

Sound Source

USES:

- Building acoustics measurements such as sound reduction index, facade insulation, reverberation time and absorption
- Sound insulation measurements according to Simple Test Method of ASTM E597-77T
- Power amplifier and pink noise generator included
- Produces shaped spectra according to ASTM E597-77 T
- Diffuser for improved reproducibility of insulation measurements

FEATURES:

- 115dB sound power (battery driven) or 118dB (mains driven) in the range 100 Hz to 4 kHz
- 0°, 30° or 45° inclination of cabinet for facade insulation measurements
- Compatible with Building Acoustics Analyzer Type 4418

The Sound Source Type 4224 is specifically designed for building acoustics measurements such as sound reduction index, facade insulation, reverberation time and absorption. The Type 4224 consists of a loudspeaker with built-in power amplifier and noise generator contained in a robust, moulded cabinet with an integral handle. It can deliver up to 115dB sound power level from 100Hz to 4 kHz when driven from its internal, rechargeable batteries or up to 118dB sound power level when driven from a mains supply. In spite of its impressive performance the Type 4224 weighs only 18kg (40lbs).

The Sound Source Type 4224 is a portable and robust instrument capable of producing high noise levels. It is thus eminently suited for in situ building acoustics measurements.

The Type 4224 can be used with a wide variety of Brüel & Kjær instruments to form both simple easily portable set-ups as well as larger set-ups for automatic measurements. Sound insulation and reverberation measurements in octave bands can be made using a sound level meter and octave filter set, e.g. Type 2235 and Type 1624, together with Level Recorder Type 2317. A more sophisticated system for use with the sound source would be a Modular Precision Sound Level Meter Type 2231 and 1/1-1/3 Octave Filter Set Type 1625 with the Reverberation Processor Module BZ 7104.

When used in conjunction with the Building Acoustics Analyzer Type 4418 and a microphone, the 4224 constitutes a powerful and portable system for the automatic measurement

and calculation of all the commonly used quantities in building acoustics according to both national and international standards (Fig.2).

The conical diffuser, seen in Fig.2, can be snap-locked onto the front of the cabinet, to improve the reproducibility of sound insulation measurements and to render the measured results less dependent on the position and the angle of inclination of the cabinet. When not in use the diffuser can be stowed in the pocket of the instrument's protective cover.

In its wide band mode, the Sound Source Type 4224 produces a pink noise signal from 100Hz to 4 kHz. To produce bands of noise, this signal can be fed to an external 1/3 or 1/1 octave filter, before amplification and reproduction by the loudspeaker. Two special filter networks within the 4224 can be switched into the circuit to shape the noise signal to produce spectrum I and spectrum II in accordance with "Simple test method for measuring sound insulation" ASTM E597-77T (Fig.3). For this method the only other instrument required is



a sound level meter, for example Type 2222.

A Calibration Attachment is supplied with the 4224 to provide a well-defined microphone position for a near-field measurement of the sound pressure level in front of the cabinet (see Fig.4). This measurement is used

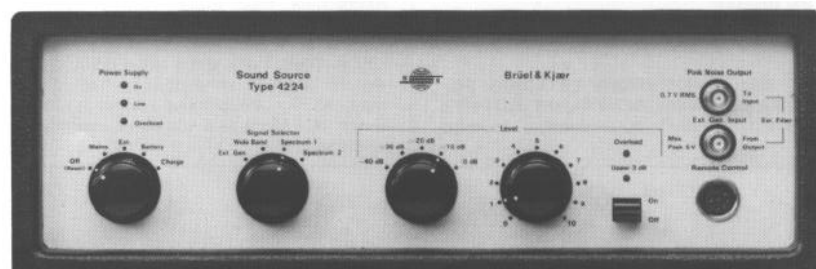


Fig.1. Control panel of the 4224



Fig.2. The Sound Source Type 4224 fitted with its diffuser. Here used in conjunction with the Building Acoustics Analyzer Type 4418 to measure reverberation time in a cafeteria

in the determination of the "calibration constant" which is required for the "Simple test method" (see ASTM E597-77T for details). When not in use the Calibration Attachment is held by a clip on the rear of the cabinet.

The circuitry of the Type 4224 is already prepared to receive additional filter networks if other types of shaped spectra are desired.

The output level can be attenuated in steps of 10dB over a 40 dB range, and varied continuously. Lamps on the control panel indicate when the delivered sound power exceeds the maximum for continuous use ("Overload") and when it is within 3dB of the overload condition ("Upper 3 dB").

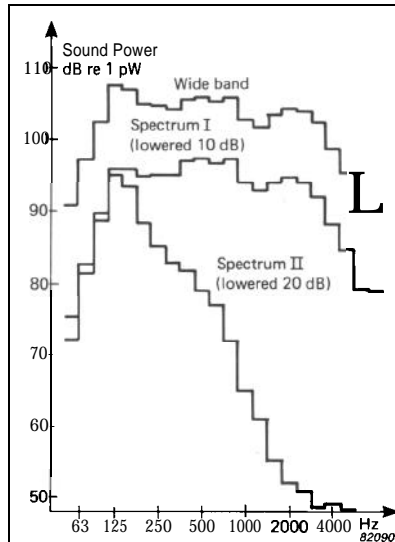


Fig.3. Sound power spectra with the 4224 operating at full power for a) Wide Band b) Spectrum I and c) Spectrum II. For the sake of clarity the curves for Spectrum I and Spectrum II have been lowered 10dB and 20dB respectively

There is no danger of overheating the Type 4224 as it is protected by a thermostat which switches off the instrument if it becomes too warm after prolonged use at high power. Operation is then inhibited until the instrument cools down.

A "Remote Control" socket is pro-

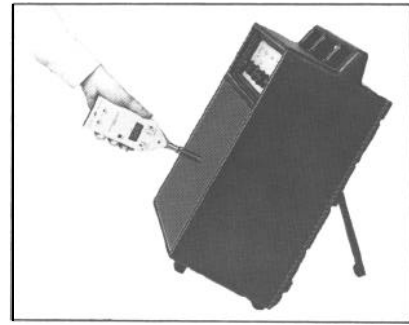


Fig.4. The inclination of the cabinet can be set at 0°, 30° or 45° required by certain standards and for facade insulation measurements. Here a Sound Level Meter Type 2222 is inserted in the Calibration Attachment during the determination of the "calibration constant"

vided to enable the Sound Source to be remotely switched on or off which is necessary in certain set-ups for measuring reverberation time. This facility also enables the battery power to be used more efficiently during insulation measurements.

The Type 4224 can be operated from its internal batteries, from a mains supply or from an external DC supply. The operating time with the internal batteries is sufficient for almost all purposes. A battery charger is incorporated for re-charging the internal batteries.

Specifications 4224

<p>SOUND POWER LEVEL: 0 to 118 dB re 1 pW, mains operated 0 to 115 dB re 1 pW, battery operated. Variable attenuation from 0 to -40 dB in 10 dB steps. Continuously variable</p>	<p>sound power level. Max. 5 V peak. Impedance 150 kΩ</p>	<p>DIMENSIONS AND WEIGHT Height: 480 mm (19 in) Width: 380mm (15in) Depth: 242 mm (9,5 in) Weight: 16 kg (40lbs)</p>
<p>SOUND POWER SPECTRUM: Wide band: 100 Hz to 4 kHz, +0dB to -10 dB re max. level. 63 Hz to 10 kHz, +0dB to -30 dB re max. level Ext. Filter: 1/3 & 1/1 oct. with ext. Filter Type 1613, 1616 (battery operated), 1617 or 1618 (mains operated) Spectrum I: Fulfils ASTM E 597-77T Spectrum II: Fulfils ASTM E 597-77T</p>	<p>SOUND POWER OFF: Stops the signal (to -60 dB) in less than 30ms without transient overload</p>	<p>ENVIRONMENT Temperature Range: (for operation within specifications) + 5°C to + 40°C Maximum Relative Humidity: 90% Storage Temperature: -25°C to + 70°C</p>
<p>OVERLOAD INDICATION: Indicates max. sound power level (overload) and -3 dB re overload</p>	<p>REMOTE CONTROL: Remote control of Sound Power Off. TTL Levels</p>	<p>ACCESSORIES INCLUDED: Plastic Cover KF 0091 Diffuser Cone UA 0745 Calibration Attachment DP 0401 Mains Cable AM020 4 pin plug JP 0401 8 pin plug JP 0802 Fuse 1 25 A VF 0027 Fuse 6,3 A VF 0044 Fuse 0,63 A VF 0032 Instruction Manual</p>
<p>PINK NOISE OUTPUT (TO EXTERNAL FILTER INPUT): Pink noise from 50 Hz to 10 kHz; 0,7 V RMS. Max. load 500 Ω</p>	<p>POWER SUPPLY: Class II instrument complying with IEC 348. Mains operated 100 V to 240 V, 50 Hz to 60 Hz. Built-in batteries, 10 Ni Cd cells. External Supply 12 to 17 V DC 6A.</p>	<p>ACCESSORIES AVAILABLE: Service Manual</p>
<p>EXT. GEN. INPUT (FROM EXTERNAL FILTER OR EXTERNAL GENERATOR OUTPUT): 115mV to 2V RMS corresponding to max.</p>	<p>POWER CONSUMPTION: 65 W at full load</p>	
	<p>BUILT-IN BATTERY CHARGER: Recharging time using mains supply: 14 hours</p>	
	<p>OPERATING TIME WITH NiCd CELLS: Approx. 3/4 hour at full power (-3dB re overload). Approx. 4 hours and 8 hours at reduced power of -13 dB and -30 dB re overload respectively.</p>	

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