

## Piezoelectric Charge Accelerometer Types 4391 and 4391-V

### Uses

- Industrial measurements
- Measurements in high-temperature environments
- Vibration measurements
- Shock measurements
- Conditioning monitoring

### Features

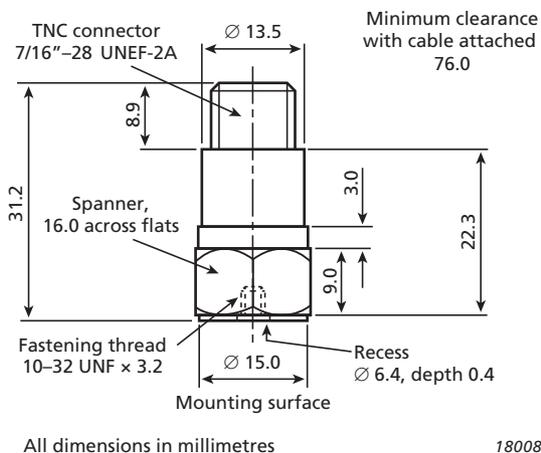
- Insulated base
- Top connector
- Low sensitivity to environmental factors



### Description

Type 4391 is a DeltaShear™ Unigain\* accelerometer with an insulated base. It features a TNC top connector and a 10–32 UNF-2B threaded hole for mounting. Type 4391-V† has the same specifications and long-term stability as Type 4391, but it has a relaxed sensitivity tolerance.

Fig. 1 Dimensions of Type 4391



### Characteristics

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

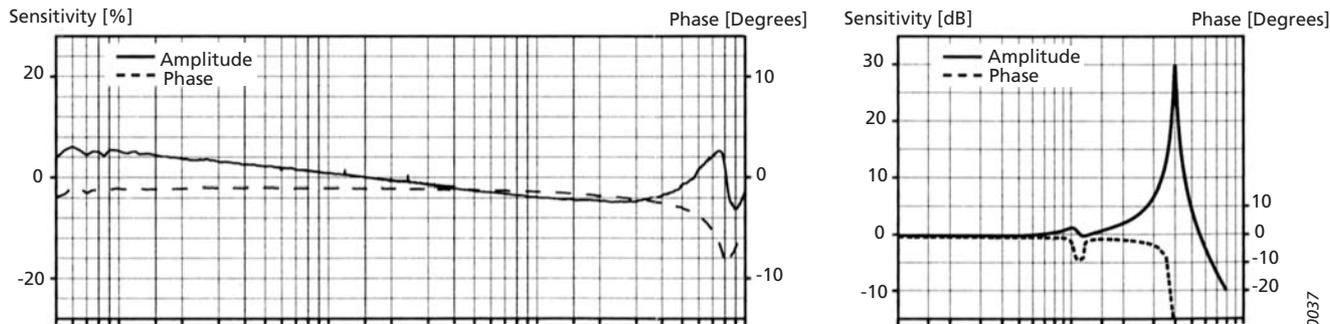
The DeltaShear design consists of three piezoelectric elements and three seismic masses arranged in a triangular configuration around a triangular centre post. They are held in place by a clamping ring that isolates the configuration from the base. The ring also prestresses the piezoelectric elements 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 4391 is a PZ 23 lead zirconate titanate element, 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 4391



\* 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 4391 and 4391-V

Type No.	4391		4391-V	
<b>General</b>				
Weight	g	16		
	oz	0.56		
Charge Sensitivity (at 159.2 Hz)	pC/ms <sup>-2</sup>	1 ± 2%	1 ± 15%	
	pC/g	9.8 ± 2%	9.8 ± 15%	
Frequency Range (±10% limit)	Hz	0.1 to 10000		
Mounted Resonance Frequency	kHz	40		
Max. Transverse Sensitivity (at 30 Hz, 100 ms <sup>-2</sup> )	%	<4		
Transverse Resonance Frequency	kHz	12		
Max. Operational Continuous Sinusoidal Acceleration (peak)	kms <sup>-2</sup>	20		
	g	2000		
<b>Electrical</b>				
Residual Noise Level (measured with NEXUS Type 2692-001 in the specified frequency range)	mms <sup>-2</sup>	2.3		
	mg	0.23		
Capacitance (excluding cable)	pF	1100		
Case (signal ground) Insulation to Base	MΩ	>100		
Min. Leakage Resistance (at 20 °C)	GΩ	>20		
<b>Environmental</b>				
Operating Temperature Range	°C	-60 to +180		
	°F	-76 to +356		
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	0.2		
	g/°F	0.01		
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	4		
	g/kG	0.04		
Max. Non-destructive Shock (± peak)	kms <sup>-2</sup>	20		
	g	2000		
<b>Mechanical</b>				
Housing Material	Titanium ASTM Grade 2			
Piezoelectric Sensing Element	PZ 23			
Construction	DeltaShear			
Sealing	Welded			
Electrical Connector	7/16–28 UNEF-2A (TNC)			
Mounting	10–32 UNF-2B × 3.2 mm threaded hole			
Mounting Torque	Max.	Nm (lbf-in)	3.5 (31)	
	Min.		0.5 (4.4)	

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

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

### COMPLIANCE WITH STANDARDS



Brüel & Kjær and all other trademarks, service marks, trade names, logos and product names are the property of Brüel & Kjær or a third-party company.

Brüel & Kjær Sound & Vibration Measurement A/S  
 DK-2850 Nærum · Denmark · Telephone: +45 77 41 20 00 · Fax: +45 45 80 14 05  
 www.bksv.com · info@bksv.com  
 Local representatives and service organizations worldwide

Although reasonable care has been taken to ensure the information in this document is accurate, nothing herein can be construed to imply representation or warranty as to its accuracy, currency or completeness, nor is it intended to form the basis of any contract. Content is subject to change without notice – contact Brüel & Kjær for the latest version of this document.

## Ordering Information

### Type 4391

includes the following accessories:

- Carrying box
- Calibration chart
- YQ-2960: Set screw, 10–32 UNF × 1/2" (12.8 mm)

### Type 4391-V

includes the following accessories:

- Carrying box
- Calibration chart
- YQ-2960: Set screw, 10–32 UNF × 1/2" (12.8 mm)

Optional Accessories	
AO-0193-x-yyy*	Super low-noise cable, TNC to TNC, 250 °C (482 °F)
AO-0231-x-yyy*	Super low-noise cable, TNC to 10–32 UNF, 180 °C (356 °F)
AO-0268-x-yyy*	Super low-noise spiral cable, TNC to TNC, 85 °C (185 °F)
AO-0038-x-yyy	Low-noise coaxial cable with 10–32 UNF connectors, 250 °C (482 °F)
AO-1382-x-yyy*	Flexible double-screened coaxial cable, 10–32 UNF, 250 °C (482 °F)
QA-0013	Hexagonal key for 10–32 UNF studs
QA-0029	Tap for 10–32 UNF thread
UA-0553	Mechanical filter (set of five)
UA-0642	Mounting magnet and two insulating discs
UA-0844	Accessory set
UA-0866	Cementing stud, 10–32 UNF, dia. 14 mm (set of 25)
YQ-2960	Set screw, 10–32 UNF × 1/2" (12.8 mm)
YQ-2962	Set screw, 10–32 UNF × 5/16" (7.7 mm)
Type 4294	Calibration Exciter
Calibration Services	
ACC-M-CAI	Accredited initial calibration
ACC-M-CAF	Accredited calibration
ACC-M-CFF	Factory standard calibration

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

yyy = length in decimetres or metres

Please specify cable length when ordering

