USER MANUAL

SOUND LEVEL METER

PCE-SLM 40/80

ENGLISH

User manuals in various languages (français, italiano, español, português, nederlands, türk, polski) can be found via our product search on:
www.pce-instruments.com

INTRODUCTION

Main Objectives and Scope of Application
The sound level meter is a digital multifunction device specifically designed for noise assessment. It measures various parameters, including the frequency-weighted sound pressure level, the time-weighted sound pressure level, the equivalent continuous sound level, the exposure sound level, and the statistical sound level. The device offers eight operating modes: standard sound level meter, integrated average, parallel measurement, statistical analysis, 24-hour measurement, 1/1-octave band, 1/3-octave band, and indoor noise mode. In addition, it features a low-frequency weighting function, making it suitable for measuring secondary radiation noise.

The meter complies with the requirements of the national standard GB/T 3785.1-2010 as well as the international standards IEC 61672-1:2013 Sound Level Meters, GB/T 15952-2010 and IEC 61252:2002 Specifications for Personal Sound Level Meters, GB/T 3241-2010, and IEC 61260:2014 Octave and Decade Filters. Construction noise (indoor noise) complies with the requirements of the standards GB 22337-2008 Community Noise Emission Standards and GB 12348-2008 "Noise Emission Standards for Industrial Enterprises at Plant Boundaries.

Secondary noise complies with JGJ/T 170-2009, Limits and Measurement Methods for Vibrations and Secondary Noise in Urban Rail Transit Buildings. The 24-hour noise monitoring complies with GB 3096-2008 Environmental Noise Quality Standards and HJ 640-2012 Technical Specifications for the Monitoring of Urban Environmental Noise. The coding of environmental monitoring stations complies with HJ 661-2013 Coding Rules for Environmental Noise Monitoring Stations. The sound level meter is a powerful, high-performance handheld device suitable for long-term, reliable, and precise measurement of various types of noise. The device is equipped with a 16-GB memory card and comes standard with 5 AA batteries. For models with a 24-hour measurement function, a portable power bank can also be used for power. Users can customize additional features such as audio recording, timed shutdown, GPS tracking, and Bluetooth connectivity. This device is designed for on-site measurement of sound levels in electromechanical systems, environmental noise, traffic noise, occupational hygiene noise, and workplace noise.
The measuring device is available in both explosion-proof and non-explosion-proof versions. The explosion-proof model has the required explosion-proof certification with the designations Ex ib I Mb and Ex ib IIb T4 Gb. Thanks to its dual protection design, it is suitable for use in environments that comply with established explosion-proof standards.

Model	PCE-SLM 40	PCE-SLM 80
Type	Class 2	Class 1
General recording studio	√	√
Integration average	√	√
Statistical analysis	√	√
Parallel measurement	√	√
24-hour measurement	√	√
Indoor noise	√	√
1/1 OTC	√	√
1/3 OTC	√	√

Workplace Conditions
The working conditions are as follows:

- Air temperature: 1 level -10°C ... +50°C; 2 level 0 ... +40°C
- Relative humidity: 20% ... 90%
- Static pressure: 65 kPa ... 108 kPa

MEASUREMENT FUNCTION

Brief Introduction
The device incorporates all standard sound level meter functionalities, with specific models and configurations detailed in Table 1. The core features include: Integral Time Setting (time range from 1 second to 99 hours 59 minutes 59 seconds).
The system defaults to manual mode when time is set to 0 (actual time: 99 hours 59 minutes 59 seconds), featuring automatic repeat measurement (1-99 cycles, with 1 cycle for single measurement) and repeat interval settings (0-99 hours 59 minutes 59 seconds, requiring ≥2 cycles).
It offers three startup modes: manual, timed, and threshold. When measuring time is set, the system automatically starts synchronized with the instrument's clock. For threshold sound level measurement, the system must first activate the instrument and wait for completion. Once the measured sound level exceeds the threshold, the system automatically triggers measurement.

Standard Sound Level Meter
The main interface of this device can be used as a standard sound level meter, with the following primary measurement parameters:
» The sound level is measured by frequency weighting A and time weighting F.

» Measure the maximum sound level of frequency A-weighted and time-weighted F

» The minimum sound level of the frequency A-weighted and time-weighted F was measured.

Average of Integral
This device features an integral average measurement mode, offering three frequency weighting options (A, C, Z) and three time weighting options (F, S, I). It enables operators to select appropriate frequency and time weighting for measurements.

Key performance indicators include:
» The average time sound level (equivalent continuous sound level);

» 1s Short-term time average sound level (short-term equivalent continuous sound level);

» Time-weighted sound level;

» Frequency C-weighted peak sound level;

» Maximum time-weighted sound level;

» Minimum time-weighted sound level;

» Normalized 8-hour average sound level;

» Sound exposure level;

» Sound exposure;

» Noise dose (reference sound level 90 dB, reference duration 8 h, exchange rate 3 dB);

» Measure duration;

» Measure time used.

Statistical Analysis
This device features statistical analysis functionality in its measurement mode, where frequency weighting is limited to A-weighting and time weighting to F-weighting.

Key measurement parameters include:
- Frequency A-weighted time average sound level (equivalent continuous sound level);
- 1s Short-term frequency A-weighted time average sound level (short-term equivalent continuous sound level);
- Frequency A-weighted F time-weighted sound level;
- Frequency A weighting F time weighting maximum value;
- The minimum value of frequency A-weighted and F-time-weighted.
- Frequency A-weighted sound exposure level;
- Cumulative sound level percentage (statistical sound level) LN (default percentages N are 5, 10,50,90, and 95; users can also change them in settings, N=1 ... 99);
- Standard deviations;
- Measure duration;
- Measure time used.

Parallel Measurement
This device adopts parallel measurement mode, which includes three frequency weighting modes (A, C, Z) and three time weighting modes (F, S, I). The sound level is measured in parallel with both frequency and time weighting.

Main measurement indicators:
- Weighted sound level (Lp) for each time period;
- Maximum weighted sound level (Lmax) for each time period;
- The minimum value of the weighted sound level (Lmin) for each time period;
- The average sound level (LeqT, equivalent continuous sound level) for each time period;
- Lpeak (the weighted peak sound level) for each frequency level of exposure to sound (LE);
- Measure duration;
- Measure time used.

24-Hour Measurement
In this mode, frequency weighting is only A-weighted, and time weighting is only F-weighted.

Main measurement indicators:
- Lden, the equivalent sound level for daytime, evening, and nighttime.
- Day and night equivalent sound level (Ldn);
- Night equivalent sound level (Ln)
- Daytime equivalent sound level (Ld);
- Evening equivalent sound level (Le);

24 hours and hourly:
- Frequency A-weighted time average sound level (equivalent continuous sound level);
- 1s Short-term frequency A-weighted time average sound level (short-term equivalent continuous sound level);
- Frequency A-weighted F time-weighted sound level;
- Frequency A-weighted F time-weighted maximum sound level;
- Frequency A-weighted F time-weighted minimum sound level;
- Frequency A-weighted sound exposure level;
- The sound level LN (N = 5, 10,50,90, and 95);
- Standard deviations SD

Room Noise
In this mode, frequency weighting is only A-weighted, and time weighting is only F-weighted.

The main measurement indicators are:
- 31.5Hz frequency band sound pressure level values (unweighted), maximum and minimum;
- 63Hz frequency band sound pressure level (unweighted), maximum value, minimum value;
- 125Hz frequency band sound pressure level (unweighted), maximum value, minimum value;
- 250Hz frequency band sound pressure level (unweighted), maximum value, minimum value;
- 500Hz frequency band sound pressure level (unweighted), maximum value, minimum value;
- Frequency A weighted equivalent continuous sound level, maximum value, minimum value.
- Mark with * when the measurement exceeds the limit.

1/1 OTC

This device utilize a 1/1 octave measurement mode, featuring 111/1 octave filter center frequencies: 16 Hz, 31.5 Hz, 63 Hz, 125 Hz, 250 Hz, 500 Hz, 1 kHz, 2 kHz, 4 kHz, 8 kHz, and 16 kHz. This mode supports three frequency weighting methods (A, C, Z) and two time weighting methods (F, S), allowing operators to select appropriate frequency and time weighting parameters for measurements.

Key measurement functions include:

- Time-averaged sound level (LeqT, equivalent continuous sound level) for each frequency band;
- Maximum weighted sound level (Lmax) for each frequency band;
- The minimum weighted sound level (Lmin) for each frequency band;
- A time average sound level, maximum and minimum values;
- C Weighted time average sound level, maximum and minimum values;
- Z Weighted time average sound level, maximum and minimum values.

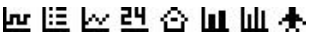
1/3 OTC

This device adopts a 1/3 octave measurement mode with 321/3 octave filter center frequencies: 16 Hz, 20 Hz, 25 Hz, 31.5 Hz, 40 Hz, 50 Hz, 63 Hz, 80 Hz, 100 Hz, 125 Hz, 160 Hz, 200 Hz, 250 Hz, 315 Hz, 400 Hz, 500 Hz, 630 Hz, 800 Hz, 1 kHz, 1.25 kHz, 1.6 kHz, 2 kHz, 2.5 kHz, 3.15 kHz, 4 kHz, 5 kHz, 6.3 kHz, 8 kHz, 10 kHz, 12.5 kHz, 16 kHz, and 20 kHz. This mode supports three frequency weighting methods (A, C, Z) and two time weighting methods (F, S), enabling operators to select appropriate frequency and time weighting parameters.

Key measurement functions include:

- Time-averaged sound level (LeqT, equivalent continuous sound level) for each frequency band;
- The minimum weighted sound level (Lmin) for each frequency band
- Maximum weighted sound level (Lmax) for each frequency band;
- A time average sound level, maximum and minimum values;
- C Weighted time average sound level, maximum and minimum values;
- Z Weighted time average sound level, maximum and minimum values.

Symbols and Definitions
The meanings of terms, symbols and abbreviations that may be used in this manual are shown below.

Nouns and Symbols	Define or describe
	Overload
	Deficit
	Upturning
	Flip down
	Left flip
	Turn right
	External power supply
	Underrange of measurement
	Threshold start
	Timer start
	The History feature is enabled
	The recording feature is enabled
	The Record and History features are enabled
	Icon for measurement mode results file
Alt	Height
Band	Frequency band
Code	Environmental monitoring point

Nouns and Symbols	Define or describe
dB	Sound level measuring device
EX	X (A, C, Z) frequency-weighted sound exposure, e.g. EA
E_A	A Frequency-weighted Acoustic Exposure
Ec	C Frequency-weighted Acoustic Exposure
Ez	Z Frequency-weighted Acoustic Exposure
F	Standard Time Weighting for Sound Level Meter
I	Pulse time weighting
FreqWt	Frequency weighting
Lat	Latitude
Lav	Time weighted average sound level
Lc	Standard level
LXE / LE	X (A, C, Z) frequency-weighted sound exposure level, e.g. LAE
LXeqT / LeqT	X (A, C, Z) frequency-weighted equivalent continuous sound pressure level, for example LAeqT
LXeq1s	X (A, C, Z) frequency-weighted 1-second equivalent continuous sound pressure level, e.g. LAeq1s
LXeq8h	X (A, C, Z) frequency-weighted normalized 8-hour average sound level, e.g. LAeq8h
LXY / Lp	X (a, C, z) frequency-weighted sound level and Y (F, s, I) time-weighted sound level, such as LAF, LCZ, etc.
LXymax / Lmax	X (A, C, Z) frequency weighting and Y (F, S, I) time weighting The maximum sound level, e.g., LAFmax
LXymin / Lmin	The minimum sound level for X (A, C, Z) frequency weighting and Y (F, S, I) time weighting, e.g., LAFmin

Nouns and Symbols	Define or describe
LXpeak / Lpeak	X (A, C, Z) weighted peak sound level, e.g. LCpeak
LeqC-A / LC-A	The Difference Between C-weighted Average Sound Level and Aweighted Average Sound Level
Ld	Daytime equivalent sound level
Ldn	Day and night equivalent sound level
Lden	Day, evening and night equivalent sound level
Le	Equivalent sound level at night
Ln	Nocturnal equivalent sound level
Limit	Indicated Limits in the Indoor Noise Model
Lng	Length
LN	Cumulative percentage sound level (statistical sound level), n = 1 ... 99. For example, L5 means 5% of the sound pressure levels exceed this value.
Lt	Threshold level
NDX	(A, C, Z) Weighted noise dose
Pa^2s / Pa^2h	A unit of sound exposure, measured in pascals per square second (Pa^2s) or pascals per square hour (Pa^2h), abbreviated as Pa^2s or Pa^2h when superscript notation is impractical.
Q	Exchange rate, range 3 ... 6
Room	Room Type in the Mode of Indoor Noise Measurement
S	Slow time weighting
Syn	The flag displayed when the Synchronize feature is selected in the 24-hour measurement mode
SD	Standard

Nouns and Symbols	Define or describe
Tm	Actual measured running time
Ts	Measure start date and time
TWA	8 time-weighted average sound level
Vel	Velocity
INT	Integral average measurement result format
L5	The result of statistical analysis shows that 5% of the sound pressure level exceeds the standard.
L90	According to the statistical analysis, 90% of the sound press ure level exceeds the sound pressure level.
LAE	Frequency A-weighted sound exposure level
LAeqT	The equivalent continuous sound pressure level (ECSL), measured in decibels, is a metric that tracks the time-dependent average of the Aweighted sound pressure level during the measurement period.
LAeq1s	1s Equivalent Continuous Sound Pressure Level (ECSPL) measures the time-varying average A-weighted sound pressure level during measurement, expressed in dB.
LAF	Frequency A-weighted and time F-weighted sound level
LAFmax	Maximum sound level with frequency A weighting and time F weighting
LAFmin	Frequency A-weighted and F-time-weighted minimum sound level
LAI	A-weighted and impulse-weighted sound level
LAImax	Maximum sound level of frequency A weighting and pulse time weighting
LAImin	Minimum Sound Level of Frequency A Weighting and Pulse Time Weighting
LAS	Frequency A-weighted and S-time-weighted sound levels
LASmax	Maximum sound level with frequency A weighting and S time weighting
LASmin	Frequency A-weighted and S-time-weighted minimum sound level

Nouns and Symbols	Define or describe
LAT1S	Frequency A-weighted 1-second equivalent continuous sound pressure level
LCE	Frequency C-weighted sound exposure level
LCeqT	Equivalent continuous sound pressure level, measured in decibels, indicates the time-varying average of the C-weighted sound pressure level during the measurement period.
LCeq1s	1s Equivalent Continuous Sound Pressure Level (ECPSL) measures the time-dependent average of C-weighted sound pressure level (C-WPSL) during the measurement period, expressed in dB.
LCF	Frequency C-weighted and F-time-weighted sound level
LCFmax	Maximum sound level with C-weighting and F-time weighting
LCI	Frequency C-weighted and Pulse Time-weighted Sound Level
LCImax	Maximum sound level with frequency C weighting and pulse time weighting
LCpeak	Frequency C-weighted peak sound pressure level
LCS	Frequency C-weighted and S-time-weighted sound level
LCSmax	Maximum sound level with C-weighting frequency and S-weighting time
Ld	Daytime equivalent sound level
Ldn	Diurnal equivalent sound level
Lden	Diurnal equivalent sound level
LeqT	Equivalent continuous sound pressure level, measured in dB, represents the average sound pressure level over time during the measurement period.
Le	Equivalent sound level at night
LE	Noise exposure level
Ln	Nocturnal equivalent sound level

Nouns and Symbols	Define or describe
LN	Statistical analysis of noise levels, where N represents the percentage exceedance
LZE	Frequency Z-weighted sound exposure level
LZeqT	The equivalent continuous sound pressure level (ECSPL) is the average Z-weighted sound pressure level measured during the measurement period, expressed in dB.
LZeq1s	1s Equivalent Continuous Sound Pressure Level (ECPSL) is the frequency Z-weighted sound pressure measured during the measurement period. The average level over time, measured in dB.
LZF	Z-weighted frequency and F-weighted time sound level
LZFmax	Maximum sound level with Z-weighting and F-time weighting
LZFmin	Minimum sound level with Z-weighting and F-time weighting
LZI	Frequency Z-weighted and Pulse Time-weighted Sound Level
LZImax	Maximum sound level with frequency Z-weighting and pulse time weighting
LZImin	Minimum sound level with frequency Z-weighting and pulse time weighting
LZS	Z-weighted frequency and S-weighted time sound level
NDA	Frequency A weighted noise dose
NDC	Frequency C weighted noise dose
NDZ	Z-weighted noise dose
Rep	Repeated measure
Sync	Synchronous measurement (24-hour measurement)
SD	Standard
STA	Statistical Analysis Measurement Result Format
TimeWt	Time weight
Tm	Actual measured running time
Total	Abstract

SPECIFICATIONS AND TECHNICAL PARAMETERS

Performance grade	Level 1 or Level 2 as specified in GB/T 3785.1-2010/ IEC 61672-1:2013.
Electromagnetic Field Radiation and Anti-jamming Classification	Class X as defined in GB/T 3785.1-2010 / IEC 61672-1:2013.
Frequency weighting	A-weighting; C-weighting; Z-weighting; Low (low frequency). Note: When A-weighting is selected and low-frequency (√) weighting is also chosen, low-frequency A-weighting can be applied to measure secondary radiation noise. Low-frequency weighting is generally not required for measurements. Keep the Weighting option set to low-frequency (×) weighting in the settings.
Time weighting	F (fast); S (slow); I (pulse).
Frequency range	10 Hz ... 20 kHz (Level 1); 20 Hz ... 12.5 kHz (Level 2)
Nominal operating mode	The nominal working mode is microphone
Reference environmental conditions	Air temperature: 23°C; relative humidity: 50%; Static pressure: 101.325 kPa;
Microphone type	A freefield frequency response measuring microphone with a nominal diameter of 127 mm and a nominal sound pressure sensitivity of 50 mV/Pa (the nominal sound pressure sensitivity level is At-26 dB (reference voltage 1 V), the microphone tip capacitance is approximately 15 pF.
Indicator	A 128×128 dot matrix LCD display (3.0 inches) with 0.1 dB resolution and 1-second data refresh rate, featuring warning indicators for overload, low voltage, and battery under-voltage.
Measurement range at 1 kHz frequency	30 dB(A) ... 130 dB (A) 40 dB(C) ... 130 dB (C) 45 dB (Z) ... 130 dB (Z) **Note:** The measurement range for other frequencies shall be the sum of the upper and lower limits of the instrument's measurement range and the frequency-weighted nominal values specified in the national standard GB/ T 3785.1-2010, provided that the upper limit shall not exceed the measurement range of 1 kHz. Both the upper and lower limits shall be no less than the lower limit of the 1 kHz measurement range. The measurement range can be customized to other nonstandard ranges based on user requirements.

Octave	**1/1 octave:** 16 Hz, 31 Hz, 63 Hz, 125 Hz, 250 Hz, 500 Hz, 1 kHz, 2 kHz, 4 kHz, 8 kHz, 16 kHz; **1/3 octave:** 16 Hz, 20 Hz, 25 Hz, 31 Hz, 40 Hz, 50 Hz, 63 Hz, 80 Hz, 100 Hz, 125 Hz, 160 Hz, 200 Hz, 250 Hz, 315 Hz, 400 Hz, 500 Hz, 630 Hz, 800 Hz, 1 kHz, 1.25 kHz, 1.6 Hz, 2 kHz, 2.5 kHz, 3.15 kHz, 4 kHz, 5 kHz, 6.3 kHz, 8 kHz, 10 kHz, 12.5 kHz, 16 kHz, 20 kHz.
Memory	» 16GB of RAM. » Calibration records are automatically saved in the instrument's memory. » The measurement records are automatically stored in the instrument's memory. » Select USB in Settings to use it as a USB drive.
Source	» It was powered by 5 AA batteries. » When the battery voltage is too low, the battery icon on the display will turn blank and start blinking. » Supports external power supply via USB port (5.0V). » When operating in 24-hour measurement mode, use a power bank for charging. Note: Explosion-proof products require LR6 alkaline batteries only.
Power bank	For extended or 24-hour measurements, a power bank is recommended, with a 10000mAh battery providing over 36 hours of operation.
Auto calibration range	±4.5dB (reference sensitivity of 50mV/Pa).
Calibration check frequency	1 kHz
The effect of windproof cover	The deviation must not exceed 0.5 dB within the critical frequency range
Reference direction	Frontal incidence (0° incidence)
Reference sound pressure level	94 dB, with a reference sound pressure of 20 μPa
Preheating time	60 s
Intrinsic noise level	» Under reference environmental conditions, the self-generated noise level does not exceed 25 dB (A-weighted) and 35 dB (Cweighted). » The expected value of the self-generated noise level of the sound level meter is not greater than the above value when the electrical input of the sound level meter is short-circuited by a 15 pF capacitor.

Temperature affect	The difference between the sound level at any temperature and the sound level at the reference temperature shall not exceed ±0.7 dB for Class 1 sound level meter and ± 1.0 dB for Class 2 sound level meter in the working temperature range of 0°C ... 40°C.
Humidity effect	When the relative humidity changes from 25% ... 90%, the difference between the indicated sound level and the reference sound level at the corresponding relative humidity should not exceed ±0.7 dB for Class 1 sound level meters and ±1.0 dB for Class 2 sound level meters.
Temperature and humidity limits	Temperature: -20°C ... +60°C; relative humidity: 95%.
Adjustment data of sound pressure response and free field response	The equivalent free field response can be obtained by adjusting the data in Table 1, based on the acoustic pressure response generated by the acoustic calibrator or the simulated acoustic pressure response produced by the electrostatic exciter.
Test the impedance of the microphone replacement (for testing)	15 pF in series with 10Ω.
The maximum sound pressure level that can be applied to the microphone	146 dB
The maximu peak-to-peak voltage that can be applied to the electrical input terminal	15 V
Output port	Type-C is used for printing or data communication.
Analog output	» The output jack is a 3.5mm dual-channel headphone jack. » The DC output is about 15mV/dB, and the range is 450mV to 1950mV. » AC output: The output is linearly proportional to the measured signal, with the root mean square value of the maximum AC output voltage not exceeding 2V.
Dimensions (length × width × thickness)	270mm×90mm×32mm.
Weight (no including battery).	360g

Free-Field Response Adjustment Data

Frequency /kHz	Free field increment/dB
1	0.2
1.25	0.3
1.6	0.4
2	0.5
2.5	0.7
3.15	0.9
4	1.3
5	1.8

Frequency /kHz	Free field increment/dB
6.3	2.2
8	3.4
10	5.0
12.5	6.2
16	7.6
18	8.4
20	9.0

MAIN STRUCTURE AND WORKING PRINCIPLE

The sound level meter consists of a microphone, a preamplifier, a signal conditioning circuit, a single-chip circuit, a power supply circuit, a display circuit, and a button circuit, and is equipped with a power supply, battery status monitoring, an overload indicator, a limit value indicator, a threshold alarm, as well as analog and digital output circuits.

The meter uses prepolarized, capacitively coupled measurement microphones that do not require an external bias voltage. As an acoustic-to-electrical transducer, the microphone converts the measured sound signals into corresponding electrical output signals, converting high-impedance signals into low-impedance signals for further processing in the subsequent circuits.

The signal conditioning circuit optimizes the preamplifier's output signal before it is sent to a 24-bit analog-to-digital converter (ADC). The microcontroller unit (MCU) controls the ADC, processes the digital output signal through frequency weighting, time weighting, detection, and logarithmic conversion, and finally sends the results to the display circuit for visual presentation.

The measurement result is displayed directly on the LCD screen; the screen can display warnings for low battery voltage, overload, and exceeding the measurement limits. The LCD screen offers advantages such as a large display area, high contrast, resistance to strong light, and reduced eye strain.
If the measurement signal exceeds the upper limit and the sound level meter is overloaded, the overload indicator appears in the center-right corner of the LCD screen; if the measurement signal falls below the lower limit, the LCD screen displays an underload indicator in the center-right area.

The meter is battery-powered. To meet the internal circuitry's reference voltage requirements, the device features a ±5 V reference power supply. The integrated battery monitoring circuit enables real-time monitoring of the battery's condition. A battery icon is displayed in the lower-left corner of the screen. When the battery level falls below the preset threshold, the icon automatically turns off and begins to flash to indicate a low battery.

USE AND OPERATION

1 - Backlight
2 - Keyboard
3 - Microphone/Pre-amplifier
4 - Tripod
5 - Battery cover

The control device has the following functions:

- **Microphone:** 12.7 mm pre-polarized condenser microphone. Note: Do not remove the protective cover.
- **Pre-amplifier:** For impedance matching, it must be installed immediately after the microphone and is non-removable.
- **Display:** 128×128 dot matrix LCD with 0.1 dB resolution, showing battery voltage status, overload, and undervoltage simultaneously.
- **Keyboard:** Button for turning on/off, measuring, and displaying.
- **Battery cover:** Press down the snap-on battery cover for easy battery replacement.
- **Tripod mounting hole:** 1/4 inch threaded hole for mounting the sound level meter on the tripod.

Instrument Output Interface
The instrument's output interfaces are visible at the bottom of the secondary screen. The 3.5 mm dual-channel headphone jack serves as the AC/DC output interface, The Type-C port is used to connect an external USB power supply for instrument operation or to connect an optional wired mini printer.

1 - T F block
2 - Type-C interface
3 - AC/DC output

Replace the Battery
The sound level meter is powered by five AA (5V) batteries, with the battery compartment located on the back of the device. When installing or replacing batteries, push the battery cover to the right in the direction indicated by the arrow. AA batteries must be inserted correctly according to the polarity marked on the packaging box. Never insert them in reverse!
If the display shows a blank battery voltage symbol with a flashing indicator in the lower left corner, this indicates the battery voltage has dropped below the specified operating level. Replace the battery promptly. While the device may continue to function normally, immediate replacement is recommended to prevent potential measurement errors.

Pay attention to:
» When replacing the battery, ensure the noise level meter is turned off.

» Do not mix new and old batteries;

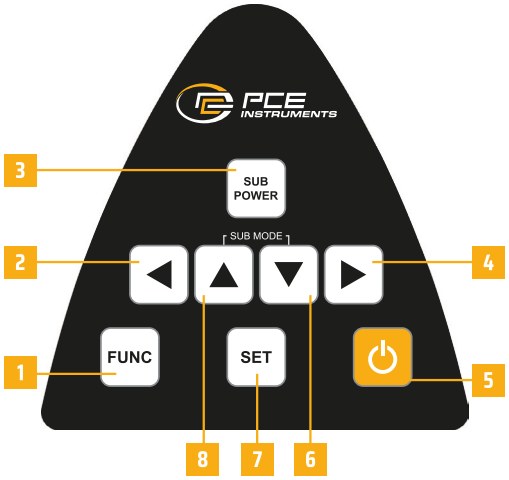
» When the battery is completely drained, the audio indicator stops functioning and fails to display battery warning signals.

» Waste batteries should be disposed of at designated recycling points to prevent environmental pollution.

Warning: Do not dispose of used batteries in fire to avoid explosion!

Buttons

1 - FUNCTION key
2 - LEFT key
3 - SUB POWER
4 - RIGHT key
5 - POWER key
6 - DOWN key
7 - SET key
8 - UP key



Button Function Description

- **Function key:** This key has different functions in different interfaces and is used as the OK, Start, Pause, Modify, Calibrate, Print, and Yes keys.
- **Set key:** This key has different functions in different interfaces and is used as the Calibrate, Set key.
- **Left arrow key:** Functions as left shift, left advance, and left page turn.
- **Down arrow key:** Shift + Page Down, used to reduce and select values in the parameter settings interface.
- **Right arrow key:** Shift-right, Shift-right advance, and Page-right, and also deletes items in the browsing interface.
- **Up arrow key:** Function value increment and selection in the parameter setting interface, used as Shift up, page up.
- **SUB function key:** Press the up and down keys simultaneously to toggle the secondary screen display.
- **Power button:** Long press to turn the device on or off (power-off must be performed from the main interface). It can also serve as a function key, with different interfaces providing distinct functions such as reset, return, exit, stop, and cancel.

Calibration
The sound level meter can be calibrated using various acoustic calibrators.
The calibration covers the entire unit, including the microphone. We recommend using dual-level acoustic calibrators or other models with 94 dB, 1 kHz output signals.

The calibration procedure using a sound level calibrator is as follows:

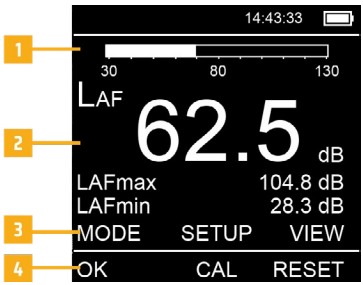
- Install the battery, or connect it directly to the USB port for external power.
- Press and hold the power button to power on and access the main interface.
- Preheat for 60 seconds.
- Press the Calibrate key (Function Key 2) to enter the calibration interface.
- Based on the calibrator's sound level and operating frequency, adjust the Calibration Level and Free Field Correction values. Use the left/right arrow keys to navigate to the modified numbers, then press the up/down arrow keys. After adjusting the values, press the Calibrate key (Function Key 1) to initiate calibration. The remaining calibration time will be displayed in the center of the screen.
- After calibration is complete, the LAF displays the calibrated sound level with Successful at the bottom of the screen. If Too High, Too Low, or Unstable appears, the calibration failed. Check the sound calibrator or calibration level settings for errors. Confirm correct settings and press the Calibrate key (Function Key 1) to proceed.
- After calibration is completed, press the power button (return key) to exit the calibration interface, turn off the sound calibrator, and remove it. At this point, the sound level meter is calibrated.

Pay attention to:

- When using other types of acoustic calibrators, please refer to the corresponding product manuals. This product is not suitable for calibrating piston-type probes.
- When calibrating, ensure the sound calibrator is tightly coupled to the microphone.
- During calibration, the background noise must be at least 20 dB below the output sound pressure level of the acoustic calibrator; otherwise, calibration must be performed according to the instructions provided by the acoustic calibrator.
- If there is a high level of background noise, the sound level meter should be calibrated to 114 dB. Although the meter is very stable and requires only occasional adjustments, it is still recommended to perform a calibration check before and after each measurement.

Main Interface Description

1 - Information area, displaying instrument model and battery label.
2 - The measurement area displays the measured sound level parameters, values, and units.
3 - Menu item area, three submenus, select with the left/right arrow keys, then press Enter to confirm.
4 - Function Key Area: The three function keys on the panel's top correspond to their respective buttons. The leftmost Function Key confirms settings, the middle Settings, calibrates, and the Power Key resets (short or long press to power off).



Main Interface Settings

In the main interface, hover over the Settings option and press the OK key (function key) to access the settings. Here, you can adjust parameters like clock, recording, brightness, and baud rate, view Memory and About the Instrument information, and choose whether to enable automatic printing and USB input functions.

To activate the USB function, position the cursor at the USB option and press OK to enter. Then, at the U disk (-) option, press OK again to switch to U disk mode. Connect the device to your computer via a USB cable, and all measurement data from the SD card will be displayed on the computer.
Modify LCD (Brightness). Use the up/down arrow keys to move the cursor to the LCD item, then press OK to proceed. The brightness can be set from 0 ... 9 (10 levels). Select 5 as the recommended brightness. Adjust the brightness value using the up/down arrow keys, then press OK to save and return, or press BACK (power button) to return without saving.

To modify the clock, place the cursor at the date & time position and press OK to enter the clock settings interface. Use the left/right arrow keys to move the cursor and the up/down arrow keys to adjust the value. After making changes, press OK to save and return, or press BACK (power button) to exit without saving.
To adjust recording settings, position the cursor at the recorder icon. Press OK to open the settings interface, then use the left/right arrow keys to move the cursor and the up/down arrow keys to adjust values. After completing the changes, click Save to save and exit, or press Return (power button) to exit without saving. Note: Select the left channel during recording. The generated file is in WAV format (left channel, measurement range 30dB ... 115dB). The device cannot play the recording directly; you must transfer (or copy) the file to a computer for playback.

After selecting the Printer option, the cursor will move to the printer position. Press Enter to enter the print settings interface, use the left/right arrow keys to move the cursor, and adjust numerical parameters with the up/down arrow keys. Click Save to save and return. If you choose the Auto (√) mode, connect the printer before measurement. The system will automatically complete printing after measurement without any manual operation.

Note
The printer's baud rate is typically set to 9600. For higher baud rates, refer to the printer manual.
Search for Storage, move the cursor to Storage, and click OK to enter the memory interface. This interface has two submenus: SD Card Information and Clear Data. Be cautious when entering Clear Data.
The query for About the Instrument' follows the same procedure as above listing the instrument's model, version, power supply voltage, and serial number.

Pattern
In the main interface, hover over the Mode option and press the OK key (function key) to access the measurement mode interface. Seven modes are available:

- Integral Average,
- Statistical Analysis,
- 24-Hour Measurement,
- Parallel Measurement,
- Indoor Noise,
- 1/1 octave,
- 1/3 octave.

Note that configurations vary by model, as detailed in Table Configure.

Glance Over
In the main interface, hover over the View option and press the OK key (function key) to access the data browsing interface. The instrument categorizes data by year, month, and day. Each measurement group's name consists of Measurement Start Time Mode Code.

For example:

- 124208.INT indicates integrated average measurements starting at 12:42:08;
- STA stands for Statistical Analysis;
- 24H refers to 24-hour measurements;
- PAR denotes Parallel;
- IND represents Indoor Noise;
- OCT indicates 1/1 octave;
- 3RD signifies 1/3 octave.

MEASURE

Standard Sound Level Meter
The main interface of this device features standard sound level meter functions, capable of measuring LAF, LAFmax, and LAFmin. To reset the maximum and minimum sound levels, press the power button (reset button).

Average of Integral
Settings in the Average Mode
In the integral average interface, press the Settings key (Settings key) to enter the integral average parameter settings interface. To configure parameters including measurement point code (Cite code), integration time (preset time, weight, repeat, LN percentage, and startup method), follow these steps:

- Use the up/down arrow keys to navigate to the desired parameter.
- Press the Modify key (function key) to open the editing interface.
- Use the left/right arrow keys to move the cursor.
- Adjust values or methods using the up/down arrow keys.
- Press the OK key (function key) to save and exit.

Pay attention to:

- If the Preset Time is set to 00:00, the integration time is set to Manual.
- After completing the startup mode settings for the Start Mode item, the corresponding mark will appear in the lower left corner of the Score Average interface. The mark is set to Threshold, RTC timer, or Manual, no tags. It will start simultaneously. Set the mode to Threshold and click the Start button in the Integral Average interface to launch.
- When the option low (√) is selected during weighting, the system will switch to low-frequency measurement (16Hz ... 200Hz) to measure secondary radiation noise.

Average of Integral
The steps of integral average measurement are as follows:

- Open and calibrate according to the Calibration section
- Select the Mode option, press OK to enter measurement mode, then choose Integral average and press OK to access the integral average measurement interface.
- Set the parameters of measurement point code, integration time, weighting, repeat measurement, and start mode according to section before. If no adjustment is made, select A weighting for frequency and F weighting for time. If the measurement noise changes rapidly, select S weighting for time.
- Press the start button to begin measurement. During the process, press the up/down arrow keys to view parameters including equivalent continuous sound level, time-weighted instantaneous sound level, C-weighted peak sound level, 1-second equivalent continuous sound level, maximum time-weighted sound level, minimum time-weighted sound level, standardized 8-hour average sound level, sound exposure level, and noise dose. The measurement duration and actual operating time are also displayed.
- If the overload symbol is displayed in the middle of the right side of the screen indicating that the measured sound level has exceeded the upper limit of the sound level measurement range. If the display shows a mark below the limit in the middle of the right side, This indicates that the measured sound level is below the lower limit of the sound level meters measurement range.
- When the integration time expires, the sound level meter automatically or manually stops measurement and switches to the display interface, where users can view or print the results.

» Press the Return key (power button) to return to the integrated average interface and perform the next measurement.

» After the measurement is completed, return to the main interface and check the sensitivity with a sound level meter calibrator to ensure the accuracy and reliability of the measurement data.

» Shut down

Pay attention to:

» When the repeated measurement setting is configured for 2 or more total measurements, the sound level meter will automatically perform the next measurement after completing the current one.

» When the sound level meter is not in use for an extended period, the battery must be removed to prevent battery leakage from damaging the instrument.

» To shut down, exit to the main interface and press and hold the power button.

Statistical Analysis

Settings in Statistical Analysis Mode

In the statistical analysis interface, press the Settings key (Function Key 2) to access the configuration panel. This section primarily includes parameter settings such as measurement point coding, integration time, statistical sound level, repeated measurements, startup mode, and historical records.

The detailed steps are as follows:

» Use the Up/Down Arrow Keys to navigate to the desired settings

» Press the OK key (Function Key 1) to confirm, then use the Left/Right Arrow Keys to adjust the cursor position and modify values or methods with the Up/Down Arrow Keys.

» After completing the settings, click the Save key (Function Key 1) to save the configuration and return to the main interface.

Pay attention to:

» Set the preset time to 00:00:00, which means the clock time is set to 99:59:59.

» After completing the startup mode settings in the Startup Mode section, the corresponding mark will appear in the lower left corner of the average points interface. The mark is set to Threshold, RTC, or Manual and unmarked states. Additionally, in the measurement interface, you must press the start button to activate the device.

Statistical Analysis Technique

The statistical analysis and measurement procedures are as follows:

» Enable and calibrateaccording to the Calibration section

» Select the Mode option, press the OK key (function key) to enter measurement mode, then select Statistic and press OK to access the statistical analysis interface.

» Set the parameters such as measurement point code, integration time, statistical sound level, repeated measurement, starting mode, and history according to the method

» Press the Start button to begin the measurement. During the measurement, press the ↑/↓ keys to view the measured values of LAeqT, LAF, LAeq1s, LAFmax, LAFmin, LAE, SD, LN, and Tm.

» The overload symbol appears in the middle of the right side of the display. Indicating that the measured sound level has exceeded the upper limit of the sound level measurement range. If the display shows a mark below the limit in the middle of the right side, this indicates that the measured sound level is below the lower limit of the sound level meter's measurement range.

» When the integration time expires, the sound level meter automatically or manually stops measurement and switches to the display interface, where users can view or print the results.

» Press the BACK key (power button) to return to the statistical analysis interface and proceed with the next measurement.

» After the measurement is completed, return to the main interface and use the sound level meter calibrator to check the sensitivity to ensure the accuracy and reliability of the measurement data.

» Close

» **Note:** The statistical analysis pattern has only A frequency weighting and F time weighting.

24h Pattern
24 Hour Mode Settings
In the 24-hour measurement interface, press the Settings key to enter the statistical analysis settings interface. The main parameter settings include measurement point encoding, integration time, statistical sound level, synchronization, startup mode, history, and mode.

The specific operation steps are as follows:
» Use the up and down arrow keys to move to the required repair.

» For modified items, press the OK key (function key) to enter the settings interface.

» Use the left/right arrow keys to move the cursor, and the up/down arrow keys to adjust values or method parameters.

» After completing the settings, press the Save key (function key 1) to save and return to the main interface.

Pay attention to:
» If the preset time is set to 00:00:00 or more than 1 hour, it will be limited to 1 hour.

» Sync means that the start time of each subsequent measurement after the first measurement is at the hour mark. Asynch means that the minute and second of each subsequent measurement is the same as the minute and second of the first measurement.

24h Mode Measurement
The hourly measurement steps are as follows:
» Enable and calibrate according to the Calibration section

» Select the Mode option, press OK to enter measurement mode, select 24 hours, then press OK to access the 24-hour measurement interface.

» Set parameters such as measurement point code, integration time, statistical sound level, synchronization, start mode, history and mode according to method.

» Press the start button to begin the first set of measurements. During the measurement process, press the Up/Down arrow button to view LAeqT, LAF, LAeq 1s, LAFmax, LAFmin, LAE, SD, LN, and Tm the measured value.

» The overload symbol appears in the center of the right display. This indicates that the measured sound level has exceeded the upper limit of the sound level measurement range. If the center of the right display shows a value below the limit, this means that the measured sound level is below the lower limit of the sound level measurement range.

- When the integration time reaches the automatic completion of the first measurement set, the sound level meter enters the 24-hour measurement results interface, where the first set of measurement results can be viewed.
- When the second set of measurement time ends, the instrument automatically starts the second set of measurements.
- After completing 24 sets of measurements, you can view and print them in the measurement results interface.
- Press the power button to return to the 24-hour measurement interface and proceed with the next measurement.
- After the measurement is completed, return to the main interface. It is recommended to calibrate the sensitivity of the sound level meter using a sound level calibrator to ensure the accuracy and reliability of the measurement data.
- Shut down
- **Note:** When measuring for extended periods, use the charger to prevent measurement interruptions caused by low battery power.

Parallel Mode

Settings in Parallel Mode

In the parallel measurement interface, press the Settings key to access the parameter configuration screen. Key parameters include measurement point encoding, integration time, repeat measurement, startup mode, and historical records.

The procedure is as follows:

- First, use the Up/Down Arrow keys to select the item you want to modify, then press OK (function key) to confirm.
- Use the Left/Right Arrow keys to move the cursor, and adjust values or methods with the Up/Down Arrow keys.
- After completing the settings, press Save (function key) to save and return to the main interface.

Parallel Mode Measurement

The parallel measurement steps are as follows:

- Enable and calibrate according to the Calibration section
- Select the Mode option, press the OK key (function key) to enter measurement mode, select Parallel, and press OK to enter the parallel measurement interface.
- Set parameters according to section before, such as test point code, integration time, repeated measurement, starting mode, and history.
- Press the start key to begin the measurement. During the process, use the up/down arrow keys to view the time-weighted instantaneous sound level, maximum instantaneous sound level, minimum instantaneous sound level, equivalent continuous sound level, peak sound level, sound exposure level, measurement duration, and elapsed time.

» When the integration time expires, the sound level meter automatically or manually stops the measurement. It then displays the results, allowing you to view or print them.

» Press the BACK key (power button) to return to the parallel measurement interface and proceed with the next measurement.

» After the measurement is completed, return to the main interface and use the sound level meter calibrator to check the sensitivity to ensure the accuracy and reliability of the measurement data.

» Close

Indoor Noise Pattern

Settings in Indoor Mode

To access the indoor noise measurement settings interface, press the Settings button. This interface includes key parameters such as measurement point encoding, integration time, room type, repeat measurement, startup mode, and historical records.

The procedure is as follows:

» First, press the Up/Down Arrow keys to select the item you want to modify, then press the OK key (function key) to enter the settings interface.

» Use the Left/Right Arrow keys to move the cursor, and adjust values or modify methods using the Up/Down Arrow keys.

» After completing the settings, click the Save key (function key) to save the changes and return to the main interface.

Indoor Noise Measurement

The steps for indoor noise measurement are as follows:

» Enable and calibrate according to the Calibration section

» Select the Mode option, press OK to enter measurement mode, then select Indoor Noise and press OK to access the indoor noise measurement interface.

» Set the parameters Measurement Point Code, Integration Time, Room Type, Repeat Measurement, Start Mode, and History according to method.

» Press the start button to begin the measurement. During the process, use the Up/Down Arrow keys to view the sound pressure levels, maximum and minimum values, and Aweighted sound levels for the 31.5Hz, 63Hz, 125Hz, 250Hz, and 500Hz frequency bands.

» When the integration time expires, the sound level meter automatically or manually stops the measurement, then displays the results on the interface where you can view or print the data.

» Press the BACK key (power button) to return to the indoor noise measurement interface for the next measurement.

» After the measurement is completed, return to the main interface. It is recommended to use a sound level calibrator to check the sensitivity of the sound level meter to ensure the accuracy and reliability of the measurement data.

» Shut down

1/1 OTC Octave

1/1 Settings in OTC Octave Mode

Press the SETUP key in the octave interface to enter octave settings. The steps are as follows:

» Use the ↑/↓ keys to navigate to the item you want to modify, press OK to enter

» Use the ←/→ keys to move the cursor, and adjust the value or method with the ↑/↓ keys.

» After completing the settings, press Save to save and return.

1/1 Octave

1/1 The octave measurement procedure is as follows:

» Open and calibrate according to the Calibration section

» Select the Mode option, press OK to enter measurement mode, then select 1/1 octave and press OK to open the 1/1 octave measurement interface.

» According to section before, set parameters such as measurement point code, integration time, weighting, repeated measurement, starting mode, and history. If no adjustment is made, select A weighting for frequency weighting and F weighting for time weighting. If the measurement noise changes rapidly, S weighting can be selected for time weighting.

» Press the start key to begin the measurement. During the measurement, press the ↑/↓ arrow keys to view 11 frequency bands (16 Hz, 31.5 Hz, 63 Hz, 125 Hz, 250 Hz, 500 Hz, 1 kHz, 2 kHz, 4 kHz, 8 kHz, and 16 kHz) and their corresponding continuous sound levels, maximum values, minimum values, and Tm measurements under A, C, and Z weighting.

» When the integration time expires, the sound level meter automatically or manually stops the measurement, then displays the results on the interface where you can view or print the data.

» Press the BACK key (power button) to return to the 1/1 octave measurement interface and proceed with the next measurement.

» After the measurement is completed, return to the main interface. It is recommended to use a sound level calibrator to check the sensitivity of the sound level meter to ensure the accuracy and reliability of the measurement data.

1/3 OTC Octave Mode

1/3 OTC Octave Mode Settings

To access the 1/3 octave interface, press the SETUP key (Function Key 2). This interface allows configuration of key parameters including measurement point encoding, integration time, weighting coefficients, repeat measurements, modes, and historical records. The procedure is as follows:

» First, press the up/down arrow keys to select the desired modification. Confirm the entry by pressing OK (Function Key 1).

» Use the left/right arrow keys to move the cursor, and adjust values or method parameters via the up/down arrow keys.

» After completing the settings, press Save (Function Key 1) to save and return.

1/3 Octave

The frequency measurement procedure for a 1/3 octave interval is as follows:

» Enable and calibrate according to the Calibration section

» Select the Mode option, press OK (Function Key 1) to enter measurement mode, select 1/3 octave, then press OK to access the 1/3 octave measurement interface.

» Set the parameters for measurement point code, integration time, weighting, repeat measurement, start mode, and history according to secion before. If no adjustment is needed, select A weighting for frequency and F weighting for time. If the measurement noise changes rapidly, select S weighting for time weighting.

» Press the Start button to begin the measurement. During the process, press the Up/ Down Arrow keys to view 32 frequency bands (16 Hz, 20 Hz, 25 Hz, 31.5 Hz, 40 Hz, 50 Hz, 63 Hz, 80 Hz, 100 Hz, 125 Hz, 160 Hz, 200 Hz, 250 Hz, 315 Hz, 400 Hz, 500 Hz, 630 Hz, 800 Hz, 1 kHz, 1.25 kHz, 1.6 kHz, 2 kHz, 2.5 kHz, 3.15 kHz, 4 kHz, 5 kHz, 6.3 kHz, 8 kHz, 10 kHz, 12.5 kHz, 16 kHz, and 20 kHz) along with their corresponding continuous sound levels, maximum values, minimum values, and Tm measurements (using the A, C, and Z weighting methods).

» When the integration time expires, the sound level meter automatically or manually stops the measurement, then displays the results on the interface where you can view or print the data.

» Press the BACK key (power button) to return to the 1/3 octave measurement interface and proceed with the next measurement.

» After the measurement is completed, return to the main interface. It is recommended to calibrate the sensitivity of the sound level meter using a sound level calibrator to ensure the accuracy and reliability of the measurement data.

Print Measurement Data

Micro Printer and Its Application

The sound level meter can be optionally equipped with a micro printer with serial interface for printing the measurement results.

» User manuals for different printer batches may vary. Please refer to the printer manual.

» If the printer is not used for a long time or does not work properly, turn off the power.

» Use a charger that meets the requirements.

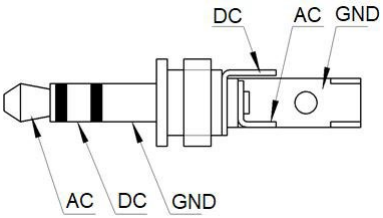
» When connecting a printer to a computer, first connect the data cable, then the printer power cable.

» Thermosensitive paper has two sides. Printing is only allowed on the front side.

» When the print is unclear, gently wipe the surface of the heating element of the print head chip with a cotton ball dipped in a small amount of alcohol.

» Do not open the paper tray cover while printing, as it may cause the printer to malfunction.

Analog Output and Wiring
The measuring device features both AC and DC voltage output signals. For easy volume adjustment, the AC and DC outputs share a single 3.5mm dual-channel jack. External devices (e.g., digital multimeters, audio equipment) can be connected to the sound level meter's output port using the included 3.5mm plug. Users must connect the output line correctly according to the required voltage type during operation.
The DC output voltage is about 15mV/dB, and the range is 450mV ... 1950mV.
AC output: The output is linearly proportional to the measured signal, with the root mean square value of the maximum AC output voltage not exceeding 2V.



INSTRUMENT MAINTENANCE

General Precautions
To prevent sound level meters from being damaged due to improper use or operation, the following instructions are provided:

- After use, remove the battery to prevent liquid leakage that may damage the instrument.
- Sound level meters should be stored in a dry place.
- Always turn off the power before loading or unloading microphones, extension cords, batteries, or external power sources.
- Do not remove the microphone cover to avoid damaging the diaphragm.
- Avoid touching the input contacts with your hands to prevent damage to the sound level meter caused by static electricity.
- Avoid prolonged exposure of liquid crystal displays (LCDs) to intense ultraviolet radiation to prevent aging.

Regular Verification
To ensure the accuracy and reliability of the measurement results, the sound level meter should be checked and calibrated annually.

DISPOSAL

For the disposal of batteries in the EU, the (EU) 2023/1542 directive of the European Parliament applies. Due to the contained pollutants, batteries must not be disposed of as household waste. They must be given to collection points designed for that purpose. In order to comply with the EU directive 2012/19/EU we take our devices back. We either re-use them or give them to a recycling company which disposes of the devices in line with law. For countries outside the EU, batteries and devices should be disposed of in accordance with your local waste regulations. If you have any questions, please contact PCE Instruments.

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