PRODUCT DATA

Miniature DeltaTron Accelerometers — Types 4507 and 4508
Miniature Charge Accelerometers — Types 4507 C and 4508 C

Miniature DeltaTron® Accelerometers Types 4507 and 4508 consist of a ThetaShear® accelerometer and a DeltaTron preamplifier in a lightweight titanium housing with integrated 10–32 UNF connectors. Types 4507 C and 4508 C are similar to the DeltaTron accelerometers but come without the preamplifier.

USES

- Modal measurements for automotive body and power-train applications
- Multichannel modal analysis measurements
- Structural analysis measurements

FEATURES

- ID (TEDS) "Smart Transducer Interface" IEEE–P1451.4
- Robust titanium housing with integrated titanium connector
- Easily fitted to different test objects using a selection of mounting clips
- Low-weight ThetaShear design giving high sensitivity/weight ratio and very low sensitivity to environmental factors
- Triaxial mounting facility

DeltaTron Accelerometers

- Connect directly to DeltaTron power supply (ICP® compatible). The DeltaTron principle allows the use of inexpensive cables. Low output impedance so that long cables can be used
- Built in low-noise preamplifiers with ASICs give more than 100 dB dynamic range
- Choice of sensitivities from 10 mV/g to 1 V/g

Charge Accelerometers (4507 C and 4508 C)

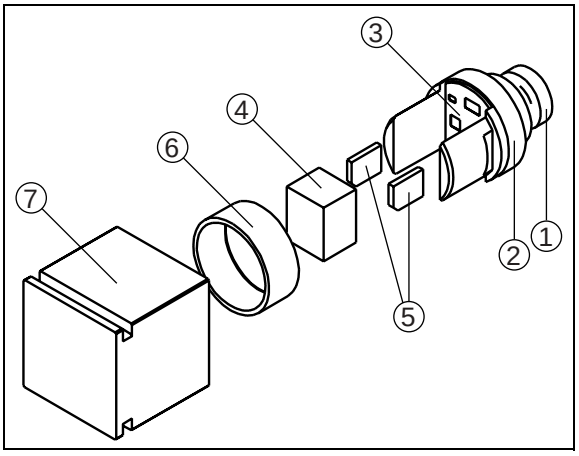
- Sensitivity 5 pC/g
- Operating temperature up to 250°C (482°F)

Description

Miniature DeltaTron Accelerometers Types 4507 and 4508 are specifically designed to withstand the rough environment of the automotive industry. A combination of high sensitivity, low mass and small physical dimensions make them ideal for modal measurements, such as automotive body and power-train measurements, as well as for modal analysis on aircraft, trains and satellites. The main difference between the two Types is the position of the coaxial connector which is on the top surface perpendicular to the main axis for Type 4508 (top-mounted connector), and on the side surface parallel to the main axis for Type 4507 (side-mounted connector).

Design

Fig. 1
Exploded view of Miniature DeltaTron Accelerometer Type 4508 (top mounted connector) showing the ThetaShear design and the built-in DeltaTron preamplifier



The 10–32 UNF connector ① is an integrated part of the top piece ② which also contains the preamplifier ③ (not 4507 C or 4508 C). The slotted cylindrical stanchion holds a central seismic mass ④ flanked by two piezoelectric disks ⑤. This assembly is clamped rigidly by a ring ⑥. The parts are firmly held together without the use of any bonding agent other than friction, a principle which has proved extremely reliable in Brüel & Kjær DeltaShear® accelerometers. This assembly is hermetically welded to the titanium housing ⑦.

Mounting

Special effort has been put into making mounting as flexible as possible. The accelerometer housing has slots that allow the use of mounting clips so that the accelerometers can be easily fitted to a number of different test objects, or removed, for example, for calibration. UA 1407, UA 1475 and UA 1478 are sets of one hundred plastic mounting clips. UA 1564 is a set of five high-temperature mounting clips.

Fig. 2
High-temperature Mounting Clip UA 1564

Specifications:

Temperature range:		–55° to +175°C (–67° to +347°F)
If discolouring can be accepted:		–55° to +250°C (–67° to +482°F)
Weight:		5.7 gram
Maximum acceleration (with a 5 gram accelerometer):		50 g peak
(Perpendicular to mounting surface):		250 g peak
Material:	Base – Anodized aluminium	Spring – Stainless spring steel

Fig. 3
Mounting Clip UA 1407

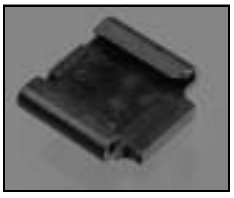


Fig. 4
Mounting Clip UA 1407 in use with Type 4508

Specifications:

Weight:	0.4 gram
Upper limiting frequency, 10%:	– Type 4507 mounted with grease: 3 kHz
	– Type 4507 dry mounting: 1.5 kHz
	– Type 4508 mounted with grease: 4 kHz
	– Type 4508 dry mounting: 2 kHz

Fig. 5
Mounting Clip with Thick Base UA 1475

Fig. 6
The Mounting Clip with Thick Base UA 1475 can be filed down to suit your mounting surface needs. Here it is mounted on a tube with Type 4508

Specifications:

Weight (before shaping): 0.7 gram
Upper limiting frequency, 10%:
– Type 4507 mounted with grease: 3 kHz
– Type 4507, dry mounting: 1.5 kHz
– Type 4508 mounted with grease: 4 kHz
– Type 4508, dry mounting: 2 kHz

Fig. 7
Swivel Base UA 1478

Fig. 8
Swivel Base UA 1478 mounted on a sloping surface with Type 4508

Specifications:

Weight: 0.8 gram
Upper limiting frequency, 10% (mounted with grease):
– Excited along the accelerometer's axis of sensitivity and with mounting surface of the hemispherical part perpendicular to the direction of excitation: 2.3 kHz
– Excited along the accelerometer's axis of sensitivity and with mounting surface of the hemispherical part at 45° to the direction of the excitation: 1.7 kHz

Common specifications for all plastic mounting clips:

Temperature range: −54° to +50°C (−65° to +122°F)
(For brief use, <1 hour): −54° to +80°C (−65° to +176°F)
Maximum acceleration: 10 g peak
(Perpendicular to mounting surface): 70 g peak
Material: Glass reinforced polycarbonate

Fig. 9
Spirit Level UA 1480

Fig. 10
Spirit Level UA 1480 in use on Swivel Base UA 1478

Specifications:

Max. dimensions: 85 × 23 × 17 mm (3.3 × 0.9 × 0.7 in.)
Material: Black anodized aluminium

The mounting clips are attached to the object with glue or double-sided adhesive tape. A mounting clip with a thick base (Fig. 5) is also available and can be filed down to suit the mounting surface. A mounting clip with a swivel base (Fig. 7) is a third option. This makes it easy to align the accelerometer in order to retain the coordinate system. Spirit Level UA 1480 (Fig. 9) is also available for this purpose. Finally, a high-temperature mounting clip is also available.

Environmental Sensitivity

Some of the most troublesome environmental factors encountered when using piezoelectric accelerometers are temperature transients. By careful choice of materials, mechanical design and the shear concept, this factor has been reduced to a minimum. Special effort has also been made to minimise interference from RF (Radio Frequency) electromagnetic fields.

High humidity is another environmental factor that can influence the accuracy of piezoelectric transducers. Careful design and manufacturing have reduced this effect to a minimum for the 4507 and 4508 families. Furthermore, some members of the families (see Specifications) are equipped with hermetically sealed (glass) connectors, that make them completely independent of humidity and aggressive gas.

Calibration

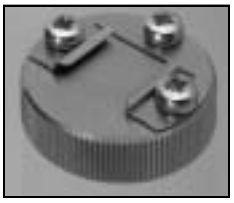
Each accelerometer is individually calibrated and supplied with a comprehensive calibration chart. Long-term stability and reliability are ensured by artificial ageing during the production process. Field checking and system calibration are straightforward using Brüel & Kjær's Hand-held Vibration Calibrator Type 4294.

Subsequent Calibration

Brüel & Kjær manufactures a range of equipment for frequency response, sensitivity and system calibrations. Details of these are available in separate Product Data Sheets.

For calibration of Types 4507/4508, Calibration Clip DV 0459 is available.

Fig. 11
Calibration Clip DV 0459



Specifications:
Material:
Base – Stainless steel (hardened)
Spring – Stainless steel spring
Mounting surface diameter: 21 mm
Mounting thread: 10 – 32 UNF
Weight: 17 gram

Fig. 12 *Example of the calibration chart supplied with the accelerometer*

Calibration Chart for DeltaTron® Accelerometer Type 4508 B

Brüel & Kjær

Serial No.: 2155373

Reference Sensitivity [1] at 159.2 Hz (ω = 1000 s^{-1}), 20 ms^{-2} RMS, 4 mA supply current and 24 °C: 10,14 mV/ms^{-2} (99,4 mV/g)

Frequency Range:	Amplitude (±10%):	0.3 Hz to 8 kHz
	Phase (± 5°):	2 Hz to 5 kHz
Mounted Resonance Frequency:		25 kHz
Transverse Sensitivity [2]: Maximum (at 30 Hz, 100 ms^{-2}):		< 5% re Reference Sensitivity
Transverse Resonance Frequency:		> 18 kHz
Calculated values for TEDS [3]:	Resonance frequency:	24,9 kHz
	Quality factor @ f_{res}:	300,7
	Amplitude slope:	-2,2 %/decade
	High pass cut-off frequency:	0,166 Hz
	Low pass cut-off frequency:	91,8 kHz
Measuring Range:		± 700 ms^{-2} peak (± 71 g peak)

Polarity of the electrical signal is positive for an acceleration in the direction of the arrow on the drawing.

Electrical:

Bias Voltage:	at full temperature and current range:	+ 13 V ± 1 V
Power Supply requirements:	Constant Current:	+ 2 to + 20 mA
	Unloaded Supply Voltage:	+ 24 V to + 30 V
Output Impedance:		< 30 Ω
Start-up time (to 90 % of bias):		5 s
Inherent Noise (RMS): Broadband (1 Hz to 8 kHz):		< 35 µV corresponding to < 0.0035 ms^{-2} (< 350 µg)
Spectral:	10 Hz:	1.5x10^{-4} ms^{-2}/√Hz (15 µg/√Hz)
	100 Hz:	3.5x10^{-5} ms^{-2}/√Hz (3.5 µg/√Hz)
	1000 Hz:	2x10^{-5} ms^{-2}/√Hz (2 µg/√Hz)

Ground Loops can introduce error signals. These can be avoided by insulating the accelerometer from the mounting surface (see Mounting Technique).

Recommended cables: AO 1382, AO 0531, AO 0463 and other cables see Product Data Sheet

Built-in ID-information according to IEEE P1451.4

Environmental:

Temperature Range:	- 54 to + 121 °C (- 65 to + 250°F)
Temperature Coefficient of Sensitivity:	+ 0.06%/°C
Temp. Transient Sensitivity (3 Hz Low. Lim. Frq. (-3 dB, 6 dB/oct)):	0.3 ms^{-2}/°C
Magnetic Sensitivity (50 Hz, 0.038 T):	3 ms^{-2}/T
Base Strain Sensitivity (at 250 µε in base plane): Mounted on adhesive tape 0.09 mm thick:	0.005 ms^{-2}/µε
Max. Non-destructive Shock:	50 kms^{-2} peak (5000 g peak)
Humidity:	90 % RH non-condensing

Mechanical:

Case Material:	Titanium ASTM Grade 2
Sensing Element:	Piezoelectric, Type PZ 23
Construction:	Theta Shear®
Sealing:	Welded
Weight:	4.8 gram (0.17 oz)
Electrical Connector:	10 - 32 UNF-2A
Mounting Surface Flatness:	< 3 µm

[1] This calibration is obtained on a modified Brüel & Kjær Calibration System Type 9610 System No.: 150127_1 and is traceable to the National Institute of Standards and Technology, USA and Physikalisch-Technische Bundesanstalt, Germany.
The expanded uncertainty is 1.0% determined in accordance with EAL-R2. A coverage factor k=2 is used. This corresponds to a coverage probability of 95% for a normal distribution.

[2] The uncertainty is 0.3% of Reference Sensitivity.

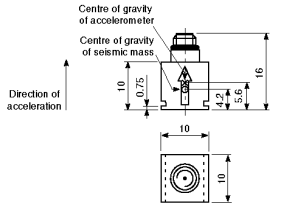
[3] Transducer Electronic Data Sheet according to IEEE P1451.4.

[4] Deviation from Reference Sensitivity.

Patents involved: US 08387851, JP 50952694 and DK 169653.

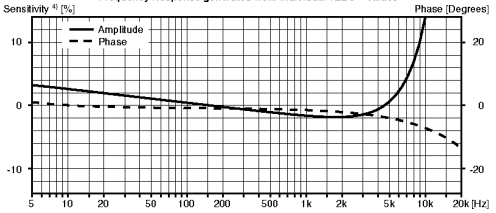
For further information, please see http://www.bk.dk and Product Data Sheet BP 1841.

Mounting Technique:
The accelerometer can be fastened directly to the measuring object by glue e.g., hot glue. However, if a reduced frequency range can be accepted, it is recommended to use one of the special mounting clips (see below) which is glued to the measuring object. In any case the mounting surface must be clean and smooth.
Three types of mounting clips are available: UA 1407 (set of 100) is a low profile clip recommended for mounting on plane surfaces. UA 1475 (set of 100) is a clip with a thick base which can be filed to fit a curved mounting surface. UA 1478 (set of 100) is a swivel base clip for use where the accelerometer is to be aligned according to a given co-ordinate system (see Product Data Sheet BP 1841).
Applying a little grease to the mounting surface of the accelerometer as well as the clip will improve the frequency response.
See also ISO 5348.

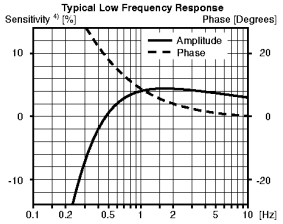


All dimensions in millimetres

Frequency Response generated from individual TEDS [3] values



Typical Low Frequency Response



Date 26 Mar 1999 Operator DN

Specifications obtained in accordance with ANSI S2.11-1969 and parts of ISO 5347.

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

BC 0297-12

Serial No.: 2155373

DeltaTron Accelerometers

DeltaTron is a generic name for accelerometers and signal-conditioning products from Brüel & Kjær. It identifies products that operate on a constant-current power supply and give output signals in the form of voltage modulation on the power supply line. One of the advantages of this system is that it allows you to use inexpensive cables.

Accelerometers Types 4507 and 4508 can be used with all vibration setups with Delta-Tron or ICP®* input modules.

The built-in, low-noise preamplifiers are made using thick film technology. They comprise ASICs including a special reference voltage that ensures very stable bias voltage over the entire operating temperature range.

The low output impedance means that you can connect long cables between the accelerometer and measurement equipment.

DeltaTron Power Supply

WB 1372 is a cost-effective and reliable single-channel, battery-operated power supply for DeltaTron accelerometers. The frequency range covers the full frequency range for the accelerometers and the transducer current is 3 mA ±20%. Both input and output have BNC connectors.

Charge Accelerometers

Accelerometers Types 4507 C and 4508 C can be used in high-temperature applications up to 250°C (482°F), and the use of an external conditioning amplifier allows variable amplification for optimum signal-to-noise ratio. NEXUS™ Charge Conditioning Amplifier Type 2692 and Measuring Amplifier Type 2525 are suitable for conditioning the signal. Alternatively, Charge to DeltaTron Converter Type 2647 (with TEDS, see below) enables the accelerometers to be used with DeltaTron power supplies.

Cables and Connectors

In order to distinguish the individual accelerometers in a multichannel measurement set-up, coloured cable markers (UA 1243) are available to fit both cable AC 0104 and the thicker cables AC 0005 and AC 0208.

Types 4507 and 4508 require cables with 10 – 32 UNF connectors. For general, non-critical use, standard Cables AO 0463 and AO 0531 are recommended (not for Type 4507 C or 4508 C) since they are very flexible and easy to install.

For Types 4507 C and 4508 C, low-noise or super low-noise cables are recommended: AO 0038, AO 0122, AO 0406 or AO 1382 (see Ordering Information for details).

* ICP is a registered trademark of PCB Piezotronics, Inc.

Maximum Cable Length (DeltaTron only)

The maximum output voltage of a DeltaTron accelerometer when driving long cables depends on the supply current at which it is operating, and on the capacitive load due to the connecting cable.

The maximum cable length in metres (for distortion ≤1%) is given by:

$$L = 140\,000 \times \frac{I_s - 1}{f \times V_o \times C_m}$$

where:
I_s = supply current (mA)
f = frequency (kHz)
V_o = output voltage (V_{peak})
C_m = cable capacitance (pF/m)

IEEE P1451.4 "A Smart Transducer Interface for Sensors and Actuators"

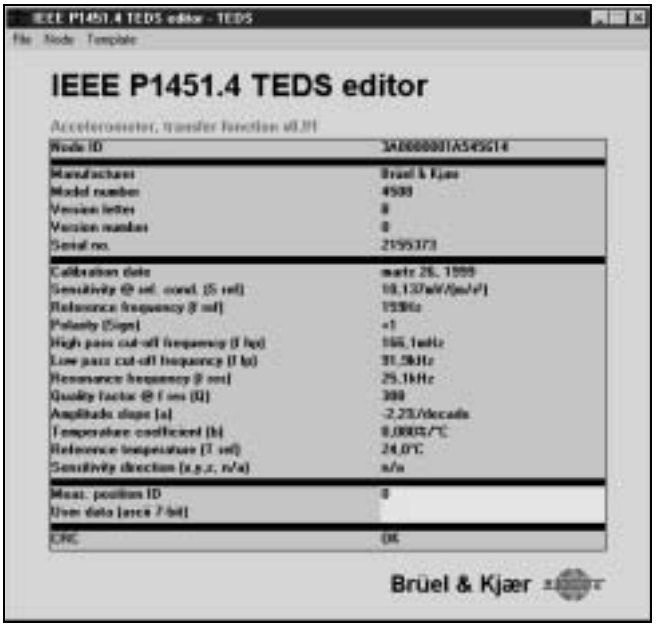


Fig. 13
Members of the Type 4507 and 4508 DeltaTron families that are distinguished by a B version letter include an EEPROM with TEDS. The figure shows a typical template for Type 4508 B

The IEEE P1451 Working Groups have been working on a uniform approach for connecting sensors and actuators to communication networks, control systems and measurement systems. IEEE P1451.4 proposes a mixed-mode smart transducer communication protocol based on existing analogue connections. It also specifies Transducer Electronic Data Sheet (TEDS) formats for interfacing analogue transducers with additional, smart features to legacy systems. The proposed interface is designed to be compatible with other P1451 network-capable transducer interfaces. The IEEE P1451.4 draft specification is subject to change until approval by the IEEE.

Frequency Response

The following information on frequency response is included on each accelerometer's accompanying calibration chart (Fig. 12). However, certain accelerometers have this information built in electronically (TEDS) as well.

The upper frequency limits given in the specifications are the frequencies where the deviation from the reference sensitivity is less than 10%. It is approximately 30% of the mounted resonance frequency. This assumes that the accelerometer is correctly mounted on the test structure – a poor mounting can have a marked effect on the mounted resonance frequency.

The lower frequency limits and phase response are determined by the built-in preamplifiers. The lower frequency limits are given in the specifications for deviations from reference sensitivity of less than 10%.

Increased measurement accuracy can be achieved by dividing the actual measurement by the individual frequency response.

Frequency response curves generated from the individual TEDS values are given on the calibration chart for the major part of the frequency range. At low frequencies, the curves given are typical (Fig. 12).

The calibration chart also includes these individual TEDS values that, together with a general formula, best fit the measured frequency response. The expression can be used for frequency response compensation in the specified frequency range. The relative frequency response, including amplitude and phase, is:

$$S_{rel}(f, T) = (Sign) \times (1 + b(T - T_{ref})) \times \frac{j\frac{f}{f_{hp}}}{\left(1 + j\frac{f}{f_{hp}}\right)} \times \frac{1}{\left(1 + j\frac{f}{f_{lp}}\right)} \times \frac{1}{\left(1 + \left(j\frac{f}{f_{res}}\right)^2 + j\frac{f}{Qf_{res}}\right)} \times \left(j\frac{f}{f_{ref}}\right)^{\frac{a}{\ln 10}}$$

$Sign$ = Polarity	b = Temperature Coefficient
T = Temperature	T_{ref} = Reference Temperature
f = Frequency	f_{hp} = High-pass Cut-off Frequency
f_{lp} = Low-pass Cut-off Frequency	f_{res} = Resonance Frequency
f_{ref} = Reference Frequency	Q = Quality Factor
a = Amplitude Slope/Decade	

Combining this equation with the amplitude sensitivity S_{ref} and f_{ref} and T_{ref} we have:

$$S(f, T) = S_{ref} \times \frac{S_{rel}(f, T)}{\left|S_{rel}(f_{ref}, T_{ref})\right|}$$

Implementation of this formula in either real-time data acquisition systems or in post-processing will support an automatic update of amplitude and/or phase.

Triaxial Measurements

Types 4507 B 004, B 005, B 006 and 4507 C are equipped with three sets of mounting slots. These make it possible to perform triaxial measurements by successively mounting the accelerometer in three directions perpendicular to each other. This is easily done when the accelerometer is mounted in one of the mounting clips. However, it implies that the measurements take place on a non-variant system.

Fig. 14
Example of a triaxial measurement performed by rotating Type 4507 B 004 in the mounting clip

Applications

The innovative and time-saving features of Types 4507 and 4508 make them ideal for modal analysis on aircraft, trains and satellites. These applications often involve large, composite structures that require multiple measurement points. Types 4507 and 4508 excel in such situations, providing ease of handling, fast calibration and reliability. With a rugged construction, Types 4507 and 4508 can also be used in a wide range of measurement environments. They also have low sensitivity to temperature transients, which is advantageous when it comes to making measurements at low frequencies.

Special Types

Fig. 15
Examples of special types – accelerometer with hexagonal housing with integrated stud and accelerometer with 10–32 UNF integrated thread

Types 4507/8 can be made from different materials and with different housings (see Fig. 15).

Compliance with Standards

CE, C-Tick	CE-mark indicates compliance with: EMC Directive and Low Voltage Directive. C-Tick mark indicates compliance with the EMC requirements of Australia and New Zealand
Safety	EN 61010–1 and IEC 61010–1: Safety requirements for electrical equipment for measurement, control and laboratory use. UL 3111–1: Standard for Safety – Electrical measuring and test equipment
EMC Emission	EN 50081–1: Generic emission standard. Part 1: Residential, commercial and light industry. EN 50081–2: Generic emission standard. Part 2: Industrial environment. CISPR 22: Radio disturbance characteristics of information technology equipment. Class B Limits. FCC Rules, Part 15: Complies with the limits for a Class B digital device.
EMC Immunity	EN 50082–1: Generic immunity standard. Part 1: Residential, commercial and light industry. EN 50082–2: Generic immunity standard. Part 2: Industrial environment. **Note 1:** The above is guaranteed using Cable AO 1382 only. **Note 2:** Sensitivity to RF (in accordance with EN 50082 – 2) 4507, 4507 B, 4507 B 003, 4507 B 004, 4508, 4508 B and 4508 B 003: <60µV 4507 001, 4507 B 001, 4508 001 and 4508 B 001: <10µV 4507 002, 4507 B 002, 4507 B 005, 4507 B 006, 4508 002, 4508 B 002 and 4508 B 004: <100µV
Temperature	IEC 68–2–1 & IEC 68–2–2: Environmental Testing. Cold and Dry Heat. Operating Temperature: 4507, 4507 001, 4507 B, 4507 B 001, 4507 B 003, 4507 B 004, 4508, 4508 001, 4508 B, 4508 B 001, and 4508 B 003: –54° to +121°C (–65° to +250°F) 4507 002, 4507 B 002, 4507 B 005, 4507 B 006, 4508 002, 4508 B 002, and 4508 B 004: –54° to +100°C (–65° to +212°F) 4507 C, 4508 C: –74° to +250°C (–101° to +482°F)

Specifications – Miniature DeltaTron Accelerometers Types 4507

	Sensitivity	Sensitivity Tolerance	Measuring Range	Frequency Range, 10%	Phase Response, ± 5°	Built-in ID (TEDS)	Output Impedance	Bias Voltage	Start-up Time (± 10% of final bias)	Inherent Noise (broadband)/ Equivalent Vibration Level		Temperature Coefficient of Sensitivity	Sensing Element	Sealing	Humidity	Mounting Slots (pairs)
Units	mV/ms^{-2}	%	ms^{-2}	Hz	Hz		Ω	V	s	µV	µg	%/°C			%	
4507	10	±5	700	0.3–6 k	2–5k	No	<2	12 ± 1	5	<35	<350	0.09	PZ23	Welded	90	1
4507–001	1	±5	7000	0.1–6 k	0.5–5k	No	<2	12 ± 1	50	<8	<800	0.09	PZ23	Welded	90	1
4507–002	100	±10	70	0.4–6 k	2–5k	No	<2	12 ± 2	5	<150	<150	0.18	PZ27	Hermetic	100	1
4507 B	10	±5	700	0.3–6 k	2–5k	Yes	<30	13 ± 1	5	<35	<350	0.09	PZ23	Welded	90	1
4507 B 001	1	±5	7000	0.1–6 k	0.5–5k	Yes	<30	13 ± 1	50	<8	<800	0.09	PZ23	Welded	90	1
4507 B 002	100	±10	70	0.4–6 k	2–5k	Yes	<30	13 ± 2	5	<150	<150	0.18	PZ27	Hermetic	100	1
4507 B 003	10	±5	700	0.3–6 k	2–5k	Yes	<30	13 ± 1	5	<35	<350	0.09	PZ23	Welded	90	None
4507 B 004	10	±5	700	0.3–6 k	2–5k	Yes	<30	13 ± 1	5	<35	<350	0.09	PZ23	Welded	90	3
4507 B 005	100	±10	70	0.4–6 k	2–5k	Yes	<30	13 ± 2	5	<150	<150	0.18	PZ27	Hermetic	100	3
4507 B 006	50	±5	140	0.2–6 k	1–5k	Yes	<30	13 ± 2	10	<80	<160	0.18	PZ27	Hermetic	100	3

Specifications – Miniature DeltaTron Accelerometers Types 4508

	Sensitivity	Sensitivity Tolerance	Measuring Range	Frequency Range, ± 10%	Phase Response, ± 5°	Built-in ID (TEDS)	Output Impedance	Bias Voltage	Start-up Time (±10% of final bias)	Inherent Noise (broadband)/ Equivalent Vibration Level		Temperature Coefficient of Sensitivity	Sensing Element	Sealing	Humidity	Mounting Slots (pairs)
Units	mV/ms^{-2}	%	ms^{-2}	Hz	Hz		Ω	V	s	µV	µg	%/°C			%	
4508	10	±5	700	0.3 – 8 k	2 – 5 k	No	<2	12 ± 1	5	<35	<350	0.06	PZ23	Welded	90	1
4508 – 001	1	±5	7000	0.1 – 8 k	0.5 – 5 k	No	<2	12 ± 1	50	<8	<800	0.06	PZ23	Welded	90	1
4508 – 002	100	±10	70	0.4 – 8 k	2 – 5 k	No	<2	12 ± 2	5	<150	<150	0.12	PZ27	Hermetic	100	1
4508 B	10	±5	700	0.3 – 8 k	2 – 5 k	Yes	<30	13 ± 1	5	<35	<350	0.06	PZ23	Welded	90	1
4508 B 001	1	±5	7000	0.1 – 8 k	0.5 – 5 k	Yes	<30	13 ± 1	50	<8	<800	0.06	PZ23	Welded	90	1
4508 B 002	100	±10	70	0.4 – 8 k	2 – 5 k	Yes	<30	13 ± 2	5	<150	<150	0.12	PZ27	Hermetic	100	1
4508 B 003	10	±5	700	0.3 – 8 k	2 – 5 k	Yes	<30	13 ± 1	5	<35	<350	0.06	PZ23	Welded	90	None
4508 B 004	50	±5	140	0.2 – 8 k	1 – 5 k	Yes	<30	13 ± 2	10	<80	<160	0.12	PZ27	Hermetic	100	1

Specifications – Miniature Charge Accelerometers Types 4507 C, 4508 C

	Charge Sensitivity	Sensitivity Tolerance	Measuring Range	Frequency Range, +10%*	Mounted Resonance Frequency	Transverse Sensitivity	Transverse Resonance	Min. Leakage Resistance at 20°C	Capacitance	Sensing Element	Base Strain Sensitivity (In base plane at 250 µε)	Temperature Transient Sensitivity (3 Hz LLF, 20dB/decade)	Magnetic Sensitivity (50 Hz – 0.03 T)	Ambient Temperature range	Max. Operational Shock (±Peak)	Max. Operational Continuous sinusoidal acceleration (Peak)	Sealing	Humidity	Mounting Slots (pairs)	Weight
Units	pC/ms^{-2}	%		Hz	kHz	%	kHz	GΩ	pF		$ms^{-2}/µε$	$ms^{-2}/°C$	ms^{-2}/T	°C	kms^{-2}	kms^{-2}		%		grams
4507 C	0.45	±15	2 mms^{-2} to 20 kms^{-2}	0.1 to 6 k	18	<5	18	20	360	PZ23	0.005	0.2	1	–74 to 250	50	20	Welded	90	3	4.5
4508 C	0.45	±15	2 mms^{-2} to 20 kms^{-2}	0.1 to 8 k	25	<5	18	20	360	PZ23	0.005	0.6	1	–74 to 250	50	20	Welded	90	1	4.5

* Using NEXUS Conditioning Amplifier Type 2692

Common Specifications 4507 and 4508 (DeltaTron only)

Dynamic

Mounted Resonance Frequency:
4507: 18 kHz
4508: 25 kHz
Transverse Sensitivity: <5% of sensitivity

Electrical

Constant Current Supply: 2 to 20 mA
Supply Voltage (unloaded):
+24 to +30 V DC (for full specification range)
Min. +18 V DC (reduced measuring range)
Polarity: Positive (for an acceleration in the direction of the engraved arrows)

Environmental

Max. Non-destructive Shock (±Peak): 50 kms^{-2}; 5000 g
Temp. Transient Sensitivity (3 Hz lower limiting frequency):
4507: 0.2 ms^{-2}/°C
4508: 0.3 ms^{-2}/°C
Base Strain Sensitivity (mounted on adhesive tape 0.09 mm thick): 0.005 ms^{-2}/με
Magnetic Sensitivity: 3 ms^{-2}/T
Temperature Range:
4507, 4507 001, 4507 B, 4507 B 001, 4507 B 003, 4507 B 004, 4508, 4508 001, 4508 B, 4508 B 001, and 4508 B 003:
–54° to +121°C (–65° to +250°F)
4507 002, 4507 B 002, 4507 B 005, 4507 B 006, 4508 002, 4508 B 002, and 4508 B 004:
–54° to +100°C (–65° to +212°F)

Physical

Case Material: Titanium
Sensing Element: Piezoelectric
Design Configuration: ThetaShear
Connector: 10–32 UNF coaxial
Dimensions (H×W×L): 10×10×10 mm (0.4″), excl. connector
Weight: 4.8 gram (0.17 oz.)

Note: All values are typical at 25°C (77°F), unless measurement uncertainty is specified. All uncertainty values are specified at 2σ (i.e., expanded uncertainty using a coverage factor of 2)

Ordering Information

Types 4507/4508 Miniature DeltaTron Accelerometers
Types 4507 C/4508 C Miniature Charge Accelerometers
Include the following accessories:
Carrying Box
Individual Calibration Chart
One Mounting Clip (not 4507 B 003 or 4508 B 003)

Optional Accessories

AO 0531	Cable AC 0208 with 10–32 UNF to BNC connectors, 5 m (16.4 ft) –5 to 70°C (23 to 158°F)
AO 0463	Cable AC 0208 with 10–32 UNF connectors, 1.2 m (4 ft) –5 to 70°C (23 to 158°F)
AO 0038	Super low-noise Teflon cable, AC 0005 with 10–32 UNF connectors, 1.2 m (4 ft), 250°C (482°F)
AO 0122	Reinforced super low-noise cable, AC 0200 with 10–32 UNF connectors, 3 m (10 ft), 250°C (482°F)
AO 0406	Double-screened low-noise cable AC 0104 with 10–32 UNF connectors, 5 m (16 ft), 250°C (482°F). Includes adaptor JP 0145
AO 1419	Low-noise cable AC 0066 with 10–32 UNF connectors, 1.2 m (4 ft), 250°C (482°F)
AO 1382	Low-noise, double-screened Teflon cable AC 0104 with 10–32 UNF connectors, 1.2 m (4 ft), 200°C (392°F)

Cables AO 0038, AO 0122, AO 0406 and AO 1382 are recommended for use with Miniature Charge Accelerometers Types 4507 C and 4508 C

Cables AO 0038, AO 0122, AO 0463 and AO 1382 are available in other lengths with 10–32 UNF connectors. The following suffixes to the type numbers are used to specify the length when ordering:

F:	3 m (10 ft) (except AO 0122)
G:	5 m (16 ft)
H:	10 m (33 ft)
K:	30 m (100 ft)

Customer specified lengths:
AO 0038V–AC 0005–x
AO 0122V–AC 0200–x
AO 0463V–AC 0208–x
AO 1382V–AC 0104–x
Where “x” specifies the length in metres

UA 1243	3×30 pieces of red/green/yellow cable markers for Cable AC 0104
UA 1244	As above, for Cable AC 0005 and AC 0208
YJ 0216	Mounting Wax
QS 0007	Cyanoacrylate Adhesive
WB 1372	DeltaTron Power Supply
UA 1407	Set of 100 Mounting Clips
DV 0459	Calibration Clip
UA 1418	Set of 25 dummy accelerometers for mass loading
UA 1478	Set of 100 swivel bases
UA 1475	Set of 100 mounting clips with thick base
UA 1564	Set of 5 high-temperature mounting clips
JP 0192	Solder connector adaptor
4507–CFF	Re-calibration (sensitivity)
4508–CFF	Re-calibration (sensitivity)

00/10
BP 1841–13

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