Triaxial CCLD Accelerometer Types 4529-B and 4529-B-001

The family of Triaxial CCLD Accelerometer Type 4529 replaces the extremely popular Type 4506 family, using the same flexible mounting accessories to save set-up time and ensure accurate local coordination. Due to their high dynamic range, the accelerometers cover a wide range of applications, including on-road and modal testing.*

Uses and Features

Uses

- Multi-purpose test applications due to a high dynamic range
- Multi-channel modal and structural analysis measurements
- On-road test

Features

- Five mounting surfaces
- Single axis supply makes single- or bi-axial measurements possible to save channels
- Easily fitted to different test objects using a selection of mounting clips
- Hermetically sealed
- Electrically insulated for ground loop protection
- Robust titanium housing with integrated titanium 4-pin connector
- Transducer Electronic Data Sheet (TEDS) saves test set-up time

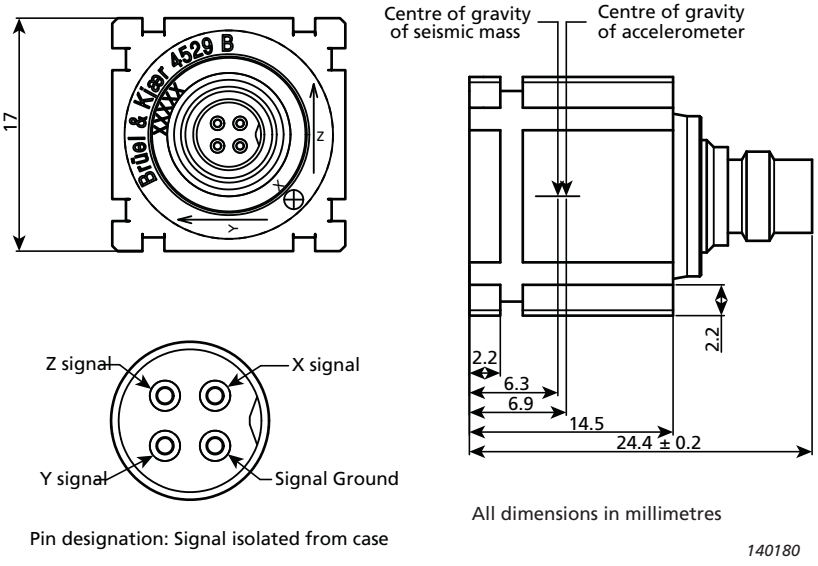
* CCLD: Constant current line drive, also known as DeltaTron (IEPE compatible)

Mounting

Fig. 1
Cable can be fastened in the mounting clip

To make mounting as flexible as possible, the accelerometer housing has slots to be used in combination with a selection of mounting clips. The clips are attached to the test object with glue or double-sided, adhesive tape. This design allows the accelerometer to be easily fitted to and removed from a number of different objects, for example, during calibration. Fig. 2 shows the slots, connector orientation and dimensions of Type 4529.

Fig. 2
Diagram of Type 4529 showing connector orientation and dimensions



Mounting Clips

For curved surfaces, there is a mounting clip with a thick base that can be filed down (Fig. 4) to fit. When building a coordinate system for test measurements, the swivel base mounting clip (Fig. 5) and Spirit Level (Fig. 6) allow easy alignment of the accelerometer.

Common Specifications for all 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. 3
Mounting Clip UA-1408 (set of 100)
Specifications:
Weight: 2.1 grams
Upper limiting frequency, 10% (mounted with grease): 3 kHz

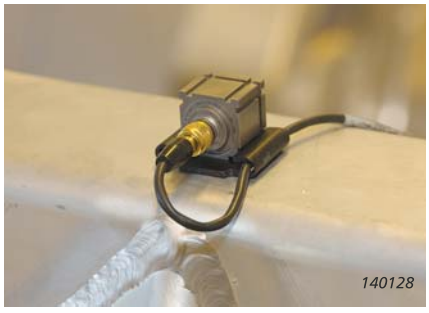


Fig. 4
Mounting Clip with Thick Base UA-1474 (set of 100). This can be filed down to suit the mounting surface (see picture, far right)
Specifications:
Weight: 3.9 grams
Upper limiting frequency, 10% (mounted with grease): 3 kHz

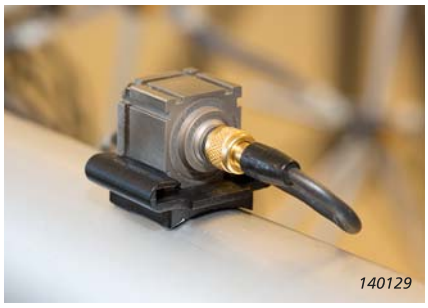


Fig. 5
Swivel Base UA-1473 (set of 100)
Specifications:
Weight: 5.0 grams
Upper limiting frequency, 10% (mounted with grease):
– excited along one of the accelerometer's axes of sensitivity with base of the mounting clip at a 45° angle to the direction of the excitation: 1.3 kHz

Fig. 6
Spirit Level UA-1480
Specifications:
Max. dimensions: 85 × 23 × 17 mm
Material: Black, anodised aluminium

Clip for High-temperature Conditions

A high-temperature mounting clip is available (Fig. 7) for testing in environments that exceed 50 °C (122 °F).

Fig. 7
High-temperature Mounting Clip UA-1563 (set of 5)
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: 11 grams
Maximum acceleration (with a 17 gram accelerator): 10 g peak
(Perpendicular to mounting surface: 50 g peak)
Material:
Base: Anodized aluminium;
Spring: Stainless spring steel
Upper limiting frequency, 10%
No impact on the specifications

Calibration

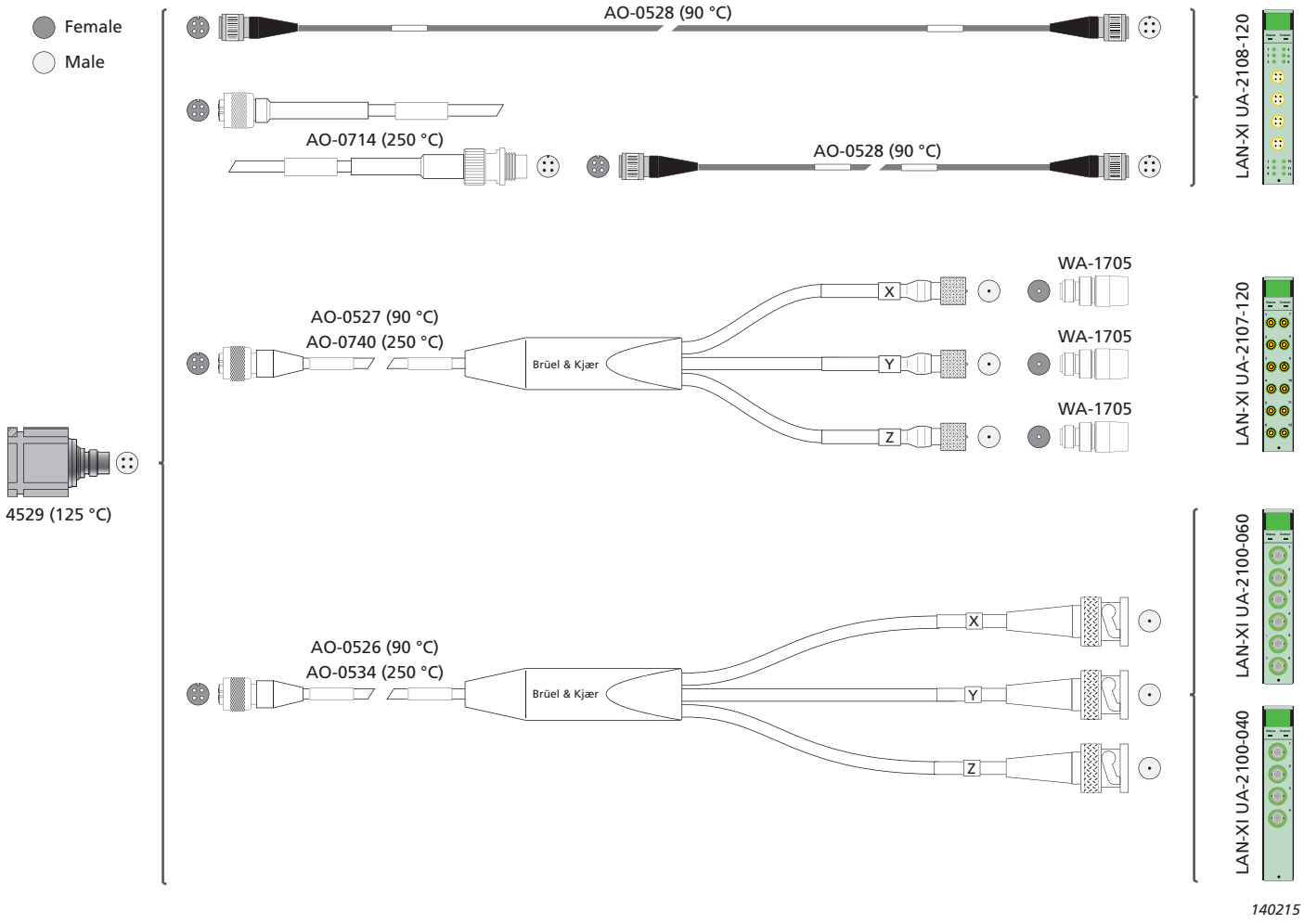
Fig. 8
Calibration Clip DV-0460
Specifications:
Mounting-surface diameter: 29 mm
Mounting thread: 10–32 UNF
Weight: 44 grams
Material:
Base: Stainless steel (hardened);
Spring: Stainless steel spring

Each accelerometer is individually calibrated and comes with a comprehensive calibration chart. Artificial ageing during the production process ensures long-term stability and reliability. Field checking and system calibration is straightforward using hand-held Vibration Calibrator Type 4294.

Cables and Connectors

Triaxial Accelerometer Type 4529 requires a cable with a 4-pin Microtech connector. Brüel & Kjær can supply cables with connector configurations of two 4-pin Microtech connectors, 4-pin Microtech to 3 × BNC connectors and 4-pin Microtech to 3 × 10–32 UNF connectors for a range of temperatures. For powering two accelerometers from a D-range subconnector, cable AO-0536 is available.

Fig. 9 *Cable configuration chart for Type 4529*



Maximum Cable Length

The maximum output voltage of a CCLD accelerometer when driving long cables depends on the supply current at which it is operating, the frequency, and on the capacitance of the connecting cable.

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

$$L = 140000 \times \frac{I_s - 1}{f \times V_o \times C_m}$$

where:

I_s = supply current (mA)
f = highest frequency to be measured (kHz)
V_o = output voltage (V_{peak})
C_m = cable capacitance (pF/m)

Brüel & Kjær's Triaxial CCLD Accelerometer Family

Types 4529-B and 4529-B-001 are part of a larger family of triaxial CCLD accelerometers. From dedicated modal testing to high-temperature applications, Brüel & Kjær has an accelerometer to meet your needs.

If you need to test at temperatures higher than 180 °C, we recommend Brüel & Kjær´s family of triaxial charge accelerometers. See our website at www.bksv.com for the full range of accelerometers to match your requirements.

Table 1 *Overview of Brüel & Kjær's family of triaxial CCLD accelerometers. (More variants can be found on www.bksv.com)*

	4524-B-001	4520	4535-B	4528-B	4527	4529-B
Application	Modal test	General purpose	General purpose	High-temperature, general purpose	High-temperature, general purpose	General purpose
Temperature (°C)	−54 to +100	−51 to +121	−60 to +125	−60 to +165	−60 to +180	−60 to +125
Weight (grams)	4.4	2.9	6	6	6	14.5
TEDS	Yes	No	Yes	Yes*	No	Yes
Isolation	Yes by design	Yes with insulated adaptor	Yes with insulated adaptor	Yes with insulated adaptor	Yes with insulated adaptor	Yes by design
Frequency Range (Hz)	**X**: 0.2 to 5.5k **Y:** 0.25 to 3k **Z:** 0.25 to 3k	**X:** 2 to 7k **Y:** 2 to 7k **Z:** 2 to 7k	**X:** 0.3 to 10k **Y:** 0.3 to 10k **Z:** 0.3 to 12.8k	**X:** 0.3 to 10k **Y:** 0.3 to 10k **Z:** 0.3 to 12.8k	**X:** 0.3 to 10k **Y:** 0.3 to 10k **Z:** 0.3 to 12.8k	**X:** 0.3 to 12.8k **Y:** 0.3 to 6k **Z:** 0.3 to 6k
Mounting	Clip or adhesive	Adhesive	M3, clip or adhesive	M3, clip or adhesive	M3, clip or adhesive	Clip or adhesive
Sensitivity (mV/ms^{-2})	1	1	1	1	1	10
Noise Floor (mm/s^{-2})	50	70	9	9	9	3

* The TEDS data retention can work up to 165 °C. High-temperature usage can reduce the lifetime of the TEDS chip. This does not have any impact on the specifications of the accelerometer. TEDS is only recommended to be used during the measurement setup phase

Specifications – Types 4529-B and 4529-B-001

General			4529-B	4529-B-001
Voltage Sensitivity (at 159.2 Hz and 4 mA supply current)		mV/ms^{-2} (mV/g)	10 ±10% (98 ±10%)	1 ±10% (9.8 ±10%)
Frequency Range	Amplitude (±10%)	Hz	X: 0.3 to 12800	X: 0.3 to 12800
		Hz	Y: 0.3 to 6000	Y: 0.3 to 6000
		Hz	Z: 0.3 to 6000	Z: 0.3 to 6000
	Phase (±5°)	Hz	X: 2 to 5000	X: 2 to 5000
		Hz	Y: 2 to 5000	Y: 2 to 5000
		Hz	Z: 2 to 5000	Z: 2 to 5000
Mounted Resonance Frequency		kHz	X: 39	X: 39
		kHz	Y: 19	Y: 19
		kHz	Z: 19	Z: 19
Max. Transverse Sensitivity (at 30 Hz, 100 ms^{-2})		%	<5	<5
Measuring range (±peak)		ms^{-2} (g)	700 (71)	7000 (710)
Electrical				
Bias Voltage	At full temperature and current range	V_{DC}	+13 ±1	+13 ±1
Power Supply	Constant current	mA	2 to 20	2 to 20
	Unloaded supply voltage	V_{DC}	+22 to +30	+22 to +30
Output Impedance		Ω	<50	<50
Start-up time (to final bias ±10%)		s	<10	<10
Broadband Noise (RMS)	0.3 – 10000 Hz	µV (µg)	X, Y, Z: 60 (600)	X, Y, Z: 90 (900)
	1 – 10000 Hz		X, Y, Z: 30 (300)	X, Y, Z: 50 (500)
	2 – 10000 Hz		X, Y, Z: 20 (200)	X, Y, Z: 40 (400)
Noise Spectral	10 Hz	$mms^{-2}/\sqrt{Hz}$ (µg/√Hz)	X, Y, Z: 0.2 (20)	X, Y, Z: 0.3 (30)
	100 Hz		X, Y, Z: 0.04 (4)	X, Y, Z: 0.06 (6)
	1000 Hz		X, Y, Z: 0.02 (2)	X, Y, Z: 0.04 (4)
Insulation Resistance (signal ground to case)		GΩ	>1	
Environmental				
Operating Temperature Range		°C (°F)	–60 to +125 (–76 to +257)	
Temperature Coefficient of Sensitivity		%/°C	+0.1	+0.1
Temperature Transient Sensitivity (3 Hz Low.Lim.Frq. (–3 dB, 6 dB/oct))		ms^{-2}/°C (g/°F)	0.32 (0.0176)	0.32 (0.0176)
Magnetic Sensitivity (50 Hz, 0.038 T)		ms^{-2}/T (g/kGauss)	8 (0.08)	15 (0.15)
Base Strain Sensitivity (at 250 µε in base plane)		ms^{-2}/µε (g/µε)	0.0014 (0.00014)	0.0014 (0.00014)
Humidity			100% RH	
Max. Non-destructive Shock (peak)		kms^{-2} (g)	50 (5100)	50 (5100)

Mechanical			
Case Material		Titanium ASTM Grade 5	
Piezoelectric Sensing Element		Piezoelectric, PZ23	Piezoelectric, PZ23
Construction		Shear	
Sealing		Hermetic	
Weight	gram (oz)	14.5 (0.51)	14.5 (0.51)
Electrical Connector		4-pin receptacle, ¼"–28 UNF (titanium)	
Mounting		1 x 1.6 mm slots for clip mounting on five sides	

All values are typical at 25 °C unless measurement uncertainty is specified.

Compliance with Standards

	The CE marking is the manufacturer's declaration that the product meets the requirements of the applicable EU directives RCM mark indicates compliance with applicable ACMA technical standards – that is, for telecommunications, radio communications, EMC and EME China RoHS mark indicates compliance with administrative measures on the control of pollution caused by electronic information products according to the Ministry of Information Industries of the People's Republic of China WEEE mark indicates compliance with the EU WEEE Directive
Safety	EN/IEC 61010–1: Safety requirements for electrical equipment for measurement, control and laboratory use. ANSI/UL 61010–1: Safety requirements for electrical equipment for measurement, control and laboratory use.
EMC Emission	EN/IEC 61000–6–3: Generic emission standard for residential, commercial and light industrial environments. EN/IEC 61000–6–4: Generic emission standard for industrial environments. CISPR 22: Radio disturbance characteristics of information technology equipment. Class B Limits. EN/IEC 61326: Electrical equipment for measurement, control and laboratory use – EMC emission requirements.
EMC Immunity	EN/IEC 61000–6–1: Generic standards – Immunity for residential, commercial and light industrial environments. EN/IEC 61000–6–2: Generic standards – Immunity for industrial environments. EN/IEC 61326: Electrical equipment for measurement, control and laboratory use – EMC immunity requirements. **Note 1:** The above is only guaranteed using accessories listed in this Product Data. **Note 2:** Sensitivity to RF (in accordance with EN 50082–2) <50 µV.
Temperature	IEC 60068–2–1 & IEC 60068–2–2: Environmental Testing. Cold and Dry Heat.

Ordering Information

Types 4529-B and 4529-B-001 Triaxial CCLD Accelerometers include the following accessories:

- Carrying Box
- Individual Calibration Chart
- One Mounting Clip

Optional Accessories

YJ-0216	Mounting Wax
WB-1453	CCLD Power Supply
UA-1408	Set of 100 Mounting Clips
UA-1473	Set of 100 Swivel Base Clips
UA-1480	Spirit Level for Swivel Base
UA-1474	Set of 100 Mounting Clips with thick base
DV-0460	Calibration Clip
UA-1563	Set of 5 High-temperature Mounting Clips
UA-1417	Set of 25 Dummy Accelerometers for mass loading
WA-1705	10–32 UNF to SMB adaptor
UA-2108-060	LAN-XI Front Panel, Triaxial Accelerometer (6 ch.)
UA-2108-120	LAN-XI Front Panel, Triaxial Accelerometer (12 ch.)

CABLES*

AO-0526-x-yyy	Cable with 4-pin Microtech to 3 × BNC connectors, 90 °C (194 °F)
AO-0527-x-yyy	Cable with 4-pin Microtech to 3 × 10–32 UNF connectors, 90 °C (194 °F)
AO-0528-x-yyy	Cable with 4-pin Microtech to 4-pin Microtech connectors, 90 °C (194 °F)
AO-0534-x-yyy	Cable with 4-pin Microtech to 3 × BNC connectors, 125 °C (257 °F)
AO-0740-x-yyy	Cable with 4-pin Microtech to 3 × 10–32 UNF connectors, 125 °C (257 °F)
AO-0714-x-yyy	Cable with 4-pin Microtech to 4-pin Microtech connectors, 250 °C (482 °F)
AO-0536-x-yyy	Cable with 37-pin D-range subconnector to 2 × 4-pin Microtech, 10 m (33 ft) 90 °C (194 °F)

CALIBRATION

4529-CAF	Accredited Calibration
4529-CAI	Accredited Initial Calibration
4529-CFF	Factory Standard Calibration with Calibration Chart
4529-CTF	Traceable Calibration

* x = D (decimetres) or M (metres)
yyy = length in decimetres or metres
for example, AO-0526-D-050 is 50 decimetres long

BP 2517 – 11 2014-07

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