

# Product Data

## Sound Level Calibrator — Type 4231

### FEATURES:

- Conforms to IEC 942 (1988) Class 1 and ANSI S1.40-1984 (R 1997)
- Robust pocket-size design with highly stable level and frequency
- Calibration accuracy  $\pm 0.2$  dB
- 94 dB SPL, or 114 dB SPL for calibration in noisy environments
- Extremely small influence of static pressure
- Sound pressure independent of microphone equivalent volume
- 1 kHz calibration frequency for correct calibration level independent of weighting networks
- Fits Brüel & Kjær 1" and 1/2" microphones (1/4" and 1/8" microphones with adaptor)
- Switches off automatically when removed from the microphone

### USES:

- Calibration of sound level meters and other sound measurement equipment

The Sound Level Calibrator Type 4231 is a handy, portable sound source for calibration of sound level meters and other sound measurement equipment. The calibrator is very robust and stable and conforms to IEC 942 Class 1 and ANSI S1.40-1984.

The Sound Level Calibrator Type 4231 is a pocket-sized, battery operated sound source for quick and direct calibration of sound level meters and other sound measuring systems. It fits Brüel & Kjær 1" and 1/2" microphones and, with adaptors, it can be used for 1/4" and 1/8" microphones as well.

The calibration frequency is 1000 Hz (the reference frequency for the standardized international weighting networks), so the same calibration value is obtained for all weighting networks (A, B, C, D and Linear). The calibration pressure of  $94 \pm 0.2$  dB re  $20 \mu\text{Pa}$  is equal to 1 Pa or  $1 \text{ N/m}^2$ . The +20 dB level step gives 114 dB SPL which is convenient for calibration in noisy environments.

The design of the 4231 is based on a feed-back arrangement to ensure a highly stable sound pressure level and ease of use. The feed-back loop uses a condenser microphone (see Fig. 1), which is specially developed for this purpose. This microphone is optimised to have extremely high sta-

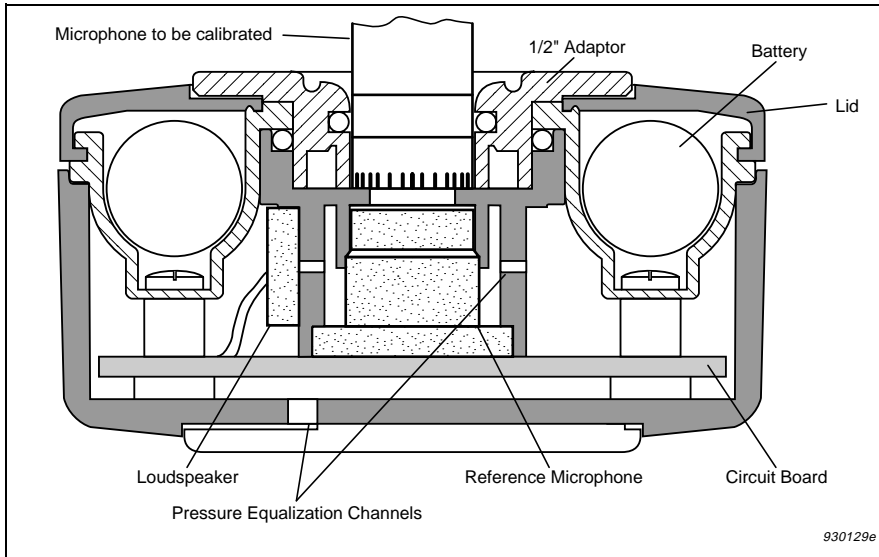


bility and independence of variations in static pressure and temperature around the 1 kHz calibration frequency. The result of this is a user-friendly calibrator where exact fitting of the microphone is non critical and the effects of changes in temperature and static pressure are negligible.

The calibrator gives a continuous sound pressure level when fitted on

a microphone (see Fig. 2) and activated. The sensitivity of the sound measuring equipment can then be adjusted until it indicates the correct sound pressure level. The calibrator is automatically switched off when removed from the microphone.

A leather protecting case, which does not need to be removed to use the calibrator, is supplied.



*Fig.1 Cross-sectional view of Sound Level Calibrator Type 4231. The feed-back loop is based on a high-quality condenser microphone to ensure a very stable sound pressure level*



*Fig.2 Type 4231 fitted to 2238 Mediator. The calibrator's centre of gravity is positioned very close to the microphone, giving a stable set-up*

# Specifications 4231

<p><b>STANDARDS SATISFIED:</b> IEC 942 (1988), Sound Calibrators, Class 1 ANSI S1.40–1984 (R 1997), Specifications for Acoustic Calibrators</p> <p><b>NOMINAL SOUND PRESSURE LEVEL:</b> 94.0 dB ±0.2 dB or 114.0 dB ±0.2 dB re 20 µPa at reference conditions</p> <p><b>FREQUENCY:</b> 1 kHz ±0.1%</p> <p><b>SPECIFIED MICROPHONE TYPES:</b> (Conforms to IEC 942 Class 1) Brüel &amp; Kjær (and similar types) 1" and 1/2", 1/4", 1/8" with adaptors</p> <p><b>EQUIVALENT FREE-FIELD LEVEL:</b> (0° incidence, re Nominal Sound Pressure Level) –0.15 dB for 1/2" Brüel &amp; Kjær Microphones. See the 4231 User Manual for other microphones</p> <p><b>EQUIVALENT RANDOM INCIDENCE LEVEL:</b> (re Nominal Sound Pressure Level) +0.0 dB for 1", 1/2", 1/4" and 1/8" Brüel &amp; Kjær Microphones.</p> <p><b>NOMINAL EFFECTIVE COUPLER VOLUME:</b> &gt;200 cm<sup>3</sup> at reference conditions</p> <p><b>TOTAL HARMONIC DISTORTION (THD):</b> &lt;1%</p> <p><b>LEVEL STABILITY:</b> <b>Stabilization Time:</b> 5 s <b>Short-term:</b> Better than 0.02 dB (as specified in IEC 942) <b>1 Year:</b> Better than 0.05 dB</p> <p><b>REFERENCE CONDITIONS:</b> <b>Ambient Temperature:</b> 20°C (68°F) <b>Ambient Pressure:</b> 1013 hPa <b>Ambient Humidity:</b> 65% RH <b>Load:</b> Microphone Type 4134 (effective load volume: 0.25 cm<sup>3</sup>)</p> <p><b>Environmental</b> <b>AMBIENT CONDITIONS:</b> <b>Pressure:</b> 650 to 1080 hPa <b>Humidity:</b> 10 to 90% RH (without condensation) <b>Effective Load Volume:</b> 0 to 1.5 cm<sup>3</sup> <b>INFLUENCE OF AMBIENT CONDITIONS:</b> <b>Temperature Coefficient:</b> ±0.0015 dB/°C</p>	<p><b>Pressure Coefficient:</b> +8 × 10<sup>-5</sup> dB/hPa <b>Humidity Coefficient:</b> 0.001 dB/%RH</p> <p><b>Power Supply</b> <b>Batteries:</b> 2 × 1.5 V IEC Type LR6 ("AA" size) <b>Lifetime:</b> Typically 200 hours continuous operation with alkaline batteries at 20°C (68°F) <b>Check:</b> When the calibrator can only be operated by keeping the On/Off button continuously pressed the batteries should be changed.</p>	<p><b>Dimensions and Weight:</b> <b>Height:</b> 30 mm (1.2") <b>Width:</b> 72 mm (2.8") <b>Depth:</b> 72 mm (2.8") <b>Weight:</b> 150 g (0.33 lb.), including batteries</p> <p><b>Note:</b> All values are typical at 25°C (77°F), unless measurement uncertainty or tolerance field is specified. All uncertainty values are specified at 2σ (i.e. expanded uncertainty using a coverage factor of 2)</p>														
<p><b>COMPLIANCE WITH STANDARDS:</b></p> <table border="1"> <tr> <td style="text-align: center; vertical-align: middle;"><b>CE</b></td> <td>CE-mark indicates compliance with: EMC Directive.</td> </tr> <tr> <td>Safety</td> <td>EN 61010–1 and IEC 1010–1: Safety requirements for electrical equipment for measurement, control and laboratory use.</td> </tr> <tr> <td>EMC Emission</td> <td>EN 50081–1: Generic emission standard. Part 1: Residential, commercial and light industry. EN 50081–2: Generic emission standard. Part 2: Industrial environment. CISPR 22: Radio disturbance characteristics of information technology equipment. Class B Limits. FCC Rules, Part 15: Complies with the limits for a Class B digital device.</td> </tr> <tr> <td>EMC Immunity</td> <td>EN 50082–1: Generic immunity standard. Part 1: Residential, commercial and light industry. EN 50082–2: Generic immunity standard. Part 2: Industrial environment.</td> </tr> <tr> <td>Temperature</td> <td>IEC 68–2–1 &amp; IEC 68–2–2: Environmental Testing. Cold and Dry Heat. Operating Temperature: –10 to +50°C (14 to 122°F) Storage Temperature: –25 to 70°C (–13 to 158°F)</td> </tr> <tr> <td>Humidity</td> <td>IEC 68–2–3: Damp Heat: 90% RH (non-condensing at 40°C (104°F))</td> </tr> <tr> <td>Enclosure</td> <td>IEC 529 (1989): Protection provided by enclosures: IP 50</td> </tr> </table>			<b>CE</b>	CE-mark indicates compliance with: EMC Directive.	Safety	EN 61010–1 and IEC 1010–1: Safety requirements for electrical equipment for measurement, control and laboratory use.	EMC Emission	EN 50081–1: Generic emission standard. Part 1: Residential, commercial and light industry. EN 50081–2: Generic emission standard. Part 2: Industrial environment. CISPR 22: Radio disturbance characteristics of information technology equipment. Class B Limits. FCC Rules, Part 15: Complies with the limits for a Class B digital device.	EMC Immunity	EN 50082–1: Generic immunity standard. Part 1: Residential, commercial and light industry. EN 50082–2: Generic immunity standard. Part 2: Industrial environment.	Temperature	IEC 68–2–1 & IEC 68–2–2: Environmental Testing. Cold and Dry Heat. Operating Temperature: –10 to +50°C (14 to 122°F) Storage Temperature: –25 to 70°C (–13 to 158°F)	Humidity	IEC 68–2–3: Damp Heat: 90% RH (non-condensing at 40°C (104°F))	Enclosure	IEC 529 (1989): Protection provided by enclosures: IP 50
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## Ordering Information

<p><b>Type 4231</b> Sound Level Calibrator <b>Includes the following accessories:</b> KE 0317: Leather Case 2 × QB 0013: Alkaline Batteries Type LR6 UC 0210: Adaptor for 1/2" microphones</p>	<p><b>Optional Accessories</b></p> <p><b>DP 0775:</b> Adaptor for 1/4" microphones <b>DP 0774:</b> Adaptor for 1/8" microphones <b>DP 0682:</b> Adaptor for Studio Microphones Types 4003 and 4006</p>	<p><b>DP 0750:</b> Adaptor for Studio Microphones Types 4004 and 4007 <b>DP 0887:</b> Adaptor for Head and Torso Simulator Type 4128 <b>DP 0888:</b> Adaptor for Intensity Probe Sets Types 3545, 3548, 3583, 3584</p>
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Brüel&Kjær reserves the right to change specifications and accessories without notice



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