PRODUCT DATA

DC Response Accelerometers — Types 4570, 4571, 4572, 4573, 4574, and 4575

The DC Response Accelerometers are designed to measure low-frequency vibration down to DC. The gas-damped sensing element offers a wide dynamic range and very stable frequency response even after subjection to high shock levels. The accelerometer has built-in conditioning, where the sensing element and electronics are shielded, sealed and insulated from the housing.

D-versions are available offering high thermal stability from –55 to +121°C.

USES AND FEATURES

USES
• Low-frequency, motion and tilt measurements
• Flight testing
• Road load testing
• Transportation
• Modal analysis

FEATURES
• High temperature stability
• Hermetically sealed
• 2 to 500 g full scale
• 10000 g shock survivability
• Low power consumption

Characteristics

The DC response accelerometers are gas-damped, resulting in minimal influence of thermal changes. These low-impedance units operate with a supply voltage from 8 to 24 VDC, and a supply current of 5 mA. The ±2 volt differential output is DC-coupled at a bias voltage of 2.5 VDC, and a 2.5 V reference is built-in for differential measurements. The units can be used with either differential or single-ended input.

Fig. 1 Typical frequency response

Typical Frequency Response

Typical Frequency Response for 4570
The units feature an internal temperature compensation (updated at intervals of 40 ms) that minimises thermal zero shift and sensitivity shift over a wide temperature range. All types will operate from −55° to +121°C. For standard versions, the thermal zero shift and thermal sensitivity shift are specified in the temperature range −20° to +85°C. For high thermal stability the D-versions are compensated from −55° to +121°C.

**Calibration**

The transducers are individually calibrated providing a 1600-point, high-resolution calibration in the specified frequency range (magnitude and phase), ultimately giving a unique characterisation and securing the integrity of the vibration measurement. Transducer sensitivity is provided at 159.2 Hz and the zero g output is in mV. The individual values for thermal zero shift and sensitivity shift at compensation limits are provided.

Data is included on the calibration chart for response equalisation with Brüel & Kjær’s PULSE Multi-analyzer or post-processing software.

### Physical Characteristics

![Fig. 2
Accelerometer dimensions](image)

![Fig. 3
Accelerometer electronic schematics](image)
Mounting Options

Clip Mounting
For very flexible and easy mounting, the accelerometers can be bolted to Adaptor for Clip Mounting UA-2083\(^1\) (see Fig. 4), and applied without any change in frequency response. The adaptor has slots that enable the use of mounting clips, such as Large Mounting Clip UA-1408; Mounting Clip with Thick Base UA-1474, which can be filed down to suit the mounting surface; as well as Swivel Base UA-1473 and Spirit Level UA-1480, which make it easy to align the accelerometer to retain the coordinate system used. Finally, a high-temperature mounting clip, such as UA-1563, is available with a 10–32 UNF tapped hole for mounting. The mounting clips can then be attached to the object, with glue or double-sided adhesive tape.

Fig. 4 Side view of the accelerometer bolted to UA-2083 inserted in a mounting clip

Fig. 5 Top view of the accelerometer bolted to UA-2083 on the mounting clip

Triaxial Measurements
In applications where a triaxial measurement is desired, the accelerometers can be mounted using Triaxial Mounting Block UA-2079\(^2\) without any change in amplitude response (±10%). The material is clear hard-anodised aluminium and weighs 46 g (1.6 oz.). The block can be mounted using 6–32 UNF bolts, M 4 bolts, a 10–32 UNF stud or adhesively. The recommended configuration of the accelerometers is shown in Fig. 7.

Fig. 6 Dimensions of Triaxial Mounting Block UA-2079

Fig. 7 Mounting configuration for UA-2079

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\(^1\)Adaptor for Clip Mounting UA-2083 is supplied with five standard (thin-based) clips.

\(^2\)Triaxial Mounting Block UA-2079 includes a 10–32 UNF steel stud and 25 4–40 UNC screws.
The DC Response accelerometers are available with integral cables with three different terminations dependent on the type number:
- Standard accelerometers, including D-versions, feature an integral cable with an open end
- Accelerometers with a suffix -001 (for example, 4573-001 or 4573-D-001), feature an integral cable with a 7-pin LEMO termination
- Accelerometers with a suffix -002 (for example, 4572-002 or 4572-D-002), feature an integral cable with a 9-pin sub-D terminator

**Recommended Conditioning**
The standard recommended conditioning available for the DC response accelerometers and lower limiting frequency are outlined in Table 1. Output can either be single-ended or differential.

<table>
<thead>
<tr>
<th>Input</th>
<th>AC Measurement</th>
<th>DC Measurement</th>
</tr>
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<tbody>
<tr>
<td>Nexus Conditioning Amplifiers Types 2690 – 93</td>
<td>Single-ended Grounded</td>
<td>0.7 Hz (HDF)</td>
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<tr>
<td></td>
<td>Single-ended Floating</td>
<td>0.7 Hz (HPF)</td>
</tr>
<tr>
<td>PULSE Multi-analyzer Type 3560</td>
<td>Single-ended Grounded (all modules)</td>
<td>0.15 Hz (HPF)</td>
</tr>
<tr>
<td></td>
<td>Single-ended Floating (Input/Output Module Type 3110)</td>
<td>0.15 Hz (HPF)</td>
</tr>
<tr>
<td>Differential Amplifier Type 2697</td>
<td>Differential</td>
<td>Optional</td>
</tr>
<tr>
<td>Differential Amplifier Type 2697-A</td>
<td></td>
<td>50 mHz (HPF)</td>
</tr>
<tr>
<td>Endevco® Type 136</td>
<td>Differential</td>
<td>Yes</td>
</tr>
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</table>

<sup>a</sup> Offset unspecified for Input/Output Module Type 3109
Specifications – DC Response Accelerometers Types 4570 – 4575 incl. D-versions

**DYNAMIC CHARACTERISTICS**

<table>
<thead>
<tr>
<th>Units</th>
<th>4570</th>
<th>4570-D</th>
<th>4571</th>
<th>4571-D</th>
<th>4572</th>
<th>4572-D</th>
<th>4573</th>
<th>4573-D</th>
<th>4574</th>
<th>4574-D</th>
<th>4575</th>
<th>4575-D</th>
</tr>
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<tbody>
<tr>
<td>Voltage Sensitivity (@ 159.2 Hz) +/-10%</td>
<td>mV/ms⁻²/(g)</td>
<td>0.4(4)</td>
<td>1(10)</td>
<td>2(20)</td>
<td>6.7(67)</td>
<td>20(200)</td>
<td>100(1000)</td>
<td></td>
<td></td>
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<tr>
<td>Measuring Range</td>
<td>ms⁻²/(g)</td>
<td>±5000(500)</td>
<td>±2000(200)</td>
<td>±1000(100)</td>
<td>±300(30)</td>
<td>±100(10)</td>
<td>±20(2)</td>
<td></td>
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<tr>
<td>Frequency Response (typical)</td>
<td>see Fig. 1</td>
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<tr>
<td>Amplitude Response 5%</td>
<td>Hz</td>
<td>0 to 1500</td>
<td>0 to 1500</td>
<td>0 to 1500</td>
<td>0 to 700</td>
<td>0 to 400</td>
<td>0 to 250</td>
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<tr>
<td>Amplitude Response 10%</td>
<td>Hz</td>
<td>0 to 1850</td>
<td>0 to 1850</td>
<td>0 to 1850</td>
<td>0 to 850</td>
<td>0 to 500</td>
<td>0 to 300</td>
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<tr>
<td>Residual Noise (DC to f₁₀%)</td>
<td>μV RMS</td>
<td>600</td>
<td>650</td>
<td>450</td>
<td>700</td>
<td>350</td>
<td>500</td>
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<tr>
<td>Residual Noise (0.5 to 100 Hz)</td>
<td>μV RMS</td>
<td>140</td>
<td>150</td>
<td>100</td>
<td>250</td>
<td>150</td>
<td>300</td>
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<tr>
<td>Resolution (0.5 to f₁₀%)</td>
<td>mg/(Hz)²</td>
<td>3.5</td>
<td>1.5</td>
<td>0.5</td>
<td>0.35</td>
<td>0.075</td>
<td>0.03</td>
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<tr>
<td>Transverse Sensitivity</td>
<td>%</td>
<td>&lt;3</td>
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<tr>
<td>Max. Operational Shock</td>
<td>km/s⁻² (g) pk</td>
<td>100 (10000)</td>
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<tr>
<td>Non-linearity</td>
<td>% FSO</td>
<td>&lt;±1</td>
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<tr>
<td>Base Strain Sensitivity @ 250 με</td>
<td>ms⁻²</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
<td>0.03</td>
<td>0.07</td>
<td>0.07</td>
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<tr>
<td>Thermal Transient Sensitivity</td>
<td>Equiv. ms⁻²°C</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.2</td>
<td>0.3</td>
<td>0.3</td>
<td></td>
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<tr>
<td>Magnetic Sensitivity (50 Hz, 0.038 Tesla)</td>
<td>ms⁻²/T</td>
<td>400</td>
<td>120</td>
<td>70</td>
<td>40</td>
<td>20</td>
<td>4</td>
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</tbody>
</table>

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

**Common Specifications**

**ELECTRICAL CHARACTERISTICS**
- Bias Voltage (zero g output): 2.5 ±0.05 V DC
- Full-scale Output Voltage: ±2 V pk
- Output Impedance: <100 Ω
- Ref. Voltage: 2.5 V ±0.005 V
- Output Impedance: (Vref) 1 kΩ
- Supply Voltage: 8 to 24 V DC
- Current: 5 mA
- Insulation Resistance (case to shield): >100 MΩ

**PHYSICAL CHARACTERISTICS**
- Weight (excl. cable): 8 g (0.282 oz.)
- Case Material: Anodized aluminium
- Jacket Material: TPE cable
- Length of Integral Cable: 3 m (9.8 ft.)
- Connector: Dependent on version:
  - Open-end
  - Accelerometers with -001 suffix: 7-pin LEMO
  - Accelerometers with -002 suffix: 9-pin Sub-D
- Mounting Provision: Holes for 4-40 UNC, M3 screws or adhesive
- Output: Single-ended or differential

**Environmental Characteristics**
- Temp. Range: –55 to +121°C (–67 to +249°F)
- Thermal Zero Shift, –20 to +85°C (–4 to +185°F): <±40 mV
- Thermal Sensitivity Shift, –20 to +85°C (–4 to +185°F): 2.1%
- Humidity (sensing element): Hermetic solder seal
- Humidity (case): Epoxy seal

**TEMPERATURE SPECIFICATIONS (D-VERSIONS)**
- Temperature Range: –55 to +121°C (–67 to +249°F)
- Temperature Range (compensated): –55 to +121°C (–67 to +249°F)
- Thermal Zero Shift (–55 to +121°C): ±40 mV
- Thermal Sensitivity Shift (–55 to +121°C): 3.1%

*Fig. 9 Typical thermal behaviour for D-type accelerometers*

Other specifications available upon request. Please contact your local Brüel & Kjaer representative if you have any specific requirements.
## Compliance with Standards

<table>
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<tbody>
<tr>
<td>Safety</td>
</tr>
<tr>
<td>EMC Immunity</td>
</tr>
<tr>
<td>Humidity</td>
</tr>
</tbody>
</table>

### Ordering Information

All types include the following accessories:

- Carrying box
- Calibration chart
- 2 × 4–40 UNC socket head cap screw (length: 11 mm) with washer
- QA-0013: Hex wrench

#### Optional Accessories

- **AO-0414**: Extension cable 7-pin LEMO 1 B male to female connector
- **AO-0700**: Extension cable 7-pin LEMO 1 B to 6-pin LEMO 0 B connector
- **DV-0460**: Big Calibration Clip
- **UA-1408**: Set of 100 Mounting Clips
- **UA-1473**: Set of 100 Swivel Bases
- **UA-1474**: Set of 100 Mounting Clips, Thick Base
- **UA-1480**: Spirit Level for Swivel Bases
- **UA-1563**: Set of 5 High-temperature Clips
- **UA-2079**: Triaxial Mounting Block
- **UA-2080**: 25 pcs of 4–40 UNC socket head cap screws (length: 11 mm) with washer
- **UA-2083**: Adaptor for Clip Mounting

### Calibration Services

To order Accredited Calibration, specify product type number followed by 'CAF' (for example, 4570-CAF, 4575-CAF, etc.)

To order Factory Standard Calibration, specify product type number followed by 'CFF' (for example, 4570-CFF, 4575-CFF, etc.)

### TRADEMARKS

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