



Wireless Spirometer (P4522-SP)

User manual



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.

The 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

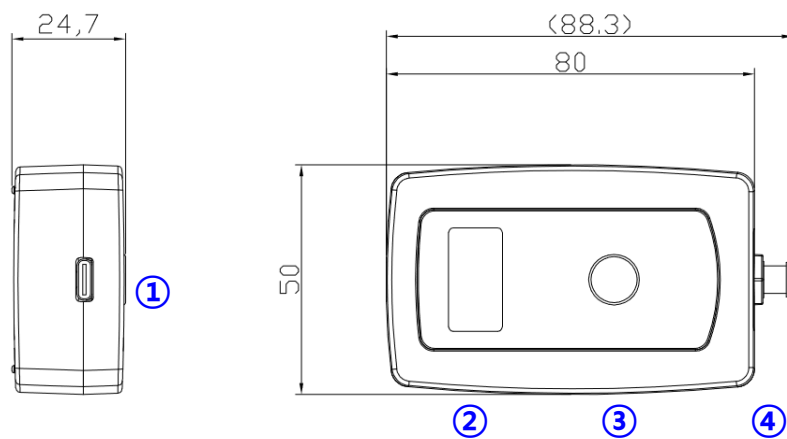
Composition

The wireless spirometer consists of the following.

- Wireless spirometer (P4522-SP)
- Orifice and tube
- disposable bacterial filter
- disposable mouthpieces
- USB-A/C cable
- Booklet

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

ScienceCube
SC:VOLT-001

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

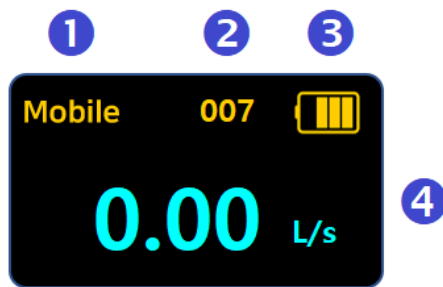
V250

Bluetooth mode
Change 0000

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.

See last page for more information.

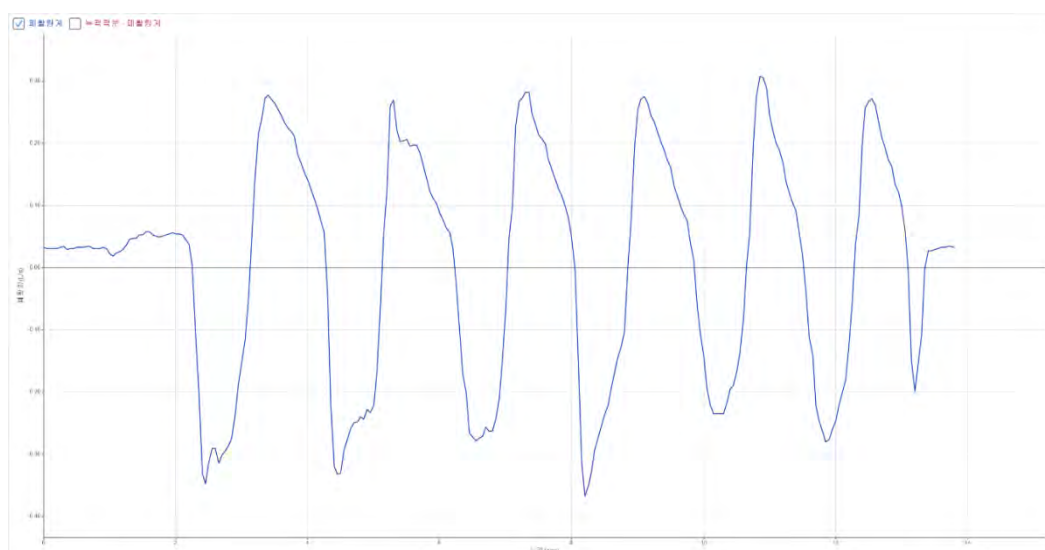
Measurement screen



① Connection mode	Mobile : Connecting Android or iOS PC : Connecting to Windows PC  : Connected via USB cable ※ 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°C, ~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.

How to install Science#

● Install Windows PC version

Online installation file (approximately 39MB)

<http://www.koreadigital.com/url/updates/sciencesharppc/setup.exe>

* Internet connection is required during installation

Offline installation file (approximately 340MB)

http://www.koreadigital.com/url/updates/sciencesharppc/setup_full.exe

* Installation does not require an Internet connection, but contains large content

● Install from a mobile smart device (Smartphone or Tablet PC)

1. Download Science# to your smart device (Refer to QR codes below)
2. Connect using Bluetooth (See Science# documentation or refer to next page)
3. Run Science#
4. When you connect the sensor, the measurement is displayed on the Science# screen



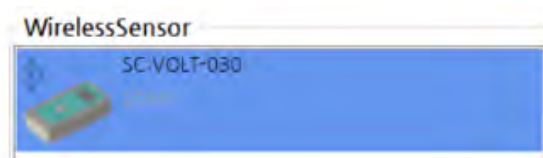
Features

- Up to four 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.

How to connect Wireless Sensor to Science# program

● Windows PC

1. Install and run Science# (Refer to previous page for installation method)
2. Power on the sensor
3. Click the  [Connect] icon and select [Bluetooth Interface] from [Select Interface]
4. [Add Bluetooth or other device] → [Bluetooth] → Add sensor number after checking the number on the backside of sensor
5. When you see like the picture, click on Wireless Sensor and connect



● Android or iOS (Smartphone or Tablet PC)

1. Install and run Science# (Refer to previous page for installation method)
2. Power on the sensor
3. Click the  [Connect] icon and select [Bluetooth Interface]
4. After selecting the device search, check the sensor number on the backside and connect



If you experience any connection issues, check Bluetooth mode on the sensor. Please refer to the next page for instructions on how to change it.

How to switch to Bluetooth mode for Android and iOS

For mobile devices (Android, iOS) Bluetooth Low Energy technology is used for wireless communication. For these devices do not pair the sensor just use it directly in the software.

Turn off the sensor. Then press and hold the power button until the text 'Bluetooth mode Change Mobile' is shown, then release the button. The mode is set to 'Mobile', meaning that Bluetooth Low Energy is used.

How to switch to Bluetooth mode for Windows

For Windows computers, Bluetooth Classic technology is used for wireless communication. Before you start to use the sensor for measurement you have to pair it. If you are asked for a PIN, enter either "1234" or "0000".

Turn off the sensor. Then press and hold the power button until the text 'Bluetooth mode Change PC' is shown, then release the button. The mode is set to 'PC', meaning Bluetooth Classic is used.

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