ScienceCube

Wireless Spirometer (WL122SP)

User Guide

Rev. WL122SP-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 spirometer can measure respiratory volume and cycle in physiology experiments.

The wireless spirometer is a sensor that measures respiratory volume and breathing cycle in physiological experiments. A spirometer uses pressure differences to measure the speed of air being breathed through an opening and can calculate the user's airflow rate and vital capacity. Results are expressed in liters per second. The spirometer consists of a removable, disposable paper mouthpiece containing a bacterial filter and an orifice connected by tubing to the sensor.

You can measure by remotely connecting to a smart device or PC wirelessly or wired.

Suggested experiments

- Investigate the lung capacity of athletes versus non-athletes
- Compare lung capacity of smokers versus lung capacity of non-smokers
- Conduct respiratory experiments

Composition

The ScienceCube wireless spirometer *consists of the following.*

- Wireless spirometer(WL122SP)
- Orifice and tube
- disposable bacterial filter
- disposable mouthpieces
- 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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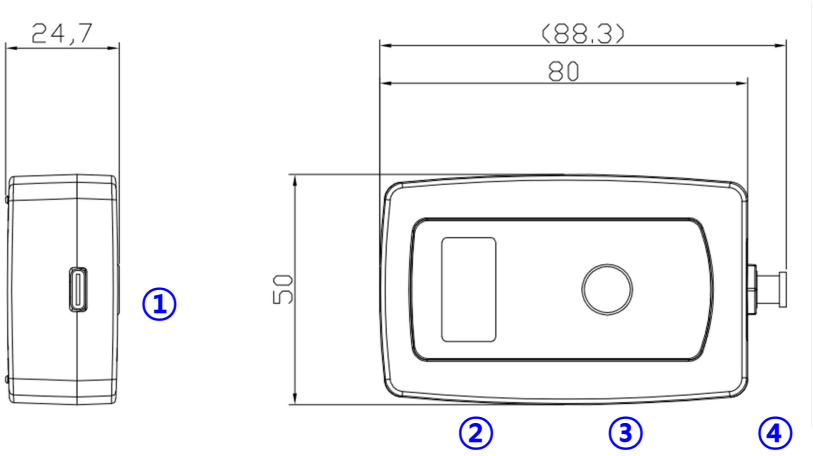
Function of wireless sensor

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.

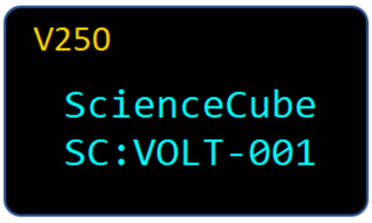
④ Sensing part : : tube, socket insertion hole.

> **Caution** : Do not use the sensor near fire or explosive gases. High concentrations of contaminants can permanently damage the sensor.

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	Double click	■■	1) Zero point setting (For sensors with zero point function) 2) A user calibration (if the sensor has a calibration function) is performed and **U0** or **UC** is displayed above the device.
	Long click	■■■■■	Turns off.

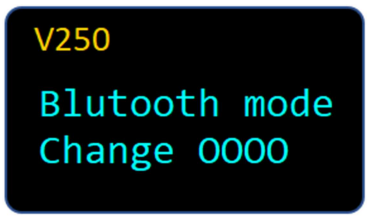
Start screen



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



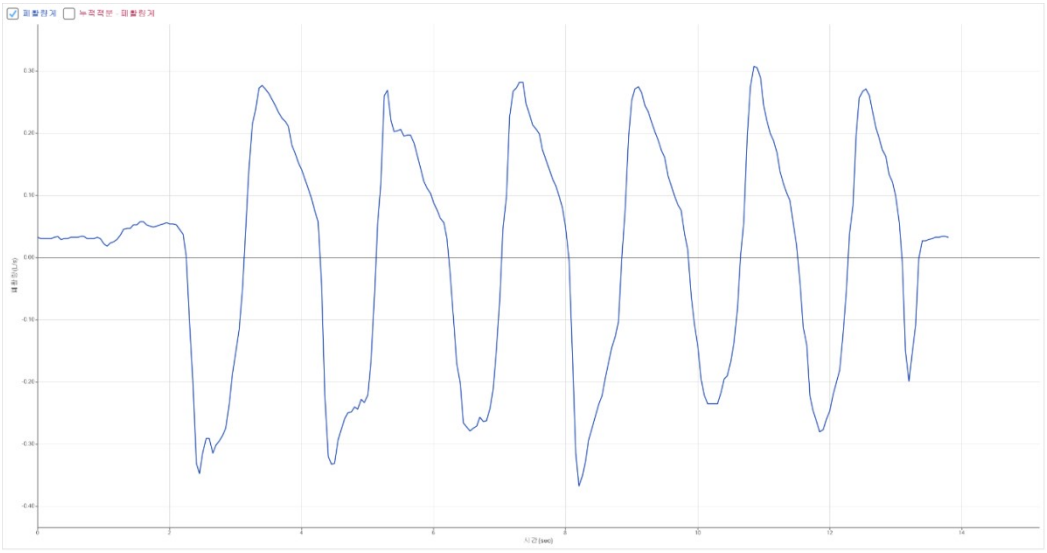
When you press and hold the power button and turn it on, the Bluetooth connection mode changes to **Mobile** or **PC** with the following message.

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) If **user calibration** is used, **U0** or **UC** will be displayed above the units. 3) For sensors with **multiple ranges**, the current range is displayed. 4) For **multiple sensors**, the values for each sensor type are displayed.

How it Works

The spirometer consists of a high-sensitivity pressure sensor and sensor tube. Inside this tube is a small disc, at which point the tube narrows. As air exhaled through the mouthpiece moves through the tube, the pressure increases at the inlet of the disc and decreases at the opposite end. A pressure sensor detects changes in this pressure and changes the output value accordingly. Inside the sensor, an analog-to-digital converter converts the voltage into an appropriate result. When air moves in the opposite direction (breathing in) through the tube, the sensor gives a negative value in reverse.



Specifications

Item	Description
Range	-5 ~ +5 L/s
Resolution	0.01 L/s
Sampling Time	Max. 100Hz (0.01 sec.), (Typical 1Hz)
Condition	0 ~ 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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