

## Miniature CCLD Accelerometer Types 4394 and 4397-A

Piezoelectric Accelerometers

### Features

- High frequency
- High sensitivity-to-mass ratio

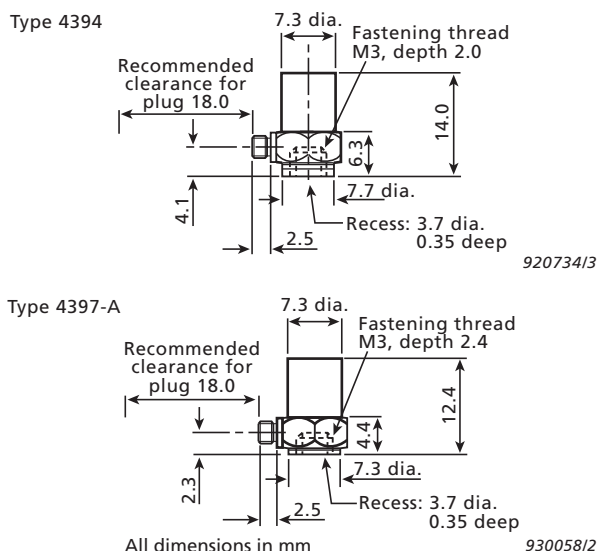
### Description

Types 4394 and 4397-A are piezoelectric DeltaShear™, Unigain accelerometers with side connectors. They feature an M3 connection and can be mounted on the test object with an M3 threaded steel stud. The two types differ from each other in that Type 4394 has a ceramic isolated base.

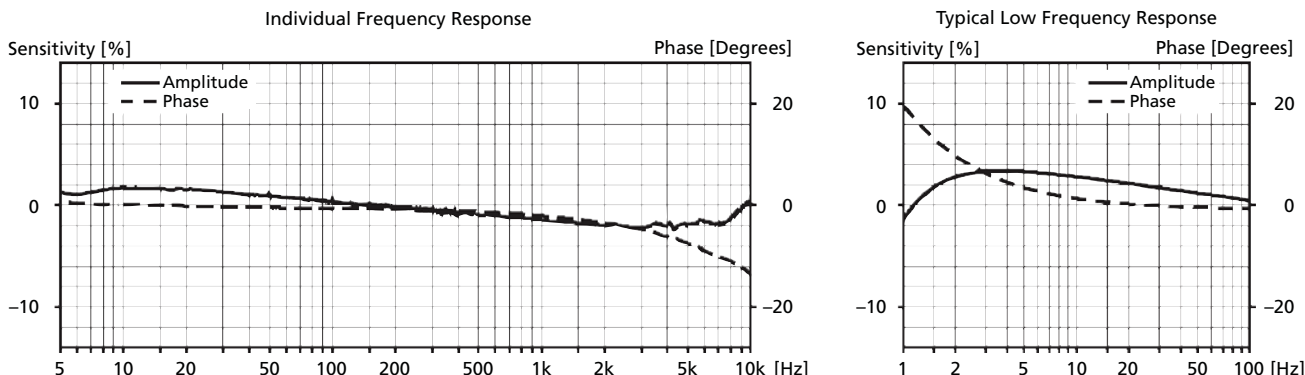
### Characteristics

These miniature accelerometers may be treated as voltage sources. Their sensitivity is expressed in terms of voltage per unit acceleration ( $\text{mV}/\text{ms}^{-2}$ ).

**Fig. 1** Dimensions of Type 4394 and 4397-A



**Fig. 2** Frequency response curves for Types 4394 and 4397-A



The DeltaShear design involves three piezoelectric elements and three masses in a triangular configuration around a central triangular post. A clamping ring pre-stresses these elements to give a higher degree of linearity. The signal is collected between the housing and the clamping ring and amplified in the built-in CCLD\* preamplifier. The piezoelectric element used in Types 4394 and 4397-A is PZ 23 lead zirconate titanate. The housing material is titanium.

### Calibration

The sensitivity given in the calibration chart is measured at 159.2 Hz. For a 95% confidence level, the accuracy of the factory calibration is  $\pm 0.7\%$ .

\* CCLD: Constant current line drive, also known as DeltaTron (IEPE compatible)

## Specifications – Types 4394 and 4397-A

Type No.		4394*	4397-A*
<b>General</b>			
Weight (excluding cable, wherever applicable)	gram	2.9	2.4
	oz	0.102	0.085
Voltage Sensitivity (at 159.2 Hz and 4 mA supply current)	mV/ms <sup>-2</sup>	1 ±2%	
	mV/g	9.8 ±2%	
Frequency Range	Amplitude (±10%)	1 to 25000	
	Amplitude (±5%)	1 to 10000	
	Phase (±5°)	4 to 2500	
Mounted Resonance Frequency	kHz	52	53
Max. Transverse Sensitivity (at 30 Hz, 100 ms <sup>-2</sup> )	%	<4	
Transverse Resonance Frequency	kHz	15	17
Measuring range (± peak)	kms <sup>-2</sup>	5 (7.5 when T < 100 °C)	
	g	500 (750 when T < 100 °C)	
TEDS		No	
<b>Electrical</b>			
Bias Voltage	at 25 °C and 4 mA	V	12 ±0.5
	at full temp. and curr. range		8 to 15
Power Supply	Constant current	mA	2 to 10 (2 to 20 mA if T < 100 °C)
	Unloaded supply voltage	V	24 to 30
Output Impedance		Ω	100
Start-up time (to final bias ±10%)		s	<5
Residual Noise (inherent RMS broadband noise in the specified frequency range)		μV	<25      <15
		μg	<2500      <1500
Noise Spectral	10 Hz	mms <sup>-2</sup> /√Hz (μg/√Hz)	1.3 (130)      0.79 (79)
	100 Hz		0.45 (45)      0.21 (21)
	1000 Hz		0.17 (17)      0.14 (14)
<b>Environmental</b>			
Operating Temperature Range		°C	-50 to +125
		°F	-58 to +257
Temperature Coefficient of Sensitivity		%/°C	0.04      0.05
Temperature Transient Sensitivity (3 Hz Lower Limiting Freq. (-3 dB, 6 dB/oct))		ms <sup>-2</sup> /°C	2
		g/°F	0.11
Magnetic Sensitivity (50 Hz, 0.038 T)		ms <sup>-2</sup> /T	10      50
		g/kGauss	0.1      0.5
Base Strain Sensitivity (at 250 με in base plane)		ms <sup>-2</sup> /με	0.005
		g/με	0.0005
Max. Non-destructive Shock (± peak)		kms <sup>-2</sup>	100 (axial), 50 (transverse)
		g	10000 (axial) 5000 (transverse)
<b>Mechanical</b>			
Case Material			Titanium ASTM Grade 2
Piezoelectric Sensing Element			PZ 23
Construction			DeltaShear
Sealing			Welded
Electrical Connector			Coaxial M3
Mounting		M3 × 2 mm threaded hole	M3 × 2.4 mm threaded hole
Mounting Torque	Nm (lbf-in)	Max. 0.6 (5.3), Min. 0.2 (1.8)	

\* All values are typical at 25 °C (77 °F) unless otherwise specified

### COMPLIANCE WITH STANDARDS



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## Ordering Information

### Type 4394

includes the following accessories:

- Carrying Box
- Calibration Chart
- AO-1381-D-012: Cable M3 (M) to 10–32 UNF (M), 1.2 m, 250 °C (482 °F)
- 3×YS-8321: Steel stud with flange, M3/M3, 3.5 mm

### Type 4397

includes the following accessories:

- Carrying Box
- Calibration Chart
- AO-1381-D-012: Cable M3 (M) to 10–32 UNF (M), 1.2 m, 250 °C (482 °F)
- 4×YS-8321: Steel stud with flange, M3/M3, 3.5 mm

### Type 4397-A

includes the following accessories:

- Carrying Box
- Calibration Chart
- 1×YS-8321: Steel stud with flange, M3/M3, 3.5 mm

Optional Accessories	
AO-0283	Super low-noise coaxial cable, M3 to 10–32 UNF, 250 °C (482 °F)
AO-0339	Flexible low-noise coaxial cable, M3 to 10–32 UNF, 250 °C (482 °F)
AO-1381	Flexible double-screened low-noise coaxial cable, M3 to 10–32 UNF, 250 °C (482 °F)
AO-0641	Low-cost coaxial cable, M3 to BNC, 90 °C (194 °F)
AO-0698	Super low-noise coaxial cable, M3 to SMB, 250 °C (482 °F)
UA-0867	25 × cement stud, M3, 8.0 mm dia.
UA-0186	25 × extension connector 10–32 UNF
UA-1075	5 × mounting magnet
UA-1221	25 × steel stud with flange, M3/M3, 3.5 mm
WA-0224	Mechanical filter
JP-0145	Plug adaptor, BNC/10–32 UNF
QA-0041	Tap for M3 thread
QA-0042	Hexagonal key for M3 studs
QS-0007	Tube of cyanoacrylate adhesive
YJ-0216	Beeswax for mounting
Type 4397-A only	
UA-1193	10 × insulated stud, M3/M3, 2.4 mm
YQ-2003	M3 threaded steel stud, 5 mm
YQ-2007	M3 threaded steel stud, 8 mm
Calibration Services*	
439x-CAF	Accredited calibration
439x-CAI	Accredited initial calibration
439x-CFF	Factory standard calibration
439x-CTF	Traceable calibration

\* x = 4 or 7