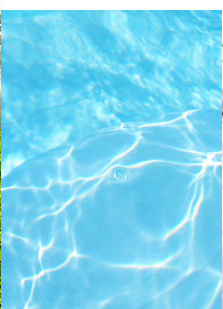




# Operation Manual

## GS43/44

CO<sub>2</sub> Gas monitoring transmitter/Indoor



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## 1. Summary

### 1.1 Features

1. Non-Dispersive Infrared (NDIR): For detecting the CO<sub>2</sub> Concentration.
2. Remote monitor by RS-485 (Modbus RTU).
3. Customized Monitoring System.
4. Providing software can be set and read the records.
5. GS43/44 UI:
  - a. Set the Category of Physical Output & Measuring Range.
  - b. CO<sub>2</sub> Concentration Detection. It provides the setting features to On/ OFF for Self-Correcting ABC Algorithm.
  - c. RS-485 Port No.
  - d. Different Baud Rate for data transmission.

### 1.2 Applicable Fields

- a. The ventilation system for various building.
- b. The HVAC process as Heating, Ventilation and Air Condition.
- c. Monitor CO<sub>2</sub> concentration for house and building.

## 2. Security considerations

### 2.1. Manual Guide

Before using this product, the user must to read the details of this user's manual, then use this product with correct steps. This user's manual is for reference while Using/ Setting this product, and required to conserve properly.

#### **Solemn Statement:**

1. This product is improperly to used in explosion-proof area.
2. Do not use this product in dangerous situation where human health & life may be threaten & affected.







### 2.2. Improper Installation Environment

In additional, if the user install this product in special environments as Dust-Free Room, Breed Environment for Animals, etc, please initiate a specialized product consultation to our professional sales of eYc-tech.




### 2.3. Illustration, Warning & Attention

If the improper & dangerous results which result from improper operator or improper environment, eYc-tech will not bear any legal responsibility












## Illustration

	 This mark is to give advice & warning for the potential dangerous which result from obvious wrong/ improper operation steps. (The left mark means "Watch out for electric shock")
	In order to avoid the dangerous situation,  this mark means some special operation/ action is forbidden to implement. (The left mark means "Forbidden to Disassemble")
	In order to avoid the dangerous situation,  this mark means Specified Action/ Operation is required to implement. (The left mark means "General Instruction")

## **Warning**

	Please implement the wiring operation under power-off status; otherwise it will cause electric shock, or become the root cause of machinery breakdown.
	This product must be operated under ruled power supplying value, and be operated under the ruled normal operation conditions which described in the user's manual; otherwise it may cause the disasters as fire accident or be the root cause of machinery breakdown.
	Please install this product under normal pressure status. Otherwise it may cause the safety problems.

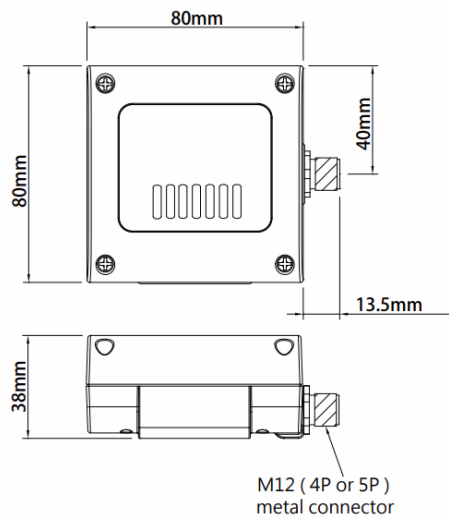
## **Attention**

	In order to be in accordance with all applicable safety standards. The installation & wiring must be performed by qualified installer & professional instruments.
	Please ensure the outlook/ outbox do not have any damage which result from improper transportation, or malfunction which results from lost attachments.
	In order to prevent the GS43/44 from damages. This product must be used in the proper environment which specified in this user's manual.
	All wiring must comply with the rule for indoor wiring and electrical installation rules. The screw must be tight for upper cover & lower base.
	In order to prevent the interferences from frequency converter, etc, and avoid error signal to result in the product damage, please use the isolated conducting wire.
	In order to prevent the product from short circuit, please install this product base on the wiring diagram on chapter 5, and please use the nonconductor material for wire end.
	In order to prevent the reduced accuracy from other interferences, do not use the two-way wireless devices within 3 meters,
	Do not disassemble this product, otherwise it may cause the malfunction.
	During the product is breakdown, please take safety strategy. Because it may cause high humidity atmosphere or the output value exceed maximum value as ruled.
	Please recycle the partial or whole parts while discard this product.
	While discard this product, the user must to comply with the related rules for industrial domestic wastes for different country/ location.

3. Housing, Dimension & Installation

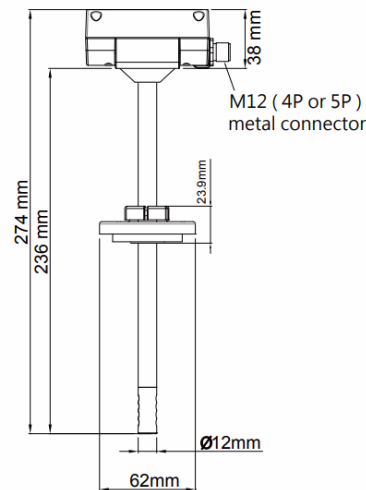
3.1 Housing & Dimension

【 GS43 ( indoor ) 】



M type (4P) : RS-485 or analogue  
M type (5P) : RS-485 + analogue

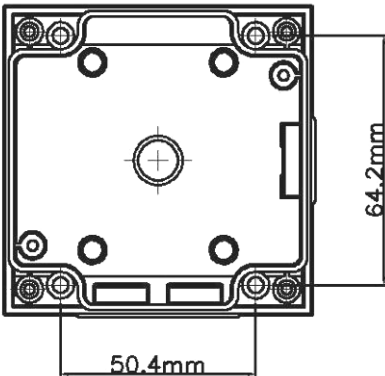
【 GS44 ( duct ) 】



M type (4P) : RS-485 or analogue  
M type (5P) : RS-485 + analogue

3.2 Installation

Base

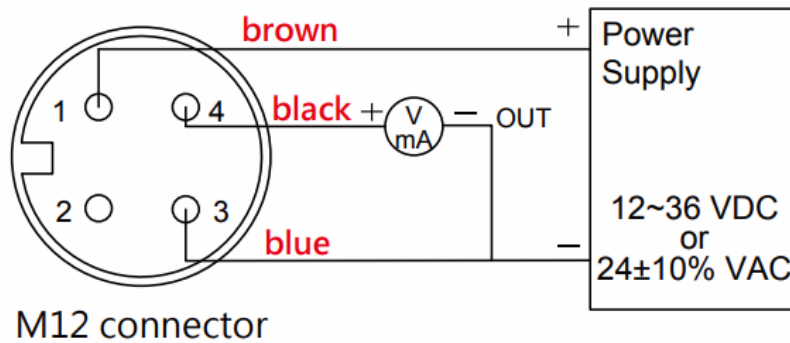


#### 4. Hardware Feature

Power :	DC 12~36V or AC 24V $\pm 10\%$ (under current consumption DC 200mA or AC 210mA)
Analog output :	One programmable channel, Optional 0~1V, 0~5V, 0~10V, 1~5V, 0~20mA, 4~20mA
RS-485 output :	Baud Rate 9600, 19200, 38400, 57600, 115200 bps Data Frame N81, none parity, 8 bit data, 1 bit stop Station ID 1-247

## 5. Signal Connection

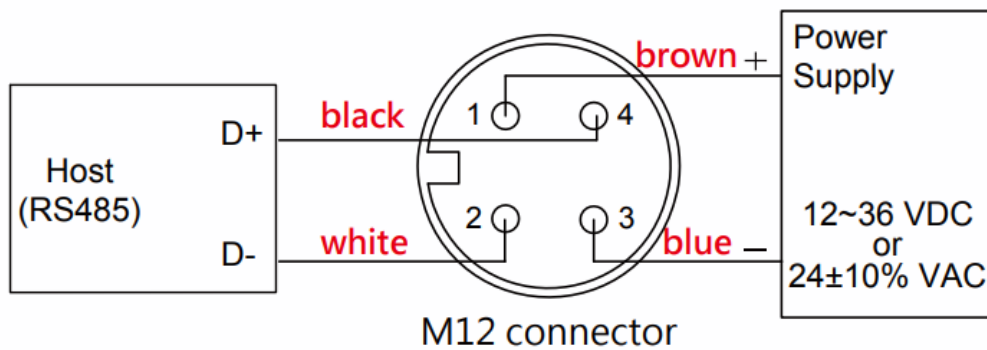
### 1. Analog Output Connection Diagram



M12 connector

M type ( 4P )

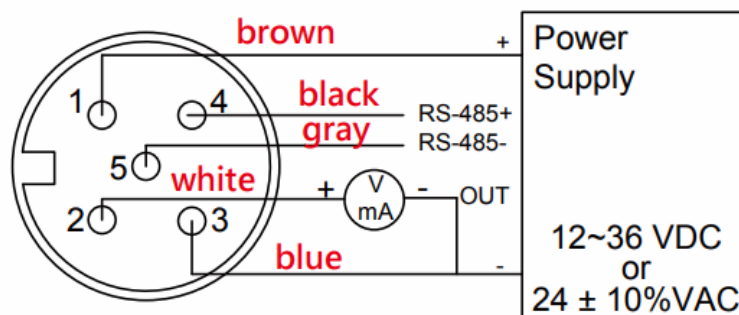
### 2. RS-485 Serial Port Connection Diagram



M12 connector

M type ( 4P )

### 3. Analog Output and RS-485 Serial Port Connection Diagram



M12 connector

M type ( 5P )



## **6. Software Feature & Using**

### **6.1 Software Compatibility**

GS43/44 software features are compatible to Microsoft Windows System, and the PC System connects with GS43/44 via COM PORT (Serial Port) °

### **6.2 RS-485 Serial Communication**

GS43/44 uses RS-485 Serial Port Interface to connect with monitor PC, except the software, the hardware interface is also necessary, GS43/44 provides 2 methods for hardware connection.

1. If the PC equipped with COM Port. Use Converter (RS-232 to RS-485) to connect with GS43/44.
2. In despite of the PC equipped with COM Port. Use Converter (USB to RS-485) to connect with GS43/44.

### **6.3 GS43/44 Setting\_Analog Output**

1. GS43/44 provides one output terminal as OUT1 and output CO<sub>2</sub> concentration measure.
2. In order to mapping to target measure span. User may set the different output voltage or electric current range independently on each terminal as 0-1V, 0-5V, 1-5V 、 0-10V ,2-10V, 0-20mA or 4-20mA.

#### **6.4 GS43/44 Setting\_CO2 Self-Correcting Algorithm ADC**

1. NDIR is a fast, accuracy & precious technology to detect CO<sub>2</sub> concentration. It uses two physical characteristics, to detect the concentration of specified gas,
  - a. The gas absorbs the wavelength of Infrared Rays.
  - b. The gas concentration and absorbed quantity is Direct Proportion.
2. The strength of Infrared Rays have attenuation phenomenon after long time, Then the accuracy & precious of measurement must be influenced. Thus the technology of CO<sub>2</sub> Self-Correcting Algorithm provides improvement for this defection.
3. In the general environment, the CO<sub>2</sub> concentration usually measured as 400ppm. The environments as From Room/ Office with the condition as midnight period & nobody status, the CO<sub>2</sub> concentration usually measured as 400ppm. Thus GS43/44 use the average statistics values for 7 days to implement Self-Correcting feature.
4. This feature is not adaptive to use in special environment as Factory/ Plant Greenroom where the CO<sub>2</sub> concentration may keep on high value & keep for long period.

#### **6.5 GS43/44 Setting\_Port No. & Transmission Rate**

1. RS-485 serial communication interface merged with Modbus Protocol, these 2 features co-works to construct the digital communication format.
2. Usable Port No. Range : 1~247.
3. On the same wiring, the Port No. must to be different.
4. The maximum devices quantity which connected to RS-485 interface restricted on 31 devices.
5. Three selectable Transmission Rate (Baud Rate): 9600 / 19200 / 38400 / 57600 / 115200 bps.

**7. GS43/44 UI operation step**

7.1 Execute “GS4X UI” ..... 12

7.2 Connect to PC via RS-485..... 13

7.3 Scan RS-485 connection ..... 16

7.4 Setting RS-485 communication format ..... 21

7.5 Select Parameter of Output ..... 23

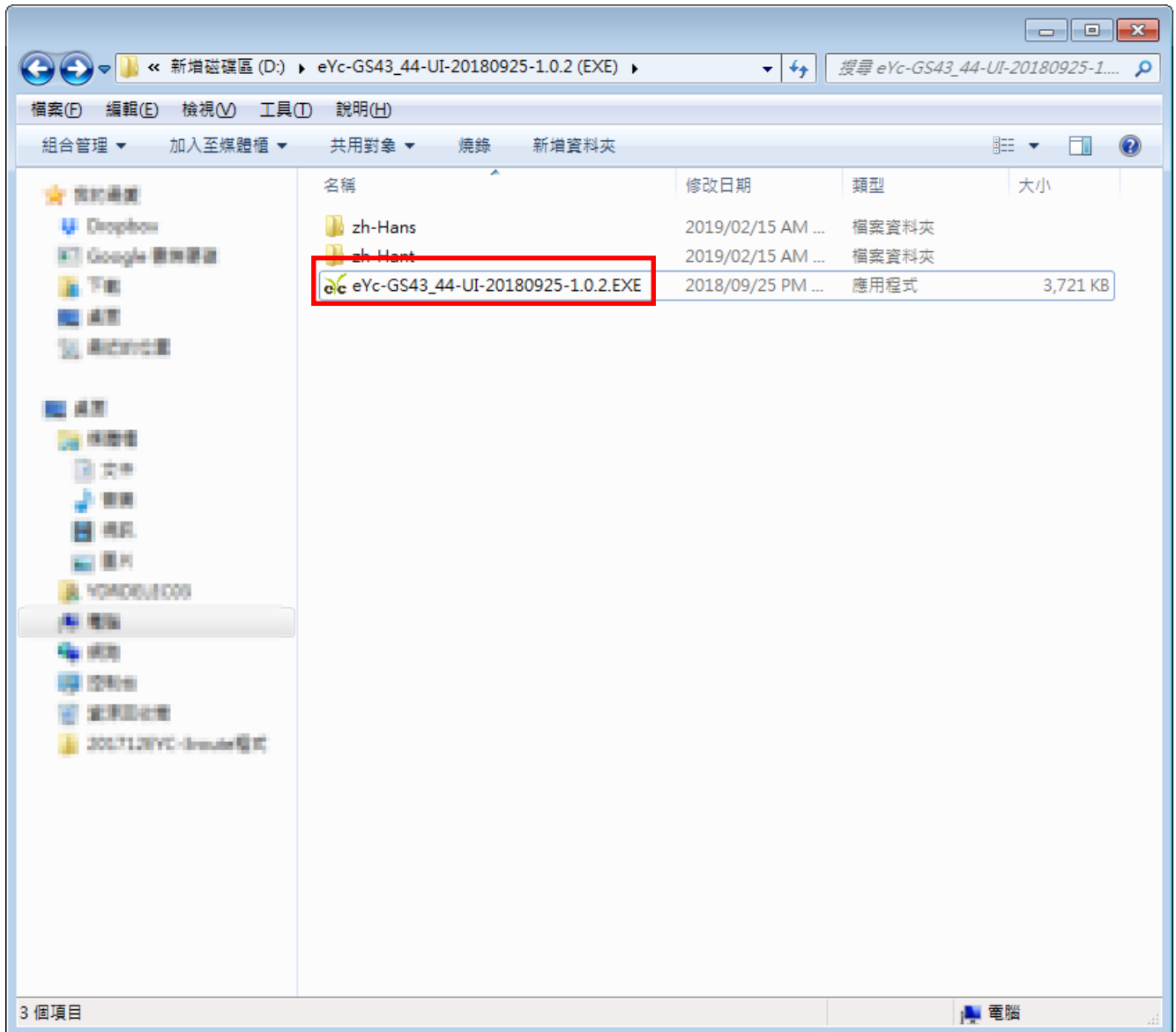
7.6 CO<sub>2</sub> Self-Correcting ADC .....25

## 7.1 Execute “GS43/43 UI”

1. Free installation file : eYc-GS43\_44-UI-YYYYMMDD-A.B.CEXE

a. O.S Requirement: Windows XP or above.

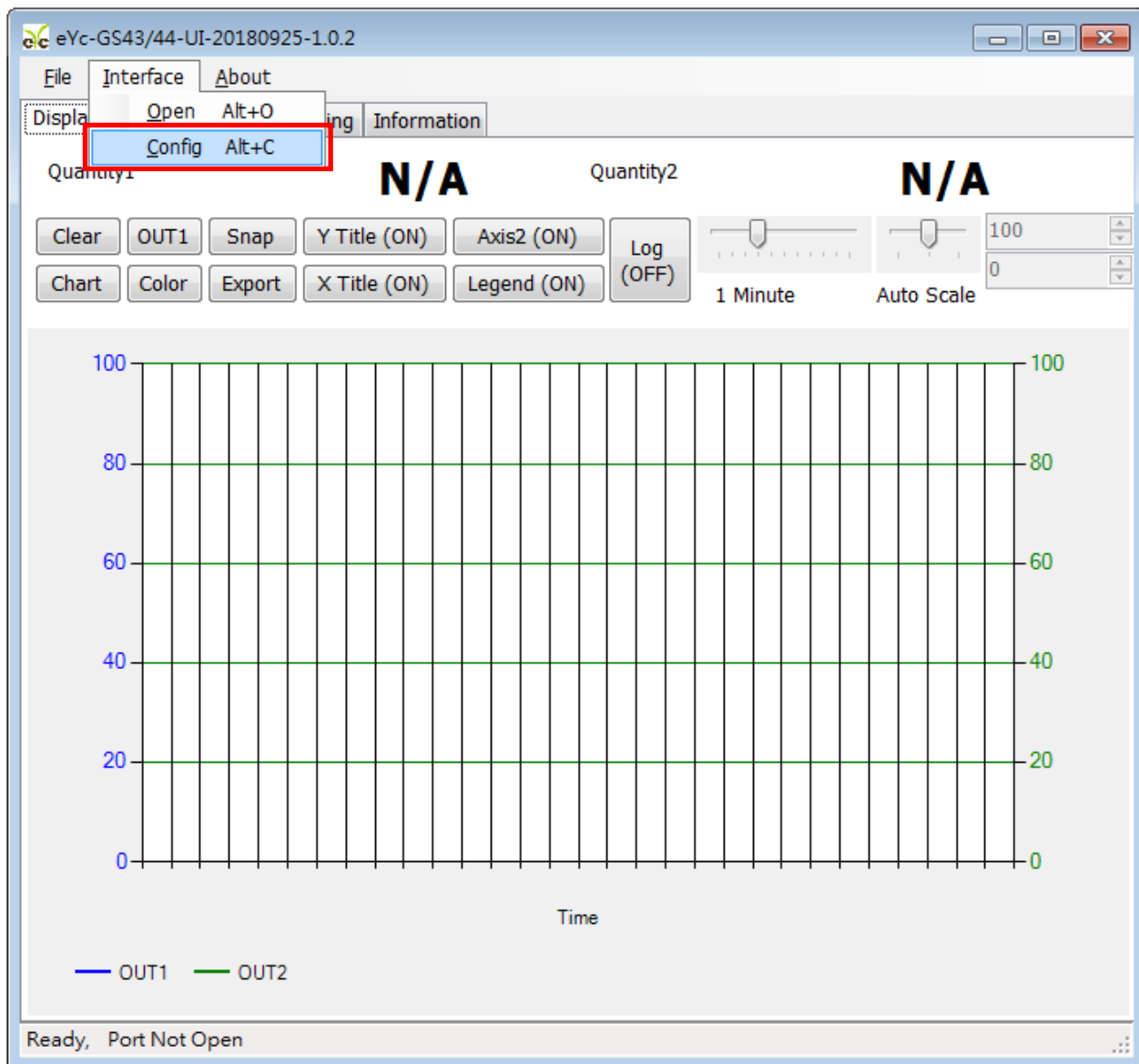
b. Click “eYc-GS43\_44-UI-YYYYMMDD-A.B.C.EXE” to open GS43/44 UI



2. Other applications required: Microsoft Office 2003 or above

## 7.2 Connect to PC via RS-485

1. Connect GS43/44 to PC via RS-485 cable
2. Click "Interface > Config"



3. Select the corresponding values of com port as following :

- a. Port No
- b. Baud Rate : 9600, 19200, 38400, 57600, 115200
- c. Data Frame : None-8Bit-1Stop, None-8Bit-2Stop, Even-8Bit-1Stop, Even-8Bit-2Stop, Odd-8Bit-1Stop, Odd-8Bit-2Stop,
- d. Physical Interface: RS-485
- e. Station ID(The factory default 1)

The screenshot shows a software window titled "Interface" with a close button in the top right corner. The window contains several configuration fields:

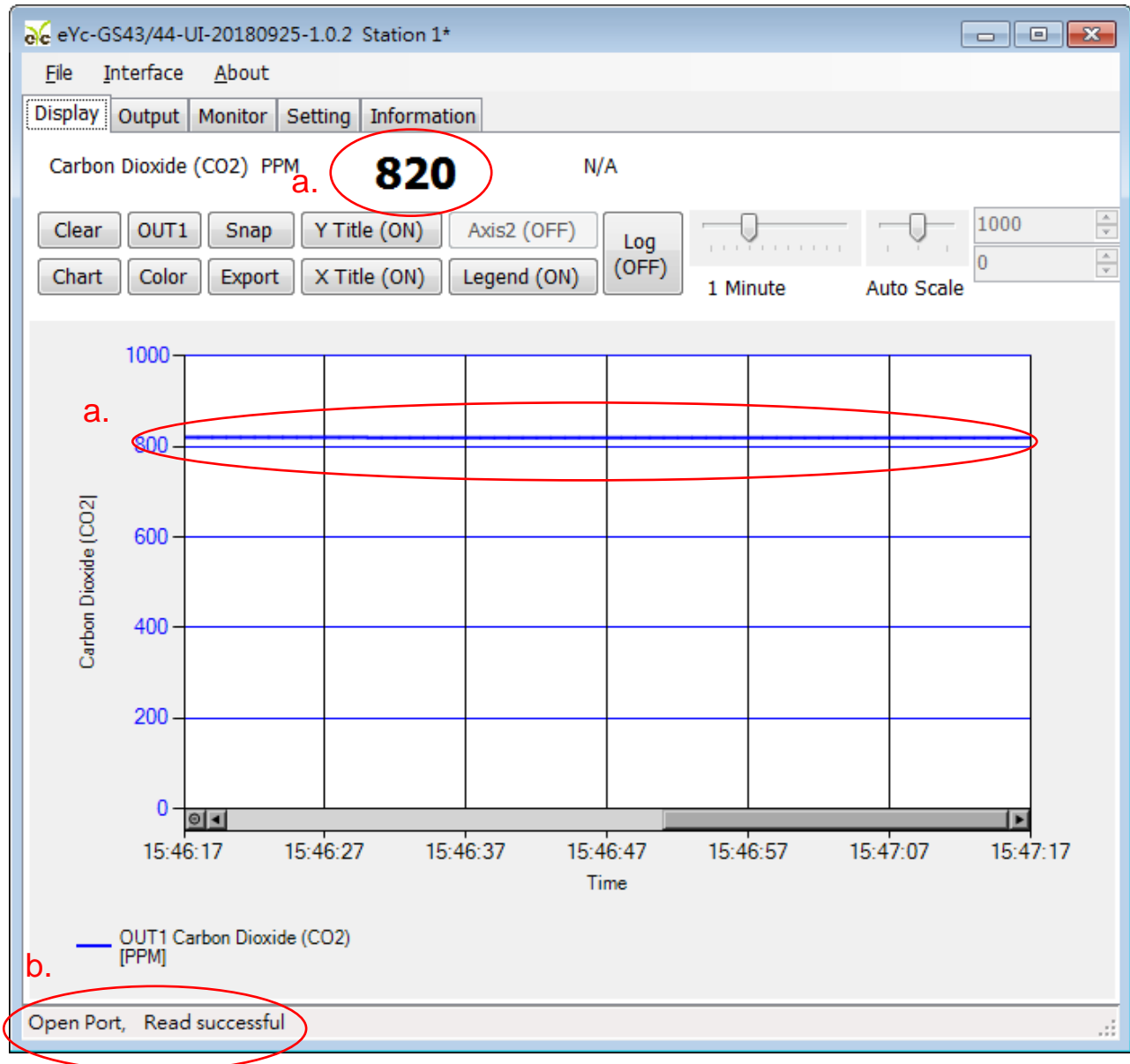
- PORT**: A dropdown menu showing "COM1", highlighted with a red box and labeled "a.".
- BAUD RATE**: A dropdown menu showing "9600", highlighted with a red box and labeled "b.".
- DATA FRAME**: A dropdown menu showing "None-8Bit-1Stop", highlighted with a red box and labeled "c.".
- TIMEOUT**: A slider set to "250 ms".
- RETRY**: A slider set to "2 times".
- Physical Interface**: A section with two radio buttons: "RS-232" and "RS-485". The "RS-485" button is selected and highlighted with a red box and labeled "d.".
- STATION ID**: A text input field containing the number "1", highlighted with a red box and labeled "e.".

Below these fields is a table with three columns: "Station ID", "Baud Rate", and "Data Type". The table is currently empty. At the bottom of the window are three buttons: "Scan", "Apply", and "Cancel".

4. Click Apply accomplish the setting

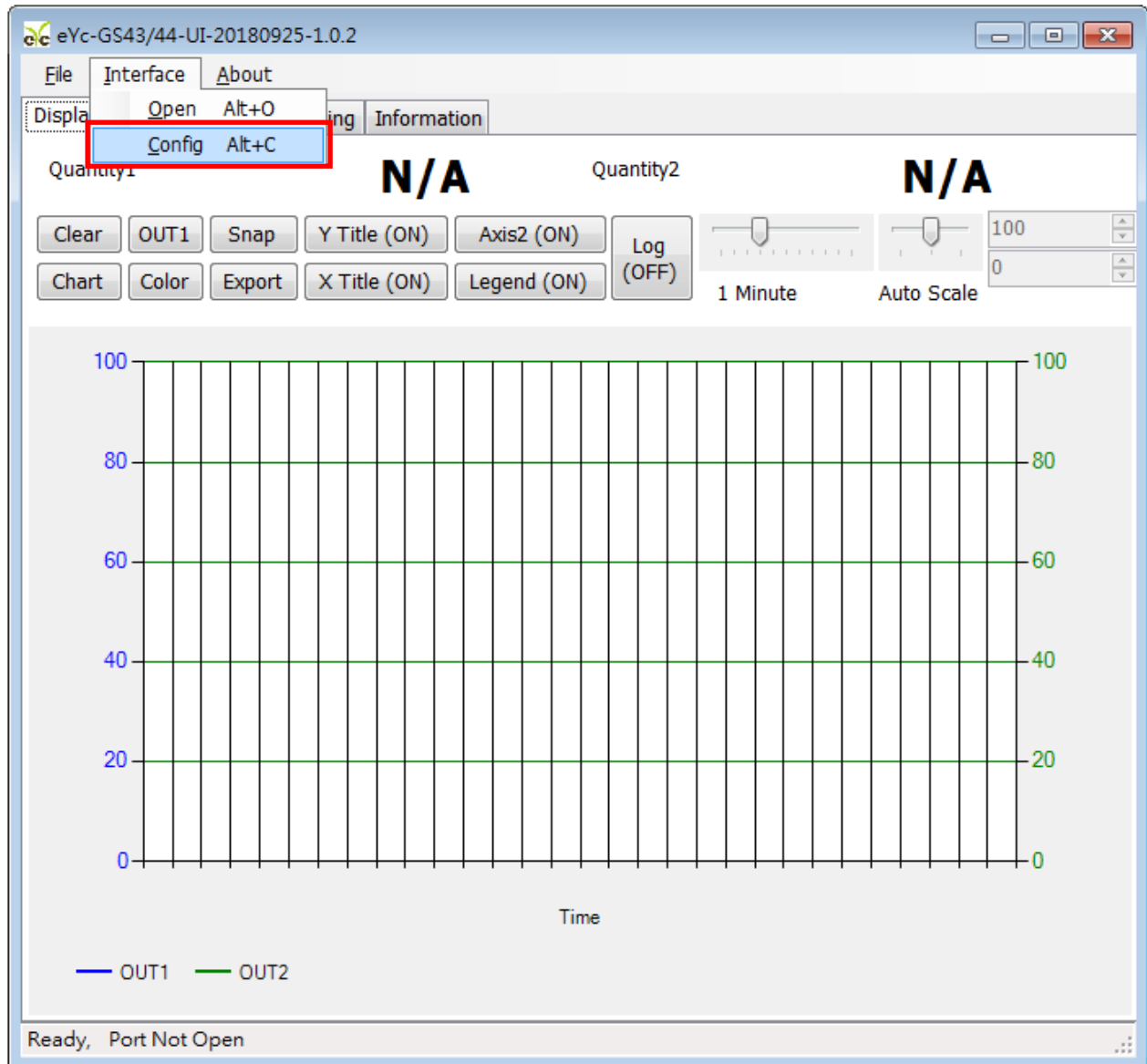
5. Connect successful :

- Shows the values of output1 as CO<sub>2</sub> concentration
- Shows “Open port, Read successful” in status bar



### 7.3 Scan RS-485 connection

1. Connect GS43/44 to PC via RS-485 cable
2. Click "Interface > Config"





3. Select the corresponding values of com port as following
- a. Port
  - b. Physical Interface: RS-485

**Interface**

**PORT** a. **COM1**

**BAUD RATE** 9600

**DATA FRAME** None-8Bit-1Stop

**TIMEOUT** 250 ms

**RETRY** 2 times

**Physical Interface**

☐ RS-232 b. ☒ **RS-485**

**STATION ID** 1

Station ID	Baud Rate	Data Type
------------	-----------	-----------

**Scan** **Apply** **Cancel**

4. Click Scan to start connection device scans

5. Scanning device and setting state
  - a. Choose Station ID
  - b. Click CLOSE AND EXPORT

The 'Scan' dialog box contains the following configuration settings:

- Baud: 9600
- Data Type: N81
- Station ID: 87 (with a green progress bar)
- Progress: 1% (with a green progress bar)

Below the settings is a table with the following data:

	Station ID	Baud Rate	Data Type	Model Name	FW Version
a.	1	9600	N81	GS43	1.0.2

At the bottom of the dialog are three buttons: STOP, CLOSE AND EXPORT (labeled with 'b.'), and CANCEL.

Interface

**PORT** COM5

**BAUD RATE** 9600

**DATA FRAME** None-8Bit-1Stop

**TIMEOUT** 250 ms

**RETRY** 2 times

**Physical Interface**

☐ RS-232 ☒ RS-485

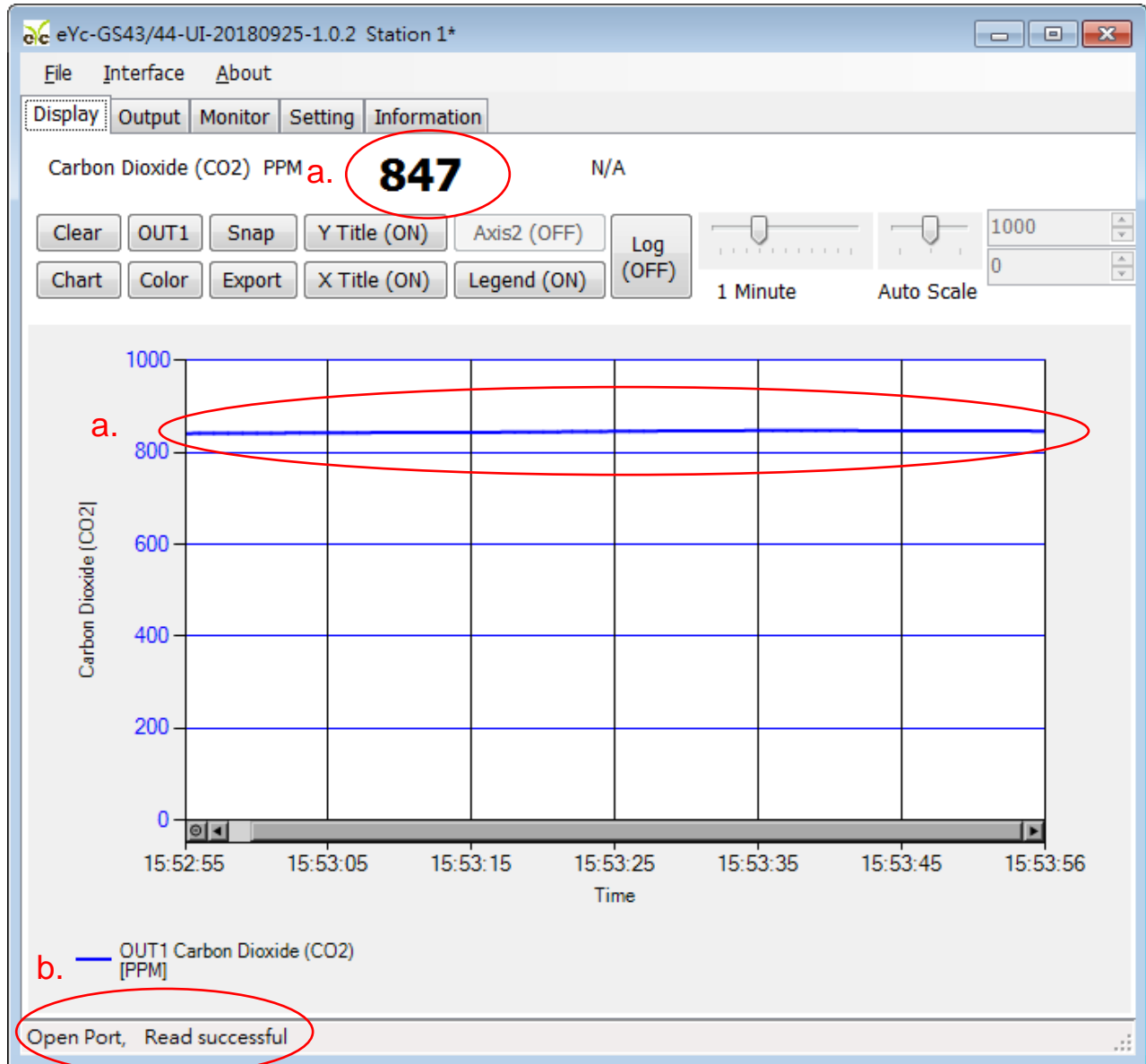
**STATION ID** 1

	Station ID	Baud Rate	Data Type
▶	1	9600	N81

Scan Apply Cancel

6. Click Apply accomplish the setting

7. Connect successful
  - a. Shows the values of output1 ad CO<sub>2</sub> concentration
  - b. Shows Open port, Read successful in status bar



## 7.4 Setting RS-485 communication format

1. RS485 connection establishment according to 7.2
2. Click on Setting

The screenshot shows the 'eYc-GS43/44-UI-20180925-1.0.2 Station 1\*' software window. The 'Setting' tab is selected and highlighted with a red box. The interface is divided into three main sections: Environment, Modbus Protocol, and CO2 AutoCalib.

**Environment**

Air Pressure (mBar) 1013.25

**Modbus Protocol**

Station ID 1

Baud Rate 9600

Data Frame None-8Bit-1Stop

Test Count: Write Error: Read Error: Data Error:

Echo Test (OFF) Reset Counter

**CO2 AutoCalib**

Auto Baseline Correction

Apply Read

Read OUT1 Config, Read successful

3. TO select Modbus Protocol parameter

a. Station ID : 1~247

b. Baud Rate : 9600, 19200, 38400, 57600, 115200

c. Data Frame : None-8Bit-1Stop, None-8Bit-2Stop, Even-8Bit-1Stop, Even-8Bit-2Stop,  
Odd-8Bit-1Stop, Odd-8Bit-1Stop

The screenshot shows the 'eYc-GS43/44-UI-20180925-1.0.2 Station 1\*' software window. The 'Setting' tab is selected. The 'Environment' section shows 'Air Pressure (mBar)' at 1013.25. The 'Modbus Protocol' section has 'Station ID' set to 1, 'Baud Rate' set to 9600, and 'Data Frame' set to None-8Bit-1Stop. To the right of these settings are 'Test Count' (Write Error, Read Error, Data Error), 'Test Result', and buttons for 'Echo Test (OFF)' and 'Reset Counter'. The 'CO2 AutoCalib' section has an 'Auto Baseline Correction' button. At the bottom are 'Apply' and 'Read' buttons. The status bar at the bottom indicates 'Read OUT1 Config, Read successful'.

4. Click Apply accomplish the setting

5. RS485 connection establishment according to 7.2 or 7.3

## 7.5 Select Parameter of Output

### 1. Click on Output

eYc-GS43/44-UI-20180925-1.0.2 Station 1\*

File Interface **Output** Monitor Setting Information

Display

**OUT1**

Quantity Carbon Dioxide (CO2)

☐ Voltage ☒ Current

Analog Range 4-20mA

Upper Range 2000

Lower Range 0

☐ Alarm Mode

Upper Point 0.0

Lower Point 0.0

Upper Level 4.0

Lower level 4.0

Apply Read

**OUT2**

Quantity

☐ Voltage ☐ Current

Analog Range

Upper Range 0

Lower Range 0

☐ Alarm Mode

Upper Point 0.0

Lower Point 0.0

Upper Level 0.0

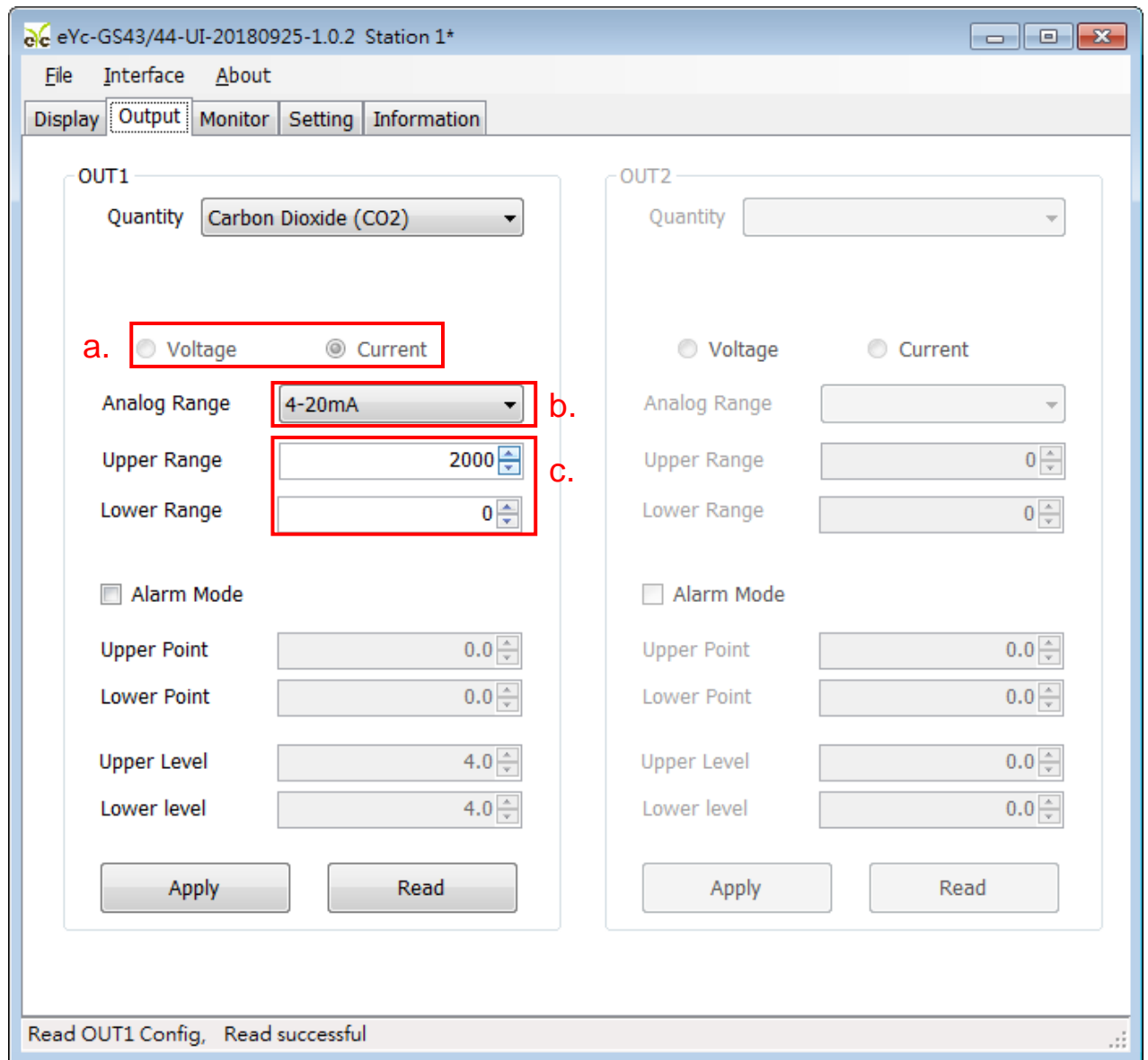
Lower level 0.0

Apply Read

Read OUT1 Config, Read successful

2. Select the parameters of Output1 and Output2

- a. Analog output: Voltage or Current
- b. Analog Range
- c. Upper Point and Lower Range



3. Click Apply accomplish the setting



## 7.6 CO<sub>2</sub> Self-Correcting ADC

1. RS485 connection establishment according to 7.2
2. Click on Setting

eYc-GS43/44-UI-20180925-1.0.2 Station 1\*

File Interface About

Display Output Monitor **Setting** Information

**Environment**

**Air Pressure (mBar)** 1013.25

**Modbus Protocol**

**Station ID** 1

**Baud Rate** 9600

**Data Frame** None-8Bit-1Stop

Test Count: Write Error: Read Error: Data Error:

**Echo Test (OFF)** **Reset Counter**

**CO2 AutoCalib**

**Auto Baseline Correction**

**Apply** **Read**

Read OUT1 Config, Read successful

3. CO<sub>2</sub> AutoCalib > Auto Drift Calib : The default status set as OFF, this function is used for calibration of CO<sub>2</sub> environment, it perform the sampling method (average value of 7 days) to implement calibration.
- a. This product is suitable for indoor HAVC environment as general apartment, office building.
  - b. The environment have to clean up for over 6 hours if user attempt to turn ON this function; And it is advised to turn OFF this function if the humans stay in the indoor environment for long periods.

eYc-GS43/44-UI-20180925-1.0.2 Station 1\*

File Interface About

Display Output Monitor **Setting** Information

**Environment**

Air Pressure (mBar) 1013.25

**Modbus Protocol**

Station ID 1

Baud Rate 9600

Data Frame None-8Bit-1Stop

Test Count: Write Error: Read Error: Data Error:

Echo Test (OFF) Reset Counter

**CO2 AutoCalib**

Auto Baseline Correction

Apply Read

Read OUT1 Config, Read successful

## 8. Protocol

8.1 User can use GS43/44 UI to read data, and another option as ModBus Protocol is provided.

8.2 Modbus is a standard protocol in industry field, a common protocol between electrical

equipments. 8.3 For getting more information, please refer to the protocol of GS43/44 product.

8.4 Wiring Rule:

1. The Port No. must be different.
2. The maximum devices which connected to RS-485 interface restricted to 32 devices.
3. Transmission Rate (Baud Rate) must be the same.

## 9. Factory Default Setting

9.1 Suggested Setting

Please refer to following setting details if the ordering code is not specified,

1. ID Setting : 01
2. Modbus Baud Rate : 9600
3. Analog Output : 4-20mA
4. CO<sub>2</sub> Range : 0-2000 PPM
5. CO<sub>2</sub> Self-Correcting ADC : OFF

## 10. Cautions

10.1 In order to prevent the internal PCB & Electric Components from damages, the user must be careful while opening the cover.

10.2 In order to avoid damage or measuring error, for anybody, do not touch or knock the High-Sensitivity Sensors.

10.3 In order to maintain accurate measuring values. Please install product at well ventilation location.

10.4 For the special environment as Chemical Factory or Plant Greenhouse, please turn OFF the CO<sub>2</sub> Self-Correcting ADC function if the CO<sub>2</sub> concentration stays on long term & high concentration status.

## 11. Inspection and Maintenance

### Maintenance & Trouble Shooting

The user is unnecessary to calibrate the product while installation. The GS43/44 product has already accomplish the inspection/ calibration before shipment. The user just to follow the steps for maintenance.

1. Periodical Inspection --- According to the contamination status & density of air dust, to implement the inspection/ maintenance periodically for sensing accuracy, and clean the filter of GS/43/44.
2. Protection for High-Sensitivity Sensor --- In order to protect the surface of sensor, any scratch/ damage is forbidden during the maintenance.
3. Trouble Shooting --- Please follow the instructions for appropriate solution,

Unusual Status	Inspection	Shooting Procedure
1. No Output 2. Output Unstable	1. Disconnected Wiring. 2. Wiring Loosen or Disconnected. 3. Confirm the voltage of power supply. 4. The damage of sensors.	1. Re-Perform the wiring 2. Crew on terminal tightly or re-place wires. 3. Replace the sensor.
1. Slow Response Output 2. Inaccuracy	1. Moisture/ Condensation on sensor. 2. Check the installed location. 3. Check the dust & Contamination of GS43/44 Housing.	1. Remove the housing. 2. Place the sensor in the Clean/ Nature Air for drying. 3. Refer to the Chapter 5 for installation. 4. Clean the filter of GS43/44.

Accurate | Professional | Stable

Temperature and Humidity / Dew Point /  
Air Velocity / Flow / Pressure  
Measuring Specialist