

# PiezoStar pressure sensor

## For engine measurement technology, plug-in

### Type 6124A...



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. Type 6124A can be used in applications with classic fuels as well as with alternative fuels including hydrogen.

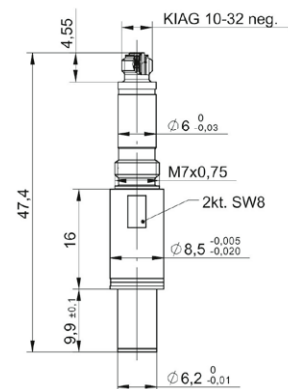
- Low thermal shock error and low acceleration sensitivity
- Very small linearity deviation
- Minimal sensitivity change across the temperature range
- Compatible for installation with Type 6125... pressure sensors
- High accuracy and high sensitivity
- Suitable for use in hydrogen combustion engines

### 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  $\leq \pm 1$  %) and excellent linearity ( $\leq \pm 0,3$  %). 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

Measuring range	bar	0 ... 300
Calibrated partial ranges	bar	0 ... 100, 0 ... 200, 0 ... 250, 0 ... 300
RT, 250, 350 °C		
Overload	bar	350
Sensitivity	pC/bar	-30
Natural frequency	kHz	$\geq 65$
Linearity, all ranges (at 23 °C)	%FSO	$\leq \pm 0.3$
Acceleration sensitivity		
Axial	bar/g	$< 0.002$
Radial	bar/g	$< 0.0002$
Operating temperature range	°C	-20 ... 350
Temperature min./max.	°C	-40 ... 400
Thermal sensitivity change		
RT ... 350	%	$\leq \pm 1$
250 °C $\pm$ 100 °C	%	$\leq \pm 0.7$
Thermal shock error		
(at 1 500 1/min, IMEP = 9 bar		
$\Delta p$ (short-term drift)	bar	$\leq \pm 0.3$
$\Delta$ IMEP	%	$\pm 1.5$
$\Delta p_{max}$	%	$< \pm 1$
Insulation resistance at 23 °C	M $\Omega$	$\geq 10^{13}$
Tightening torque, greased	N·m	10
Capacitance, without cables	pF	12
Weight (without connector and cables)	g	11.5
Connector		10-32 UNF

## 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, by 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.

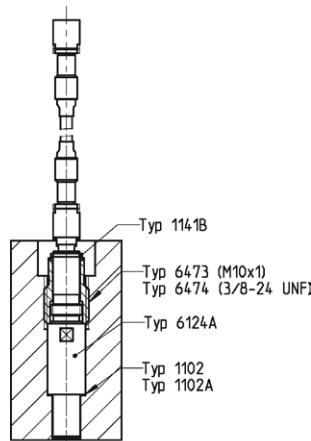


Fig. 1: Direct installation of sensor Type 6124A... with mounting nut

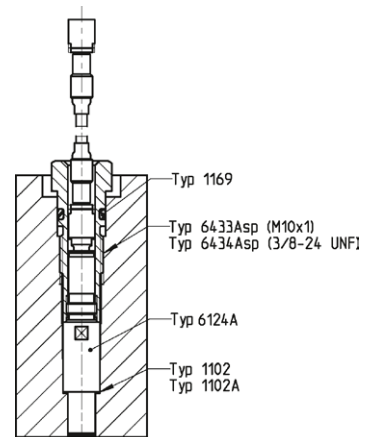


Fig. 2: Installation of sensor Type 6124A... with mounting sleeve

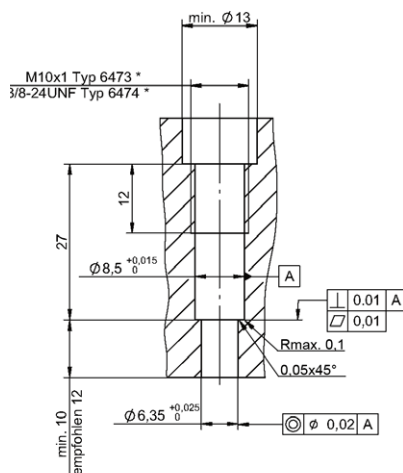


Fig. 1a: Mounting bore for direct installation with mounting nut

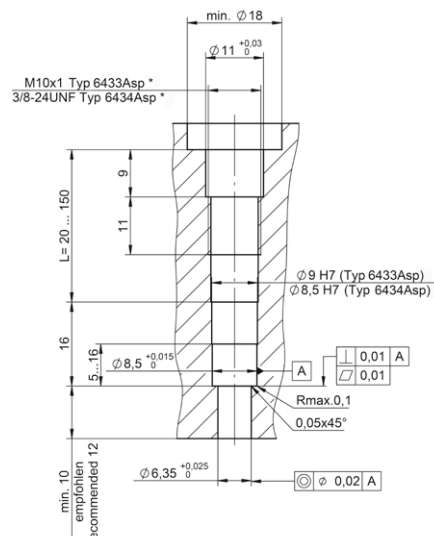


Fig. 2a: Mounting bore for installation with mounting sleeve, customer specific

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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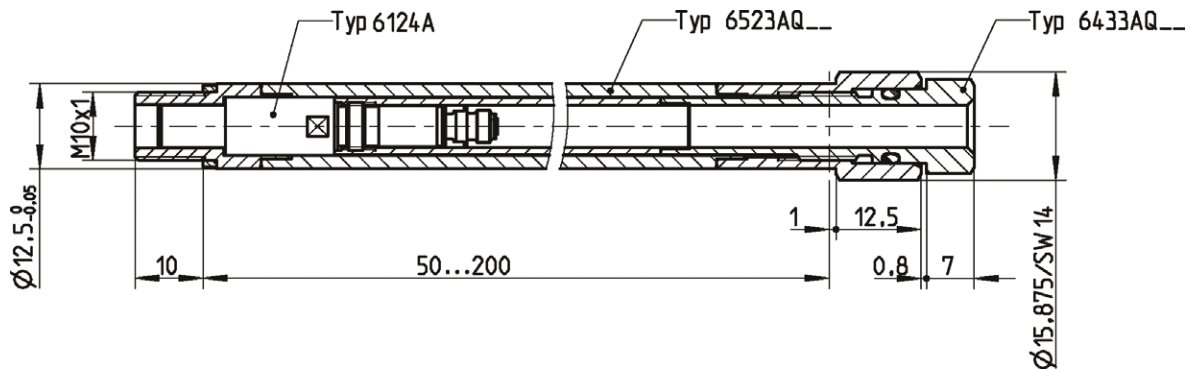


Fig. 3: Mounting sleeve type 6523AQ with M10x1 pressure fitting type 6433AQ

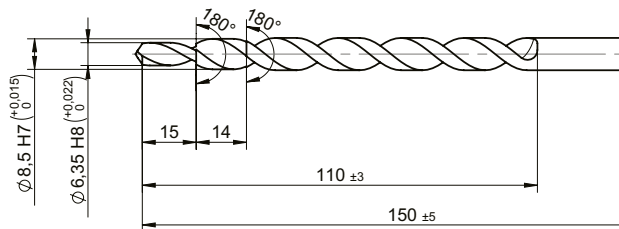


Fig. 4: Step drill Type 1337A for mounting nur M10x1

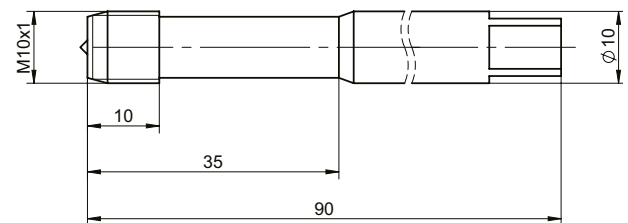


Fig. 7: Screw tap Type 1353 for M10x1

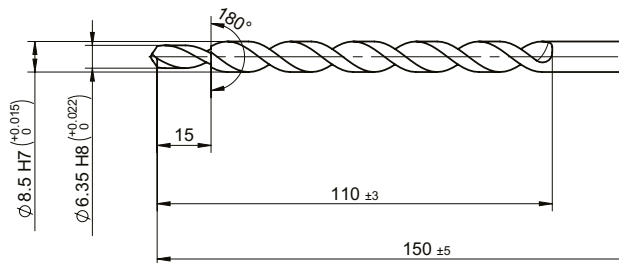


Fig. 5: Step drill Type 1337A2 for mounting nut 3/8-24 UNF

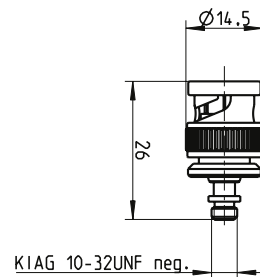


Fig. 8: Coupling Type 1721, BNC pos. – 10-32 UNF neg.

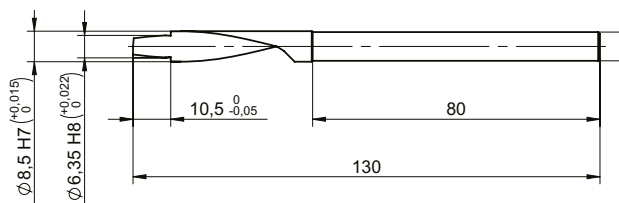


Fig. 6: Reaming tool Type 1337

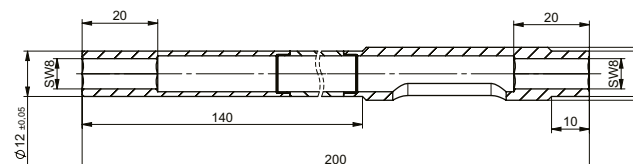


Fig. 9: Mounting key Type 1373

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**Includes accessories**

- Coupling BNC pos. – 10-32 neg.  
(for non-PiezoSmart version)
- Cu-sealing ring (5 units)

**Accessories (optional)**

- Coupling Triax – BNC pos
- PiezoSmart extension cables
  - L = 1 m
  - L = 2 m
  - L = 10 m
- Connecting cables PFA steel braiding
  - L = 1 m
  - L = 2 m
  - L = 3 m
  - with PiezoSmart, L = 1 m \*
  - with PiezoSmart, L = 2 m \*
  - with PiezoSmart, L = 3 m \*
- Connecting cables, FPM oil-tight
  - L = 1 m
  - L = 2 m
  - L = 3 m
  - with PiezoSmart L = 1 m \*
  - with PiezoSmart L = 2 m \*
  - with PiezoSmart L = 3 m \*
- Torque wrench 5 ... 40 Nm
- Mounting key SW8
- Tap M10x1
- Step drill
  - for mounting nut M10x1
  - for mounting nut 3/8-24 UNF
- Reaming tool
- Extraction tool
  - for sensor and dummy sensor 6469A1Q01
  - for dummy sensor 6469A1 & 6469A2
- Mounting nut
  - M10x1
  - 3/8-24 UNF
- Clamping ring for mounting nut
- Sealing ring
  - Cu-sealing ring (5 units)
  - Ni-sealing ring (5 units)
- Flameguard
- Temperature sensor
- Sensordummy
  - M7x0,75 (6124A0)
  - M10x1 (6124A1)
  - 3/8-24 UNF (6124A2)

**Type**

1721
1102A1
1704A4
1987B1
1987B2
1987B10
1969A1
1969A2
1969A3
1985A2S311
1985A2S321
1985A2S331
1983AC1
1983AC2
1983AC3
1985A2S711
1985A2S721
1985A2S731
1373B
1373
1353
1337A
1337A2
1337
1317
1319
6473
6474
1141B
1102A1
1102A2
6539A3
6124T
6469A1Q01
6469A1
6469A2

**Accessories (optional) – continued**

- Mounting sleeve M10x1 (customized)
- Mounting sleeve pressure fitting (customized)
  - M10x1 incl. O-Ring
  - 3/8-24 UNF incl. O-Ring
- O-Ring for pressure fitting
- Adapter for pressure generator, Type 6906
  - M10x1
  - 3/8-24 UNF
- Engine adapter
  - M14x1,25 – M10x1
  - M14x1,25 – M10x1 (recessed)
  - 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)	S

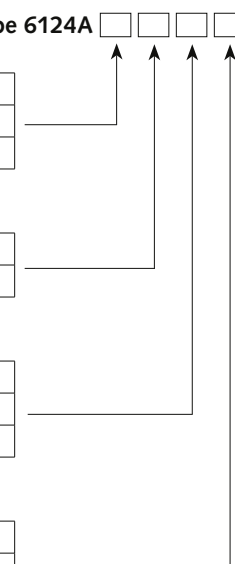
**Cable type**

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







Type 6124A

**Example of order**

Sensor with mounting nut M10x1, with PiezoSmart **Type 6124A1S3-1**  
and 1 m PFA cable with steel braiding

\* with factory calibration data, state SN with order

Description of Icons

	H2 tested: Suitable for the use in hydrogen combustion engines		Anti Strain Design: Insensitive to mechanical strain effects
	Ready to Use: Easy installation - minimal modifications		High Thermal Stability: Temperature stable over measuring range
	Closed Loop Combustion Control: Suitable for closed loop control applications		High Robustness: High durability with good thermodynamic performance

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