

PRODUCT DATA

Sound Calibrator Type 4231

Sound 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 EN/IEC 60942 (2017) Class 1, and ANSI S1.40-2006.



050231

Uses and Features

Uses

- Calibration of sound level meters and other sound measurement equipment

Features

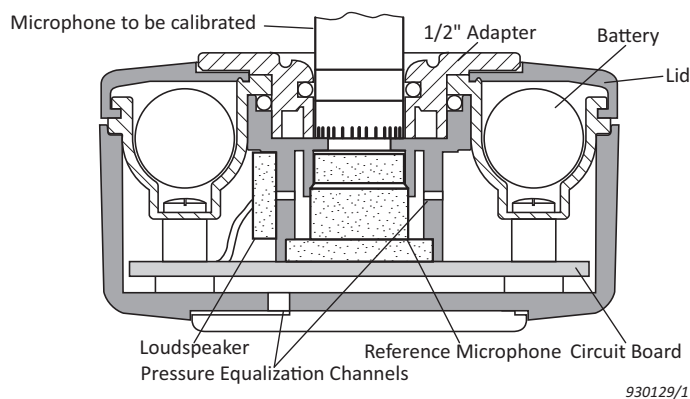
- Conforms to EN/IEC 60942 (2017) Class 1, and ANSI S1.40-2006
- Robust, pocket-sized design with highly stable level and frequency
- Calibration accuracy ± 0.2 dB
- 94 dB SPL or 114 dB SPL for calibration in noisy environments
- Extremely small influence of static pressure and temperature
- Sound pressure independent of microphone equivalent volume
- 1 kHz calibration frequency for correct calibration level independent of weighting network
- Fits HBK 1" microphones (1/2", 1/4" and 1/8" microphones with adaptor)
- Switches off automatically when removed from the microphone

Sound 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 HBK 1" microphones and, using the supplied removable adaptor, 1/2" microphones. With optional 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 ± 0.2 dB re $20 \mu\text{Pa}$ is equal to 1 Pa or 1 N/m^2 . The +20 dB level step gives 114 dB SPL, which is convenient for calibration in noisy environments, or for checking linearity.

The design of Type 4231 is based on a feedback arrangement to ensure a highly stable sound pressure level and ease of use. The feedback loop uses a condenser microphone (see Fig. 1), which is specially developed for this purpose.

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



This microphone is optimized to have extremely high stability 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 not critical and the effects of changes in temperature and static pressure are negligible.

Fig. 2 Type 4231 fitted on the B&K 2245 Sound Level Meter microphone. The calibrator's centre of gravity is positioned very close to the microphone, giving a stable setup




The calibrator gives a continuous sound pressure level when fitted on a microphone 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 protection case, which does not need to be removed to use the calibrator, is supplied.

	<p>The CE marking is the manufacturer's declaration that the product meets the requirements of the applicable EU directives.</p> <p>RCM mark indicates compliance with applicable ACMA technical standards – that is, for telecommunications, radio communications, EMC and EME in Australia.</p> <p>China RoHS mark indicates compliance with administrative measures on the control of pollution caused by electronic information products according to the Ministry of Information Industries of the People's Republic of China.</p> <p>WEEE mark indicates compliance with the EU WEEE Directive.</p>
Safety	<p>EN/IEC 61010-1: Safety requirements for electrical equipment for measurement, control and laboratory use.</p> <p>ANSI/UL 61010-1: Safety requirements for electrical equipment for measurement, control and laboratory use.</p>
EMC Emission	<p>EN/IEC 61000-6-3: Generic emission standard for residential, commercial and light industrial environments.</p> <p>EN/IEC 61000-6-4: Generic emission standard for industrial environments.</p> <p>CISPR 22: Radio disturbance characteristics of information technology equipment. Class B Limits.</p> <p>FCC Rules, Part 15: Complies with the limits for a Class B digital device.</p> <p>EN/IEC 60942: Instrumentation Standard – Electroacoustics – Sound Calibrators.</p>
EMC Immunity	<p>EN/IEC 61000-6-1: Generic standards – Immunity for residential, commercial and light industrial environments.</p> <p>EN/IEC 61000-6-2: Generic standards – Immunity for industrial environments.</p> <p>EN/IEC 61326: Electrical equipment for measurement, control and laboratory use – EMC requirements.</p> <p>EN/IEC 60942, ANSI S1.40-2006: Instrumentation Standard – Electroacoustics – Sound Calibrators.</p> <p>NOTE: The above is only guaranteed using accessories listed in this document.</p>
Temperature	<p>IEC 60068-2-1 & IEC 60068-2-2: Environmental Testing. Cold and Dry Heat.</p> <p>Operating Temperature: –10 to +50 °C (+14 to 122 °F)</p> <p>Storage Temperature: –25 to +70 °C (–13 to +158 °F)</p>
Humidity	IEC 60068-2-78: Damp Heat: 90% RH (non-condensing at +40 °C (+104 °F))
Mechanical	<p>Non-operating:</p> <p>IEC 60068-2-6: Vibration: 0.3 mm (10 to 58 Hz), 20 m/s² (58 to 500 Hz)</p> <p>IEC 60068-2-27: Shock: 1000 m/s²</p> <p>IEC 60068-2-29: Bump: 3000 bumps at 400 m/s²</p>
Enclosure	IEC 60529: Protection provided by enclosures: IP 50 with leather protection case.

Specifications – Sound Calibrator Type 4231

All values are typical at +25 °C (+77 °F), unless measurement uncertainty or tolerance field is specified. All uncertainty values are specified at 2 σ (that is, expanded uncertainty using a coverage factor of 2)

STANDARDS SATISFIED

- EN/IEC 60942 (2017), Class 1, Sound Calibrators
- ANSI S1. 40-2006, Specification for Acoustic Calibrators Class 1

SOUND PRESSURE LEVELS

94.0 dB \pm 0.2 dB (Principal SPL) or 114.0 dB \pm 0.2 dB re 20 μ Pa at reference conditions

FREQUENCY

1 kHz \pm 0.1%

SPECIFIED MICROPHONE

Size according to IEC 61094-4:

- 1" without adaptor
- 1/2" with adaptor UC 0210 (supplied)
- 1/4" with adaptor DP 0775 (optional)
- 1/8" with adaptor DP 0774 (optional)

For Surface Microphone Types 4948 and 4949, use one of the following optional adaptors*:

- DP 0977
- DP 0979

EQUIVALENT FREE-FIELD LEVEL

(0° incidence, re Nominal Sound Pressure Level)

–0.15 dB for 1/2" HBK microphones. See the Type 4231 user manual for other microphones

EQUIVALENT RANDOM INCIDENCE LEVEL

(re Nominal Sound Pressure Level)

+0.0 dB for 1", 1/2", 1/4" and 1/8" HBK microphones

NOMINAL EFFECTIVE COUPLER VOLUME

>200 cm³ at reference conditions

DISTORTION

<1%

LEVEL STABILITY

Short-term: Better than 0.02 dB (as specified in IEC 60942)

One Year: Better than 0.05 dB (σ = 96%)

Stabilization Time: <5 s

REFERENCE CONDITIONS

Temperature: +23 °C \pm 3 °C (+73 °F \pm 5 °F)

Pressure: 101 \pm 4 kPa

Humidity: 50%, –10% +15% RH

Effective Load Volume: 0.25 cm³

ENVIRONMENTAL CONDITIONS

Pressure: 65 to 108 kPa

Humidity: 10 to 90% RH (non-condensing)

Effective Load Volume: 0 to 1.5 cm³

INFLUENCE OF ENVIRONMENTAL CONDITIONS (TYPICAL)

Temperature Coefficient: \pm 0.0015 dB/°C

Pressure Coefficient: $+8 \times 10^{-4}$ dB/kPa

Humidity Coefficient: 0.001 dB/% RH

POWER SUPPLY

Batteries: 2 \times 1.5 V IEC Type LR6 ("AA" size)

Lifetime: Typically 200 hours continuous operation with alkaline batteries at +23 °C (+73 °F)

Battery Check: When Type 4231 stops working continuously, and only operates when the On/Off button is held in, the batteries should be replaced

DIMENSIONS AND WEIGHT

(Without case)

Height: 40 mm (1.5")

Width: 72 mm (2.8")

Depth: 72 mm (2.8")

Weight: 150 g (0.33 lb), including batteries

* See the Type 4231 user manual for more information.

Type 4231	Sound Calibrator	OPTIONAL ACCESSORIES
includes the following accessories:		DP 0775 Adaptor for 1/4" microphones
• KE 0317: Leather Case		DP 0774 Adaptor for 1/8" microphones
• 2 × QB 0013: Alkaline Battery Type LR6		DP 0887 Calibration Adaptor for Sound Quality Head and Torso Simulator (HATS) Types 4100 and 4100-D
• UC 0210: Adaptor for 1/2" microphones		DP 0977 Calibration Adaptor for unflanged surface microphones
		DP 0979 Calibration Adaptor for flush-mounted surface microphones
		DP 1079 Calibration Adaptor for Wideband Ear Simulator Type 4195-A-HLx and Type 4987
		DI 0658 Calibration Adaptor for High-frequency Head and Torso Simulator Type 5128
		UA 1546 Calibration Adaptor for Head and Torso Simulator Type 4128-C