RIKEN KEIKI

PT0E-2242

Portable Gas Leak Checker
SP-230 Series

SP-230 (Type F)
SP-230 (Type H2)

Operating Manual
(PT0-213)

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Product Overview

1-1. Introduction

Thank you for purchasing this SP-230 Series Portable Gas Leak Checker (“the product” hereinafter). Please confirm that the model number of the product you purchased matches the model number of the product covered by this manual.

The product should be used only by fully-trained personnel.
The maintenance procedures described in this manual should be performed only by fully-trained personnel. Any maintenance procedure not described in this manual must be performed by RIKEN KEIKI or our certified service engineers. Please contact RIKEN KEIKI.

This manual describes how to use the product and provides product specifications. Make sure you have read and fully understood the contents of this manual before using the product. This applies both to first-time users and those who have previously used the product.
Keep this manual in a handy place so that you can refer to it at any time.

The contents of this manual are subject to change without notice to allow product improvements. Any duplication or reproduction of this manual without permission 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 detect single gases, such as R600a or hydrogen, in the atmosphere.
The product is available in two models: Type F for detecting fluorocarbon gas leaks and Type H2 for detecting hydrogen leaks. The detection results are not intended to assure life or safety.

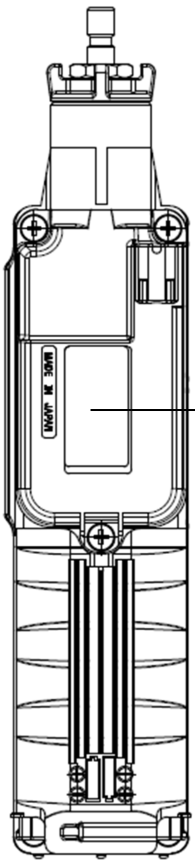
1-3. DANGER, WARNING, CAUTION, and NOTE

This manual uses the following headings to ensure safe and effective work:

⚠ **DANGER**	This indicates situations in which improper handling may result in fatal or serious injury to persons or serious damage to property.
⚠ **WARNING**	This indicates situations in which improper handling may result in serious injury to persons or serious damage to property.
⚠ **CAUTION**	This indicates situations in which improper handling may result in minor injury to persons or minor damage to property.
NOTE	This indicates handling tips.

1-4. Checking standards and explosion-proof specifications

The product specifications will vary depending on the specific standards and explosion-proof certification. Check actual product specifications before use.
To confirm the product specifications, check the nameplate affixed to the product as shown in the figure below.



① Typical nameplate for Japan Ex model

② Typical nameplate for CE/UKCA marking model

UKCA CE

* Either nameplate ① or ② shown above is affixed according to the explosion-proof specifications specified by the customer.

2

Important Safety Information

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

2-1. Danger information

DANGER

Explosion-proofing

- Do not modify or alter the circuitry or configuration.
  When using the product in hazardous areas, the following precautions must be observed to safeguard against static electricity hazards:
  ① Wear anti-static clothing and conductive shoes (anti-static work shoes).
  ② When using the product indoors, stand on a conductive work floor (with a leakage resistance of 10 MΩ or less).
- The ratings are as follows:

Power source:	3.0 V DC, 150 mA (Toshiba LR6 batteries × 2)
Ambient temperature:	-20 °C to +55 °C

Usage

- If measuring inside manholes or enclosed spaces, never lean over or look into the manhole or enclosed space. There is a danger that oxygen-deficient air or other gases may be discharged from such locations.
- High-concentration (100 %LEL or higher) gas may be discharged from the product gas outlet. Be sure to maintain a safe distance from flame sources.

2-2. Warning information

WARNING

If an abnormality occurs

- 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/

Sampling point pressure

- The product is designed to draw in gas at atmospheric pressure. There is a danger that target gas may leak from inside the product if an excessive pressure is applied to the gas inlet or gas outlet of the product. Be careful to avoid excessive pressure during use.

Fresh air adjustment in surrounding atmosphere

- When fresh air adjustment is performed in the atmosphere, check the atmosphere for freshness before starting.
  The presence of miscellaneous gases will make it impossible to adjust the product correctly, resulting in the danger of erroneous detection when actual gas leaks occur.

Action when a gas alarm occurs

- A gas alarm indicates an extreme hazard. The user must take appropriate action after taking appropriate steps to ensure safety.

Battery level check

- Check battery levels before using the product. The batteries may be depleted when the product is used for the first time or after extended periods without use. Replace the batteries with new ones before use.
- If a low battery voltage alarm occurs, gas cannot be detected. If the alarm is issued during use, turn off the power and promptly replace the batteries in a safe place.

Miscellaneous

- Do not dispose of the product into fire.
- Do not attempt to wash the product, either in a washing machine or an ultrasonic cleaning machine.
- There is a danger that oxygen-deficient air or other gases may be discharged from enclosed locations. Never lean over or look inside openings.

2-3. Caution information

CAUTION

- Do not use the product in locations where it may be exposed to oil or chemicals, etc.
  - Avoid using the product in locations where the product may be splashed with liquids such as oil and chemicals.
  - Do not place the product in locations where water or dirt accumulates. Placing the product in such locations may cause malfunction due to water or dirt ingress into the gas inlet or other openings.
- The gas inlet and outlet are not waterproof. Take care to prevent water such as rainwater from entering these parts. Failure to do so may prevent gas detection.
- The product is waterproof against freshwater and tap water. It is not waterproof against hot water, saltwater, detergent, chemicals, or perspiration.
- Avoid deliberately submerging the product in water.
- The sensor sensitivity will be significantly reduced if dirty water, dust, or metal particles are drawn in. Take care when using in such environments.
- If the product has been exposed to water or dirt, remove the water or dirt, and adjust as specified to confirm that it operates correctly.
- Do not use the product in locations where the temperature exceeds the range of operating temperatures.
  - The operating temperature range for the product is between -20 °C and +55 °C. Avoid using the product at high temperatures, high humidity, high pressures, or low temperatures outside the operating range.
  - Avoid using the product for extended periods in locations where it is exposed to direct sunlight.
  - Avoid storing the product inside parked vehicles in hot weather.
  - Avoid sudden humidity and temperature fluctuations.
  - Do not leave the product in hot, humid locations for extended periods. Doing so may impair product performance.
- Adhere to the operating humidity range to prevent condensation forming inside the product. Condensation forming inside the product or tapered nozzle may cause clogging or gas adsorption, which may prevent accurate gas detection. Condensation must be avoided at all costs. In addition to the usage environment, carefully monitor the temperature and humidity of the sampling point to prevent condensation forming inside the product or tapered nozzle.
- Do not use walkie-talkies near the product.
  - Radio waves from walkie-talkies or other radio wave transmitting devices near the product may affect readings. If walkie-talkies or other radio wave transmitting devices are used, these must be used away from the product where they do not affect operation.
  - Do not use the product near devices that emit strong electromagnetic radiation (high-frequency or high-voltage devices).
- Keep the product away from magnetic fields.
  Magnetic fields may cause the product to fail or malfunction. If the product does not operate correctly, use it away from magnetic fields.
- Verify that the operation status display is blinking before using the product.
  If the operation status display is not blinking, gas cannot be detected properly.
- Correct gas measurement is not possible if the flow confirmation icon is not rotating. Check to confirm flow.
- Be sure to perform regular maintenance.
  The product must be maintained regularly to ensure safety. Continuing to use the product without maintaining it will result in sensor sensitivity variations, preventing accurate gas detection.

CAUTION

Miscellaneous

- The gas alarm may remain active following continuous contact with gas or after contact with high-concentration gas. If this occurs, draw in fresh air for at least five minutes (recommended), then repeat fresh air adjustment.
- Pressing buttons unnecessarily may change the settings, preventing alarms from activating correctly. Avoid performing any operations not described in this operating manual.
- Do not drop the product or subject it to impact. Doing so may degrade explosion-proof, waterproof, dustproof, and gas detection performance.
- An abnormality alarm may be triggered if the product is subjected to strong impact. If this occurs, turn the power off and then back on again, then confirm that the product functions correctly before use.
- The impact resistance of the product is not a guarantee against damage or failure. Dropping the product may affect readings. We recommend performing inspection including gas adjustment if it has been dropped.
- Do not remove the panel sheet on the LCD display. Doing so will impair waterproof and dustproof performance.
- The usage environment may include gases that adversely affect the device sensor. The product cannot be used in the presence of the following gases:
  ① High-concentration sulfides (e.g., H_2S, SO_2)
  ② Halogen gases (e.g., chlorine compounds)
  ③ Silicone (Si compounds)
  ④ High-concentration solvent gases
- Using the product in the presence of the gases listed in ① to ③ above (high-concentration sulfides, halogen gases, silicone, etc.) may lead to dramatically reduced sensor life, inaccurate readings, or other problems. Avoid using the device in such environments.
  If gas detection is performed in the presence of gases like silicone, be sure to check the gas sensitivity before any subsequent use of the device.
  Exposure to the gases mentioned in ④ above (high-concentration solvent gases) may result in cracks occurring in the device. Avoid contact with high-concentration solvent gases during use.

Battery replacement

- Always turn off the power for the product before replacing the batteries.
- When replacing the batteries, replace both with new batteries at the same time.
- Note the polarity of the batteries.

Usage

- The operating time will be reduced due to battery performance in cold environments.
- The response of the LCD display may slow at low temperatures.
- Always perform fresh air adjustment under conditions of pressure, temperature, and humidity similar to those in the operating environment and in fresh air.
  Wait for the reading to stabilize before performing fresh air adjustment.
- If there is a temperature difference of 15 °C or more between the storage and usage locations, turn on the power and allow the product to stand and acclimatize for about 10 minutes in an environment similar to the usage location before performing fresh air adjustment.
- When wiping the product clean, do not splash water on it or use organic solvents like alcohol and benzine. Doing so may discolor or damage the surfaces of the product.
- Even if the product is not used for extended periods, turn the power on at least once every six months to check pump suction (by running the product for approximately three minutes).
  Grease inside the pump motor may solidify and prevent operation if the product is not operated for extended periods.
- If you do not intend to use the product for extended periods, store with the batteries removed. Battery leaks may result in fire or injury.
- After a period of extended storage, be sure to perform fresh air adjustment before resuming use. For information on readjustment including fresh air adjustment, contact RIKEN KEIKI.

2-4. Important notes related to explosion resistance

Observe the following points to ensure performance as an explosion-proof product:

Product overview

- The SP-230 Portable Gas Leak Checker is a gas monitor designed to continuously detect combustible gases.
- Gas is drawn in by a built-in pump.
- Use only alkaline AA batteries (LR6T) manufactured by Toshiba as the power source.
- Do not replace the dry batteries in hazardous locations.

Explosion-proof construction	Intrinsically safe explosion-proof construction
Explosion-proof class	Ex ia IIC T4 Ga
Ambient temperature	-20°C to +55°C
Electrical specifications	Alkaline batteries: Toshiba LR6
Applicable standards	JNIOSH-TR-46-1: 2020 JNIOSH-TR-46-6: 2015

DANGER

- Be sure to replace the batteries in a safe place.
- Be sure to use only the specified batteries.

WARNING

- Do not disassemble or modify the product.
- Do not modify or alter the circuitry or configuration.
- This device is an explosion-proof product. Do not disassemble or modify any parts other than those specified.
- If the housing becomes damaged, stop using the device, and have it repaired.
- Do not replace the dry batteries in a hazardous area.
- When using the product in hazardous areas, take the following precautions to safeguard against static electricity hazards:
  ① Wear anti-static clothing and conductive shoes (anti-static work shoes).
  ② When using the product indoors, stand on a conductive work floor (with a leakage resistance of 10 MΩ or less).

INST. No. $\underbrace{0}_{A}\,\underbrace{0}_{B}\,\underbrace{0\,0\,0}_{C}\,\underbrace{0\,0\,0\,0\,0}_{D}\,\underbrace{0\,0}_{E}$

A: Year of manufacture (0 to 9)
B: Month of manufacture (1 to 9 for January to September, X for October, Y for November, Z for December)
C: Manufacturing lot
D: Serial number
E: Factory code

Manufacturer

RIKEN KEIKI

RIKEN KEIKI Co., Ltd.
2-7-6 Azusawa, Itabashi-ku, Tokyo, 174-8744, Japan
Website: https://www.rikenkeiki.co.jp/

3

Product Configuration

3-1. Main unit and accessories

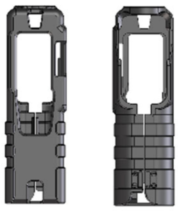
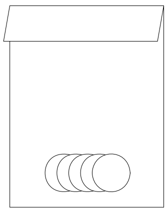
Open the box and packaging and inspect the product and accessories.
If anything is missing, contact RIKEN KEIKI.

Main unit

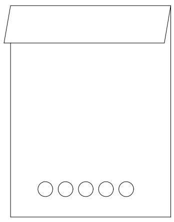
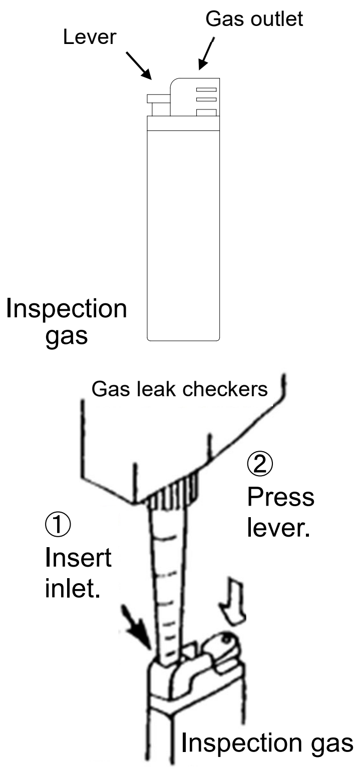
For detailed information on the names and functions of product parts and the LCD display, refer to ‘3-2. Part names and functions’ (p. 12).

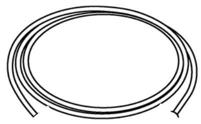
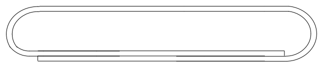
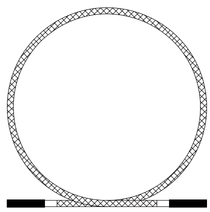
SP-230 main unit

Accessories

Protective cover		×1 (fitted)	AA Alkaline batteries		×2
Tapered nozzle		×1	Hand strap		×1
Replacement waterproof filters		1 bag (set of 5)	Operating Manual	–	×1
			Product warranty	–	×1

Optional accessories

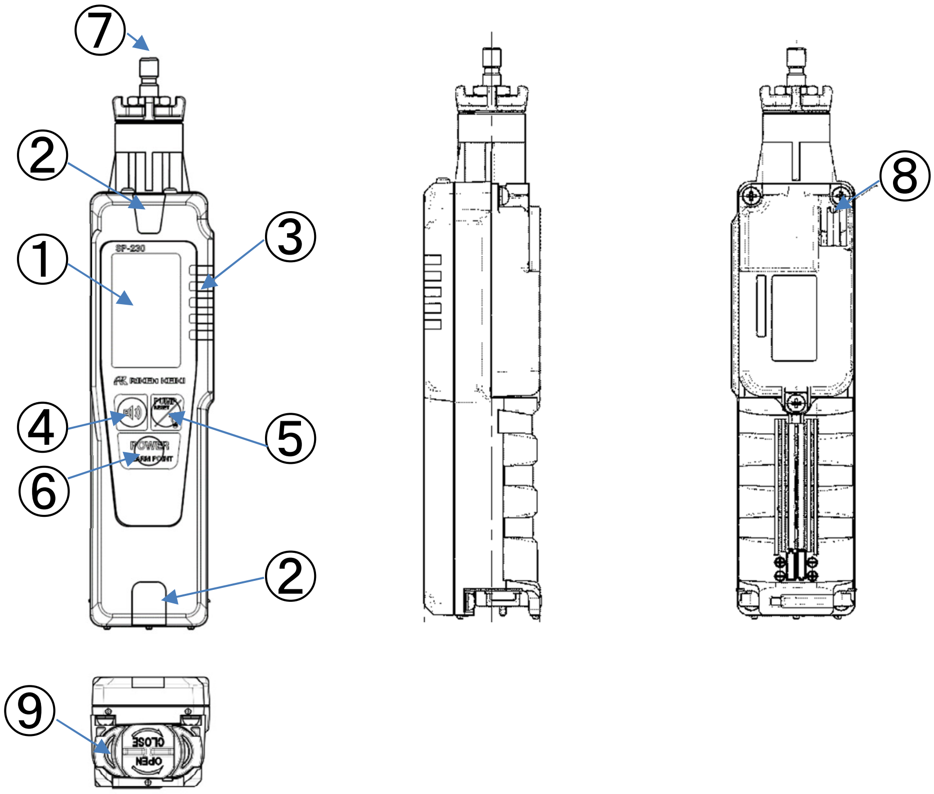
Filter (set of 5) Tertiary filter Low-density polyethylene		Filter to prevent foreign matter ingress when replacing the miscellaneous gas removal filter
Inspection gas		For checking gas response <Usage instructions> ① Turn on the power to the product, then insert the tip of the inlet into the gas outlet. ② Press the inspection gas lever, then check to confirm the product gas alarm activates. For information on alarm activation, refer to ‘5-6. Gas detection’ (p. 20). ③ After inspecting, draw in fresh air, then turn off the product power. Note: ・ Check to confirm that there are no naked flames or high-temperature devices in the vicinity before use. ・ After checking the product alarm activation, release the inspection gas lever to stop the gas feed. ・ The gas alarm may remain active following continuous contact with gas. If this occurs, draw in fresh air for at least five minutes (recommended), then repeat fresh air adjustment.

Inspection gas		Note: ・ Gas leak checkers in the vicinity may also come into contact with the gas. ・ Do not perform in a confined space.
Tube EPDM ⌀6 × ⌀3.5 × 500 mm		Attachment used for inserting annealed copper pipe into water heaters or other hot equipment.
Annealed copper pipe External ⌀4 × thickness 1 mm × length 60 cm		
Humidifier tube		Used for gas adjustment. Adds moisture to atmospheric air to adjust accuracy.

3-2. Part names and functions

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

Main unit

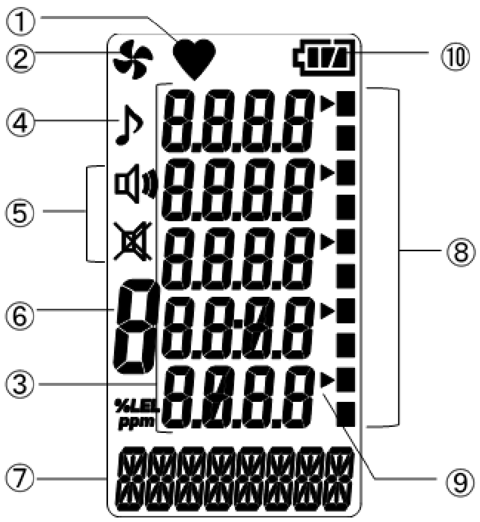


No.	Name	Function
①	LCD display	Displays gas concentration, gas name, alarms, and other information.
②	Alarm LED arrays	The LEDs flash or light up when an alarm occurs.
③	LED display	Red LED: Indicates the detection target gas concentration. Green LED: Indicates the alarm setpoints. Blinks while warming up.
④	Buzzer button	Toggles the operation tone and alarm sound on and off. Used to select the display mode and setting mode, and also to decrement input values.
⑤	PUMP RESET/Light button	Resets the pump operation when a low flow rate alarm occurs. Turns the light on and off. Used to select the display mode and setting mode, and also to increment input values.
⑥	POWER/ALARM POINT button	Turns the power on and off. Edits alarm setpoints. Used to select the display mode and setting mode, and also to confirm settings.
⑦	Gas inlet	Samples gas.
⑧	Gas outlet	Outlet for discharging gas drawn in (Do not block)
⑨	Battery cover	Remove when replacing the batteries.

CAUTION

- Do not remove the panel sheet on the LCD display. Doing so will impair waterproof and dustproof performance.
- Do not block the gas outlet or subject it to force.

LCD display



No.	Name	Function
①	Operating status icon	Indicates the operating status in detection mode. (When normal: Blinks.)
②	Flow confirmation icon	Indicates suction status. (When normal: Rotates.)
③	Gas concentration display	Displays the gas concentration and units.
④	Operation tone icon	Indicates the operation tone setting.
⑤	Alarm sound icons	Indicates the alarm sound setting.
⑥	Mode display	Indicates the measurement mode status.
⑦	Gas name/message display	Displays the gas name and function related messages.
⑧	Bar meter display	Displays the gas concentration level in the form of a bar meter.
⑨	Alarm setpoint display	Displays the alarm setpoints.
⑩	Battery level icon	Indicates the approximate battery level.

NOTE

- Approximate battery levels are indicated as follows:
  Sufficient
  Low
  Replace the batteries.
  The battery level icon will blink if the battery level drops even further.
- The operation tone icon indicates whether the operation tone is on or off as follows:
  Operation tone on
  Operation tone off
- The alarm sound icons indicate whether the alarm sound is on or off as follows:
  Alarm sound on
  Alarm sound off

4
Alarm Functions

4-1. Gas alarm activation

The product's "gas alarm" is triggered when the detected gas concentration reaches or exceeds the alarm setpoint. When the gas alarm triggers, the alarm lamp flashes, the buzzer sounds, and indications are given on the barometer and LED display. (Auto reset operation)

The frequency of the gas alarm lamp flashing and buzzer sounding varies depending on the detected concentration. The alarm switches to rapid intermittent operation as the detected concentration increases and signals/sounds continuously once the upper limit of the detection range is exceeded.

4-2. Fault alarm activation

The "fault alarm" is triggered if an abnormality is detected in the product. When the fault alarm triggers, the alarm lamp flashes and the buzzer sounds. (Self-latching)
When a fault alarm occurs, the following fault details are displayed on the LCD:

- System abnormality: [FAIL SYSTEM]
- Adjustment abnormality: [FAIL AIR CAL]
- Low flow rate: [FAIL LOW FLOW]
- Sensor abnormality: [FAIL SENSOR]
- Low battery voltage: [FAIL BATTERY]
- Clock abnormality: [FAIL CLOCK]
- Pump abnormality: [FAIL PUMP]

Alarm lamp	Repeated flashing at about 1-second intervals
Buzzer	Repeated intermittent beeps at about 1-second intervals "Blip-bleep, blip-bleep"
LCD display	Example display for low flow rate 

If a fault alarm occurs, determine the cause and take appropriate action.
If the problem lies with the product and the fault occurs repeatedly, contact RIKEN KEIKI immediately.

NOTE

- The low flow rate ([FAIL LOW FLOW]), adjustment abnormality ([FAIL AIR CAL]), and clock abnormality ([FAIL CLOCK]) alarms can be canceled by pressing the PUMP RESET/Light button.
- For more information on faults (error messages), refer to '10. Troubleshooting' (p. 46).

5

Usage Instructions

5-1. Usage note

The operating precautions apply to both users who have previously used the product and first-time users. Failure to comply with these precautions may result in failure of the product or inability to detect gas correctly.

5-2. Preparing startup

WARNING

- Protective film is attached to the LCD display on the product to protect it against scratching during shipping.
  Be sure to peel off this protective film before using the product. Explosion-proofing performance cannot be met if the protective film is left attached.

Check the following before starting gas detection:

- Confirm that the protective film attached to the LCD display to protect it against scratching during shipping has been removed.
- Confirm that the batteries have been installed and the battery level is sufficient.
- Confirm that the tapered nozzle and filter are not dirty.
- Confirm that the tapered nozzle is not bent or split.
- Confirm that the nipple to which the tapered nozzle is attached is not loose.

5-3. Battery replacement

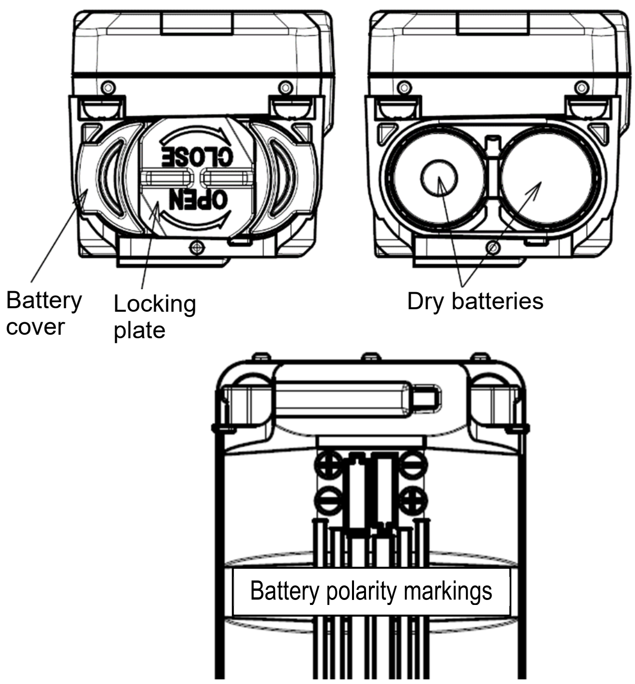
When using the product for the first time or if the battery level is low, install new AA alkaline batteries as follows:

1 **Confirm that the power for the product is turned off.**
If the power is on, turn off the power.

2 **Turn the locking plate counterclockwise, then open the battery cover.**

3 **Remove the old batteries, then insert new batteries noting the polarity.**

4 **Close the battery cover, then turn the locking plate clockwise.**



CAUTION

- Be sure to turn off the power for the product before replacing the batteries.
- Replace the batteries in a safe place.
- When replacing the batteries, replace both batteries with new ones at the same time.
- Note the polarity when replacing the batteries. Check the battery polarity marked on the product body. If the operator presses the POWER/ALARM POINT button after inserting the batteries with the incorrect polarity, the clock abnormality indication ([FAIL CLOCK]) will appear the next time the power is turned on (assuming the clock function is enabled). Cancel this by pressing the PUMP RESET/Light button to display the date and time setting screen. Refer to ‘7-2. Date and time setting’ (p. 35) and set the time and date.
- If the batteries are removed for at least five minutes, the clock abnormality ([FAIL CLOCK]) will be displayed the next time the power is turned on (assuming the clock function is enabled). Cancel this by pressing the PUMP RESET/Light button to display the date and time setting screen. Refer to ‘7-2. Date and time setting’ (p. 35) and set the time and date.
- If the battery cover is not fully locked, the dry batteries may fall out, or water may get in through the gaps. Water may also get in if minute foreign matter is trapped beneath the product body and the battery cover.

5-4. Startup procedure

When the power is turned on, self diagnosis is performed, and then the product enters detection mode.

NOTE

- Turning on the power causes the LCD and all of the lamps to operate. (The buzzer also operates if the operation tone is turned on.) Before operating the product, check that these operations function correctly.

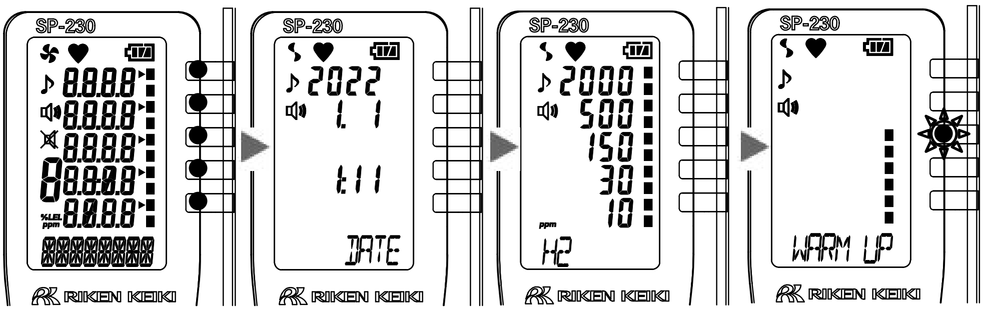
Turning on the power

To turn on the power, hold down the POWER/ALARM POINT button (for at least one second) until the buzzer blips.
When the power is turned on, the LCD display changes automatically as shown below before entering detection mode. (Display examples: Hydrogen model)

1 Hold down POWER/ALARM POINT button for at least one second.

Hold down until the entire LCD display lights up, the alarm lamp lights up, and the buzzer blips.

Entire LCD display lights up. | **Date and time display*** | **Gas name/Full scale display** | **Warmup time**

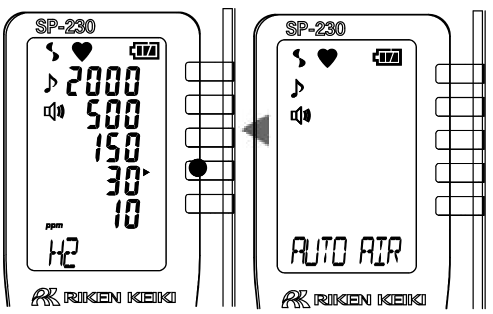


Display example: January 01, 2022 01:11

Display example: H2

Green LEDs flash in sequence from top to bottom.

Detection mode | **Automatic fresh air adjustment display**



The buzzer will beep for approximately one second, the alarm setpoint display and green LED will illuminate, and detection mode will appear.

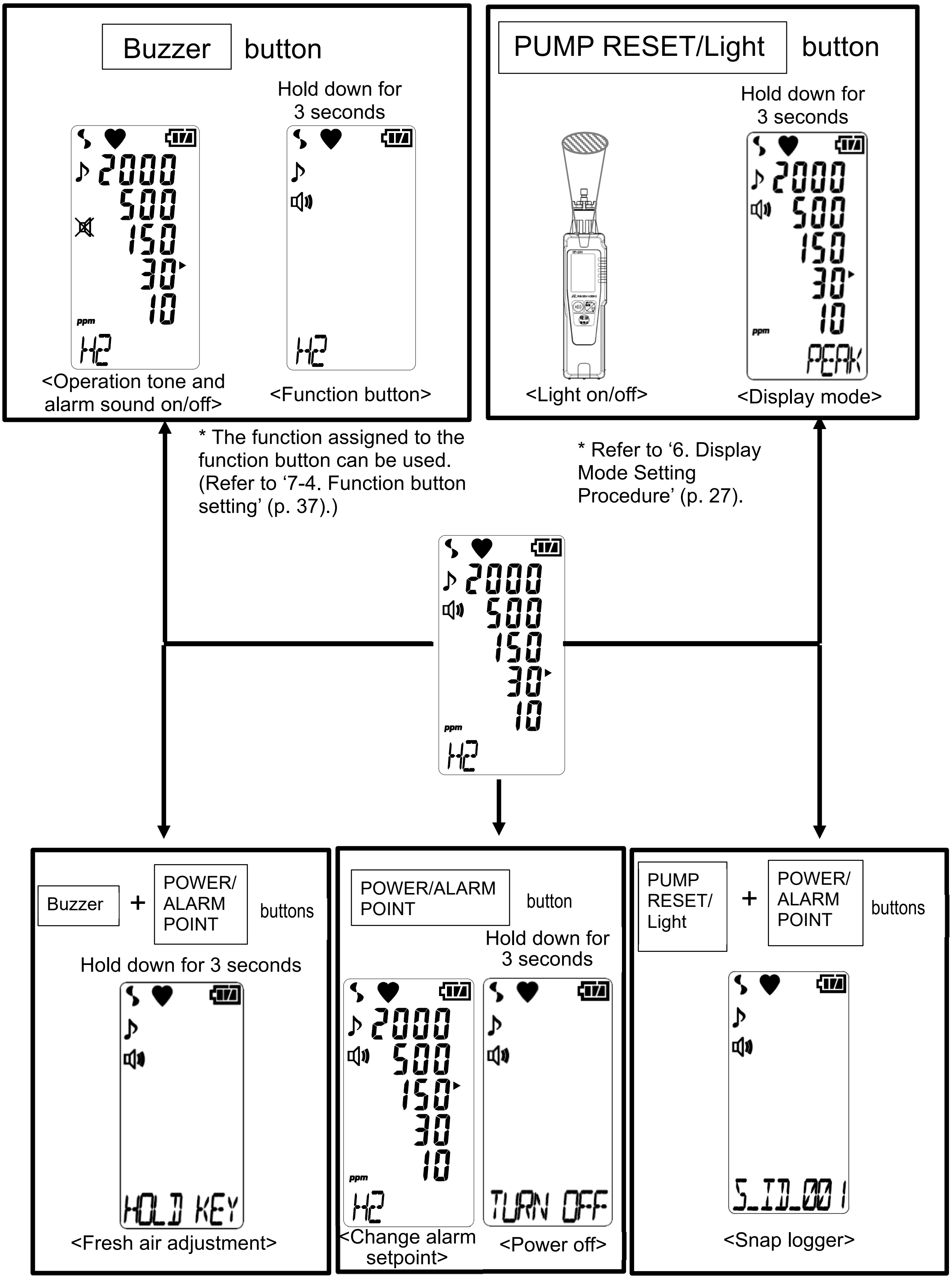
* The date and time is displayed only when the clock function is enabled. The clock function is disabled by default and date and time is not initially displayed.
For information on enabling the clock function, refer to ‘7-3. Clock function ON/OFF setting’ (p. 36).

NOTE

- When the clock function is enabled, a clock abnormality ([FAIL CLOCK]) will occur if the batteries are removed for at least five minutes—for example, during battery replacement—or if the power is turned on after inserting the batteries with the incorrect polarity. Cancel this by pressing the PUMP RESET/Light button to display the date and time setting screen. Refer to ‘7-2. Date and time setting’ (p. 35) and set the time and date.
- The warmup time ([WARM UP]) will vary depending on the sensor stability. Depending on sensor stability, the green LEDs may not flash in sequence.
- If the device has not been used for an extended period, it may take longer than normal to warm up or a sensor abnormality indication ([FAIL SENSOR]) may appear. If this occurs, restart the product.
- The product automatically performs fresh air adjustment during startup. If the ambient conditions at startup differ from the conditions for measurement, repeat fresh air adjustment in the conditions used for measurement. (Refer to ‘5-8. Fresh air adjustment’ (p. 22).)
- About the LCD backlight and button backlights
  Pressing the Buzzer, PUMP RESET/Light, or POWER/ALARM POINT button turns on the LCD backlight and button backlights. The LCD backlight and button backlights go out after approximately 30 seconds if no operation is performed.
  The LCD backlight and button backlights also turn on automatically if an alarm is triggered.

5-5. Basic operation flow

The product is used in detection mode after turning on the power.
(Display examples: Hydrogen model)



* Refer to '5-8. Fresh air adjustment' (p. 22).

* Refer to '5-7. Selecting alarm setpoints' (p. 21).

* Refer to '5-9. Snap logger' (p. 23).

5-6. Gas detection

In detection mode, hold the tip of the tapered nozzle close to the location in question to detect the gas. Gas is drawn in. The detected gas concentration is displayed as a bar meter on the LCD display and LED display unit.
If no gas is detected, no LEDs other than the alarm setpoint LEDs (green LEDs) will light up on the LED display unit bar meter.
If the gas concentration exceeds the alarm setpoint, the LED lights up red (green if below the alarm setpoint). The LEDs light up in sequence from bottom to top as the gas concentration increases.

DANGER

- If measuring inside manholes or enclosed spaces, never lean over or look into the manhole or enclosed space. There is a danger that oxygen-deficient air or other gases may be discharged from such locations.
- Oxygen-deficient air or other gas may be discharged from the product gas outlet. Never breathe in this air.
- High-concentration (100 %LEL or higher) combustible gas may be discharged from the product gas outlet. Be sure to maintain a safe distance from flame sources.

WARNING

- The product is designed to draw in gas at atmospheric pressure. There is a danger that detection target gas may leak from inside the product if an excessive pressure is applied to the product gas inlet or outlet. Be careful to avoid excessive pressure during use.
- When fresh air adjustment is performed in the atmosphere, check the atmosphere for freshness before starting. The presence of miscellaneous gases will make it impossible to adjust the product correctly, resulting in the danger of erroneous detection when actual gas leaks occur.
- A gas alarm indicates an extreme hazard. The user must take appropriate action based on the situation.
- Check the battery level before using the product. The batteries may become depleted if not used for an extended period. Always replace with new batteries before use.
- Gas cannot be detected if a low battery alarm occurs. If the alarm is issued during use, turn off the power and promptly replace the batteries in a safe place.
- The reading may freeze at a high value if the product is dropped or subjected to impact. If this occurs, perform fresh air adjustment in a location where there is fresh air.
- If the concentration of the gas drawn in is below the alarm setpoint, nothing will appear on the LCD display or LED display unit bar meter. Make sure the alarm setpoints are set appropriately before use.
  (Example: Nothing will appear on the LCD display or LED display unit bar meter if the gas drawn in is detected at 10 or more or less than 30 with the alarm setpoint set to 30.)

CAUTION

- When detecting gas, attach the tapered nozzle provided to avoid the effects of airborne dust.

5-7. Selecting alarm setpoints

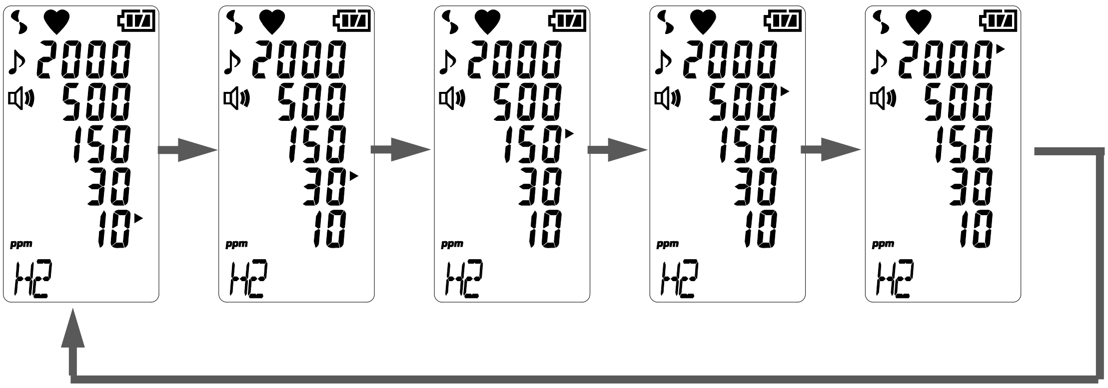
As shipped, the product is set to detect R600a (Type F) or H2 (Type H2), with the alarm setpoint set to 30. The alarm setpoint can be selected to one of five levels to suit the environment in which the gas to be detected is present.

Alarm setpoint selection procedure

(Display examples: Hydrogen model)

1 Press the POWER/ALARM POINT button in detection mode.

Pressing the POWER/ALARM POINT button cycles through the five alarm setpoints.

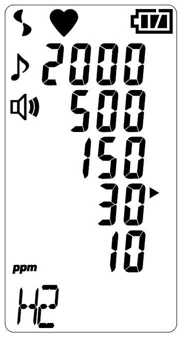


5-8. Fresh air adjustment

Perform fresh air adjustment under ambient measurement conditions after detecting a high-concentration gas or following an alarm triggered by changes in temperature or humidity.

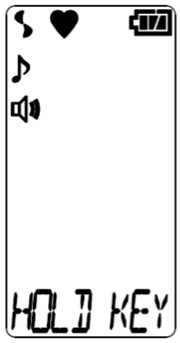
* Confirm that the surrounding air is fresh when performing fresh air adjustment.
(Display examples: Hydrogen model)

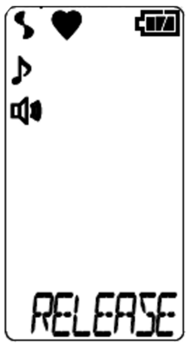
1 Hold down the Buzzer button and POWER/ALARM POINT button at the same time in detection mode.



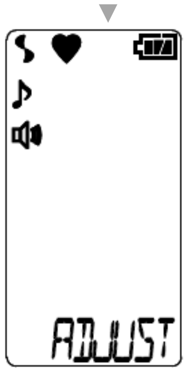
2 When the display changes from [HOLD KEY] to [RELEASE], release the POWER/ALARM POINT button.

(The buzzer blips three times.)





Fresh air adjustment is performed and the product returns to detection mode.
(The buzzer blips once.)



If fresh air adjustment is unsuccessful, [FAIL AIR CAL] is displayed.
Repeat fresh air adjustment in fresh air.

NOTE

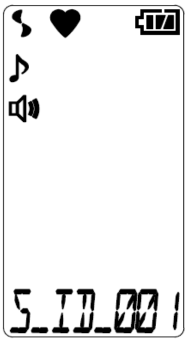
- Always perform fresh air adjustment under conditions of pressure, temperature, and humidity similar to those in the operating environment and in fresh air.
- Wait for the reading to stabilize before performing fresh air adjustment.
- If the temperature or humidity changes rapidly between the storage and usage locations, turn on the power and allow the product to stand and acclimatize for about 10 minutes in an environment similar to the usage location before performing fresh air adjustment.

5-9. Snap logger

Peak values can be recorded during measurement.
Up to 256 data items can be recorded, and when the maximum number of items is reached, the oldest data is overwritten by new data.
This function is enabled when the clock function is enabled. By default, the clock function is disabled. Turn on the clock function before using the snap logger function. (Refer to '7-3. Clock function ON/OFF setting' (p. 36).)
If assigned to the function button, it can also be accessed by holding down the Buzzer button (for at least three seconds) while in detection mode.

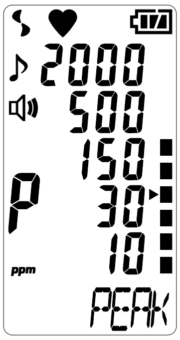
1 Press the PUMP RESET/ Light button and POWER/ALARM POINT button at the same time in detection mode.

The station ID selection screen is displayed.



2 Use the Buzzer button or PUMP RESET/Light button to select the station ID, then press the POWER/ALARM POINT button.

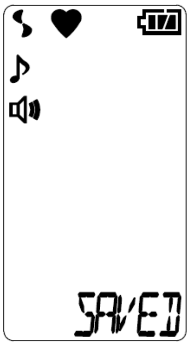
The peak value is displayed.



To cancel recording, press the Buzzer button and PUMP RESET/Light button at the same time. The product returns to detection mode.

3 Press the POWER/ALARM POINT button.

The date/time and peak value are recorded.



To continue and record another log, repeat steps 2 to 3.
To quit log recording, press the Buzzer button and PUMP RESET/Light button at the same time.

The product returns to detection mode.

NOTE

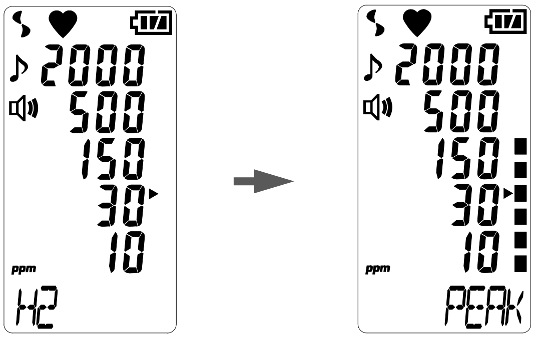
- The following operations are available while the peak value is displayed in step 2:
  Buzzer button: Operation tone and alarm sound on/off
  PUMP RESET/Light button: Light on/off

5-10. Peak hold function

If the peak hold function is enabled, the most recent peak value will be constantly displayed on the bar meter display.
(Display examples: Hydrogen model)

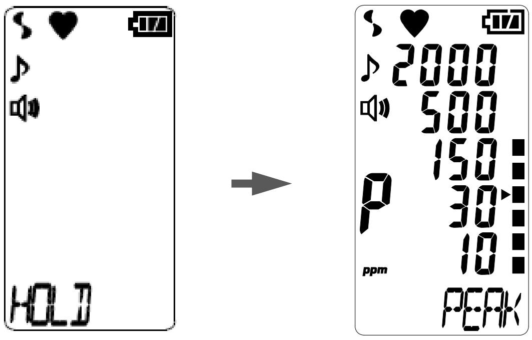
1 Hold down the PUMP RESET/Light button (for at least three seconds) in detection mode.

The display changes to the display mode peak value display.



2 Hold down the Buzzer button (for one second) with the peak value display screen displayed.

The peak hold function is enabled.
[P] is displayed in the mode display while the peak hold function is enabled.
To disable the peak hold function, hold down the Buzzer button (for one second) once again.



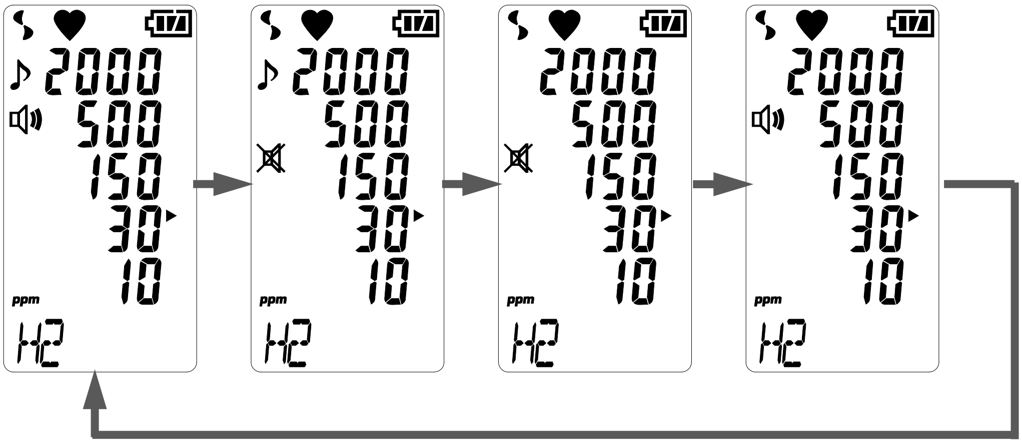
NOTE

- To clear the retained peak value, hold down the Buzzer button (for at least three seconds) with the display modepeak value display screen displayed.
- The peak hold function will be reset and disabled if the power is turned off and back on again.

5-11. Toggling the operation tone and alarm sound on and off

The operation tone and alarm sound can be toggled on and off.
(Display examples: Hydrogen model)

1 Press the Buzzer button in detection mode.
Pressing the Buzzer button cycles through the operation tone and alarm sound settings.



Operation tone on Alarm sound on	Operation tone on Alarm sound off	Operation tone off Alarm sound off	Operation tone off Alarm sound on

5-12. Turning on the light

The light can be turned on when using the product in dark locations.

1 Press the PUMP RESET/Light button.

The light turns on. The light will go out automatically approximately two minutes after it is turned on.
To turn off the light, press the PUMP RESET/Light button again.

CAUTION

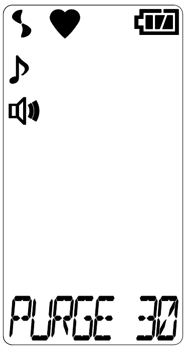
- The light automatically turns off when a low battery voltage alarm occurs.

5-13. Turning off the power

To turn off the power, hold down the POWER/ALARM POINT button (for at least three seconds) until the buzzer blips three times and [TURN OFF] disappears.

CAUTION

- Purge mode is automatically enabled (for up to 30 seconds) before the power turns off if any gas remains inside the device. A countdown appears after automatic purging starts ([PURGE 30]). This changes to [TURN OFF] once gas purging is complete, after which the power is turned off.



Automatic purging start ([PURGE 30])

6

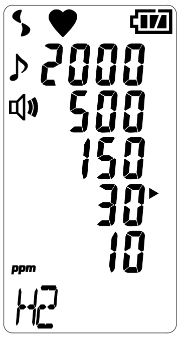
Display Mode Setting Procedure

6-1. Selecting display mode

Display mode lets users review and change various display settings and perform other operations.
(Display examples: Hydrogen model)

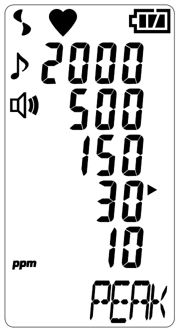
1 Hold down the PUMP RESET/Light button (for at least three seconds) in detection mode.

The display changes to the display mode peak value display.



2 Press the PUMP RESET/Light button repeatedly to display the required menu.

The display mode setting screen changes each time the button is pressed.
The setting screen changes even if the button is held down, and the setting screen stops changing on returning to detection mode.



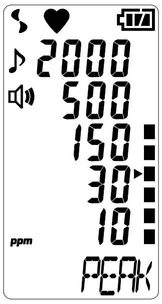
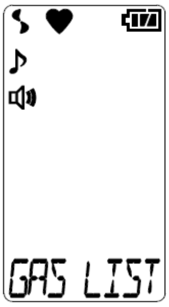
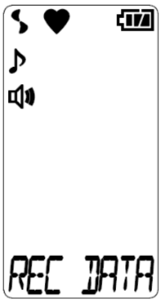
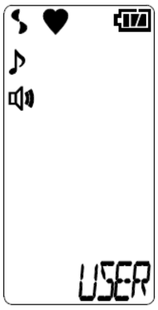
3 Select the desired setting item, then press the POWER/ALARM POINT button.

For information on setting items, refer to ‘Display mode overview’ (p. 28).

NOTE

- If no button is pressed for approximately 20 seconds, the product will automatically return to detection mode.
- In display mode, gas detection continues, and alarms may be triggered.

Display mode overview

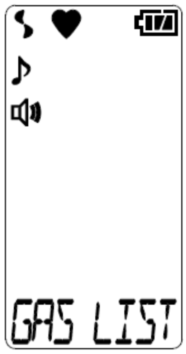
Item	LCD display	Details
Peak display		Displays the maximum concentration detected since the power was turned on. * To clear the peak value, hold down the Buzzer button (for at least three seconds) until [PEAK CLR] is displayed.
Target gas selection setting		Displays the gas concentration converted from the detection target gas by changing the setting to a gas registered beforehand in the product. (Refer to ‘6-2. Target gas selection setting’ (p. 29).)
Log data display		Displays the data recorded by the snap logger. (Refer to ‘6-3. Log data display’ (p. 32).) * Displayed only when the clock function is enabled. (Refer to ‘7-3. Clock function ON/OFF setting’ (p. 36).)
User mode selection		Selects user mode. (Refer to ‘7-1. Selecting user mode’ (p. 33).)

6-2. Target gas selection setting

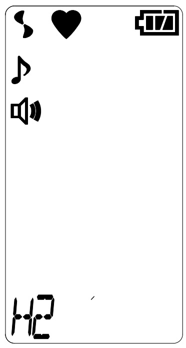
The default setting for the product is normally [R600a] for Type F and [H2] for Type H2, but gas concentration can be detected simply by switching to another pre-registered gas.
If assigned to the function button, it can also be set by holding down the Buzzer button (for at least three seconds) while in detection mode.
(Display examples: Hydrogen model)

1 Press the POWER/ALARM POINT button on the display mode GAS LIST screen.

The gas conversion setting is displayed.

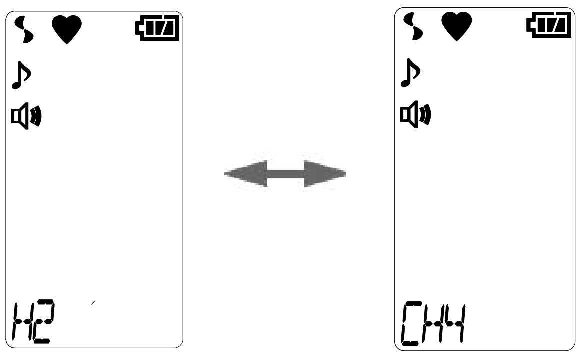


Displays the name of the gas currently set.



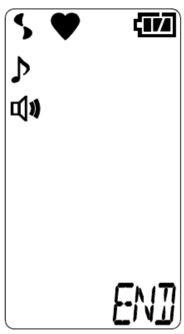
2 Press the Buzzer button or PUMP RESET/Light button to select the conversion gas name.

Pressing the button cycles through the list of gases.



3 Press the POWER/ALARM POINT button once the desired gas name appears.

[END] is displayed, and the product returns to display mode.



NOTE

- Before setting the concentration conversion, refer to the gas lists on the following pages.

Gas list for freon gas (Type F)

Gas name (standard name)	Display	Scale 1 (ppm)	Scale 2 (ppm)	Scale 3 (ppm)	Scale 4 (ppm)	Scale 5 (ppm)	Unit conversion (guide) (g/year)
R600a (Isobutane)	R600A	10	30	150	500	2000	Approx. 2.7
R290 (Propane)	R290	10	50	200	500	2000	Approx. 2.1
Freon 123	R123	20	100	500	2000	5000	Approx. 14.4
Freon 134a	R134A	20	100	500	2000	5000	Approx. 9.58
Freon 142b	R142B	10	50	100	200	500	Approx. 4.7
Freon 22	R22	10	50	200	1000	3000	Approx. 4.1
Freon 32	R32	10	50	200	500	2000	Approx. 2.4
Freon 23	R23	10	50	200	500	2000	Approx. 3.3
Freon 407C	R407C	10	50	200	500	2000	Approx. 4.0
Freon 410A	R410A	10	50	200	500	2000	Approx. 3.4
Freon 404A	R404A	10	50	200	500	2000	Approx. 4.6
2,3,3,3-Tetrafluoropropene (HFO-1234yf)	R1234YF	10	50	200	500	1000	Approx. 5.3
Freon 507A	R507A	10	50	200	500	1000	Approx. 4.6
Freon 407A	R407A	10	50	200	500	2000	Approx. 4.2

Alarm setpoints can be altered on a five-point scale from 1 to 5 for each gas type.

NOTE

- The unit conversion value (g/year) represents the approximate value at “scale 1” concentration when assuming a pump flow rate of approximately 200 mL/min (constant).
  Note that the unit conversion value will vary depending on differences in flow rate due to individual pump differences and deterioration over time.
- Prolonged or high-concentration exposure to chlorine and sulfur compounds will reduce sensor life and increase measurement errors.
- Detecting silicon compounds will decrease sensitivity and reduce sensor life.
- Drawing in high concentrations of solvent gases will degrade seals and other components inside the detector.

Gas list for hydrogen gas (Type H2)

Gas name (standard name)	**Display**	Scale 1 **(ppm)**	Scale 2 **(ppm)**	Scale 3 **(ppm)**	Scale 4 **(ppm)**	Scale 5 **(ppm)**
Methane (calibration gas)	CH4	10	30	150	500	2000
Hydrogen (calibration gas)	H2	10	30	150	500	2000
Acetylene	C2H2	10	30	150	500	2000
Ethylene	C2H4	10	30	150	500	2000
Ethane	C2H6	10	30	150	500	2000
Propylene	C3H6	10	30	150	500	2000
Propane	C3H8	10	30	150	500	2000
Butadiene	C4H6	10	30	150	500	2000
Isobutylene	C4H8	10	30	150	500	2000
Normal butane	N-C4H10	10	30	150	500	2000
Isobutane	I-C4H10	10	30	150	500	2000
Cyclopentane	C5H10	10	30	150	500	2000
N-hexane	N-C6H14	10	30	150	500	2000
Freon 22	R22	10	50	200	1000	3000
Freon 134a	R134A	20	100	500	2000	5000
HFO-1234yf	R1234YF	10	50	200	500	1000

NOTE

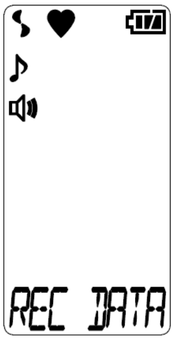
- As shipped, the product is adjusted for methane and hydrogen.
- Response may be slower with certain conversion gases.
- This product is intended for the detection of minute gas leaks, so gas concentration readings are approximate.

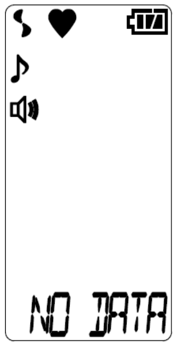
6-3. Log data display

Data recorded by the snap logger can be viewed.
The REC DATA screen is displayed only when the clock function is enabled. (Refer to ‘7-3. Clock function ON/OFF setting’ (p. 36).)

(Display examples: Hydrogen model)

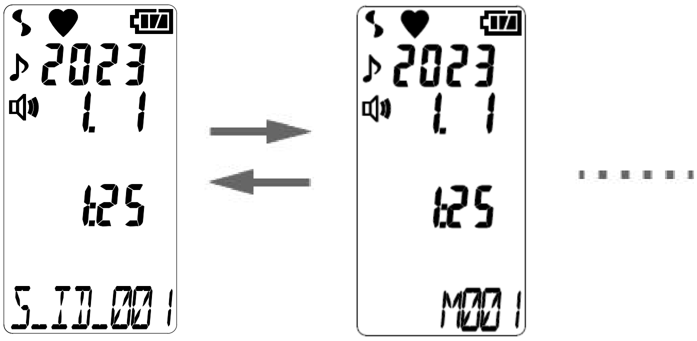
1 **Display mode**
Press the POWER/ALARM POINT button on the REC DATA screen.
The log data display appears. The display cycles through recorded date, station ID, and memory number. If no data has been recorded, [NO DATA] appears.





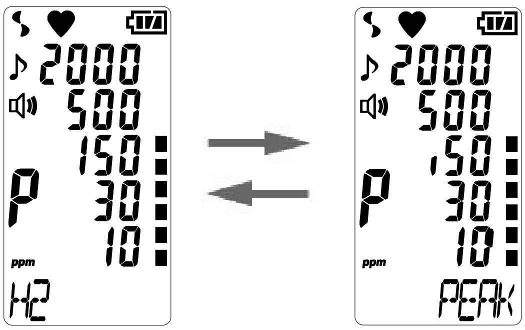
* If no recorded data exists

2 **Press the Buzzer button or PUMP RESET/Light button to select the log data to be displayed.**
Pressing the button cycles through the records.



<Station ID> <Memory number>

3 **Press the POWER/ALARM POINT button once the desired log data appears.**
The selected memory gas name and peak are displayed alternately.



4 **To exit, press the Buzzer button and PUMP RESET/Light button at the same time.**
The product returns to display mode.

7

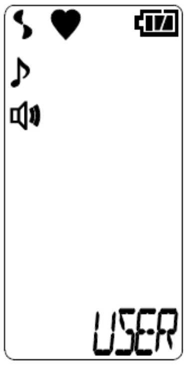
User Mode Setting Procedure

7-1. Selecting user mode

This can be used for maintenance such as adjusting the internal clock.
(Display examples: Hydrogen model)

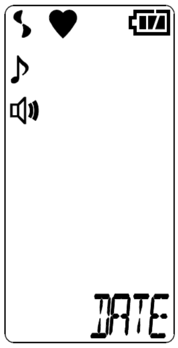
1 Press the button several times in display mode to display [USER], then press the POWER/ALARM POINT button.

Selects the user mode clock function ON/OFF setting.
* Selects the date and time setting if the clock function is enabled.



2 Press the Buzzer button or PUMP RESET/Light button repeatedly to display the required menu.

The user mode setting screen changes each time the button is pressed.



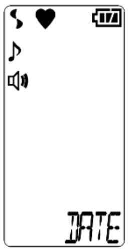
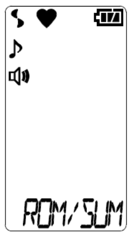
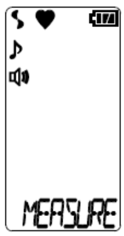
3 Select the desired setting item, then press the POWER/ALARM POINT button.

For information on setting items, refer to 'User mode overview' (p. 34).

CAUTION

- Be sure to return to detection mode after user settings are complete. The product will not return automatically to detection mode if left in user mode.

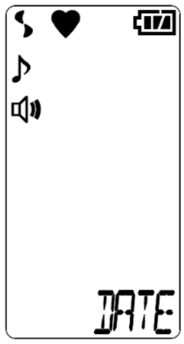
User mode overview

Item	LCD display	Details
Date and time setting		This sets the date and time for the internal clock. (Refer to '7-2. Date and time setting' (p. 35).) * Displayed only when the clock function is enabled.
Clock function ON/OFF setting		Sets the clock function on and off. (Refer to '7-3. Clock function ON/OFF setting' (p. 36).)
Function button setting		Sets the function assigned to the function button. (Function button: Hold down the Buzzer button for at least three seconds while in detection mode.)
ROM/SUM display		Displays the product program number, SUM value, and version. * This is not normally used by the user.
Detection mode selection		To exit, press the POWER/ALARM POINT button and return to detection mode.

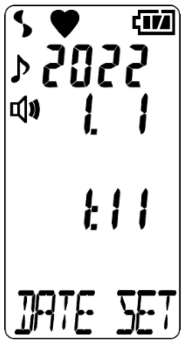
7-2. Date and time setting

This sets the date and time for the internal clock.
The date and time setting screen is displayed only when the clock function is enabled. Turn on the clock function as described in ‘7-3. Clock function ON/OFF setting’ (p. 36) before setting the date and time.

1 **Press the POWER/ALARM POINT button on the user mode DATE screen.**
The date and time setting screen is displayed.

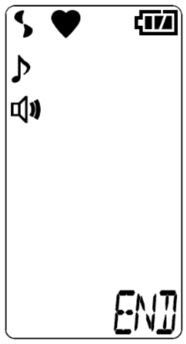


2 **Press the Buzzer button or PUMP RESET/Light button to set the time and date, then press the POWER/ALARM POINT button.**



3 **Set the date and time in the sequence year → month → day → hours → minutes.**

[END] appears once the minutes have been set. The display then returns to the user mode menu.

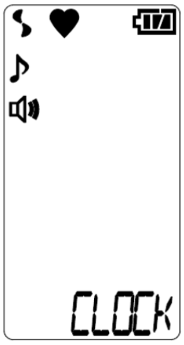


7-3. Clock function ON/OFF setting

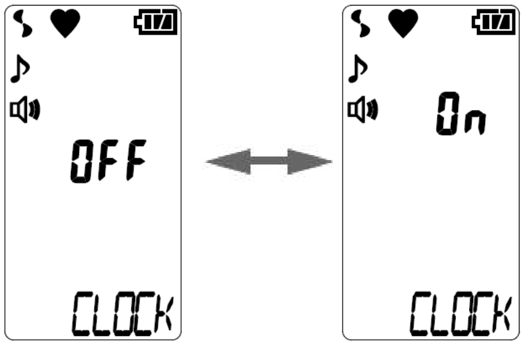
Sets the clock function on and off.
By default, the clock function is disabled. Turn on the clock function in order to display the date and time at startup or to use the snap logger function.

1 Press the POWER/ALARM POINT button on the user mode CLOCK screen.

The clock function ON/OFF setting screen is displayed.

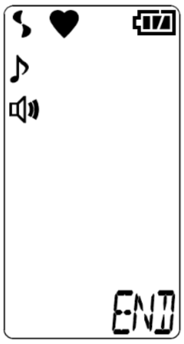


2 Press the Buzzer button or PUMP RESET/Light button to turn the clock function on or off, then press the POWER/ALARM POINT button.



3 Exiting setting

[END] appears once the clock function has been set on or off. The display then returns to the user mode menu.



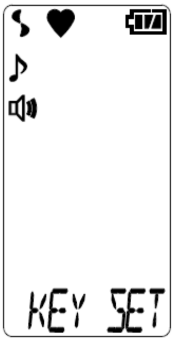
NOTE

- If the date or time is invalid when the clock function is enabled, a clock abnormality ([FAIL CLOCK]) will be displayed.
- Press the PUMP RESET/Light button to reset the abnormality. The date and time setting screen appears. Set the date and time as described in ‘7-2. Date and time setting’ (p. 35).
- A clock abnormality ([FAIL CLOCK]) will be displayed after turning on the power when the clock function is first turned on or if the batteries are removed for at least five minutes—for example, during battery replacement—or after inserting the batteries with the incorrect polarity.

7-4. Function button setting

The function button can be set.
A function can be assigned and called up by holding down the Buzzer button (for at least three seconds) while in detection mode.
By default, the target gas selection setting is assigned.

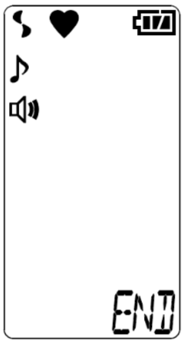
1 Press the POWER/ALARM POINT button on the user mode KEY SET screen.
The function button setting screen is displayed.



2 Press the Buzzer button or PUMP RESET/Light button to select the function to be assigned to the function button, then press the POWER/ALARM POINT button.

3 Exiting setting

[END] appears once the function button has been set. The display then returns to the user mode menu.



List of functions that can be assigned to the function button

Functions	LCD display	Details
Target gas selection setting		Assigns the target gas selection setting to the function button. (Refer to '6-2. Target gas selection setting' (p. 29).) Destination when using function button Detection mode → Display mode → [GAS LIST] → Current setting
Snap logger		Assigns the snap logger to the function button. (Refer to '5-9. Snap logger' (p. 23).) Destination when using function button Detection mode → Station ID selection screen

NOTE

- If the snap logger is assigned to the function button, it cannot be used when the clock function is disabled. Turn on the clock function. (Refer to '7-3. Clock function ON/OFF setting' (p. 36).)

8
Maintenance

The product is a precision device.
Maintain and inspect the product at regular intervals to ensure product performance and improve gas leak detection reliability.

8-1. Maintenance intervals and maintenance items

Maintain the following items at regular intervals before use:

- Daily maintenance (Pre-work checks): Perform maintenance before commencing work.
- Regular maintenance: Perform maintenance at least once a year to ensure product performance.

Inspection item	Inspection details	Daily maintenance (Pre-work checks)	Regular maintenance
Battery level check	Check to confirm battery levels are sufficient.	○	○
Concentration display check	Check to confirm that the concentration reading is zero after drawing in fresh air. If the reading is offset, perform fresh air adjustment after confirming that no miscellaneous gas is present in the vicinity.	○	○
Flow rate check	Check the flow confirmation icon to confirm that there is no abnormality.	○	○
Filter check	Check to confirm that the dust filter and miscellaneous gas removal filter are not dirty or clogged.	○	○
Gas adjustment	Perform gas adjustment using a calibration gas.	—	○

Maintenance service

RIKEN KEIKI provides services related to regular maintenance, including span adjustment, as well as other adjustments and maintenance.
Preparing a calibration gas requires dedicated equipment, including gas cylinders of the specified concentration and gas sampling bags.
Our certified service engineers have expert knowledge of the dedicated tools used for these services, along with expertise in products. We recommend taking advantage of our maintenance service to ensure safe use of the product.

The major maintenance service items are as follows. For more information, contact RIKEN KEIKI.

<Main service details>

Item	Description
Battery level check	Checks battery levels.
Concentration display check	Checks to confirm that the concentration reading is zero using zero gas. Fresh air adjustment is performed if the reading is not zero.
Filter check	Checks to confirm that the dust filter and miscellaneous gas removal filter are not dirty or clogged. Replacement if dirty or clogged
Span adjustment	Adjusts sensitivity using a calibration gas.
Product cleaning and repair (visual inspection)	Checks the product exterior for dirt and cleaning/repairing of visible areas. Replacing parts if cracked or damaged
Product operation check	Checks operation of individual functions using buttons and checking parameters.
Consumable part replacement	Carries out replacement of the sensors, filters, pump, and other consumable parts.

8-2. Cleaning instructions

Clean the product if it becomes excessively dirty. Be sure to turn off the power before cleaning, and wipe clean using a cloth. Do not clean using water or organic solvents for cleaning, as these may cause the product to malfunction.
Use dry air to clean inside the tapered nozzle. Gas detection may be affected if the interior of the tapered nozzle becomes dirty.

CAUTION

- Do not use water or organic solvents such as alcohol or benzine when wiping the product. These may discolor or damage the surface of the product, or cause the sensor to malfunction.

NOTE

- Water may remain in the grooves after the product has got wet. Remove any moisture as follows:
  ① Wipe away moisture on the product thoroughly using a dry towel or cloth.
  ② Hold the product firmly and shake it about 10 times facing downward.
  ③ Wipe away moisture escaping from the inside thoroughly using a towel or cloth.
  ④ Place the product on a dry towel or cloth and allow it to stand at room temperature.

8-3. Parts replacement

Teflon filter replacement procedure

The Teflon filter may become dirty and clogged with continued use.
Replace the filter if it appears especially dirty.
Also replace the filter if water has been sucked in or the flow rate drops.

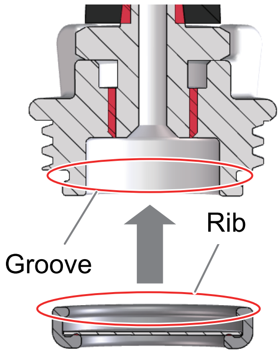
1 Turn the cap counterclockwise and remove.

2 Remove the seal from the cap.

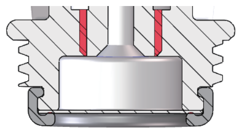
3 **Replace the Teflon filter contained inside the seal with a new filter.**

4 **Reattach the seal with the Teflon filter inside to the cap.**

Check to confirm that the rib securely engages with the groove here.



5 **Reattach the cap with seal fitted to the main unit.**

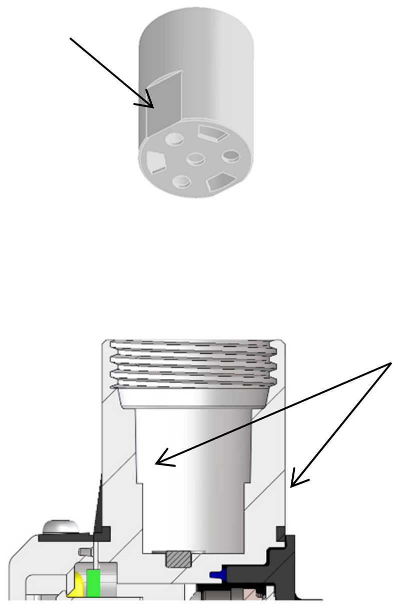


Miscellaneous gas removal filter (CF-8392) replacement procedure (Type H2)

A miscellaneous gas removal filter (CF-8392) is fitted inside the product to remove silicone, sulfides, and other miscellaneous gases that may damage the sensor.
With prolonged use, it may become dirty and clogged, reducing the miscellaneous gas removal performance. Replace the filter after inadvertently aspirating water or oil, if clogging generates a low flow rate alarm, if sensor sensitivity is noticeably reduced, if the product has been used in environments in which Si-based or other miscellaneous gases are present, or if the filter is discolored.

The recommended replacement interval for the miscellaneous gas removal filter (CF-8392) is one year.

Mount by sliding the flat sides on either side of the filter into the guide.



Sensor replacement

The built-in sensors have finite service lives (warranty period one year), and must be replaced regularly.
If the sensors cannot be adjusted using span adjustment, the readings are not restored after fresh air adjustment, or the readings fluctuate, the sensors are at the end of their life.
Contact RIKEN KEIKI for replacement.

Battery replacement

For information on how to replace the batteries, refer to ‘5-3. Battery replacement’ (p. 15).

9

Storage and Disposal

9-1. 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 direct sunlight
・In a location free of gases, solvents, and vapors

Store the product in its shipping carton if this has been retained.
If the shipping carton is not available, store away from dust and dirt.

CAUTION

- If the product is not to be used for extended periods, store with the dry batteries removed. Battery leakage may result in fire or injury.
- Even if you do not intend to use the product for extended periods, turn the power on at least once every six months to check pump suction (by running the product for approximately three minutes). Grease inside the pump motor may solidify and prevent operation if the product is not operated for extended periods.

9-2. Procedures for use after storage

CAUTION

- Be sure to perform gas adjustment if the product is used again after a period in storage.
- Contact RIKEN KEIKI to request readjustment and gas adjustment.

9-3. Product disposal

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

WARNING

- Dispose of the batteries in accordance with procedures specified by the local authority.

<Disposal in EU member states>

• Waste Electrical and Electronic Equipment (WEEE) directive

The symbol on the product shown on the left indicates that the product and its individual parts must not be disposed of with general or household waste, and must be sorted and disposed of appropriately.
Proper disposal will help prevent potential negative effects on human health and the environment.
To ensure proper treatment, collection, and recycling of the product at the time of its disposal, please use the return and collection system available in your country. For more information on collecting and recycling used products, please contact the dealer or supplier from whom you purchased the product.

• Battery regulations

The symbol on the product or battery shown on the left indicates that batteries must be disposed of separately from general or household waste.
To ensure proper treatment, collection, and recycling of batteries at the time of their disposal, please dispose of them properly using the collection system available in your country.

<u>Battery removal</u>
For information on how to remove the batteries, refer to ‘5-3. Battery replacement’ (p. 15).

10

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.

<Product abnormalities>

Symptom	Cause	Action
The power cannot be turned on.	The batteries are depleted.	Replace with two new batteries in a safe place.
	The POWER/ALARM POINT button was pressed for too short a time.	When turning on the power, hold down the POWER/ALARM POWER switch until you hear a short blip.
	The dry batteries have not been correctly inserted.	Check to confirm that the batteries are correctly inserted in the main unit.
Abnormal operation	Effects of sudden static electricity noise, etc.	Turn off the power once, and then turn it back on again (restart).
The product does not operate.	Effects of sudden static electricity noise, etc.	Remove the batteries in a safe place, reinsert the batteries, then turn on the power again to operate.
System abnormality [FAIL SYSTEM]	A circuit abnormality occurred in the main unit.	Contact RIKEN KEIKI for repairs.
Sensor abnormality [FAIL SENSOR]	The sensor is defective.	Remove the batteries in the presence of fresh air, reinsert the batteries, then turn on the power again. If the error persists even after turning the power back on again several times, contact RIKEN KEIKI to request sensor replacement.
Low battery voltage alarm indication [FAIL BATTERY]	The battery level is low.	Turn off the power and replace with new batteries in a safe place.
Low flow rate alarm indication [FAIL LOW FLOW]	Water or oil has been sucked into the product.	Before using the PUMP RESET/Light button to reset the pump, check the tapered nozzle to confirm that there are no signs of damage or water or oil being sucked in.
	The tapered nozzle is clogged.	Before using the PUMP RESET/Light button to reset the pump, check the tapered nozzle to confirm that it is properly connected and not clogged or twisted.

Symptom	Cause	Action
	The power was turned on at a cold temperature or after an extended period.	Turn the power off and on several times. The pump may start working. If the problem persists, contact RIKEN KEIKI to request pump replacement.
	The pump is deteriorated.	Contact RIKEN KEIKI to request pump replacement.
Fresh air adjustment is not possible. [FAIL AIR CAL]	Fresh air is not being supplied around the product.	Provide fresh air, and perform fresh air adjustment in the measurement environment.
Clock abnormality [FAIL CLOCK]	Internal clock abnormality	Set the date and time. If this symptom occurs frequently, the internal clock may be faulty and must be replaced. Contact RIKEN KEIKI for repairs.
Pump abnormality [FAIL PUMP]	Pump abnormality	Contact RIKEN KEIKI for repair.

11

Product Specifications

Model	SP-230 (Type F) For freon detection	SP-230 (Type H2) For hydrogen detection
Detection principle	Hot-wire semiconductor type	
Detection target gas	Refer to ‘Gas list for freon gas’ (p. 30)	Refer to ‘Gas list for hydrogen gas’ (p. 31)
Calibration gas	R600a (Isobutane)	H2, CH4
Concentration display	LCD bar meter + scale + LED	
Detection range	Depends on target gas (R600a: 10 – 2,000 ppm)	Depends on target gas (H2/CH4: 10 – 2,000 ppm)
Detection method	Pump suction type	
Alarm setpoints	Default setting: 30 ppm (R600a: 10, 30, 150, 500, 2,000 ppm)	Default setting: 30 ppm (H2/CH4: 10, 30, 150, 500, 2,000 ppm)
Display items	Operating status icon, flow confirmation icon, operation tone icon, alarm sound icons, alarm setpoint display, battery level icon, bar meter display, mode display, gas name/message display	
Response time (for identical conditions)	Within 3 seconds	
Gas alarm type	One-step alarm	
Gas alarm indication	Lamp flashing, buzzer sounding	
Gas alarm pattern	Auto reset	
Fault alarm	Sensor abnormality/Low flow rate/Low battery voltage/System abnormality/Adjustment abnormality/Clock abnormality/Pump abnormality	
Fault alarm icon	Lamp flashing/buzzer sounding/fault information display	
Fault alarm pattern	Self-latching	
Power source	AA alkaline batteries × 2	
Continuous operating time	Approx. 13 hours (with alkaline dry batteries, at 25 °C, no alarm, no lighting)	
Operating temperature range	-20 °C to +55 °C (no sudden fluctuations)	
Operating humidity range	Up to 95 %RH (no condensation)	
Explosion-proof construction	Intrinsically safe explosion-proof construction	
Explosion-proof class	Ex ia IIC T4 Ga (Japan Ex)	
Certifications	CE marking, UKCA marking	
Protection level	IP67 equivalent	
External dimensions	Approx. 41 mm (W) × 186 mm (H) ×38 mm (D) (excluding projections)	
Weight	Approx. 220 g (excluding dry batteries)	

* This product is intended for the detection of minute gas leaks, so gas concentration values are approximate.

12
Appendix

12-1. Terminology

vol%	Indicates gas concentrations in units of parts per hundred by volume.
ppm	Indicates gas concentration in units of parts per million by volume.
LEL	Abbreviation for "lower explosive limit". The lower explosive limit is the minimum concentration of a combustible gas mixed in air at which ignition will result in explosion.

Revision history

Issue	Revision details	Issue date
0	First issue (PT0-2240)	April 19, 2024
1	EU Declaration of conformity	June 12, 2024
2	Deletion : EU Declaration of conformity, Correction : 9-3 Product disposal	August 29, 2025