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Piezoelectric pressure sensor

Type 603C...

for Test & Measurement applications

The miniature pressure sensors of the Type 603C series are, due to their high natural frequency, suited for a variety of applications where highly dynamic pressure transients need to be measured. The acceleration compensation ensures reliable measurements even under highly vibrating conditions.

- Pressure range up to 1 000 bar (15 000 psi)
- Acceleration compensated
- Small sensor size
- Short rise time & high natural frequency
- Wide operating temperature range
- Charge (PE) or Voltage (IEPE) output

Description

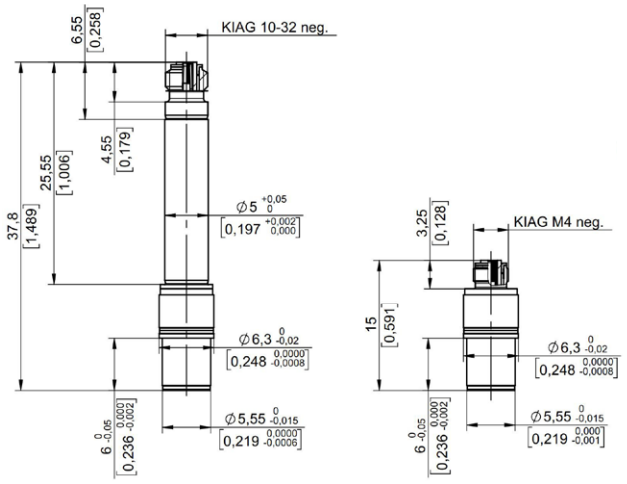
Due to their high natural frequencies, piezoelectric pressure sensors can be used for a variety of applications where dynamic pressures need to be measured. Another unique characteristic of piezoelectric pressure sensors is their ability to measure small pressure fluctuations that are superimposed on 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 603C series there is a Quartz crystal. The pressure to be measured acts on the sensor's diaphragm and compresses the Quartz 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

- High pressure measurements on hydraulic and pneumatics systems, etc.
- Highly dynamic pressure measurements on shock tubes, blast tests, etc.



Technical data – PE sensors [1]

Type 603CA...

Output signal		pC	Charge (PE)
Pressure range		bar	0 ... 1 000
		psi	0 ... 15 000
Calibrated partial range		%	10; 100
Overload		bar	1 100
		psi	15 950
Sensitivity	(nom.)	pC/bar	–5.0
		pC/psi	–0.35
Linearity	(typ.)	%FSO	≤±0.4
	(max.)	%FSO	≤±1.0
Operating temperature range		°C	–196 ... +200
		°F	–321 ... +392
Rise time (10 ... 90 %)		µs	<0.4
Natural frequency [2]		kHz	>500
Temp. coefficient of sensitivity			
25 °C ... 200 °C		%/°C	≈–0.027
77 °F ... 392 °F		%/°F	≈–0.015
25 °C ... –196 °C		%/°C	≈+0.027
77 °F ... –321 °F		%/°F	≈+0.015
Acceleration sensitivity (axial)		bar/g	≤0.00014
		psi/g	≤0.00200
Acceleration sensitivity (radial)		bar/g	≤0.00001
		psi/g	≤0.00015
Insulation resistance		Ω	$\geq 10^{13}$
Weight	Type 603CAA / 603CAB	gram	4.8 / 2.2
Housing and diaphragm material		–	17-4 S.S.

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

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Technical data – IEPE sensors [1)]

Type 603CBA...			00014.0	00035.0	00070.0	00350.0	00690.0	01000.0
Output signal		V	Voltage (IEPE)					
Pressure range		bar	14	35	70	350	690	1000
		psi	200	500	1 000	5 000	10 000	15 000
Maximum pressure		bar	1 000					
		psi	15 000					
Overload		bar	1 100					
		psi	15 950					
Sensitivity	(nom.)	mV/bar	357	143	71	14	7	5
		mV/psi	25	10	5	1	0.5	0.3
Linearity		%FSO	≤±1.0					
Operating temperature range		°C	–55 ... +120					
		°F	–67 ... +248					
Rise time (10 ... 90 %)		µs	<0.4					
Natural frequency [2)]		kHz	>500					
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	≈–0.027					
77 ... 248 °F		%/°F	≈–0.015					
25 ... –55 °C		%/°C	≈+0.027					
77 ... –67 °F		%/°F	≈+0.015					
Acceleration sensitivity (axial)		bar/g	≤0.00014					
		psi/g	≤0.00200					
Acceleration sensitivity (radial)		bar/g	≤0.00001					
		psi/g	≤0.00015					
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	4.0					
Housing and diaphragm material		–	17-4 S.S.					

[1)] Indications are valid for 23 °C / 73 °F (if not specified otherwise)
[2)] Calculated from peak 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 603C □ □ □

Output signal

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

Housing

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

Pressure range (only IEPE)

14 bar / 200 psi	**00014.0**
35 bar / 500 psi	**00035.0**
70 bar / 1 000 psi	**00070.0**
350 bar / 5 000 psi	**00350.0**
690 bar / 10 000 psi	**00690.0**
1 000 bar / 15 000 psi	**01000.0**

Ordering example	Type
PE sensor with standard housing	603CAA
PE sensor with short housing	603CAB
IEPE sensor (70 bar / 1 000 psi)	603CBA00070.0

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