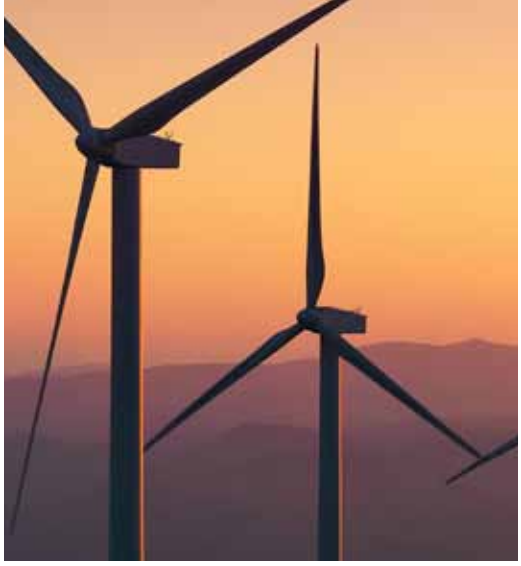
TECHNICAL REFERENCE GUIDE

KVALITEST
INDUSTRIAL

DJB Instruments
SENSING ENGINEERING INNOVATION


Introduction

DJB Instruments (UK) Ltd has been manufacturing accelerometers, cables, instrumentation and accessories for over 40 years. Originally established as DJ Birchall Ltd in 1974, it changed name in 2010 after the death of the company's founder, Don Birchall.

DJB is proud to uphold the traditions of quality British manufacturing that has been admired for so long around the world and remains the UK's only test and measurement accelerometer manufacturer.

Don Birchall's innovation in sensor design is continued by the company today through collaborations with world leading universities in areas of research including wireless sensors and ultra-high temperature PE ceramics. With numerous unique products already available, including water-cooled technology for vibration measurements at 900°C, DJB has a great foundation and history to support the next evolution in its global expansion.

Decide on DJB!!

When choosing a DJB product you are selecting excellence in design, engineering and manufacturing, backed up by a technical and customer support team with extensive applications experience to ensure you get the advice you need from enquiry to application and beyond.

Home of the Konic Shear® Accelerometer

Don Birchall introduced and patented the Konic Shear® design back in the 1970's and it remains at the heart of the DJB product range today. Offering improved performance and reduced cross axis error, the Konic Shear® accelerometer remains at the pinnacle of accelerometer design.

Knowledge & Training

In almost all engineering and research applications the quality and accuracy of data used for analysis is heavily dependent on the selection and correct installation of the relevant sensor. This is certainly the case in all forms of vibration testing and analysis. To help customers improve their understanding of accelerometers, DJB has established an enviable reputation for providing training in specific areas of accelerometer technology, selection and use, also working closely with industry partners to expand the training program into areas of signal processing and vibration testing. If you want to understand more about how accelerometers work and perhaps see how they are made, visit the back page of this guide for more details.

Calibration & Repairs

As part of the complete service, DJB have a fully equipped in-house calibration facility offering traceability to National Standards using UKAS calibrated equipment. This is available to calibrate accelerometers from any manufacturer. All DJB calibrations include the all important cross axis check as standard. In addition to calibration DJB can also offer repairs for broken accelerometers and cables.

Remember…

everyone at DJB is available to help!

Just call us on +44 (0)1638 712288
or email sales@djbinstruments.com



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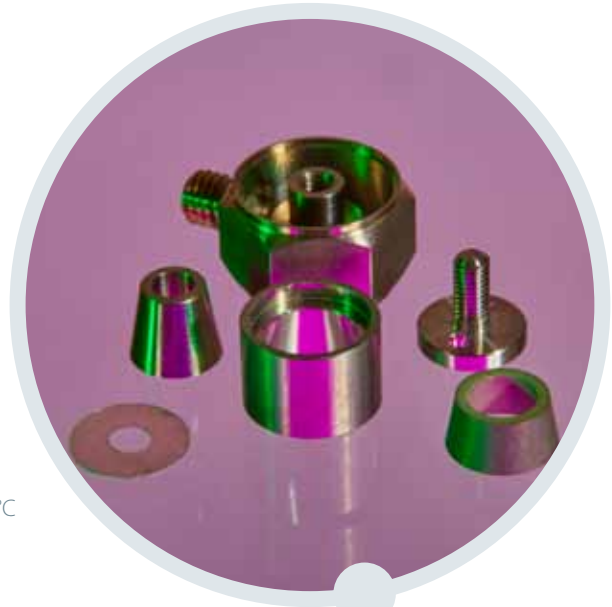


Technical Tips

Factors to consider to maintain consistent and accurate data.

Index Piezoelectric Accelerometers

E	Side entry	**VTC**	Voltage, Top entry, TNC	**CR**	Calibration Reference	**Connectors**	
EB	Side entry, tapped base	**VTI**	Voltage, Top entry, case Isolated	**TB**	Tapped Base	**(see page 26 for accessories)**	
S	Side entry with stud	**T**	Top entry	**HT**	High Temperature	**TC**	TNC
V	Voltage, side entry	**TE**	Top entry	**I**	Isolated	**M**	Microdot
VI	Voltage, side entry, case Isolated	**TS**	Top entry with Stud	**F**	Flange	**KP**	M3.5
VT	Voltage, Top entry	**TC**	Top entry, TNC			**4S-1**	4pin ¼ -28 UNF

Type	Sensitivity	Weight	Size (mm)	Min - Max Temp	Connector	Mounting	Page
Mono-axial Piezo-Tronic IEPE Accelerometers							
A/128/V1	1mV/g up to 10mV/g	0.19gm	5.7 x Ø3.5 x 2.3	-50°C • 200°C	Int. Cbl, L8, M	Adhesive	11
A/127/V	1mV/g up to 100mV/g	1.4gm	11.1 x 7.1 x 5.4	-50°C • (185°C HT)	KP	Adhesive	11
A/124/E	1mV/g up to 200mV/g	2gm	8 (A/F) x 9	-50°C • (185°C HT)	KP	Adhesive	11
A/124/TE	1mV/g up to 200mV/g	2gm	8 (A/F) x 9	-50°C • (185°C HT)	KP	Adhesive	11
A/124/TS	1mV/g up to 200mV/g	2gm	8 (A/F) x 9	-50°C • (185°C HT)	KP	M4 x 5mm stud	11
A/123/E	1mV/g up to 250mV/g	3.4gm	9.5 (A/F) x 10	-50°C • (185°C HT)	M	Adhesive	11
A/123/S	1mV/g up to 250mV/g	5.2gm	9.5 (A/F) x 9.4	-50°C • (185°C HT)	M	M5 x 5mm stud	11
A/123/TE	1mV/g up to 250mV/g	4.4gm	9.5 (A/F) x 9.4	-50°C • (185°C HT)	M	Adhesive	11
A/123/TS	1mV/g up to 250mV/g	4.9gm	9.5 (A/F) x 9.4	-50°C • (185°C HT)	M	M5 x 5mm stud	11
A/123/EB	1mV/g up to 250mV/g	4.9gm	9.5 (A/F) x 9.4	-50°C • (185°C HT)	M	Base tap	11
A/123/TB	1mV/g up to 250mV/g	5.2gm	9.5 (A/F) x 9.4	-50°C • (185°C HT)	M	Base tap	11
A/122/V	10mV/g up to 1V/g	12gm	17.2 x Ø16 x 9.5	-50°C • (185°C HT)	M	Through hole	11
A/120/V	10mV/g up to 1V/g	12.5gm	14.3 (A/F) x 19.2	-50°C • (185°C HT)	M	Base tap 10-32 UNF	11
A/120/VT	10mV/g up to 1V/g	12.9gm	14.3 (A/F) x 19	-50°C • (185°C HT)	M	Base tap 10-32 UNF	11
A/120/VTC	10mV/g up to 1V/g	27gm	14.3 (A/F) x 21.5	-50°C • (185°C HT)	TNC	Base tap 10-32 UNF	11
A/120/VI	10mV/g up to 1V/g	12.5gm	14.3 (A/F) x 19.3	-50°C • (185°C HT)	M	Base tap 10-32 UNF	11
A/120/VTI	10mV/g up to 1V/g	26.6gm	14.3 (A/F) x 19.3	-50°C • (185°C HT)	M	Base tap 10-32 UNF	11
A/121/V	100mV/g up to 3V/g	90gm	25.4 (A/F) x 21.3	-50°C • (185°C HT)	M	Base tap 10-32 UNF	11
A/121/VT	100mV/g up to 3V/g	90gm	25.4 (A/F) x 22.8	-50°C • (185°C HT)	M	Base tap 10-32 UNF	11
A/121/VTC	100mV/g up to 3V/g	90gm	25.4 (A/F) x 22.8	-50°C • (185°C HT)	TNC	Base tap 10-32 UNF	11
A/121/VI	100mV/g up to 3V/g	90gm	25.4 (A/F) x 22.8	-50°C • (185°C HT)	M	Base tap 10-32 UNF	11
A/1600/V	1V/g up to 10V/g	114.5gm	28 (A/F) x 28.7	-50°C • (185°C HT)	M	Base tap 10-32 UNF	11
A/1600/VT	1V/g up to 10V/g	114.5gm	28 (A/F) x 28.7	-50°C • (185°C HT)	M	Base tap 10-32 UNF	11
A/120/CR	10mV/g • 100mV/g	24gm	14.3 (A/F) x 25	-50°C • 125°C	M	Base tap 10-32 UNF	11
Tri-axial Piezo-Tronic IEPE Accelerometers							
AT/18	1mV/g up to 10mV/g	1.2gm	7 x 7.5 x 5.6	-50°C • 200°C	Int. Cbl, 4P-1	Adhesive	12
AT/10	1mV/g up to 100mV/g	6.9gm	11.5 x 11.5 x 11.5	-50°C • (185°C HT)	4S-1	Adhesive	12
AT/10/TB	1mV/g up to 100mV/g	6.9gm	11.5 x 11.5 x 11.5	-50°C • (185°C HT)	4S-1	Base tap	12
AT/10/F	1mV/g up to 100mV/g	10gm	11.5 x 11.5 x 11.5	-50°C • (185°C HT)	4S-1	x2 M3 Screws	12
AT/14	1mV/g up to 200mV/g	13gm	16.4 x 16.4 x 12	-50°C • (185°C HT)	4S-1	Adhesive	12
ATI/14	1mV/g up to 200mV/g	13gm	16.4 x 16.4 x 12	-50°C • (185°C HT)	4S-1	Adhesive	12
AT/14/TB	1mV/g up to 200mV/g	16.6gm	16.4 x 16.4 x 15.3	-50°C • (185°C HT)	4S-1	Base tap 10-32 UNF	12
AT/11	1mV/g up to 100mV/g	18.9gm	17 x 17 x 17	-50°C • (185°C HT)	4S-1	Adhesive, Mounting clip	12
AT/13	1mV/g up to 100mV/g	25.9gm	19 x 19 x 19	-50°C • (185°C HT)	4S-1	Adhesive, Mounting clip	12
A/136/V	1mV/g up to 200mV/g	24.9gm	24 x 17 x 14.7	-50°C • (185°C HT)	M	Adhesive, Mounting clip	12
A/131/V	10mV/g up to 500mV/g	19gm	19.1 x 19.1 x 11.7	-50°C • (185°C HT)	M	Through hole	12
A/134/V	1mV/g up to 200mV/g	19gm	19.1 x 19.1 x 11.7	-50°C • (185°C HT)	M	Through hole	12
A/134/V-3	1mV/g up to 200mV/g	22gm	22.2 x 22.2 x 11.7	-50°C • (185°C HT)	M	Through hole & 3 x tapped	12
A/130/V	10mV/g up to 500mV/g	40.9gm	25.4 x 25.4 x 13.2	-50°C • (185°C HT)	M	Through hole	12
A/130/V-1	10mV/g up to 500mV/g	41gm	25.4 x 25.4 x 13.2	-50°C • (185°C HT)	M	Through hole & 3 x tapped	12
Mono-axial Piezoelectric Charge Accelerometers							
A/28/E	0.4pC/g nom.	0.19gm	5.7 x Ø3.5 x 2.3	-50°C • 200°C	Int. Cbl, L8	Adhesive	13
A/27/E	2pC/g nom.	1.4gm	11.1 x Ø7.1 x 5.4	-50°C • 200°C	KP	Adhesive	13
A/24/E	5pC/g nom.	2gm	8 (A/F) x 9	-50°C • 250°C	KP	Adhesive	13
A/24/E-1	5pC/g nom.	2gm	8 (A/F) x 9	-50°C • 200°C	KP	Adhesive	13
A/24/TE	5pC/g nom.	2gm	8 (A/F) x 9	-50°C • 250°C	KP	Adhesive	13
A/24/TE-1	5pC/g nom.	2gm	8 (A/F) x 6.5	-50°C • 200°C	KP	Adhesive	13
A/24/TS	5pC/g nom.	2gm	8 (A/F) x 8.7	-50°C • 250°C	KP	M4 x 5mm stud	13
A/23/E	8pC/g nom.	3.4gm	9.5 (A/F) x 10	-50°C • 250°C	M	Adhesive	13
A/23/S	8pC/g nom.	4.9gm	9.5 (A/F) x 9.4	-50°C • 250°C	M	M5 X 5mm stud	13
A/23/TE	8pC/g nom.	4gm	9.5 (A/F) x 10.5	-50°C • 250°C	M	Adhesive	13
A/23/TS	8pC/g nom.	4.5gm	9.5 (A/F) x 10.5	-50°C • 250°C	M	M5 X 5mm stud	13
A/23/EB	8pC/g nom.	4.9gm	9.5 (A/F) x 10	-50°C • 250°C	M	Base tap	13
A/23/TB	8pC/g nom.	5.2gm	9.5 (A/F) x 10	-50°C • 250°C	M	Base tap	13
A/22	26pC/g nom.	12gm	17.2 x Ø16 x 8.1	-50°C • 250°C	M	Through hole	13
A/20	30pC/g nom.	12.5gm	14.3 (A/F) X 16.6	-50°C • 250°C	M	Base tap 10-32 UNF	13
A/20/T	30pC/g nom.	12.9gm	14.3 (A/F) X 16.6	-50°C • 250°C	M	Base tap 10-32 UNF	13
A/20/TC	30pC/g nom.	27gm	14.3 (A/F) X 19.2	-50°C • 250°C	TNC	Base tap 10-32 UNF	13
A/29	100pC/g nom.	45gm	19.1 (A/F) x 21.8	-50°C • 250°C	M	Base tap 10-32 UNF	13
A/29/T	100pC/g nom.	45gm	19.1 (A/F) x 24	-50°C • 250°C	M	Base tap 10-32 UNF	13
A/29/TC	100pC/g nom.	50gm	19.1 (A/F) x 25.7	-50°C • 250°C	TNC	Base tap 10-32 UNF	13
A/21	360pC/g nom.	95gm	25.4 (A/F) X 20.1	-50°C • 250°C	M	Base tap 10-32 UNF	13
A/21/T	360pC/g nom.	95gm	25.4 (A/F) X 21.3	-50°C • 250°C	M	Base tap 10-32 UNF	13
A/21/TC	360pC/g nom.	102gm	25.4 (A/F) X 23.9	-50°C • 250°C	TNC	Base tap 10-32 UNF	13
A/600	1.2nC/g nom.	114.5gm	28 (A/F) x 28	-50°C • 250°C	M	Base tap 10-32 UNF	13
A/600/T	1.2nC/g nom.	114.5gm	28 (A/F) x 28	-50°C • 250°C	M	Base tap 10-32 UNF	13

Type	Sensitivity	Weight	Size (mm)	Min - Max Temp	Connector	Mounting	Page
Tri-axial Piezoelectric Charge Accelerometers							
AT/08	0.4pC/g nom.	1.2gm	7 x 7.5 x 5.6	-50°C • 200°C	Int. Cbl, M or 4S-1	Adhesive	14
AT/01	2pC/g nom.	6.8gm	11.5 x 11.5 x 11.5	-50°C • 200°C	4S-1	Adhesive	14
AT/01/TB	2pC/g nom.	6.8gm	11.5 x 11.5 x 11.5	-50°C • 200°C	4S-1	Base tap	14
AT/01/F	2pC/g nom.	9.9gm	11.5 x 11.5 x 11.5	-50°C • 200°C	4S-1	x2 M3 Screws	14
AT/04	5pC/g nom.	13gm	16.4 x 16.4 x 12.1	-50°C • 200°C	4S-1	Adhesive	14
ATI/04	5pC/g nom.	13gm	16.4 x 16.4 x 12.1	-50°C • 200°C	4S-1	Adhesive	14
AT/04/TB	5pC/g nom.	16.6gm	16.4 x 16.4 x 15.3	-50°C • 200°C	4S-1	Base tap 10-32 UNF	14
A/38	0.4pC/g nom.	0.9gm	7.3 x 7.3 x 4.4	-50°C • 200°C	L8	Adhesive, Through hole	14
A/38-1	0.4pC/g nom.	0.9gm	7.2 x 7.2 x 4.4	-50°C • 200°C	L8	Adhesive, Through hole	14
A/31	7pC/g nom.	19gm	19.1 x 19.1 x 11.7	-50°C • 220°C	M	Adhesive, Through hole	14
A/34	7pC/g nom.	19gm	19.1 x 19.1 x 11.7	-50°C • 220°C	M	Adhesive, Through hole	14
A/34-2	7pC/g nom.	22gm	22 x 22 x 11.7	-50°C • 220°C	M	Thr. Hole & 3x tap, Adhesive	14
A/30	25pC/g nom.	38gm	25.4 x 25.4 x 13.2	-50°C • 220°C	M	Adhesive, Through hole	14
A/30-1	25pC/g nom.	38gm	25.4 x 25.4 x 13.2	-50°C • 220°C	M	Through hole & 3 x tapped	14
A/36	5pC/g nom.	18gm	24 x 17 x 14.7	-50°C • 220°C	M	Thr. Hole & 3x tap, Adhesive, Clip	14
A/36-1	5pC/g nom.	18gm	24 x 17 x 10.7	-50°C • 220°C	M	Thr. Hole & 3x tap, Adhesive, Clip	14
Ultra High Temperature Exhaust & Turbo Charger Test Accelerometer, 900 °C							
A/133/V-3	1mV/g up to 250mV/g	41gm	28 x 28 x 19	-50°C • 900°C	M	Through hole	15
A/133/V-10	1mV/g up to 250mV/g	45gm	28 x 28 x 29	-50°C • 900°C	M	Through hole	15
A/33	7pC/g nom.	41gm	28 x 28 x 19	-50°C • 900°C	M	Through hole	15
A/33-1	7pC/g nom.	45gm	28 x 28 x 29	-50°C • 900°C	M	Through hole	15
Seismic / Micro g Mono-axial Accelerometers							
A/800	9nC/g nom.	400gm	38.1 (A/F) x 44	-50°C • 250°C	M	Base tap ¼-28 UNF	15
A/800/T	9nC/g nom.	400gm	38.1 (A/F) x 44	-50°C • 250°C	M	Base tap ¼-28 UNF	15
A/800/TC	9nC/g nom.	429gm	38.1 (A/F) x 44	-50°C • 250°C	TNC	Base tap ¼-28 UNF	15
A/1800/V	10V/g	400gm	38.1 (A/F) x 44	-50°C • 125°C	M	Base tap ¼-28 UNF	15
A/1800/VT	10V/g	400gm	38.1 (A/F) x 44	-50°C • 125°C	M	Base tap ¼-28 UNF	15
A/1800/VTC	10V/g	429gm	38.1 (A/F) x 44	-50°C • 125°C	TNC	Base tap ¼-28 UNF	15
High Shock Mono-axial Piezo-Tronic IEPE Accelerometers							
A/161	0.5mV/g	10gm	Ø13.2 x 26	-40°C • 121°C	M5	M5 Stud	16
A/161-1	0.5mV/g	10gm	Ø13.2 x 26	-40°C • 121°C	Int. Cbl	M5 Stud	16
A/162	0.2mV/g	10gm	Ø13.2 x 26	-40°C • 121°C	M5	M5 Stud	16
A/162-1	0.2mV/g	10gm	Ø13.2 x 26	-40°C • 121°C	Int. Cbl	M6 Stud	16
A/163-1	0.1mV/g	16gm	Ø13.2 x 26	-40°C • 121°C	Int. Cbl	M6 Stud	16
Low Cost Mono-axial Piezoelectric Accelerometers							
A/140	100m/Vg	85gm	Ø21 x 52	-50°C • 120°C	2 pin MIL-C-5015	Base tap ¼-28 UNF	16
A/140/C	100m/Vg	99gm	Ø22 x 36	-50°C • 120°C	3m Int. Cbl.	Base tap ¼-28 UNF	16
A/140/SC	100m/Vg	149gm	26 x 37	-50°C • 120°C	3m Int. Cbl.	Through hole	16
A/140/SW	100m/Vg	149gm	26 x 37	-50°C • 120°C	3m Int. Cbl.	Through hole	16
A/140/W	100m/Vg	99gm	Ø22 x 36	-50°C • 120°C	3m Int. Cbl.	Base tap ¼-28 UNF	16
Industrial Mono-axial Piezoelectric Accelerometers							
A/53/F	12pC/g nom.	20gm (ex. Cbl)	33 x 12.7 x 14.2	260°C	Int. Cbl, 7/16 UNS, M	Flange mount	17
A/53/F/HT	1.7pC/g nom.	20gm (ex. Cbl)	33 x 12.7 x 14.2	400°C	Int. Cbl, 7/16 UNS, M	Flange mount	17
A/52/F	100pC/g nom.	100gm (ex. Cbl)	50.8 x 28.6 x 21.7	260°C	Int. Cbl, 7/16 UNS, M	Flange mount	17
A/52/F/HT	12pC/g nom.	123gm (ex. Cbl)	50.8 x 28.6 x 21.7	400°C	Int. Cbl, 7/16 UNS, M	Flange mount	17
A/81/F	230pC/g nom.	150gm (ex. Cbl)	50.8 x 28.6 x 24.5	260°C	Int. Cbl, 7/16 UNS, M	Flange mount	17
A/81/F/HT	35pC/g nom.	160gm (ex. Cbl)	50.8 x 28.6 x 24.5	400°C	Int. Cbl, 7/16 UNS, M	Flange mount	17
A/301/F	220pC/g nom.	150gm	31.5 x 31.5 x 25.4	260°C	2 Pole 7/16 UNS	Flange mount	17
A/301/F/HT	25pC/g nom.	150gm	31.5 x 31.5 x 25.4	400°C	2 Pole 7/16 UNS	Flange mount	17
A/107/F	100pC/g nom.	80gm	29.2 x 29.2 x 24.5	260°C	2 Pole 7/16 UNS	Flange mount	17
A/107/F/HT	10pC/g nom.	80gm	29.2 x 29.2 x 24.5	400°C	2 Pole 7/16 UNS	Flange mount	17
A/1107/V	100mV/g	85gm	29.2 x 29.1 x 24.5	185°C	2 Pole 7/16 UNS	Flange mount	17
A/172/VF	100mV/g	130gm	40.2 x 36.4 x 24.7	185°C	2 Pole 7/16 UNS	Flange mount	17

DC MEMS Accelerometer Range

	Model	Sensitivity	g Range	Weight	Size	Temp. Range	Mounting	Page
Monoaxial	AM/2.1000	1000mV/g	± 2g	22gm	21.5 x 21.5 x 10.5mm	-40°C to +85°C	4 x Ø3.1mm holes	18
	AM/2HR.1000	1000mV/g	± 2g	22gm	25 x 25 x 12mm	-40°C to +85°C	4 x Ø3.1mm holes	18
	AM/5.300	300mV/g	± 5g	22gm	21.5 x 21.5 x 10.5mm	-40°C to +85°C	4 x Ø3.1mm holes	18
	AM/10HR.200	200mV/g	± 10g	22gm	25 x 25 x 12mm	-40°C to +85°C	4 x Ø3.1mm holes	18
	AM/20.100	100mV/g	± 20g	22gm	21.5 x 21.5 x 10.5mm	-40°C to +85°C	4 x Ø3.1mm holes	18
	AM/50HR.40	40mV/g	± 50g	22gm	25 x 25 x 12mm	-40°C to +85°C	4 x Ø3.1mm holes	18
Biaxial	AMB/2.1000	1000mV/g	± 2g	23gm	20.5 x 20.5 x 20.5mm	-40°C to +85°C	4 x Ø2.5mm holes or M5 tapped base	18
	AMB/2HR.1000	1000mV/g	± 2g	40gm	28 x 28 x 25mm	-40°C to +85°C	2 x Ø4mm holes or M5 tapped base	18
	AMB/5.300	300mV/g	± 5g	23gm	20.5 x 20.5 x 20.5mm	-40°C to +85°C	4 x Ø2.5mm or M5 tapped base	18
	AMB/10HR.200	200mV/g	± 10g	40gm	28 x 28 x 25mm	-40°C to +85°C	2 x Ø4mm holes or M5 tapped base	18
	AMB/20.100	100mV/g	± 20g	23gm	20.5 x 20.5 x 20.5mm	-40°C to +85°C	4 x Ø2.5mm or M5 tapped base	18
	AMB/50HR.40	40mV/g	± 50g	40gm	28 x 28 x 25mm	-40°C to +85°C	2 x Ø4mm holes or M5 tapped base	18
Triaxial	AMT/2.1000	1000mV/g	± 2g	23gm	20.5 x 20.5 x 20.5mm	-40°C to +85°C	4 x Ø2.5mm or M5 tapped base	18
	AMT/2HR.1000	1000mV/g	± 2g	40gm	28 x 28 x 25mm	-40°C to +85°C	2 x Ø4mm holes or M5 tapped base	18
	AMT/5.300	300mV/g	± 5g	23gm	20.5 x 20.5 x 20.5mm	-40°C to +85°C	4 x Ø2.5mm or M5 tapped base	18
	AMT/10HR.200	200mV/g	± 10g	40gm	28 x 28 x 25mm	-40°C to +85°C	2 x Ø4mm holes or M5 tapped base	18
	AMT/20.100	100mV/g	± 20g	23gm	20.5 x 20.5 x 20.5mm	-40°C to +85°C	4 x Ø2.5mm or M5 tapped base	18
	AMT/50HR.40	40mV/g	± 50g	40gm	28 x 28 x 25mm	-40°C to +85°C	2 x Ø4mm holes or M5 tapped base	18

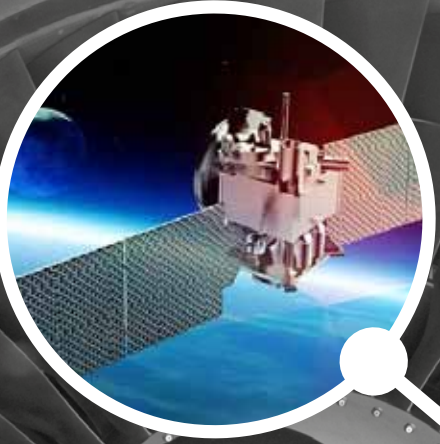
Typical accelerometers used for ground testing:
From miniature accelerometers to minimise mass loading, through to general purpose monoaxial and increasingly triaxial accelerometers available in both IEPE and Charge versions.

A/127, A/27, page 11,13 **A/124, A/24** page 11,13
AT/10, AT/01 page 12,14 **AT/14, AT/04** page 12,14

Typical accelerometers used for in-flight health monitoring:
High temperature capabilities for engine / gearbox monitoring. Many are custom made to suit a particular engine or gearbox.

A/81, A/107 page 17

Low outgassing:
DJB supply cables and accelerometers for low outgassing application in space and testing applications, contact us to discuss your requirements.



Aerospace

There are many different test applications that fall under the 'Aerospace' market heading, one that fascinates many is outer space. DJB supplies numerous companies involved in satellite development, test and build; one particular application is summarised below, this typifies the additional considerations of testing anything with respect to the environmental conditions of space.

Satellites are destined for a tough environment, space can be both extreme cold and extreme heat, with high radiation risk and ultra-low vacuum. In addition, to achieve orbit they undergo significant vibration and sound levels causing high stresses during the launch phase, so there is much to consider.

Application note:

One particular application uses DJB's A/124 miniature IEPE accelerometers (both top and side entry versions are used) These are installed into satellites as part of the build process along with cables and connectors. All materials installed on a satellite must meet stringent low outgassing requirements which ensure a minimal loss of material mass under high vacuum. Whilst 90% of DJB's cables have been standardised to suit low outgassing requirements, the stress relief used on the rear of the connectors is changed to a special version of low outgassing heat shrink. The other materials used in DJB accelerometers meet low outgassing requirements as standard, having been tested by many companies all over the world to confirm this standard is met.

Once installed and the build completed, each satellite undergoes a range of environmental and structural tests to ensure it is robust enough to survive launch conditions. The DJB accelerometers are used during this phase to monitor various parts of the satellite and to provide control during testing; critical measurements to ensure the multi million pound investment is fit for flight. As they are now part of the satellite build they are also destined for space, never to be seen again….!!

- Low Outgassing accelerometers and Cables
- Low mass
- High reliability
- Proven track record of performance
- Custom cable lengths to suit build requirements
- Special ceramic mounting blocks

Typical accelerometers used:
Many applications can be heavily reliant on the size of the accelerometer, where temperature is rarely an issue, with IEPE becoming a common choice.

A/128, A/28 page 11,13
AT/18, AT/08 page 12,14
AT/10, AT/01 page 12,14

DC MEMS accelerometers are also commonly used for low frequency testing. See page 18

PE-Wave
PIEZOELECTRIC WIRELESS ACCELEROMETER

Sports Science & Human Vibration

The effects of vibration on human beings, whether as a result of using machines (drills, hydraulic hammers, driving) or as part of their involvement in sport or human endeavour, is one that has steadily increased in its importance for both health reasons and for the never ending goal to improve human performance. Measuring vibration in these applications has many challenges relating to accelerometer size, mounting as well as cabling which can be restrictive.

Application note:

As part of the development for the wireless accelerometer, DJB was looking for a human vibration application to demonstrate how measurement of vibration using wireless technology could be beneficial. One idea was the measurement of vibration in a gaming application, typically using hand held controllers which offered a vibration response.

The test was set up using a common gaming system which offers the user to be involved via vibration feedback when 'crashing' on screen during gameplay. DJB used an ultra miniature A/28 teardrop accelerometer mounted on a finger ring which was in turn connected to the new prototype wireless hub worn on the users wrist. With the player engrossed in active game play the wireless system was triggered and vibration measurements from the accelerometer were recorded when the controller vibrated. It proved to be a very successful test with surprisingly high vibration levels. Similar technology could be used for hand tools, sports equipment etc.

- Low mass
- Miniature and ultra-miniature sizes
- Proven track record of performance
- Custom cable lengths to suit build requirements
- Wide variety of mounting methods

Typical accelerometers used:

NVH and Modal analysis

AT/10, AT/01	page 12,14
AT/14, AT/04	page 12,14
AT/11	page 12
AT/13	page 12
A/133, A/33	page 15

Automotive Research, Test & Measurement

The world of NVH (Noise, Vibration & Harshness) testing is the very cornerstone of automotive development. The need to develop smooth, quiet and reliable vehicles requires a detailed understanding and mastery of vibration and structural analysis, to this end the Automotive industry uses accelerometers in the widest range of applications. DJB offers solutions for almost every conceivable application, but one in particular remains unique to DJB and market leading for those involved in the most extreme conditions of turbo or exhaust test and development.

The A/133 IEPE and A/33 charge output water cooled accelerometers were developed by DJB in association with several major Automotive customers for the testing and measurement of exhaust and turbo charger vibration. Extreme temperatures exceeding 900°C are not uncommon on turbo chargers and measuring vibration at these temperatures is extremely difficult and although non-contact vibration measurement is possible, it is also extremely expensive. The A/33 charge based triaxial accelerometer was originally developed in 1997 and was followed in 2005 with the IEPE version A/133. Both capable of measuring vibration on a product with a surface temperature up to 900°C using a simple water cooling system with a flow rate of approximately 0.5 litre per minute, the accelerometers are offered in triaxial and uniaxial configurations.

Application note:

A major US Automotive OEM approached DJB for a triaxial accelerometer for use in testing exhaust vibration on vehicles in full operational conditions, i.e high temperature and road use. Their data acquisition and analysis system had the facility to provide the constant current supply to operate an IEPE accelerometer, so DJB specified the A/133 variant.

As the picture shows, the accelerometers were installed in a number of locations on a new exhaust development. With a single bolt mounting through the centre of the accelerometer body they are simple to install in what can be a confined space.

Supplied with cooling water via a windscreen washer pump, the accelerometer cables and cooling pipes were protected by over braiding to avoid damage under the vehicles during road tests, these were routed back to the instrumentation and pump/water supply within the vehicles boot.

Cables were also supplied by DJB and were made to suit the customers' installation requirements.

Over the many years of field use the A/133 and A/33 accelerometers have proven themselves as extremely rugged devices that can be used in harsh conditions for many years. On the rare occasion damage occurs they have the benefit of being fully repairable, each axis insert can be removed and replaced.

- Konic Shear® for long term cross axis stability
- High temperature
- High reliability
- Proven track record of performance
- Integral stainless steel cables or connectors
- Low cost range available

Typical accelerometers and instrumentation used:

A/140 series – Low cost range of accelerometers
Page 16

VS1 – Handheld vibration meter for spot checks
Page 21

Junction boxes – Designed and built specific to your requirements. Page 29

A/81, A/52 – High temperature options.
Page 17

Machine and Condition Monitoring

Industrial manufacturing processes inevitably generate vibration and noise. This is particularly true of any rotating machinery, in many applications heat also becomes an issue. It is the nature of vibration to be extremely damaging and as a result, industrial machines undergo regular monitoring to check the health of bearings and other structural elements, with the goal of predicting potential failures before they occur and cause significant damage and cost.

For over 4 decades DJB has been an integral part of the nuclear power generation capability in the UK. There are many sources of vibration in a nuclear power station and an equal number of critical processes that rely on massive machinery to generate the vast quantities of electricity required by the UK public.

Application note:

The DJB range of flange mounted high temperature industrial accelerometers, including the A/81 and A/52 models, have been used in a number of different locations within power stations including gas circulators for over 40 years. These are extreme conditions requiring high temperature capabilities for both the accelerometer and cables. Using stainless steel mineral insulated cables welded to the body of the accelerometer provides 800°C functionality to protect the signal as it is carried back to the monitoring equipment.

The A/52 and A/81 both use the DJB Konic Shear® design to provide long term stability against cross axis error whilst also using high temperature piezoelectric ceramics to achieve operating temperatures up to 400°C.

- Konic Shear® for long term cross axis stability
- High temperature
- High reliability
- Proven track record of performance
- Integral stainless steel cables or connectors
- Low cost range available

Piezoelectric Accelerometers

Mono-axial Piezo-Tronic IEPE Accelerometers

Integral Electronics, Voltage Output

All dimensions given in mm (L x W x H) not including the connector

Micro Miniature
A/128/V1

Sensitivity
1mV/g up to 10mV/g

Weight 0.19gm

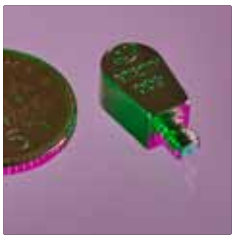
Size (mm)
5.7 x ø3.5 x 2.3

Min-Max. Temp
-50˚C • 200˚C

Connector
Integral Cable, L8,
10-32 UNF Microdot

Sensing Element
Shear Plate
Piezo-Ceramic

Mounting
Adhesive



Miniature
A/127/V

Sensitivity
1mV/g up to 100mV/g

Weight 1.4gm

Size (mm)
11.1 x 7.1 x 5.4

Min-Max. Temp
-50˚C • 125˚C (185˚C HT)

Connector
M3.5 KP

Sensing Element
Konic Shear®
Piezo-Ceramic

Mounting
Adhesive

Miniature
A/124/E, A/124/TE,
A/124/TS

Sensitivity
1mV/g up to 200mV/g

Weight 2gm

Size (mm)
8 (A/F) x 9

Min-Max. Temp
-50˚C • 125˚C (185˚C HT)

Connector
M3.5 KP

Sensing Element
Konic Shear®
Piezo-Ceramic

Mounting
Adhesive,
M4 x 5mm integral stud

A/123/E, A/123/S,
A/123/TE, A/123/TS,
A/123/EB, A/123/TB

Sensitivity
1mV/g up to 250mV/g

Weight 3.4-5.2gm

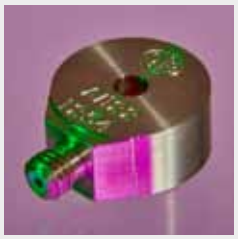
Size (mm)
9.5 (A/F) x 9.4-10

Min-Max. Temp
-50˚C • 125˚C (185˚C HT)

Connector
10-32 UNF Microdot

Sensing Element
Konic Shear®
Piezo-Ceramic

Mounting
Adhesive,
M5 x 5mm integral stud
Base tapped



A/122/V

Sensitivity
10mV/g up to 1V/g

Weight 12gm

Size (mm)
17.2 x ø16 x 9.5

Min-Max. Temp
-50˚C • 125˚C (185˚C HT)

Connector
10-32 UNF Microdot

Sensing Element
Konic Shear®
Piezo-Ceramic

Mounting
Through hole Ø3.5mm
Mounting kit available

A/120/V, A/120/VT,
A/120/VTC, A/120/VI,
A/120/VTI

Sensitivity
10mV/g up to 1V/g

Weight 12.5-27gm

Size (mm)
14.3 (A/F) x 19-21.5

Min-Max. Temp
-50˚C • 125˚C (185˚C HT)

Connector
10-32 UNF Microdot,
TNC

Sensing Element
Konic Shear®
Piezo-Ceramic

Mounting
Base tapped 10-32 UNF
4mm deep

A/121/V, A/121/VT
A/121/VTC, A/121/VI

Sensitivity
100mV/g up to 3V/g

Weight 90gm

Size (mm)
25.4 (A/F) x 21.3-22.8

Min-Max. Temp
-50˚C • 125˚C (185˚C HT)

Connector
10-32 UNF Microdot,
TNC

Sensing Element
Konic Shear®
Piezo-Ceramic

Mounting
Base tapped 10-32 UNF
4mm deep

Micro g Voltage
A/1600/V, A/1600/VT

Sensitivity
1V/g up to 10V/g

Weight 114.5gm

Size (mm)
28 (A/F) x 28.7

Min-Max. Temp
-50˚C • 125˚C (185˚C HT)

Connector
10-32 UNF Microdot

Sensing Element
Shear Plate
Piezo-Ceramic

Mounting
Base tapped 10-32 UNF
4mm deep

Calibration Reference
A/120/CR

Sensitivity
10mV/g • 100mV/g

Weight 24gm

Size (mm)
14.3 (A/F) x 25

Min-Max. Temp
-50˚C • 125˚C

Connector
10-32 UNF Microdot

Sensing Element
Konic Shear®
Piezo-Ceramic

Mounting
Base tapped 10-32 UNF
4mm deep

Accelerometer Key:

E	Side entry
EB	Side entry, tapped base
S	Side entry with stud
V	Voltage, side entry
VI	Voltage, side entry, case Isolated
VT	Voltage, Top entry
VTC	Voltage, Top entry, TNC
VTI	Voltage, Top entry, case Isolated
T	Top entry
TE	Top entry
TS	Top entry with Stud
TC	Top entry, TNC
CR	Calibration Reference
TB	Tapped Base
HT	High Temperature
I	Isolated
F	Flange

Tri-axial Piezo-Tronic IEPE Accelerometers

Integral Electronics, Voltage Output

All dimensions given in mm (L x W x H) not including the connector

AT/18

Sensitivity
1mV/g up to 10mV/g

Weight 1.2gm

Size (mm)
7 x 7.5 x 5.6

Min-Max. Temp
-50˚C • 200˚C

Connector
1m integral cable,
4 pin ¼-28 UNF

Sensing Element
Shear Plate
Piezo-Ceramic

Mounting
Adhesive

AT/10, AT/10/F, AT/10/TB

Sensitivity
1mV/g up to 100mV/g

Weight 6.9-10gm

Size (mm)
11.5 x 11.5 x 11.5

Min-Max. Temp
-50˚C • 125˚C (185˚C HT)

Connector
4 pin ¼-28 UNF

Sensing Element
Konic Shear®
Piezo-Ceramic

Mounting
Adhesive,
2x M3 Screws,
Base tapped

AT/14, AT/14/TB, ATI/14, ATI/14/TB

Sensitivity
1mV/g up to 200mV/g

Weight 13-16.6gm

Size (mm)
16.4 x 16.4 x 12-15.3

Min-Max. Temp
-50˚C • 125˚C (185˚C HT)

Connector
4-Pin ¼ - 28 UNF

Sensing Element
Konic Shear®
Piezo-Ceramic

Mounting
Adhesive,
Base tapped 10-32 UNF

AT/11

Sensitivity
1mV/g up to 100mV/g

Weight 18.9gm

Size (mm)
17 x 17 x 17

Min-Max. Temp
-50˚C • 125˚C (185˚C HT)

Connector
4 pin ¼-28 UNF

Sensing Element
Konic Shear®
Piezo-Ceramic

Mounting
Adhesive
Mounting clip

AT/13

Sensitivity
1mV/g up to 100mV/g

Weight 25.9gm

Size (mm)
19 x 19 x 19

Min-Max. Temp
-50˚C • 125˚C (185˚C HT)

Connector
4 pin ¼-28 UNF

Sensing Element
Konic Shear®
Piezo-Ceramic

Mounting
Adhesive
Mounting clip

A/136/V

Sensitivity
1mV/g up to 200mV/g

Weight 24.9gm

Size (mm)
24 x 17 x 14.7

Min-Max. Temp
-50˚C • 125˚C (185˚C HT)

Connector
10-32 UNF Microdot

Sensing Element
Konic Shear®
Piezo-Ceramic

Mounting
Adhesive
Mounting clip

A/131/V

Sensitivity
10mV/g up to 500mV/g

Weight 19gm

Size (mm)
19.1 x 19.1 x 11.7

Min-Max. Temp
-50˚C • 125˚C (185˚C HT)

Connector
10-32 UNF Microdot

Sensing Element
Konic Shear®
Piezo-Ceramic

Mounting
2 x Ø3.57mm
through holes
Adhesive

A/134/V, A/134/V-3

Sensitivity
1mV/g up to 200mV/g

Weight 19-22gm

Size (mm)
19.1 x 19.1 x 11.7
22.2 x 22.2 x 11.7

Min-Max. Temp
-50˚C • 125˚C (185˚C HT)

Connector
10-32 UNF Microdot

Sensing Element
Konic Shear®
Piezo-Ceramic

Mounting
2 x Ø3.57mm through holes, 1 x M4 Ø through hole + 3 x tapped 10-32 UNF x 4mm deep
Adhesive

A/130/V, A/130/V-1

Sensitivity
10mV/g up to 500mV/g

Weight 40.9gm

Size (mm)
25.4 x 25.4 x 13.2

Min-Max. Temp
-50˚C • 125˚C (185˚C HT)

Connector
10-32 UNF Microdot

Sensing Element
Konic Shear®
Piezo-Ceramic

Mounting
3 x Ø3mm
through holes,
3 x tapped 10-32 UNF
x 4mm deep
Adhesive

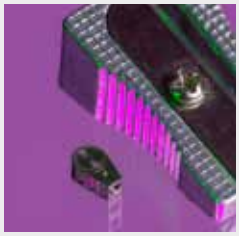
Accelerometer Key:

E	Side entry
EB	Side entry, tapped base
S	Side entry with stud
V	Voltage, side entry
VI	Voltage, side entry, case Isolated
VT	Voltage, Top entry
VTC	Voltage, Top entry, TNC
VTI	Voltage, Top entry, case Isolated
T	Top entry
TE	Top entry
TS	Top entry with Stud
TC	Top entry, TNC
CR	Calibration Reference
TB	Tapped Base
HT	High Temperature
I	Isolated
F	Flange

Mono-axial Piezoelectric Accelerometers

Charge Output

All dimensions given in mm (L x W x H) not including the connector



Micro-Miniature
A/28/E

Sensitivity
0.4pC/g nom.

Weight 0.19gm

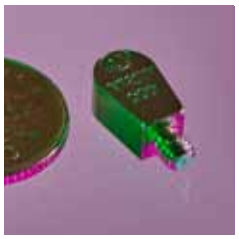
Size (mm)
5.7 x ø3.5 x 2.3

Min-Max. Temp
-50˚C • 200˚C

Connector
Integral Cable, A/28/E-1
L8 A/28/E

Sensing Element
Shear Plate
Piezo-Ceramic

Mounting
Adhesive



Miniature
A/27/E

Sensitivity
2pC/g nom.

Weight 1.4gm

Size (mm)
11.1 x 7.1 x 5.4

Min-Max. Temp
-50˚C • 200˚C

Connector
M3.5 KP

Sensing Element
Konic Shear®
Piezo-Ceramic

Mounting
Adhesive

Miniature
A/24/E, A/24/E-1,
A/24/TE, A/24/TE-1
A/24/TS

Sensitivity
5pC/g nom.

Weight 2gm

Size (mm)
8 (A/F) x 6.5-9

Min-Max. Temp
-50˚C • 200˚C (E-1,TE-1)
-50˚C • 250˚C (E,TE,TS)

Connector
M3.5 KP

Sensing Element
Konic Shear®
Piezo-Ceramic

Mounting
Adhesive,
M4 x 5mm Integral stud

A/23/E, A/23/S,
A/23/TE, A/23/TS,
A/23/EB, A/23/TB

Sensitivity
8pC/g nom.

Weight 3.4-5.2gm

Size (mm)
9.5 (A/F) x 9.4-10.5

Min-Max. Temp
-50˚C • 250˚C

Connector
10-32 UNF Microdot

Sensing Element
Konic Shear®
Piezo-Ceramic

Mounting
Adhesive,
M5 x 5mm Integral stud,
Base tapped

A/22

Sensitivity
26pC/g nom.

Weight 12gm

Size (mm)
17.2 x 16 x 8.1

Min-Max. Temp
-50˚C • 250˚C

Connector
10-32 UNF Microdot

Sensing Element
Konic Shear®
Piezo-Ceramic

Mounting
3.5mm through hole

A/20, A/20/T, A/20/TC

Sensitivity
30pC/g nom.

Weight
12.5gm - 27gm

Size (mm)
14.3 (A/F) x 16.6-19.2

Min-Max. Temp
-50˚C • 250˚C

Connector
10-32 UNF Microdot, TNC

Sensing Element
Konic Shear®
Piezo-Ceramic

Mounting
Base tapped 10-32 UNF
x 4mm deep

A/29, A/29/T, A/29/TC

Sensitivity
100pC/g

Weight
45gm - 50gm

Size (mm)
19.1 (A/F) x 21.8-25.7

Min-Max. Temp
-50˚C • 250˚C

Connector
10-32 UNF Microdot, TNC

Sensing Element
Konic Shear®
Piezo-Ceramic

Mounting
Base tapped 10-32 UNF
x 4mm deep

A/21, A/21/T, A/21/TC

Sensitivity
360pC/g nom.

Weight
95gm - 102gm

Size (mm)
25.4 (A/F) x 20.2-23.9

Min-Max. Temp
-50˚C • 250˚C

Connector
10-32 UNF Microdot, TNC

Sensing Element
Konic Shear®
Piezo-Ceramic

Mounting
Base tapped 10-32 UNF
x 4mm deep

A/600, A/600/T

Sensitivity
1.2nC/g nom.

Weight 114.5gm

Size (mm)
28 (A/F) x 28

Min-Max. Temp
-50˚C • 250˚C

Connector
10-32 UNF Microdot

Sensing Element
Shear Plate
Piezo-Ceramic

Mounting
Base tapped 10-32 UNF
x 4mm deep

Tri-axial Piezoelectric Accelerometers

Charge Output

All dimensions given in mm (L x W x H) not including the connector

AT/08

Sensitivity
0.4pC/g nom.

Weight 1.2gm

Size (mm)
7 x 7.5 x 5.6

Min-Max. Temp
-50˚C • 200˚C

Connector
1m integral cable,
10-32 UNF Microdot or
4 pin ¼-28 UNF

Sensing Element
Shear Plate
Piezo-Ceramic

Mounting
Adhesive

AT/01, AT/01/TB, AT/01/F

Sensitivity
2pC/g nom.

Weight 6.8-9.9gm

Size (mm)
11.5 x 11.5 x 11.5

Min-Max. Temp
-50˚C • 200˚C

Connector
4 pin ¼-28 UNF

Sensing Element
Konic Shear®
Piezo-Ceramic

Mounting
Adhesive, Base tapped,
2 x M3 Screws

AT/04, AT/04/TB, ATI/04, ATI/04/TB

Sensitivity
5pC/g nom.

Weight 13-16.6gm

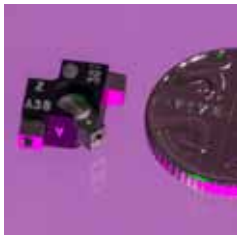
Size (mm)
16.4 x 16.4 x 12.1-15.3

Min-Max. Temp
-50˚C • 200˚C

Connector
4 pin ¼-28UNF

Sensing Element
Konic Shear®
Piezo-Ceramic

Mounting
Adhesive, 10-32UNF
Base tapped



A/38, A/38-1

Sensitivity
0.4pC/g nom.

Weight 0.9gm

Size (mm)
7.3 x 7.3 x 4.4

Min-Max. Temp
-50˚C • 200˚C

Connector
L8

Sensing Element
Shear Plate
Piezo-Ceramic

Mounting
1 x Ø 2.1mm
through hole,
Adhesive

A/31

Sensitivity
7pC/g nom.

Weight 19gm

Size (mm)
19.1 x 19.1 x 11.7

Min-Max. Temp
-50˚C • 220˚C

Connector
10-32 UNF Microdot

Sensing Element
Konic Shear®
Piezo-Ceramic

Mounting
Adhesive, 2 x Ø3.25mm
through holes

A/34, A/34-2

Sensitivity
7pC/g nom.

Weight 19-22gm

Size (mm)
19.1 x 19.1 x 11.7
22.2 x 22.2 x 11.7

Min-Max. Temp
-50˚C • 220˚C

Connector
10-32 UNF Microdot

Sensing Element
Konic Shear®
Piezo-Ceramic

Mounting
Adhesive, 2 x Ø3.25mm
through hole. 1 x M4 Ø
through hole. 3 x tapped
10-32 UNF x 4mm deep

A/30, A/30-1

Sensitivity
25pC/g nom.

Weight 38gm

Size (mm)
25.4 x 25.4 x 13.2

Min-Max. Temp
-50˚C • 220˚C

Connector
10-32 UNF Microdot

Sensing Element
Konic Shear®
Piezo-Ceramic

Mounting
3 x Ø 3mm through holes;
1 x M4 Ø through hole.
3 x tapped 10-32 UNF x
4mm deep
Adhesive

A/36, A/36-1

Sensitivity
5pC/g

Weight 18gm

Size (mm)
24 x 17 x 10.7-14.7

Min-Max. Temp
-50˚C • 220˚C

Connector
10-32 UNF Microdot

Sensing Element
Konic Shear®
Piezo-Ceramic

Mounting
Adhesive, Mounting clip,
3 x mounting holes

Water Cooled Tri-Axial Piezoelectric
A/33 (Flat Base)
A/33-1 (Raised base)

Sensitivity 7pC/g nom.

Weight 41gm,45gm

Size (mm) 28 x 28 x 19
28 x 28 x 29

Min-Max. Temp
-50˚C • 900˚C Max
Surface Temp with Water
Flow

Connector
10-32 UNF Microdot

Sensing Element
Konic Shear® Piezo-
Ceramic

Mounting
1 x Ø5.5mm through hole,

Accelerometer Key:

E	Side entry
EB	Side entry, tapped base
S	Side entry with stud
V	Voltage, side entry
VI	Voltage, side entry, case Isolated
VT	Voltage, Top entry
VTC	Voltage, Top entry, TNC
VTI	Voltage, Top entry, case Isolated
T	Top entry
TE	Top entry
TS	Top entry with Stud
TC	Top entry, TNC
CR	Calibration Reference
TB	Tapped Base
HT	High Temperature
I	Isolated
F	Flange

Ultra High Temperature Exhaust & Turbo Charger Test Accels, 900°C

Water Cooled IEPE Tri-Axial
A/133/V-3 (Flat base)
A/133/V/10 (Raised base)

Sensitivity 1mV/g up to 250mV/g

Weight 41gm, 45gm

Size (mm) 28 x 28 x 19
28 x 28 x 29

Min-Max. Temp -50˚C • 900˚C Max
Surface Temp with Water Flow

Connector 10-32 UNF Microdot

Sensing Element
Konic Shear® Piezo-Ceramic

Mounting
1 x Ø5.5mm through hole

Water Cooled Tri-Axial Piezoelectric
A/33 (Flat Base)
A/33-1 (Raised base)

Sensitivity 7pC/g nom.

Weight 41gm,45gm

Size (mm) 28 x 28 x 19
28 x 28 x 29

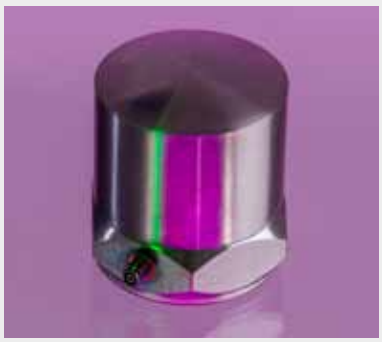
Min-Max. Temp -50˚C • 900˚C Max
Surface Temp with Water Flow

Connector 10-32 UNF Microdot

Sensing Element
Konic Shear® Piezo-Ceramic

Mounting
1 x Ø5.5mm through hole,

Mono-axial Seismic Accelerometers



Charge output micro g measurement
A/800, A/800/T, A/800/TC

Sensitivity 9nC/g nom.

Weight 400gm - 429gm

Size (mm) 38.1 (A/F) x 44

Min-Max. Temp -50˚C • 250˚C

Connector 10-32 UNF Microdot, TNC

Sensing Element
Shear Plate Piezo-Ceramic

Mounting
Base tapped ¼-28 UNF x 4mm deep

IEPE micro g measurement
A/1800/V, A/1800/VT, A/1800/VTC

Sensitivity 10V/g

Weight 400gm - 429gm

Size (mm) 38.1 (A/F) x 44

Min-Max. Temp -50˚C • 125˚C

Connector 10-32 UNF Microdot, TNC

Sensing Element
Shear Plate Piezo-Ceramic

Mounting
Base tapped ¼-28 UNF x 4mm deep

High Shock Mono-axial IEPE Accelerometers

Integral Electronics, Voltage Output

All dimensions given in mm (L x W x H) not including the connector

A/161, A/161-1 -10,000g Range

Sensitivity
0.5mV/g

Weight 10gm

Size (mm)
Ø13.2 x 26

Min-Max. Temp
-40˚C • 121˚C

Connector
M5 or Integral Cable

Sensing Element
Shear Plate Piezo-Ceramic

Mounting
M5 stud

A/162, A/162-1 25,000g Range

Sensitivity
0.2mV/g

Weight 10gm

Size (mm)
Ø13.2 x 26

Min-Max. Temp
-40˚C • 121˚C

Connector
M5 or Integral Cable

Sensing Element
Shear Plate Piezo-Ceramic

Mounting
M5 stud (A/162)
M6 stud (A/162-1)

A/163-1 -50,000g Range

Sensitivity
0.1mV/g

Weight 16gm

Size (mm)
Ø13.2 x 26

Min-Max. Temp
-40˚C • 121˚C

Connector
Integral Cable

Sensing Element
Shear Plate Piezo-Ceramic

Mounting
M6 stud

Low Cost Mono-axial Industrial IEPE Accelerometers

A/140

Sensitivity 100m/Vg

Weight (exc cable)
85g

Size (mm)
Ø21 x 52

Min-Max. Temp
-50˚C • 120˚C

Connector
2 pin MIL-C-5015

Sensing Element
Konic Shear® Piezo-Ceramic

Mounting
Base tap ¼-28 UNF

A/140/C

Sensitivity 100m/Vg

Weight (exc cable)
99g

Size (mm)
Ø22 x 36

Min-Max. Temp
-50˚C • 120˚C

Connector
3m int. cable

Sensing Element
Konic Shear® Piezo-Ceramic

Mounting
Base tap ¼-28 UNF

A/140/SC

Sensitivity 100m/Vg

Weight (exc cable)
149g

Size (mm)
26 x 37

Min-Max. Temp
-50˚C • 120˚C

Connector
3m int. cable

Sensing Element
Konic Shear® Piezo-Ceramic

Mounting
Through hole

A/140/SW

Sensitivity 100m/Vg

Weight (exc cable)
149g

Size (mm)
26 x 37

Min-Max. Temp
-50˚C • 120˚C

Connector
3m int. cable

Sensing Element
Konic Shear® Piezo-Ceramic

Mounting
Through hole

A/140/W

Sensitivity 100m/Vg

Weight (exc cable)
99gm

Size (mm)
Ø22 x 36

Min-Max. Temp
-50˚C • 120˚C

Connector
3m int. cable

Sensing Element
Konic Shear® Piezo-Ceramic

Mounting
Base tap ¼-28 UNF

Mono-axial Industrial Piezoelectric Accelerometers

Charge Output

All dimensions given in mm (L x W x H) not including the connector

A/53/F, A/53/F/HT

Sensitivity
12pC/g *(A/53/F)*,
1.7pC/g *(A/53/F/HT)*

Weight (exc cable)
20gm

Size (mm)
33 x 12.7 x 14.2

Max. Temp
260˚C *(A/53/F)*
400˚C *(A/53/F/HT)*

Connector
Int. Cbl, 2 pole connector 7/16 UNS, HT Microdot

Sensing Element
Konic Shear®
Piezo-Ceramic

Cable Integral Hardline Cable

Mounting 2 x Ø5.2mm holes @ 24.4mm ctrs.

A/52/F, A/52/F/HT

Sensitivity
100pC/g *(A/52/F)*,
12pC/g *(A/52/F/HT)*

Weight (exc cable)
100gm *(A52/F)*
123gm *(A/52/F/HT)*

Size (mm)
50.8 x 28.6 x 21.7

Max. Temp
260˚C *(A/52/F)*
400˚C *(A/52/F/HT)*

Connector
Int. Cbl, 2 pole connector 7/16 UNS, HT Microdot

Sensing Element
Konic Shear®
Piezo-Ceramic

Cable Integral Hardline Cable

Mounting 2 x Ø6.4mm holes @ 38.1mm ctrs.

A/81/F, A/81/F/HT

Sensitivity
230pC/g *(A/81/F)*,
35pC/g *(A/81/F/HT)*

Weight (exc cable)
150gm (A/81/F)
160gm (A/81/F/HT)

Size (mm)
50.8 x 28.6 x 24.6

Max. Temp
260˚C *(A/81/F)*
400˚C *(A/81/F/HT)*

Connector
Int. Cbl, 2 pole connector 7/16 UNS, HT Microdot

Sensing Element
Konic Shear®
Piezo-Ceramic

Cable Integral Hardline Cable

Mounting 2 x Ø6.4mm holes @ 38.1mm ctrs.

A/301/F, A/301/F/HT

Sensitivity
220pC/g *(A/301/F)*
25pC/g *(A/301/F/HT)*

Weight
150gm

Size (mm)
31.5 x 31.5 x 25.4

Max. Temp
260˚C *(A/301/F)*
400˚C *(A/301/F/HT)*

Connector
2 pole connector 7/16 UNS

Sensing Element
Konic Shear®
Piezo-Ceramic

Mounting 4 x Ø3.8mm holes 24.7mm PCD

A/107/F, A/107/F/HT

Sensitivity
100pC/g *(A/107/F)*
10pC/g *(A/107/F/HT)*

Weight
80gm

Size (mm)
29.2 x 29.2 x 24.5

Max. Temp
260˚C *(A/107/F)*
400˚C *(A/107/F/HT)*

Connector
2 pole connector 7/16 UNS

Sensing Element
Konic Shear®
Piezo-Ceramic

Mounting
3 x Ø3.2mm holes 25.4mm PCD

Voltage Output

A/1107/V

Sensitivity 100mV/g

Weight 85gm

Size (mm)
29.2 x 29.1 x 24.5

Max. Temp 185˚C

Connector
2 pole connector 7/16 UNS

Sensing Element
Konic Shear®
Piezo-Ceramic

Mounting
3 x Ø4.7mm holes 30.2mm PCD

A/172/VF

Sensitivity 100mV/g

Weight 130gm

Size (mm)
40.2 x 36.4 x 24.7

Max. Temp 185˚C

Connector
2 pole connector 7/16 UNS

Sensing Element
Konic Shear®
Piezo-Ceramic

Mounting
3 x Ø5mm holes 34.29mm PCD

Piezoelectric Dynamic Pressure Transducers

M/02/F, M/02/T

Sensitivity 5nC/bar nom.

Weight 46gm (F) 70gm (T)

Size (mm) 23 (F) 33.5 (T)

Min-Max. Temp -50˚C • 250˚C

Max Wkg. Pressure 200 bar

Deviation -5% @ -50°C
+15% @ +250°C

Connector 10-32 UNF Microdot skt

Case Seal Welded, hermetic diaphragm

M/02/FA, M/02/TA

Sensitivity 5nC/bar nom.

Weight 56.5gm (FA) 77gm (TA)

Size (mm) 36 (FA) 42 (TA)

Min-Max. Temp -50˚C • 250˚C

Max Wkg. Pressure 200 bar

Deviation -5% @ -50°C
+15% @ +250°C

Connector 10-32 UNF Microdot skt

Case Seal Welded, hermetic diaphragm

DC MEMS Accelerometer Range

The AM range of accelerometers are MEMS (micro electro mechanical system) DC response devices for testing low frequency vibration measurement from DC (0Hz) and above. They are a variable capacitance design and are available with a 2m integral cable fitted with a 7 pin connector to suit the DJB DCM-03 MEMS signal conditioning unit or alternatively as bare wires.

Ideally suited to low frequency vibration application including low level vibration where high sensitivity is required. Due to their ability to measure DC response they can also be used to measure constant gravity application.

DJB's range of MEMS accelerometer are available in monoaxial, biaxial and triaxial versions with most types also available as high resolution.

	Model	Sensitivity	g Range	Weight	Size	Temp. Range	Mounting
Monoaxial	AM/2.1000	1000mV/g	± 2g	22gm	21.5 x 21.5 x 10.5mm	-40°C to +85°C	4 x Ø3.1mm holes
	AM/2HR.1000	1000mV/g	± 2g	22gm	25 x 25 x 12mm	-40°C to +85°C	4 x Ø3.1mm holes
	AM/5.300	300mV/g	± 5g	22gm	21.5 x 21.5 x 10.5mm	-40°C to +85°C	4 x Ø3.1mm holes
	AM/10HR.200	200mV/g	± 10g	22gm	25 x 25 x 12mm	-40°C to +85°C	4 x Ø3.1mm holes
	AM/20.100	100mV/g	± 20g	22gm	21.5 x 21.5 x 10.5mm	-40°C to +85°C	4 x Ø3.1mm holes
	AM/50HR.40	40mV/g	± 50g	22gm	25 x 25 x 12mm	-40°C to +85°C	4 x Ø3.1mm holes
Biaxial	AMB/2.1000	1000mV/g	± 2g	23gm	20.5 x 20.5 x 20.5mm	-40°C to +85°C	4 x Ø2.5mm holes or M5 tapped base
	AMB/2HR.1000	1000mV/g	± 2g	40gm	28 x 28 x 25mm	-40°C to +85°C	2 x Ø4mm holes or M5 tapped base
	AMB/5.300	300mV/g	± 5g	23gm	20.5 x 20.5 x 20.5mm	-40°C to +85°C	4 x Ø2.5mm or M5 tapped base
	AMB/10HR.200	200mV/g	± 10g	40gm	28 x 28 x 25mm	-40°C to +85°C	2 x Ø4mm holes or M5 tapped base
	AMB/20.100	100mV/g	± 20g	23gm	20.5 x 20.5 x 20.5mm	-40°C to +85°C	4 x Ø2.5mm or M5 tapped base
	AMB/50HR.40	40mV/g	± 50g	40gm	28 x 28 x 25mm	-40°C to +85°C	2 x Ø4mm holes or M5 tapped base
Triaxial	AMT/2.1000	1000mV/g	± 2g	23gm	20.5 x 20.5 x 20.5mm	-40°C to +85°C	4 x Ø2.5mm or M5 tapped base
	AMT/2HR.1000	1000mV/g	± 2g	40gm	28 x 28 x 25mm	-40°C to +85°C	2 x Ø4mm holes or M5 tapped base
	AMT/5.300	300mV/g	± 5g	23gm	20.5 x 20.5 x 20.5mm	-40°C to +85°C	4 x Ø2.5mm or M5 tapped base
	AMT/10HR.200	200mV/g	± 10g	40gm	28 x 28 x 25mm	-40°C to +85°C	2 x Ø4mm holes or M5 tapped base
	AMT/20.100	100mV/g	± 20g	23gm	20.5 x 20.5 x 20.5mm	-40°C to +85°C	4 x Ø2.5mm or M5 tapped base
	AMT/50HR.40	40mV/g	± 50g	40gm	28 x 28 x 25mm	-40°C to +85°C	2 x Ø4mm holes or M5 tapped base

MEMS 3 Channel Signal Conditioning

The DCM-03 MEMS DC signal conditioner is for use with DJB's range of AM, AMB and AMT variable capacitance MEMS accelerometers. The unit has 3 channels and can be used with three single axis capacitive accelerometers or one triaxial capacitive accelerometer. Offering a wide range of features in a compact and powerful unit the DCM-03 is the perfect addition to your low frequency testing system.

Features

- LED display
- Wide frequency band and low noise
- Adjustable low pass filter
- Mains powered
- User selectable gains
- Output overload indicator

Instrumentation

DJB Instruments offer a wide range of instrumentation for use with charge, IEPE & MEMS accelerometers. From single channel low cost units through to modular high channel racks, solutions for both charge or IEPE signal conditioning/ amplification are available.

Signal conditioning can be integrated into miniature in-line solutions avoiding the need for additional boxes. DJB's QV/02 and QV/04 range of in-line are among the smallest in the world.

Impact hammers and hand held vibration equipment also form part of the growing product range available from DJB.

- Impact hammers from 50N to 50,000N range are available, each supplied in a neat carry case with cable and various hammer tips.
- Handheld vibration calibrator, the VC/01 is an ideal tool for field checking accelerometers.
- The VS1 hand held vibration meter is everything a machine monitoring engineer could want.

Instrumented IEPE Impact Hammer Range

All dimensions given in mm (L x W x H) not including the connector

IH-01-50

Sensitivity 100mV/N

Measuring Range 50N

Hammer Mass 24gm

Head Diameter 14mm

Hammer Length 130mm

Output Connector BNC

Tips Supplied
Stainless Steel, Aluminium, Nylon, Rubber

IH-01

Sensitivity 25mV/N

Measuring Range 200N

Hammer Mass 120gm

Head Diameter 18mm

Hammer Length 250mm

Output Connector BNC

Tips Supplied
Stainless Steel, Aluminium, Nylon, Rubber

IH-02

Sensitivity 2.5mV/N

Measuring Range 2000N

Hammer Mass 180gm

Head Diameter 16mm

Hammer Length 250mm

Output Connector BNC

Tips Supplied
Stainless Steel, Aluminium, Nylon, Rubber

IH-05

Sensitivity 1mV/N

Measuring Range 5000N

Hammer Mass 220gm

Head Diameter 20mm

Hammer Length 250mm

Output Connector BNC

Tips Supplied
Stainless Steel, Aluminium, Nylon, Rubber

IH-10

Sensitivity 0.5mV/N

Measuring Range 1000N

Hammer Mass 750gm

Head Diameter 32mm

Hammer Length 340mm

Output Connector BNC

Tips Supplied
Hard tip, Medium tip, Soft tip

IH-20

Sensitivity 0.25mV/N

Measuring Range 20000N

Hammer Mass 950gm

Head Diameter 32mm

Hammer Length 350mm

Output Connector BNC

Tips Supplied
Hard tip, Medium tip, Soft tip

IH-50

Sensitivity 0.1mV/N

Measuring Range 50000N

Hammer Mass 1300gm

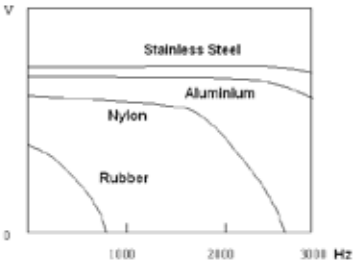
Head Diameter 51mm

Hammer Length 390mm

Output Connector BNC

Tips Supplied
Hard tip, Medium tip, Soft tip

Excitation pulse width and frequency response vary with hammerhead materials. Response curves are for indication only



AF Impedance Head

AF/50/5

Sensitivity - Force 5mV/N

Sensitivity – Acceleration 50mV/g

Weight 30gm

Size (mm) 17 x 28mm

Min-Max. Temp -40˚C • 121˚C

Connector M5 Microdot

Sensing Element Shear Plate Piezo-Ceramic

Mounting M5 Base tapped

AF/100/10

Sensitivity - Force 10m V/N

Sensitivity – Acceleration 100mV/g

Weight 30gm

Size (mm) 17 x 28mm

Min-Max. Temp -40˚C • 121˚C

Connector M5 Microdot

Sensing Element Shear Plate Piezo-Ceramic

Mounting M5 Base tapped

Hand Held Calibrator

VC-01

The VC-01 hand held calibrator is a low cost reference device that allows the user to quickly check the response of accelerometers at a known fixed frequency and level. Ideal for use in the field or in a lab. Its simple one button operation ensures all the user needs to do is fix the test accelerometer to the top of the calibrator either using the supplied stud or via adhesive/ petrowax and press the button. The output can be monitored on any signal analyser or scope and the level checked against the known excitation level.

Features:

Battery powered with auto shutdown, lightweight, simple one button operation, stud adaptor included, rugged black anodised aluminium case, battery level indicator.

Acceleration Amplitude (RMS)	9.81m/s² (1g) ±3%
Vibration Frequency	159.2Hz ±0.5%
Output Waveform	Sine
Waveform distortion	≤5%
Maximum Load (gms)	120
Working Temperature °C	0 to +55
Storage Temperature °C	-45 to +85

Maximum Humidity %RH	95
Weight (approx. gms)	500
Mounting	M5 tapped hole (variety of studs available)
Case Material	Aluminium
Dimensions (mm)	Ø52 x 148 (H)
Auto Shutdown (s)	50
Power indicator	Normal: Green Low Battery: Orange

Hand Held Vibration Meter

VS1

The VS1 is DJB's new generation of hand held vibration meter. It is a compact, rechargeable, hand held Vibration Meter designed to conform to ISO10816-3 and operates with a constant current IEPE accelerometer providing accurate vibration measurement.

VS1 kit Includes:

- Vibration Meter
- Magnet
- Coiled Sensor Cable.
- Probe
- 4 ¼ - 28 UNF Spike
- Carry Case and Handbook
- USB A to B with Charger and Worldwide Adapters

VS1 Features:

- Storage of up to 100 time-stamped readings.
- Vibrant colour LCD Display.
- Rechargeable Lithium-ion battery with worldwide charger.
- RMS, peak, peak-peak, crest factor readings in acceleration, velocity or displacement modes.
- Bearing condition mode (acceleration and velocity).
- Industrial Rubber Case.
- Adaptive amplifier for high accuracy.
- AC output.
- Audio output for listening to vibration directly.

Charge & IEPE Amplifiers

Charge

CA/04/N, CA/04/NL, CA/04/NH, CA/04/EH

Frequency
Extended Low Frequency Response

Output
Normalised O/P 3.16V/g (max)

Input range
1/110pC/g (CA/04/N)
0.1/11pC/g (CA/04/NL)
10/1100pC/g (CA/04/NH)
100/11000pC/g (CA/04/EH)

Bandwidth
0.1/100kHz

Warning indicators
Overload LED

CA/04/V (Velocity)

Frequency
n/a

Output
O/Ps 100mV/g
& 1V/mm/sec. (max)

Input range
1/110pC/g

Bandwidth
0.7/100kHz

Warning indicators
n/a

CA/04/D (Differential)

Frequency
n/a

Output
n/a

Input range
1/110pC/g (CA/04/D)
10/1100pC/g (CA/04/DH)

Bandwidth
0.7/100kHz

Warning indicators
n/a

Charge & IEPE

DIN Rail Mounted Charge or IEPE Source Amplifier CV1-C, CV1-V

Output
Fixed gain selectable on request

Output Connector
Terminal Block

Input Connector
SMC

Warning indicators
Power on

Please note:
Other options including filters are available on our website.

9 Channel Charge IEPE or Combined Source Amplifier
See Page 23 for options

Input connectors
9 x BNC

Output connectors
9 x BNC

Sensor Excitation
(V & CV only) +24VDC, 2-14mA user selectable

Gain
x1, x10, x100
selectable per channel

Bandwidth
0.5/500kHz Max.

Warning indicators
Open/short circuit

IEPE

Single Channel IEPE Source Amplifier VV/04

Output
Normalised O/P 31.6V/g (max)

Input range
1/110mV/g

Bandwidth
3dB Bandwidth
0.4Hz/100kHz

Warning indicators
Transducer O/C and S/C Fault detection

4 Channel IEPE Source Amplifier V4/04

Output AC

Gain
x 1, 3.16, 10, 31.6 and 100

Output Connector
n/a

Input Connector
n/a

Warning indicators
Transducer O/C and S/C Fault detection
O/L Indicator

IEPE Battery Powered

IEPE Battery Supply VB/01

Gain
x 1 only

Output Connector
BNC

Input Connector
BNC

Warning indicators
Transducer O/C and S/C detection
Power on

Batteries Required
x2 PP3 9V

IEPE Battery Supply VB/02

Gain
x 1, x 10, x 100 user selectable

Output Connector
BNC

Input Connector
BNC

Warning indicators
Transducer O/C and S/C detection
Power on

Batteries Required
x2 PP3 9V

Level Alarm

Level Alarm LA/04

Features
High level alarm indicator
Alarm timer eliminates spurious triggering,
Programmable alarm Setpoint and timer,
Latching non-latching alarm mode

Input
Single ended

Portable and Rack Based Housings



DJB's range of modular instrumentation can be supplied in portable and rack base housings suited for use with any of the 04 range of instrumentation modules seen on pages 22,24.

PC/04 - Portable housings with up to 4 single width slots are available with user selectable input and output connectors, usually microdot or BNC. Housings also include power supply, module interconnections for a wide range of module combinations. Power options include standard AC power in addition to DC 12/28VDC.

For input/output connector options contact our sales team **sales@djbinstruments.com**

9 Channel Charge, IEPE or Combined Source Amplifier

As an alternative to the modular solution, DJB also offer a range of 9 Channel rack based Amplifiers, the CV9 range is available in three versions, all offering simple front panel BNC input and output connectors and all available as AC or DC powered racks.

Signal Conditioning and Amplification - Charge

CV9-C: A 9 channel charge amplifier with individually selectable gain (x1, x10, x100) per channel via a three way switch.

CV9-CL: A 9 channel charge amplifier with individually selectable gain (x0.1, x1, x10) per channel via a three-way switch.

CV9DC-C: A DC powered 9 channel charge amplifier with individually selectable gain (x1, x10, x100) per channel via a three-way switch.

Signal Conditioning and Amplification - IEPE

CV9-V: A 9 channel IEPE signal conditioner with individually selectable gain (x1, x10, x100) per channel and user selectable 2-14mA supply.

CV9DC-V: A DC powered 9 channel IEPE signal conditioner with individually selectable gain (x1, x10, x100) per channel via a three-way switch and user selectable 2-14mA supply.

Signal Conditioning and Amplification - Combined Charge & IEPE

CV9-CV: A 9 channel source amplifier, individual channels are switchable from IEPE to charge amplification, with individually selectable gain (x1, x10, x100) per channel and user selectable 2-14mA supply.

CV9DC-CV: A DC powered 9 channel source amplifier, individual channels are switchable from IEPE to charge amplification, with individually selectable gain (x1, x10, x100) per channel and user selectable 2-14mA supply.

Features

- Short circuit/open circuit warning indicator
- IEPE Constant Current Source, user selectable via internal jumpers
- Switchable Gain x1, x10 and x100 for charge and voltage inputs (x0.1, x1 & x10 CV9-CL), Individual channel selectable.
- Front Panel BNC input/output connectors
- 19" Rack Mountable Enclosure

Power

Input connector IEC 320

Input AC: 105-240 V AC

DC: 9-30 V DC

Physical

Weight 2.75kg

Size

H 44.5mm, W 482.6mm, D 348mm

Input connectors 9 x BNC

Output connectors 9 x BNC

Sensor Excitation
(V & CV only) +24VDC, 2-14mA user selectable

Gain x1, x10, x100 selectable per channel (CV9-CL x 0.1, x 1, x10)

Bandwidth 0.5/500kHz Max.

Warning indicators Open/short circuit

Inline Converters

Hybrid Two Wire IEPE Source Line Driver QV/02

Weight
20.5g

Dimensions
Ø15 x 47.5

IEPE
Miniature 2 Wire Charge/ Voltage Converter

Connector
I/P 10-32 UNF Microdot
O/P BNC

Gain
0.1,1 and 10mV/pC

Hybrid Two Wire IEPE Source Line Driver QV/04

Weight
15g

Dimensions
Ø12.5 x 28.5

IEPE
Miniature 2 Wire Charge/ Voltage Converter

Connector
I/P 10-32 UNF Microdot
O/P 10-32 UNF Microdot

Gain
0.1,1 and 10mV/pC

Integrators

Acceleration/ Velocity Converter VM/04

Voltage
Single Integrator
High Pass Filter
Converts Vibration Data from Acceleration to Velocity Format

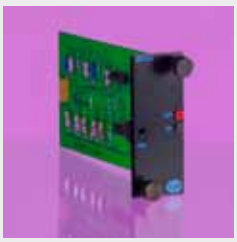
Output
Configurable for optimum signal/ noise down to min. 2Hz

Acceleration/ Displacement Converter DM/04

Voltage
Double Integrator/
High Pass Filter
Converts Vibration Data from Acceleration to Displacement Format

Output
Configurable for optimum signal/noise down to min. 2Hz

Filters



Bandpass Filter BP/04/N BP/04/W

Frequencies
Fixed Frequency Bandpass Filters
1Hz/15kHz Tuning Rate

High Pass
Customer Selectable

Low Pass
Customer Selectable

DIN Rail Mounted Filter Module CV1-F CV1-VF

Frequencies
Fixed Frequency factory set to customer spec.
Variable Frequency set by DIP switch, 255 steps

High Pass
Range of High pass filters available

Low Pass
Range of Low pass filters available

LHP Filter

Modular Switchable Low/High Pass Filter

Available as a single channel DC powered unit or up to 9 channels in a AC/DC powered chassis. Utilising simple BNC input and output connectors on the front panel, with user selectable AC/DC coupling and IEPE signal source (4mA/20VDC).

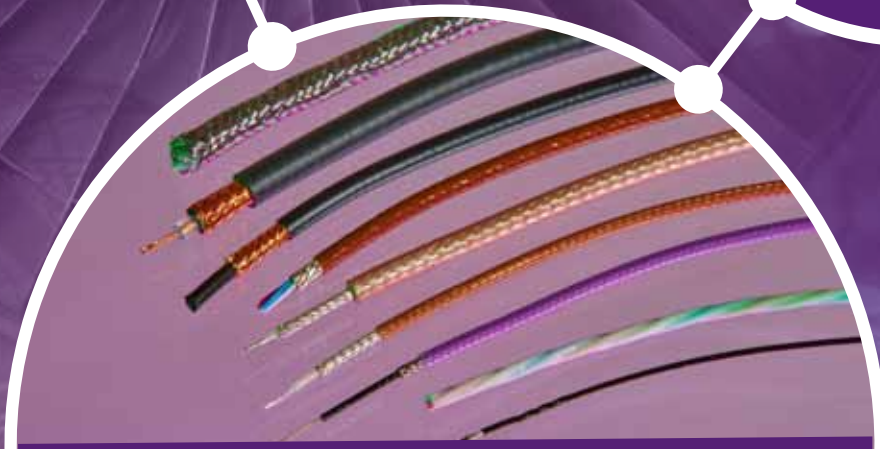
For more details visit our website.

Features:

- Input Overload Indicator
- Frequencies: Full range of filter responses available, Butterworth, Bessel, anti-alias & general purpose
- Switchable High/Low Pass
- Single ended/differential input
- Modular System
- 6 Gain steps to x50

Cable Assembly

Specialist cable & assembly for challenging applications - Anything is possible! DJB provides a bespoke cable assembly service offering a vast range of cables from just 0.8mm diameter, including low noise and armoured solutions whilst offering a wide range of connectors made both in house and off the shelf. This, together with excellent relationships with cable manufacturers, means we can be very supportive of special requests.



Cables & Accessories

Free Cable Inspection

DJB offers a service where you can send up to 20 cables for us to inspect free of charge. We will supply a report detailing the health of your cables for you to assess your options

Cable Repair Service

Save money and be 'GREEN' to boot by utilising your existing cables. We can make good of most manufacturers and with the free cable inspection prior to commencing, you will be kept up to speed right throughout the process.

How confident are you that your current cables are aiding your work without ultimately affecting the data? Why not take advantage of the free cable inspections service so you can be sure of peak performance.

Accessories

Cables

Softline Low Noise Cable for use with Charge or IEPE Accelerometers/Sensors

Cable Code	Description	Max Temp	O/D
T08	PFA Jacket - coaxial screened	200˚C	0.8mm
T10	FEP Jacket - coaxial screened	200˚C	1.0mm
T18	PFA Jacket - coaxial screened	260˚C	1.8mm
T23	PTFE Jacket - screened twin core	260˚C	2.3mm
P39	PVC Jacket - coaxial extendable coil	80˚C	3.9mm
P45	PVC Jacket - coaxial screened	85˚C	4.5mm
P52	PVC Jacket - screened twin core	60˚C	4.5mm

Softline Non-Low Noise Cable for use with IEPE Accelerometers/Sensors

Cable Code	Description	Max Temp	O/D
S18	FEP Jacket - coaxial screened	200˚C	1.8mm
S28	PVC Jacket - coaxial screened	70˚C	2.8mm
S30	FEP Jacket - coaxial double screened	200˚C	3.0mm
S51	PVC Jacket - coaxial screened	80˚C	5.0mm
SC42	Stainless Steel overbraided screened twin core	120˚C	4.2mm
S55	PVC Jacket – coaxial screened	80˚C	5.6mm

Softline Multi-Core Cable

Cable Code	Description	Max Temp	O/D
LT17	FPA Jacket - 3 core low noise screened	260˚C	1.8mm
ET25	FEP Jacket - 4 core screened	200˚C	2.5mm
SM35	PVC Jacket - 4 core screened	80˚C	3.5mm
Z21	Halogen free coaxial cable	70˚C	1.95mm
ET36	FEP Jacket - 9 core cable	200˚C	3.6mm

Hardline High Temperature Cable - Stainless Steel Jacket with Mineral Insulation

Cable Code	Description	Max Temp	O/D
HL15	Stainless steel mineral insulated - twin core	800˚C	1.5mm
HL30	Stainless steel mineral insulated - twin core	800˚C	3.0mm
HL25	Stainless steel mineral insulated - triaxial	800˚C	2.5mm

Please see our handy guide for explanation of our cable codes.

Using the cable and connector codes we have devised a system to ensure our custom cables are exact to your specifications. Don't forget we offer a free inspection service for up to 20 cables in which you will receive a report to consider your options.

The best way is to show you is by example. **Microdot to BNC via low noise cable at 3m in length = MP2 / BC1 / T18 / 30**

Connector	Connector	Cable	Length
1st Connector Usually to suit the accelerometer	2nd Connector Usually to suit the data acquisition system	Cable Type	Length (in decimetres) ie. 3m = 30 5m = 50
MP2	BC1	T18	30

Cable assembly for a triaxial accelerometer

4S-1 to 4F via ET25 cable at 2.7m broken out to 3off non low noise cable at 3m ended in 3off BNC =
4S-1 / ET25 / 27 / 4F / 3S18 / 3 / 3BC1

Connector	Cable	Length		Cable	Length	Connector
1st Connector Usually to suit the accelerometer	Cable Type	Length (in decimetres) ie. 3m = 30 5m = 50	Joiner for break out cables	Cable Type	Length (in decimetres) ie. 3m = 30 5m = 50	2nd Connector Usually to suit the data acquisition system
4S-1	ET25	27	4F	3S18	3	3BC1

Accessories

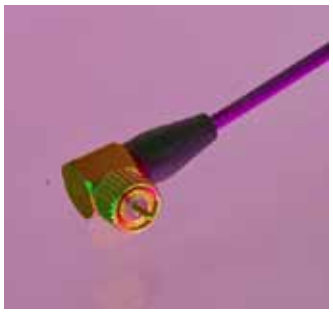
Joiners / Adapters

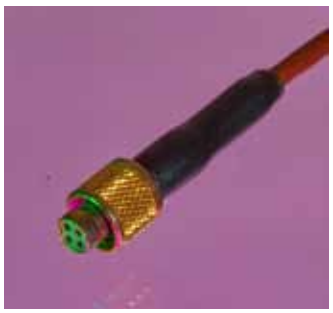
Product Code	Description
BB	Bulkhead joiner for BNC plug and microdot plug.
BBB	Isolated BNC to BNC bulkhead socket
BJ	Inline joiner for microdot plug and BNC socket
BSJ	BNC to BNC joiner socket
MB	Bulkhead joiner for microdot plug
MJ	Inline joiner for microdot plug
MJ-I	Inline joiner for microdot plug inc. isolating bush
MJT	Bulkhead joiner for microdot socket – TNC plug
TB	TNC bulkhead socket

Connectors

This is a selection of connectors available. DJB holds an extensive range to assist multiple applications. Contact us to discuss your requirements.

Product Code	Description
4P-1	¼-28 UNF 4 pin connector plug
4S	M4.5mm, 4 pin connector socket
4S-1	¼-28 UNF 4 pin connector socket
7P	2 pole 7/16 UNS free plug
7S	2 pole 7/16 UNS free socket
BC	BNC plug
BS	BNC socket
FC103	Fischer 6 pole series 103 connector
KP	M3.5 Mini-microdot plug
KP5	5-44UNC Mini-microdot plug
L8	Connector for A/28/E
LP5	Lemo 5 pin plug
LP7	Lemo 7 pin plug
LP8	Lemo 8 pin plug
M2	Microdot plug for 2.5mm tri-ax hardline cable - high temp
M5	M5 Microdot plug
MP	10-32 UNF Microdot plug
MIL-C-5015	2 pole connector
MPS	10-32 UNF Microdot plug sealed IP64
MR	Right-angled 10-32 UNF microdot plug
MS	10-32 UNF Microdot socket
SMB	SMB connector
SMBS	SMB Crimp plug fitted to 2.8mm cable
SMC	SMC Crimp plug
SS	Sealed flanged 10-32 UNF microdot plug IP64
TC	TNC Clamp plug
TCHB	TNC Clamp plug with heatshrink boot
TP	Lemo mini twin plug



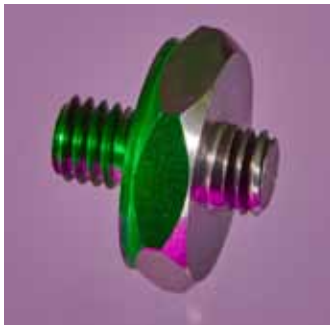


DJB provides a bespoke cable assembly service offering a vast range of cables from just 0.8mm diameter, including low noise and armoured solutions, whilst offering a wide range of connectors made both in house and off the shelf. The extensive cable facility on site at DJB enables us to supply and fit any commercially available connector – contact us for more details. Anything is possible!

Mounting Accessories

Non Isolated Mounting Studs/Bases

Product Code	Description
SF/01	Flat adhesive base, 22.2mm diameter, 5.8mm x ¼-28 UNF thread
SF/02	Flat adhesive base, 12mm diameter, 3.7mm x 10-32 UNF thread
SF/03	Flat adhesive base, 15.9mm diameter, 3.3mm x 10-32 UNF thread
SP/01	Mounting stud, 4.2mm ¼-28 UNF / 12.7mm ¼-28 UNF thread
SP/02	Mounting stud, 2.7mm 10-32 UNF / 9.7mm 10-32 UNF thread
SP/03	Mounting stud 2.7mm 10-32 UNF / 5.0mm M5 thread
SP/04	Mounting stud 2.7mm 10-32 UNF / 5.0mm M6 thread
SA/03	Adhesive base for A/23/S, A/123/S, A/23/TS, A/123/TS
SA/04	Adhesive base for A/24/TS, A/124/TS



Isolated Mounting Studs/Bases

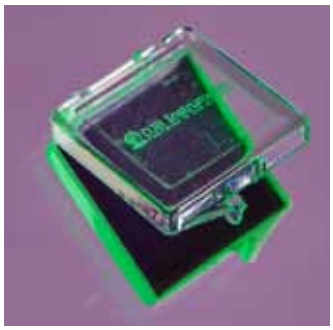
Product Code	Description
IS/01	Flanged Mounting Stud, 2.8mm 10-32 UNF / 5.0mm 10-32 UNF thread
IS/02	Flanged Mounting Stud, 2.8mm 10-32 UNF / 5.0mm M5 thread
IS/03	Flanged Mounting Stud, 3.7mm 10-32 UNF / 5.0mm 10-32 UNF thread
IS/04	Flanged Mounting Stud, 3.7mm 10-32 UNF / 5.0mm M5 thread
IS/05	Flanged Mounting Stud, 4.1mm ¼-28 UNF / 5.0mm ¼-28 UNF thread
SI/03	Flanged Mounting Stud, 3.7mm 10-32 UNF / 14.5mm 10-32 UNF thread
SI/10	Flanged Mounting Stud, 3.7mm 10-32 UNF / 5mm M6 thread
SI/14	Flanged Mounting Stud10-32 UNF/M5
SI/22	Stud Kit for A/22 inc within the A/22
CL/01	AT/13 clip (bag of 50 MOQ)

Isolated Mounting Magnets

Product Code	Description
IM/01	20.6mm A/F, 3.7mm 10-32 UNF stud
IM/02	20.6mm A/F, 10-32 UNF tapped hole
SM/01	Adaptor stud for use with IM/02, 10-32 UNF / 5-40 UNC
SM/02	Adaptor stud for use with IM/02, 10-32 UNF / ¼-28 UNF
SM/03	Adaptor stud for use with IM/02, 10-32 UNF / M6
SM/04	Adaptor stud for use with IM/02, 10-32 UNF / 10-32 UNF

Triaxial Mounting Blocks

Product Code	Description
FB1	Stainless steel 10-32 UNF tapped on 5 faces, supplied with 2 x M4 mounting bolts
FB2	Stainless steel M5 tapped on 5 faces, supplied with 2 x M4 mounting bolts



Petro Wax

Product Code	Description
Petro Wax	25mm Square box

Bespoke Junction Boxes

DJB can manufacture a range of tailor made junction boxes to suit any application. Boxes are available in a variety of finishes including metal die cast or powder coated and can be supplied with flanges or holes for wall mounting.

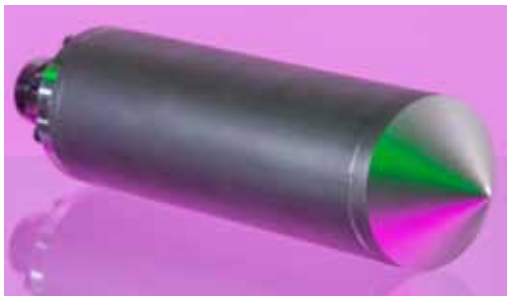
Channel counts from 4 to 64 are available, input connectors are typically BNC or 10-32UNF Microdot, but can be any type of connector available. Input channels are identified by engraved numbers. Cables can be prefitted and exit the box via a stainless steel cable gland for robustness. Cable length and terminating connector are customer specified and all cables are labelled to match the channel numbers engraved on the junction box.

Contact us for more details sales@djbinstruments.com

Down Hole Seismic Sonde

With Integrated Electronics

The sonde contains three A1800 voltage accelerometers each containing integral electronics to work at temperatures of 125°C. The sensors are configured on three orthogonal axis.



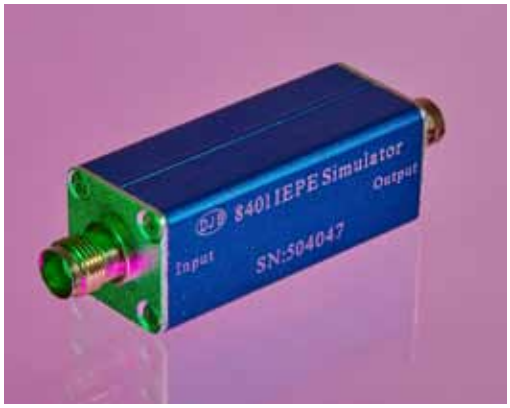
Advantages of Seismic Sondes built by DJB Instruments are:

- Can be deployed in a reasonably deviated well
- Can be deployed to a depth of up to 400m using a standard 100m dia. cased well
- Does not require clamping mechanism as it rests at the bottom
- Large accelerometers and low noise amplifiers;
  - Gives very high output
  - Able to detect small signals
  - No deterioration of signal quality over time
- Able to remove from a borehole very easily for deploying elsewhere
- 76mm diameter allows cost-effective small diameter boreholes
- The selected accelerometer has large bandwidth compared to other seismic sensors such as geophones or seismometers. This facilitates additional analytical treatment such as source parameters etc
- No spurious response within the bandwidth of interest
- Down-hole amplifiers to improve signal to noise ratio
- Can be operated using car batteries and therefore used in remote places
- Low power consumption and therefore the batteries can last for a long time

Diameter 76mm
Length 300mm
Temp Range -50°C to + 125°C
Frequency Response 4Hz to 400Hz
Voltage Sensitivity 10V/g

IEPE Sensor Simulator

Input Voltage: ±5V
Output Bias: 11V ±3VDC
Amplitude Linearity: <2%
Power Supply: 2 to 20mA / +18 to 28VDC
Noise: <40mV
Size: 60mm x 26mm x 60mm
Mass: 120gms



Calibration Services

Ensure precise accurate data results

- Conforms to National traceable standards
- Quick turn around from our purpose built specialist facility
- Includes a cross axis check
- Able to test at high temperature/ high pressure / extended sweeps
- Quickly and accurately determines the sensitivity of instrumented impact hammers

Accelerometers can last for decades if treated properly. However, regular calibration is important as things can change with age. This is your opportunity to check the accelerometer for correct operation and to ensure it has suffered no damage in its day to day handling and use. DJB calibrates both charge and IEPE accelerometers as well as signal conditioning equipment for all manufacturers.
Please contact us for a quotation and turnaround time.

Our calibration service is usually between 1 to 3 days. However, if you have an urgent requirement then give us a call to see how we can best help.

We also now offer a calibration service for Instrumented Impact Hammers

VC-01 Handheld Calibrator
If you would like the option to test subjects yourself periodically, why not invest in a VC-01 Handheld Calibrator.

This is the perfect tool for calibrating accelerometers should you drop them or after a long period of storage when you don't want to send them for a full calibration.

Technical Tips

Factors to consider to maintain consistent and accurate data.

For over 40 years DJB has been making accelerometers, in this time having seen many changes in technology, analysis techniques and the increased reliance on test software. Although the applications for accelerometers has increased, the understanding of how they should be selected, mounted, connected and handled has reduced. Today many engineers see them as a simple sensor, however this is far from the truth, in the world of dynamic vibration measurement, nothing is simple and errors of up to 35% can be introduced before a single piece of data is analysed.

It remains the responsibility of the engineer to collect accurate data. Acquisition software on PC's can't determine good data from bad, so the engineer must ensure accuracy starts at the sensor.

In recent years DJB have been leading the way in providing specific accelerometer training to customers and this guide summarises some key information for your reference.

Topics Covered:

- Accelerometer types (focus on types used for test and measurement or monitoring applications)
- Principles of operation for Piezoelectric accelerometers
- Piezoelectric accelerometer designs
- The pros and cons of piezoelectric, IEPE and MEMS
- Accelerometer specifications explained
- Accelerometer Selection - Points to consider
- Cross axis sensitivity and its control
- Cable selection - Types, correct use and points to consider
- Accelerometer mounting
- Instrumentation - Points to consider

Accelerometer Types for Test, Measurement & Monitoring

Piezoelectric - This was the original accelerometer design principle using the piezoelectric effect discovered by the Curie brothers in 1880. It is an entirely mechanical design converting mechanical energy (vibration) into an electrical charge, this charge output normally has to be converted into a voltage for analysis externally. This design requires no power.

IEPE (Integrated Electronics Piezoelectric) - This uses the same basic principles as the piezoelectric accelerometer with the same mechanical operation, however the charge signal is converted to a voltage using internal electronic amplifier circuitry that is miniaturised and powered by an external power supply providing both DC power and constant current.

MEMS (Microelectromechanical system) - There are 2 primary types of MEMS accelerometer, piezoresistive and variable capacitance, they are both heavily reliant on electronic circuitry and offer true DC frequency measurement for low frequency and constant g measurements.

The Principle of Operation and Design:

Piezoelectric Accelerometers

All piezoelectric accelerometers operate on the same principle, a seismic mass applies a force to a piezoelectric material (crystal or ceramic) and the subsequent stress caused on the material surface outputs a charge which is proportional to the force. The force is affected by the mass size as well as the acceleration level (F-ma). The amount of charge output can also be affected by the amount of piezoelectric material, so high sensitivity accelerometers tend to be quite large and heavy.

For a practical demonstration of this principle visit our Youtube page.

Piezo-resistive

A piezoresistive accelerometer is constructed with a proof mass at the end of an armature and piezoresistors or "Strain Gauges" that measure the electrical resistance of the armature when it is under stress.

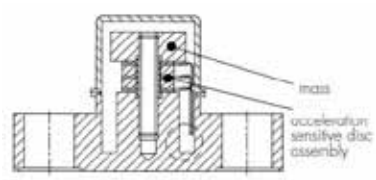
Capacitive

Capacitive accelerometers are created by suspending the proof mass and armature between two plates. This allows the capacitance to be measured between the armature and wall of the accelerometer. This is the most popular construction method.

Piezoelectric Accelerometer Designs

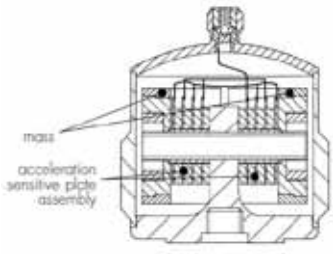
Compression, Shear or Konic Shear®

Compression Mode Accelerometer – Compression mode accelerometers are constructed by the stacking of piezoceramic sensing elements, along with a mass. The sandwiched design is then compressed to a pre-designed load with a screw.



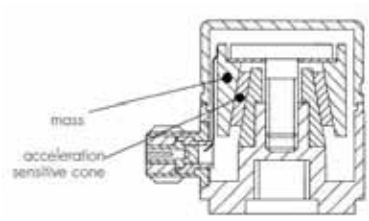
Compression

Shear Mode Accelerometer – Shear mode accelerometers usually involve the piezoelectric sensing elements being mounted radially around a fixed centre post with their seismic masses bolted through to the central post. The sensing elements have shear forces exerted on them when subject to acceleration, the stress in the piezoelectric material is caused by the shearing action and the appropriate charge is output.

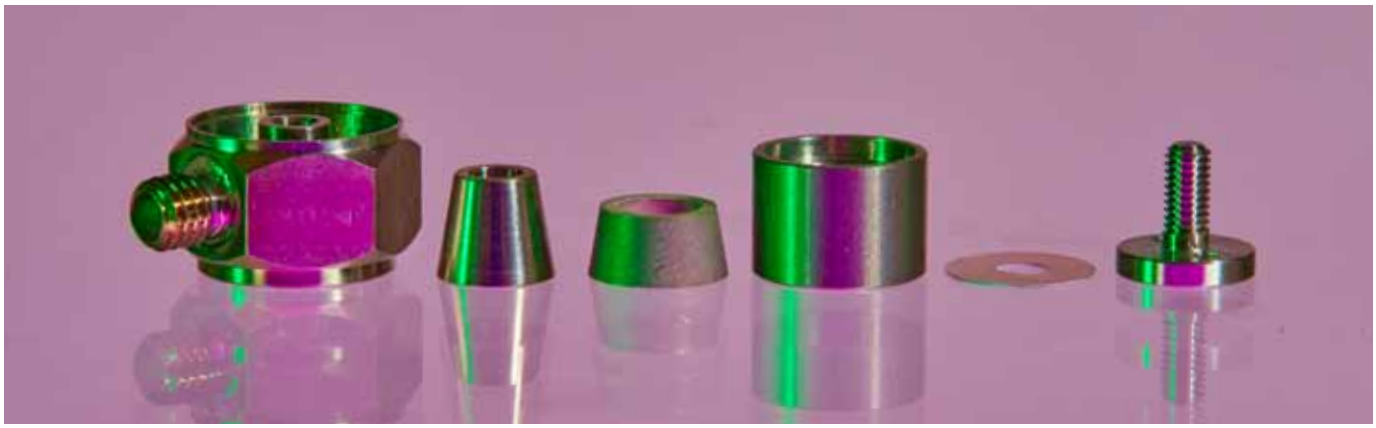


Shear

The Konic Shear® Design – This was a design patented by DJB's founder and remains a unique feature of DJBs accelerometer range today. In this design a hollow piezoceramic cone is mounted onto a spigot connected to the base, with the mass then added, sandwiching the piezoceramic element. As the accelerometer is subject to vibration the mass applies a predominately shearing stress to the surface of the piezoelectric material with a small element of compression.



Konic Shear®



IEPE, Charge & MEMS Accelerometers – Pros and Cons

IEPE:

Pros
- Use wide range of cable types
- Less sensitive to dirt on connectors
- Signal conditioning often built into DAQ systems

Cons
- Lower operating temperature
- More expensive per unit
- Fixed sensitivity
- Less robust due to internal electronics
- More prone to ESD damage

Charge:

Pros
- Higher operating temperature
- Robust mechanical only assembly
- Flexible gain/sensitivity via charge amplifier
- Lower cost per unit
- Unlikely to suffer ESD damage

Cons
- Must use low noise cable type
- Sensitive to dirt on connectors
- Sensitive to cable flex (triboelectric noise)
- Requires charge amplifier

MEMS:

Pros
- Measures DC low frequency response
- High sensitivity for low level vibrations
- Measure constant gravity applications
- Influenced less by noise

Cons
- Restricted temperature operating range
- Restricted frequency range (DC to <1kHz typical)
- Sensitive to damage
- Only measures low level accelerations

Accelerometer Specifications Explained

There are many specifications and lines on a datasheet for an accelerometer, some are easy to understand and relate to unit size, mass or its environmental condition capability, others are less obvious and can cause issues when comparing one manufacturer to another, some terminology Is not common across the markets.

Supply Voltage/Constant current supply – 2-20mA, supply voltage 15-35V DC. This is the range of supply voltage/currents that the IEPE accelerometer will operate with, this should allow it to work with a wide variety of off the shelf data acquisition systems.

Settling time – This is the time taken for the IEPE accelerometer's internal electronics to settle to its bias voltage and reach its operating condition, in modern accelerometers this is typically in the region of 1 second.

Sensitivity – Either rated in pC/g for charge output accelerometers or mV/g for IEPE accelerometers this is the output signal you can expect for a given acceleration and is required to enable conversion of the accel out put into 'g'.

Cross Axis Error – A critical parameter when recalibrating accelerometers. The cross axis error relates to the percentage of the output measured in the primary axis of vibration which is actually due to vibration applied to the accelerometer from a cross axial direction. Typically, less than 5%, this parameter should always be checked at recalibration. DJB's Konic Shear® design is one of the best at minimising cross axis effects due to its radial design. (See page 34 for a more in depth explanation of Cross Axis)

Bias Voltage – Only relevant to IEPE accelerometers, this reflects the operating DC voltage that the integral electronics amplifier circuit operates at when powered. This will vary from one manufacturer to another and higher is not necessarily better than lower, the level is simply a feature of the electronics design.

Saturation Limit – Peak measuring range of the accelerometer.

Base strain/Base bending – is the phenomena whereby an additional strain is applied to the piezoelectric sensing element due to the bending of the base of the accelerometer caused by a bending mode in the test item. This is not part of the vibration measurement and as such is an error. This is a common fault with compressive accelerometer designs, but less so with shear and Konic Shear® designs. This should be less than 5%.

Accelerometer Selection – Points to consider...

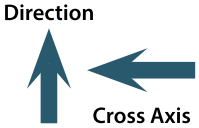
- **Accelerometer Mass** - Mass loading is the effect of adding mass to a test item which then changes the dynamic characteristics of that item. This is an Issue because when testing we are trying to understand the test structures natural responses to vibration, so mass loading must be minimised. The mass of the accelerometer must be relevant to the test structure size/mass and potentially material type.
  We have a great video on our Youtube page to show this phenomenon, well worth a look.
- **Sensitivity** – Consider the measurement range you require. An IEPE accelerometer is limited by its voltage output (nominally 5VAC or 5000mVAC), so a 100mV/g accelerometer measures nominally 50g, whilst a 10mV/g measures 500g. The sensitivity you use needs to cover the whole range of your likely measurement. If you take an IEPE accelerometer beyond its measurement range it will overload and there will be a period of time that it cannot output a signal. Similarly, the sensitivity cannot be too low because a 10mV/g sensitivity will struggle to output enough signal if measuring a 1g acceleration for example.
- **Temperature range** – Charge accelerometers usually operate up to 260°C whilst standard IEPE accelerometers operate up to 125°C. Make sure this matches your requirement. If you need a high temperature IEPE accelerometer, look at our world leading HT range which operate up to 185°C
- **Mounting method** – please see below for more details
- **Cable types** – THIS IS VERY IMPORTANT! Check out page 26 for more details.
- **Calibration** – Accelerometers can last for decades if treated properly. However regular calibration is important as things can change with age. A return to base annual calibration is recommended, this gives a health check up to the sensitivity, frequency response and cross axis output. Also consider how you use your accelerometer, do you do your testing at an elevated or reduced ambient temperature, if so why not get your accelerometer calibrated under the same conditions. See page 22 for more details.
- **Frequency range** – All accelerometers have a flat frequency response range over which the sensitivity does not vary by more than ±5%, ensure this range matches the test range.
- **Connector orientation** – Top or side entry connectors are available, using the correct option will reduce stress on the cable connection, this is critical to ensure no data corruption or loss.
- **IEPE or Charge?** – See page 33 for the pros and cons of IEPE and Charge accelerometers.
- **Instrumentation** - Do you have IEPE signal conditioning available, do you need a charge amplifier? do you need any filtering?

Cross Axis Error

What is it and why is it so important?

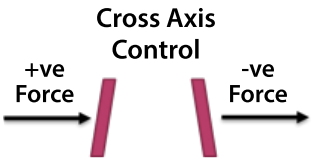
An accelerometer is used to measure acceleration in the axis (or axes) of interest to the engineer, however it is almost inevitable that whatever the accelerometer is mounted on will actually be vibrating In all directions and not just the axis of interest. As a result, the accelerometer is designed to 'ignore' the other vibration inputs by 'pre-polarisation' of the piezoelectric material used to sense vibration. The pre-polarisation aligns the output of the PE material to operate in the direction of vibration and by doing so the output in any cross axis direction is almost zero (less that 5% of the primary axis).

The issue is that over time the pre-polarisation will degrade, causing the cross axis error to rise, this will cause an error in the data analysed. Age, use and temperature affect pre-polarisation so how long this takes will vary. The only way to check the error is to carry out a cross axis calibration which is provided by DJB as part of a standard annual calibration service.



Konic Shear® and Cross Axis

DJB accelerometers using the Konic Shear® design also use pre-polarisation to control cross axis error. However, in addition to this the Konic Shear® design also cancels cross axis error due to its radial design. Any cross axis input causing a stress on one side of the PE ceramic cone is cancelled out by an equal stress reduction on the other side of the cone, this ensures long term cross axis control even as the pre-polarisation degrades.



Cable Selection

The difference between Low noise and Non-Low noise cables... It is important to use the correct cable when using accelerometers.

Charge accelerometers - A charge output accelerometer must be used with a LOW NOISE cable. The term low noise refers to the cables ability to reduce triboelectric noise (otherwise known as motion induced noise) rather than electrical noise. This reduction is accomplished by the inclusion of a graphite/carbon layer or silver wrap on the outer surface of the inner dielectric layer. If a non-low noise cable is used with a charge accelerometer, movement of the cable will add an additional signal into the data causing errors in data analysis. This additional charge is caused by the cable layers rubbing together and generating static electrical charge which gets added to the charge signal being carried by the cable.

IEPE accelerometers – An IEPE accelerometer is much more forgiving and can be used with almost any type of cable. The more traditional coaxial cable is commonly used for these accelerometers. If using both Charge and IEPE accelerometers within your facility. It is best to standardise all cables to be low noise types to avoid potential errors in using the wrong cable.

For more details about cable selection and for a practical demonstration of triboelectric noise please visit our Youtube page.

Accelerometer Mounting Guide

Accelerometer Mounting is a critical part of the testing process and one that is most commonly overlooked having little attention paid to it, most engineers will work on the basis of 'It's not moving when I try and wiggle it so that must be OK!) To maximise data accuracy the accelerometer must be closely coupled with the test item and a poor mounting method can introduce significant errors into the data, particularly as frequency levels rise.

It is interesting to understand the relationship of displacement, acceleration and frequency, the table below gives the figures for the amount of displacement required to generate a 1g signal as different frequencies. Once you appreciate how small displacement become at higher frequency you can start to appreciate how Important it is to ensure the mounting of an accelerometer is both solid and without gaps to the test surface.

Frequency	Displacement		Frequency	Displacement	
1Hz	19.56 in	496mm	1000Hz	0.00002 in	0.0005mm
10Hz	0.20 in	4.97mm	2000Hz	0.000005 in	0.00012mm
35Hz	0.00016 in	0.004mm	3000Hz	0.000002 in	0.00006mm

A summary of the mounting methods is outlined below:

Stud Mount - This is the best and most effective method of mounting an accelerometer. However, there is a need to drill holes in your test item which is not always possible. Stud mounting will give the best frequency response at high levels and to improve coupling a small amount of silicone spray can be used on the test surface prior to mounting the accelerometer. Always use the manufacturers recommended mounting torque when tightening the accelerometer.

Adhesive Mount - This is probably the most commonly used mounting method, however it is also the one that can cause the most problems. It is essential that a minimum amount of adhesive is used, too much and it can cause damping to the vibration transmission as adhesive does not set to be as hard as metal and under vibration acts like a spring or a soft packing material. Cyanoacrylate is an excellent adhesive for this application due to its thin consistency. When removing an accelerometer that has been stuck down do NOT knock it off sideways, this is particularly important for IEPE accelerometers, as the high Impact shock during removal can damage the Internal electronics. It should be twisted off using a spanner or removal tool. Always remove old adhesive before refitting an accelerometer and in doing so try not to damage the base of the accelerometer, most cyanoacrylates have a solvent to soften the adhesive, use this to assist cleaning the surface

Petrowax - Petroleum based wax is a great way of carrying out Modal testing and other quick 'look see' type tests due to the ease of removal and refitting. However, it should only be used for relatively low frequency testing and as with adhesive, a minimal amount of wax should be used due to the potential for damping to occur. Petrowax should only be used at ambient conditions (nominally 20°C) as higher temperature will render the wax useless. Sliding the accelerometer into place with the wax on the base creates a good bond and removes excess wax.

Magnetic Mounts - Magnetic mounts can offer quite high frequency responses but are obviously only appropriate for test items with smooth magnetic surfaces and are more often used for machine monitoring applications. Magnets used are generally of high pull force and as such can damage surfaces if not used appropriately.

Clip Mounts - Clips can be used for low frequency testing such as Modal analysis and are an ideal way of installing triaxial accelerometers in such a way as to make their X,Y,Z axes line up regardless of their mounting orientation. This also means clips can be left in place which makes repeating of the test easier.

Instrumentation - Points to consider

- Charge or IEPE – If you are using a charge accelerometer you will need a charge amplifier. Very few data acquisition systems offer built in charge conditioning, so an external box will be required. IEPE accelerometers can often be connected directly to the acquisition system as the IEPE power is available, an ideal way of minimising hardware needs. If an older acquisition system is used, a range of IEPE signal conditioners is available from battery powered/DC supplied to rack Base multi channel solutions. See pages 22-24 for more details.
- In line Charge Amplifier – This is becoming a very popular way of connecting charge accelerometers, utilising the IEPE power built into many data acquisition systems. The fixed gain amplifier is housed in a BNC/microdot adaptor, allowing it to be connected directly to the data acquisition hardware with a low noise cable attached to a charge accelerometer – see page 24 for more details.
- Filters – Analogue filters enable users to filter out unwanted noise or other spurious signals. See page 24.
- Integrators – Conversion of the accelerometer signal to either a velocity or displacement value is a relatively simple mathematical process.
- Integrators can do this in real time allowing the use of the already converted signal. See page 24.

DJB Instrumentation is available as modular systems in portable case or rack based systems as well as fixed, single or 9 channel solutions.

These are some of the key points, but there is a lot more detail that should be considered for each of these. If you would like to know more or see how accelerometers work and are built, consider attending one of DJB's full training courses at their UK factory and remember 'If in doubt ask!', DJB engineers are available to guide you on the correct choice for your test.

If you would like further information, please visit DJB Instruments UK Ltd website www.djbinstruments.com or email the sales team on sales@djbinstruments.com. If you are active on LinkedIn follow the DJB page as we regularly post technical articles here too.

Training & Refresher Courses

Contact us for the latest available dates on site and at DJB Instruments

Accelerometers - The truth and more

In presenting this training DJB are working towards improved data quality and to educate users and designers about the importance of the accelerometer in the data acquisition process. This course is aimed at existing users, engineers, new users, specifiers and product designers. The course clarifies many of the facts about accelerometers through presentations and practical demonstrations and provides a refreshing view on how to avoid errors and common mistakes.

In detail the course will focus on the following topics:

- Principles of operation – Piezoelectric effect, materials used.
- Accelerometer types and correct selection – Construction, charge output, IEPE, temperature effects, mass loading, sensitivity, common problems, pros and cons.
- Importance of correct cable use - low noise or non-low noise, what happens if you get it wrong, signal loss, tribo-electric noise, cable fixing, connectors.
- Mounting methods and which to use – stud, wax, adhesive, magnets, tape, which and why, isolation, ground loops
- Associated instrumentation – Charge amplifiers, IEPE voltage conditioning, data acquisition.

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