

Insertion Type CO₂ Concentration Transmitter

Model CY8100C1000 (Main Unit)

Part No. 83165722-002 (Assembly Kit)

General

Model CY8100C in combination with Part No. 83165722-002 is an insert type CO₂ concentration transmitter used for detecting concentration of carbon dioxide (CO₂) in ducts. This product can be used in a wide range of applications such as monitoring of CO₂ concentration in return ducts and the control of outdoor air intake.

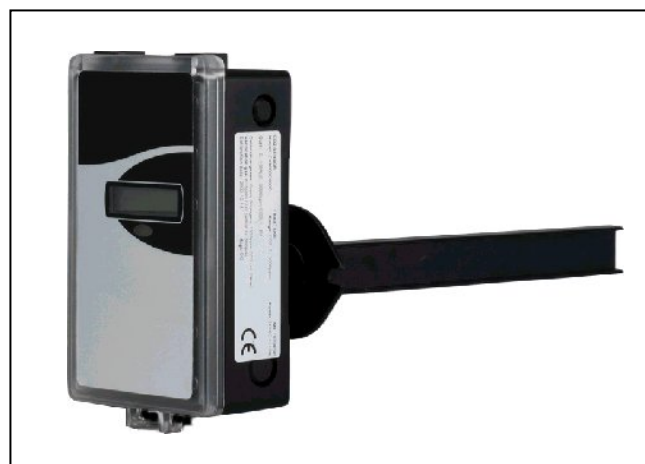
Features

- Non-dispersive infrared absorption method (NDIR)
- Linear output signal in 1-5 V DC range
- Long-term stability

Model Number and Part Number

For the insertion type CO₂ concentration transmitter, both of the following items are required.

Model/Part number	Description
CY8100C1000	Main unit
83165722-002	Assembly kit - Sampling probe - Gasket, 2 screws, 2 washers - Cable assembly



Optional Parts

Part number	Description
83165722-002	Assembly kit (for replacement) - Sampling probe - Gasket, 2 screws, 2 washers - Cable assembly
83104511-001	Zero calibration service bag (CO ₂ zero calibration gas generator)
83104981-001	Zero calibration service cylinder (CO ₂ zero calibration gas cylinder)

Specifications

(1/2)

Item	Specification
Measuring range	0 to 2000 ppm CO ₂ Concentration
Operating principle	Non-dispersive infrared absorption method (NDIR)
Measuring accuracy	± (50 ppm + 5 % of reading)
Drift	Continuously ON: ±150 ppm/year Continuously OFF (reference value): ±15 ppm/48 hours at 50 %RH
Time constant	15 min. or less (windless) 3 min. or less (0.6 m/s wind)
Environmental conditions	Operation CO ₂ concentration: 0 to 2000 ppm Temperature: 0 to 50 °C Humidity: 0 to 95 %RH (non-condensing)
	Transport/ Storage Temperature: -20 to 50 °C Humidity: 0 to 95 %RH (in moisture-proof package)
Power supply voltage	24 V AC ± 10 %, 50 to 60 Hz
Power consumption	Max. 3 VA
Output signal	1 to 5 V DC (linear with 0-2000 ppm CO ₂ concentration)
Allowable load resistance	5 kΩ or more
Wiring	Power supply: 2-wire CO ₂ concentration output: 2-wire

(2/2)

Item	Specification
Initial stabilizing time	Continuously OFF for 48 hours or longer: Approx. 10 days (* Product in a package is exceptional.) Other than the above: Approx. 3 days
Allowable vibration	4.9 m/s ² (10 to 150 Hz)
Insulation resistance	100 MΩ or higher at 500 V DC (between the case and each lead wire)
Enclosure rating (main unit)	IEC IP65 (dust-proof and water-proof)
Weight	Approx. 350 g
Material	Main unit - Case: PC + ABS plastic (Bayblend® FR90) - Cover: PC Makrolon® 6555 Sampling probe: PC Makrolon® 6555
Application	Indoor duct, chamber

Safety Instructions

Please read instructions carefully and use the product as specified in this manual. Be sure to keep this manual near by for ready reference.

Usage Restrictions

This product is targeted for general air conditioning. Do not use this product in a situation where human life may be affected. If this product is used in a clean room or a place where reliability or control accuracy is particularly required, please contact Azbil Corporation's sales representative. Azbil Corporation will not bear any responsibility for the results produced by the operators.

 **WARNING**



- Do not disassemble the product. Disassembly may result in electrical shock or equipment damage.

 **CAUTION**



- Installation and wiring must be performed by qualified personnel in accordance with all applicable safety standards.



- This product must be operated under the operating conditions (power, temperature, humidity, vibration, shock, installation position, atmospheric condition, etc) specified in this manual to prevent equipment damages.



- This product must be operated within its rated operating ranges specified in this manual. Failure to comply will cause equipment damage.



- All wiring must comply with local codes of indoor wiring and electric installation rules.



- This product does not have a power switch. Install the power circuit breaker in the power source.



- Always disconnect power source before performing any wiring.



- Use crimp terminal lugs with insulation for electric wires to be connected to the screw terminals.



- Make sure all the wires are tightly connected to the screw terminals. Loose connection may cause fire or heat generation. Loose connection also may lower the measuring accuracy.



- Dispose of this product in accordance with your local regulations. Do not reuse all or part of this product.

Trademark information:

Bayblend and Makrolon are registered trademarks of Bayer MaterialScience AG.

IMPORTANT:

Regarding the operating conditions, in a space where fresh air is always required or more fresh air than usual is required due to hard work intensity, it is dangerous to control fresh air (outdoor air) intake. Do not control fresh air (outdoor air) intake using CO₂ measuring instruments including this product under such conditions.

Dimensions

Main unit (with sampling probe assembled to)

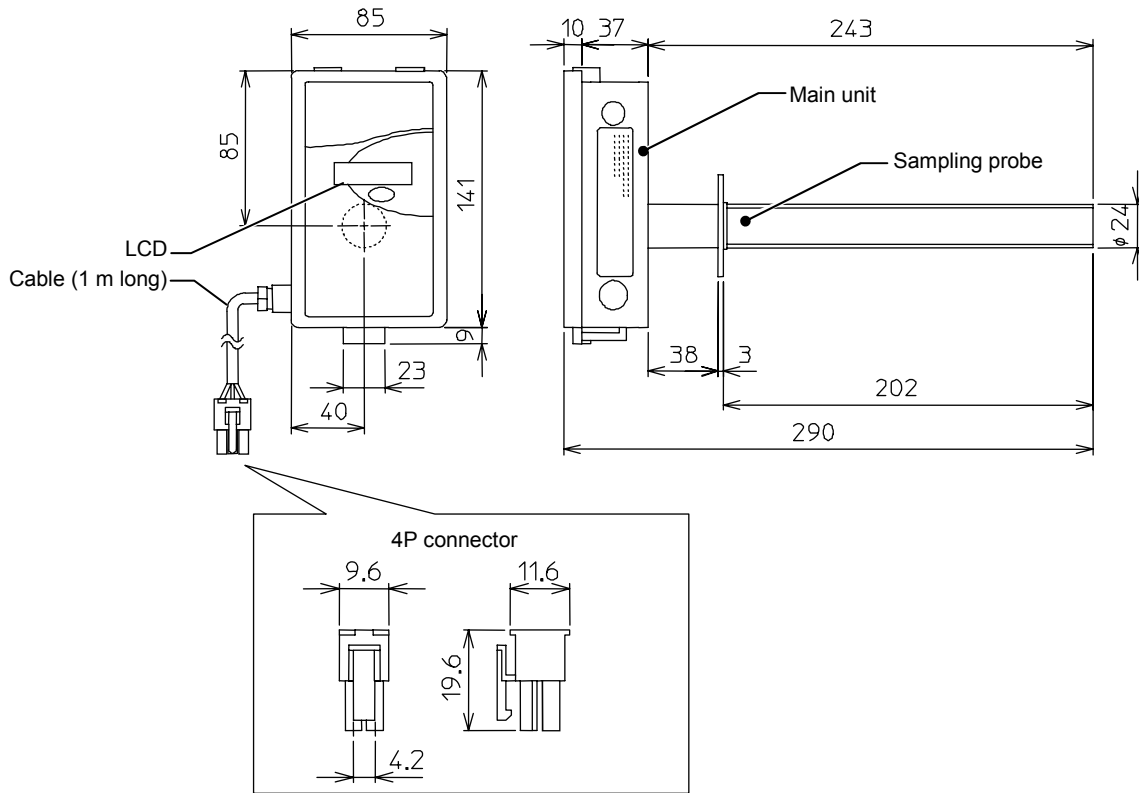
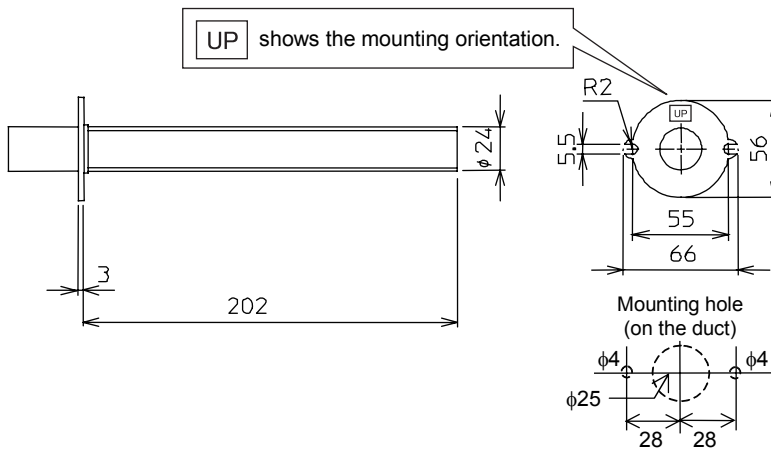


Figure 1. Dimensions of the main unit with sampling probe (mm)

Assembly kit

- Sampling probe



- Cable assembly

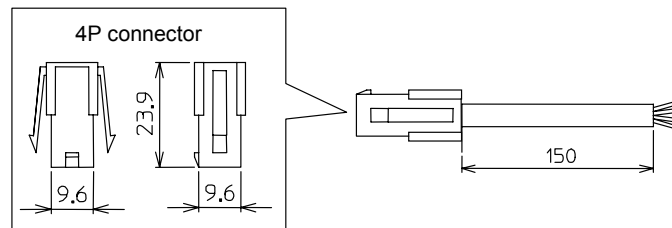


Figure 2. Dimensions of the assembly kit (mm)

Installation

Precautions for installation

- Installation environment
Although the main unit enclosure conforms to IEC IP65 for dustproof and waterproof, avoid installing in locations exposed to corrosive atmosphere or direct sunlight.
- Handling of the main unit
The main unit is packaged in a tightly sealed aluminum moisture-proof bag for shipment. This prevents large output drift that may be caused from moisture absorption of the main unit continuously non-energized. Table 1 shows the output drift (reference value) after the main unit has been left without power supply.
Note that output drift of the main unit continuously energized is ± 150 ppm/year.

Table 1. Output drift of the main unit continuously non-energized (reference value)

		Non-energized period			
		to 6 hours	to 12 hours	to 24 hours	to 48 hours
Humidity (%RH)	30	< ± 10 ppm drift			
	50	< ± 10 ppm drift			< ± 15 ppm drift
	80	< ± 10 ppm drift	< ± 15 ppm drift		< ± 25 ppm drift

IMPORTANT:

The main unit is packaged for shipment after inspection and calibration. To minimize the output drift that may occur after its installation, it should be unpacked and mounted just before the power is supplied (approximately within 48 hours).
If the main unit has been continuously non-energized (since it is unpacked till it is activated, or since it is shut down) for 48 hours or over, be sure to conduct the CO₂ zero gas calibration (explained later) after the power is supplied.

Assembly

The assembly kit (sampling probe and cable assembly) and the main unit must be ordered and mounted separately to minimize the drift (See the above **Precautions for installation** section.) caused by the main unit left non-energized after being unpacked. If it takes more than 48 hours to activate after the product installation, mount only the assembly kit at the time of installation and unpack the main unit to mount right before activating.

Installation of assembly kit

Sampling probe: Sampling probe needs to be mounted to the duct first before mounting the main unit.

- Select a the probe mounting position where the typical CO₂ concentration of the air can be detected and where the specific air velocity can be acquired.
- Drill a hole with 25 mm diameter for mounting the sampling probe and two holes with 4 mm diameter for the screws, as shown in Figs. 2 and 3.
- Provide a gasket between the probe and the duct, and insert the sampling probe so that the air sampling part is completely inserted inside the duct to expose it to the air inside the duct.
- Set the sampling probe so that the air flows perpendicularly to the probe (air sampling part), as shown in Fig. 3.
- Check the mounting orientation. 'UP' mark on the sampling probe (See Figs. 2 and 3.) must be positioned on the upper side. Then, fix the sampling probe with two M4 screws with washers on the both sides.

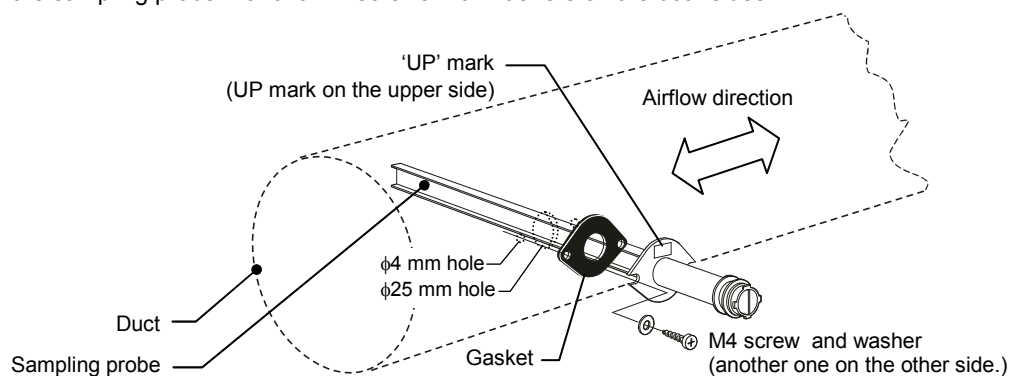


Figure 3. Sampling probe mounting to the duct

Cable assembly: Following is an example of cable assembly installation using round outlet box (JIS* C8340) with two entries.

* JIS: Japanese Industrial Standard

Lead the controller cable into the outlet box through an entry. Connect the controller cable with the cable assembly, as shown in Fig. 4.

Note that the size of the entry must be large enough for the main unit cable connector to lead through. The main unit cable will be connected when the power is supplied. (See Figs. 1 and 4.)

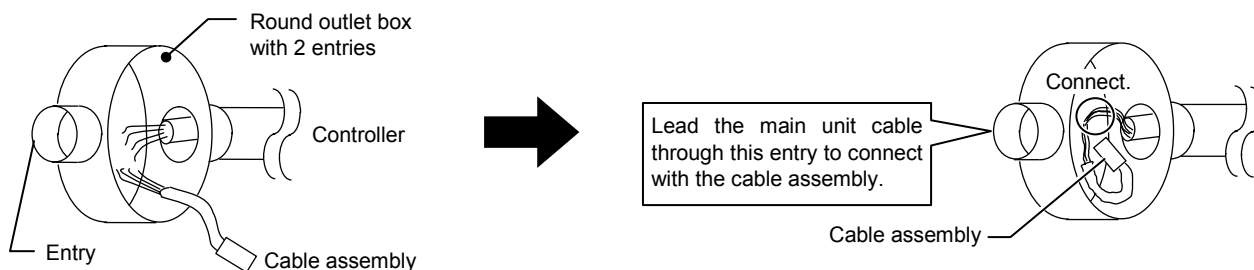


Figure 4. Connection example of cable assembly

Installation of main unit

Main unit is easily assembled with the sampling probe by snap-in bayonet mount. Refer to the following procedure.

- 1) Engage the notches of the main unit with the locking knobs of the sampling probe, then lightly press the main unit.
- 2) Turn the main unit clockwise until it stops, as shown in Fig. 5.

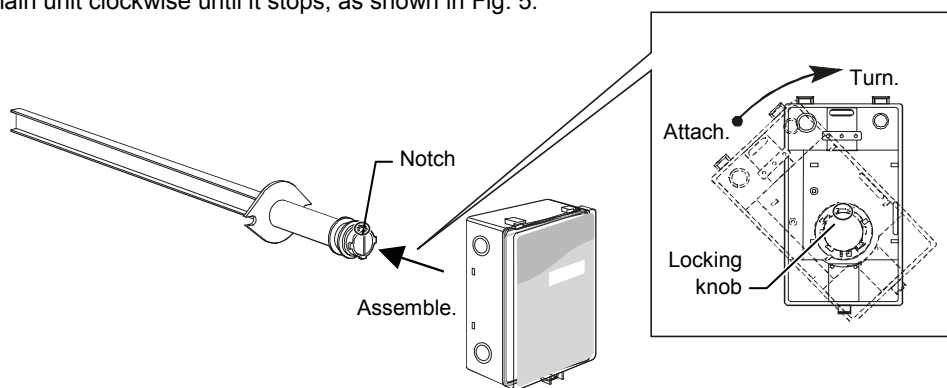


Figure 5. Assembling the main unit with the sampling probe

- 3) Connect the main unit cable with the cable assembly, to which the controller cable has already been connected, as shown in Fig. 6.

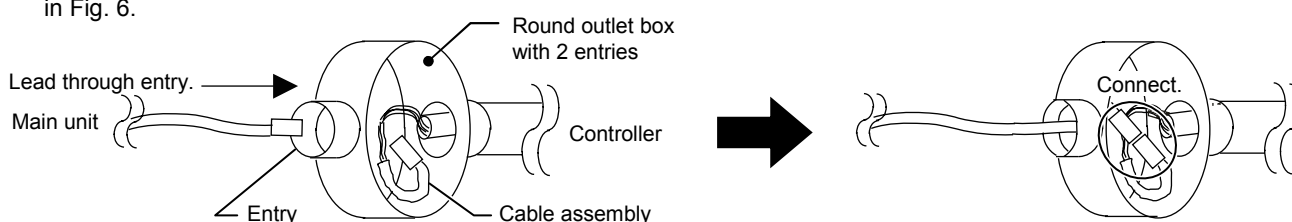


Figure 6. Connection of the main unit cable with the cable assembly

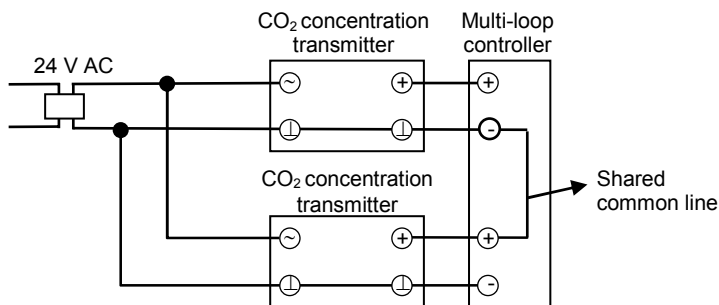
Wires Connection

Connection of power supply line

IMPORTANT:
Do not apply power supply voltage other than 24 V AC. Otherwise, it may damage the product.

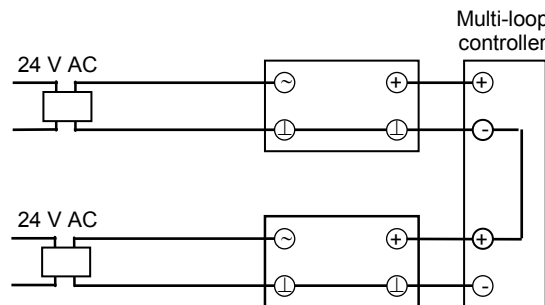
Use insulation transformer. Do not share the 24 V AC power supply with any other device. If the transformer is shared, a loop will formed at common and the product may get damaged. Refer to the following examples.

Shared transformer: **Incorrect** example



Loop is formed at the common line.

Separate transformer: **Correct** example



Loop is not formed at the common line.

Figure 7. Connection examples: with shared transformer and with separate transformers

Terminals layout

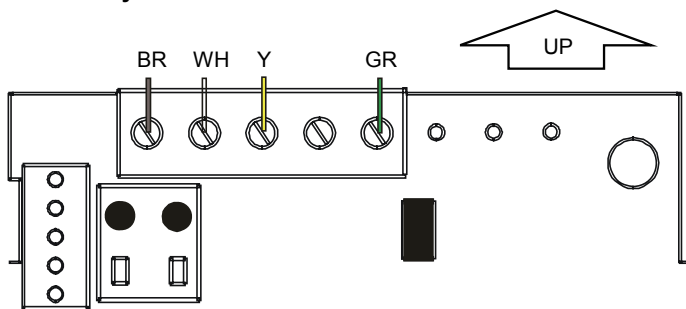


Figure 8. Terminals arrangement

Lead wires of the main unit cable

Lead color	Description
WH: White	24 V AC power (common)
BR: Brown	24 V AC power
GR: Green	Common output (-)
Y: Yellow	1-5 V DC output (+)

Lead wires of the cable assembly

Lead color	Description
White	24 V AC power (common)
Brown	24 V AC power
Green	Common output (-)
Yellow	1-5 V DC output (+)

Operation

Operation check

Remove the front cover of the main unit, and breathe directly onto it 10 cm away from the main unit. Check that the reading on the LCD and the output ascend quickly.

LCD indication

On the LCD, CO₂ concentration is continuously displayed. The display is changed a when a button is pressed, as shown in Fig. 10. For the layout of each button, see Fig. 9.

In the event of equipment trouble, tool icon is displayed on the LCD, as shown in Fig. 11.

LED indication

Green LED: Normal operation

Yellow LED: Initializing, pressing a button, error during calibration

Maintenance

Periodic inspection

Since the measurement gases flow into the inside of the housing, annual cleaning of circuit boards inside the housing is recommended.

Periodic calibration

The output drift (a maximum of 150 ppm/year) occurs even if this product is in continuously energized state. Be sure to conduct a CO₂ zero gas calibration every year.

IMPORTANT:

As mentioned in **Installation** section, leaving the main unit non-energized for a long time may cause drift in Table 1. In such a case, CO₂ zero gas calibration of the main unit must be carried out after the supply of power. Note that the output needs about ten days to stabilize for the main unit continuously non-energized for a long time. Please calibrate the main unit when it has been continuously energized for 10 days.

The zero calibration service bag (Part No. 83104511-001) needs to be ordered for the main unit calibration.

Refer to the following procedure and perform CO₂ zero gas calibration. (See Figs. 9 and 10)

- 1) Remove the front cover from the main unit.
- 2) Remove the adaptor attached to the rear side of the front cover, and attach the adaptor to the CO₂ zero gas inlet on the main unit. Connect the zero calibration service bag with the main unit CO₂ zero gas inlet, referring to Specifications/Instructions of the zero calibration service bag (AB-5803). Two inlets are provided on the main unit. Use either one.
- 3) Turn on the zero calibration service bag to start supplying CO₂ zero gas to the main unit.
- 4) Keep supplying the CO₂ zero gas until CO₂ concentration is stabilized (approximately for five minutes).
- 5) When CO₂ concentration is stabilized, calibrate the main unit referring to Fig. 10.
- 6) Yellow LED lights up to indicate when calibration is completed successfully. Then, the LCD returns to display the CO₂ concentration.
- 7) Remove the adaptor from the CO₂ zero gas inlet and attach it to the rear side of the front cover.
- 8) Put the front cover back to the main unit.

Refer to AB-5803 for handling the zero calibration service bag (Part No. 83104511-001).

Layout of CO₂ zero gas inlets, buttons, and LED

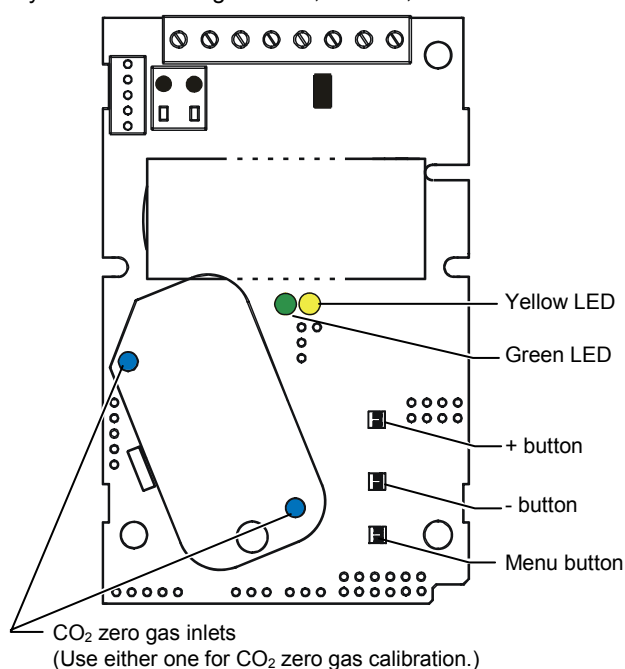
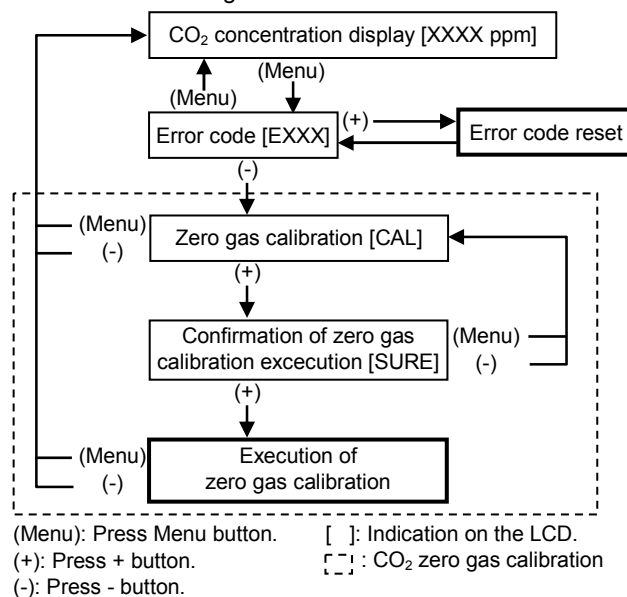


Figure 9. Layout of CO₂ zero gas inlets, buttons, and LED on the main unit (without the front cover)

Operation flow of CO₂ zero gas calibration and error code check



Notes:

- * Indication on LCD returns to CO₂ concentration if no button is pressed for 10 seconds.
- * Let go of the main unit when LED turns on.
- * Wait until the LED turns off, then go to the next operation.

Figure 10. Operation flow of CO₂ zero gas calibration and error code check.

Fault detection self diagnostics

This product contains fault detecting self diagnostic functions. Error or faulty operation occurring when the power is turned on or during the normal operation is detected and indicated with the yellow LED and the tool icon on the LCD as shown in Fig. 11.



Figure 11. Tool icon on the LCD

If error code except E000 (normal operation) and E032 (CO₂ concentration level out of 0-9999 ppm range) is displayed, there may be something abnormal with the product. Please contact our service personnel. (See Fig. 10 for checking error code.)

Note that the yellow LED also lights up during:

- Initialization
- Pressing a button
- Calibration

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Specifications are subject to change without notice.

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