ScienceCube

Wireless Temperature (WL100T)

User Guide

Rev. WL100T-02-2024

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 temperature sensor can measure the temperature of air, liquids, or solids.

The wireless temperature sensors measure the temperature of air, liquids, solids, and more. When designing scientific experiments, there is no need to connect signal cables, making even complex experimental designs easy to move and secure.
The probe is made of stainless steel, making it durable and corrosion-resistant, allowing it to be used in a variety of environments, and the state-of-the-art semiconductor temperature measurement device measures temperature values more accurately and quickly.
The probe has a thickness of 4mm and can be easily fixed to the test tube using a rubber stopper. By detecting the temperature within 5mm from the tip, you can design various experiments.
Additionally, the sensor has a display window so you can immediately check the measured values, and measurements can be made by remotely connecting to a smart device or PC wirelessly or wired without an interface.

> **Caution :** Long-term measurements are not recommended for experiments using chemical solutions. When measuring professional chemical tests, protect the probe with a tube made of chemical-resistant or corrosion-resistant material (Teflon, etc.).

Suggested experiments

- Separation experiment of mixture
- Observation of super cooling phenomenon
- Thermal equilibrium experiment
- Specific heat measurement of metals
- Radiation equilibrium observation

Composition

The ScienceCube wireless temperature sensor consists of the following.

- Wireless temperature sensor(WL100T)
- 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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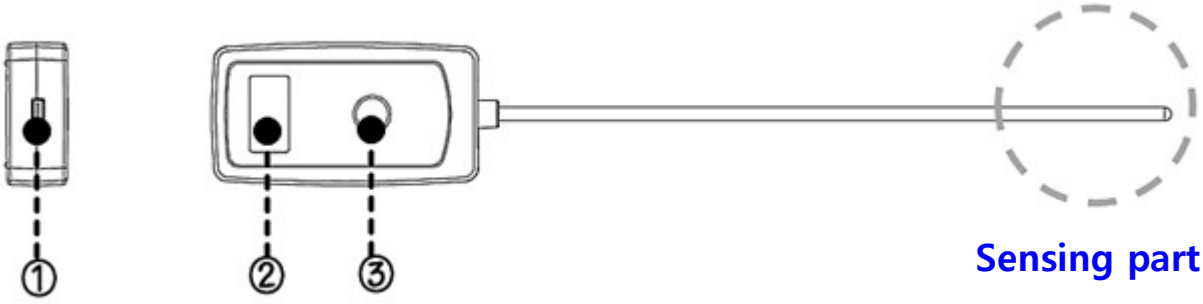
Function of wireless sensor

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.

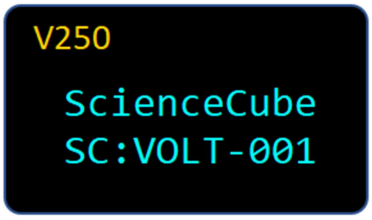
④ Sensing part : Contains sensors that detect temperature and is protected with a stainless steel.

> **Caution** : Do not measure beyond the sensor's measurement range. Doing so can reduce the accuracy of the sensor, cause sensor malfunctions, or result in permanent damage.

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	Long click	▬▬	Turns off.

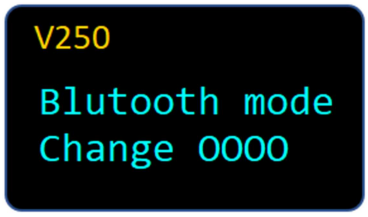
Start screen



V250 : Displays the sensor's firmware version.

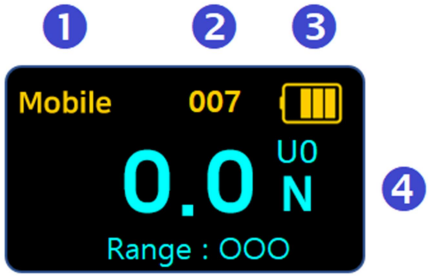
SC:OOOO-001 : When you search for a Bluetooth device, the device name will be displayed. (Sensor name and 3-digit serial number)

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

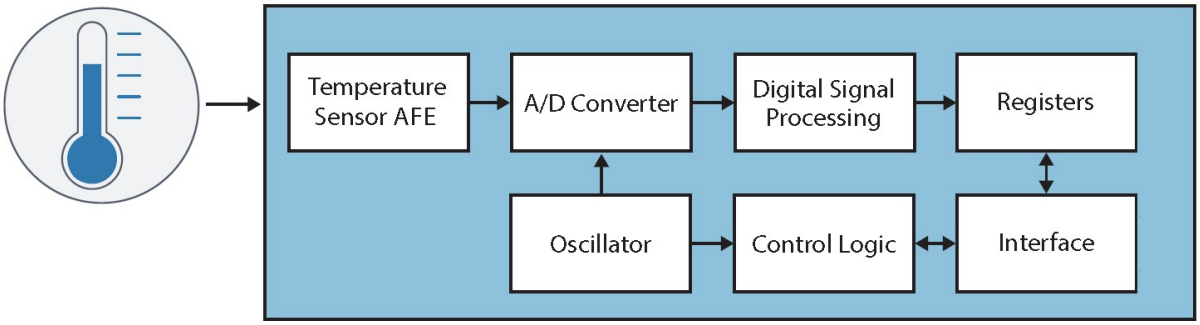


①**Connection mode**	**Mobile** : Connecting Androidor iOS. **PC** : Connecting to Windows PC : Linked via a USB cable. ※ A long press changes the mode and turns on the sensor.
②**Sensor-ID**	This is the sensor's unique number and is displayed along with the sensor name in the device name when connected 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.

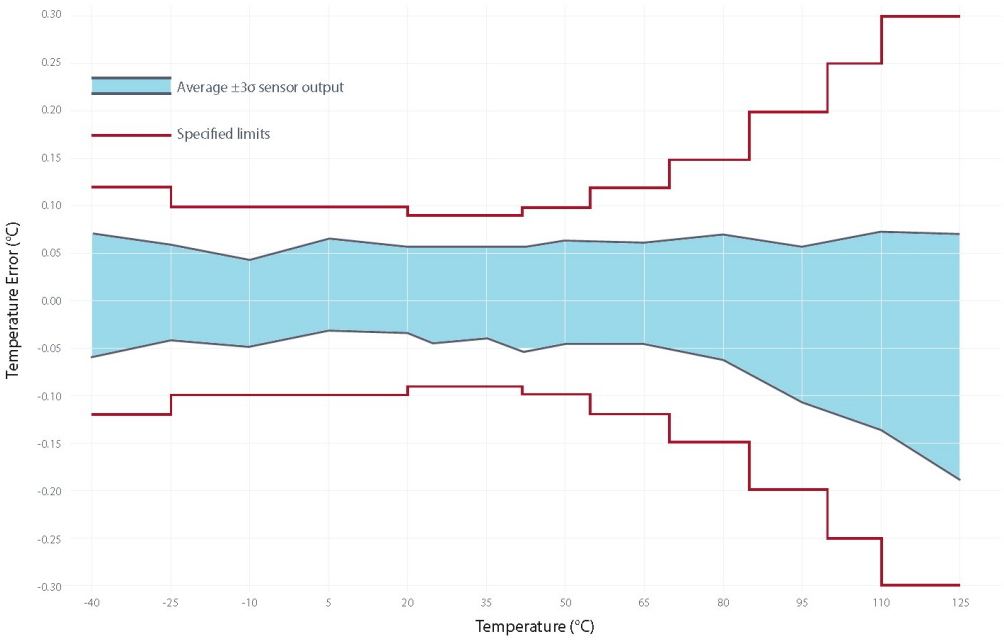
How it Works

Science Cube wireless temperature sensor uses a state-of-the-art semiconductor digital temperature sensor.

According to the electrical properties of semiconductors, the internal PN junction exhibits constant voltage or current characteristics depending on temperature changes. Using this principle, electrical signals can be converted to temperature using an A/D converter and digital signal processor (DSP).



In addition, ultra-precise digital temperature implementation is possible through very precise calibration and compensation according to distribution. This shows the variation with temperature over the following range:



Using the Sensor

The ScienceCube wireless temperature sensor can be measured in the following ways:

1. Run 'Science#' and connect the sensor wirelessly or wired.
2. Select the temperature units to use in [Sensor Settings].
3. Set the [Data Collection Interval] and [Experiment Time] in [Experiment Settings].
4. Click [Start] to start the experiment.

For more information on how to use the Science# application, see the help.

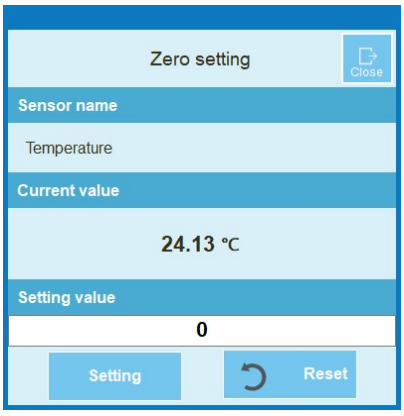
Calibration

All wireless temperature sensors are precisely calibrated using standard equipment during the manufacturing process before being delivered and are ready for immediate use. No separate calibration process is required.

[Zero point setting]

If you want to see changes according to a random temperature set by the user, you can measure using the zero point setting. Measurements are made assuming an arbitrary temperature of '0 degrees', and the sensor's measurement range can be as small as the arbitrary temperature setting.

Only the values collected by the Science# program are reflected, and the temperature value displayed on the sensor does not change.



Experiment example

<Display of thermal balance graph using wireless temperature sensor>

① Add 100ml of hot water (approximately 45℃) into the thermal cup.

② Add 100ml of cold water (approximately 15℃) into the graduated cylinder and install a rubber stopper with a hole.

③ Insert the temperature sensor into the rubber stopper hole and block the entrance to the graduated cylinder.

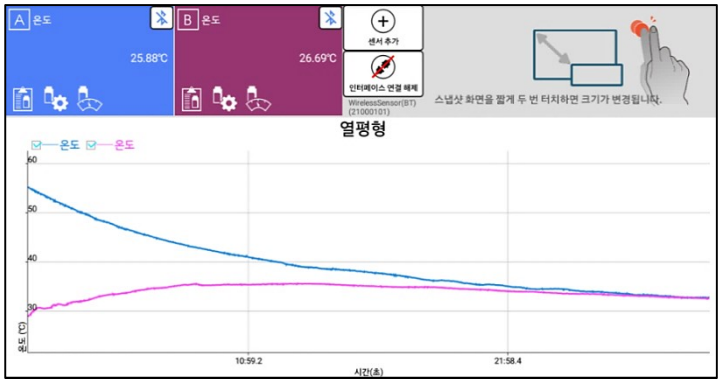
④ Another temperature sensor is fixed on the stand to measure the temperature of the water in the cup.

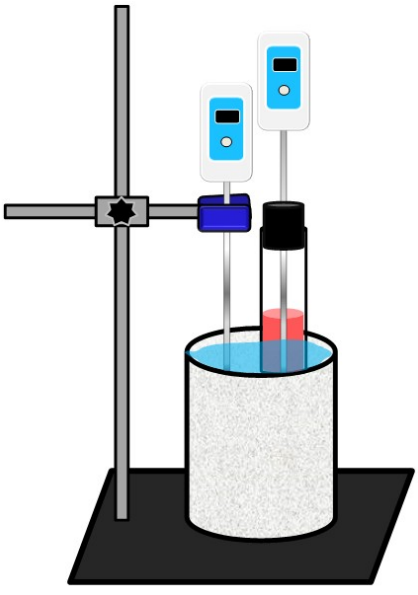
⑤ After running Science#, turn on the temperature sensor and connect the sensor.

⑥ In the experiment settings, set collection interval: 5hz, time: 30 minutes, then place the cylinder in the cup and press Start experiment.

⑦ After 30 minutes, check the results after completing the experiment.

*For detailed experiment details, please refer to contents included in 'science#'.





Specifications

Item	Description
Range	-40℃ ~ 125 ℃ (-40 ~ 257°F)
Resolution	0.06℃ (Logging using Science#) 0.1℃ (Display)
Sampling Time	Max. 100Hz (0.01 sec.)
Condition	-20 ~ 60℃, Max. 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 14 hours after full charge (depending on usage conditions)
EMC	KC : R-R-KDY-WL100T 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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