

## Piezoelectric Charge Accelerometer Types 4393 and 4393-V

### Uses

- High-level, high-frequency measurements
- Vibration testing and analysis
- Shock measurements
- Measurements on delicate structures, in confined spaces or in high-temperature environments



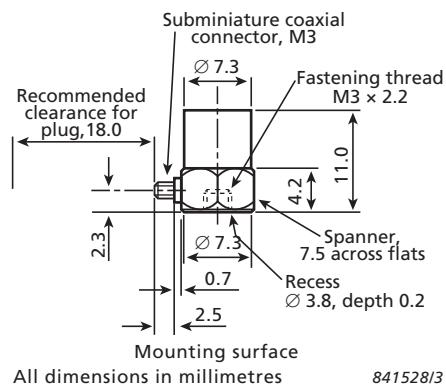
### Features

- Small size
- Very high resonance frequency
- Low weight

### Description

Type 4393 is a miniature DeltaShear™ Unigain\* accelerometer with a low weight and high resonance frequency. It has an M3 side connector and an M3 threaded hole for mounting. Type 4393-V<sup>†</sup> has the same specifications and long-term stability as Type 4393, but it has a relaxed sensitivity tolerance.

**Fig. 1** Dimensions of Type 4393



### Characteristics

This piezoelectric accelerometer may be treated as a charge source. Its sensitivity is expressed in terms of charge per unit acceleration ( $\text{pC}/\text{ms}^{-2}$ ,  $\text{pC}/\text{g}$ ).

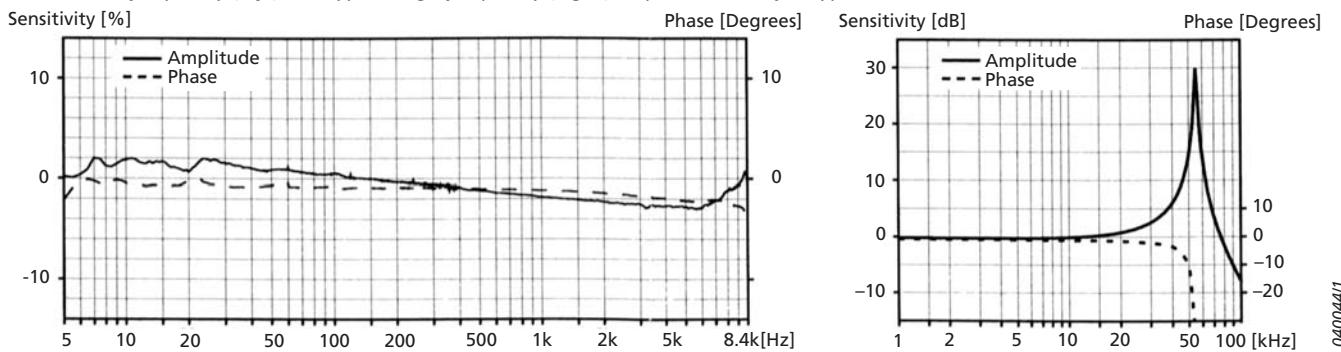
The DeltaShear design consists of three piezoelectric elements and three seismic masses arranged in a triangular configuration around a triangular centre post. They are held in place by a clamping ring that isolates the configuration from the base. The ring also prestresses the piezoelectric elements to give a high degree of linearity. This design provides a high sensitivity-to-mass ratio, a relatively high resonance frequency and high isolation from base strains and temperature transients.

The piezoelectric element used in Type 4393 is PZ 23, and the housing material is titanium.

### Calibration

The sensitivity is calibrated to a convenient value such as 1, 3.16 or 31.6  $\text{pC}/\text{ms}^{-2}$  for Unigain accelerometers. The sensitivity given in the calibration chart has been measured at 159.2 Hz with 95% confidence level, using the coverage factor  $k = 2$ .

**Fig. 2** Individual frequency (left) and typical high-frequency (right) response curves for Type 4393



\* Unigain: The individual measured sensitivity is within  $\pm 2\%$  of the specified sensitivity

† V-type: The individual measured sensitivity is within  $\pm 15\%$  of the specified sensitivity

## Specifications – Charge Accelerometer Types 4393 and 4393-V

All values are typical at 25 °C (77 °F) unless measurement uncertainty is stated

Type Number		4393	4393-V
<b>General</b>			
Weight	g	2.4	
	oz	0.085	
Charge Sensitivity (at 159.2 Hz)	pC/ms <sup>-2</sup>	0.316 ± 2%	0.316 ± 15%
	pC/g	3.10 ± 2%	3.10 ± 15%
Frequency Range (±10% limit)	Hz	0.1 to 16500	
Mounted Resonance Frequency	kHz	55	
Max. Transverse Sensitivity (at 30 Hz, 100 ms <sup>-2</sup> )	%	<4	
Transverse Resonance Frequency	kHz	18	
Max. Operational Continuous Sinusoidal Acceleration (peak)	kms <sup>-2</sup>	50	
	g	5000	
<b>Electrical</b>			
Residual Noise Level (measured with NEXUS Type 2692-001 in the specified frequency range)	mms <sup>-2</sup>	5.2	
	mg	0.52	
Capacitance (excluding cable)	pF	590	
Min. Leakage Resistance (at 20 °C)	GΩ	20	
<b>Environmental</b>			
Operating Temperature Range	°C	−74 to +250	
	°F	−101 to +482	
Temperature Coefficient of Sensitivity	%/°C	0.05*	
Temperature Transient Sensitivity (3 Hz Low. Lim. Freq. (−3 dB, 6 dB/octave))	ms <sup>-2</sup> /°C	5	
	g/°F	0.28	
Base Strain Sensitivity (at 250 με in the base plane)	ms <sup>-2</sup> /με	0.005	
	g/με	0.0005	
Magnetic Sensitivity (50 Hz, 0.038 T)	ms <sup>-2</sup> /T	30	
	g/kG	0.3	
Max. Non-destructive Shock (± peak)	kms <sup>-2</sup>	250	
	g	25000	
<b>Mechanical</b>			
Housing Material		Titanium ASTM Grade 2	
Piezoelectric Sensing Element		PZ 23	
Construction		DeltaShear	
Sealing		Welded	
Electrical Connector		M3	
Mounting		M3 × 2.2 mm threaded hole	
Mounting Torque	Max.	1.0 (8.8)	
	Min.	0.3 (2.7)	

\* In the temperature range −25 to +125 °C (−13 to +257 °F)

### COMPLIANCE WITH STANDARDS



### Ordering Information

#### Type 4393

includes the following accessories:

- Carrying box
- Calibration chart
- AO-0283-D-012: Super low-noise coaxial cable, M3 to 10–32 UNF, length 1.2 m
- YQ-2003: Set screw, stainless steel, hex socket with cup point, M3 × 5 mm

#### Type 4393-V

includes the following accessories:

- Carrying box
- Calibration chart
- YQ-2003: Set screw, stainless steel, hex socket with cup point, M3 × 5 mm

### Optional Accessories

AO-0283-x-yyy*	Super low-noise coaxial cable, M3 to 10–32 UNF, 250 °C (482 °F)
AO-0339-x-yyy*	Flexible low-noise coaxial cable, M3 to 10–32 UNF, 250 °C (482 °F)
AO-1381-x-yyy*	Flexible double-screened, low-noise cable, M3 to 10–32 UNF, 250 °C (482 °F)
DB-0757	Cementing stud, M3, dia. 8.0 mm
JJ-0032	Adapter, 10–32 UNF connectors
JP-0162	Plug adapter, 10–32 UNF to TNC
QA-0041	Tap for M3 thread
QA-0042	Hexagonal key for M3 studs
QS-0007	Tube of cyanoacrylate adhesive
UA-0629	Accelerometer accessory set
UA-1075	Mounting magnet and two insulating discs, M3, dia. 10 mm, length 1.6 mm (set of five)
UA-1216	Insulated stud, double end, M3 × 5.4 mm
YJ-0216	Beeswax for mounting
YQ-2003	Set screw, stainless steel, hex socket, cup point, M3 × 5 mm
YQ-2007	Set screw, stainless steel, hex socket, cup point, M3 × 8 mm
Type 4294	Vibration Exciter

### Calibration Services

ACC-M-CAI	Accredited initial calibration
ACC-M-CAF	Accredited calibration
ACC-M-CFF	Factory standard calibration
ACC-M-CTF	Traceable calibration

\* x = D (decimetres) or M (metres)

yyy = length in decimetres or metres

Please specify cable length when ordering

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