Piezoresistive High Pressure Sensor with Amplifier

Type 4067...

High pressure sensor with rugged diaphragm and front seal for measuring on hydraulic Systems, (e.g. fuel injection Systems of internal combustion engines), and gas pressure measurements. Suitable for static and dynamic pressures. Its small dimensions allow its use with a clamp adapter on the injection pipe.

- Measuring range up to 1 000, 2 000, 3 000 and 5 000 bar
- Measures static and dynamic pressures
- High natural frequency
- This is one of the smallest sensors for static measurement

Description

The pressure to be measured acts through a rugged diaphragm on an arrangement of piezoresistive “rods”. The pressure changes the values of the resistances diffused into the rods. These resistances are arranged in a Wheatstone bridge.

The pressure sensor itself is not temperature compensated. The amplifier Type 4618A... provides temperature compensation, linearisation of the pressure signal and contains a stabilized power supply. For this reason, the sensor must always be operated with the amplifier adjusted to it.

Amplifier Type 4618A... additionally contains two adjustable limit switches with optocouplers. A version with simultaneous temperature measurement is available as an option.

Application

Sensor Type 4067... is used appropriately wherever high pressures with a static component have to be measured in confined spaces. Examples are the fine tuning of injection systems in diesel engines or measurements on hydraulic systems.

Mounting

The device can be mounted directly (Fig. 4) or with the aid of a clamp adapter (Fig. 6) available for different diameters of injection lines.

The sealing joint Type 1100 (Fig. 5) supplied provides good leak-tightness even at high static pressures and small tightening torques.

Tightening must be carried out with a torque wrench. The permissible tightening torque must on no account be exceeded, otherwise the sensor will be damaged beyond repair. In the event of a leakage, the sealing joint Type 1100 should be exchanged and the contact surface re-machined with end finishing tool Type 1300A25. The sensor zero is sensitive to tightening. If the zero point is displaced, it can be corrected at the amplifier with an externally accessible potentiometer.
## Technical Data

### Typ 4067...

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Range</th>
<th>0 ... 1 000</th>
<th>0 ... 2 000</th>
<th>0 ... 3 000</th>
<th>0 ... 5 000</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Range</strong></td>
<td>bar</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Overload</strong></td>
<td>bar</td>
<td>1 500</td>
<td>2 500</td>
<td>3 500</td>
<td>6 000</td>
</tr>
<tr>
<td><strong>Sensitivity (±0,5 % at 25 °C)</strong></td>
<td>mV/bar</td>
<td>10</td>
<td>5</td>
<td>3,3</td>
<td>2</td>
</tr>
<tr>
<td><strong>Natural frequency</strong></td>
<td>kHz</td>
<td>&gt;100</td>
<td>&gt;100</td>
<td>&gt;200</td>
<td>&gt;200</td>
</tr>
</tbody>
</table>

### Output signal:
- Depends on measuring chain
- **Output Impedance**: Ω 10
- **Supply (amplifier)**: V DC, 18 ... 30
- **Zero (at 25 °C, 1 bar abs)**: mV <±100 (**)
- **Endpoint Linearity**: % FSO <±0,5

### Thermal error:
- **Zero Shift**: % FSO <±2
- **Sensitivity shift**: % <±1

### Operating temperature range
- **Sensor**: °C 20 ... 120
- **Amplifier Type 4618Ax**: °C 0 ... 70
- **Storage temperature**: °C -40 ... 140
- **Operating temperature**: °C 0 ... 120

### Tightening Torque
- N·m 15 15 15 20

### Degree of protection
- **IP65**

### Acceleration error
- mbar/g <10

### Service Life
- Typical >10^7 >10^7 >10^7 >10^7

1) Refer to table measuring chain

*) A Version with reduced sensitivity shift (<±1%) is available. Type 4067C3000... Please see data sheet 4067C_000-708.

**) Tightened to specified torque
Piezoresistive High Pressure Sensor with Amplifier, Type 4067...

Dimensions

![Diagram of dimensions]

Installation

![Diagram of installation]

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.
Measuring Chain

Fig. 7: Measuring chain

Connector Pinout

Fig. 8: Pin assignment

Connector Type 1500A81 is permanently fixed on the sensor cable (Fig. 8). The connector Type 1500A67 must be soldered to a suitable cable to supply the amplifier and for the signal and limit switch output (Fig. 9).

For more complete information on the amplifier Type 4618A... see data sheet 4618A_000-293.

Fig. 9: Electrical connections amplifier
Accesories Included
The complete measuring chain
Type 4067xxxxAx includes the following components:

- Sensor with integrated cable L = 2 m 4067...
- Amplifier, adjusted 4618A
- 8-pole connector for supply, output signal and limit switch 1500A57
- Spare sealing joints 1100

Optional Accessories

- Extension cable 4757A...
- Drill 1327
- Sealing joint 1100
- Screw tap M10x1 1353
- Finishing tool 1300A25
- Mounting key for deep bores 1300A41
- Torque wrench 4 ... 20 N·m 1300A39
- 8 ... 40 N·m 1300A11
- Fork wrench for Type 1300A39 or 1300A11, SW8 1300A29
- Fork wrench for Type 1300A39 SW9 1300A97
- Fork wrench for Type 1300A39 SW11 1300A75

Optiona Accessories

- Dummy sensor 6449
- Clamp adapter for 6 mm line 6533A11
- Clamp adapter for 1/4” line 6533A12
- Clamp adapter for 6 ... 8 mm line 6533A18
- Clamp adapter for 8 ... 13 mm line 6533A19
- Clamp adapter for 13 ... 20 mm line 6533A110
- Adapter for Pressure generator Type 6905A 6925
- Replacement sensors see Page 3
- Cable for Type 4067BC... 4767A2
- Replacement amplifier, adjusted 4618A...

Fig. 10: Mounting key for deep bores Type 1300A41

Fig. 11: Torque wrench Types 1300A11 and 1300A39

Fig. 12: Drill Type 1327

Fig. 13: Screw tap Type 1353

Fig. 14: Finishing tool Type 1300A25

Fig. 15: Fork wrench Type 1300A29

Fig. 16: Clamp adapter Type 6533A1...
### Ordering Key

#### Measuring Chain

**Design**

<table>
<thead>
<tr>
<th>Option</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integrated cable</td>
<td>A</td>
</tr>
<tr>
<td>Cable with 90° connector</td>
<td>BB</td>
</tr>
<tr>
<td>With plug</td>
<td>BC</td>
</tr>
</tbody>
</table>

**Measuring Range**

<table>
<thead>
<tr>
<th>Range</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 ... 1 000 bar</td>
<td>1000</td>
</tr>
<tr>
<td>0 ... 2 000 bar</td>
<td>2000</td>
</tr>
<tr>
<td>0 ... 3 000 bar</td>
<td>3000</td>
</tr>
<tr>
<td>0 ... 5 000 bar</td>
<td>5000</td>
</tr>
</tbody>
</table>

**Signal Output**

- for pressure measurement 10 V and 4 ... 20 mA: A0
- for pressure measurement (0 ... 10 V) and temperature measurement (10 mV/°C): A2
- for pressure measurement (4 ... 20 mA) and temperature measurement (10 mV/°C): A4
- for pressure measurement (10 V or 4 ... 20 mA) and temperature measurement (with Type 4620A2): D2
- with PiezoSmart® *) cable length L = 500 mm: S

**Sensors**

Sensor as replacement comes with calibration plug Type 4958A0 or disk for digital compensation.

<table>
<thead>
<tr>
<th>Range</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 ... 1 000 bar</td>
<td>Type 4067__1000</td>
</tr>
<tr>
<td>0 ... 2 000 bar</td>
<td>Type 4067__2000</td>
</tr>
<tr>
<td>0 ... 3 000 bar</td>
<td>Type 4067__3000</td>
</tr>
<tr>
<td>0 ... 5 000 bar</td>
<td>Type 4067__5000</td>
</tr>
</tbody>
</table>

**Amplifiers**

as replacement, adjusted to a given sensor (including Type 4958A)

<table>
<thead>
<tr>
<th>Range</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 ... 1 000 bar</td>
<td>Type 4618A0</td>
</tr>
<tr>
<td>0 ... 2 000 bar</td>
<td>Type 4618A2</td>
</tr>
<tr>
<td>0 ... 3 000 bar</td>
<td>Type 4618A4</td>
</tr>
<tr>
<td>0 ... 5 000 bar</td>
<td>Type 4620A2</td>
</tr>
</tbody>
</table>

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