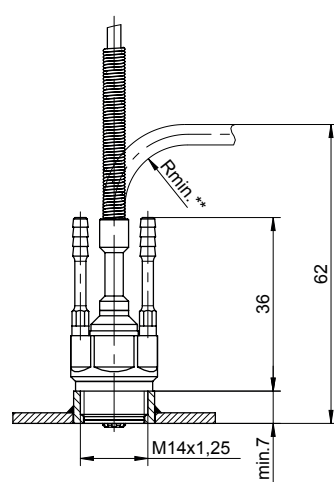
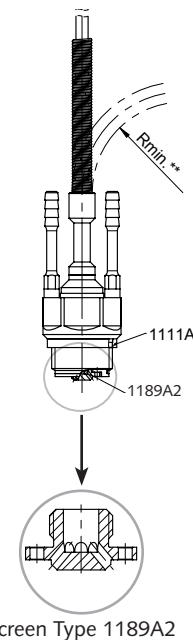


Fig. 2: Sensor installed in fitting (e.g. exhaust application)



Screen Type 1189A2

\*\* Rmin. 20 fixed installation  
Rmin. 41 free movement

Fig. 3: Sensor Type 4049B...DS

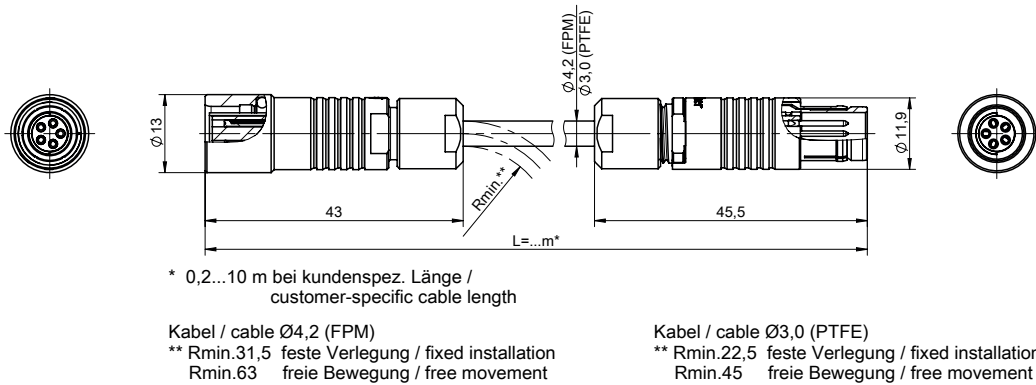


Fig. 4: Extension cable Type 4785A\_1

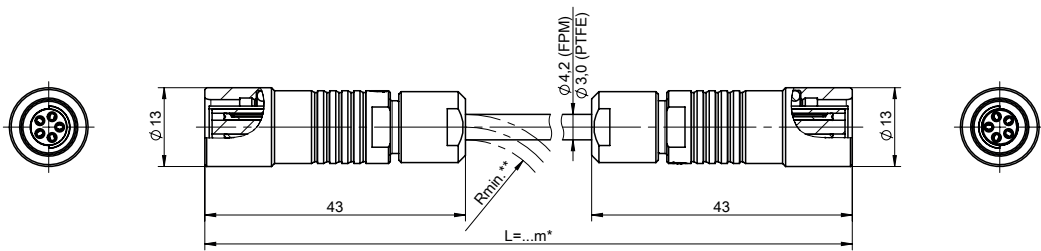


Fig. 5: Adapter cable Type 4785A\_2 for an easy connection of DS sensors to existing wiring with Type 4761B...

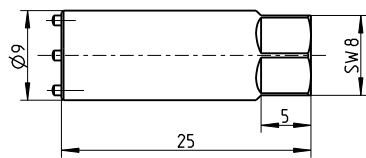


Fig. 6: Screen mounting tool Type 1300A127

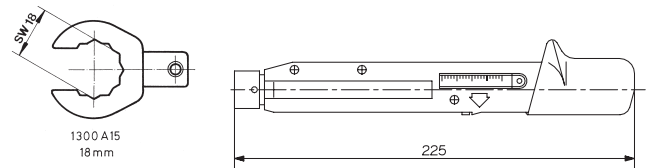


Fig. 9: Torque wrench 4 ... 20 N-m Type 1300A39 and open ended insert tool Type 1300A15 (18 mm) or 1300A33 (16 mm)

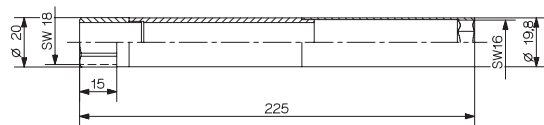


Fig. 7: Sensor mounting tool Type 1300A19

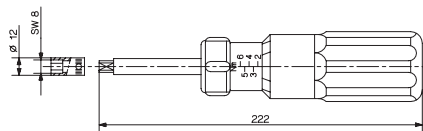


Fig. 10: Torque wrench 1 ... 6 N-m Type 1300A17

4049B\_003-145e-11.19

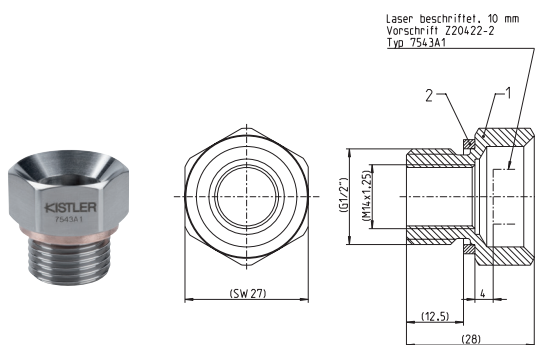


Fig. 8: G 1/2" Adapter Type 7543A1



Fig. 11: Temperature conditioning unit Type 2621G

## Scope of delivery

- Seal

## Optional accessories

- Screen mounting tool
- Sensor mounting tool
- Open ended insert tool 16 mm
- Open ended insert tool 18 mm
- Torque wrench 4 ... 20 N·m
- Torque wrench 1 ... 6 N·m

## Adaptor

- Adaptor G1/2"
- Sensor dummy M14x1.25

## Amplifier/SCP

- SCP (Slim-) for 2 measuring modules
- SCP for 8 measuring modules
- Piezoresistive SCP amplifier
- Piezoresistive 1-channel amplifier

## Water cooling equipment

- Water connecting hose
- Water connecting tube with quick coupling
- Temperature conditioning unit

- Extension cable for sensor

FPM (0 ... 180 °C)

- L = 1 m
- L = 2 m
- L = 3 m
- L = 5 m
- L = 7.5 m
- L = 10 m
- L = ...m (L<sub>min</sub> = 0,5/L<sub>max</sub> = 10 m)

- Extension cable for sensor

PTFE (-40 ... 180 °C)

- L = ... m (L<sub>min</sub> = 0.5 m/L<sub>max</sub> = 10 m)

- Adapter cable for connection of DS sensors to 4761B... cable

FPM (0 ... 180 °C)

- L = 0.2 m
- L = ... m (L<sub>min</sub> = 0.5 m/L<sub>max</sub> = 10 m)

- Adapter cable for connection of DS sensors to 4761B... cable

PTFE (-40 ... 180 °C)

- L = ...m (L<sub>min</sub> = 0.5 m/L<sub>max</sub> = 10 m)

## Type/Art. No.

1111A

## Type/Art. No.

1300A127  
1300A19  
1300A33  
1300A15  
1300A39  
1300A17

7543A1  
4189

2852A...  
2853A...  
4665B...  
4624A...

1203Csp  
1233A1  
2621G

4785A41-1,00  
4785A41-2,00  
4785A41-3,00  
4785A41-5,00  
4785A41-7,50  
4785A41-10,0  
4785A41-SP-...

4785A11-SP-...

4785A42-0,20  
4785A42-SP-...

4785A12-SP-...

## Ordering key

Type 4049B  DS  -

## Pressure range

0 ... 5 bar	05
0 ... 10 bar	10

## Sensor type

Digital compensation and PiezoSmart®	DS
--------------------------------------	----

## Cable type

PTFE cable	1
------------	---

## Cable length

2 m	2,0
0,5 m	0,5

## Ordering example: Type 4049B05DS1-2,0

- Version with measuring range 0 ... 5 bar, with digital temperature compensation and PiezoSmart®, cable length 2 m. Compatible with Kistler amplifier Type 4665/4665B... and Type 4624A...