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Watercooled PiezoStar pressure sensor

for combustion engine measurements

The world's smallest water-cooled cylinder pressure sensor in M8 size. Ideally suited for combustion engine research and for thermodynamic investigations, sensor Type 6041B... exhibits a high sensitivity and excellent thermodynamic stability due to optimized water cooling. The water-cooling achieves perfect heat transfer without picking up signal noise from the coolant.

- Low thermal shock error
- Long service life
- High accuracy
- Optimized cooling and low noise

Description

High sensitivity, high resonant frequency and excellent zero point stability due to integrated water cooling. The sensor can be mounted in a bore of only ø12 mm. This requires a special mounting tool.

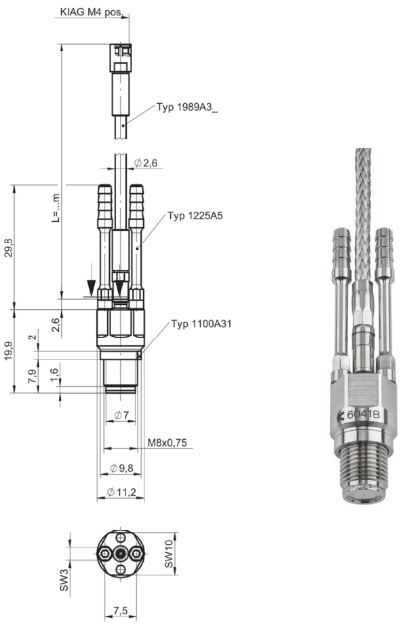
The Type 6041B... uses a PiezoStar crystal for very high sensitivity in a compact design. Sensor Type 6041B... is mounting compatible to the Type 6041A... as well as to the uncooled variants Type 6045A.../B... .

The durable optimized diaphragm with low thermal shock sensitivity guarantees precise measurement. The sensors are supplied with a mounted cable. For standard applications a rugged metal-sheathed cable is supplied.

Application

The miniature sensor Type 6041B... is ideally suited for thermodynamic measurements in multivalve engines where space is at a premium. The low sensitivity to thermal shock and the excellent zero point stability yield precise measuring results. In addition, the excellent linearity across the whole range and the high sensitivity allows gas exchange to be analyzed accurately.

Type 6041B...



From serial no. 5000000

Technical data

Measuring range	bar	0 ... 250
Calibrated ranges RT/50°C	bar	0 ... 100 0 ... 150 0 ... 200 0 ... 250
Overload	bar	300
Sensitivity	pC/bar	≈-40
Natural frequency nominal	kHz	>70
Linearity all ranges (room temperature and 50°C)	%/FSO	≤±0.3
Acceleration sensitivity		
cooled	bar/g	<0.01
non-cooled	bar/g	<0.001
Cooling water flow (50°C, p max. 3 bar)	L/min	0.3 ... 0.5
Shock resistance	g	2 000
Operating temperature range	°C	-20 ... 350
Min./max. temperature non-cooled	°C	-50 ... 400
Sensitivity shift		
23° ... 350°C	%	≤±2
50° ±30°C	%	≤±0.4
Thermal shock error (at 1 500 1/min, IMEP = 9 bar)		
Δp (short-term drift)	bar	≤±0.25
ΔIMEP	%	≤±1
Δp_{max}	%	≤±1

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PiezoStar is a registered trade mark of Kistler Group

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Technical data (continuation)

Insulation resistance at 20°C and 50°C	Ω	$>10^{13}$
Tightening torque	N·m	6
Capacity, sensor only	pF	6
Weight, sensor with cable	g	28.5
Connector, ceramic insulator	–	M3x0.35

Cooling fluid specification

- Demineraziized water according to norm VDE-Norm 0510
- Cooling fluid additive Glysantin G30 / G40 / G48 or similar products (do not mix with each other)
- Mixing ratio: 1 part additive with 4 parts demineralized water suitable for applications down to(-9°C)
- For more information please refer to instruction manual of cooling unit 2621G

Mounting

Mounting Examples

The pressure sensor Type 6041B… can be installed directly into an M8x0.75 bore, either flush mounted with the combustion chamber or mounted with a recessed diaphragm.

It can be mounted in existing bores for a Type 6041A... . With tool Type 1300A73 mounting in a bore with diameter 12 mm is possible (see Fig. 2).

Direct Mounting

The bore must be machined exactly to specification. Kistler tap Type 1361 ensures the correct tolerances are achieved.

In order to avoid pipe oscillations we recommend flushmounting the sensor in the cylinder head (Figure 2). To reduce the thermal effect on the sensor, a recessed mounting position (up to 2 mm) is recommended.

An alternative installation method uses a mounting position with a small diameter boer in front of the diaphragm. This offers excellent thermal-shock protection but can be prone to pipe oscillation (Figure 3).

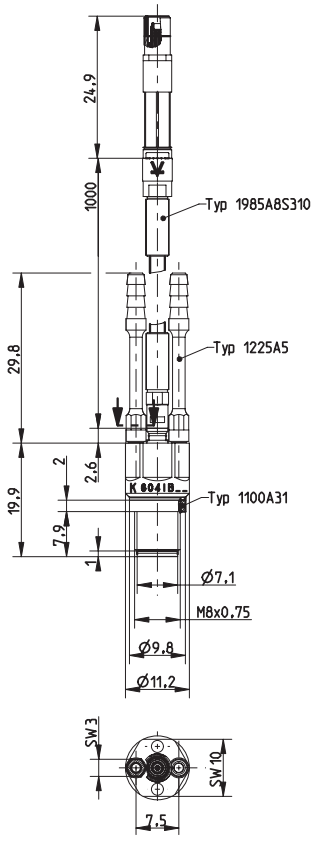

Fig. 1: Up to serial number 4999999

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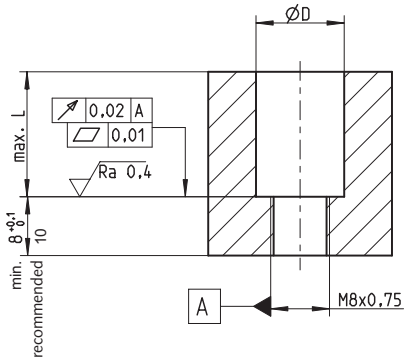

Fig. 2: Flush mounted sensor. Bore ø according to mounting tool. See picture 5 and picture 6

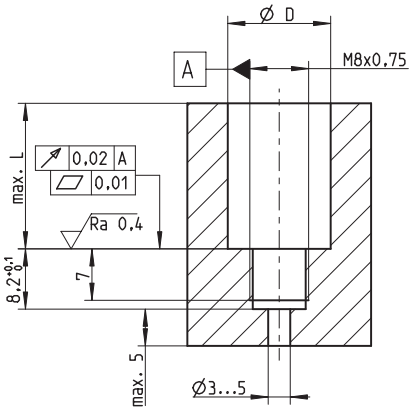

Fig. 3: Recessed mounted sensor. Bore ø according to mounting tool. See picture 5 and picture 6

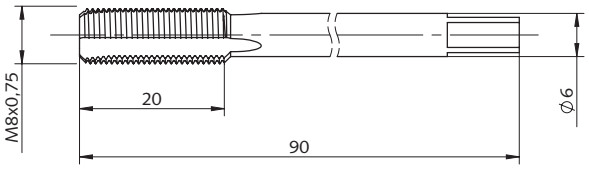

Fig. 4: Screw tap M8x0.75 Type 1361

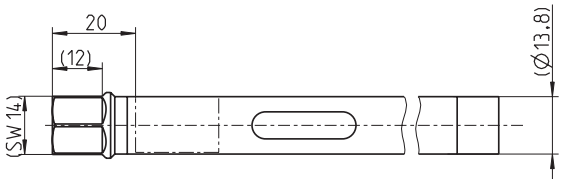

Fig. 5: Mounting wrench ø13.8/SW14 Type 1300A67 for mounting bore ø14 mm

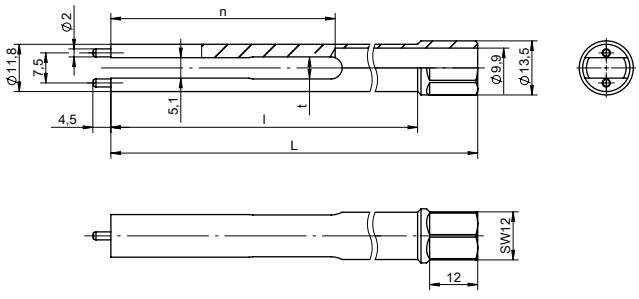

Fig. 6: Mounting key for bore Ø12 SW12
Type 1300A73 with l = 140/L = 155
Type 1300A73Q01 with l = 190/L = 205

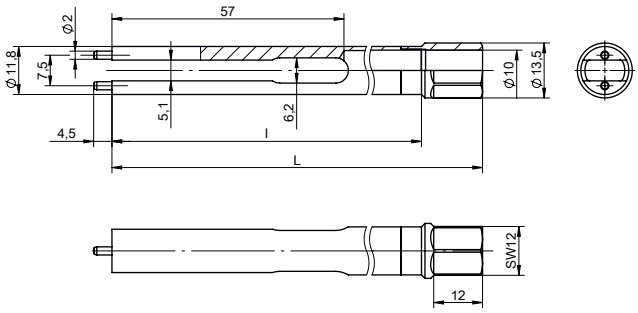

Fig. 7: Mounting key for bore Ø12 SW12
Type 1300A73A250 with l = 250/L = 265
Type 1300A73A300 with l = 300/L = 315

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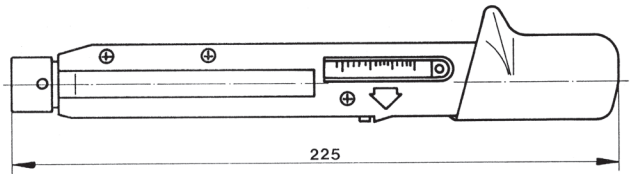

Fig. 8: 4 … 20 N·m torque wrench Type 1300A39

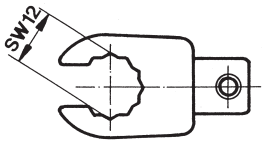

Fig. 9: SW12 fork wrench insert for mounting and torque wrench Type 1300A13

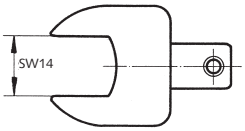

Fig. 10 SW14 fork wrench insert for mounting and torque wrench Type 1300A71

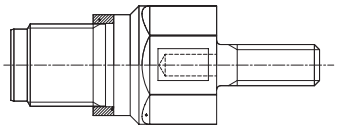

Fig. 11: Dummy sensor Type 6475

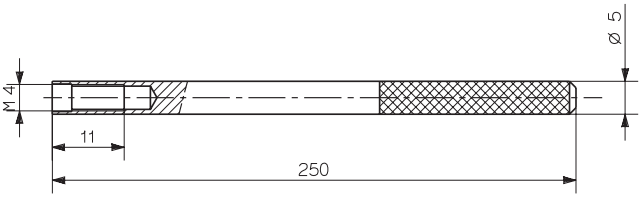

Fig. 12: Extraction tool for dummy sensor Type 1319

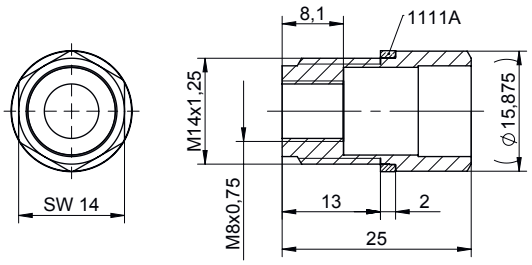

Fig. 13: Adapter Type 6589Q01. Sensor flush mounted

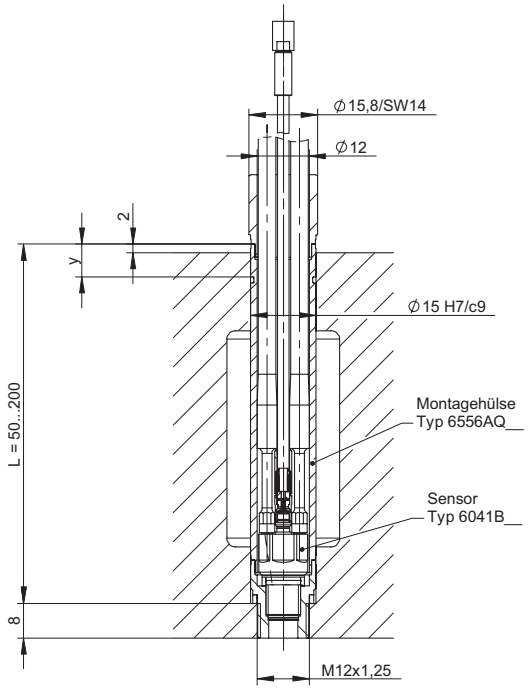

Fig. 14: Sensor installation with mountig sleeve

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Scope of delivery	Type/Art. No.
• Pressure sensor with pressed-on seal 1100A31	6041B
• Connecting cable acc. to ordering key	
• Calibration certificate	
• Adapter M4 neg. – BNC pos. (not for PiezoSmart)	1705

Optional accessories	Type/Art. No.
• PiezoSmart extension cables	
– L = 1 m	1987B1
– L = 2 m	1987B2
– L = 10 m	1987B10
• Connecting cables, PFA steel braiding	
– L = 1 m	1989A313
– L = 2 m	1989A323
– L = 3 m	1989A333
– with PiezoSmart, L = 1 m	1985A8S311
– with PiezoSmart, L = 2 m	1985A8S321
– with PiezoSmart, L = 3 m	1985A8S331
• Connecting cables, FPM oil-tight	
– L = 1 m	1989A713
– L = 2 m	1989A723
– L = 3 m	1989A733
– with PiezoSmart, L = 1 m	1985A8S711
– with PiezoSmart, L = 2 m	1985A8S721
– with PiezoSmart, L = 3 m	1985A8S731
• Cr-Ni seal ring (replacement for pressed-on sensor seal)	1100A31
• Connecting hose for cooling water length L = 29.5 mm	1225A5
• Fluoropolymer-hose for cooling water	1203Csp
• Dummy sensor	6475
• Extraction tool for dummy sensor Type 6475	1319
• Mounting sleeve M12x1.25 (custom made)	6556AQ...
• Adapter for pressure generator Type 6904	6589
• Adapter for pressure generator Type 6905A	6929
• Engine adapter M14/M8, flush	6589Q01
• Engine adapter M14/M8, set back	6589Q02
• Conditioning system	2621G
• Protective cap for sensor plug M3x0.35 D3.9x5	65006959

Mounting tools (optional)	Type/Art. No.
• Mounting key for bore Ø12 SW12	
– L = 155	1300A73
– L = 205	1300A73Q01
– L = 265	1300A73A250
– L = 315	1300A73A300
• Wrench jaw insert SW12 for 1300A73	1300A13
• Mounting key for bore min. ø14	1300A67
• Wrench jaw insert SW14 for Type 1300A67	1300A71
• Torque wrench (4 ... 20 N·m)	1300A39
• Screw tap M8x0.75	1361

Ordering Key

Type 6041B ☐ ☐ ☐

Sensor version

Without PiezoSmart (standard)	-
With PiezoSmart (standard)	S

Cable version

Metal braided PFA	3
FPM oil-proof	7

Cable length

1 m (standard)	-1
2 m (standard)	-2
3 m (standard)	-3

Order example Type 6041B...

Standard sensor with PiezoSmart and 2 m FPM (cable oil-proof):
Type 6041BS7-2
Standard sensor with PiezoSmart and 1 m PFA cable:
Type 6041B-3-1

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