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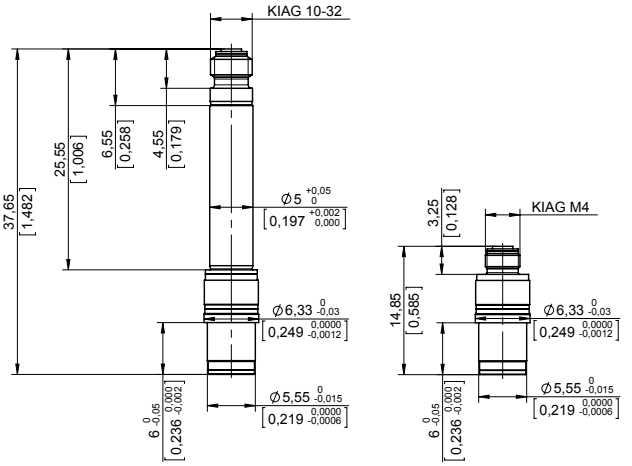
Piezoelectric pressure sensor

Type 601C...

for Test & Measurement applications

The miniature pressure sensors of the Type 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 (3 626 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 ... 3 626
Calibrated partial range		%	2; 20; 100
Overload		bar	300
		psi	4 350
Sensitivity	(nom.)	pC/bar	–37.0
		pC/psi	–2.6
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 °C ... 100 °C		%/°C	≈+0.009
77 °F ... 212 °F		%/°F	≈+0.005
25 °C ... 350 °C		%/°C	≈+0.014
77 °F ... 662 °F		%/°F	≈+0.008
25 °C ... –196 °C		%/°C	≈–0.035
77 °F ... –321 °F		%/°F	≈–0.019
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	gram	4.5 / 1.9
Housing and diaphragm material			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...		00001.5	00003.5	00007.0	00014.0	00035.0	00070.0	00250.0
Output signal	V	Voltage (IEPE)						
Pressure range	bar	1.5	3.5	7	14	35	70	250
	psi	22	50	100	200	500	1 000	3 626
Maximum pressure	bar	250						
	psi	3 626						
Overload	bar	300						
	psi	4 350						
Sensitivity (nom.)	mV/bar	3 333	1 429	714	357	143	71	20
	mV/psi	230	99	49	25	9.9	4.9	1.4
Linearity	%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 (nom.)	s	2	3					
Low frequency response –3 dB	Hz	0.080	0.053					
–5 %	Hz	0.242	0.161					
Temp. coefficient of sensitivity								
25 ... 120 °C	%/°C	≈+0.008						
77 ... 248 °F	%/°F	≈+0.005						
25 ... –55 °C	%/°C	≈–0.008						
77 ... –67 °F	%/°F	≈–0.005						
Acceleration sensitivity (axial)	bar/g	≤0.0020						
	psi/g	≤0.0290						
Acceleration sensitivity (radial)	bar/g	≤0.0001						
	psi/g	≤0.0015						
Supply voltage (by IEPE-Coupler)	VDC	22 … 30						
Supply current (by IEPE-Coupler)	mA	2 … 20						
Output bias voltage (nom.)	VDC	11						
Output voltage FSO	V	±5						
Weight	gram	3.6						
Housing and diaphragm material	–	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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Mounting

Please check the T&M Pressure catalogue or sensor manual for an overview on the different mounting options.

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

Accessories (optional)	Type/Art.-No.
• Sensor seal nickel (1pcs)	1131A
• Floating clamp nut M7x0.75	6423B00
• Floating clamp nut 5/16-24 UNF	6423B11
• Adapter M10x1[1)]	6503C0A
• Adapter seal (stainless steel) for 6503C0A	1113C0B
• Adapter seal (copper) for 6503C0A	1113C0C
• Adapter 3/8-24 UNF[1)]	6503C1A
• Adapter seal (stainless steel) for 6503C1A	1113C1B
• Adapter seal (copper) for 6503C1A	1113C1C
• Adapter M3x0.5[1)]	6507B0A
• Adapter 5-40 UNC[1)]	6507B1A
• Adapter seal for 6507BxA	1117B0C
• Lubrication Grease (Adapter)	1063
• Dummy sensor (standard housing)	6487AA
• Dummy sensor (short housing)	6487AB

[1)] All of the adapters are delivered with 1 pc. of each adapter seal type and 1 pc. lubrication grease Type 1063.

Please check the T&M pressure catalogue or sensor manual for further accessories and mounting details.

Ordering key

Type 601C □ □ □

Output signal

Charge (PE)	**A**
Voltage (IEPE)	**B**

Housing

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

Pressure range (only IEPE)

1.5 bar / 22 psi	**00001.5**
3.5 bar / 50 psi	**00003.5**
7 bar / 100 psi	**00007.0**
14 bar / 200 psi	**00014.0**
35 bar / 500 psi	**00035.0**
70 bar / 1 000 psi	**00070.0**
250 bar / 3 625 psi	**00250.0**

Ordering example	Type
PE sensor with standard housing	601CAA
PE sensor with short housing	601CAB
IEPE sensor (250 bar / 3 625 psi)	601CBA00250.0

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