



Wireless B-Differential Gas Pressure Sensor (P4516-PF) User manual



Rev.01 (Dec. 2023)

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

Introduction

This Wireless gas pressure sensor measures relative values to ambient pressure. When measuring pressure, it converts to an intermediate form, such as a displacement, which converts the displacement into an electrical output, such as a voltage or current.

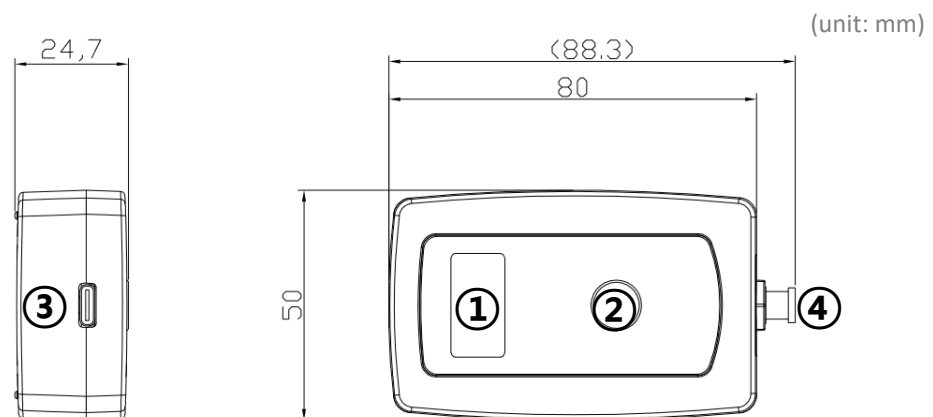
This wireless sensor does not require a separate cable so that can be used easily in complex experiment environments. Also, it is possible to connect up to 4 sensors at same time, so you can use it with other kinds of sensors together.

Composition & Usage

Composition

- Wireless Gas Pressure Sensor B
- USB-A/C cable
- Silicone tube, dedicated syringe, socket

Picture

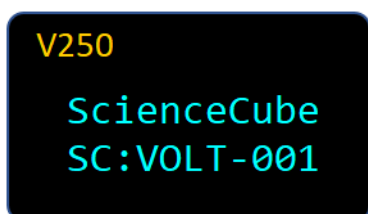


- ① OLED screen: Display for battery level and pH value
- ② Power button: Press for 5 seconds when power is off.
- ③ Charging and USB communication
- ④ Silicone tube, socket insertion hole

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	■	A sensor with a flip function rotates the display 180 degrees to ensure that the text is always readable.
	Long click	■■■■■	Turns off.

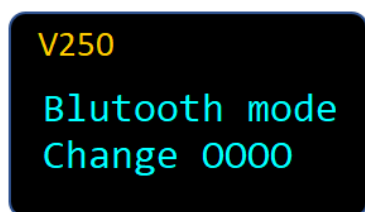
Start screen



V250 : Displays the sensor's firmware version.

SC: xxxx-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.

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	Displays sensor measurement values and units in real time.

Features and Detail

Features

contents	Detailed description
Features	It measures relative gas pressure to ambient pressure. Up to four sensors can be connected at the same time.
Uses	Bluetooth classic, low energy support USB communication support Dedicated app (science #) available

Detail

contents	Detailed description
Max.	-650 to +650 hpa
Measurement	
Resolution	0.2 hpa
Sampling Rate	Max. 100 samples/second
Interface	Windows PC (USB or Bluetooth) Android Device (Bluetooth)
Application	Science#
Operating Environment	-20 ~ 60 °C, Max 85%RH
Connection	Bluetooth 4.2 or USB (Type-C)
Power	Li-Po Rechargeable Battery (700mAh) Bluetooth 4.2 or USB (Type-C) Approximately 13 hours available when the battery is fully charged.

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.

Guide for science experiment

< Science activity using gas pressure sensor >

Boyle's law	Expansion of Choco pie	Breath of yeast
The principle of cloud generation	Solubility of gas by temperature	Steam pressure
Reaction rate by surface area	Reaction rate with acid concentration	Decomposition of hydrogen peroxide

< Example of test method >

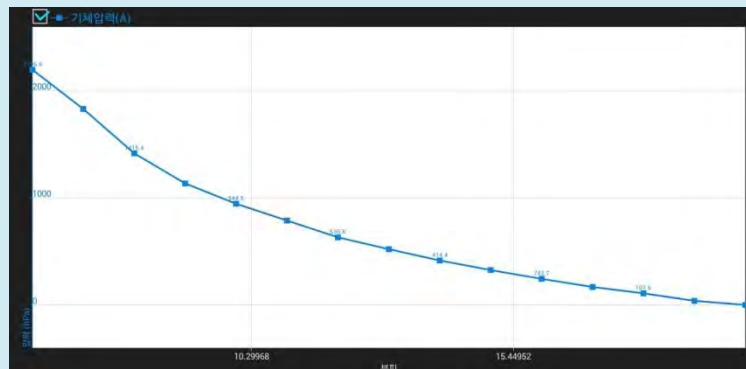
Boyle's law

Materials

Science# program, Wireless gas pressure sensor A, Syringe (20 mL)

Experiment Method

- ① Place the syringe on a 20 mL scale.
- ② Install the wireless gas pressure sensor A in the syringe.
- ③ Launch Science# and connect the wireless gas pressure sensor A.
- ⑤ Press  to set zero point.
- ⑥ Set[settings] to [Sampling Methods - Event-based] – [graph setting-Line/scatter]- [Touch Event-Number Title of X-axis: number]
- ⑦ Press  [start] to collect data
- ⑧ Place the syringe on the 20mL scale and press  [collect] to enter the syringe volume value '20' in the number input field.
- ⑧ Measure the pressure by decreasing the volume 1mL like the above method and input the volume by the same method up to 6mL.





Safety Warnings

All data, analyzes and derivative works obtained with this product may be used only for the purpose of scientific experiment education and not for other purposes such as professional research or commercial purposes.

The safety precautions are intended to prevent accidents and risks by using the product safely and correctly.

Please note that this product does not have any legal liability for accidental accidents caused by user's negligence during the scientific experiment activities or for the use of other uses.

- ① **Never separate or modify the sensor except for a professional technician.** Permanent damage to the unit may result. The sensor is permanently sealed in the process and cannot be disassembled for any purpose. In addition, please use customer support center for inspection, adjustment and repair.
- ② **Do not try to open it in a place with high humidity or splashing water.** If water enters the main body, cable or power supply unit, it may occur electric shock, fire, malfunction or deformation
- ③ **Do not conduct experiments where heat or smoke (gas) is generated in an enclosed space.** Experimentation in an enclosed space may cause suffocation and fire. Be sure to follow the safety instructions in the well-ventilated area.
- ④ **Do not use the unit beyond the operating limits or exceeding the short-term exposure limits.** If the exposure exceeds the maximum allowable range, the reliability of the sensor may be lowered.
- ⑤ There is a risk of explosion and injury due to breakage of laboratory equipment in low pressure or high pressure condition which is a difference of more than 20 hPa atmospheric pressure (1 atm - 1013 hPa) Please be absolutely careful about the use of experiment equipment and keep experiment safety.

Experimental Safety Precautions

1. Please be careful of electrical safety accidents such as electric shock and fire during the experiment.
2. Turn off the power when not doing the experiment.
3. Do not experiment with wet hands.
4. Do not mess around with sensors
5. Keep out of the reach of children

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



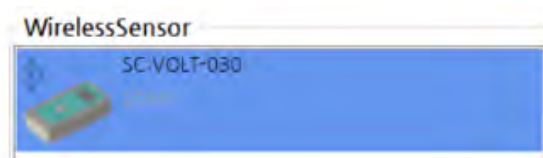
Features

- 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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