



User's Manual

SM-2100 Portable IAQ Monitor

Carbon dioxide,
Temperature, Humidity

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This Manual supplies information of IAQ Monitor.

Read Notice and cautions in advance to use the product properly.

This manual can be updated to improve specification and function without notice.

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Before using

This manual contains installation, function and maintenance of Oxygen Gas Sensor, SM-2100.

This manual supplies information to use SM-2100 properly.

Take proper procedure according to instruction of security in case of emergency.

Warning and Cautions

Please read this manual before using to avoid possible accident or danger.



Warning

Warning means a case of serious injury, disaster or death when user violates instruction.

(Warning includes all instruction of caution.)

Caution for battery

Do not shock body which can change appearance.

Do not put in the hot temperature or boil.

Do not wet or soak in water.



Prohibition of manipulation

Do not take a part or reassemble SenseCube's body or sensor.

Please consult with Customer Service Center for examination or repair.



Prohibition of non-standard part

Please use standard parts supplied with SM-2100. Do not use nonstandard part (sensors, Electrical power device). It may cause malfunction, fire, electrical shock.



Cautions

Cautions mean a case of damage or trouble when user violates this instruction.

Do not touch power plug or adaptor with wet hand.

Do not polish products with water or detergent.

Please polish the products with dried cloth. Water causes electric shock, fire or malfunction.

Do not place Monitor, Battery or Adaptor near heating equipment. Heat causes transform, explosion or fire.

Do not use other adaptor than SenseCube supplies. Other products can cause serious hazard to products.

Restore measuring data separately. Data can be deleted or damaged by user's carelessness, upgrade or unexpected case. Manufacturer doesn't have any responsibility for damage or missing data.

Rapid change or strong wind makes value unstable temporarily.

Measuring can be temporarily unstable by a sudden change in atmospheric pressure or strong wind.

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1. INTRODUCTION

IAQ Monitor (Model:SM-2100) directly measures carbon dioxide concentration, temperature and humidity on the side and stores measured data(data-logging). It is a high performance monitor that can do remote-measurement and real time analysis with a computer.

1.1 Overview

SM-2100 equips with dot matrix-type graphic LCD(128*64 pixel) so it shows digitized reading of data and graphs. And it adopts graphic menu and 5 ideal buttons. So you can use identify measured data and use this monitor easily. At the same time, it supports multi languages.

SM-2100 adopts a rechargeable Lithium-Polymer battery for safety. You can recharge a battery with USB port on a computer or a supplied adaptor.

SM-2100 can communicate with computer through USB 2.0. You can save or analyze data in real time with computer programs and analyze polynomial function with exclusive program.

SM-2100 can store data up to 50,000 and 16 times repeatedly. It can export stored data to a computer.

1.2 Specification

1.2.1 Technical Data

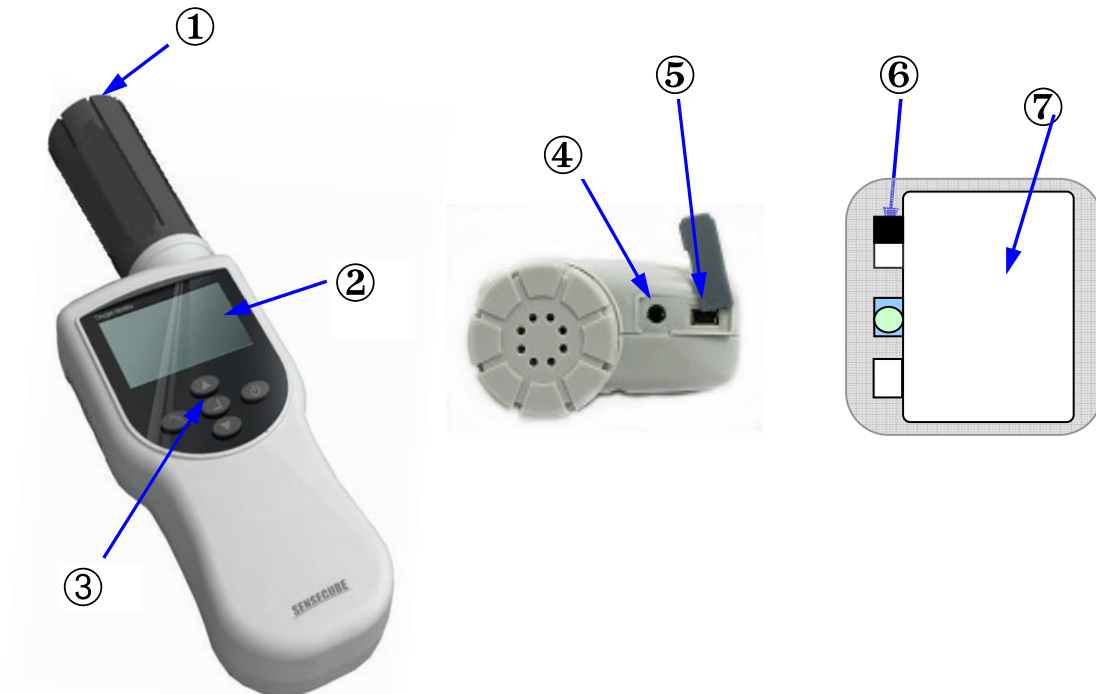
Model	IAQ Monitor SM-2100		
Measuring principle	CO ₂		Dual NDIR Wavelength type
	Temperature, Humidity		Semiconductor type
Measuring ranges	CO ₂		0~2,000 / ~5,000 / ~10,000ppm
	Temperature		-10~60℃
	Humidity		0~99% RH
Accuracy (@25℃)	CO ₂	2,000ppm	±(50 ppm+3%reading)
		5,000ppm	±(100 ppm+3%reading)
		10,000ppm	±(200 ppm+3%reading)
	Temperature		±0.4 ℃
	Humidity		±3 %
Response time (60%)	CO ₂		< 40 sec
	Temperature, Humidity		< 10 sec
Operating conditions	CO ₂ , Humidity	Temperature	5~45℃
		Humidity	0~95%RH (Non-condensing)
	Temperature	Temperature	-10~60℃
		Humidity	0~95%RH (Non-condensing)
Storage temperature		-40~70℃	
Power	Lithium polymer Rechargeable battery (3.7V, 1,100mAh)		
Recharge	Over USB 1.1 or Power adapter (DC5V, 700mA)		
Dimension	250 mm x 80 mm x 30 mm Length × Width × Height		
Weight	270g		

1.2.2 Composition

IAQ Monitor	1ea
Charger	1ea
USB Cable	1ea (Mini-USB)
Manual	1ea
Portable Case	

1.3 IAQ Monitor

1.3.1 Body



[Figure 1] IAQ Monitor

- ① Sensing Part
- ② Display
- ③ Key Buttons
- ④ L-Link connector for SenseCube
- ⑤ USB Communication or Recharge adaptor connector
- ⑥ Firm-ware Upgrade Switch (back)
- ⑦ Battery (back)




1.3.2 Communication

USB Port

It is used to communicate with the monitor and a computer.
It can be connected to each other using a mini USB cable.






1.3.3 Displays

LED screen shows various information of monitor as like power, recharge directly.

Icon	Status	Descriptions
	Green	Power On
	Yellow	Charging a Battery (The charger light turns green when the recharging is completed.)
	Green	Connected to external power (USB or AC power)

<Table 1> Lamp Indication

1.3.4 Buttons

Button	Functions	Descriptions
	Power	Power on or off (press about 1 sec)
	Menu	Open main menu Back to previous Menu
	Enter	Set value or move to next menu
	Up	Move up or next item
	Down	Move down or previous item

<Table 2> Buttons

1.4 Power

This device employs Lithium-polymer battery so you can recharge it without extra power.

- ※ Must use a USB DC 5V power adaptor supplied with SenseCube.
Using a nonstandard power supplier causes fire and electrical shock.

1.4.1 Recharge with a computer

This device has battery recharge circuit in USB port.

It is recharged automatically when connected to computer.

1.4.2 Recharge with an AC220 adaptor

Using a supplied USB adaptor, you can recharge a battery easily without other charger.

1.4.3 Recharging Time

Battery Status	Descriptions
Recharging Time	About 4 hours (discharged, power off)
Storage temperature	0 °C ~ 40 °C (indoor)

<Table 3> Battery Recharging

※ Recharging time can be extended when it's operating.

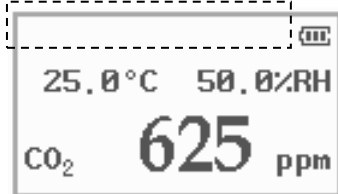
1.4.4 Discard Battery

A Lithium-polymer battery includes Lithium.
Dispose it properly in observance of local law.

2. Start

The light can read newspaper is ideal to see LED display. To save battery, turned off automatically depends on the set time.

2.1 Icon definitions



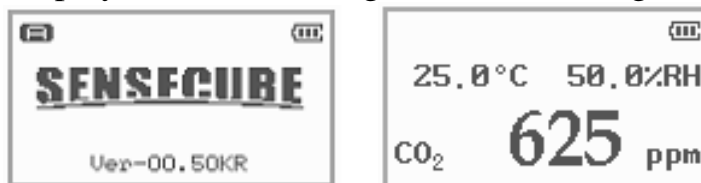
- Connected to computer
- Restored data
- Battery (enough)
- Shortage Battery
- No Battery (need recharge)
- Alarm
- under 'under ppm' of alarm set
- over 'over ppm' of alarm set

2.2 Turn On

SenseCube logo pops up with beep sound when press .

For preventing malfunctioning, press over 1sec.

Display window is changed into measuring mode(METER) automatically.



2.3 Moving Menu



- : display main menu
- : move to next or previous menu
- : select sub-menu / : return main menu

2.4 Details of Menu

1. Meter

2. Logger

3. Alarm Set

4. Data Manager

1: Search

2: Delete

3: Erase All

5. Display

1: Contrast

2: Bright

3: Language

4: PWR Save

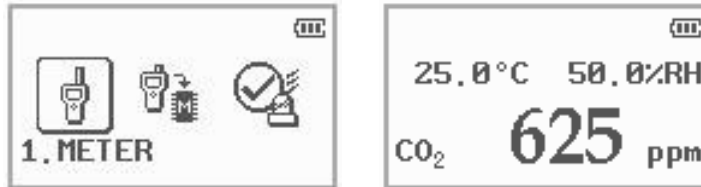
5: Key Beep

6: Info.

6. Setting

3. Usage



3.1 METER

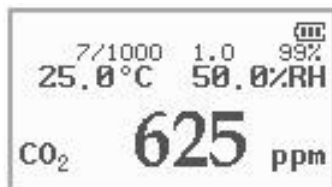


It displays current temperature, humidity and carbon dioxide concentration in real time (twice a second).



3.2 LOGGING



Set value as you want to measure with  or .
D/H/M means estimated measurement time.
When setting is completed, it moves to measuring mode.



- 7/1000: Saved data and available data for save
- 1.0 : Interval time (1.0~60.0sec)
- 99%: Available data memory(initial: 99%)

Start storing data with . To finish storing, select  again.
You can save data up to 16 times.

When memory is full, there will be a warning beep and it doesn't store data any more.

Saving is stopped automatically when move to other menu or battery is short.

3.3 ALARM SET



Adjust CO₂ ppm and On/Off with and .

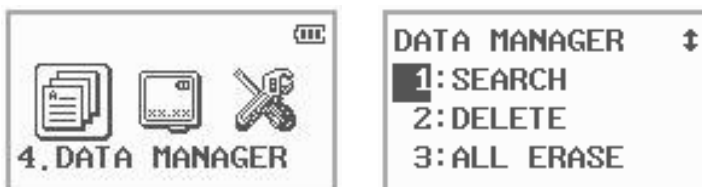
To move next article, press . To finish setting, select .

	Range	Alarm sound
Max.	800~5,000ppm	pip-(at 2sec. interval)
Min.	400`1,000ppm	Pip pi pi pip

<Table 4> Alarm Sound

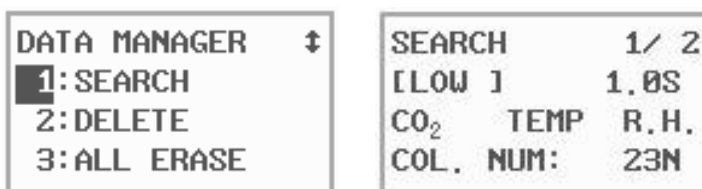
If you cancel 'alarm ON' or current CO₂ level gets out of set CO₂ ppm, alarm sound is turned off.

3.4 DATA MANAGER



1. Search : Search saved data
2. Delete : Delete selected data
3. All Erase : Delete all data

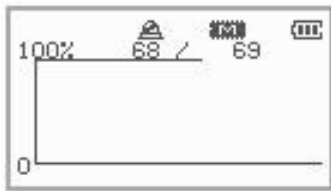
3.4.1 SEARCH



You can search saved data and move to other banks with or .

This device can save maximum 16 banks.

- [1/2] : [The number of current data bank / Total saved bank]
- [Low] 1.0S : Interval time
- Col. Num : 23N : the number of collected data from current data bank



You can see graph selecting .

3.4.2 DELETE



You can delete selected data bank.



To move to other data, select  or .


To delete selected data, select .

3.4.3 ALL ERASE



Delete all data in Memory.

Select 'YES' or 'NO' with  or .


To delete all data, select .

(Note) Recovery is not possible.

3.5 DISPLAY



Select sub-menu and wanted value with  or . Enter key is .

Selecting , you can move to main menu from sub-menu without applying selected value.

3.5.1 CONTRAST



This menu is for arranging contrast of LCD.
The range is 21 ~ 40(default: 30).

3.5.2 BACK LIGHT(BRIGHT)



Back light is turned off after set time (default: 5 sec).
If you press any button after back light is turned off, the light is turned on again. But if battery is short, it's not turned on.

3.5.3 LANGUAGE



Basically default is “KOREAN” or “ENGLISH”.

If you want to use other languages, please contact to customer service center or marketing team.

- Available Languages: Korean, English, Japanese, Chinese, French, Spanish, Italian, Portuguese, Arabic, Russian, Kazakh

3.5.4 POWER SAVE



To use battery effectively, power is turned off automatically if there's no button operation for 3 minutes. (default: ENABLE)

When you measure data on **LOGGING** mode, the power is not turned off after 3 minutes.

3.5.5 KEY BEEP



You can decide to use key beep sound. (default: ENABLE)

3.5.6 INFO.



INFO displays information of this device.
It shows firmware version and build number.

3.6 SETTINGS



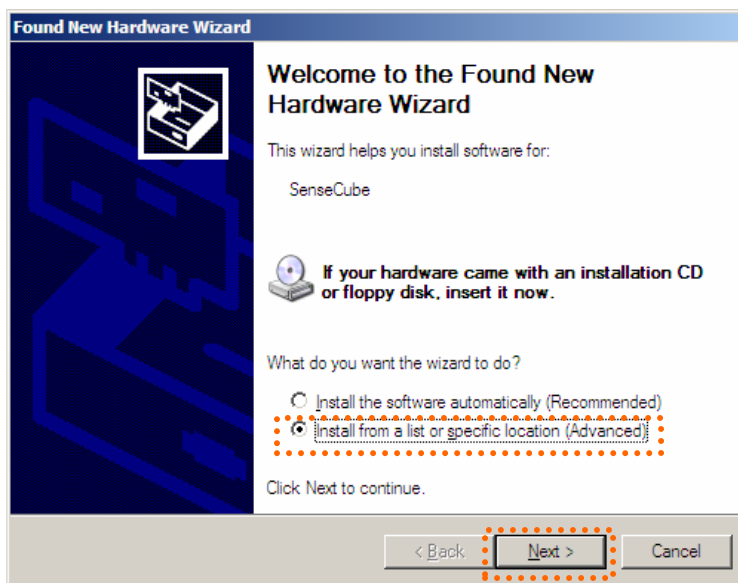
It displays product's information.
Product's information may change for improving product's performance.
(This screen shot may be different from your monitor.)

4. Connect to a Computer

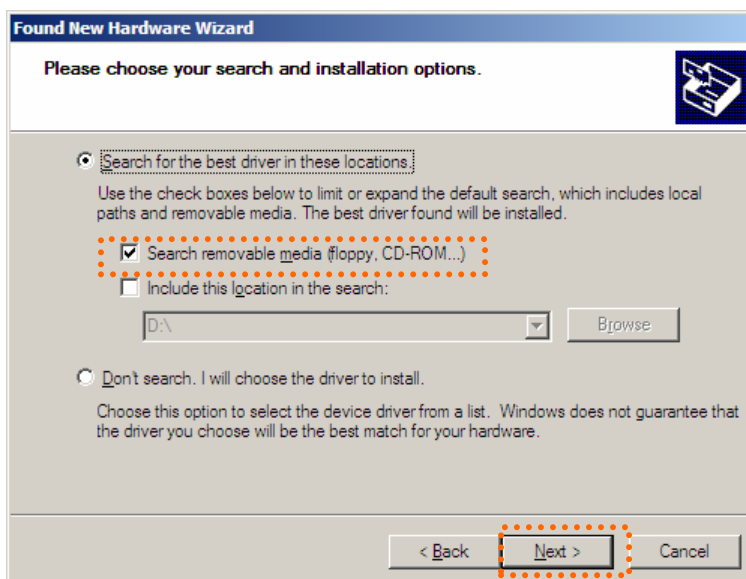
You should install USB driver program to connect a computer at first. You can download driver from supplied CD or www.sensecube.com

4.1 Install USB Driver

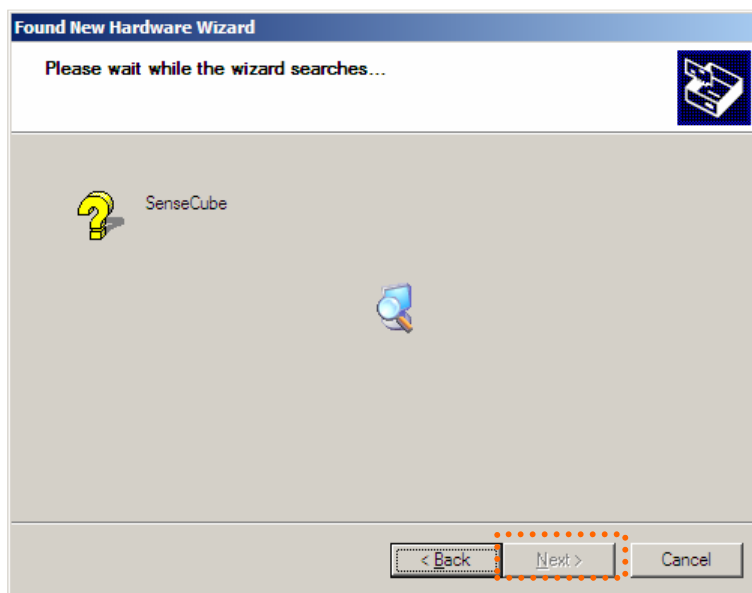
When you connect a SenseCube monitor into USB port on a computer, 'New hardware searching wizard' pops up. Install USB driver through hardware searching wizard twice.



Select Install from a list or specific location(Advanced) and Next.



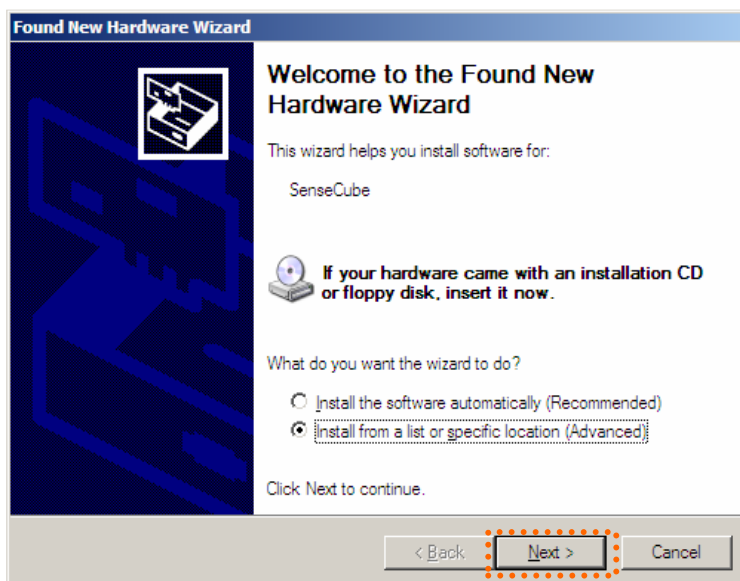
Select Search Removable media (floppy, CD-ROM...), and click Next.



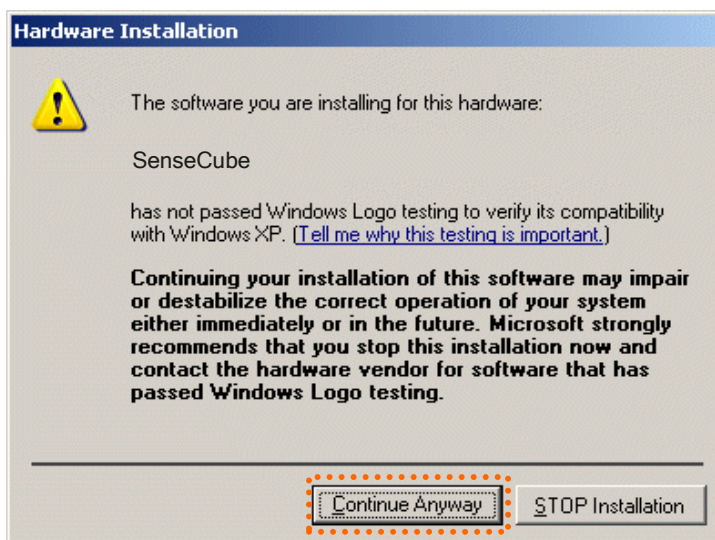
Installing Driver



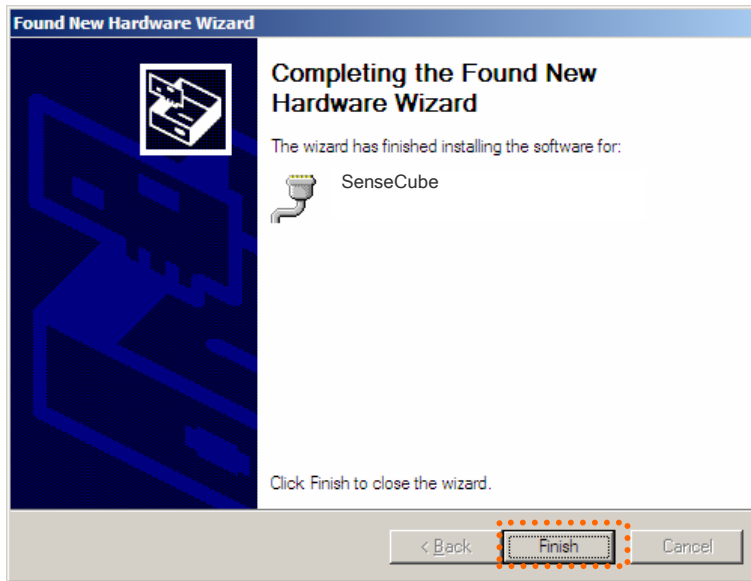
Complete Installing CP210x USB Composite Device driver.



Install same way when New hardware searching wizard again.



When this window pops up, click Continue Anyway.



Drive installation is completed.

4.2 Firmware Upgrade

SenseCube supports new functions for user's comfort. You can get the latest version program from www.sensecube.com and upgrade easily.

4.2.1 Install CD

Insert install CD. A Computer shows following screen.



① Connect PC with USB port on the upper part of this device(SM-2100 Monitor) with a supplied cable.

② Turn on the device.

③ Select  to precede upgrade program.

(Notice 1) Back up all data to a computer before upgrade.

Upgrade deletes all data.

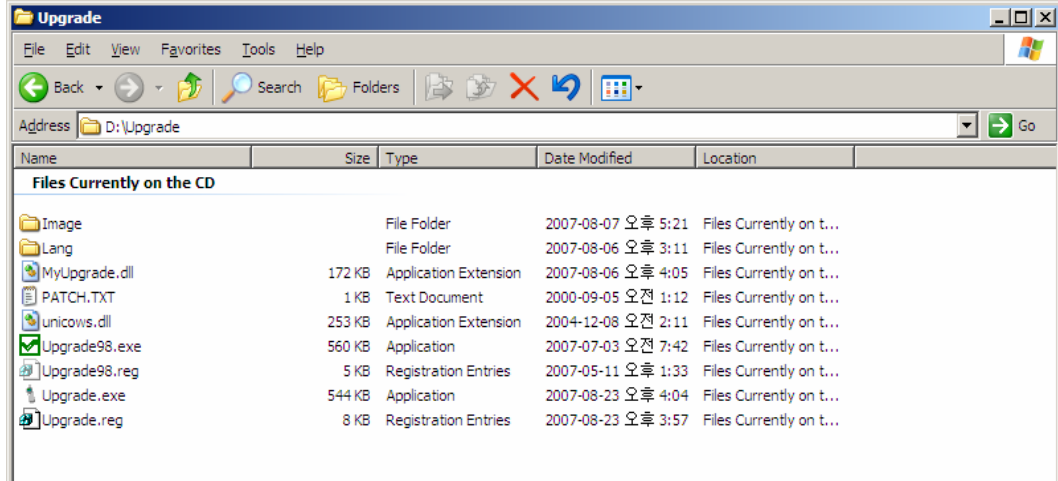
(Notice 2) Do not separate a cable or turn off the power while upgrade is operating.

4.2.2 File Download

Download upgrade program and firmware file from SenseCube's website.
Unzip file of upgrade then below folder is created.

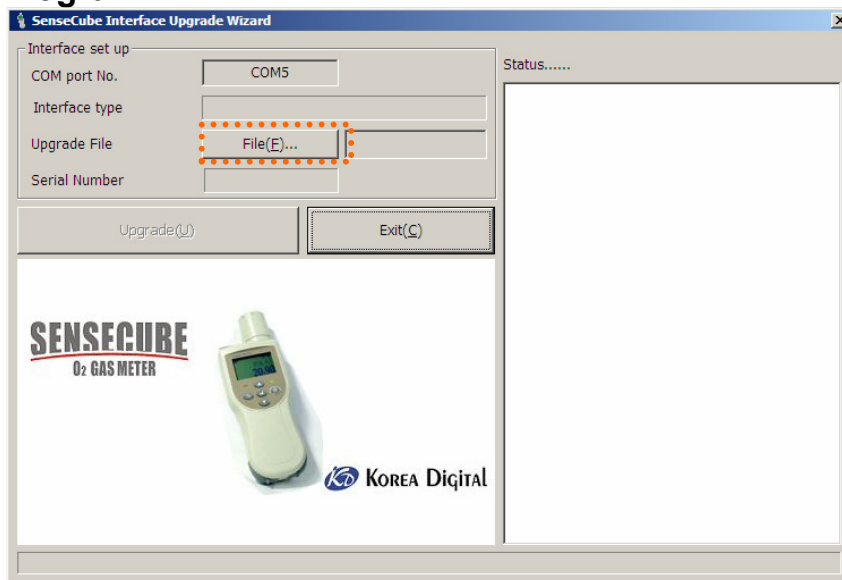
\ Upgrade \ Image \ Korean \ SM2KRxx.MBL

Copy firmware file(SM2KRxx.MBL) from above folder.

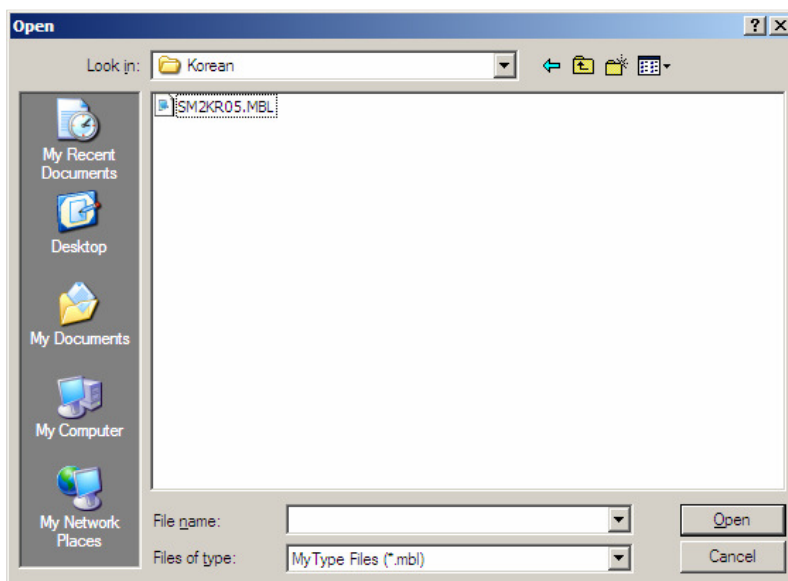


Execute Upgrade.exe for upper version of Windows 2000(XP, Vista) and execute Upgrade98.exe for Windows 98.

4.2.3 Upgrade Program



① Click **File(E)...** Button and select below root.



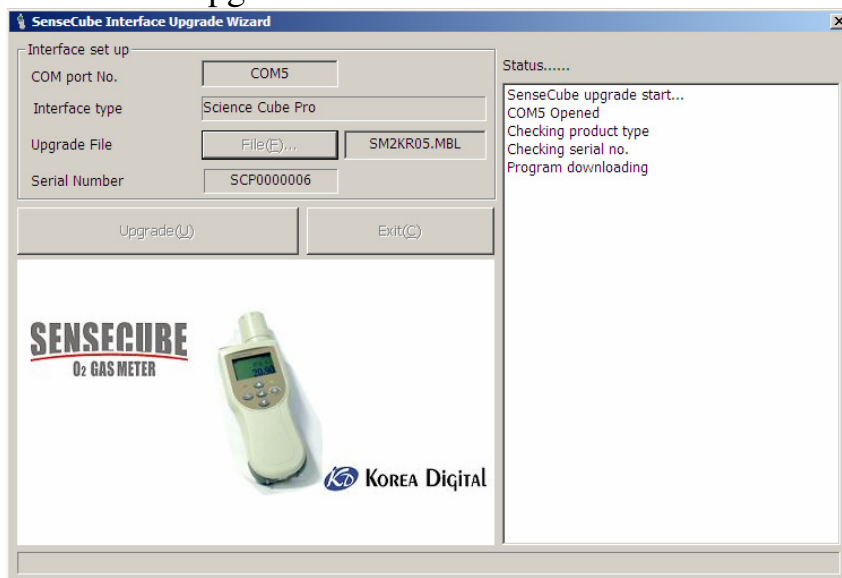
② Select \ Upgrade \ Image \ Korean \ SM2KRxx.MBL in install CD.



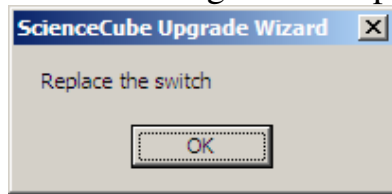
③ Open battery cover and down the slide switch.

④ Click  button.

⑤ Firmware Upgrade



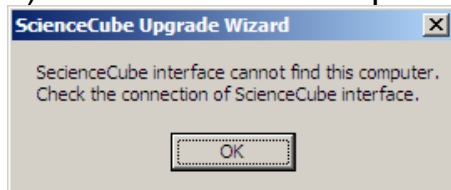
⑥ Below message shows up when upgrade is completed.



⑦ Replace the slide switch again.

4.2.4 Warning message

1) Can not find this computer.




- An IAQ monitor is not connected to a computer.
- An IAQ monitor power is off.
- Connect to a PC and an IAQ monitor with a USB cable or turn on an IAQ Monitor.
- Please check the USB driver installation status when same message is shown continuously.

2) Serial port error, check port number.

- Reconnect cable. → Finish upgrade program. → Restart the program.

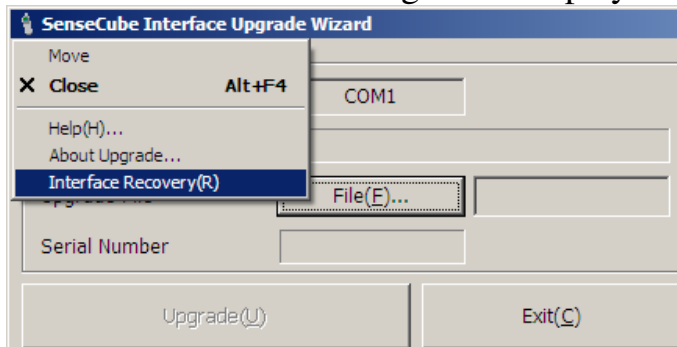
3) Error on communication.

- Communication error between PC and monitor.
- Click  and start it again.

4) Compulsory recovery.

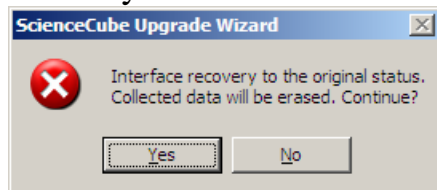
Recover program as below, when the cable is separated or program doesn't operate normally.

- ① Click the icon upper left on the 'SenseCube Interface upgrade Wizard' window. And then following menu displays.



- ② Select Interface Recovery(R).
- ③ Continue upgrade in the same way.

- ☒ When you see below warning message, continue to next process.



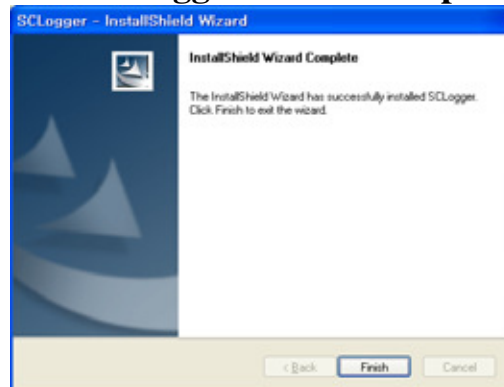
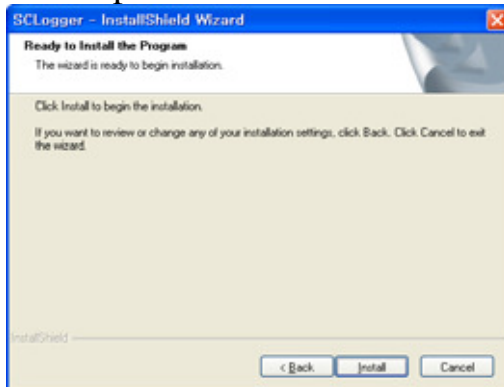
5. SC Logger program


SC Logger is a program that can measure and save data with SM-2100 at once. And you can upload stored data into a computer using this program. Download www.sensecube.com or install supplied CD.

5.1 Installing program

Insert CD > Run **SCLogger/Setup.exe** > Install SC Logger program.

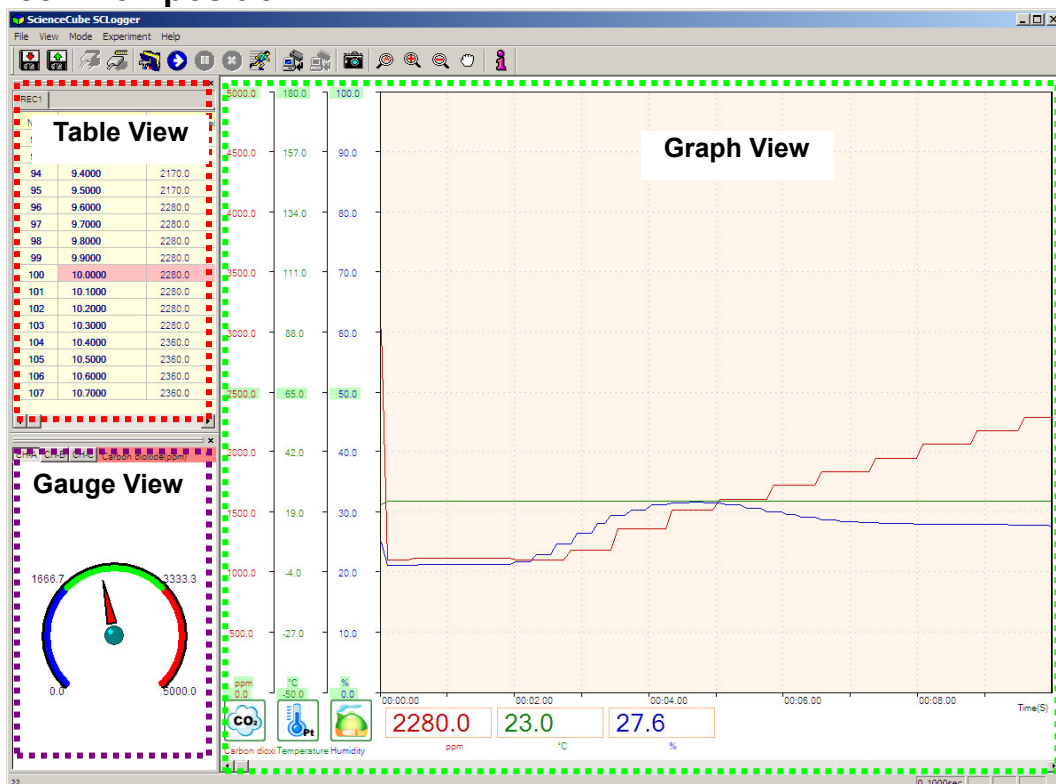
(If your computer runs on Windows 98, select **SCLogger/Win98/Setup.exe**)



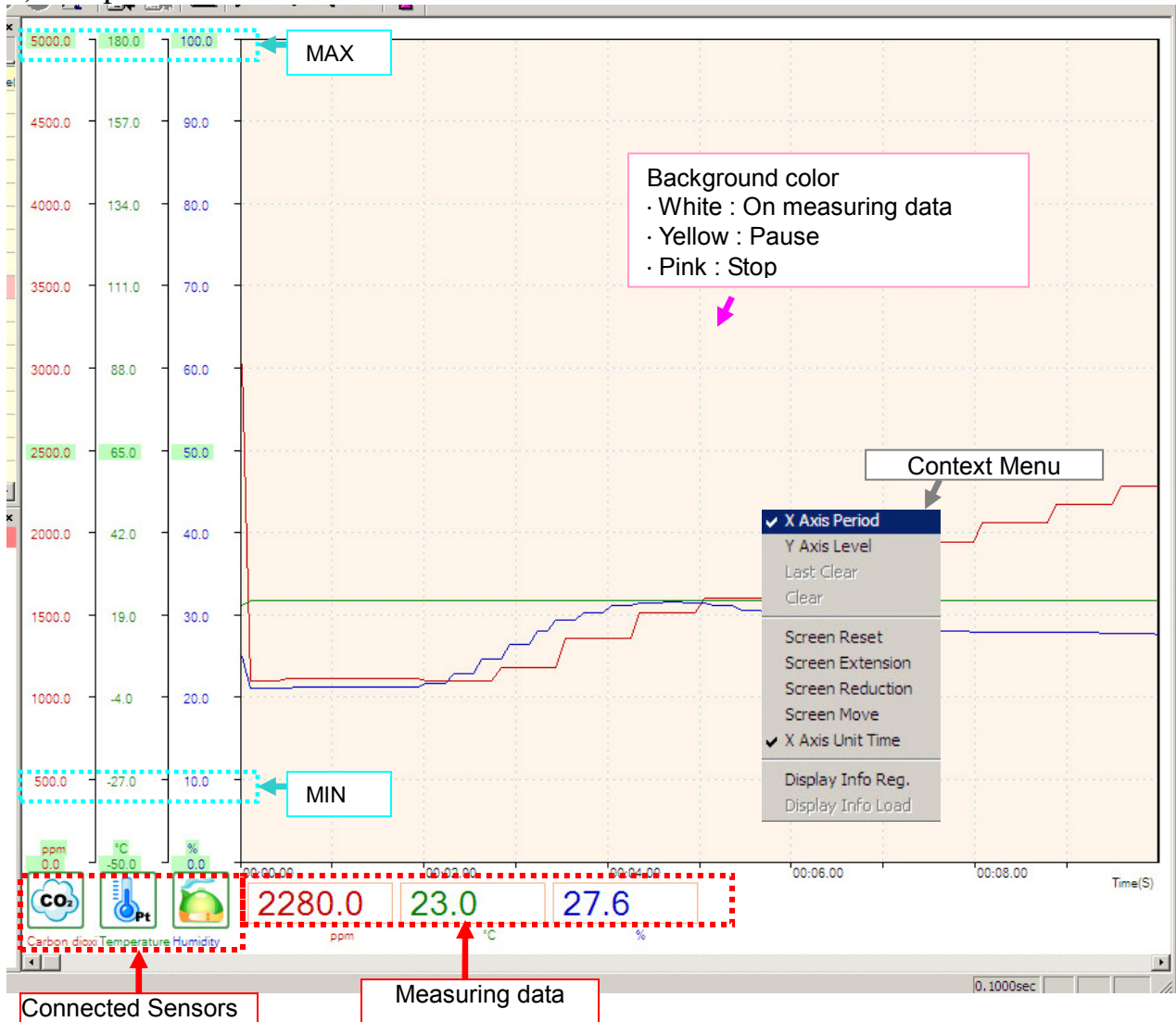
Click  icon > Run SCLogger

5.2 Overview

5.2.1 Screen Composition

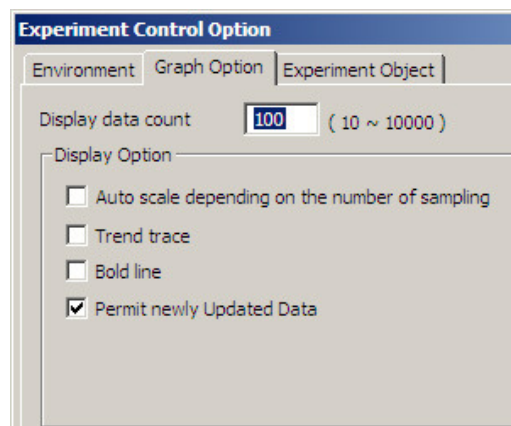


1) Graph view



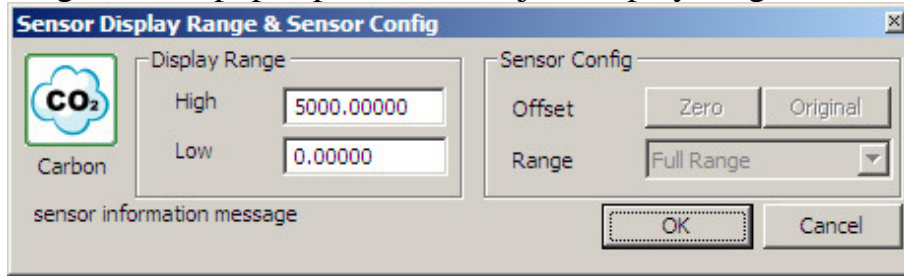
① X-axis

- X-value is displayed by Time(S) or Number of data(n).
You can select this option on context menu.
- Measuring data display: View > Digital Indicator
- Adjusting 'Display data count' number:
Experiment > Option > Graph Option



② Y-axis

- Y-value displays Max/Min value of each sensor.
- Adjust Displaying Max/Min range
 - Place the cursor on number > Move mouse wheel
 - Click icon of a sensor below Y-axis > Sensor Display Range & Sensor Config window pops up. You can adjust display range on each sensor.

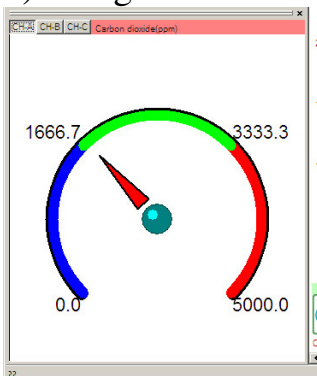


2) Table view

Num.	Time(S)	Carbon dioxide(ppm)	Temperature(°C)	Humidity(%)
1	0.1000	3020.0	21.53	24.900
2	0.2000	1100.0	23.00	21.100
3	0.3000	1100.0	23.00	21.100
4	0.4000	1100.0	23.00	21.100
5	0.5000	1100.0	23.00	21.100
6	0.6000	1110.0	23.00	21.100
7	0.7000	1110.0	23.00	21.200
8	0.8000	1110.0	23.00	21.200
9	0.9000	1110.0	23.00	21.200
10	1.0000	1110.0	23.00	21.200
11	1.1000	1110.0	23.00	21.200
12	1.2000	1110.0	23.00	21.200
13	1.3000	1110.0	23.00	21.300
14	1.4000	1110.0	23.00	21.300
15	1.5000	1110.0	23.00	21.300
16	1.6000	1110.0	23.00	21.300
17	1.7000	1110.0	23.00	21.300
18	1.8000	1110.0	23.00	21.300
19	1.9000	1110.0	23.00	21.300
20	2.0000	1110.0	23.00	21.300
21	2.1000	1100.0	23.00	21.600
22	2.2000	1100.0	23.00	21.600
23	2.3000	1100.0	23.00	21.600
24	2.4000	1100.0	23.00	22.900
25	2.5000	1100.0	23.00	22.900
26	2.6000	1100.0	23.02	22.900
27	2.7000	1100.0	23.02	24.600
28	2.8000	1100.0	23.02	24.600
29	2.9000	1180.0	23.02	24.600
30	3.0000	1180.0	23.02	26.400

It displays current sensor's information and measuring data.

3) Gauge view



It displays current values visually.

5.2.2 Main menu

File

COM Port Open : Open communication port
 COM Port Close : Close communication port
 Print : (This version doesn't support this function)
 Print Preview : (This version doesn't support this function)
 File Save for EXCEL
 File Save : Save file as SCLogger format
 File Load : Open SCLogger format file
 Exit

View

Digital Indicator : Display measuring data as figure
 Formula Input
 Chart Screen Tools > Period : X-Axis
 Level : Y-Axis
 Reset : Return size of Chart screen
 Extension : Enlarge Chart screen(graph view)
 Reduction : Reduce enlarged Chart screen(graph view)
 Move : Move Chart screen(graph view)
 Time : Display option of X-Axis (Time/Number)
 Title View : Display Title on the graph view window
 Save Image File : Save graph as image file format
 Table Bar : View/Hide Table
 Gauge Bar : View/Hide Gauge
 Status Bar : View/Hide Status bar(Menu)
 Tool Bar : View/Hide Tool bar

Mode

High Speed Mode : (SM-2100 doesn't support this function)
 Compare Experiment : Compare 5 experiments
 Compare Data View – Record 1/ Record 2 / Record 3/ Record 4/ Record 5

Experiment

Option : Setting experiment options
 Start
 Pause
 Stop
 Memory Loading : Loading data from SM-2100
 Memory Load Stop : Stop loading data from SM-2100

Help > About... : Information of program

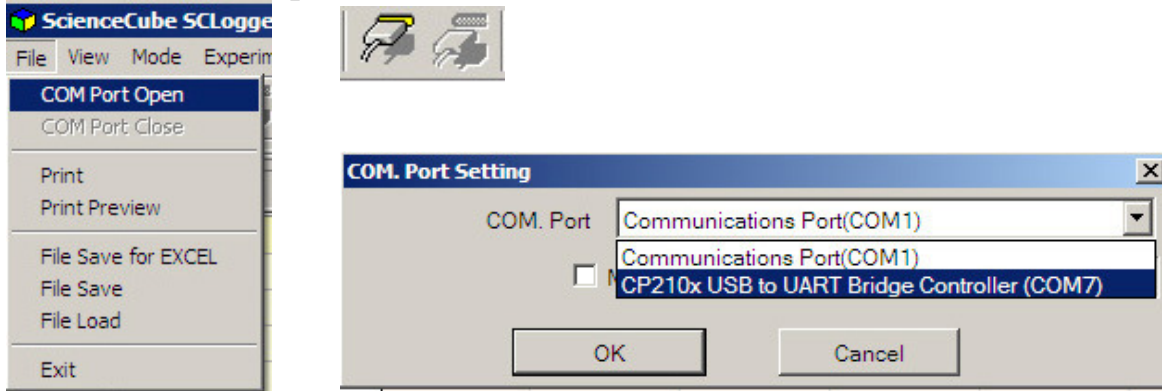
5.2.3 Tool bar



5.3 Functions of SC Logger

1) Connect with SM-2100

File > Com Port Open > Select **CP210x USB to UART Bridge Controller(COMx)**

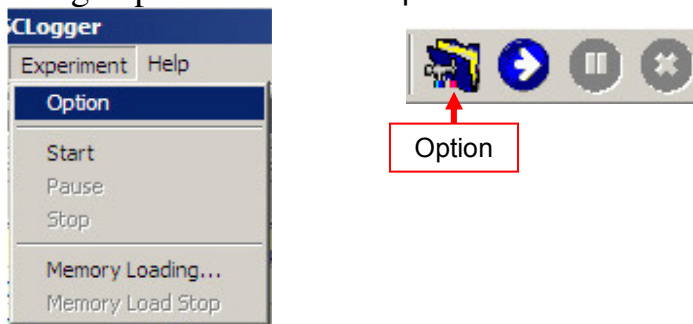


When PC and SM-2100 are connected normally, buttons on the tool bar are activated and icons of sensors show up on the left of graph view.

When PC and SM-2100 are not connected, buttons on the tool bar are inactivated like following.



2) Setting experiment: Click Option icon on tool bar or Menu > Experiment > Option



① Environment: SC Logger has most suitable information of each sensor so sets the optimum measuring intervals automatically. But you can adjust measuring intervals as you want.

- Sensor Information : It shows information of connected sensors.
- Interval : Set measuring interval. (0.1~60 Sec)
- Sample : Data numbers of measuring data per second. Inverse of Interval
- Data units quantity : Total data numbers. It is set depending on Experiment time automatically.
- Experiment Time : Whole measuring time. (Data units quantity should be limited to 50,000.)
- High-speed CH. : SM-2100 doesn't support this function.

Experiment Control Option

Environment | Graph Option | Experiment Object

Sensor Information

A: Carbon Dioxide Sensor : 0 ~ 5000ppm
0 ~ 5000ppm
Photosynthesis and respiration Carbon dioxide generating experiment

B: PT Stainless Steel Temperature Probe : -50 ~ +180°C
-50 ~ +180°C
general temperature experiment

C: Relative Humidity Sensor : 0 ~ 100%
0 ~ 100%
Measuring humidity in the air

Interval: 0.1000 Sec
Sample: 10.0000 Hz
Data units quantity: 999 n
Experiment Time: 100 Sec

☐ Strobo Timing
Slit: 1
T: T1 only
High-speed CH.: NONE

OK Cancel

② Graph Option : You can adjust options of graph view.

Experiment Control Option

Environment | Graph Option | Experiment Object

Display data count: 100 (10 ~ 10000)

Display Option

☐ Auto scale depending on the number of sampling
☐ Trend trace
☐ Bold line
☒ Permit newly Updated Data

Interval: 0.1000 Sec
Sample: 10.0000 Hz
Data units quantity: 999 n
Experiment Time: 100 Sec

☐ Strobo Timing
Slit: 1
T: T1 only
High-speed CH.: NONE

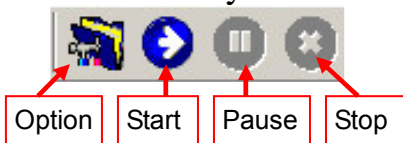
OK Cancel

- Display data count : Adjust numbers of displaying data
- Auto scale depending on the number of sampling : Range of X-axis changes automatically depending on Max data.
- Trend trace : A trace line appears on a graph view. You can see data per time as moving a trace line.
- Bold line : Make a graph line bold
- Permit newly Updated Data : The latest data shows.

③ Experiment Object : You can input additional information of an experiment.

3) Experiment

① Measurement : Click Experiment icons or Menu>Experiment. SM-2100 measure current data and you can see and analysis data with a computer in real time.



When restarting measurements after finishing it, a following message pops up.



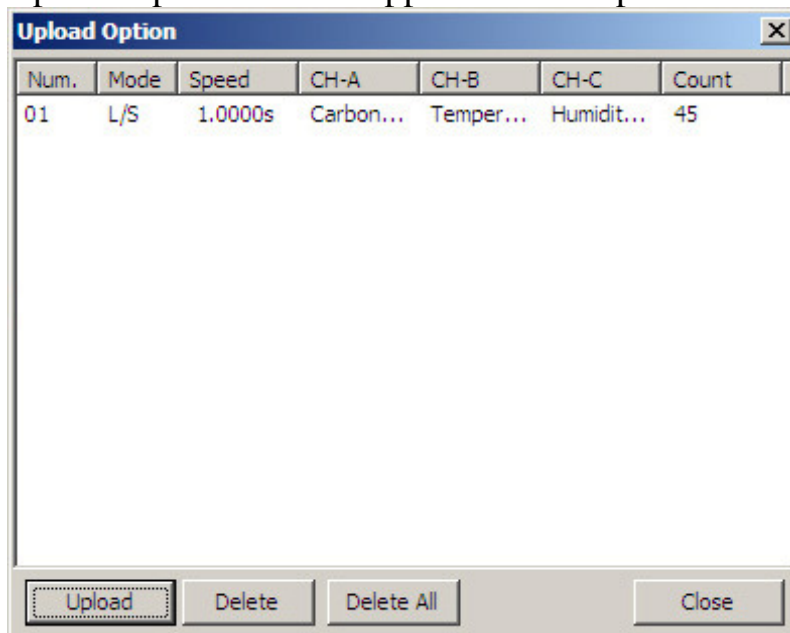
- Save : Save data into PC
- Erase : Not to save data and restart
- Append : Continue the experiment
- Cancel : Cancel restart

② Memory Loading : You can load data from SM-2100 memory to a computer.

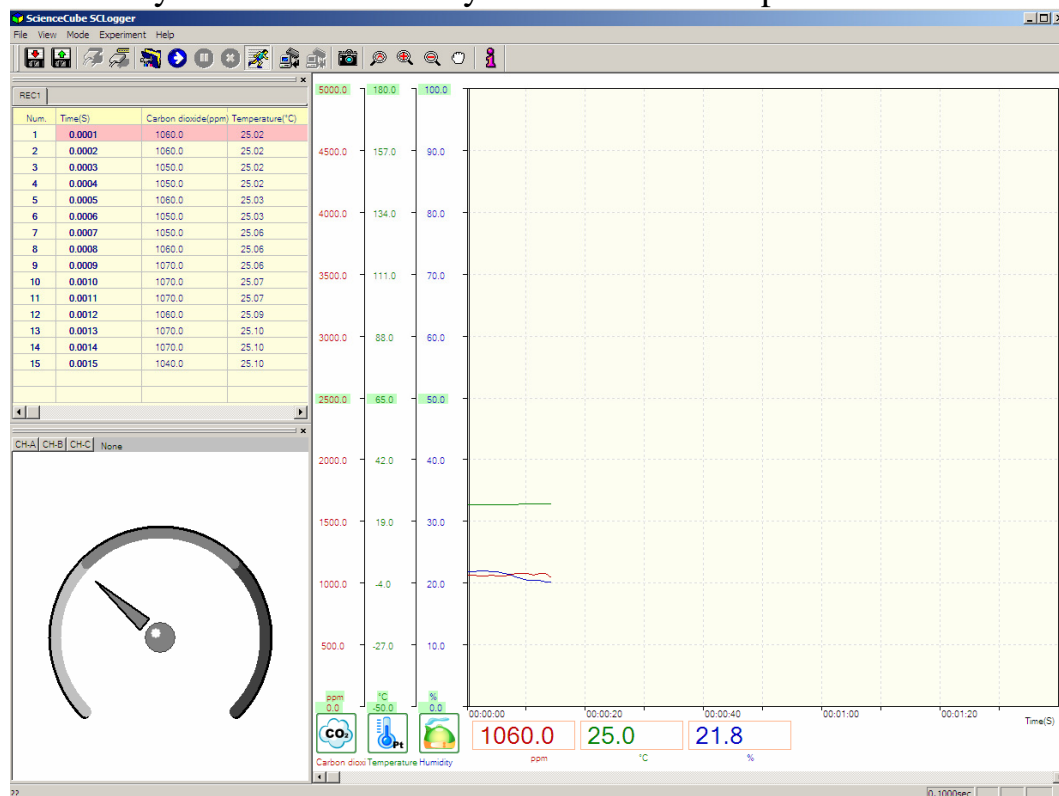
- Click Memory Loading icon or Menu > Experiment > Memory Loading



- Upload Option window appear. Click 'Upload' button.



- And then you can see and analyze data on the computer monitor as following figure.

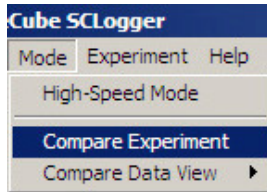


4) Mode

① High-Speed Mode : SM-2100 doesn't support this function.

② Compare Experiment : SC Logger can compare and analyze data up to 5 Records. When you do this experiment, existing data will be deleted so you should save data and then do compare experiment.

- Menu > Mode > Compare Experiment. Display is changed as following figure.



- Do and Repeat Start /Stop. With moving next REC, data are collected up to 5 times. All graphs of each Rec. are overlapped in one screen.



5) Analysis

When you stop an experiment, a trace line appears on graphs and shows measured value under part of graph view.

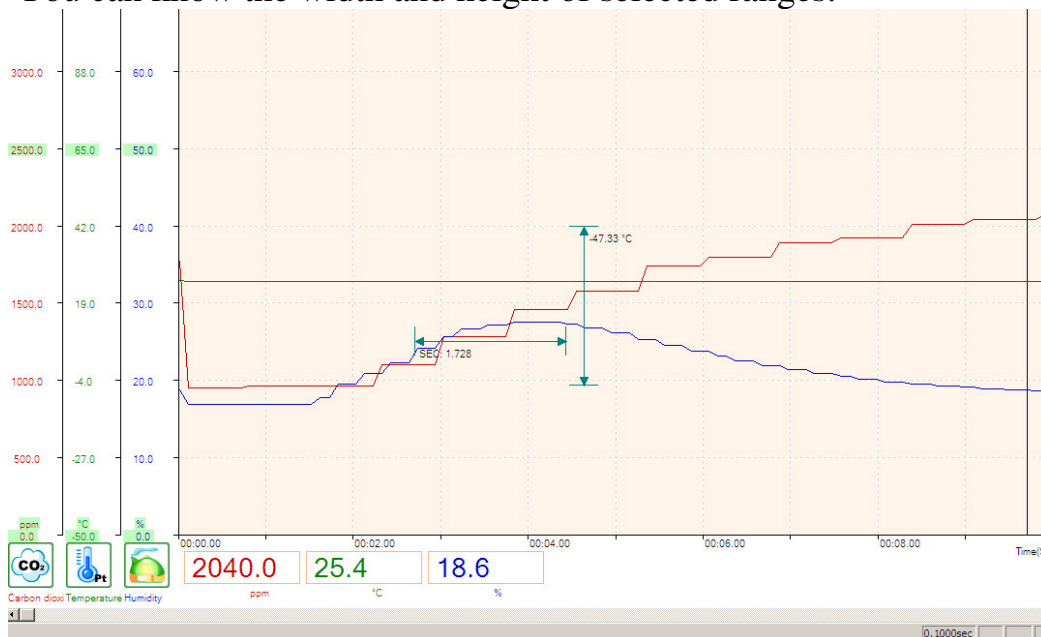


To show horizontal trace line, right click mouse. Check 'Y Axis Level'.

To show vertical trace line again, right click mouse. Check 'X Axis Period'.

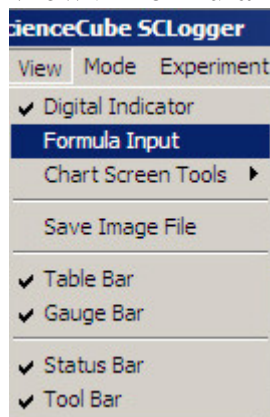


While holding down the mouse button, move the mouse cursor.
You can know the width and height of selected ranges.

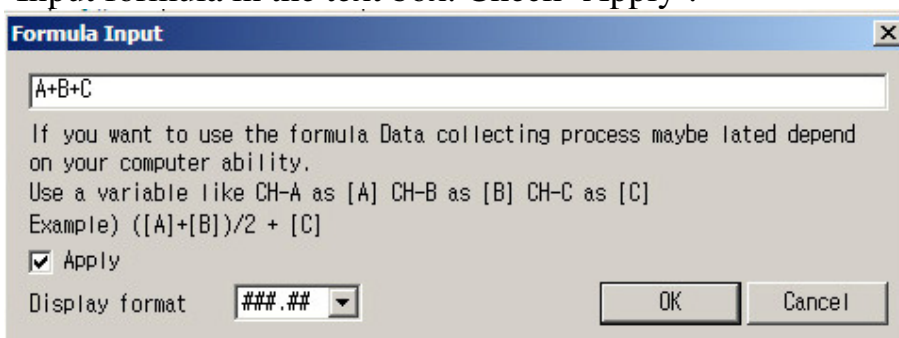


6) Apply Formula : You can input formula you want to calculate.

- View > Formula Input



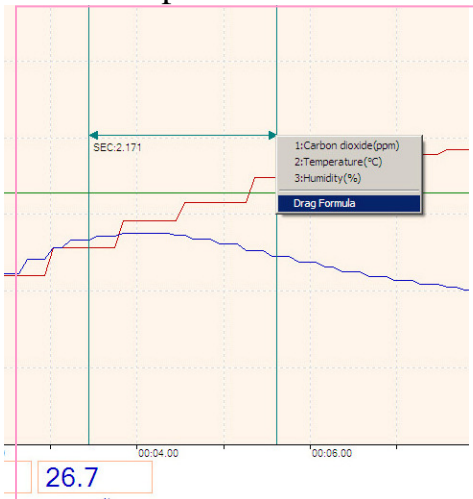
- Input formula in the text box. Check 'Apply'.



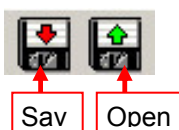
- Calculator icon and a graph line show up.



- If you want to calculate selected value, drag a trace line and select 'Drag Formula'. Do as 'Input Formula'



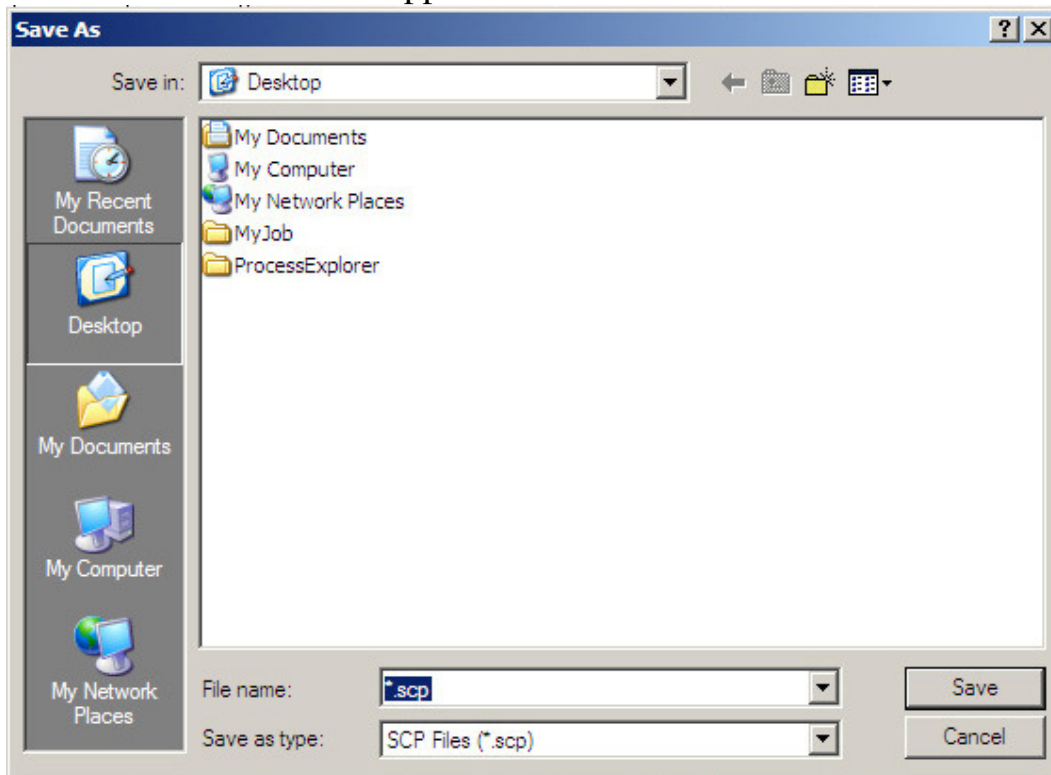
7) Save / Open files



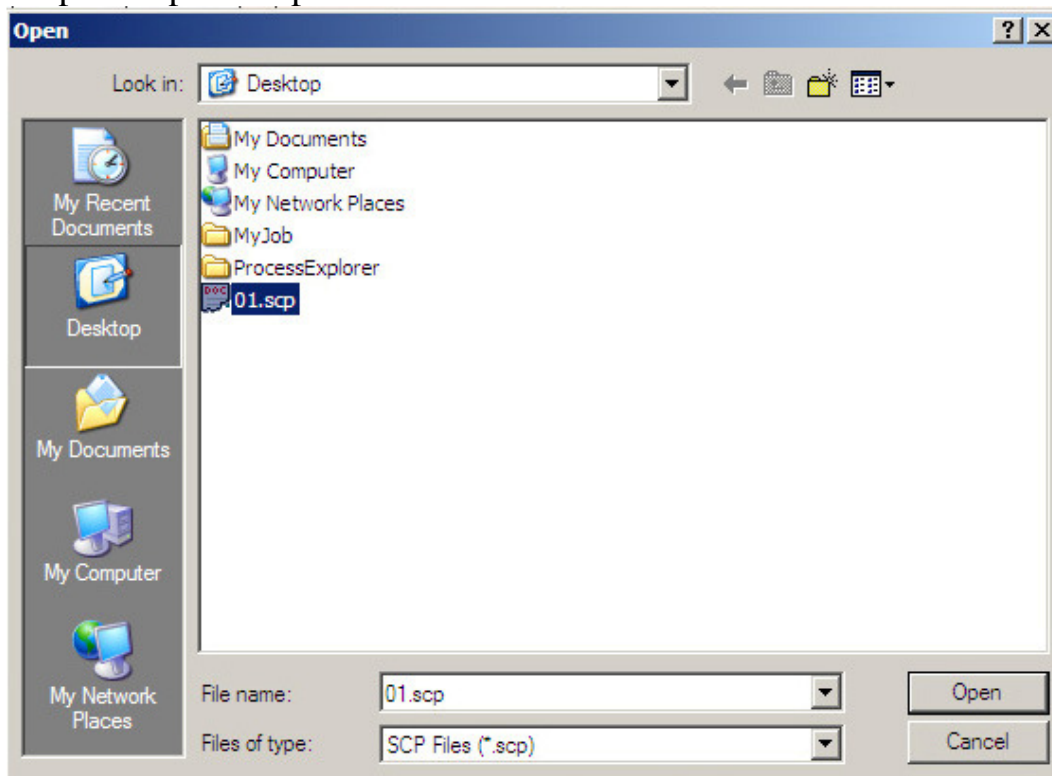
You can save data in your computer.
SCLLogger supports file formats the following :

- SCLLogger file (*.scp) : Open and save files with SCLLogger.
- Image file (*.bmp) : Save only.
- Excel file (*.csv) : Save as csv format only. You can read it with Excel program

① Save as : Save data as supported format.



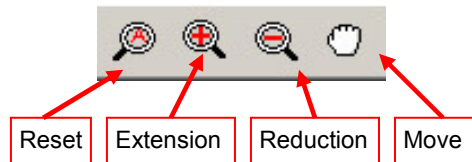
② Open : Open *.scp format file.



8) Mark a Title on the graph view window

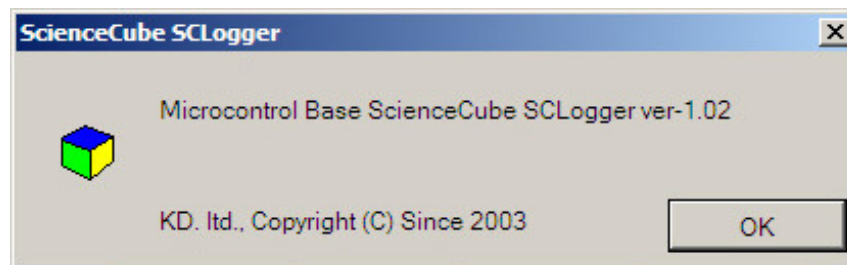
- ① Menu > Option > Experiment Object : Enter title in the text box.
- ② Menu > View > Chart Screen Tools > Title
- ③ The title is shown on the graph view.

9) Icons of Chart Screen Tools



- Reset : Return first scale
- Extension : Enlarge Chart screen(graph view)
- Reduction : Reduce enlarged Chart screen(graph view)
- Move : Drop and drag. You can move Chart screen(graph view).

10) Help > About... : It shows Information of program.



Quality Warranty

Thanks for purchasing SenseCube's products. This product passes through strict quality test of KoreaDigital Co., Ltd.

If there's any problem due to defect on manufacturing within term of guarantee, please consult with customer service center.

Product name		IAQ Monitor	Model no.	SM-2100
Purchase date			Guarantee	1 year
Shop	Name		Tel.	
	Add.			
Customer	Name		Tel.	
	Add.			

Regulations of Warranty

1. We provide customer with free repair for product's defect within the term of guarantee.
2. The standard for repair and exchange obeys the regulation established by Economic Planning Board.
3. This warranty does not cover follows:
 - a. Defect or trouble after warranty
 - b. Customer's misuse or abuse of the product
 - c. Customer's failure to observe seller's installation, operation, calibration, maintenance and adjustment specifications and procedures.
 - d. Defect or trouble caused by Natural disaster
4. We supply A/S at customer's actual expense after warranty.
5. Specifications and images may change without prior notice.

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