

# ThermoCOMP Quartz Pressure Sensor Type 6041A...

## Cylinder pressure sensor for combustion engines

Water-cooled precision cylinder pressure sensor with small dimensions, especially suited for small combustion engines and for thermodynamic investigations in the laboratory.

Fitting with or without water cooling in a bore M8x0.75. High sensitivity, high natural frequency and excellent zero point stability because of integrated water cooling. When a special wrench is used the sensor can be mounted in a bore of  $\varnothing 12$  mm.

- Miniature water-cooled cylinder pressure sensor (M8 thread)
- Thermo-shock optimized double diaphragm
- Long life thanks to TiN coating

### Description

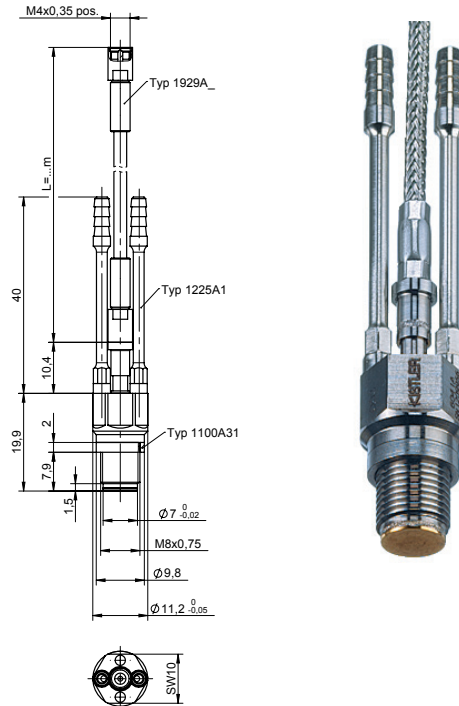
The use of Polystable quartz elements assures security against twinning even under high mechanical loading. As a result, the sensitivity remains largely constant from  $-50 \dots 350 \text{ }^\circ\text{C}$  and the sensor continues to operate without damage even if the water-cooling fails. Thanks to its anticorrosive effect, the TiN coating extends the life of the diaphragm.

### Application

The miniature sensor Type 6041A... is well 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 thanks to the built-in water cooling yield precise measuring results. Moreover, the excellent linearity in the whole range and the high sensitivity allow gas exchange to be analyzed accurately.

### Cooling fluid specification

- Demineralized water according to norm VDE-Norm 0510
- Cooling fluid BASF® 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  $-9^\circ\text{C}$
- For more information please refer to instruction manual of the cooling unit 2621F



### Technical data

Range	bar	0 ... 250	
Calibrated partial ranges	bar	0 ... 50; 0 ... 100;	
	bar	0 ... 150; 0 ... 250	
Overload	bar	300	
Sensitivity	pC/bar	$\approx -20$	
Natural frequency	kHz	$\approx 70$	
Linearity, all ranges	% FSO	$\leq \pm 0.5$	
Acceleration sensitivity	axial (with cooling)	bar/g	$< 0.012$
	radial (with cooling)	bar/g	$< 0.0045$
Shock resistance	g	$< 2\,000$	
Operating temperature range	$^\circ\text{C}$	$-50 \dots 350$	
Cooling water flow	l/min	0.3 ... 0.5	
Sensitivity shift	(50 $^\circ\text{C}$ , $p_{\text{max}}$ 3 bar)		
	with cooling 50 $\pm$ 35 $^\circ\text{C}$	%	$\pm 0.5$
	without cooling 200 $\pm$ 150 $^\circ\text{C}$	%	$\leq \pm 2$
Insulation resistance at 20 $^\circ\text{C}$	T $\Omega$	$> 10$	
Tightening torque	N·m	6	

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**Technical data (continuation)**

Thermal shock error		
Deviation from the reference (at 1 500 1/min, IMEP = 9 bar)		
$\Delta p$ (short-time drift)	bar	$\leq \pm 0.25$
$\Delta IMEP$	%	$\leq \pm 2$
$\Delta p_{max}$	%	$\leq \pm 1$
Capacitance		
Sensor only	pF	6
Sensor with cable Type 1929A1	pF	109
Weight		
Sensor only	grams	10
Sensor with cable Type 1929A1	grams	28.5
Plug, ceramic insulator		M4x0.35

**Type 6041A... U20**

(other specifications as for Type 6041A...)

Overload	bar	350
Sensitivity	pC/bar	$\approx -19$
Thermal shock error		
(at 1 500 1/min, IMEP = 9 bar)		
$\Delta p$ (short-time drift)	bar	$\leq \pm 0.5$
$\Delta IMEP$	%	$< \pm 3$
$\Delta p_{max}$	%	$< \pm 1$

**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 flush-mounting the sensor in the cylinder head (Fig. 1). 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 bore in front of the diaphragm. This offers excellent thermal-shock protection but can be prone to pipe oscillations (Fig. 2).

**Mounting example**

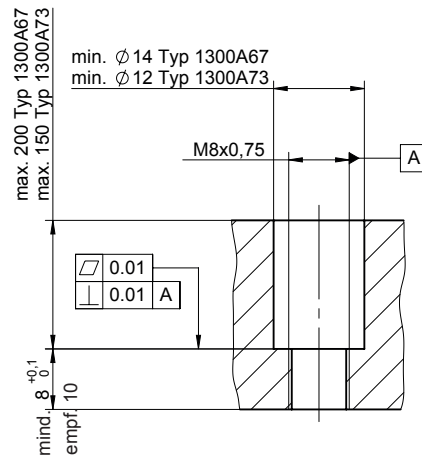


Fig. 1: Shows the bore of 14 resp. 12 mm diameter for the standard mounting

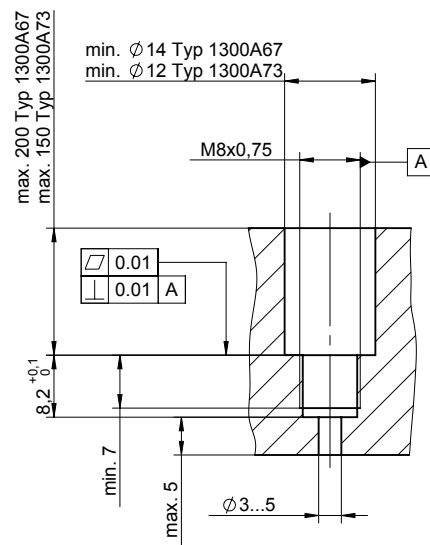


Fig. 2: Recessed mounted sensor. Shows the bore of 14 resp. 12 mm diameter for the standard mounting

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**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)

**Type/Art. No.**

6041A

**Mounting tools (optional)**

- Mounting key for bore Ø12 SW12
  - L = 155
  - L = 205
  - L = 265
  - L = 315
  - L = 365
- Wrench jaw insert SW12 for 1300A73
- Mounting key for bore min. Ø14
- Wrench jaw insert SW14 for Type 1300A67
- Torque wrench (4 ... 20 N·m)
- Screw tap M8x0.75

**Type/Art. No.**

1300A73  
1300A73Q01  
1300A73A250  
1300A73A300  
1300A73A350  
1300A13  
1300A67  
1300A71  
1300A39  
1361

**Optional accessories**

- PiezoSmart extension cables
  - L = 1 m 1987B1
  - L = 2 m 1987B2
  - L = 10 1987B10
- Connecting cables, PFA steel braiding
  - L = 1 m 1929A1
  - L = 2 m 1929A2
  - L = 3 m 1929A3
  - with PiezoSmart, L = 1 m 1985A1S311
  - with PiezoSmart, L = 2 m 1985A1S321
  - with PiezoSmart, L = 3 m 1985A1S331
- Connecting cables, FPM oil-tight
  - L = 1 m 1983AA1
  - L = 2 m 1983AA2
  - L = 3 m 1983AA3
  - with PiezoSmart, L = 1 m 1985A1S711
  - with PiezoSmart, L = 2 m 1985A1S721
  - with PiezoSmart, L = 3 m 1985A1S731
- Cr-Ni seal ring (replacement for pressed-on sensor seal) 1100A31
- Connecting hose for cooling water 1225A1
- 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 2621F
- Protective cap for sensor plug M4x0.35 neg. 1895

**Type/Art. No.**

**Ordering key**

Type 6041A		□ □ □ □
Standard		↑
Reinforced diaphragm	U20	
Without PiezoSmart	-	↑
With PiezoSmart	S	
Metal braided PFA cable	3	↑
Oilproof FPM cable	7	
Cable length 1 m	-1	↑
Cable length 2 m	-2	
Cable length 3 m	-3	

Type 6041A... can no longer be ordered.

Available variants Type 6041AU20:

- 6041AU20
- 6041AU20-3-2
- 6041AU20-7-3
- 6041AU20S3-1

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