

Pencil probe for blast pressure measurement

Type 6233B...

The Type 6233B... pencil probes are designed to measure highly dynamic pressures in free-field blast testing. An integrated amplifier circuit (IEPE) converts the charge signal from the quartz sensing elements into a voltage output. This allows driving of long cables up to several hundred meters of length.

- Rise time <1 μs
- Natural frequency >400 kHz
- Voltage output (IEPE): integrated Piezotron electronics
- Acceleration compensated
- Minimal bending sensitivity

Description

Piezoelectric technology is ideally suited to measure highly dynamic pressure signals over a wide range of pressures. Pencil probe Type 6233B... is available with measuring ranges from 0 ... 25 psi, 50 psi, 250 psi, 500 psi and 1 000 psi. The characteristic pencil shape minimizes the influence of the sensor geometry on the blast wave propagation and the measured pressure signal. Type 6233B... is pointed radially at the center of the explosion and measures the side-on pressure of the propagating blast wave. With its rugged design, acceleration compensation and minimal bending sensitivity, it is tailored to give



very accurate pressure signals in a very hostile environment. By using thermal protection foil Type 1191AAA10 the effects of thermal shock can be reduced by a factor of 10.

Application

Pencil type blast sensors are most effectively used in testing scenarios where the direction of shock wave propagation is clearly defined. The side-on measurement is least affected by reflections and superpositions of pressure waves. A typical use case is the free-field blast test, which aims at characterizing the physical effects of an explosive charge. Pencil probes are also used in blast impact scenarios, where the destructive effects of explosions on a protective structure are studied. These applications also include testing of industrial safety technology.

Technical data

Type 6233B...		0025	0050	0250	0500	1000
Range	psi (bar)	25 (1.7)	50 (3.4)	250 (17)	500 (34)	1 000 (69)
Nominal sensitivity (±20 %)	mV/psi (mV/bar)	200 (2 900)	100 (1 450)	20 (290)	10 (145)	5 (72)
Resolution	psi _{rms} (mbar _{rms})	0.007 (0.5)	0.01 (0.7)	0.05 (3.4)	0.1 (6.9)	0.2 (13.8)
Time constant	s	0.6	1.2	1.2	2.4	4.8
Acceleration sensitivity	psi/g (mbar/g)	<0.03 (2)				
Sensing element		Quartz				
Mechanical overload	psi (bar)	5 000 (350)				
Rise time	μs	<1				
Natural frequency *	kHz	>400				
Linearity	%FSO	≤±1				
Shock resistance (<1 ms)	g	2 000				
Operating temperature range	°F (°C)	-67 ... 257 (-55 ... 125)				
Temp. coeff. of sensitivity	%/°F (%/°C)	<0.032 (0.02)				
Weight	lb (grams)	0.77 (350)				
Material		Aluminium AW6023 anodized				

Electrical data

Excitation voltage	V	22 ... 30 DC
Constant current excitation	mA	2 ... 20
Output bias voltage	V	11
Output full scale	V	±5
Output impedance	Ω	<80

* Typical value for natural frequency (time domain) of the sensing element.

Dimensions

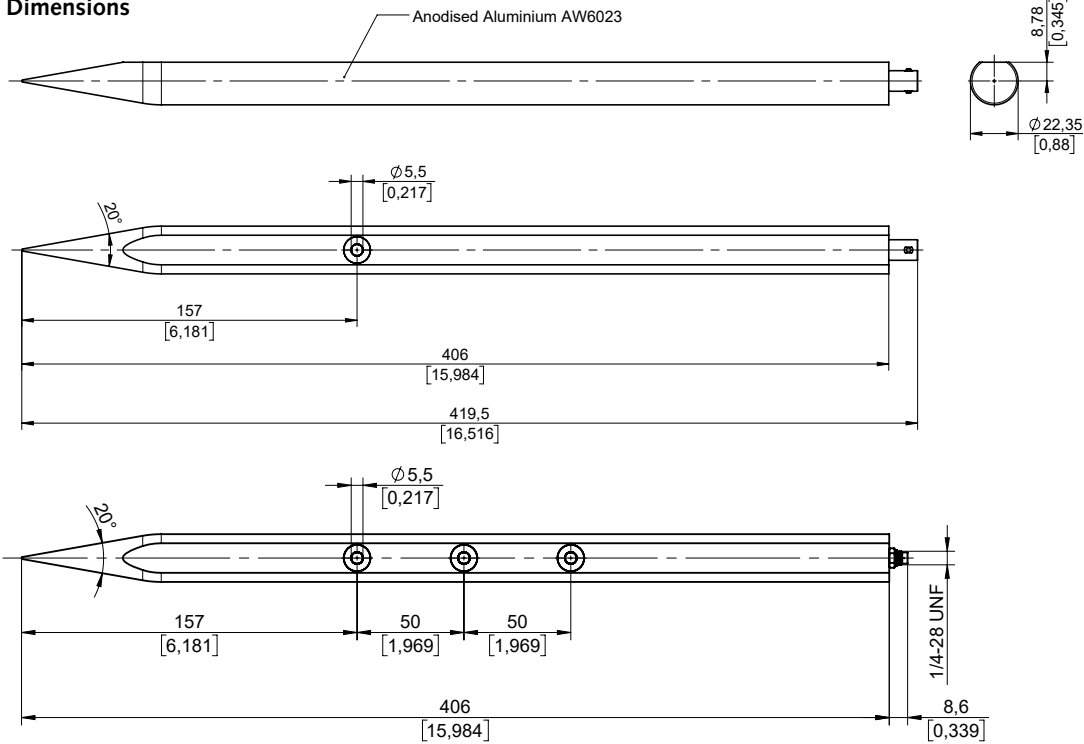


Fig. 1: Dimensions of pencil probe Type 6233B...

Mounting

Pencil probe Type 6233B...

Coax cable BNC – BNC Kistler Type 1601B

Transient Recorder with IEPE Input and Data Acquisition System (DAQ) with Software (high speed solution with > 5MS/s recommended)



Fig. 2: Typical measuring chain for pencil probe Type 6233B...

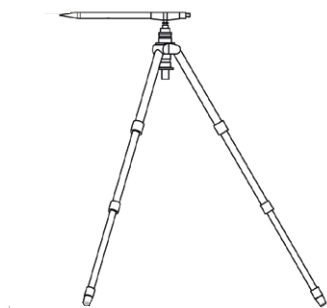


Fig. 3: Mounting on tripod using tripod adapter Type 6550A10

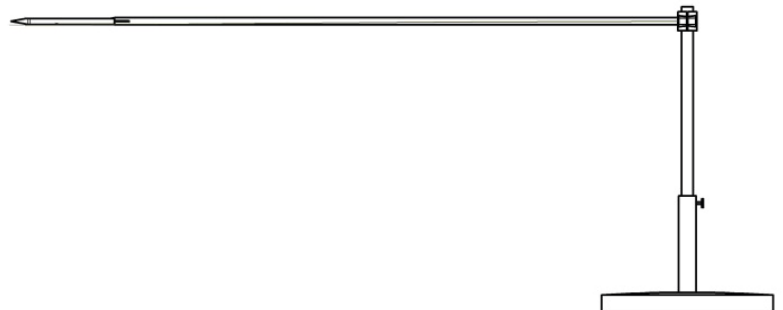


Fig. 4: Mounting on extended pipe fixation using pipe adapter Type 6550A20

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Included accessories

- BNC connector cap Type
1851
- Tip protection 65008380
- Thermal protection foil: set of 100 adhesive discs 1191AAA10
- Connecting cable MicroCom-3xBNC, 5 m length (only for Type 6233BD) 1773A5

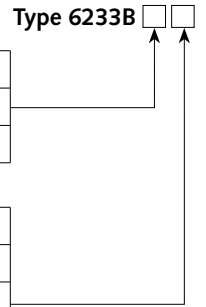
Optional accessories

- Tripod adapter: 1/4-20 UNC thread Type
6550A10
- Pipe adapter M22x1: includes clamping block and rings 6550A20
- Clamping block for pipe adapter (spare) 6550A22
- Clamping ring for pipe adapter: set 100 pieces (spare) 6550A50
- Thread cutter for pipe adapter 6550A60
- Storage case: fits 5 pencil probes, 5 tripod adapters, 5 pipe adapters and further small items. No content! Z21537
- Trigger box: includes trigger wire 2525A04
- Trigger wire for trigger box (spare) 2525AZ100

For a detailed description of the optional accessories check the instruction manual for pencil probe Type 6233B.

Ordering key

1 sensing element, BNC	A
1 sensing element, KIAG 10-32 output	B
3 sensing elements	D
1 000 psi	1000
500 psi	0500
250 psi	0250
50 psi	0050
25 psi	0025



Ordering example

- Pencil probe Type
6233BA0025
 - 1 sensing element
 - BNC output
 - 25 psi measuring range
- Pencil probe 6233BD1000
 - 3 sensing elements
 - MicroCom output
 - 1 000 psi measuring range