PiezoStar pressure sensor

For engine measurement technology, plug-in

New generation of uncooled high-temperature cylinder pressure sensors with very high sensitivity and outstanding thermodynamic characteristics. The plug-in design of the sensor makes it suitable for a varied range of installation methods, with or without a mounting sleeve.

- Low thermal shock error and low acceleration sensitivity
- Very small linearity deviation
- Minimal sensitivity change across the temperature range
- Compatible for installation with Type 6125… pressure sensors
- High accuracy and high sensitivity

Description

The Type 6124A… piezoelectric cylinder pressure sensor uses a PiezoStar crystal that can achieve very high sensitivity even with a compact sensor design. The optimal adaptation of the sensor to the new crystal package with pressure resistance design allows very low thermal sensitivity deviations (thermal sensitivity shift ≤±1 %) and excellent linearity (≤±0.3 %). Good decoupling of the measuring element and an improved connection for the signal cable make the Type 6124A… even more rugged: these are key factors in ensuring excellent signal quality, even with direct installation. The Type 6124A… sensor is compatible to the mounting bore of the ground-isolated Type 6125C… pressure sensor.

Application

Plug-in cylinder pressure sensor Type 6124A… is an excellent all-rounder. Its rugged structure makes it ideal for thermodynamic investigations and demanding measurement assignments in harsh conditions. This shoulder-sealing sensor is suitable for front-flush installation in the cylinder head. Additional mounting methods are possible thanks to a diverse range of accessories: for instance, the sensor can also be installed through the water channel, with the help of a mounting sleeve. Because it is an uncooled sensor, it is also ideal for onboard use in road tests.

Technical data

<table>
<thead>
<tr>
<th>Measuring range bar</th>
<th>0 ... 300</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calibrated partial ranges bar</td>
<td>0 ... 100, 0 ... 200, 0 ... 250, 0 ... 300</td>
</tr>
<tr>
<td>Overload bar</td>
<td>350</td>
</tr>
<tr>
<td>Sensitivity pC/bar</td>
<td>-30</td>
</tr>
<tr>
<td>Natural frequency kHz</td>
<td>≥65</td>
</tr>
<tr>
<td>Linearity, all ranges (at 23 °C) % FSO</td>
<td>≤±0.3</td>
</tr>
<tr>
<td>Axial Acceleration sensitivity bar/g</td>
<td>&lt;0.002</td>
</tr>
<tr>
<td>Radial Acceleration sensitivity bar/g</td>
<td>&lt;0.0002</td>
</tr>
<tr>
<td>Operating temperature range °C</td>
<td>-20 ... 350</td>
</tr>
<tr>
<td>Temperature min./max. °C</td>
<td>-40 ... 400</td>
</tr>
<tr>
<td>Thermal sensitivity change RT ... 350 °C</td>
<td>% ≤±1</td>
</tr>
<tr>
<td>250 °C a100 °C</td>
<td>% ≤±0.7</td>
</tr>
<tr>
<td>Thermal shock error (at 1 500 1/min, IMEP = 9 bar)</td>
<td>≤±0.3</td>
</tr>
<tr>
<td>Δp (short-term drift) bar μM</td>
<td>≤±1.5</td>
</tr>
<tr>
<td>ΔIMEP %</td>
<td>≤±1</td>
</tr>
<tr>
<td>Δpmax %</td>
<td>≤±1</td>
</tr>
<tr>
<td>Insulation resistance at 23 °C MΩ</td>
<td>≥10^13</td>
</tr>
<tr>
<td>Tightening torque, greased N·m</td>
<td>10</td>
</tr>
<tr>
<td>Capacitance, without cables pF</td>
<td>12</td>
</tr>
<tr>
<td>Weight (without connector and cables) g</td>
<td>11.5</td>
</tr>
<tr>
<td>Connector</td>
<td>10-32 UNF</td>
</tr>
</tbody>
</table>
Mounting

Direct installation:
The Type 6124A... pressure sensor can be mounted directly flush with the combustion chamber or can be slightly recessed into a 6.35 mm mounting bore. Figure 1 shows the installation of the sensor flush with the combustion chamber. This method is preferable in order to avoid pipe oscillations. The sensor can also be slightly recessed, up to 2 mm; this type of mounting reduces the thermal load on the sensor. When machining the mounting bore, the bore hole specifications must be followed exactly (Figures 1 and 2). Kistler’s step drills, Type 1337A (mounting nut M10x1) and Type 1337A2 (mounting nut 3/8-24 UNF) allow compliance with the required tolerances. Other available accessories include a reaming tool, Type 1337, to rework the sensor mounting bore, and an M10x1 screw tap, Type 1353.

Installation with mounting sleeve:
If space permits, or if the cylinder head water jacket is breached, it is advisable to use a mounting sleeve. Mounting sleeves are custom-manufactured. Figure 3 shows a mounting sleeve, Type 6523AQ... with M10x1 thread and pressure fitting Type 6533AQ... The sensor bore in the mounting sleeve is executed with very high precision. On request, Kistler will be glad to assist you with your specific installation conditions by producing drawings and manufacturing the mounting sleeves.

Servicing
Kistler recommends annual calibration from the date when the sensor is first used.
For more information, consult the operating instructions or contact your Kistler agency.
Fig. 3: Mounting sleeve Type 6523AQ... with M10x1 thread and Type 6423AQ pressure fitting.

Fig. 4: Step drill Type 1337A for mounting nur M10x1

Fig. 5: Step drill Type 1337A2, mounting nut 3/8-24 UNF

Fig. 6: Reaming tool Type 1337

Fig. 7: Screw tap Type 1353 for M10x1

Fig. 8: Coupling Type 1721, BNC pos. – 10-32 UNF neg.

Fig. 9: Socket wrench Type 1373, SW12/SW8x200
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### Accessories included in delivery scope
- Coupling BNC pos. – 10-32 neg. (for non-PiezoSmart version)
- Copper sealing ring

### Accessories (optional)
- Triax adapter – BNC pos.
- PiezoSmart extension cables
  - L = 1 m
  - L = 2 m
  - L = 3 m
- Connecting cables PFA steel braiding
  - L = 1 m
  - L = 2 m
  - L = 3 m
- Connecting cables, FPM oil-tight
  - L = 1 m
  - L = 2 m
  - L = 3 m
- Mounting wrench SW8
- Reaming tool
- Step drill
  - for mounting nut M10x1
  - for mounting nut 3/8-24 UNF
- Screw tap M10x1
- Torque wrench 5 … 40 Nm
- Extraction tool
  - for sensor
  - for sensor dummy
- O-ring for mounting sleeve
- Mounting nut M10x1
- Mounting nut 3/8-24 UNF
- Ni sealing ring
- Mounting sleeve (adapter, indication sleeve)
- Mounting sleeve, pressure fitting
  - M10x1 incl. O-ring
  - 3/8-24 UNF incl. O-ring
- Flame protector
- Clamping ring for mounting nut
- Temperature sensor

### Accessories (optional) – continued
- Adapter for pressure generator, Type 6906A
  - M10x1
  - 3/8-24 UNF
- Sensor dummy M10
- Sensor dummy 3/8-24 UNF
- Thread adapter for engine application
  - M14x1,25 – M10x1
  - M14x1,25 – M10x1 set back
  - M14x1,25 – 3/8-24 UNF

### Order code

- **Version**
  - Without mounting nut 0
  - With mounting nut M10x1 1
  - With mounting nut 3/8”x24 UNF 2

- **PiezoSmart**
  - Without PiezoSmart (standard) –
  - With PiezoSmart (standard) 5

- **Cable type**
  - Without cable 0
  - PFA with steel braiding (standard) 3
  - FPM oil-tight 7

- **Cable lengths**
  - 1 m (standard) –1
  - 2 m (standard) –2
  - 3 m (standard) –3
  - SP length
  - (0,5 … 5 m special manufacture) SP

- **Example of order**
  - Sensor with mounting nut M10x1, with PiezoSmart Type 6124A153-1
  - and 1 m PFA cable with steel braiding

* with factory calibration data, state SN with order