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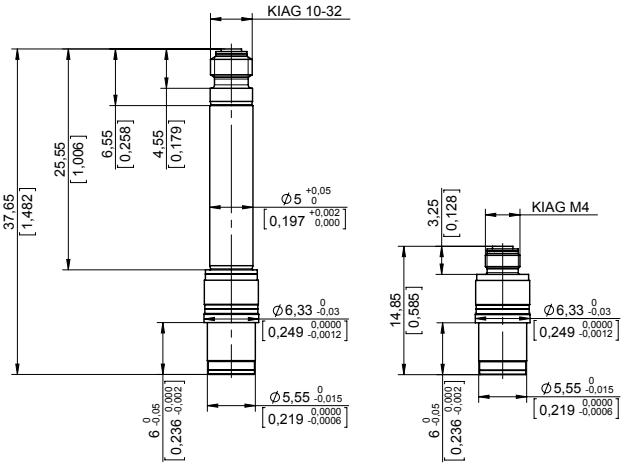
Piezoelectric Pressure Sensor

Type 601C...

For Test & Measurement Applications

The miniature pressure sensors of the 601C series are, due to their high sensitivity, suited for a variety of applications where very small pressure pulsations need to be measured. In addition, the optimized diaphragm ensures accurate dynamic pressure measurements, even when the diaphragm is simultaneously exposed to a high temperature transient.

- Pressure range up to 250 bar (3626 psi)
- High sensitivity
- Membrane optimized for thermal transients
- Small sensor size
- Short rise time & high natural frequency
- Extremely wide operating temperature range
- Charge (PE) or Voltage (IEPE) output



Description

Due to their high natural frequencies, piezoelectric pressure sensors can be used for a variety of applications where dynamic pressures need to be measured. Another unique characteristic of piezoelectric pressure sensors is their ability to measure small pressure fluctuations that are superimposed on top of high static pressures with exceptional resolution. By contrast, piezoresistive pressure sensors are the right choice when measuring static pressure curves.

At the core of the all-welded, hermetically sealed 601C series there is a high performance PiezoStar® crystal grown by Kistler. This PiezoStar crystal gives the sensor a far higher sensitivity than an equivalently sized pressure sensor based on synthetic Quartz, which results in a lower noise level and so enables lower pressure to be measured more accurately.

The pressure to be measured acts on the sensor's diaphragm and compresses the PiezoStar crystal. The compressed crystal produces a charge which is proportional to the pressure. Finally the charge signal needs to be converted, by a charge amplifier, into a voltage which can then be read.

Two variants of the sensor are available, charge output (PE) and voltage output (IEPE resp. Piezotron®). The instruction manual gives an overview on the characteristics of both variants, an indication of which type of application they are best suited to and the full measuring chain.

Typical Applications

- Pressure pulsations on pumps, compressors, etc.
- Dynamic measurements with high transient temperatures as Ex-Proof, pyrotechnical devices, closed vessel testing, energetic material testing, etc.

Technical Data – PE Sensors [1]

Type 601CA...			
Output signal		pC	Charge (PE)
Pressure range		bar	0 ... 250
		psi	0 ... 3626
Calibrated partial range		%	2, 20, 100
Overload		bar	300
		psi	4350
Sensitivity (typ.)		pC/bar	–37.0
		pC/psi	–2.5
Linearity	typ.	%FSO	≤0.1
	max.	%FSO	≤0.5
Operating temperature range		°C	–196 ... 350
		°F	–321 ... 662
Rise time (10 ... 90 %)		µs	<1.4
Natural frequency [2]		kHz	>215
Temp. coefficient of sensitivity			
25 ... 100 °C / 77 ... 212 °F		%	≈+0.7
25 ... 350 °C / 77 ... 662 °F		%	≈+4.4
25 ... –196 °C / 77 ... –321 °F		%	≈–7.7
Acceleration sensitivity (axial)		bar/g	≤0.0020
		psi/g	≤0.0290
Acceleration sensitivity (radial)		bar/g	≤0.0001
		psi/g	≤0.0015
Insulation resistance		Ω	$\geq 10^{13}$
Weight	Type 601CAA / 601CAB	grams	4.5 / 1.9
Sensor material housing & diaphragm			17-4 S.S.

[1] Indications are valid for 23 °C / 73 °F (if not specified otherwise)
[2] Calculated from rise time

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Technical Data – IEPE Sensors [1]

Type 601CBA...			00250.0	00070.0	00035.0	00014.0	00007.0	00003.5	00001.5
Output signal		V	Voltage (IEPE)						
Pressure range		bar	0 ... 250	0 ... 70	0 ... 35	0 ... 14	0 ... 7	0 ... 3.5	0 ... 1.5
		psi	0 ... 3626	0 ... 1000	0 ... 500	0 ... 200	0 ... 100	0 ... 50	0 ... 22
Maximum dymamic pressure step		bar	±250	±243	±117	±47.6	±24.1	±12.4	±5.2
(without damage)		psi	±3626	±3524	±1697	±690	±350	±180	±75
Maximum pressure		bar	250						
(static + dynamic)		psi	3626						
Sensitivity (typ.)		mV/bar	20	71	143	357	714	1429	3333
		mV/psi	1.4	4.9	9.9	25	49	99	230
Linearity	typ.	%FSO	≤0.2						
	max.	%FSO	≤1.0						
Operating temperature range		°C	–55 ... 120						
		°F	–67 ... 248						
Rise time (10 ... 90 %)		µs	<1.4						
Natural frequency [2]		kHz	>215						
Time constant		s	3						2
Low frequency response	–3dB	Hz	0.050						
	–5 %	Hz	0.152						
Temp. coefficient of sensitivity									
25 ... 120 °C / 77 ... 212 °F		%	≈+0.8						
Acceleration sensitivity (axial)		bar/g	≤0.0020						
		psi/g	≤0.0290						
Acceleration sensitivity (radial)		bar/g	≤0.0001						
		psi/g	≤0.0015						
Weight (typ.)		grams	3.6						
Sensor material housing & diaphragm			17-4 S.S.						

[1] Indications are valid for 23 °C / 73 °F (if not specified otherwise)
[2] Calculated from rise time

Mounting

Please check the manual for an overview on the different mounting options.

Included Accessories	Type/Art.-No.
• Sensor seal copper (5 pcs)	1131

Optional Accessories	Type/Art.-No.
• Floating clamp nut (metric hex)	6423B00
• Floating clamp nut (imperial hex)	6423B10
• Adapter M10	6503B0A
• Adapter 3/8-24-UNF	6503B1A

Please check the manual for details and further accessories.

Ordering Example
PE sensor with standard housing 601CAA
PE sensor with short housing 601CAB
IEPE sensor (250 bar/3625 PSI) 601CBA00250.0

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Ordering Key

Type 601C □ □ □

Output Signal

with charge output (PE)	**A**
with voltage output (IEPE)	**B**

Housing

Standard housing (PE and IEPE)	**A**
Short housing (only PE)	**B**

Pressure Range (only IEPE)

250 bar / 3625 psi	**00250.0**
70 bar / 1000 psi	**00070.0**
35 bar / 500 psi	**00035.0**
14 bar / 200 psi	**00014.0**
7 bar / 100 psi	**00007.0**
3.5 bar / 50 psi	**00003.5**
1.5 bar / 22 psi	**00001.5**

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