



01

Designed Engineered Manufactured



Technical Reference Guide **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. After some major restructuring and re-investment, the company is now enjoying a period of expansion with truly global aspirations.

DJB is proud to uphold the traditions of quality British manufacturing that has been admired for so long around the world and also maintains the fundamental engineering innovation that Don Birchall was well renowned for. Still the only global accelerometer manufacturer using the Konic Shear design patented by Don and offering significant improvements in performance and cross axis reduction, it continues future innovation through joint academic research programs and internal material developments.

As homage to our founder we have introduced Dynamic Don who will offer technical guidance in selecting and using accelerometers to ensure the very best data quality.

#### Hi, my name is Dynamic Don ...

I will be your guide to help you select the correct accelerometer, cable, signal conditioning and accessories. It is important to consider all the aspects to maximise the quality and accuracy of your data. Wherever you see me I will be providing some technical information.

The old adage of **Rubbish In = Rubbish Out** is very appropriate when using any sort of sensor. It may be the cheapest part of the acquisition and analysis system, but it is also the most important. Did you know that if you use the wrong accelerometer, cable or mounting and don't calibrate regularly, you can introduce errors of up to 35% into your data!! The biggest problem is, you will know nothing about it and neither will your very expensive software that is analysing the signal. All it sees is a voltage and it will analyse whatever it is given. It is YOUR responsibility to handle accelerometers with care and make sure you use and install them correctly.

**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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A UK company providing in-house design, manufacture and assembly with a strong customer focus. For data sheets please visit our website.

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Туре	Sensitivity	Weight	Size (mm)	Min - Max Temp	Connector	Mounting	Page
Mono-axial Piez A/128/V A/127/V A/124/TE A/124/TE A/124/TS A/123/TS A/123/TS A/123/TS A/123/TS A/123/TS A/123/TS A/123/TS A/120/VT A	20-Tronic IEPE Accelerom 1mV/g up to 100mV/g 1mV/g up to 200mV/g 1mV/g up to 200mV/g 1mV/g up to 250mV/g 1mV/g up to 250mV/g 1mV/g up to 250mV/g 1mV/g up to 250mV/g 1mV/g up to 250mV/g 10mV/g up to 1V/g 10mV/g up to 3V/g 100mV/g up to 10V/g 1V/g up to 10V/g 10mV/g up to 10V/g 10mV/g up to 10V/g 10mV/g up to 10V/g 10mV/g IEPEF Accelerom	eters 0.19gm 1.5gm 2gm 2gm 2gm 3.6gm 3.7gm 5.2gm 4.7gm 12.5gm 12.5gm 12.5gm 12.5gm 90gm 90gm 90gm 90gm 112gm 112gm 24gm 24gm 24gm	$ \begin{array}{c} 5.1 \times \ensuremath{\mathcal{O}}3.1 \times \ensuremath{\mathcal{O}}1.1 \times \ensurem$	-50°C • 200°C -50°C • (185°C HT) -50°C • (185°C HT)	L8, M KP KP KP M M M M M M M M M M M M M M M	A A A M4 x 5mm stud A M4 x 5mm stud M4 x 5mm stud A Through hole Base tap 10-32 UNF Base tap 10-32 UNF	4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4
A/161 A/161-1 A/162	0.5mV/g 0.5mV/g 0.2mV/g	8gm 8gm 8gm	Ø12 x 20 Ø12 x 20 Ø12 x 20	-40°C ● 121°C -40°C ● 121°C -40°C ● 121°C	M5 Int. Cbl M5	M5 Stud M5 Stud M5 Stud	5 5 5
A/162-1 A/163-1 Tri-axial Piezo-1	0.2mV/g 0.1mV/g fronic IEPE Acceleromete	8gm 8gm	Ø12 x 20 Ø12 x 23	-40°C • 121°C -40°C • 121°C	Int. Cbl Int. Cbl	M5 Stud M6 Stud	5 5
AT/18 AT/10 AT/14 AT/14/TB AT/14/TB AT/13 A/136/V A/131/V A/134/V A/134/V-3 A/130/V A/130/V-1	1mV/g up to 10mV/g 1mV/g up to 100mV/g 1mV/g up to 200mV/g 1mV/g up to 200mV/g 1mV/g up to 100mV/g 1mV/g up to 100mV/g 1mV/g up to 200mV/g 10mV/g up to 200mV/g 1mV/g up to 200mV/g 10mV/g up to 500mV/g 10mV/g up to 500mV/g	<ul> <li>1.2gm</li> <li>6.9gm</li> <li>12gm</li> <li>18gm</li> <li>23gm</li> <li>23gm</li> <li>19gm</li> <li>19gm</li> <li>22gm</li> <li>41gm</li> <li>41gm</li> </ul>	$\begin{array}{c} 7\times7.5\times5.6\\ 11.5\times11.5\times11.5\\ 16.4\times12\\ 16.4\times12\\ 16.4\times15.3\\ 17\times17\times17\\ 19\times19\times19\\ 24\times17\times14.7\\ 19.1\times19.1\times11.7\\ 19.1\times19.1\times11.7\\ 22.2\times22.2\times11.7\\ 25.4\times25.4\times13.2\\ 25.4\times25.4\times13.2\end{array}$	-50°C • 200°C -50°C • (185°C HT) -50°C • (185°C HT)	Int. Cbl, BNC or 4S-1 4S-1 4S-1 4S-1 4S-1 4S-1 M M M M M M M M M M	A A A Base tap 10-32 UNF A, clip A, clip Through hole Through hole Through hole Through hole Through hole Through hole & 3 x tapped	6 6 6 6 6 6 6 6 6 6 6
Mono-axial Piez	<b>coelectric Charge Acceler</b> 0.4pC/g nom. 2pC/g nom	ometers 0.19gm 1.5gm	5.1 x Ø3.1 x 2.1	-50°C • 200°C	L8	A A	7
A/25/E A/27/E A/24/E A/24/TE A/24/TE A/23/E A/23/S A/23/E A/23/TS A/23/TS A/23/TS A/20 A/20/TC A/20/TC A/20/TC A/29/TC A/29/TC A/21/TC A/21/TC A/600/T	2pC/g nom. 5pC/g nom. 5pC/g nom. 5pC/g nom. 5pC/g nom. 8pC/g nom. 8pC/g nom. 8pC/g nom. 26pC/g nom. 30pC/g nom. 30pC/g nom. 30pC/g nom. 100pC/g nom. 100pC/g nom. 360pC/g nom.	1.8gm 1.8gm 2gm 2gm 2gm 3.6gm 4gm 4gm 4gm 12.5gm 12.5gm 12.5gm 46gm 46gm 46gm 95gm 95gm 95gm 115gm 115gm	10.5 × $06.4 \times 5$ 11.1 × $07.1 \times 5.4$ 8 (A/F) × 9 8 (A/F) × 8 8 (A/F) × 8.7 9.5 (A/F) × 10.7 9.5 (A/F) × 10.5 9.5 (A/F) × 10.5 17.2 × $016 \times 8.1$ 14.3 (A/F) × 16.6 14.3 (A/F) × 16.6 14.3 (A/F) × 16.6 14.3 (A/F) × 16.6 14.3 (A/F) × 21.8 19.1 (A/F) × 22.7 25.4 (A/F) × 22.7 25.4 (A/F) × 22.3 25.4 (A/F) × 22.8 28 (A/F) × 28	-50°C 200°C -50°C 200°C -50°C 200°C -50°C 200°C -50°C 250°C -50°C 250°C	LS KP KP KP M M M M M M M M M TNC M M TNC M M TNC M M TNC M M	A A A A M4 x 5mm stud A M5 X 5mm stud A M5 X 5mm stud Through hole Base tap 10-32 UNF Base tap 10-32 UNF	, 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7
AT/08 AT/01	lectric Charge Accelerom 0.4pC/g nom. 2pC/g nom.	eters 1.2gm 6.8gm	7 x 7.5 x 5.6 11.5 x 11.5 x 11.5	-50°C • 200°C -50°C • 200°C	Int. Cbl, BNC or 4S-1 4S-1	A A	8 8
AT/04 AT/04/TB A/38 A/38-1 A/38-1 A/38-1 A/34 A/34-2 A/30 A/30-1 A/36-1	250/3 nom.           5pC/g nom.           0.4pC/g nom.           0.4pC/g nom.           7pC/g nom.           7pC/g nom.           25pC/g nom.           25pC/g nom.           25pC/g nom.           5pC/g nom.           5pC/g nom.           5pC/g nom.           5pC/g nom.           5pC/g nom.           5pC/g nom.	11.5gm 18gm 0.9gm 0.9gm 18gm 22gm 38gm 38gm 18gm 18gm	$\begin{array}{c} 16.4 \times 16.4 \times 12.1 \\ 16.4 \times 16.4 \times 15.3 \\ 7.3 \times 7.3 \times 4.4 \\ 19.1 \times 19.1 \times 11.7 \\ 25.4 \times 25.4 \times 13.2 \\ 25.4 \times 25.4 \times 13.2 \\ 24 \times 17 \times 14.7 \\ 24 \times 17 \times 10.7 \end{array}$	-50°C • 200°C -50°C • 200°C -50°C • 200°C -50°C • 200°C -50°C • 220°C -50°C • 220°C	4S-1 4S-1 L8 M M M M M M M M M	A Base tap 10-32 UNF A, Through hole A, Through hole A, Through hole A, Through hole Through hole & 3 x tapped Through hole & 3 x tapped Through hole & 3 x tapped A, Mounting Clip A, Mounting Clip A, Mounting holes	8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8
A/800 A/800/T	9nC/g nom. 9nC/g nom.	400gm 400gm 407gm	38.1 (A/F) x 44 38.1 (A/F) x 44	-50°C • 250°C -50°C • 250°C	M M	Base tap ¼-28 UNF Base tap ¼-28 UNF	9 9
A/800/TC Mono-axial IEPI A/1800/V A/1800/VT A/1800/VTC	Briezo-Tronic Accelerom 10V/g 10V/g 10V/g	eters - Seismic 400gm 400gm 407gm	38.1 (A/F) x 44 38.1 (A/F) x 44 38.1 (A/F) x 44 38.1 (A/F) x 44	-50°C • 250°C -50°C • 125°C -50°C • 125°C -50°C • 125°C	M M TNC	Base tap ¼-28 UNF Base tap ¼-28 UNF Base tap ¼-28 UNF Base tap ¼-28 UNF	9 9 9
Ultra high tempo A/133/V A/33 A/33-1	erature Exhaust & Turbo o 1mV/g up to 250mV/g 7pC/g nom. 7pC/g nom.	charger test accel, 90 38gm 38gm 38gm	28 x 28 x 19 28 x 28 x 19 28 x 28 x 19 28 x 28 x 29	-50°C • 900°C -50°C • 900°C -50°C • 900°C	M M M	Through hole Through hole Through hole	9 9 9
Mono-axial Piez A/53/F A/53/F/HT A/52/F/HT A/52/F/HT A/81/F A/81/F A/81/F/HT A/301/F A/301/F A/301/F A/301/F/HT A/107/F/HT A/107/F/HT A/107/V Mono axial Piez A/53/F/HT A/107/F/HT A/107/V Mono axial Piez A/53/F/HT A/107/F/HT	coelectric Accelerometers           12pC/g nom.           1.7pC/g nom.           100pC/g nom.           220pC/g nom.           230pC/g nom.           25pC/g nom.           25pC/g nom.           100pC/g nom.           100pC/g nom.           100pC/g nom.           100pC/g nom.           100pV/g           100mV/g	<ul> <li>Industrial 20gm (ex. Cbl) 20gm (ex. Cbl) 100gm (ex. Cbl) 123gm (ex. Cbl) 150gm (ex. Cbl) 150gm (ex. Cbl) 150gm 150gm 80gm 80gm 80gm 85gm 130gm</li> </ul>	$\begin{array}{c} 33 \times 13.7 \times 14.2 \\ 33 \times 13.7 \times 14.2 \\ 50.8 \times 29.6 \times 21.7 \\ 50.8 \times 29.6 \times 24.5 \\ 50.8 \times 29.6 \times 24.5 \\ 51.5 \times 31.5 \times 25.4 \\ 31.5 \times 31.5 \times 25.4 \\ 29.2 \times 29.2 \times 24.5 \\ 29.2 \times 29.2 \times 24.5 \\ 29.2 \times 29.1 \times 24.5 \\ 40.2 \times 36.4 \times 24.7 \end{array}$	260°C 400°C 260°C 400°C 260°C 400°C 260°C 400°C 260°C 400°C 185°C 185°C	7/16 UNS, M 7/16 UNS, M 7/16 UNS, M 7/16 UNS, M 7/16 UNS, M 7/16 UNS, M 2 Pole 7/16 UNS 2 Pole 7/16 UNS	Flange mount Flange mount	10 10 10 10 10 10 10 10 10 10 10 10
A/140 A/140/S A/140/C	100m/Vg 100m/Vg 100m/Vg 100m/Vg	76gm 81gm 76gm	Ø22 x 58 37 x 24.9 x 25.4 Ø22 x 44	-50°C • 120°C -50°C • 120°C -50°C • 140°C	2-Pin MIL-C-5015 2-Pin MIL-C-5015 Overbraid St. Steel Cbl.	Base tap ¼-28 UNF Through hole Base tap ¼-28 UNF	11 11 11
KEY: V, E = Side entry	<b>T, TE, VT</b> = Top entry	<b>S</b> = Side entry stud	<b>TS</b> = Top entry stud	<b>CR</b> = Cal. Ref.			

 $\mathbf{A} = \text{Adhesive}$ 

 e
 Int. = Integral
 HT = High temp.
 I = Isolated

 s
 M = Microdot
 KP = M3.5
 4S-1 = 4pin ¼-28 UNF

 $\mathbf{F} = Flange$ 

Connectors

# Piezoelectric Accelerometers









### Accelerometer Selection – Points to consider...

- **IEPE or Charge?** See page 8 for the pro's and cons of IEPE and Charge accelerometers.
- **Mass** Mass loading is the effect of adding mass to a test item which then changes the dynamic characteristics of that item. We have a great video on our Youtube page to show this phenomena, well worth a look.
- **Sensitivity** Consider the measurement range you require. An IEPE accelerometer is limited by its voltage output, 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.
- **Temperature range** Charge accels usually operate up to 260°C whilst standard IEPE accels 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 see page 18 for more details
- Cable types THIS IS VERY IMPORTANT! Check out page 19 for more details.
- Calibration Accelerometers can last for decades if treated properly, however regular calibration is important, things can change with age...I think we all know that feeling! See page 22 for more details.



Piezoelectric Accelerometers

# strumentation

Accessories

# 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/V

**Sensitivity** 1mV/g up to 10mV/g

Weight 0.19gm

**Size (mm)** 5.1 x Ø3.1 x 2.1

**Min-Max. Temp** -50°C • 200°C

Connector L8/Microdot

Sensing Element Shear Plate Piezo-Ceramic

Mounting Adhesive



#### Miniature A/127/V

**Sensitivity** 1mV/g up to 100mV/g

Weight 1.5gm 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, M4x5mm integral stud



#### A/123/E, A/123/S, A/123/TS, A/123/TE

Sensitivity 1mV/g up to 250mV/g

Weight 3.6-5.2gm

**Size (mm)** 9.5 (A/F) x 10

**Min-Max. Temp** -50°C ● 125°C (185°C HT)

Connector 10-32 UNF Microdot

Sensing Element Konic Shear Piezo-Ceramic

**Mounting** Adhesive, M4x5mm integral stud



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 12.5-32.6gm

**Size (mm)** 14.3 (A/F) x 19.2

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 10-32UNF 4mm deep



#### A/121/V, A/121/VI

**Sensitivity** 100mV/g up to 3V/g

Weight 90gm Size (mm) 25.4 (A/F) x 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 10-32UNF 4mm deep



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

**Sensitivity** 1V/g up to 10V/g

Weight 112gm

**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 Konic Shear Piezo-Ceramic

Mounting Base tapped 10-32UNF 4mm deep



Calibration 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 10-32UNF 4mm deep

# High Shock Mono-axial IEPE Accelerometers

Integral Electronics, Voltage Output



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

Sensitivity 0.5mV/g

Weight 8gm

**Size (mm)** Ø12 x 20

**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 8gm

**Size (mm)** Ø12 x 20

**Min-Max. Temp** -40°C ● 121°C

**Connector** M5 or Integral Cable

Sensing Element Shear Plate Piezo-Ceramic

Mounting M5 stud



A/163-1 -50,000g Range

Sensitivity 0.1mV/g

Weight 8gm

**Size (mm)** Ø12 x 23

**Min-Max. Temp** -40°C ● 121°C

**Connector** Integral Cable

Sensing Element Shear Plate Piezo-Ceramic

Mounting M6 stud

Piezoelectric Accelerometers

#### **Piezoelectric Accelerometers** – The principle of operation and design:

All piezoelectric accelerometers operate on the same principle, a mass applies a force to a piezoelectric material (crystal or ceramic) and the subsequent stress caused on the material outputs a charge which is proportional to the force. The force is affected by the mass size as well as the acceleration level. 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.

#### There are three primary designs of accelerometer:



# Tri-axial Piezo-Tronic IEPE Accelerometers

Integral Electronics, Voltage Output



#### 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, 3 X BNC or 4 pin ¼-28 UNF

Sensing Element Shear Plate Piezo-Ceramic

Mounting Adhesive



#### AT/10

Sensitivity 1mV/g up to 100mV/g Weight 6.9gm

**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



AT/14, AT/14/TB

Sensitivity 1mV/g up to 200mV/g Weight 12/18gm

**Size (mm)** 16.4 x 16.4 x 12

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

Connector 4-Pin 1/4 - 28 UNF

Sensing Element Konic Shear Piezo-Ceramic

Mounting Adhesive, 10-32UNF Base tapped.



AT/11

**Sensitivity** 1mV/g up to 100mV/g

Weight 17gm 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 10mV/g up to 100mV/g

Weight 23gm

**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 18gm

**Size (mm)** 24 x 17 x 14.7

**Min-Max. Temp** -50°C ● 125°C (185°C HT)

Connector 3 x 10-32UNF 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



#### 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

**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 10-32UNF x 4mm deep



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

**Sensitivity** 10mV/g up to 500mV/g

Weight 41gm

**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 D

Piezoelectric Accelerometers

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

# Mono-axial Piezoelectric **Accelerometers**

Charge Output



**Miniature** A/25/E

Sensitivity 0.4pC/g nom.

A/28/E

Weight 0.19gm

**Micro-Miniature** 

Size (mm) 5.1 x Ø3.1 x 2.1

Min-Max. Temp -50°C • 200°C

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

Sensing Element Shear Plate Piezo-Ceramic

Mounting Adhesive



Sensitivity 2pC/g nom.

Weight 1.5gm

Size (mm) 10.8 x Ø6.4 x 5

Min-Max. Temp -50°C • 200°C

Connector

Sensing Element Konic Shear Piezo-Ceramic

Mounting Adhesive



Miniature A/27/E

Sensitivity 2pC/g nom.

Weight 1.8gm

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/TS

Sensitivity

Weight 2gm

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

Min-Max. Temp -50°C • 200°C

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

Sensitivity 8pC/g nom.

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

Weight 3.6-4gm

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

**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

Piezoelectric Accelerometers



#### 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 10-32UNF 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 (A/20, A/20/T) 27gm (A/20/TC)

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

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 46gm (A/29, A/29/T) 51gm (A/29/TC)

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

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 (A/21, A/21/T) 102gm (A/21/TC)

Size (mm) 25.4 (A/F) x 19.1

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 115gm

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

Min-Max. Temp -50°C • 250°C

Connector 10-32 UNF Microdot

Sensing Element Konic Shear Piezo-Ceramic

Mounting Base tapped 10-32 UNF x 4mm deep

A/24/E, A/24/TE,

5pC/g nom.

# **Tri-axial Piezoelectric Accelerometers**

### Charge Output

#### 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, 3 X BNC or 4 pin 1/4-28 UNF

Sensing Element Shear Plate Piezo-Ceramic

Mounting Adhesive

A/34, A/34-2

Sensitivity

7pC/g nom.

Size (mm)

Weight 19/22gm

19.1 x 19.1 x 11.7

Min-Max. Temp

Sensing Element

2 x Ø3.25mm through

hole. 1 x M4 Ø through

hole. 3 x tapped 10-32

UNF x 4mm deep

Konic Shear Piezo-Ceramic

Mounting

-50°C • 220°C

Connector 10-32 UNF Microdot



#### AT/01

Sensitivity 2pC/g nom.

Weight 6.8gm

Size (mm) 11.4 x 11.4 x 12.1

Min-Max. Temp -50°C • 200°C

Connector 4 pin 1/4-28 UNF

Sensing Element Konic Shear Piezo-Ceramic

Mounting Adhesive



#### AT/04, AT/04/TB

Sensitivity 5pC/g nom.

Weight 11.5-18gm

Size (mm) 16.4 x 16.4 x 12.1

Min-Max. Temp -50°C • 200°C

Connector 4 pin 1/4-28UNF

Sensing Element Konic Shear Piezo-Ceramic

Mounting Adhesive, 10-32UNF Base tapped



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

#### 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 18gm

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

2 x Ø3.25mm through holes

#### A/30. A/30-1

25pC/g nom.

Weight 38gm

-50°C • 220°C

Connector

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



#### A/36, A/36-1

Sensitivity 5pC/g

Weight 18gm Size (mm)

24 x 17 x 10.7

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

#### **IEPE & Charge Accelerometers** – Pros and Cons

#### **IEPE: Pros**

- Use wide range of cable types
- Less sensitive to dirt
- Signal power often built into DAQ systems

#### **IEPE: Cons**

- Lower operating temperature
- More expensive per unit
- Fixed sensitivity
- Less robust

#### Charge: Pros

- Higher operating temperature
- Robust
- Flexible sensitivity via charge amplifier
- Lower cost per unit

#### Charge: Cons

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

Mounting

Piezoelectric Accelerometers



Sensitivity

Size (mm) 25.4 x 25.4 x 13.2

Min-Max. Temp

10-32 UNF Microdot

# Mono-axial Seismic Accelerometers

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



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

Sensitivity 9nC/g nom.

**Weight** 400gm (A/800, A/800/T) 407gm (A/800/TC)

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



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

Sensitivity 10V/g **Weight** 400gm (*A*/1800, *A*/1800/VT) 407gm (*A*/1800/VTC)

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

#### Seismic Accelerometers...

are generally much bigger and heavier than other test and measurement accelerometers. This is due to the much higher quantity of piezoelectric material and the large mass material required to create the high output (typically 10V/g or 9000pC/g) which allows for micro 'g' measurements. They are also limited on their higher frequency capability, usually limited to 500Hz to 1kHz. With a typical peak measurement range of just 0.5g their use is restricted to typical seismic applications.

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



#### Water Cooled IEPE Tri-Axial A/133/V

Sensitivity 1mV/g up to 250mV/g Weight 38gm

Size (mm) 28 x 28 x 19

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



Piezoelectric Accelerometers



#### Water Cooled Tri-Axial Piezoelecric A/33. A/33-1

Sensitivity 7pC/g nom.

Weight 38gm

Size (mm) 28 x 28 x 19

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 Triaxial Accelerometers

unique device specifically developed for exhaust and turbo charger testing where surface temperatures can exceed 900°C. As the only fully integrated device on the market it offers unrivalled reliability and repeatability under the most extreme conditions. Using a simple water pump (usually a car windscreen washer pump) requiring just 0.5ltr/min flow the operation is both simple and effective. With no reduction in operating temperature, even using the IEPE voltage output version, DJB lead the world in this application.

Max. Temp 260°C (A/301/F)

Connector

Mounting 4 x Ø3.8mm holes

### 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 nom. (A/53/F/HT)

Weight 20gm (exc cable)

**Size (mm)** 33 x 13.7 x 14.2

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

Connector 7/16 UNS HT Microdot

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 nom. (A/52/F/HT)

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

Size (mm) 50.8 x 29.6 x 21.7

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

Connector 7/16 UNS HT Microdot

Cable Integral Hardline Cable

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

Voltage Output



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

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

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

Size (mm) 50.8 x 29.6 x 24.6

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

Connector 7/16 UNS HT Microdot

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 nom. (A/301/F/HT)

Weight 150gm (A301/F, A/301/F/HT)

**Size (mm)** 31.5 x 31.5 x 25.4

400°C (A/301/F/HT)

2 pole connector 7/16 UNS

24.7mm PCD

### Charge Output



### 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

Mounting 3 x Ø3.2mm holes 25.4mm PCD. F1- 30.2mm PCD



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

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

Mounting 3 x Ø5mm holes 34.29mm PCD

# Piezoelectric Dynamic Pressure Transducers

# Low Cost Mono-axial Industrial IEPE Accelerometers

All dimensions given in mm (L  ${\rm x}$  W  ${\rm x}$  H) not including the connector



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



A/140 Sensitivity 100mV/g

**Weight** 76gm

Size (mm)

Ø22 x 58 Min-Max. Temp -50°C ● 120°C

Connector 2-Pin MIL-C-5015

Mounting ¼-28 UNF Base tapped



A/140/S

Sensitivity 100mV/g

Weight 81gm

**Size (mm)** 37 x 24.9 x 25.4

**Min-Max. Temp** -50°C ● 120°C

Connector 2-Pin MIL-C-5015

Mounting ¼-28 UNF through hole



A/140/C

Sensitivity 100mV/g

Weight 76gm

**Size (mm)** Ø22 x 44

**Min-Max. Temp** -50°C ● 140°C

**Connector** Integral Overbraided Stainless Steel Cable

Mounting 1/4-28 UNF Base tapped

#### Accelerometer Specifications Explained

**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.

**Sensitivity** – Either rated in pC/g for charge output accels or mV/g for IEPE accels this is the output signal you can expect for a given acceleration.

**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.

**Bias Voltage** – Only relevant to IEPE accels, 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%.



# Instrumentation







#### 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 15/17 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 16 for more details.
- **Filters** Analogue filters enable users to filter out unwanted noise or other spurious signals. See page 16.
- 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 16.

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

# IEPE Instrumented Impact Hammer Range



#### IH-01

Sensitivity 25mV/N Measuring Range 200N Hammer Mass 180gm Head Diameter 21mm Hammer Length 250mm Output Connector BNC Tips Supplied Stainless Steel, Aluminium, Nylon, Rubber



IH-10 Sensitivity 0.5mV/N Measuring Range 10000N Hammer Mass 1400gm Head Diameter 45mm Hammer Length 395mm Output Connector BNC Tips Supplied Hard tip, Medium tip, Soft tip



#### IH-02

Sensitivity 2.5mV/N

Measuring Range 2000N Hammer Mass 180qm

Head Diameter 16mm

Hammer Length 250mm

Output Connector BNC

Tips Supplied Stainless Steel, Aluminium, Nylon, Rubber



#### IH-50

Sensitivity 0.1mV/N Measuring Range 50000N Hammer Mass 1900gm Head Diameter 45mm Hammer Length 395mm Output Connector BNC Tips Supplied Hard tip, Medium tip, Soft tip



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

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



#### **Use of Modal / Impact Hammers**

The IH series IEPE Impact Hammer range features a rugged force sensor that is integrated into the hammer's striking surface. The force sensor serves to provide a measurement of the amplitude of the energy stimulus that is imparted to a test object. A variety of tips supplied with each hammer permit the energy content of the force impulse to be tailored to suit the requirements of the item under test. Using multi-channel data acquisition and analysis software, the test engineer is able to ascertain a variety of mechanical properties leading to an understanding of an object's structural behaviour. Items analysed can include resonance detection, mode shapes, transfer characteristics, and structural health, such as crack and fatigue detection.

IH series Impact Hammers can be applied for Structure Health Testing, Resonance Determination, Modal Analysis etc. Used in association with DJB's wide range of accelerometers full response data can be captured during impact testing.



# 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.
- 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.

- Probe
- 4 1/4 28 UNF Spike
- Carry Case and Handbook





# Source Amplifiers

All dimensions given in mm (L  ${\rm x}$  W  ${\rm x}$  H) not including the connector

### 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) DC O/P

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

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 & Voltage



DIN Rail Mounted Charge or Voltage 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 or Voltage or Combined Source Amplifier CV9-C/CV9-V/CV9-CV

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

### 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

# Voltage



#### **VV/04**

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

Input range 1/110mV/g

Bandwidth 3dB Bandwidth 0.4Hz/100kHz

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



3 Channel Voltage Source Amplifier V3/04

Output AC & DC O/P

**Gain factor** 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



4 Channel Voltage Source Amplifier V4/04

Output AC & DC O/P

**Gain factor** 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



Battery IEPE Voltage Supply VB/01

**Output** Unity Gain

Output Connector BNC

Input Connector BNC

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

Instrumentation

# **Inline Converters**

# Integrators

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

<u>zoelectric Accelerometers</u>

Instrumentation

ories

Acces



Hybrid Charge Amplifier CA/100/F

**Voltage** +10/+30

**Connector** I/P 5P O/P 10-32 UNF Microdot

Gain 1mV/pC to 1V/pC



Hybrid Two Wire Voltage Source Line Driver QV/01

**Voltage** Miniature 2 Wire Charge/ Voltage Converter

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

Gain 1mV/pC to 1V/pC



Hybrid Two Wire Voltage Source Line Driver QV/02

Voltage Miniature 2 Wire Charge/ Voltage Converter

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

Gain 1 and 10mV/pC



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

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

Acceleration/

Displacement

Double Integrator/ High Pass Filter

Converts Vibration Data

from Acceleration to

**Displacement Format** 

optimum signal/noise down to min. 2Hz

Converter

**DM/04** 

Voltage

Output Configurable for

- Switchable High/Low Pass
- Single ended/differential input
- Modular System
- 6 Gain steps to x50



# 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 15/16/17.

**PC/04** - Portable housings with up to 12 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.

**SR/04** - Rack based solutions are available with 200/240VAC, 90/130VAC 50/60Hz mains input, ±15V, 1.5A max. O/P regulated power supply.

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

# 9 Channel Charge, Voltage 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.

**CV9-C** is a fixed 9 channel charge amplifier with individually selectable gain on each channel via a three way switch x1, x10, x100 gain.

**CV9-V** is a fixed 9 channel IEPE supply with individually selectable gain on each channel via a three way switch x1. X10, x100 gain, also featuring an indicator lamp for open/correct circuit connection per channel.

**CV9-CV** is a fixed 9 channel Charge/IEPE supply amplifier with all the features of the other models in addition to individually selectable charge/IEPE per channel.

#### Features

- Short Circuit/open circuit warning indicator
- IEPE Constant Current Source, user selectable via internal jumpers
- Switchable Gain of x1, x10 and x100 for charge and voltage inputs, individual channel selectable
- Front Panel BNC input/output connectors
- 19" Rack Mountable Enclosure

#### Power

Input Connector IEC 320

Input 105-240 VAC (switchable)

Status LED Power Indicator on Front Panel

#### Physical

Weight 2.75kg

Size H 44.5mm, W 482.6mm, D 348mm

# Cables and Accessories









#### **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. 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. 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 second 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. 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. 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 <u>accelerometer</u>.

#### 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 as 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 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.

# Accessories

### Connectors

Product Code	Description	Product Code	Description
1P-1	1/4-28 UNF 4 pin connector plug	MP	10-32UNF Microdot Plug
1S	M4.5mm, 4 pin connector socket	ME	Environmental sealed 10-32 UNF Microdot Plug
1S-1	1/4-28 UNF 4 pin connector socket	MIL-C-5015	2 pole connector
7P	2 pole 7/16 UNS free plug	MPS	10-32UNF Microdot Plug sealed IP64
7S	2 pole 7/16 UNS free socket	MR	Right-Angled 10-32UNF Microdot Plug
BC	BNC Plug	MS	10-32UNF Microdot Socket
-C103	Fischer 6 pole Series 103 connector	SMB	SMB connector
٢P	M3.5 Mini-Microdot Plug	SMB-2	SMB Clamp Connector
KP5	5-44UNC Mini-microdot Plug	SMBS	SMB Crimp Plug fitted to 2.8mm cable
_8	Connector for A/28/E	SMC	SMC Crimp Plug
_P5	Lemo 5 pin Plug	SS	Sealed Flanged 10-32UNF Microdot Plug IP64
_P7	Lemo 7 pin Plug	SSMC	Sub Miniature SMC connector
_P8	Lemo 8 pin Plug	тс	TNC Clamp Plug
VI2	Microdot Plug for 2.5mm tri-ax	ТСНВ	TNC Clamp Plug with heatshrink boot
	hardline cable - high temp	TP	Lemo Mini Twin Plug
VI5	M5 Microdot Plug	TS	TNC Socket Clamp

### Cables

Softline Low Noise Cable for use with Charge or IEPE accelerometers/sensors

Cable Code	Description	Max Temp	O/D
т08	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
P30	FEP Jacket - coaxial double screened	200°C	3.0mm
P31	PVC Jacket - coaxial screened	85°C	3.0mm
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

#### Softline 4 Core Cable

Cable Code	Description	Max Temp	O/D
LT17	FPA Jacket - 3 core low noise screened	260°C	0.8mm
ET25	FEP Jacket - 4 core screened	200°C	2.5mm
SM35	PVC Jacket - 4 core screened	80°C	3.5mm

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

#### **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 or silver wrap on the outer surface of the inner dielectric layer. If a non low noise cable is used movement of the cable will add an additional signal into the data causing errors in data analysis.

**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.

# Accessories

### Non Isolated Mounting Studs/Bases

Product Code	Description
SF/01	Flat adhesive base, 22.2mm diameter, 5.8mm x 1/4-28UNF thread
SF/02	Flat adhesive base, 12mm diameter, 3.7mm x 10-32UNF thread
SF/03	Flat adhesive base, 15.9mm diameter, 3.3mm x 10-32UNF thread
SP/01	Mounting stud, 4.2mm 1/4-28UNF / 12.7mm 1/4-28UNF thread
SP/02	Mounting stud, 2.7mm 10-32UNF / 9.7mm 10-32UNF thread
SP/03	Mounting stud 2.7mm 10-32UNF / 5.0mm M5 thread
SP/04	Mounting stud 2.7mm 10-32UNF / 5.0mm M6 thread
SA/03	Adhesive base for A/123/S & A/123/TS
SA/04	Adhesive base for A/124/TS

### Isolated Mounting Studs/Bases

Product Code	Description
IS/01	Flanged Mounting Stud, 2.8mm 10-32UNF / 5.0mm 10-32UNF thread
IS/02	Flanged Mounting Stud, 2.8mm 10-32UNF / 5.0mm M5 thread
IS/03	Flanged Mounting Stud, 3.7mm 10-32UNF / 5.0mm 10-32UNF thread
IS/04	Flanged Mounting Stud, 3.7mm 10-32UNF / 5.0mm M5 thread
IS/05	Flanged Mounting Stud, 4.1mm 1/4-28UNF / 5.0mm 1/4-28UNF thread
SI/03	Flanged Mounting Stud, 3.7mm 10-32UNF / 14.5mm 10-32UNF thread
SI/05	Flanged Mounting Stud, 2.8mm 10-32UNF / 5.0mm 10-32UNF thread
SI/08	Flanged Mounting Stud, 3.7mm 10-32UNF / 5.0mm M5 thread
SI/09	Flanged Mounting Stud, 3.7mm 10-32UNF / 9.5mm M5 thread
SI/10	Flanged Mounting Stud, 3.7mm 10-32UNF / 9.5mm M6 thread
SI/11	Flanged Mounting Stud, 10-32 UNF
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 10-32UNF stud
IM/02	20.6mm A/F, 10-32UNF 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, 10-32UNF / 1/4-28UNF
SM/03	Adaptor stud for use with IM/02, 10-32UNF / M6
SM/04	Adaptor stud for use with IM/02, 10-32UNF / 10-32UNF

### Triaxial Mounting Blocks

Product Code	Description
FB1	Stainless Steel 10-32UNF 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
Petrowax	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  $125^{\circ}$ 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



Accessories

# Instrumentation

Services

# Training and Calibration









#### Calibration

DJB Instruments UK Ltd has a purpose built in house calibration and measurement facility providing calibrations to National Standards. We calibrate both charge and IEPE accelerometers as well as signal conditioning equipment for all manufacturers and recommend you do this annually, although many of our customers prefer every six months. 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. Critical points to check are 'cross axis error' which should be less than 5%. This is not always checked by other calibration facilities and is the biggest source of error in older accelerometers. Other points to consider at calibration are temperature and frequency range. Ensure the calibration results reflect the operating range of your application, if in doubt ask our engineers to explain the details regarding calibration. Please contact us for a quotation and turnaround time.

#### **Cable Test and Repair**

DJB Instruments UK Ltd are proud to lead the way with their 'green' approach to cable recycling. Over time users often accumulate boxes of broken cables, but are driven to buy new by other suppliers in the marketplace who refuse to repair cables. As a majority of connectors used are standardised (10-32UNF microdot, BNC for example), DJB are able to offer a test and repair service for almost any cable from any supplier. A majority of cable failures occur due to damage or wear to one of the connectors, by removing and refitting a new connector the cable is as good as new at a fraction of the cost and with hardly any reduction in the usable cable length. Did you know that most common signal cables have a jacket and insulator made from some form of PTFE which can be toxic during decomposition. Repairing your cables is kinder to the environment.

For details and to find out if your cables can be repaired please contact us sales@djbinstruments.com

#### Training

Understanding exactly how to use your sensors and equipment is essential to maximise data integrity, this is true for accelerometers as well as expensive data acquisition and analysis systems. An accelerometer is the critical device in a measurement system and correct use is of paramount importance. To support education for its customers DJB offer on site and factory based training specifically about accelerometers, for further details turn to the back cover.



# 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.

This course has been presented at a number of National and International events as well as on site with major Automotive, Aerospace/Defence and Electronics companies all of whom have provided positive feedback about the course benefits and have reported process improvements as a result of attending.



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