Model TX-1300EM Series
CO$_2$ Monitor
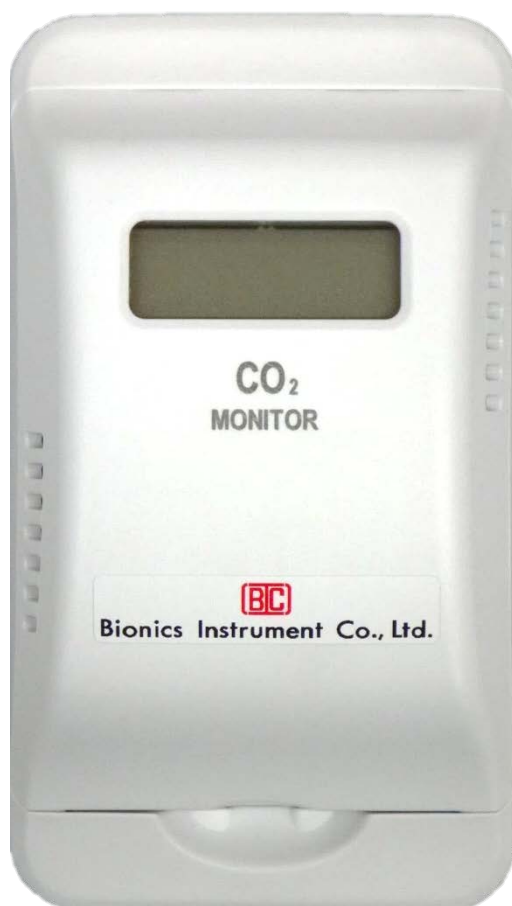
⚠ *Caution!*

For safety reasons this equipment must be operated

and serviced by qualified personnel only.

Read and understand this instruction manual completely

before operating or servicing.

Revised Record

Date	Revision	Comment	By	Approved
Mar. 6, 2025	0	New release	T. Kawamata	T. Hirota

Safety Precautions

Purpose of Use

This is a CO_2 monitor for ambient air, and indicate the concentration and output DC4-20 mA in proportion to the concentration. And this monitor is able to activate the relay contact in the monitoring range.

This monitor is not analyzer for qualitative or quantitative. Please check the specification before using this monitor, and use properly with using purpose.

Environmental Conditions

When using this monitor, be sure to observe the following cautions.

    a. Specified operating temperature range (no sudden temperature changes).

    b. Specified operating humidity range (no condensation or sudden changes in humidity).

    c. No direct sunlight.

    d. Specified power supply available.

    e. Area free of corrosive gases.

    f. Area free of flammable gases.

    g. Don't use in explosion proof area.

    h. Where is sufficient space for easy maintenance.

    i. Only explosion-proof equipment can be used in explosive locations or gases.

    j. Wiring should be done according to wiring specified by our company.

    k. Install in a location to match using purpose.

    l. Consider the selectivity of the sensor for gases that may be present in the monitoring location.

Prohibition

To use this monitor safely, please observe the following ways.

    a. Do not measure substances other than those intended for use.

    b. Do not measure concentrations outside the range of use.

    c. Be sure to observe the environmental conditions for use of this monitor.

    d. Do not modify, disassemble, or repair the monitor yourself unless performed by our service personnel.

Warranty

We guarantee this product against defects in materials and workmanship for a one-year warranty period from the date of shipping.

If a defect is found during this warranty period, we will replace or repair the product free of charge at our discretion. However, consumables are not covered by the warranty.

The warranty mentioned here is limited to the delivered product alone, and damages induced by the failure of the delivered product (damage to machinery and equipment or lost profits, etc.) are excluded from the warranty.

Expected Life

The expected life of this monitor is 5 years under proper maintenance.

This life is estimated based on using under extremely normal conditions.

If the monitor will be used under the harsh environment that differ from normal environment, the life will be short significantly even if the maintenance is done frequently.

● The cautions shown here are serious safety precautions and must be observed.

Meaning of indication

	Warning	This indicates that improper handling may result in death or serious injury.
	Caution	This indicates that improper handling may result in injury to persons or damage to property.

	The illustration indicates caution (including warnings). The illustration on the left indicates **caution against electric shock.**

	The illustration indicates caution (including warnings). The diagram on the left indicates **the possibility of fire.**

⚠ **Warning**

This device is designed to monitor CO_2 in the ambient air. (Do not use for controlling objects that may have a significant effect on human life.)

Power supply electric shock warning

Be sure to check that the power supply voltage of this monitor matches the voltage of the supplied power before connecting the monitor to the power supply.

Improper handling may result in the risk of electric shock or fire.

Use in gases

Do not use this device in places with flammable or explosive gases or steam, or in explosion-proof locations.

There is a risk of fire or explosion

Removing the inside of the unit

Do not attempt to disassemble or repair the inside of the unit unless our service staff.

This may result in injury due to fire or abnormal operation.

Do not splash water

Don't splash water for this monitor.

Do not touch the unit or its wiring connections with wet hands. Doing so may damage the monitor, cause a short circuit in the wiring, or result in electric shock.

⚠ Caution

When selling or transferring this product to another person, be sure to include the instruction manual.
The new owner will need this instruction manual to use the product safely and correctly.

Caution

⚠ Please read the instruction manual carefully to ensure correct and safe use of this instrument.
If there is a possibility of damage to the system or property due to a malfunction of the instrument, take safety measures before use.
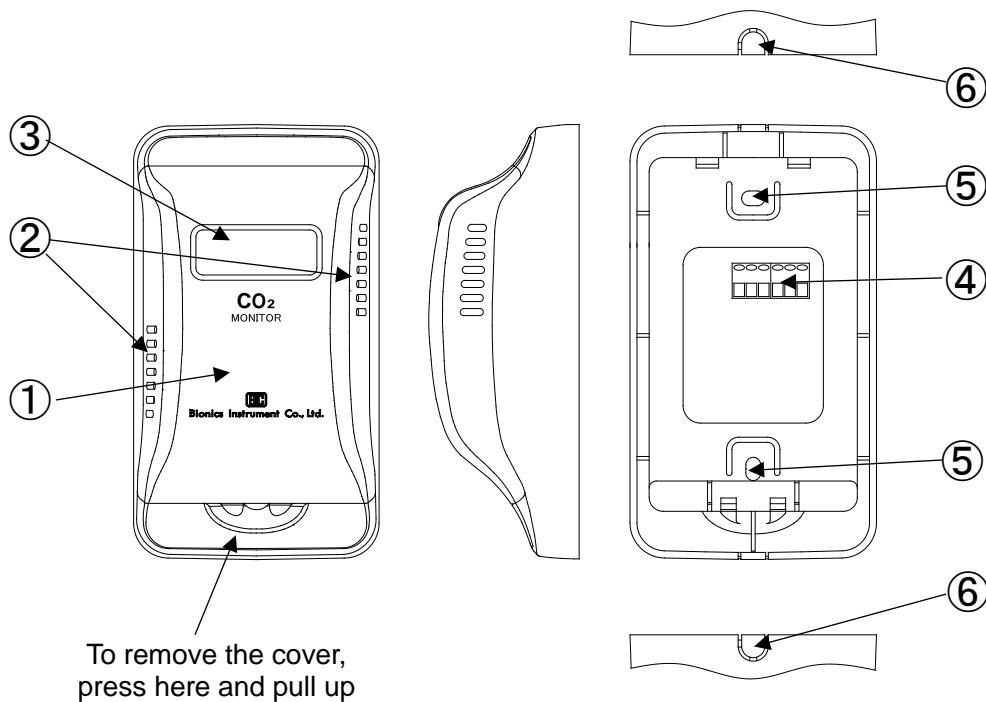
Table of Content

1. Introduction

This is a CO_2 monitor for ambient air, indicates the concentration and outputs DC4-20 mA in proportion to the concentration. And also, this monitor is able to activate the relay contact in the detecting range.

2. Component Identification

To remove the cover,
press here and pull up

①. Cover

It is cover of monitor.

To remove the cover, press bottom and pull up.

There are various setting switches on the circuit board inside the monitor

②. Ventilation slit

These slits allow gas to enter the inside of the device.

③. LCD Display

This indicates measured and setting concentrations.

④. Wiring terminal connector

This is a terminal block for connecting wire such as power supply and analog output, etc.
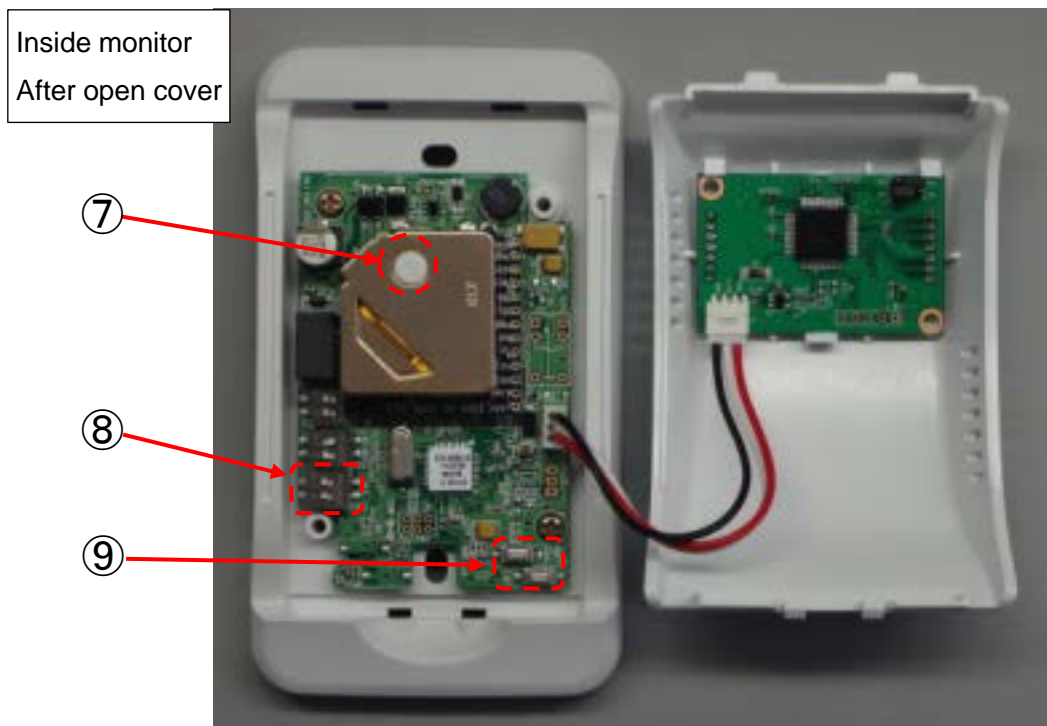
⑤. Mounting holes

These are mounting holes used when mounting the monitor to a wall.

⑥. Wiring knockout

This is a hole for passing electric cable when wiring along a wall.

It has a knockout structure so that holes can be easily made.

Inside monitor
After open cover

⑦. Gas sensing part

This is the gas sensing part in the sensor that monitors gas.

When you inspect by a check gas, expose the gas to this part.

⑧.Calibration mode selection switch SW3

This switch is used to select the calibration mode.

Please refer "Section 7. Calibration".

⑨. Up Key SW4 and Down Key SW5

These switches are used to increase and decrease value when change the relay setting.

Please refer "Section 6. Operation – Alarm setting".

3. Specification

Model : TX-1300EM-L / M / H
Target gas : Carbon dioxide（CO_2）
Gas measurement method : Diffusion type
Installation location : Indoor
Monitor installation : Wall mount
Measurement principle : Non-dispersive infrared (NDIR)
Display : 5 digits LCD
Measurement range : L : 5,000ppm
（Full scale） M : 20,000ppm
H : 10%
Measurement accuracy : Full scale ± 5 %
Response time (T90) : Within 30 seconds
Measurement interval : 3 sec.
Analog output : DC4～20mA（Max. Resistive load 500Ω）
scaling output for concentration 0 to full scale
Alarm contact output : 1 point, Dry 1a (1A 120VAC / 1A 24VDC)
Alarm operation : Upper limit operation, Non-latching
Alarm setting amount : TX-1300EM-L
High : 1,000ppm Activate alarm when reach
Low : 900ppm Deactivate alarm when reach
TX-1300EM-M
High : 5,000ppm Activate alarm when reach
Low : 4,500ppm Deactivate alarm when reach
TX-1300EM-H
High : 2.00% Activate alarm when reach
Low : 1.80% Deactivate alarm when reach
＊ Alarm setting amounts are adjustable.
Power : DC24V / AC24V（50/60Hz）±10%
Power consumption : 420mW
Warm-up time : Over 1 min.
Operating temperature range : -10～60℃（no sudden temperature change）
Operating humidity range : 0～99%RH (no condensation or sudden humidity change)
Operating pressure range : Atmosphere±10%
Vibration : No vibration
Dimension : 70(W)×124(H)×43(D) mm
Mounting dimension : 77(H) ±0.3 mm by M4 screw
Weight : Approx. 115g
Estimate monitor life : Approx. 5 years
Warranty : 1 year from shipping date (Under normal condition)

4．**Wiring**

Terminal block J1 for wiring connection is located on the rear of the monitor.

Please wire before mount the monitor on wall.

For wiring connection, refer "10. Wiring drawing" and the following specification of terminal block.

* After wiring, please check there is no mistake in wiring.

Specification of terminal block J1

Connection method	: Clamp cage specification screw connection method
Applicable wire	: 0.2 to 1.5mm^2
Wire strip length	: 6mm
Screw tightening torque	: 0.2N・m
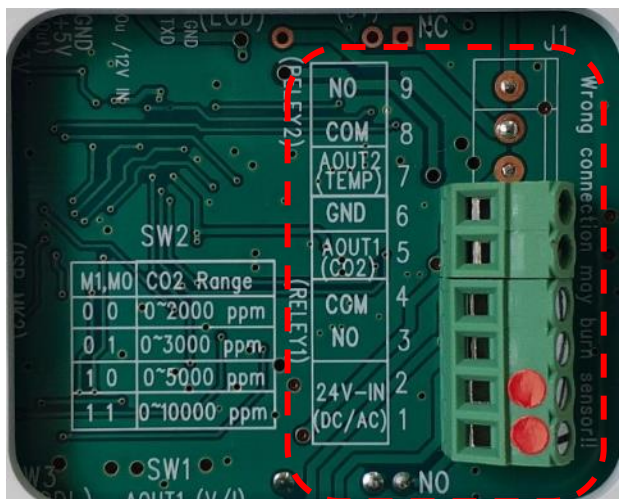
● Wiring can be done through the inside of the wall or along the wall using knockouts for wiring.

● When using knockouts for wiring, select wires that match the dimensions of the knockout holes.　　* Refer to 11. Dimensional drawing.
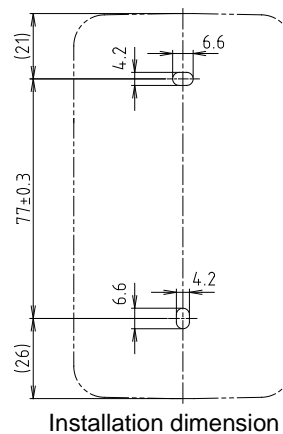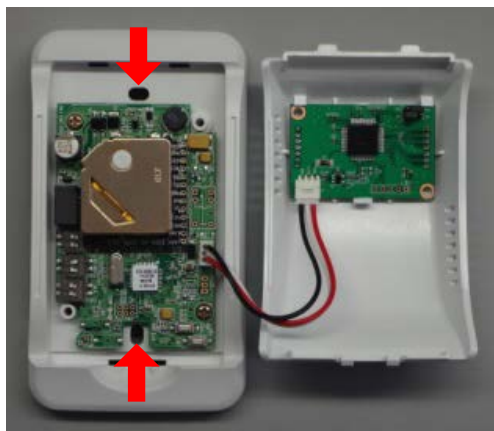
5. Installation

Installation of monitor

Use the two mounting holes (long holes) indicated by the arrows in the figure on the following to firmly fix the product to the wall.

The size of long holes is 4.2 mm wide and 6.6 long.

* Refer to 11. Dimensional Drawing

Please use M4 screws.

* Screws larger than M4 cannot be used.

Installation dimension

Installation location

- Please install the monitor on the place that meet the using environment conditions and is able to measure target CO_2 concentration purpose.

  If you use this monitor as gas leak detector, please consider installation in locations where gas leakage is anticipated (near pipe joints and branch joints) and other locations where faster detection is possible.

- CO_2 is heavier than air, so installing it in a low location is effective. But please consider the effect of the air current.

 * Near the floor (about from the waist down) - Specific gravity of CO_2: 1.529

- High concentrations of water vapor can affect detection performance. Please install with caution.

- Avoid to use the place there is potential to occur condensation.

- Please avoid to install the monitor nearby the place where interfere the air current for measuring like a doors, windows or ventilation systems etc.

* NOTICE *

Don't block the ventilation slit.

The monitor will not measure the CO_2 properly.
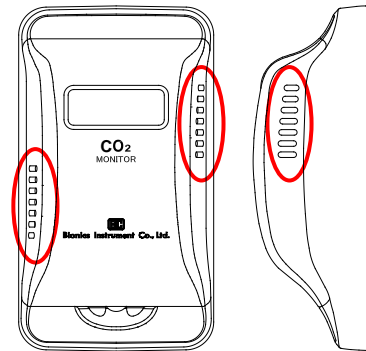
6. Operation

Starting up

The operation of monitor will be started after supply DC24V/AC24V.

Make sure to wait over 1min. for warming up after start-up.
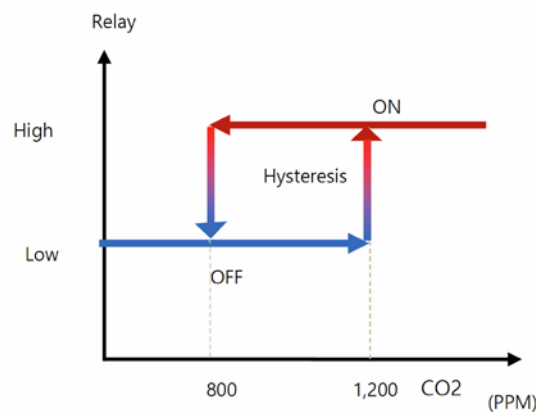
* During warming up time, it has potential to become unstable indicated concentration and it occurs analog output fluctuation or activate the alarm contact output.

Alarm setting

Explanation for alarm contact operation.

The alarm contact will be activated when be higher than the upper limiter (High), and deactivated when be lower than the lower limiter (Low).
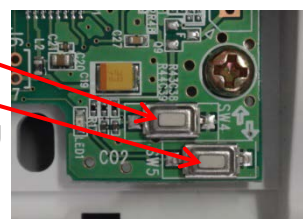
Changing alarm setting amount

Up key SW4
Down key SW5

1. Change upper limiter（High）

  ①. Push and hold Up key SW4 over 2 sec. to indicate setting screen.

  ②. The indicated value in LCD display will be blinked when setting screen.

  ③. Adjust setting value on LCD by Up key SW4 / Down key SW5.

  ④. Push Up key SW4 and Down key SW5 at the same timing over 0.5 sec. to finish adjustment.

2. Change lower limiter（Low）

  ①. Push and hold Down key SW5 over 2 sec. to indicate setting screen.

  ②. The indicated value in LCD display will be blinked when setting screen.

  ③. Adjust setting value on LCD by Up key SW4 / Down key SW5.

  ④. Push Up key SW4 and Down key SW5 at the same timing over 0.5 sec. to finish adjustment.

7. Calibration

Please use Calibration mode selection switch SW3 that located in the following photo.


SW3
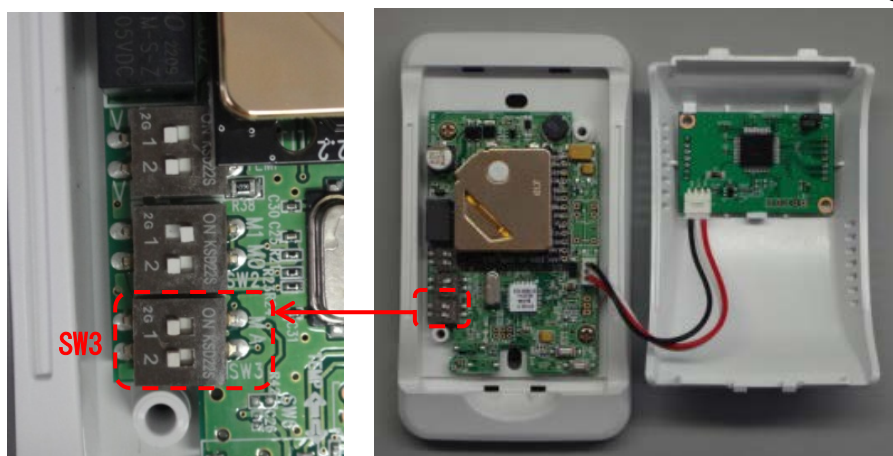
Manual easy calibration mode (Recommend)

This mode is manual easy calibration mode on the premise that ambient air is clean and CO2 concentration 400 ppm (Natural atmospheric environment).

Procedure

①. The environment of around the monitor should be clean environment with a CO_2 400 ppm (Natural atmosphere environment).

   * Should not change the CO2 concentration 400 ppm during calibration.

②. Remove the cover and change No.1 of Calibration mode selection switch SW3 to ON (Right side: Manual calibration mode).
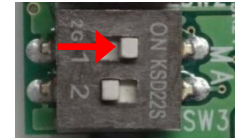
③. Keep away from monitor and wait 11 min.

   * If person is in near the monitor, CO_2 concentration may be changed. Please leave from monitor for proper calibration.

④. After 11 min. waiting, the monitor calibrates automatically to 400 ppm.

⑤. After calibration, change Calibration mode selection switch SW3 to OFF (Left side: Normal operation mode), and put the cover.

Auto easy calibration mode

   * Use auto calibration mode only when control room air quality.

Procedure

①. Power off the monitor

②. Remove the cover and No.2 of Calibration mode selection switch SW3 to ON (Right side: (Auto calibration mode).

③. Supply power to the monitor

④. The auto calibration will be done the following schedule.

   1st calibration   : After 2 days from power ON

   2nd calibration   : After 5 days from 1st Calibration

   After 2nd calibration : Every 7 days

8. Periodical maintenance
(Once per a half year at least)

This is operation check by check gas.

Gas sensing part
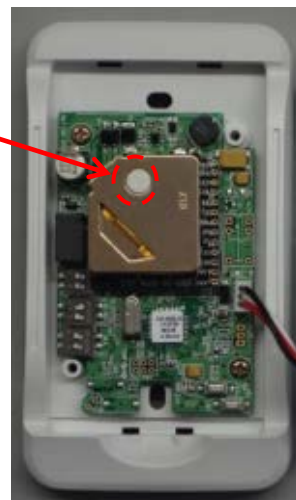
< Check procedure >

①. Remove the cover

②. Expose the check gas with concentration equivalent to full scale to gas sensing part exceeding the alarm (High) setting concentration.

③. Check to operate relay output / analog output by controller or PLC, etc.

④. Put the cover

< Notes in maintenance >

The alarm will be activated if you take this maintenance, and relay contact output and analog output will be activated also.
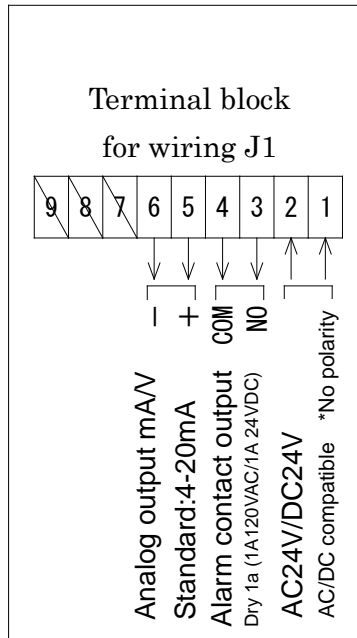
If the usage or connection method is such that an alarm will cause the refrigerator or other system to stop, please be careful not to affect the operation of connected equipment, such as by setting the equipment not to stop even if the relay contact output or analog output is operating.
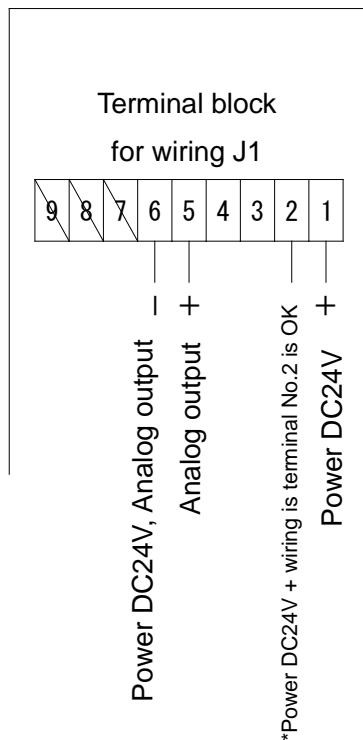
9. Usage notices

● This is not analyzer, so strict measuring/recording or traceability is incompatible.

Please avoid using the product in a way that may cause damage to persons or property based on the measurement data.

● This product must be calibrated (automatically or manually) at appropriate intervals.

● Please contact our sales representative for information on calibration services for the CO_2 sensor of this product.

● This product should be used within the range of -10°C to +60°C and 0% to 99% RH.

Please be careful as water droplets due to condensation or other reasons may cause malfunction or damage.

● The strong shocks or vibrations may break the PCB.

● The board is equipped with semiconductor components, which may be damaged or broken by static electricity. Please be careful not to touch it directly.

● Warranty is 1 year from date of shipping.

10. Wiring drawing

Rear of the monitor

Terminal block
for wiring J1

| 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |

- Analog output mA/V Standard:4-20mA (6: −, 5: +)
- Alarm contact output Dry 1a (1A120VAC/1A 24VDC) (4: COM, 3: NO)
- AC24V/DC24V AC/DC compatible *No polarity (2, 1)

Power & Analog output
Wiring for 3 wire

Terminal block
for wiring J1

| 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |

- Power DC24V, Analog output −
- Analog output +
- *Power DC24V + wiring is terminal No.2 is OK
- Power DC24V +

Power & Analog output
Wiring for 4 wire

Terminal block
for wiring J1

| 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |

- Analog output −
- Analog output +
- AC24V/DC24V AC/DC compatible *No polarity

11. Dimentional drawing

LCD Display

70

43

124

CO₂
MONITOR

Bionics Instrument Co., Ltd.

Knock out for wiring

R4.3

7.5

8.6

Mounting hole

Terminal
block
for wiring

Mounting
hole

8.6

7.5

R4.3

Knock out for wiring

Drawing for mounting hole

(21)

4.2

6.6

77±0.3

6.6

4.2

(26)