

Piezoelectric Charge Accelerometer Types 4381 and 4381-V

Uses

- General purpose vibration testing and analysis
- Low-level, low-frequency measurements
- Measurements in high-temperature environments

Features

- High sensitivity
- Low sensitivity to environmental factors

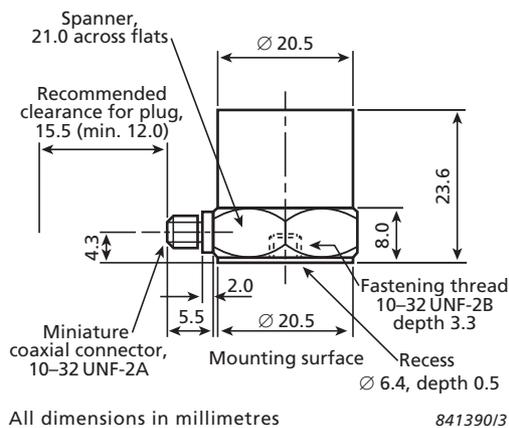


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Description

Type 4381 is a DeltaShear™ Unigain* accelerometer. It features a 10–32 UNF-2A side connector and a 10–32 UNF-2B threaded hole for mounting. Type 4381-V† has the same specifications and long term-stability as Type 4381, but it has a relaxed sensitivity tolerance.

Fig. 1 Dimensions of Type 4381



Characteristics

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

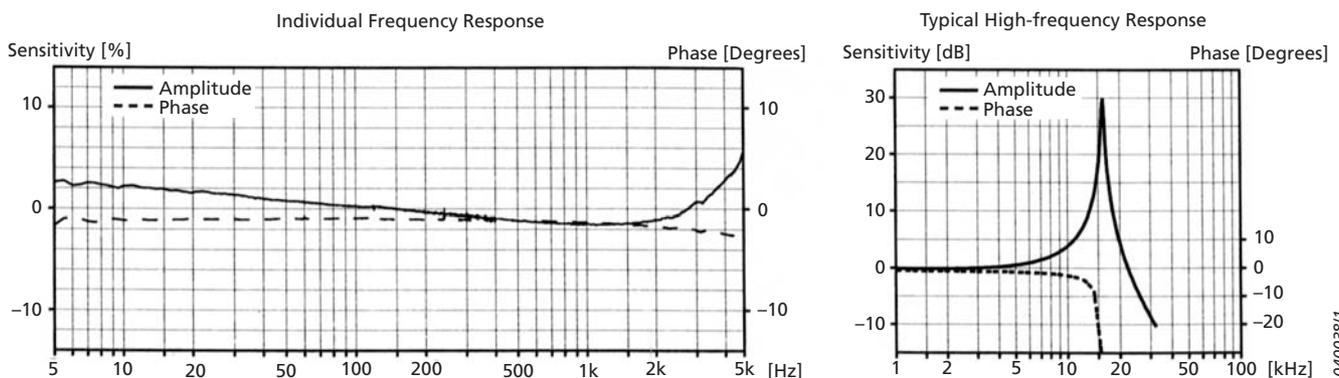
The DeltaShear design consists of three piezoelectric elements and three seismic masses arranged in a triangular configuration around a triangular centre post. They are held in place by a clamping ring that isolates the configuration from the base. The ring also prestresses the piezoelectric elements 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 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 Frequency response curves for Type 4381



* 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

Type No.	4381		4381-V	
General				
Weight (excluding cable, wherever applicable)	g	43		
	oz	1.52		
Charge Sensitivity (at 159.2 Hz)	pC/ms ⁻²	10 ± 2%	10 ± 15%	
	pC/g	98 ± 2%	98 ± 15%	
Frequency Range (±10% limit)	Hz	0.1 to 4800		
Mounted Resonance Frequency	kHz	16		
Max. Transverse Sensitivity (at 30 Hz, 100 ms ⁻²)	%	<4		
Transverse Resonance Frequency	kHz	5		
Max. Operational Continuous Sinusoidal Acceleration (peak)	kms ⁻²	20		
	g	2000		
Electrical				
Residual Noise Level (measured with NEXUS Type 2692-001 in the specified frequency range)	mms ⁻²	0.2		
	mg	0.02		
Capacitance (excluding cable)	pF	1100		
Min. Leakage Resistance (at 20 °C)	GΩ	20		
Environmental				
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 ⁻² /°C	0.04		
	g/°F	0.002		
Base Strain Sensitivity (at 250 µε in the base plane)	ms ⁻² /µε	0.003		
	g/µε	0.0003		
Magnetic Sensitivity (50 Hz, 0.038 T)	ms ⁻² /T	1		
	g/kG	0.01		
Max. Non-destructive Shock (± peak)	kms ⁻²	20		
	g	2000		
Mechanical				
Housing Material	Titanium ASTM Grade 2			
Piezoelectric Sensing Element	PZ 23			
Construction	DeltaShear			
Sealing	Welded			
Electrical Connector	10–32 UNF-2A			
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



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Type 4381

includes the following accessories:

- Carrying box
- Calibration chart
- AO-0038: Low-noise coaxial cable, 10–32 UNF, length 1.2 m
- 10–32 UNF threaded steel stud, length 12.7 mm

Type 4381-V

includes the following accessories:

- Carrying box
- Calibration chart
- 10–32 UNF threaded steel stud, length 12.7 mm

Optional Accessories	
AO-0038-x-yyy*	Low-noise coaxial cable, 10–32 UNF connectors, 250 °C (482 °F)
AO-0122-x-yyy*	Super low-noise cable, 10–32 UNF connectors, 250 °C (482 °F)
AO-0231-x-yyy*	Super low-noise cable, 10–32 UNF to TNC, 180 °C (356 °F)
AO-1382-x-yyy*	Flexible double-screened coaxial cable, 10–32 UNF connectors, 250 °C (482 °F)
DB-0544	Probe with round tip, 10–32 UNF
JJ-0207	Plug adaptor, 10–32 UNF to TNC (female)
JP-0162	Plug adaptor, 10–32 UNF to TNC (male)
QA-0013	Hexagonal key for 10–32 UNF studs
QA-0029	Tap for 10–32 UNF thread
UA-0078	Accelerometer accessory set
UA-0553	Mechanical filter (set of five)
UA-0642	Mounting magnet and two insulating discs
UA-0866	Cementing stud, 10–32 UNF, diameter 14 mm (set of 25)
YG-0150	Steel stud, double-ended with flange, 10–32 UNF, length 5.3 mm
YJ-0216	Beeswax for mounting
YP-0080	Probe with sharp tip, 10–32 UNF
YP-0150	Insulated stud, fully threaded, 10–32 UNF, length 13 mm
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
ACC-M-CTF	Traceable calibration

* x = D (decimetres) or M (metres)
 yyy = length in decimetres or metres
 Please specify cable length when ordering