

# Miniature Measuring Probe

Type 6053CC...

## for Non-Cooled Cylinder Pressure Measurement, M5 Thread

Patent No. US 6,105,434

The miniature measuring probe with very small dimensions and M5x0,5 mounting thread is particularly suitable for direct installation in small-capacity combustion engines with more than two valves per cylinder. The measuring element is identical to the standard sensor Type 6052C...

- Good temperature stability of the sensitivity
- Acceleration-compensated
- Needs only 6 mm mounting bore
- Low thermal shock error and long life thanks to the front seal
- Very high sensitivity

### Description

Type 6053CC... uses a new type of PiezoStar® crystal which achieves high sensitivity in conjunction with an extremely small sensor structure. The sensitivity drifts by a maximum of ±0,5 % over the temperature range of 200 ±50 °C. The passive acceleration compensation patented by Kistler keeps the influence of engine vibrations to a minimum.

The front seal allows very good heat dissipation and thus briefly a maximum operating temperature of 400 °C. The diaphragm, optimized by finite element calculation, produces good measuring results and ensures a long service life. The shape of the probe allows mounting with a very small access bore. The cable connection has to be outside the cylinder-head, in an area free of oil mist. O-rings also permit mounting through coolant passages. The probe can be manufactured in custom lengths between 30 and 120 mm.

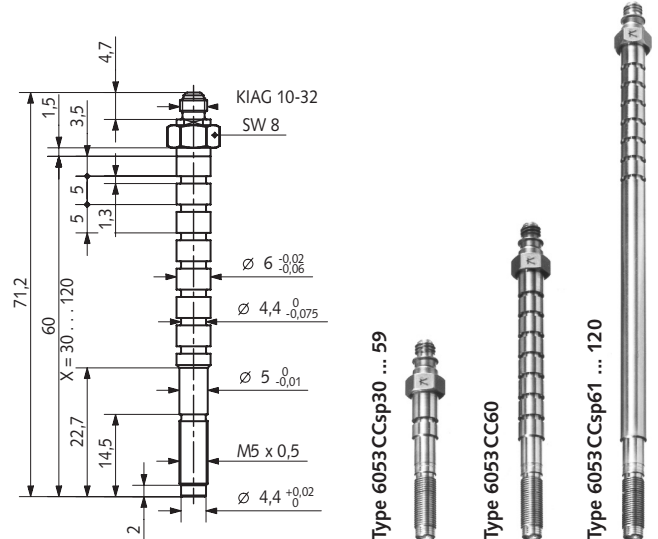
### Application

The sensor Type 6053CC... is an excellent all-rounder. Its rugged construction makes it suitable for measurements at the knock limit as well as for thermodynamic investigations. This sensor is used mainly on multi-valve engines, motor cycle and other small engines and for combustion analysis.

This sensor should be used when there is insufficient mounting space available for the Type 6052C...

At high speeds (vibrations), the Type 6053CC...U40 should be used. For applications mainly in the knocking range or at very high peak pressures, use of Type 6053CC...U20 with reinforced diaphragm (heavy duty version) is recommended.

The probe is supplied without a cable. See Accessories for the various cables available for different applications.



### Technical Data

Measuring range	bar	0 ... 250
Calibrated sub-ranges	bar	0 ... 50, 0 ... 100, 0 ... 150, 0 ... 250
Overload	bar	300
Sensitivity	pC/bar	≈-20
Natural frequency, nominal	kHz	≈160
Linearity in all ranges (at 23 °C)	%/FSO	≤±0,3
Acceleration sensitivity		
axial	bar/g	<0,0002
radial	bar/g	<0,0005
Operating temperature range	°C	-20 ... 350
Temperature min./max	°C	-50 ... 400
Connector	°C	200

**Technical Data (Continuation)**

Sensitivity change		
200 °C ±50 °C	%	≈±0,5
23 ... 350 °C	%	≤±2
Thermal shock error		
(at 1 500 1/min Δp <sub>mi</sub> = 9 bar)		
Δp <sub>mi</sub> (short time drift)	bar	≤±0,5
Δp <sub>mi</sub>	%	<±2
Δp <sub>max</sub>	%	<±1
Insulation resistance		
at 23 °C	Ω	>10 <sup>13</sup>
Shock resistance	g	2 000
Tightening torque	N·m	1,5
Capacity		
Weight (Type 6053CC60)	g	10
Connector (PTFE)	–	KIAG 10-32

**Mounting**

Direct mounting:

Sensor Type 6053CC... can be mounted directly in the cylinder head, see Fig. 1. Machining of the bore must correspond exactly to the bore specifications shown in Fig. 2.

The Kistler tools:

Step drill                                   Type 1300A53  
Special tap                                   Type 1357A and the  
Finishing tool for bore                Type 1300A79 or 1300A79Q01

must be used in order to comply with the tolerances required. The bore must be machined in one clamping. Before mounting the sensor, the sealing surface in particular must be checked; use of the finishing tool (reamer) Type 1300A79 is mandatory. When mounting the sensor, it is essential to comply with the tightening torque of 1,5 N·m. The sensor should therefore be mounted with the torque wrench Type 1300A17. You will find additional information for machining the bore and mounting in the instruction manual. Your Kistler distributor will provide you with information, for example concerning the preferred position of the indicating bore in the combustion chamber.

The shape of the probe and O-ring sealing allow mounting through coolant passages (see Figure 1). Reliable sealing requires a bore diameter of 6<sup>0.003</sup><sub>0.001</sub>, which can also be achieved with the drill Type 1300A53.

**Type 6053CC...U20** (other specification as for Type 6053CC...)

Measuring range	bar	0 ... 300
Calibrated partial ranges	bar	0 ... 100, 0 ... 200, 0 ... 300
Overload	bar	350
Acceleration sensitivity		
axial	bar/g	<0,0005
radial	bar/g	<0,0005
Thermal shock error		
(at 1 500 1/min, p <sub>mi</sub> = 9 bar)		
Δp (short time drift)	bar	≤±0,7
Δp <sub>mi</sub>	%	≤±3
Δp <sub>max</sub>	%	≤±1,5

**Type 6053CC...U40** (other specification as for Type 6053C...)

Calibrated partial ranges	bar	0 ... 100, 0 ... 200, 0 ...250
Operating temperature range	°C	–20 ... 200
Temperature min./max.		–50 ... 200
Sensitivity shift		
23 ... 200 °C	%	≤±2

Mounting sleeve:

When space allows or if the water jacket of the cylinder head will be breached, a mounting sleeve Type 6525AQ... is recommended. Mounting sleeves are manufactured to customer requirements. An additional advantage of mounting sleeves is that the actual sensor bore in the sleeve can be very precisely machined. On request, Kistler will provide drawings for your particular mounting situation.

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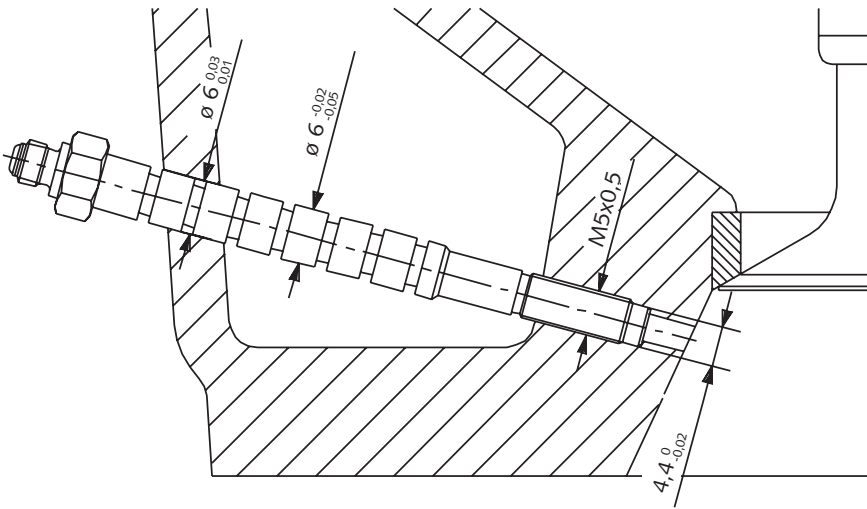


Fig. 1: Mounting through water passage

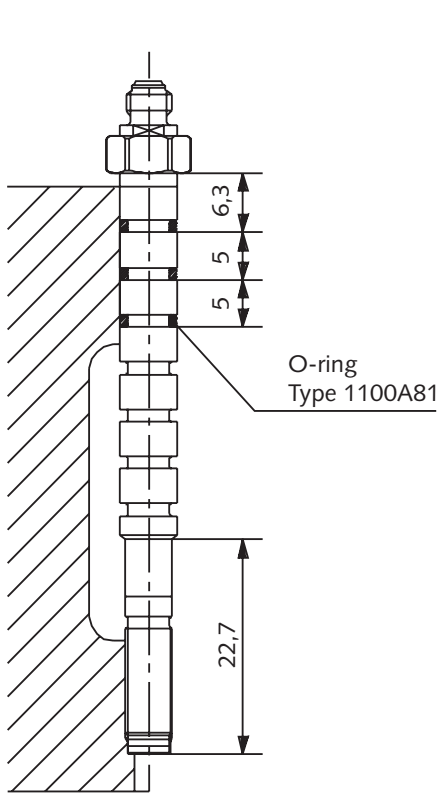


Fig. 2: Dimensions of the mounting bore

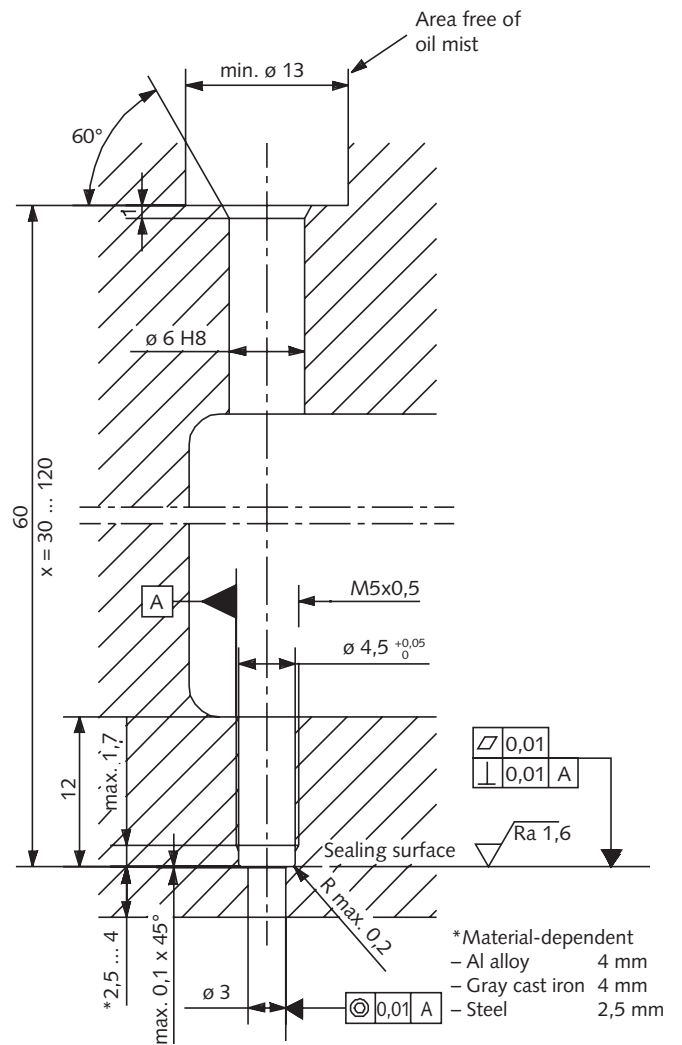


Fig. 3: Bore for sensor

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### Included Accessories

- O-ring Viton® (4x1)

### Optional Accessories

- Connecting cable Teflon® BNC pos. Type/Art. No. 1631C...
- Connecting cable Teflon 10-32 UNF pos. Type/Art. No. 1635C...
- Connecting cable, metal Type/Art. No. 1957A1
- Torque wrench 1 ... 6 N·m Type/Art. No. 1300A17
- Special tap M5x0,5 Type/Art. No. 1357A
- Special drill for bore Type/Art. No. 1300A53
- Adapter for pressure generator 6905A Type/Art. No. 6953
- Adapter for pressure generator 6904 Type/Art. No. 6585
- Adapter for pressure pulse generator 6909 Type/Art. No. 6585 and 6931A4
- Reamer for bore Type/Art. No. 1300A79
  - bore depth ≤60 mm
- Reamer for bore Type/Art. No. 1300A79Q01
  - bore depth ≤170 mm

Type/Art. No.  
1100A81

### Ordering Key

Type 6053CC

### Tube

L = 60 mm	60
L = 30 ... 59 mm write length in mm	sp30-59
L = 61 ... 120 mm write length in mm	sp61-120

### Construction

Standard	-
Amplified diaphragm	U20
Additional damping	U40

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Teflon® is a registered trademark of DuPont

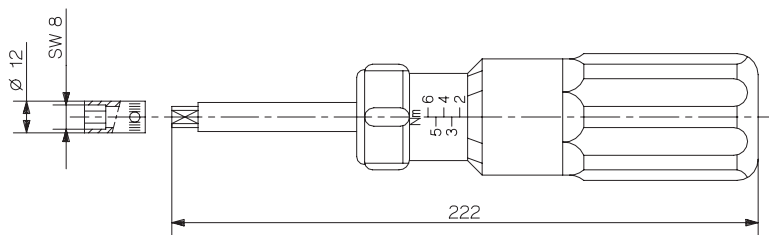


Fig. 4: Torque wrench 1 ... 6 N·m Type 1300A17

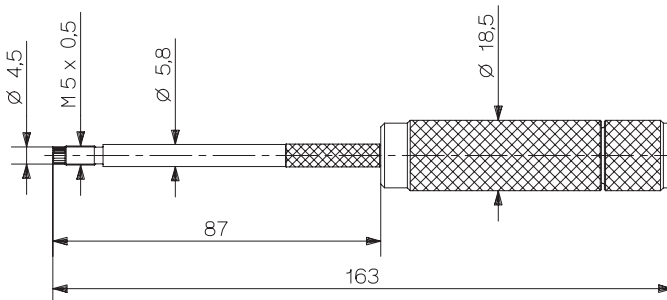


Fig. 5: Reamer Type 1300A79

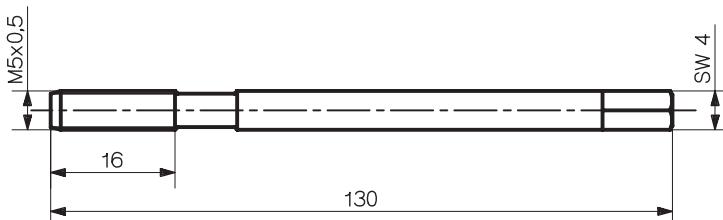


Fig. 6: Special tap Type 1357A

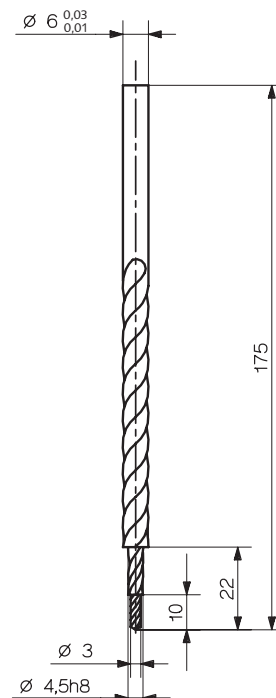


Fig. 7: Special drill Type 1300A53

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