ScienceCube

Wireless Sound Pressure (WL124S)

User Guide

Rev. WL124S-12-2023

This product is to be used for educational purposes only. It is not appropriate for industrial, medical, research, or commercial applications.

KOREADIGITAL

The Science Cube wireless Sound sensor can measure the loudness of sound.

The wireless Sound sensors is a device that measures the loudness of sound. This device displays the loudness of sound in a unit called decibels (dB). The loudness of sound is proportional to the amplitude of sound. The larger the amplitude, the louder the sound. Sound pressure level are mainly used for noise measurement. Noise measurement is necessary to evaluate the impact of noise on the human body in factories, construction sites, roads, etc.
You can measure by remotely connecting to a smart device or PC wirelessly or wired.

Suggested experiments

- environmental noise studies
- sound level comparisons
- investigating room acoustics
- sound isolation modeling
- sound propagation modeling

Composition

The ScienceCube wireless sound sensor *consists of the following.*

- Wireless sound sensor(WL124S)
- MIC. Sponge(Mounted on the end of the probe)
- USB-A/C cable
- Booklet

Feature

- Up to four Science Cube wireless sensors can be connected to a PC or smart device at the same time.
- It supports dual-mode Bluetooth, allowing you to connect not only smart devices but also desktop and laptop PCs to conduct experiments using the **Science#** application.
- It can be connected to a PC through a USB port and experiments can be performed using the **Science#** program.

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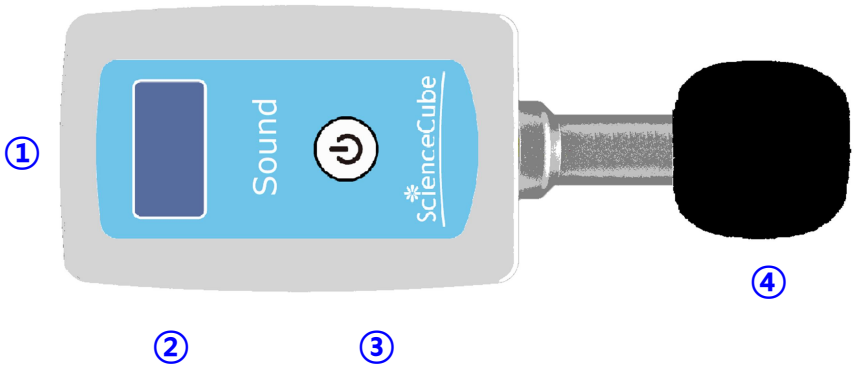
Function of wireless sensor

Structure



① USB port : Connect the sensor to a PC and use it for experiments or charging.

② OLED Display : Displays measured sensor values, sensor type, sensor ID, and remaining battery level.

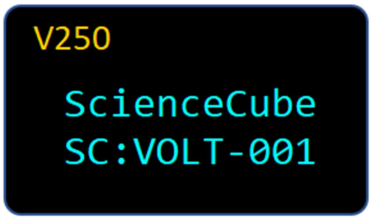
③ Power/Function Button : It has functions such as power ON/OFF, measurement sensor change and calibration, etc.

④ Sensing part : A sponge-wrapped condenser microphone detects sound.

Power/Function Button

Status	Turn	Action	Description
When the power is off	Click once	■	A short press turns the sensor on.
	Long click	■■■■■■■■	A long press changes the mode and turns on the sensor.
When it's on	Click once	■	Change sensor type or range. (Multi-sensor or range sensor only)
	Double click	■■	Sensor with flip function rotates the screen 180 degrees so text is clearly visible.
	Long click	■■■■■■■■	Turns off.

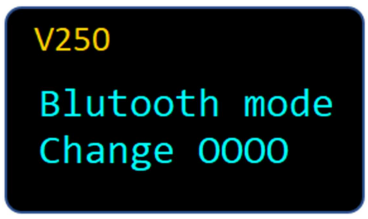
Start screen



V250 : Displays the sensor's firmware version.

SC:OOOO-001 : When you search for a Bluetooth device, the device name will be displayed. (Sensor name and 3-digit serial number)

Mode change



When you press and hold the power button and turn it on, the Bluetooth connection mode changes to **Mobile** or **PC** with the following message.

Measurement screen

①**Connection mode**	**Mobile** : Connecting Androidor iOS. **PC** : Connecting to Windows PC ※ A long press changes the mode and turns on the sensor.
②**Sensor-ID**	This is the sensor's unique number and is displayed along with the sensor name in the device name when connected via Bluetooth.
③**Battery**	Check the battery status, and when charging via USB, the display will change to charging.
④**Value**	1) Displays sensor measurement values and units in real time. 2) For sensors with **multiple ranges**, the current range is displayed.

The measurement range changes each time you press the button.

How it Works

The wireless Sound sensors measure sound pressure level in decibels. Sound pressure level (SPL) or sound level is a logarithmic measure of the effective sound pressure of a sound relative to a reference value. It is measured in decibels (dB) above a standard reference level.

The commonly used reference sound pressure in air is usually considered the threshold of human hearing (at 1 kHz). The A-frequency-weighting(dBA) was only meant for quiet sounds in the region of 40 dB sound pressure level (SPL), And that discriminates against low frequencies. The dBA output indicates sound pressure, in a manner similar to the

response of the ear. In this setting the meter primarily measures in the 500 to 10,000 Hz range.

The Sound Level Sensor uses an electric condenser microphone mounted on the end of a probe. As the AC signal from the microphone is converted to DC by a root-mean-square (RMS) circuit and thus it must have a time-constant of integration.

At its very core, a sound level meter basically consists of a microphone, a preamplifier, a signal processing unit, and a display. The most suitable type of microphone for a sound level meter is a condenser microphone, which combines precision with measurement reliability. The microphone converts the sound signal to an equivalent electrical signal. The electrical signal produced by the microphone is at a very low level and must be enhanced by a preamplifier, before reaching the main processor.

Using the Sensor

The Science# logging program will detect that the Sound Level Sensor is connected.

1. Start the Logging Program (Science#) on a computer or smart device.
2. Connect the wireless sound sensor to any of the smart device.
3. You are now ready to collect data. The logging program identifies the Wireless sound sensor and starts measuring in dB.
4. Click on Collect and begin collecting data.

In this experiment, we measure the sound level on a office room.

Sound Source	Sound Level(dB)
Threshold of pain	120
Extremely loud	90
Very loud	80
Loud	70
Moderately loud	60
Soft	50
Very soft	40
Extermely soft	30
Threshold of hearing	0

Specifications

Item	Description
Range	40 ~ 80 dB 60 ~ 100 dB 80 ~ 120 dB
Resolution	0.1dB
Sampling Time	Max. 100Hz (0.01 sec.), (Typical 1.5Hz)
Condition	-20 ~ 60℃, 85%RH
Wireless Connection	Bluetooth 5.0 or Classic 2.1
Wired Connection	USB-C
Battery	700mAh Li-Polymer rechargeable
Charging Time	within 2 hours
Operating Time	Approximately 8 hours after full charge (depending on usage conditions)
EMC	CE : EN 61326-1, EN 55011, EN 55032, EN 301

CAUTION: Do not use the instrument beyond the measurement range or in conditions that exceed the short-term exposure limits. Prolonged exposure beyond the maximum permissible range can cause serious damage to the sensor.

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