PT2E-3381



# CO<sub>2</sub> Monitor CO<sub>2</sub>RK-Lite

**Operating Manual** 

# **RIKEN KEIKI Co., Ltd.**

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# 1Product Overview

## **1-1. Introduction**

Thank you for purchasing the CO<sub>2</sub>RK-Lite ("the product" hereinafter).

This operating manual describes how to use the product correctly. Make sure you read and fully understand all the information provided in this operating manual before use.

The contents of this operating manual are subject to change without notice to allow product improvements. Any unauthorized duplication or reproduction of this operating manual is prohibited, whether in whole or in part.

Regardless of the warranty period, Riken Keiki does not accept any liability for accidents or damage resulting from use of the product.

Be sure to read the warranty policy set forth on the warranty.

## 1-2. Intended use

The product is designed to monitor carbon dioxide concentrations in indoor environments. The product displays carbon dioxide concentrations on the LCD screen and alerts the user via the LCD screen color (green, orange, or red) and a buzzer if carbon dioxide concentrations reach alarm setpoints set within the detection range (ventilation notification concentrations).

The product incorporates a nondispersive infrared absorption (NDIR) sensor. The sensor reacts directly to carbon dioxide concentrations within indoor environments. It adopts a measurement principle unaffected by interference from sterilizing alcohol such as ethanol.

The product is available in both Bluetooth® and non-Bluetooth® models. The Bluetooth® model allows viewing of carbon dioxide concentrations on the app screen of smartphones or other devices. Check the markings on the model as described in '1-4. Checking markings' to confirm the product version before use.

The product is not an analyzer designed to perform quantitative analysis/measurement or qualitative analysis of gases. Use it appropriately for your intended purposes.

## 1-3. DANGER, WARNING, CAUTION, and NOTE

This operating manual uses the following categories to indicate potential damage/hazards if the user disregards the information provided and uses the product incorrectly:

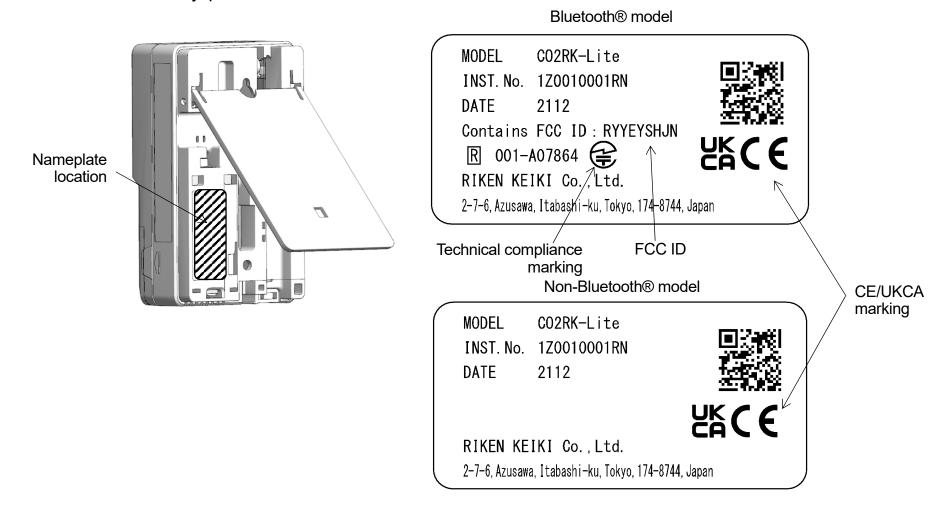
This indicates situations in which improper handling may result in fatal or serious injury or significant property damage.
This indicates situations in which improper handling may result in serious injury or significant property damage.
This indicates situations in which improper handling may result in minor injury or minor property damage.

Additionally, usage recommendations are indicated as follows:

NOTE	This indicates items that will be helpful to know when using the product.
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## 1-4. Checking markings

The nameplate affixed to the product provides various markings (CE/UKCA marking, FCC ID, technical compliance marking). Check the actual product specifications before use. For CE/UKCA marking models, please refer to the 'Declaration of Conformity' provided at the end of this manual.



## 2

# **Important Safety Information**

To maintain product performance and to ensure safe use, always observe the following WARNING and CAUTION instructions:

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- If an abnormality is discovered in the product, contact Riken Keiki immediately. Visit our website for information on the nearest Riken Keiki office.
  - Website: https://www.rikenkeiki.co.jp/

## 2-1. Warning information

## WARNING

- Do not pull, clamp, twist, or otherwise apply stress to the cable.
- Do not disassemble or modify the product. Any attempt to disassemble or modify the product will void product performance guarantees.
- Use the product only as described in this operating manual.
- Do not use the product with control devices or other equipment.
- Use the AC adapter provided.
- The product is available in both Bluetooth® and non-Bluetooth® models.
  For information on Bluetooth® wireless communication, refer to '2-3. Radio law certification'.

## 2-2. Caution information

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- Do not use walkie-talkies or other radio transmitting devices near the product or its cables. Use of such devices near the product may affect measurements.
- The product may not function correctly if the power is turned on once again within five seconds after turning it off.
- Do not poke the sensor or buzzer sound opening with sharp or pointed items. Doing so may result in malfunctions or damage to the product, preventing accurate measurements.
- Do not allow the product to come into contact with water. Do not install the product in locations where it may be exposed to water. The product is not waterproof or splashproof. Exposure to water will result in malfunctions.
- The product is a precision device. Do not subject the product to strong impact or vibration such as by dropping.
- Avoid contact with internal components after opening the case.
- Do not block the sensor vent.

## 2-3. Radio law certification

This product is certified as complying with radio laws in individual countries and regions as follows.

The following actions are prohibited by radio laws. The user and/or retailer may be subject to punishment if prohibited actions are committed.

- Use in countries or regions in which radio law certification has not been obtained
- · Sale in countries or regions in which radio law certification has not been obtained
- Disassembly or modification of the product
- · Removal of certification labels from the product

If this product is used aboard marine vessels, the radio laws of the country bordering the territorial waters shall apply. In such cases, use shall be prohibited in countries or regions in which radio law certification has not been obtained. Check to confirm that industrial, scientific, and medical equipment (e.g., microwave ovens), on-premises radio stations for mobile identification used in plant manufacturing lines (radio stations requiring a license), and specified low-power radio stations are not operated in the frequency band (2.4 GHz) used by the product. If the product causes radio interference to a radio station for mobile identification, take measures to eliminate radio interference—for example, using the product in a different location or stopping radio emissions.

The countries where wireless communication can be used vary depending on the specifications.Please check the nameplate attached to the product.

Wireless specifications

Wireless	Protocol:	Bluetooth Low Energy
communication	Version:	Ver. 4.2
	Frequency:	2,402 - 2,480 MHz
	Modulation:	FSK
	Output:	Maximum 6 dBm

Radio law certification (Country/region)	Details
Radio Act (Japan)	This product contains radio equipment certified to comply with technical standards in accordance with the Radio Act. Accordingly, a radio station license is not required when using this product.
	Construction design certification number: 001-A07864 Wireless frequency: 2,402 MHz - 2,480 MHz Maximum wireless output: 6 dBm
RE Directive (EU Countries)	CE We declare that this equipment complies with the basic requirements of Directive 2014/53/EU and other relevant provisions. Connect to the network with radio waves of
	frequency 2.4 GHz band and maximum output 6dBm.
FCC compliance (United States)	This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.
	FCC CAUTION Changes or modifications not expressly approved by the party responsible for compliance

could void the user's authority to operate the equipment.

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment and meets the FCC radio frequency (RF) Exposure Guidelines. This equipment has very low levels of RF energy that is deemed to comply without testing of specific absorption rate (SAR).

## 2-4. Installation precautions

Be sure to observe the following precautions when installing the product. Failure to comply with these precautions may result in product failure or improper monitoring.

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The product is a precision device. The specified performance may not be achieved depending on the location (environment) in which the product is installed. Check the installation location environment and implement appropriate remedial measures where necessary.

Do not install the product in the following locations:

- Locations subject to direct sunlight or outdoors
- Locations exposed to water, oil, chemicals, or dust
- Locations exposed to drafts from air conditioning or other sources
- Locations exposed to soot, smoke, or steam
- Locations below 0 °C, over 40 °C, or subject to sudden temperature fluctuations
- Humid locations such as bathrooms or locations subject to condensation
- Poorly ventilated locations such as behind curtains or other objects
- · Locations where corrosive gas is present

#### NOTE

Keep the measurement unit away from doors, windows, and vents and at least 50 cm away from people.

\* Taken from Ministry of Health, Labour and Welfare 'Winter ventilation methods for improving poorly-ventilated enclosed spaces' (published November 27, 2020)

#### <Do not install the product in locations subject to vibration or impact.>

The product contains precision electronic components. Install the product in a stable location free of vibration, impact, and risk of falling.

#### <Do not install in locations exposed to water, oil, or chemicals.>

Avoid installing in locations where there is a risk of splashing water, oil, chemicals, or other liquids.

# <Do not install in locations where temperatures can fall below 0 °C or exceed 40 °C.>

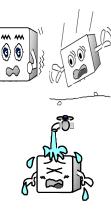
The operating temperature range for the product is between 0 °C and 40 °C. Install in a location where temperature is stable and does not exceed the operating temperature range during use.

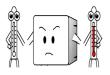
# <Do not install in locations subject to direct sunlight or sudden temperature changes.>

Avoid locations subject to direct sunlight or radiant heat (infrared radiation from hightemperature bodies) and locations subject to sudden temperature changes. Condensation may form inside the product, or the product may be unable to adjust to sudden temperature fluctuations.

#### <Install away from noise-emitting devices (main unit and cables).>

Avoid installing in locations where high-frequency or high-voltage devices are present.









# **Product Configuration**

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## 3-1. Main unit and standard accessories

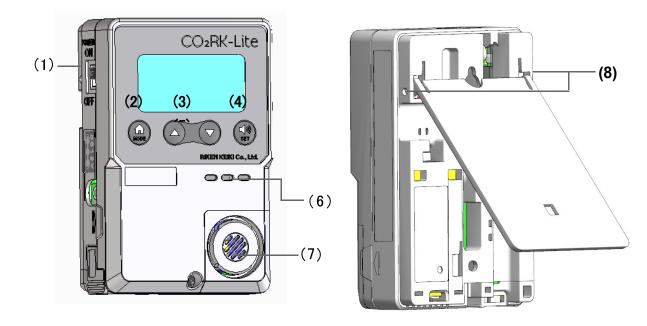
Unpack and check the product and accessories. If anything is missing, contact Riken Keiki.

#### <Main unit and standard accessories>

Main unit	Standard accessories			
CO2RK-Lite	AC adapter			
		Inspection report: ×1	Product warranty: ×1	Operating manual: ×1

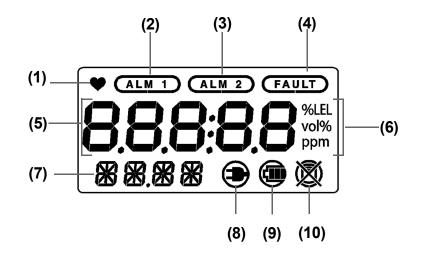
## **3-2.** Part names and functions

This section describes the names and functions of the various parts of the product and the LCD display.



Name		Main function		
(1)	Power switch	Turns the power on and off. Slide upward to turn the power on, and slide downward to turn the power off.		
(2)	MODE button	Use this button to cancel a setting while making settings.		
(3) $\triangle$ button Used to select the PEAK/1st alarm value/2nd alarm value display Used to select the screen when making settings and to increment input values				
(4)	∇ button	Used to select the screen when making settings and to decrement input values		
(5)	SET button	Used to confirm a setting when making settings		
(6)	Buzzer sound opening Emits operating and judgment sounds. (Do not block.)			
(7)	Sensor	Detects the detection target gas. The sensor is located behind the cover. (Do not block.)		
(8)	Stand attachment holes	Used to insert and secure the stand		

## 3-3. Display



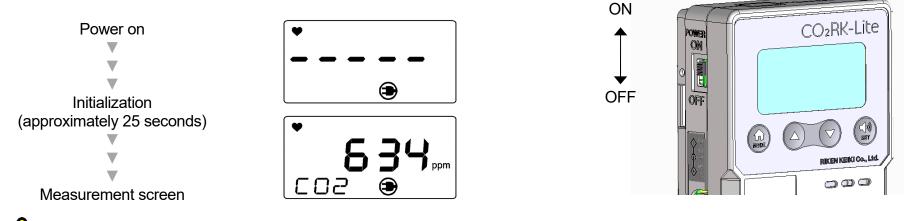
	Name	Main function
(1)	Operating status icon	Indicates the operation status. Blinks when normal.
(2)	1st alarm icon	Lights up or blinks when a 1st alarm occurs.
(3)	2nd alarm icon	Lights up or blinks when a 2nd alarm occurs.
(4)	Fault alarm icon	Lights up when a fault alarm occurs.

(5)	Concentration display Maintenance display	Displays carbon dioxide concentrations. Displays maintenance items when making settings.
(6) Units display Displays the units (ppm).		Displays the units (ppm).
		Displays the gas name. [CO2] is displayed. Displays item names when making settings.
(8) Power supply indication Lights up when the power		Lights up when the power is turned on.
(9)	Not used with this product	
(10) Buzzer on/off icon Lights up when the buzzer is turned		Lights up when the buzzer is turned off (muted).

# 4 Usage Instructions

## 4-1. Turning the power on and off

- Before turning on the power switch, check to confirm that the product has been correctly installed.
- Slide the power switch up to turn on and down to turn off.



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- Never turn the power off during initialization. Doing so may result in malfunctions.
- When using the product for the first time or after storing for extended periods, place outdoors or in a wellventilated location with the power turned on for at least 24 hours to allow time for the automatic adjustment function to activate.

## 4-2. Checking the carbon dioxide concentration (LCD display)

The measurement screen displays the carbon dioxide concentration on the LCD.

The product is capable of monitoring carbon dioxide at concentrations from 400 ppm to 5,000 ppm.

If the concentration is below 400 ppm, the display will remain fixed at 400 ppm. Likewise, if the concentration exceeds 5,000 ppm, the display will remain fixed at 5,000 ppm.

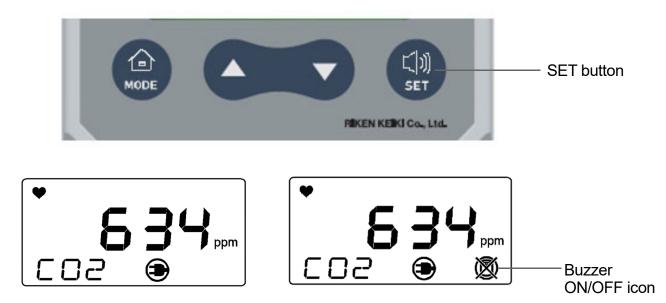


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- Atmospheric carbon dioxide concentrations outdoors may vary from region to region. Readings will constantly fluctuate within the range from 400 ppm to 450 ppm. A constant carbon dioxide concentration reading may indicate a product malfunction.
- To confirm that the product is operating correctly, expose to outdoor air out of direct sunlight, wind and rain, dust, or human exhaled breath. The product can be assumed to be operating correctly if the carbon dioxide concentration is within the range from 400 ppm to 450 ppm after five to ten minutes.

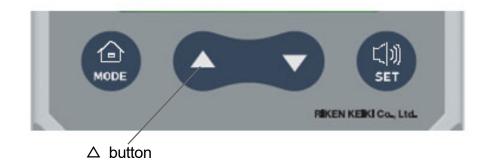
### 4-3. Turning the buzzer on and off

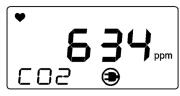
Hold down the SET button for at least three seconds to turn off (mute) or on (unmute) the buzzer. Once the buzzer is turned on or off, this state is retained even when the power is turned off.



### 4-4. Checking the peak reading and changing alarm setpoints

Use the  $\triangle$  button to check and clear the peak value, check and alter the 1st alarm setpoint, check and alter the 2nd alarm setpoint, and to select individual screens. The default concentration for the 1st alarm setpoint is 1,000 ppm, based on the Building Environmental Sanitation Management Standards (JAPAN). The default concentration for the 2nd alarm setpoint is 1,500 ppm, based on the School Environmental Sanitation Management Standards (JAPAN). The default concentration for the 2nd alarm setpoint is 1,500 ppm, based on the School Environmental Sanitation Management Standards (JAPAN). These alarm setpoints can be changed according to each country or customer's standard.





Measurement screen

Press the  $\Delta$  button to select the peak value confirmation screen.





Peak value confirmation screen

Press the  $\Delta$  button to select the 1st alarm setpoint confirmation screen.

Hold down the SET button for at least three seconds to clear the peak value currently saved.

The peak value is also cleared when the power is turned off.

1st alarm setpoint confirmation screen

Press the  $\Delta$  button to select the 2nd alarm setpoint confirmation screen.

Press the SET button. The value will blink to indicate the 1st alarm setpoint can be altered.

Press the SET button while the value is blinking to enter and save the value.

2nd alarm setpoint confirmation screen

Press the  $\Delta$  button to return to the measurement screen.

Press the SET button. The value will blink to indicate the 2nd alarm setpoint can be altered.

Press the SET button while the value is blinking to enter and save the value.

## 5 Functions

## 5-1. Alarm activation (Ventilation alert function)

The product notifies the user via the following alarm indications when carbon dioxide concentrations reach the values set for the alarm setpoints:



<When 1st alarm setpoint is exceeded>

- The LCD backlight lights up in orange.
- The [ALM1] icon at the top of the LCD blinks.
- The buzzer blips twice.
- \* Press any button to stop just the buzzer.



<When 2nd alarm setpoint is exceeded>

- The LCD backlight lights up in red.
- The [ALM1] and [ALM2] icons at the top of the LCD blink.
- The buzzer blips three times.
- \* Press any button to stop just the buzzer.

The alarm will be automatically reset once the carbon dioxide concentration falls below the reset concentration (50 ppm below the concentration set as the alarm setpoint).

## 5-2. Fault alarm activation

The following alarm indications are triggered if a product abnormality is detected.

An error message will appear on the LCD. Check the error message and take the appropriate corrective action.



<When a fault is detected>

- The LCD backlight lights up in red.
- The [FAULT] icon blinks at the top of the LCD.
- The buzzer blips three times.

\* Press any button to stop just the buzzer.

After the product has successfully recovered from the fault, it restarts with the process normally performed right after it is turned on (initialization).

If the problem lies with the product and the fault occurs repeatedly, contact Riken Keiki immediately.

#### NOTE

For more information on malfunctions (error messages), refer to '7. Troubleshooting'.

## **5-3.** Automatic adjustment function

The product features an automatic adjustment function that corrects sensor output fluctuations over time. This records the lowest carbon dioxide concentration measured during the 24-hour period since the product was turned on. It corrects this to correspond to a 420 ppm carbon dioxide concentration in the outdoor atmosphere. If the power is subsequently left on, the lowest carbon dioxide concentration measured during the next seven-day period is recorded. This value is corrected to correspond to a 420 ppm carbon dioxide concentration in the outdoor atmosphere.

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- The outdoor atmospheric carbon dioxide concentration may vary from region to region but is normally within the range from 400 ppm to 450 ppm.
- The product must be installed in a location where the carbon dioxide concentration of the indoor air falls to approximately the same 420 ppm as the outdoor air at night, such as at weekends. If the lowest carbon dioxide concentration is not 420 ppm during this period, this difference will be regarded as the margin of error.
- The automatic adjustment function will not operate reliably if the power is turned on and off frequently.
- To correct sensor output fluctuations over time, turn off the power, then turn the power back on to activate the automatic adjustment function 24 hours later.
- If the product reading does not vary from 400 ppm in a room where several people are present or if the reading remains high (for example, over 1,000 ppm) where few people are present, the adjustment may not have occurred. Turn off the power, then turn the power back on again to activate the automatic adjustment function 24 hours later.

## 5-4. Smartphone app

The product uses Bluetooth® to allow monitoring of carbon dioxide concentrations from a smartphone. Download and install the dedicated free RK Link app from Google Play or the App Store to use this function.

RK Link includes an email sending function using Gmail. A Google account (Gmail address) is required to use this. For more information, refer to the separate RK Link operating manual.



Google Play Store



Apple App Store

# 6 Storage and Disposal

### 6-1. Procedures for storage or when not in use for extended periods

The product must be stored in the following environment:

- At normal temperature and humidity in a location not exposed to strong light (e.g., direct sunlight)
- In a location free of gases, solvents, and vapors

Store the product in its shipping carton, if retained and available.

If the shipping carton is no longer available, store the product away from dust, etc.

#### 6-2. Product disposal

Dispose of the product as industrial waste (incombustible) in accordance with local regulations.

# 7 Troubleshooting

This troubleshooting section does not address causes of all problems that may occur with the product. It provides brief explanations to assist in determining the causes of common problems.

If you encounter symptoms not addressed here or if problems persist even after taking corrective action, contact Riken Keiki.

Symptom/display	Cause	Action
	The power switch is turned off.	Turn the power switch ON.
The power cannot	Cable abnormality (break, unconnected, short)	Check the wiring for this product and for related devices.
be turned on.	The AC adapter is defective.	The AC adapter must be replaced. Contact Riken Keiki.
	The AC adapter is not correctly connected.	Connect the AC adapter correctly.
Abnormal operation	Effects of radio waves, etc.	Turn off the power and restart. If similar symptoms recur frequently, take appropriate measures to address the noise source.

Symptom/display	Cause	Action
Sensor abnormality E-1 SENS	Sensor abnormality	A sensor abnormality has occurred. Contact Riken Keiki.
System abnormalityInternal ROM, RAM, orE-9 SYSTEMEEPROM abnormalities		Contact Riken Keiki.
	Sudden temperature fluctuations Install the product in a location free of sudden temper fluctuations, such as where exposed to air-conditionir drafts or open windows.	
The reading does not stabilize.	Carbon dioxide concentration fluctuations	Both heating equipment and human respiration generate high concentration carbon dioxide. Avoid installing in such locations.
	Effects of external noise	Microwave ovens and other large domestic electrical appliances may generate powerful electromagnetic radiation. Avoid installing in such locations.

# 8

# **Product Specifications**

## 8-1. Specifications list

Detection principle	Nondispersive infrared absorption method (NDIR)
Detection target gas	Carbon dioxide (CO <sub>2</sub> )
Detection range	400 - 5,000 ppm
Display accuracy	±50 ppm ± 5 % reading (standard conditions: 25 °C, 1 atmosphere)
(for identical conditions)	
Display function	LCD digital display (with 3-color backlight: green, orange, and red)
Alarm setpoints	1st: 1,000 ppm / 2nd: 1,500 ppm (default setting)
Alarm pattern	1st: Backlight lights up (orange), buzzer sounds
	2nd: Backlight lights up (red), buzzer sounds
	* By default, the buzzer is set to on.
Power source	100 - 240 V AC ± 10 %, 50/60 Hz
Power consumption	Maximum 5 VA (100 V AC), 8 VA (240 V AC)
Operating temperature range	0 - 40 °C (no sudden fluctuations)
Operating humidity range	Up to 90 %RH (no condensation)
External dimensions	Main unit: Approximately 80 (W) × 120 (H) × 38.5 (D) mm
Weight	Approximately 180 g

## 8-2. Product warranty

- 1. One year from date of purchase provided the product is used correctly and in accordance with the operating manual and all other warnings and instructions.
- 2. No after-sales maintenance or other service is provided for this product.
- 3. In the following cases, a fee will be charged for repairs or replacement, even within the warranty period:
  - (a) The defect or damage is as the result of erroneous operation, unwarranted repair, or modification.
  - (b) When faults or damages are due to the item being repaired or modified at service agencies other than RIKEN KEIKI or service agencies designated by RIKEN KEIKI.
  - (c) When the faults or damages are due to the item being incorrectly moved, transported, toppled, dropped, or stored after the product was purchased.
  - (d) When the faults or damages are due to external factors such as; acts of providence such as fire, earthquake, flood, lightning strikes, etc.; pollution; abnormal voltage; use of power sources outside of rated ranges (voltage, frequency); etc.
  - (e) When the cause of the fault is something other than this product.

## **Revision History**

Issue	Revision details	Issue date
0	First issue	November 12, 2021
1	Correction : CE Declaration of Conformity, Addition : UKCA Declaration of Conformity	July 11, 2022

Place: Tokyo, Japan

Jun. 29, 2022 Date:

Takakura Toshiyuki General manager Quality Control Center

<b>UK-Declaration of Conformity</b> Document No.: 320UK22071 Ne, RIKEN KEIKI Co., Ltd. 2-7-6, Azusawa, Itabashi-ku, Tokyo, 174-8744 Japan declare under our sole responsibility that the following product conforms to all the relevant provisions. Product Name: CO2 Monitor Model: CO2RK-Lite	UK-Declaration of Conformity Document No.: 320UK22071 So., Ltd. 2-7-6, Azusawa, Itabashi-ku, Tokyo, 174-8744 Japan responsibility that the following product conforms to ons. Product Name: CO2 Monitor Model: CO2RK-Lite	
Regulations	UK designated Standards	
Electromagnetic Compatibility Regulations 2016 (S.I. 2016/1091)	BS EN 50270:2015 BS EN IEC 61326-1:2021 BS EN IEC 61000-3-2:2019+A1:2021 BS EN 61000-3-3:2013+A1:2019	
The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012 (S.I. 2012/3032)	BS EN IEC 63000:2018	
Radio Equipment Regulations 2017 (S.I. 2017/1206)	BS EN 300 328 V2.2.2 BS EN 301 489-1 V2.2.3 BS EN 301 489-17 V3.2.4 BS EN 62479:2010	

Place: Tokyo, Japan

Date: May. 27, 2022

7. Sallalan

Takakura Toshiyuki General manager Quality Control Center

