

Watercooled PiezoStar pressure sensor for combustion engine measurements

Type 6041B...

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

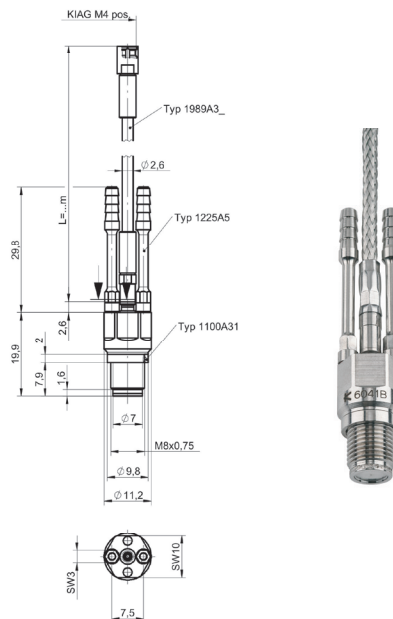
High sensitivity, high resonant frequency and excellent zero point stability due to integrated water cooling. The sensor can be mounted in a bore of only $\varnothing 12$ mm. This requires a special mounting tool.

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.



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

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

- Demineralized 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).

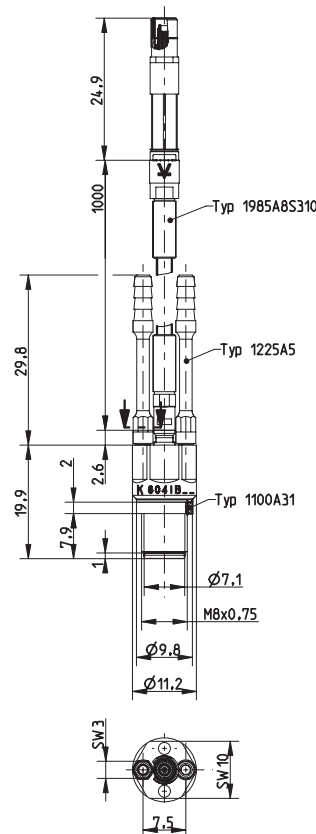


Fig. 1: Up to serial number 4999999

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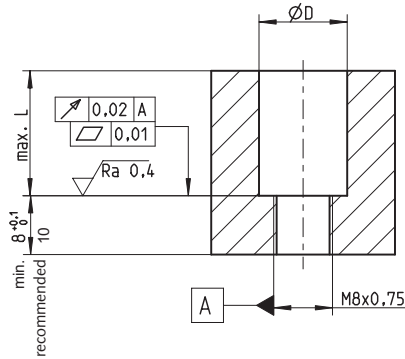


Fig. 2: Flush mounted sensor. Bore \varnothing according to mounting tool. See picture 5 and picture 6

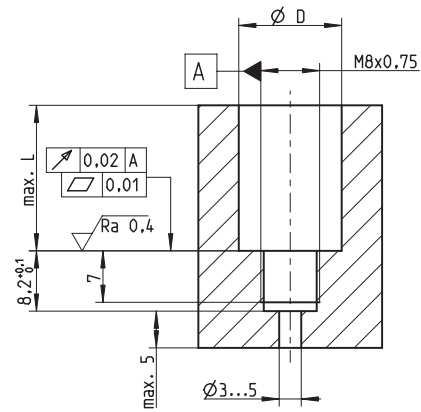


Fig. 3: Recessed mounted sensor. Bore \varnothing according to mounting tool. See picture 5 and picture 6

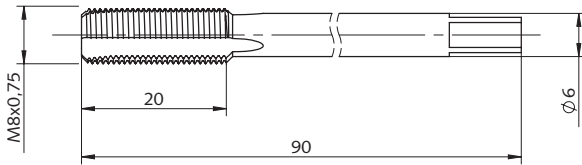


Fig. 4: Screw tap M8x0.75 Type 1361

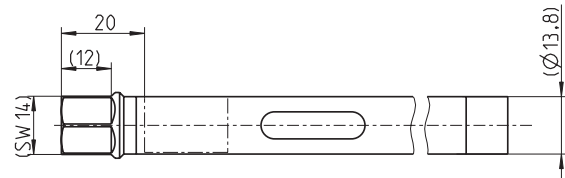


Fig. 5: Mounting wrench $\varnothing 13.8$ /SW14 Type 1300A67 for mounting bore $\varnothing 14$ mm

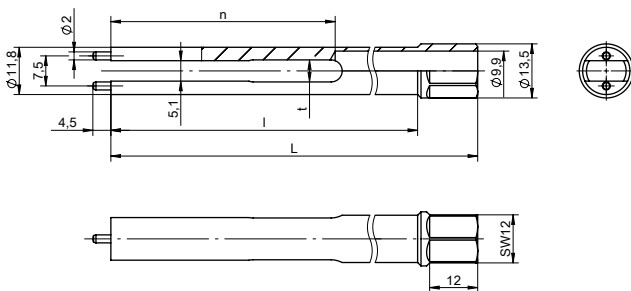


Fig. 6: Mounting key for bore $\varnothing 12$ SW12
Type 1300A73 with $I = 140/L = 155$
Type 1300A73Q01 with $I = 190/L = 205$

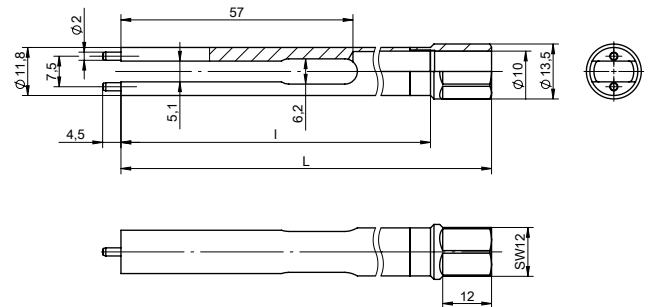


Fig. 7: Mounting key for bore $\varnothing 12$ SW12
Type 1300A73A250 with $I = 250/L = 265$
Type 1300A73A300 with $I = 300/L = 315$
Type 1300A73A350 with $I = 350/L = 365$

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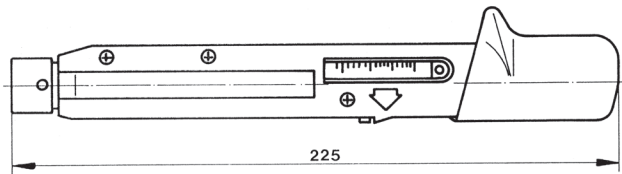


Fig. 8: 4 ... 20 N-m torque wrench Type 1300A39

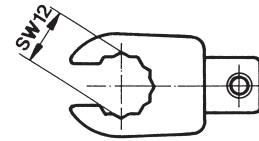


Fig. 9: SW12 fork wrench insert for mounting and torque wrench Type 1300A13

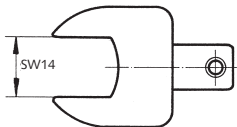


Fig. 10: SW14 fork wrench insert for mounting and torque wrench Type 1300A71

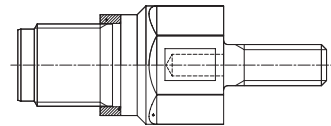


Fig. 11: Dummy sensor Type 6475

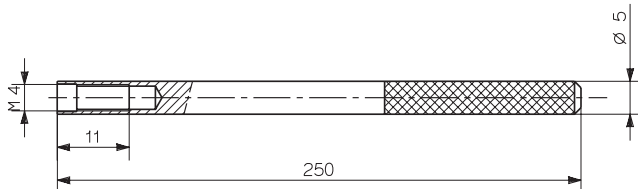


Fig. 12: Extraction tool for dummy sensor Type 1319

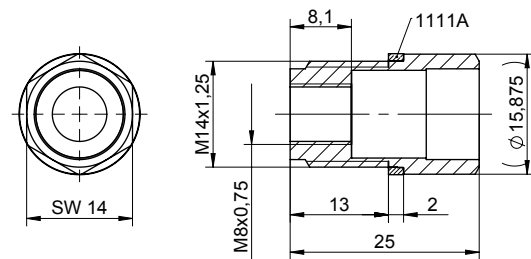


Fig. 13: Adapter Type 6589Q01. Sensor flush mounted

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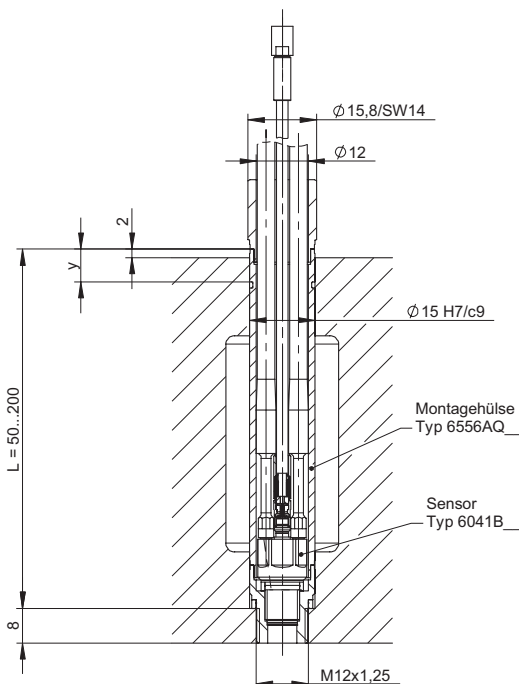


Fig. 14: Sensor installation with mounting sleeve

Scope of delivery

- Pressure sensor with pressed-on seal 1100A31
- Connecting cable acc. to ordering key
- Calibration certificate
- Adapter M4 neg. – BNC pos. (not for PiezoSmart)

Optional accessories

- 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

Type/Art. No.

6041B

1705

Type/Art. No.1987B1
1987B2
1987B101989A313
1989A323
1989A333
1985A8S311
1985A8S321
1985A8S3311989A713
1989A723
1989A733
1985A8S711
1985A8S721
1985A8S7311100A31
1225A51203Csp
64751319
6556AQ...

6589

6929
6589Q01
6589Q02
2621G

65006959

Mounting tools (optional)

- Mounting key for bore Ø12 SW12
 - L = 155 1300A73
 - L = 205 1300A73Q01
 - L = 265 1300A73A250
 - L = 315 1300A73A300
 - L = 365 1300A73A350
- 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

Type/Art. No.1300A73
1300A73Q01
1300A73A250
1300A73A300
1300A73A350
1300A13
1300A67
1300A71
1300A39
1361**Ordering Key**

Sensor version		Type 6041B		
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 6041BS7-2Standard sensor with PiezoSmart and 1 m PFA cable:
Type 6041B-3-1