

PRODUCT DATA

Precision Sound Level Meter — Type 2232

USES

- Community and industrial noise measurements
- Checking compliance with noise rating recommendations
- Traffic noise measurements
- Front-end for other equipment

FEATURES

- Ease of operation
- Small and lightweight, fits in a pocket
- Measuring range from 34 to 130 dB
- Type 1 precision
- Equipped with a robust, high sensitivity prepolarized condenser microphone
- Large easily-read digital display
- DC output

Introduction

Precision Sound Level Meter Type 2232 is an inexpensive instrument for primarily making community noise surveys and less demanding acoustic measurements, but nevertheless offers the accuracy and quality associated with a precision-grade sound level meter. Its excellent ergonomic design and ease of operation enable even the inexperienced user to carry out reliable measurements quickly and effectively. The handy convenience of a Type 1 precision sound level meter which can be carried around in a pocket will be appreciated by all users. A large, easily read digital display gives a single value indication of the maximum A-weighted sound level measured during the previous second, thereby eliminating meter reading errors. Type 2232 is robust, compact and lightweight (460 g), and is the ideal tool for environmental health inspectors and other personnel concerned with maintaining acceptable noise levels in industrial and residential locations, for instance police officers checking vehicle noise.

Sound Level Meter Type 2232 satisfies the requirements of IEC 60651 Type 1 and ANSI S1.4 1983 Type S1A.

Description

The Sound Level Meter consists basically of a microphone, an amplifier and a detector with associated frequency and time weighting circuits, an analogue DC output, and a digital display. Overload, underrange and low battery indica-

tors are also provided. Type 2232 is equipped with a high sensitivity Brüel & Kjær Prepolarized Condenser Microphone Type 4176 which was developed especially for use with it. The non-removable protection grid is internally fitted with a fine gauze filter which provides excellent immunity from dust and particle penetration to the diaphragm.

Measurements from 34 to 130 dB are carried out in two 60 dB measuring ranges: 34 to 94 dB and 70 to 130 dB. “F” or “S” time-weighting may be selected in accordance with IEC 60651. Two display-reset modes allow either a “max. hold” reading to be displayed or automatic resetting every second. In the automatic mode the max. time-weighted sound level measured during the preceding 1 s is displayed. When the manual displayreset mode is selected, the display shows the max. time-weighted level measured since the last manual re-set. A continuous analogue DC output, which is proportional to the A-weighted “F” or “S” time-weighted sound level, is provided for connection to other equipment. Type 2232 is powered from two 9 V, preferably alkaline, batteries (IEC Type 6LF22) which will provide approximately 30 hours continuous operation. Calibration of Type 2232 is easily carried out using an external reference source such as Sound Level Calibrator Type 4231.



2232

Specifications – Precision Sound Level Meter Type 2232

MEASURING RANGE

34 dB to 130 dB in two 60 dB ranges: 34 to 94 dB and 70 to 130 dB

PRIMARY INDICATOR RANGE

Identical to actual display range

FREQUENCY RESPONSE

In accordance with IEC 60651 Type 1.
A-weighting

DETECTOR

Characteristics: RMS indication in accordance with IEC 60651, Type 1
Dynamic Range: 70 dB (60 dB on scale plus 10 dB over)
Time Weighting: "F" and "S" to IEC/EN 60 651, Type 1
Crest Factor: 10 dB (c.f. 3) at upper limit of display range, rising linearly with decreasing signal level to a maximum of 26 dB (c.f. 20)

DISPLAY

3 1/3 digit liquid crystal display with 0.1 dB display resolution. Overload, underrange and low battery warning
Read Out Interval: Updated once per second
Display Reset: "Auto." resets once per second and displays max. time-weighted value measured during the previous 1 s. "Man." resets when the reset button is pressed and displays max. time-weighted value measured since last reset

DC OUTPUT

Proportional to continuous A-weighted "F" or "S" sound level
Output Impedance: <10Ω
Nominal Output Voltage: 50 mV/dB 3% (0 to 3 V in both measuring ranges)
Offset: 7 mV ±15 mV
Minimum Load Impedance: 10 kΩ

MICROPHONE

Type: Half-inch Prepolarized Condenser Microphone Type 4176
Sensitivity: 50 mV/Pa (-26 dB re 1 V/Pa)
Cartridge Capacitance: 13 pF

EFFECT OF WINDSCREEN

<0.5 dB up to 10 kHz

CALIBRATION

Trimmer adjustment using Sound Level Calibrator Type 4231 or Multifunction Calibrator Type 4226

CALIBRATION REFERENCE CONDITIONS

Sound Field: Free Field Condition
Reference Incidence Direction: Perpendicular to microphone diaphragm (0° incidence)
Reference Sound Pressure Level: 94 dB re 20 μPa
Reference Frequency: 1000 Hz
Reference Temperature: 20°C
Reference Measuring Range: 70 to 130 dB

WARM-UP TIME

4 s

EFFECT OF AMBIENT TEMPERATURE (AT 1 KHZ)

Operating Temperature Range: -15 to +50°C (+5 to 122°F). Sensitivity variation of complete sound level meter <0.5 dB (re 20°C)
Microphone Temperature Coefficient: -0.004 dB/°C
Storage Temperature Range: -20 to +70°C (-4 to +158°F) without batteries

EFFECT OF MAGNETIC FIELD

<22 dB for 80 A/m at 50 Hz

EFFECT OF HUMIDITY (AT 40°C, 1 KHZ)

<0.5 dB sensitivity variation for 0 to 90% R.H.

VIBRATION SENSITIVITY (10 HZ TO 2 KHZ)

Typically <76 dB equivalent sound pressure level for vibration level of 1 m/s² applied perpendicularly to microphone diaphragm. (Typically <71 dB equivalent SPL for 1 m/s² parallel to diaphragm)

POWER SUPPLY

Two 9 V alkaline batteries (IEC Type 6LF22) or other 9 V batteries
Battery Life: Approx. 30 hours continuous operation with alkaline batteries.

DIMENSIONS

Overall Length: 267 mm (9.9 in)
Overall Width: 72 mm (2.8 in)
Depth: 23 mm (0.9 in)

WEIGHT

460 g (1 lb.) with batteries

Compliance with Standards

 	CE-mark indicates compliance with: EMC Directive and Low Voltage Directive. C-Tick mark indicates compliance with the EMC requirements of Australia and New Zealand
Safety	EN 61010-1 and IEC 61010-1: Safety requirements for electrical equipment for measurement, control and laboratory use. UL 3111-1: Standard for Safety – Electrical measuring and test equipment
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. RF immunity implies that sound level indications of 45 dB or greater will be affected by no more than 0.5 dB. EN 50082-2: Generic immunity standard. Part 2: Industrial environment. RF immunity implies that sound level indications of 60 dB or greater will be affected by no more than 0.5 dB.
Note: The EMC specifications are given for use with one AO0481 AC output cable. EMC standards are not guaranteed to be fulfilled with cables other than the one mentioned above	

Ordering Information

Type 2232 Precision Sound Level Meter

ACCESSORIES INCLUDED

Type 4176 Half-inch Prepolarized Condenser Microphone
UA 0459 Windscreen
DZ 9566 Random Incidence Corrector
KE 0205 Leather Carrying Case
QB 0016 9V Alkaline Battery (2 pieces)

JP 0213 2.5 mm Mini-jack Plug

ACCESSORIES AVAILABLE

Type 4231 Sound Level Calibrator
AO 0481 Output Cable
UA 0587 Tripod
Type 4226 Multifunction Acoustic Calibrator