

EC01

(Test chamber for gas sensor evaluation)

Instruction Manual



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Thank you very much for purchasing EC01 (Test chamber for gas sensor evaluation). Please read this instruction manual carefully to use the product correctly.

1. Safety instructions



Make sure to follow

- (1) This test chamber is not explosion-proof. Do not use it for measurements when using flammable gases with greater than 50% concentration of the Lower Explosive Limit (LEL).
- (2) The test chamber does not guarantee a completely sealed condition. Do not use it for measurements with high concentrations of toxic gases hazardous to the human body.
- (3) When measuring with flammable gas, make sure to handle flames with caution, and only exhaust gas from the test chamber in an area with adequate ventilation. Also be sure to take necessary safety precautions such as installing gas detectors.
- (4) Perform measurements in a well-ventilated area, especially when using toxic gases. Also, be careful not to inhale gases when venting them from the test chamber. Make sure to ventilate gases outdoors or in fume hoods for safety.

2. Precautions for use

- (1) This product is a simplified test chamber. Make sure to close the lid firmly without any gaps. For highly accurate gas testing, use more airtight test chambers than this product.
- (2) Placing large-volume equipment such as gas detectors in the test chamber reduces the effective volume of the test chamber, and may lead to errors in the gas concentration.
- (3) Highly adsorbent gases such as ammonia, VOCs and organic solvent vapors attach to the inner surface of the test chamber easily, and are therefore not suitable for such applications. If the gas is adsorbed in the chamber and liquefied, the concentration of the gas in a gaseous state may decrease. If you need to test with highly adsorbent gases, use a test chamber made of a material resistant to gas adsorption or with an internal coating.
- (4) If highly adsorbent gases are injected into the test chamber, remove adsorbed gases by appropriate measures such as cleaning the inside of the test chamber with alcohol and venting the inside with clean air for a long time.
- (5) Measurements in high / low temperature or in extremely high / low humidity in indoor environments may affect the measurement values of the gas sensor. Check the specification of each sensor.

3. Parts names and functions

Products and accessories

* Make sure that the test chamber for gas sensor evaluation itself and the following accessories are included in the package



Test chamber for gas sensor evaluation (with signal cable)



Test board for evaluation modules



Lid

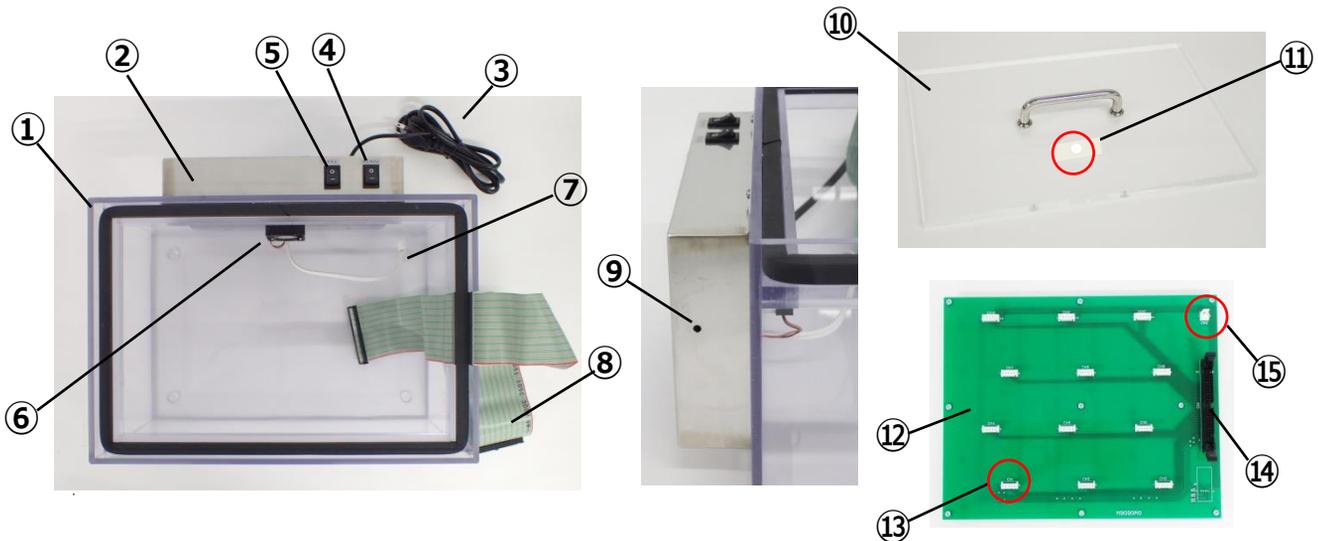


Syringe (5ml)



Instruction Manual (this document)

Parts names



- ① Test chamber body
- ② Control box
- ③ AC power cable
- ④ Power switch
- ⑤ Switch of mixing fan
- ⑥ Mixing fan
- ⑦ Power supply cable
- ⑧ Ribbon cable for measuring sensor output (50-core)
- ⑨ Supply voltage adjustment hole (not used normally)

- ⑩ Test chamber lid
- ⑪ Gas inlet
- * Adhesive tape is affixed to the syringe insertion rubber. Do not remove this tape, because it is used to prevent the insertion rubber from coming off when removing the syringe during measurement.
- ⑫ Test board for gas sensor evaluation modules
- ⑬ Connectors for module measurement (CH1 to CH12)
- ⑭ Connector for ribbon cable connection (CN1)
- ⑮ Connector for power supply (CN2)

Wiring specifications

Signal from the test board for evaluation modules (CN1)

CN1 Pin number	Evaluation module Connector pin number	Evaluation module CH number
1 to 6	1	Common VC (5.0 V DC)
7	2	CH1
8	3	
9	4	
10	2	CH2
11	3	
12	4	
13	2	CH3
14	3	
15	4	
16	2	CH4
17	3	
18	4	
19	2	CH5
20	3	
21	4	
22	2	CH6
23	3	
24	4	
25	2	CH7
26	3	
27	4	

CN1 Pin number	Evaluation module Connector pin number	Evaluation module CH number
28	2	CH8
29	3	
30	4	
31	2	CH9
32	3	
33	4	
34	2	CH10
35	3	
36	4	
37	2	CH11
38	3	
39	4	
40	2	CH12
41	3	
42	4	
43	NC	
44	NC	
45 to 50	5	Common GND

* The red line on the ribbon cable line (50-core) corresponds to number "1" of the CN1 pin.

Connector pin layout for gas sensor evaluation module

Pin number	Model number of the gas sensor evaluation module				
	EM26	EM3870A	EM5042A	EM5141A	EM-FECS (A)
1	VC	VC	VC	VC	VC
2	VOUT	VOUT1 (CH4)			
3		VOUT2 (CO)	VOUT	VOUT	VOUT
4					
5	GND	GND	GND	GND	GND

VC = Power input
 VOUT = Sensor output
 GND = Ground

* Refer to the Product Information of each gas sensor evaluation module for details.

Connector pin layout for power supply (CN2)

Pin number	Name	Function
1	VC	Power input
2	GND	Ground

4. Measurement preparation

Prepare a measuring instrument (such as data logger or digital multimeter) that can measure the voltage.

- The measurement device on the right is an example.

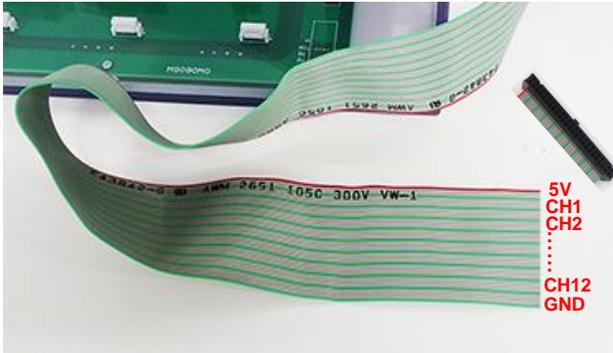


1 Wire the voltage measuring instrument.

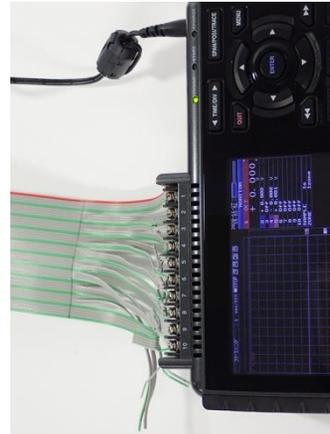
There are two methods for wiring:

(A) Connecting a ribbon cable directly to a data logger or other voltage measuring instrument.

- Disconnect the connector by cutting the end of the ribbon cable coming out of the chamber body. Check "Wiring specifications" on page 3, and connect the required lines to the voltage measuring device.



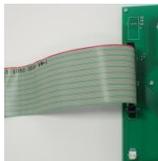
The signal wires coming out of the test chamber for gas sensor evaluation correspond to connector pins 1 to 50, starting with the red line.



[Example of connection to a data logger]

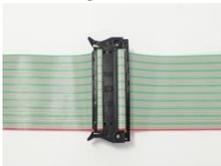
(B) Wiring using recommended connectors prepared by the user

- (1) Connecting a ribbon cable with a connector from the chamber to a printed circuit board, etc.



Recommended connector: XG4A-5031 (Omron)

- (2) Connecting a ribbon cable with a connector from the chamber to an extension ribbon cable



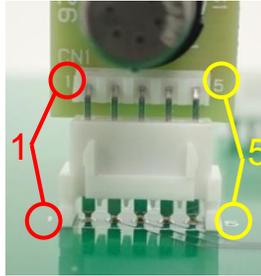
Recommended connector: XG4E-5031 (Omron)

Ribbon cable: Cable with 2.54 pitch (50-core) compatible with a MIL standard connector

2 Attach the sensor to the gas sensor evaluation module, and attach it to the test board for evaluation modules.

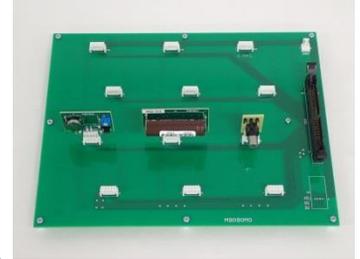


Insert the terminal of the gas sensor evaluation module into the larger hole of the connector for the module.



Match the pin number of the gas sensor evaluation module and the terminal number of the connector on the test board for evaluation modules, and insert it fully.

[Example of attachment of the test board for evaluation modules]



3 Open the lid of the test chamber and turn on the mixing fan for 2 to 3 minutes to remove the contaminated air in the chamber.

① Connect the AC power cable of the test chamber to the power outlet, and turn the power switch on the top of the control box ("POWER") to "ON".

* The "green LED" in the control box lights up.



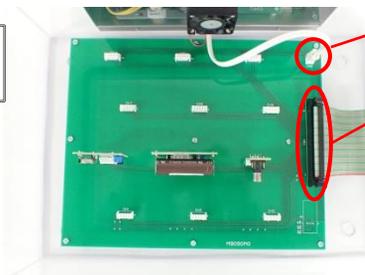
Green LED

② Turn on the "FAN" switch and rotate the mixing fan for 2 to 3 minutes to remove the contaminated air in the chamber, and stop it when it is done.

③ Set the power switch to "OFF".

4 Place the test board for evaluation modules attached with the gas sensor evaluation modules in the test chamber. Connect the power supply cable and the ribbon cable to their respective connectors on the test board.

Make sure that the power switch is "OFF" before connection.



Connector for power supply

Connector for ribbon cable (50-core)

5 Check the output voltage.

① Set the power switch to "ON".

② Check if they are properly wired with data logger, for example, in advance.

* If the power supply voltage needs to be adjusted, see "How to adjust the power supply voltage" in page 7. The factory setting of the supply voltage is 5 V. When testing with our gas sensor evaluation module, the power supply voltage does not require adjustment.

5. Measuring procedure

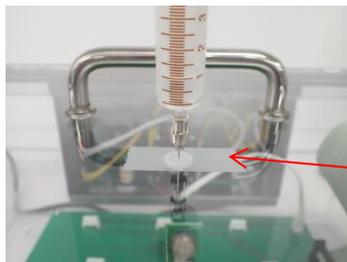
1 Close the lid of the test chamber.

* The lid should be closed by lightly pressing down to make it airtight.

2 Before injecting the gas, make sure to measure the output voltage from the evaluation module in clean air, and confirm the voltage is stable.

3 Insert the syringe needle into the gas inlet on the lid and inject the gas.

* Calculate the required gas injection volume from the inner volume of the chamber and the gas concentration to measure. (See below for calculation method)



The adhesive tape is affixed to the top surface to prevent the "rubber for syringe insertion" from popping out. Replace it with a new adhesive tape as it ages.
* Use standard mending tape.

Calculation of the injection volume of the gas

When diluting 100% concentration gas:

The injection volume V (ml) of 100% concentration gas required to make a test gas of concentration C (ppm) in the test chamber can be calculated from the following formula.

$$V = (\text{chamber capacity}) \times \frac{C}{1,000,000}$$

* Chamber capacity = 10,300 ml

Example:	Test gas concentration	100% concentration gas injection volume
	1,000 ppm	→ 10.3 ml
	5,000 ppm	→ 51.5 ml

4 After the injection, turn on the fan switch and mix the gas for approximately 30 seconds. Then perform the measurement considering the operating conditions of the sensor.

5 After the measurement is complete, open the lid in a well ventilated area and turn the fan to vent the gas in the chamber.



When opening the lid after the measurement, make sure to place the test chamber in a well ventilated area, open the lid and turn the fan to remove the gas in the chamber. Be careful not to inhale the gas from the test chamber or spread it into the room.

How to adjust the power supply voltage

The factory setting of the power supply voltage to the test board is set to 5V, and users do not need to adjust it usually.

This adjustment should only be made if any adjustment is required between 4.00 V and 5.50 V.

The power supply voltage can be adjusted by inserting a + screwdriver into the supply voltage adjustment hole on the side of the control box and turning the adjustment volume.

Check the voltages between ribbon cable connector pin numbers 1 to 6 (VC+) and 45 to 50 (GND).

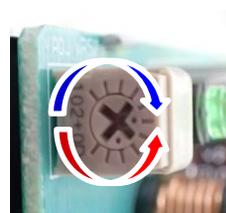
Control box



Screwdriver



Turn clockwise (+) 4.00V -> 5.50V
Turn counterclockwise (-) 5.50V -> 4.00V



6. Specifications

Name	Test chamber for gas sensor evaluation
Model number	EC01
Product configuration	Test chamber body and lid without opening Test board for gas sensor evaluation modules (12 modules max.) Syringe (5ml)
Main power	AC 100 V to 240 VAC
Power consumption	2W (when fan is on) * excluding power consumption required for gas sensor operation
Operating temperature range	0 °C to 50 °C
Effective inner capacity	10,300 ml
External dimensions	340 (W) x 270 (D) x 202 (H) mm (excluding ribbon cable)
Weight	Approx. 4 kg (including test board for evaluation modules)
Main material	Chamber body: Polyvinyl chloride Lid: Acrylic

Standards of connectors

Connectors	Part number	Manufacturer	Standards	
CN1	XG4A-5031	OMRON	MIL standard	MIL-C-83503
			UL standard	(File No. E103202) certified
CN2	B2P-VH-1	JST	UL standard	(File no. E60387) certified
			CSA standard	LR20812
Evaluation module Connectors (CH1 to CH12)	05JQ-BT	JST	UL standard	(File no. E60387) certified
			CSA standard	LR20812

Optional parts

The following parts are available separately.

Test board for evaluation modules

(Model number: EC-P01)



Board size: 200 x 258 mm

Lid with air supply and exhaust openings

(Model number: EC-P02)



Air inlet and outlet, outer diameter: 32 mm Φ

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This manual is subject to change without notice to improve product performance.