

# Piezoresistive Absolute Pressure Sensor Type 4005B...

## Miniature Sensor for Research and Development

Universal pressure sensor M5x0,5 for measuring absolute pressure in ranges from 0 ... 5 to 0 ... 250 bar.

- Precise pressure measurements within 0 ... 125 °C
- Ideal for intake measurement on internal combustion engines
- Compact size and low mass
- High overload pressure (up to 3x rated pressure)
- High natural frequency

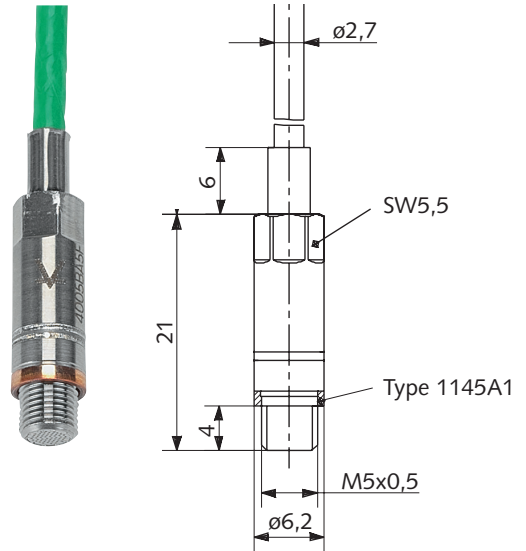
### Description

The piezoresistive pressure sensor Type 4005B... is a small, rugged general purpose sensor available in absolute pressure ranges up to 250 bar. Operating in difficult test applications over a temperature range of -40 ... 125 °C the Type 4005B... utilizes a fully active four arm Wheatstone bridge to generate an electrical signal which is proportional to the applied input pressure. The Wheatstone bridge is implanted into a silicon measuring element, a proven technology which provides significant advantages but in particular reduces hysteresis and repeatability errors. The sensing element is packaged within a M5x0,5 housing using Kistler's DCE (Direct Chip Exposure) method of construction. This technique has many benefits allowing Kistler to provide accurate miniature sensors with a high natural frequency, reduced thermal error, low acceleration sensitivity and an excellent non-linearity specification.

The sensor Type 4005B... is available in a number of variations including those that are suitable for use with Kistler amplifiers Type 4665 and 4618A... . Equipped with PiezoSmart®, an active sensor identification system, it is possible to reduce set-up time and improve overall installation consistency when used in conjunction with the amplifier Type 4665. When calibrated with a Type 4618A2 it is possible to monitor both the pressure signal and the sensor temperature via scaled electrical signals.

### Application

The small size and excellent dynamic response of the Type 4005B... allows for high quality pressure measurements to be made in locations where other sensors may not fit. The sensor is well suited for the measurement of gas pressure close to the intake valve. The sensor can be used for a variety of measuring tasks especially of gaseous (non conductive) media.



## Technical Data

### Type 4005B..., General

Measuring ranges	bar	0 ... 5	0 ... 10	0 ... 20	0 ... 50	0 ... 100	0 ... 250
Overload	bar	15	30	40	100	200	400
Excitation	mA*	1					
Output signal (FSO@1mA)	mV**	100 (nominal)					
Hysteresis	%FSO	<0,2					
Linearity***	±%FSO	<0,2					
Min./Max. temperature	°C	-40/125					
Natural frequency	kHz	>100					
Acceleration sensitivity	mbar/g	<0,1					
Dead volume	mm <sup>3</sup>	40					
Mounting torque	N·m	1,5 ... 2,5					
Media compatibility		Gases compatible with parylene and 17-4 PH stainless steel					
Weight (including connector)	g	50					

### Type 4005B...V200S, with SCP Amplifier Type 4665

Output signal	V	0 ... 10					
Sensitivity	V/bar	2	1	0.5	0,2	0,1	0,04
Hysteresis	%FSO	<0,2					
Linearity***	±%FSO	<0,2					
Operating temperature range Amplifier	°C	0 ... 60					
Thermal zero shift (0 ... 125 °C)	±%FSO	<1					
Thermal sensitivity shift (0 ... 125 °C)	±%	<1					
Frequency range (-3 dB, measuring chain)	kHz	0 ... 90					
Filter settings		User selectable					
Excitation		Integrated					
Electrical connector		Fischer connector S103A054					
Extension cable		Type 4763B...					

### Type 4005B... with Amplifier Type 4618A... (Measuring Chain)

Pressure output signal							
Type 4618A0	V or mA	0 ... 10 V or 4 ... 20 mA					
Type 4618A2	V	0 ... 10					
Type 4618A4	mA	4 ... 20					
Temperature output signal							
Type 4618A2	mV/K	10					
Type 4618A4	mV/K	10					
Hysteresis	%FSO	<0,2					
Linearity***	±%FSO	<0,2					
Compensated temperature range	°C	0 ... 125					
Operating temperature range Amplifier	°C	0 ... 60					
Thermal zero shift (0 ... 125 °C)	±%FSO	<1					
Thermal sensitivity shift (0 ... 125 °C)	±%	<1					
Frequency range (-3 dB, measuring chain)	kHz	0 ... 40					
Filter settings		User configurable					
Supply voltage	VDC	18 ... 30					
Electrical connection		Binder connector pos. 5 pin, M16x0,75					

\* For constant voltage excitation, please contact Kistler

\*\* Alternative outputs available, please contact Kistler

\*\*\* Max. deviation from best straight line (BSL)

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This information corresponds to the current state of knowledge. Kistler reserves the right to make technical changes. Liability for consequential damage resulting from the use of Kistler products is excluded.

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### Installation

The sensor can be easily mounted directly into a simple threaded measuring port. When measuring compressible media with high flow dynamics (such as intake pressure measurement in combustion engines), a flush mount configuration must be ensured (Fig. 1).

When the sensor temperature is likely to exceed 125 °C, consideration should be taken as to the use of a suitable cooling adapter or sensor Type 4007B... . A Kistler Representative will be pleased to provide you with further detailed information regarding the installation.

### Mounting

The sensor fitting must be machined in accordance with the data sheet specifications (Fig. 4) and it is essential to comply with the tightening torque of 1,5 ... 2,5 N·m when installing the sensor. The use of the correct installation tools is also to be encouraged in particular the mounting tool Type 1300A12 (Fig. 11) and the torque wrench Type 1300A17 (Fig. 10).

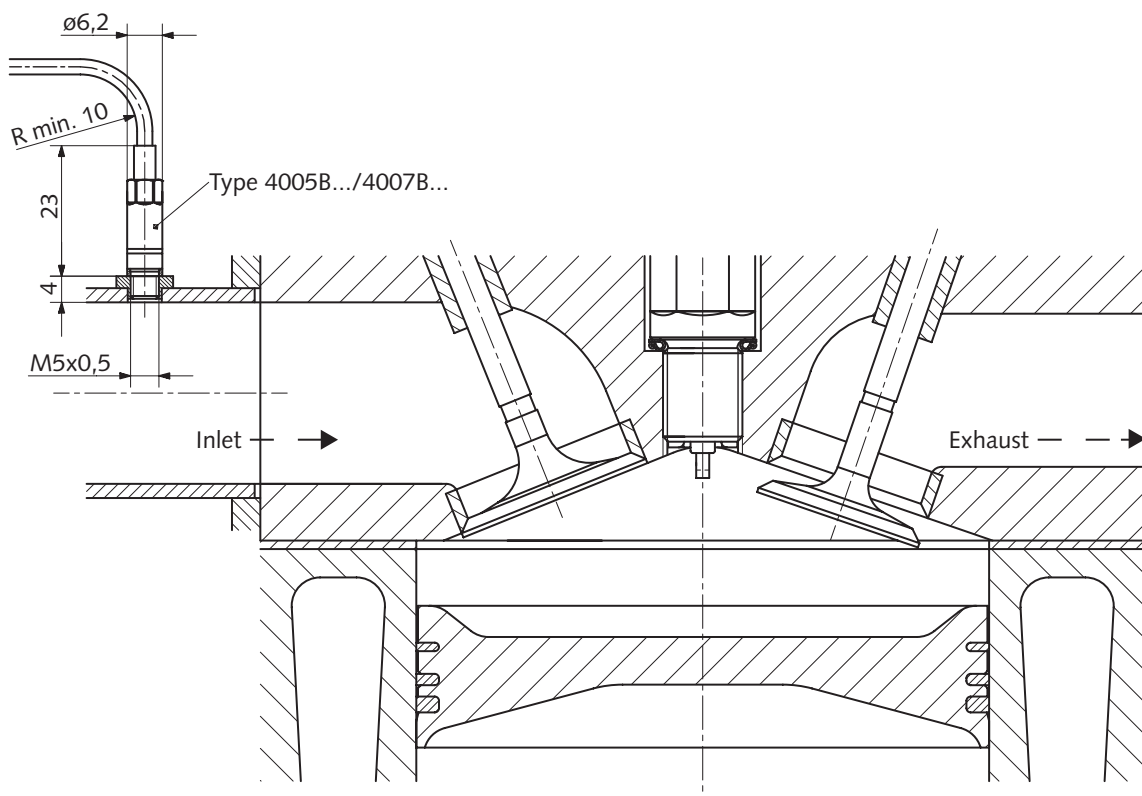


Fig. 1: Direct installation of sensor Type 4005B.../4007B... in the intake of an internal combustion engine

For more detailed instructions please see handout doc. no. 100-444.

**Sensor Type 4005B...V200S for SCP Amplifier Type 4665 (with Connecting Cable Type 4763B...)**

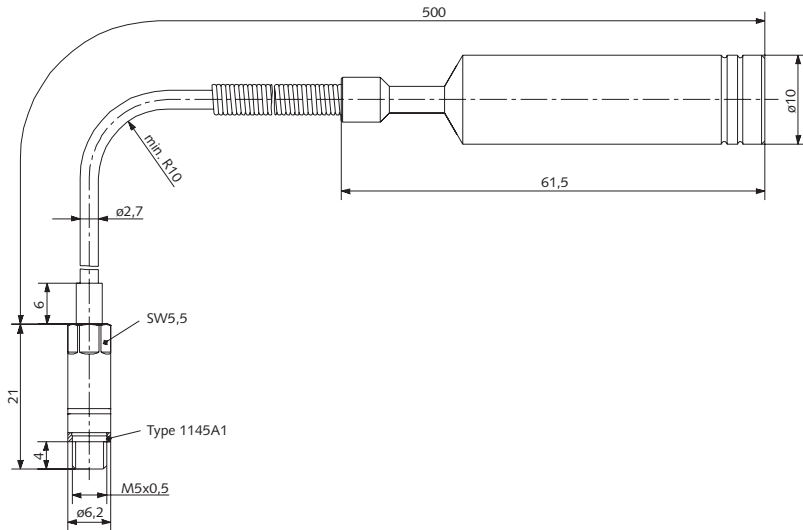


Fig. 2: Sensor Type 4005B... with Fischer connector

**Sensor Type 4005B... with Amplifier Type 4618A... (Measuring Chain)**

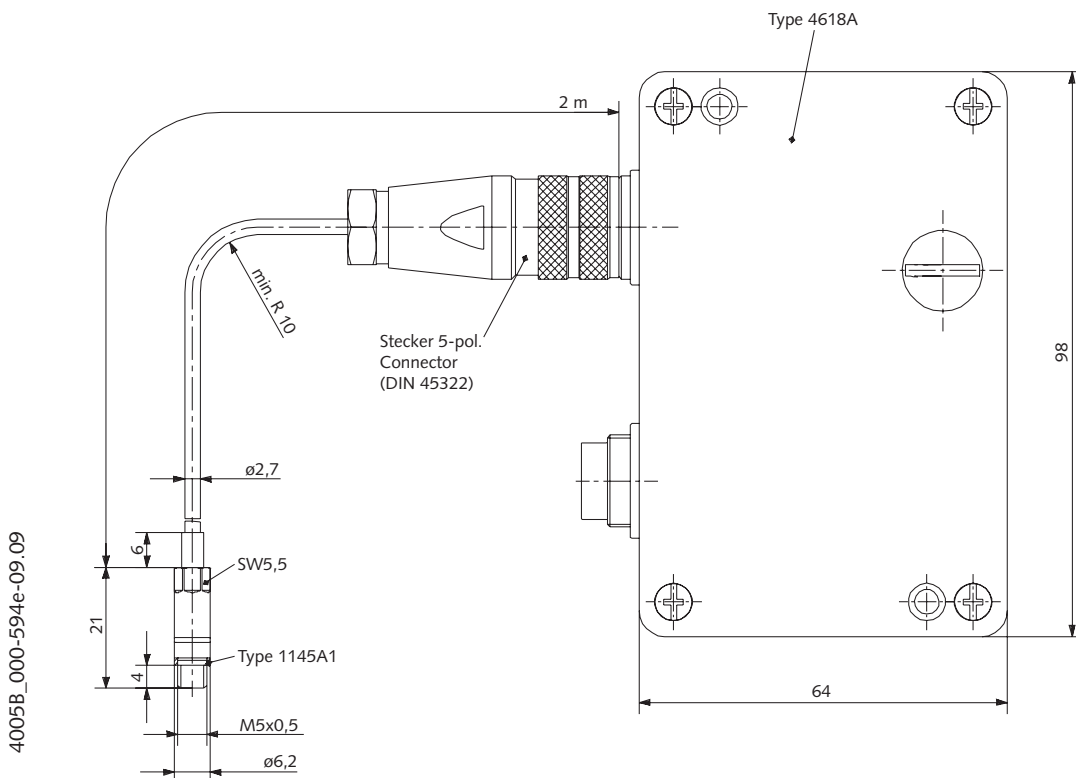


Fig. 3: Sensor Type 4005B... with amplifier Type 4618A...

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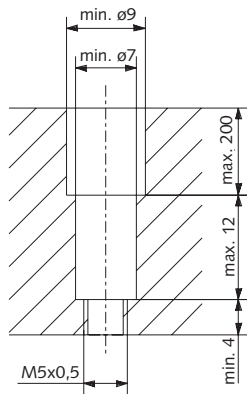


Fig. 4: Mounting bore for direct mounting

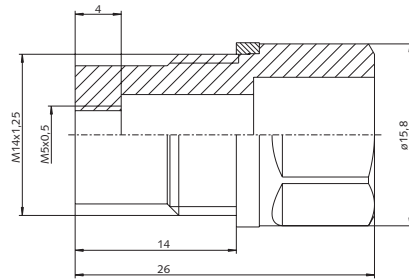


Fig. 5: Adapter Type 6596

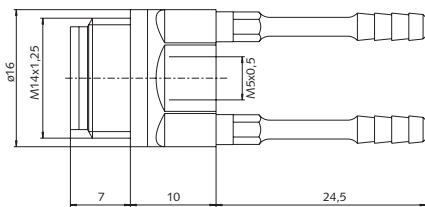


Fig. 6: Cooling adapter Type 7525A2

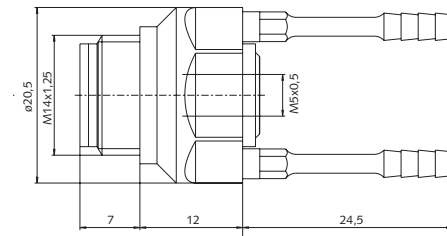


Fig. 7: Cooling adapter, damped Type 7525A6

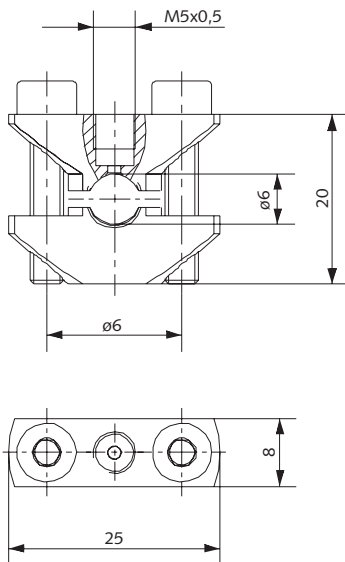


Fig. 8: Briden adapter Type 6533A71 for 6 mm pipe diameter

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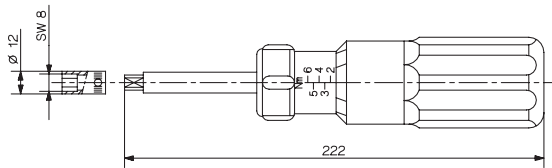


Fig. 10: Torque wrench 1 ... 6 N·m Type 1300A17



Fig. 11: Mounting tool Type 1300A12

**Included Accessories**

- Copper seal

**Type**

1145A1

**Optional Accessories**

- Mounting tool
- Torque wrench 1 ... 6 N·m
- Teflon® seal
- O-ring seal Viton®

**Type**

1300A12  
1300A17  
1145A2  
1100A63

Connecting cable for measuring chain  
with amplifier Type 4618A...

- L = 2 m
- L = 5 m
- L = ... m ( $L_{\min} = 0,5$  m /  $L_{\max} = 10$  m)

4757A2  
4757A5  
4757Asp

Connecting cable with  
amplifier Type 4665

- L = 2 m
- L = 5 m
- L = 10 m
- L = ... m ( $L_{\min} = 0,5$  m /  $L_{\max} = 10$  m)

4763B2  
4763B5  
4763B10  
4763Asp

**Optional Accessories**

- SCP for 8 measuring modules
- SCP Compact for 4/6 measuring modules
- Piezoresistive amplifier
- Dummy sensor M5x0,5
- Adapter M14x1,25 – M5x0,5
- Adapter M12x1 – M5x0,5
- Cooling adapter M14x1,25 – M5x0,5
- Cooling adapter, damped M14x1,25 – M5x0,5
- Briden adapter M5x0,5 for 6 mm pipe diameter

**Type**

2853A...  
2854A...  
4665  
7537A2  
6596  
6598  
7525A2  
7525A6  
6533A71

For PiezoSmart specifications please refer to the PiezoSmart® brochure doc. no. 100-421.

### Ordering Key

 Type 4005B    

Absolute pressure	<b>A</b>
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#### Pressure

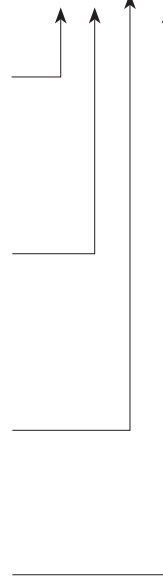
Measuring range 0 ... 5 bar	<b>5</b>
Measuring range 0 ... 10 bar	<b>10</b>
Measuring range 0 ... 20 bar	<b>20</b>
Measuring range 0 ... 50 bar	<b>50</b>
Measuring range 0 ... 100 bar	<b>100</b>
Measuring range 0 ... 250 bar	<b>250</b>

#### Thread

Fine thread M5x0,5 <sup>*)</sup>	<b>F</b>
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#### Amplifier Configuration

without amplifier	<b>-</b>
with amplifier Type 4618A0	<b>A0</b>
with amplifier Type 4618A2	<b>A2</b>
configured for amplifier Type 4665	<b>V200S</b>



<sup>\*)</sup> Alternative process connections on request.