

# Pencil probe for blast pressure measurement

Type 6233A...

The Type 6233A... 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  $\mu$ s
- Natural frequency >300 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 6233A... 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 6233A... 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 6233A...		A0025	A0050	A0250	A0500	A1000
Range	psi (bar)	25 (1,7)	50 (3,4)	250 (17)	500 (34)	1 000 (69)
Nominal sensitivity ( $\pm 20$ %)	mV/psi (mV/bar)	200 (2 900)	100 (1 450)	20 (290)	10 (145)	5 (72)
Resolution	psi <sub>rms</sub> (mbar <sub>rms</sub> )	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				
Overload	psi (bar)	5 000 (350)				
Natural frequency	kHz	~300				
Rise time	$\mu$ s	<1				
Linearity	%FSO	$\leq \pm 1$				
Shock resistance (<1 ms)	g	2 000				
Operating temperature range	$^{\circ}$ F ( $^{\circ}$ C)	-67 ... 257 (-55 ... 125)				
Temp. coeff. of sensitivity	%/ $^{\circ}$ F (%/ $^{\circ}$ C)	0,032 (0,02)				
Weight	lb (grams)	0,77 (350)				
Material		Aluminium AW6023 anodized				
<b>Electrical data</b>						
Excitation voltage	V	22 ... 30 DC				
Constant current excitation	mA	2 ... 20				
Output bias voltage	V	11				
Output full scale	V	$\pm 5$				
Output impedance	$\Omega$	<80				

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**Dimensions**

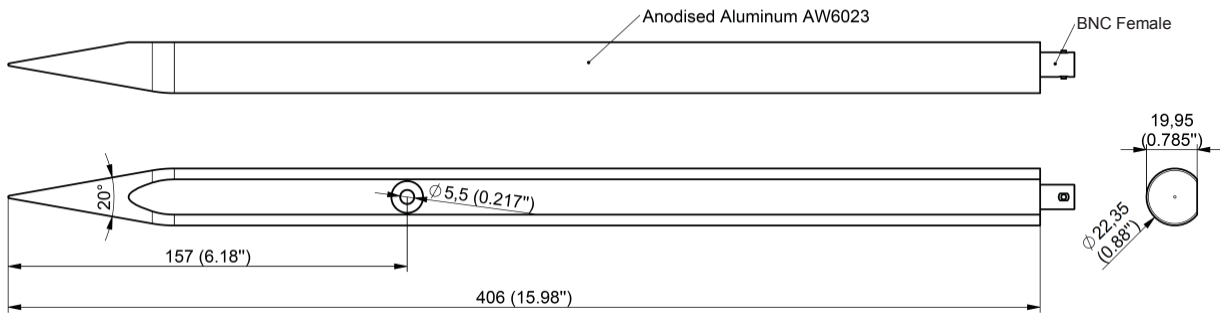


Fig. 1: Dimensions of pencil probe Type 6233A...

**Mounting**

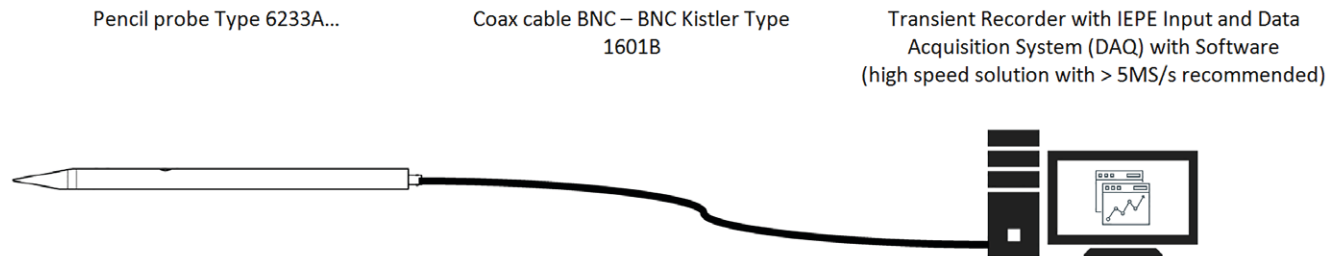


Fig. 2: Typical measuring chain for pencil probe Type 6233A...

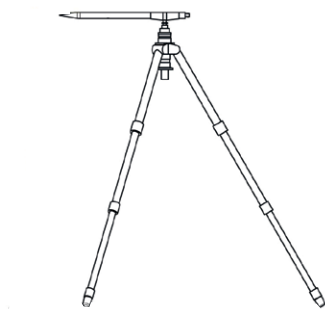


Fig. 3: Mounting on tripod using tripod adapter Type 6550A10

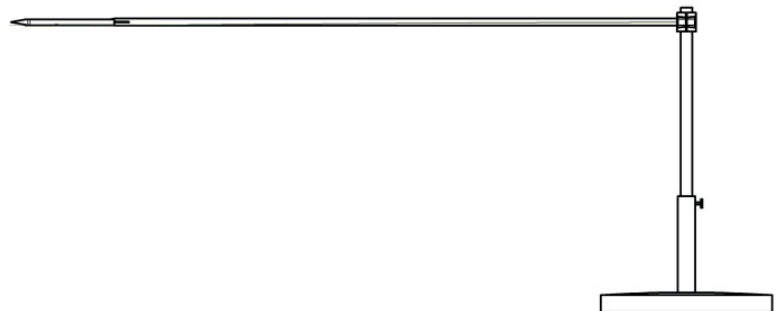


Fig. 4: Mounting on extended pipe fixation using pipe adapter Type 6550A20

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**Included accessories**

- BNC connector cap
- Tip protection
- Thermal protection foil: set of 100 adhesive discs

**Type**  
1851  
65008380  
1191AAA10

**Ordering key**

**Pencil probe**

Type 6233A...	<b>A0025</b>
Type 6233A...	<b>A0050</b>
Type 6233A...	<b>A0250</b>
Type 6233A...	<b>A0500</b>
Type 6233A...	<b>A1000</b>

Type 6233A

**Optional accessories**

- Tripod adapter: 1/4-20 UNC thread 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

**Ordering example**

- Pencil probe range 25 psi

**Type**  
6233AA0025

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