RIKEN KEIKI

PT0E-1385

# Portable
# Combustible Gas Detector
# NC-1000
## Operating Manual
## (PT0-138)


**RIKEN KEIKI Co.,Ltd.**

2-7-6 Azusawa, Itabashi-ku, Tokyo, 174-8744, Japan
Phone : +81-3-3966-1113
Fax : +81-3-3558-9110
E-mail : intdept@rikenkeiki.co.jp
Web site : https://www.rikenkeiki.co.jp/

# Contents

# 1

# Outline of the Product

## Preface

Thank you for choosing our portable combustible gas detector NC-1000 (hereinafter referred to as the gas detector). Please check that the model number of the product you purchased is included in the specifications on this manual.

This manual explains how to use the gas detector and its specifications. It contains information required for using the gas detector properly. Not only the first-time users but also the users who have already used the product must read and understand the operating manual to enhance the knowledge and experience before using the gas detector.

Note that the contents of this manual are subject to change without notice for product improvement. It is also prohibited to copy or reproduce this manual, in whole or in part, without permission.

Regardless of warranty period, we shall not make any indemnification for accidents and damage caused by using the gas detector.
Make sure to read the warranty policy specified on the warranty.

## Purpose of use

This product is used to detect combustible gases (ppm) in the air.
It provides two different specifications for target combustible gases: "general combustible gases (HC)" used in ordinary factories, oil tankers, etc. and "methane (CH4)" such as city gas and natural gas.
Detection results are not intended to guarantee life or safety in any way.

## Definition of DANGER, WARNING, CAUTION and NOTE

Throughout this manual, the following indications are used to ensure safe and effective work.

| | |
|---|---|
|  **DANGER** | This message indicates that improper handling may cause serious damage on life, health or assets. |
|  **WARNING** | This message indicates that improper handling may cause serious damage on health or assets. |
|  **CAUTION** | This message indicates that improper handling may cause minor damage on health or assets. |
| **NOTE** | This message indicates advice on handling. |

# 2

# Important Notices on Safety

To maintain the performance and use the gas detector safely, observe the following instructions of DANGER, WARNING and CAUTION.

## 2-1. Danger cases

**DANGER**

About use

- While conducting measurement in a manhole or confined space, do not lean over or look into the manhole or closed space. It may lead to dangers because oxygen-deficient air or other gases may blow out.
- Oxygen-deficient air or other gases may be discharged from the gas exhausting outlet (GAS OUT). Never inhale the air or gases.
- High-concentration (10000 ppm or higher) gases may be discharged. Never use fire near it.

# 2-2. Warning cases

## WARNING

Sampling point pressure

- The gas detector is designed to draw gases under the atmospheric pressure. If excessive pressure is applied to the gas inlet (GAS IN) and outlet (GAS OUT) of the gas detector, measuring gases may leak out from its inside and may cause dangerous conditions. Be sure that excessive pressure is not applied to them while used.
- Do not connect the gas sampling hose directly to a location with a pressure higher than the atmospheric pressure. The internal piping system may be damaged.

Air calibration in atmosphere

- When air calibration is performed in the atmosphere, check the atmosphere for freshness before beginning it. If other gases exist, the adjustment cannot be performed properly, thus leading to dangers when the gas leaks.

Response to gas alarm

- Issuance of a gas alarm indicates that there are extreme dangers. Take proper actions based on your judgment.

Battery level check

- Before use, check that there remains sufficient battery power. When the gas detector is not used for a long period, the batteries may be exhausted. Be sure to replace them with new ones before use.
- If a low battery voltage alarm is triggered, gas detection cannot be conducted. If the alarm is triggered during use, turn off the power and promptly replace the batteries in a safe area.

Others

- Do not throw the gas detector into fire.
- Do not wash the detector in a washing machine or ultrasonic cleaner, etc.
- Do not block the buzzer sound opening. No alarm sound can be heard.
- Do not remove the batteries while the power is on.
- Before turning on the power, check that the gas detector is connected to the gas sampling probe and the surrounding air is fresh. When the gas detector is powered on, zero adjustment is performed by air calibration automatically. Therefore, if the power is turned on under a gas atmosphere, incorrect gas concentration will be displayed.
- If the main unit is dropped or given a shock, the reading may remain high. In this case, perform air calibration in a location with fresh atmospheric air.

# 2-3. Precautions

## CAUTION

**Do not use the gas detector where it is exposed to oil, chemicals, etc. Do not submerge the gas detector under water on purpose.**

- Do not use in a place where the gas detector is exposed to liquids such as oil and chemicals.
- The gas detector, being compliant to IP67, is not water-pressure-resistant. Do not use the gas detector where a high water pressure is applied to it (under a faucet, shower, etc.) or submerge it under water for a long time. The gas detector is water-proof only in fresh water and running water, and not in hot water, salt water, detergent, chemicals, human sweat, etc.
- The gas inlet and outlet are not water-proof. Be careful not to let water such as rainwater get into these parts. Because this may cause trouble and gas cannot be detected.
- Do not place the detector where water or dirt gets accumulated. The gas detector placed at such a location may cause malfunction due to water or dirt that gets into the buzzer opening, etc.
- Note that drawing in dirty water, dust, metallic powder, etc. will significantly deteriorate the sensor sensitivities. Be careful when the gas detector is used in an environment where these elements exist.

Do not use the gas detector in a place where the temperature drops below -20ºC or rises over 50ºC.

- The operating temperature of the gas detector is -20 to +50ºC. Do not use the gas detector at higher temperatures, humidities and pressures or at lower temperatures than the operating range.
- Avoid long-term use of the gas detector in a place where it is exposed to direct sunlight.
- Do not store the detector in a sun-heated car.

Observe the operating restrictions to prevent condensation inside the gas detector or gas sampling hose.

- Condensation formed inside the gas detector or gas sampling hose causes clogging or gas adsorption, which may disturb accurate gas measurement. Thus, condensation must be avoided. In addition to the operating environment, carefully monitor the temperature/humidity of the sampling point to prevent condensation inside the gas detector or gas sampling hose. Please observe the operating restrictions.

Do not use a transceiver near the gas detector.

- Radio wave from a transceiver near the gas detector may disturb readings. If a transceiver or other radio wave transmitting device is used, it must be used in a place where it disturbs nothing.
- Do not use the gas detector near a device that emits strong electromagnetic waves (high-frequency or high-voltage devices).

Verify that the flow check display is rotating before using the detector

- If the flow check display is not rotating, gas measurement cannot be performed properly. Check whether the flow rate is lost.

## CAUTION

Never fail to perform a regular maintenance.

- Since this is a safety unit, a regular maintenance must be performed to ensure safety. Continuing to use the gas detector without performing maintenance will compromise the sensitivity of the sensor, thus resulting in inaccurate gas detection.

Others

- Pressing buttons unnecessarily may change the settings, preventing alarms from activating correctly. Operate the gas detector using only the procedures described in this operating manual.
- Do not drop or give shock to the gas detector. The accuracy of the gas detector may be deteriorated.
- Do not jab the buzzer opening with a sharp-pointed item. Doing so may cause a failure or damage.
- Do not remove the panel sheet on the display. The water-proof and dust-proof performances will be deteriorated.
- Do not affix a label or the like on the infrared port. Infrared communications can no longer be conducted.
- The operating environment may include gases that have harmful effects on the sensor of the gas detector. The gas detector cannot be used in the presence of the following gases:
  (1) Sulfides (such as H2S and SO2) continuously existing in high concentrations
  (2) Halogen gases (such as chloride compounds and chlorofluorocarbons)
  (3) Silicone (Si compounds)
  Do not use the gas detector in the presence of the above gases (such as high-concentration sulfides, halogen gases and silicone), which may shorten the sensor life significantly or cause malfunctions such as inaccurate readings.
  In case the gas detector is used for detection in the presence of silicone, etc., be sure to check the gas sensitivities before using it again.

Replacement of batteries

- Turn off the power of the gas detector before replacing the batteries.
- Replace all of the four batteries with new ones at one time.
- The requirements of explosion-proof standard of the gas detector include the use of TOSHIBA dry batteries. To use the unit as an explosion-proof product, use four AA alkaline dry batteries (LR6) manufactured by TOSHIBA CORPORATION.
- Pay attention to the polarities of the batteries.

Usage

- In a low-temperature environment, the operating time is shortened due to the battery performance property.
- At low temperatures, the responses of the LCD display may slow down.
- Perform air calibration under pressure and temperature/humidity conditions close to those in the operating environment and in fresh air.
- Perform air calibration after the reading is stabilized.
- If there is a sudden temperature change of 15ºC or more between the storage and operational locations, turn on the power of the gas detector, let it stand for about 10 minutes in a similar environment to the operational location, and perform air calibration in fresh air before using it.
- When cleaning the gas detector, do not splash water over it or use organic solvents such as alcohol and benzine on it. The surface of the gas detector may be discolored or damaged.
- If the gas detector is not used for a long time, turn on the power at least once every six months and check that the pump draws in air (about three minutes). The gas detector, when not activated for a long time, may cease to work because of hardening of the grease in the pump motor.
- If the gas detector is not used for a long time, store it after removing the batteries. Battery leaks may result in fire, injury, etc.
- When the gas detector is used again after a long-period storage, never fail to perform air calibration. For information on readjustment including air calibration, please contact RIKEN KEIKI.

# 2-4. Safety information

## Outline of the product

The combustible gas detector model NC-1000 is designed to detect leakage of combustible gases in a hazardous area continuously.
The detection range of NC-1000 is 0 to 10,000 ppm.
A sample of gas is drawn by the internal small pump.
Only AA alkaline dry batteries (LR6, four pieces, manufactured by TOSHIBA) are used for power supply.
The dry batteries cannot be replaced in a hazardous area.

## Technical data

| | | |
|---|---|---|
| Explosion-proof specifications | Explosion-proof class | Ex ia IIB T4 Ga<br>Ⓔx II 1G Ex ia IIB T4 Ga |
| | Surrounding temperature range | -20 - +50ºC |
| Electrical specifications | | Driven by four AA alkaline dry batteries (LR6, manufactured by TOSHIBA) |
| Certificate number | IECEX | IECEx DEK 13.0090 |
| | ATEX | DEKRA 13ATEX0227 |
| Applied standards | | IEC60079-0：2017 EN IEC 60079-0:2018<br>IEC60079-11:2011 EN60079-11:2012 |
| Precautions | | • Do not replace dry batteries in a hazardous area.<br>• Do not disassemble/modify the devices.<br>• Use only AA alkaline dry batteries (LR6, manufactured by TOSHIBA) for power supply.<br>• Use only CR1220 (manufactured by Hitachi Maxell) for backup power supply. |
| How to read instruction number | | INST.No. 0 0 000 0000 00<br>A B C D E<br>A: Manufacturing year (0 - 9)<br>B: Manufacturing month (1 - 9, XYZ for Oct. to Dec.)<br>C: Manufacturing lot<br>D: Serial number<br>E: Factory code |

## Manufacturer

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# 3

# Product Components

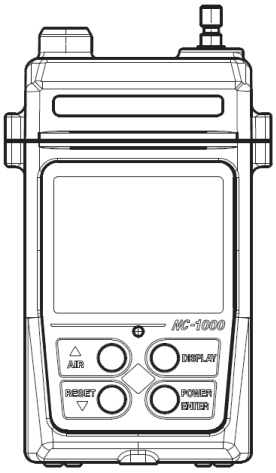
## 3-1. Main unit and standard accessories

After opening the package, check the gas detector and accessories.
If anything in the following list is not included, contact RIKEN KEIKI.

### Main unit

For names and functions of individual parts of the gas detector and LCD display, see "Names and functions for each part" (P. 12).

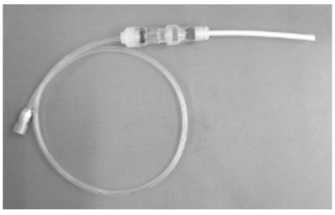
**<Main Unit>**



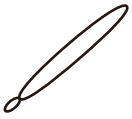

### Accessories

AA alkaline dry batteries: 4 (installed)


Gas sampling probe and gas sampling hose (1 m)
: 1



Hand strap: 1



Product warranty: 1
Operating manual: 1

**DANGER**

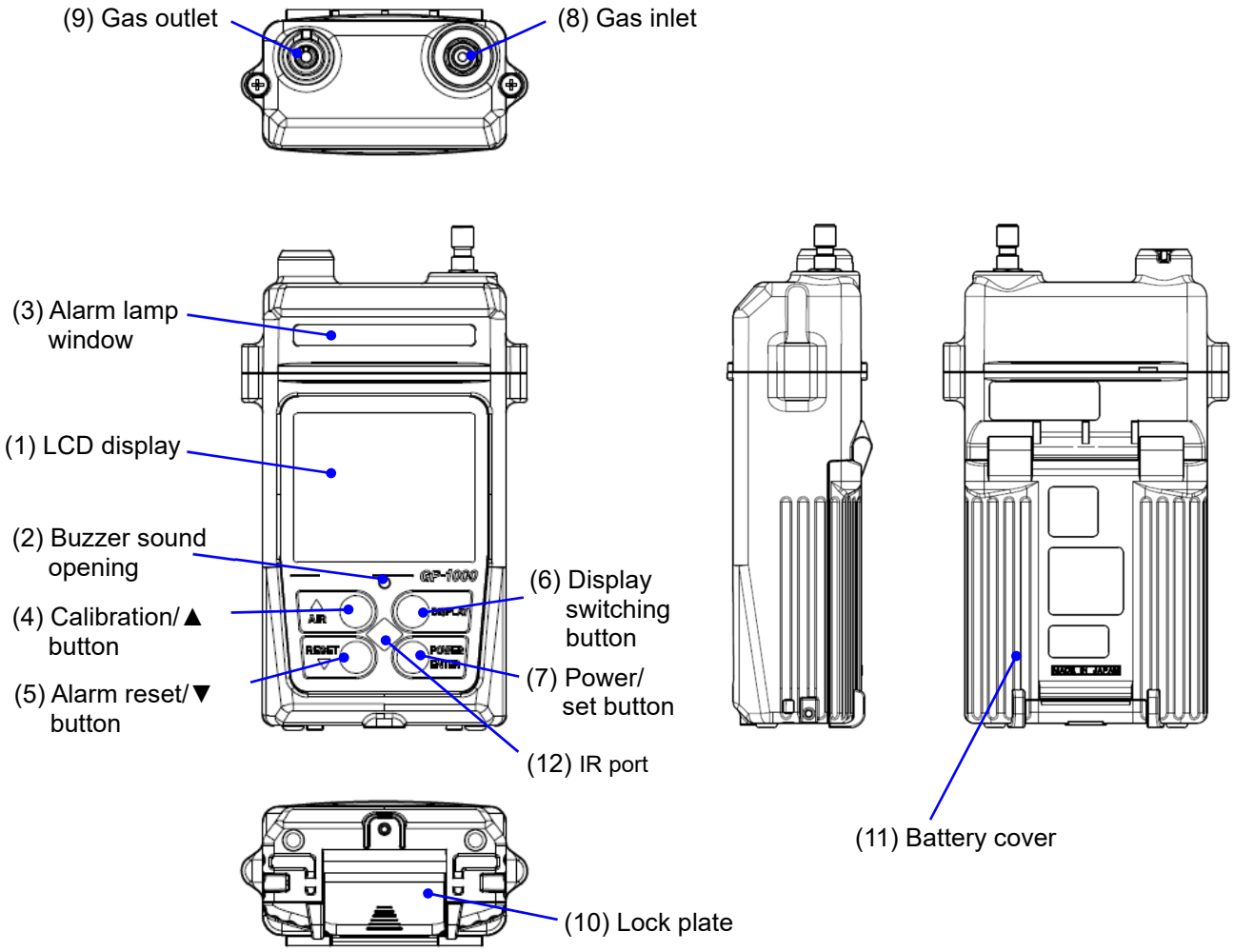
About explosion-proof

- Do not modify or change the circuit, structure, etc.
- When using the gas detector in a hazardous area, take the following countermeasures for preventing dangers resulting from electrostatic charges.
  (1) Wear anti-static clothes and conductive shoes (anti-static work shoes).
  (2) For indoor use, use the gas detector while standing on a conductive work floor (with a leakage resistance of 10 MΩ or less).
- Replace the batteries in a non-hazardous area.
- The rated values of the gas detector
  Power supply: 6.0 VDC (LR6, four pieces, manufactured by TOSHIBA) Ambient temperature: -20 - +50ºC
- The explosion-proof class of the gas detector
  Ex ia IIC T4 (Japan Ex)
  II1G Ex ia IIC T4 Ga (ATEX explosion-proof directive)
  Ex ia IIC T4 Ga (IECEx explosion-proof directive)
- The protection class of case
  IP20

# 3-2. Names and functions for each part

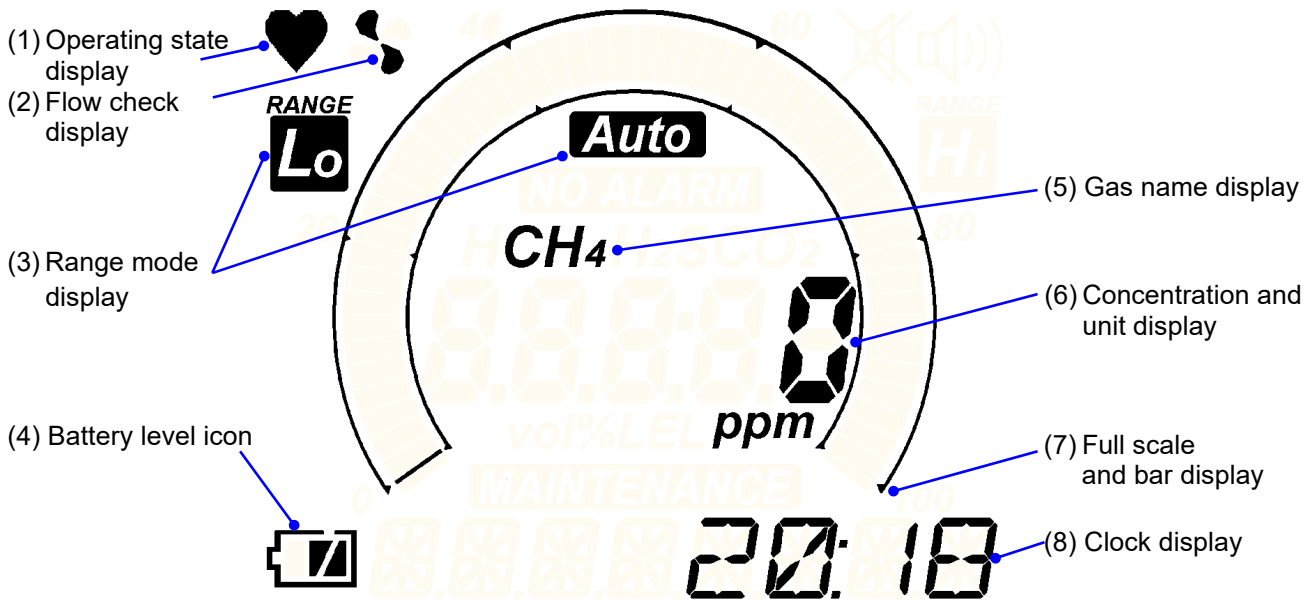
This section describes names and functions of main unit and battery unit parts and LCD display.

## <Appearance of Main Unit>




| No. | Name | Function |
|---|---|---|
| (1) | LCD display | Displays gas concentrations, measured gas names, alarms, etc. |
| (2) | Buzzer sound opening | Emits operation and alarm sounds. (Do not block it.) |
| (3) | Alarm lamp window | Blinks (in red) in response to an alarm. |
| (4) | Calibration/▲ button | Keep this button pressed to perform air calibration. |
| (5) | ALARM reset/▼ button | When an alarm occurs, press this button to reset the alarm. |
| (6) | Display switching button | Press this button to change the display. |
| (7) | Power/set button | Turns the power ON/OFF. |
| (8) | Gas inlet | Connect a gas sampling hose to this port. |
| (9) | Gas outlet | Exhausts the gas drawn into the gas detector. (Do not block it.) |
| (10) | Lock plate | Retains the battery cover. |
| (11) | Battery cover | Protects the battery. |
| (12) | IR port | Used to send and receive data. While the data logger management software (option) is used, this port is used to upload detection data to the PC and configure the settings of the gas monitor from the PC. |

## <LCD Display>

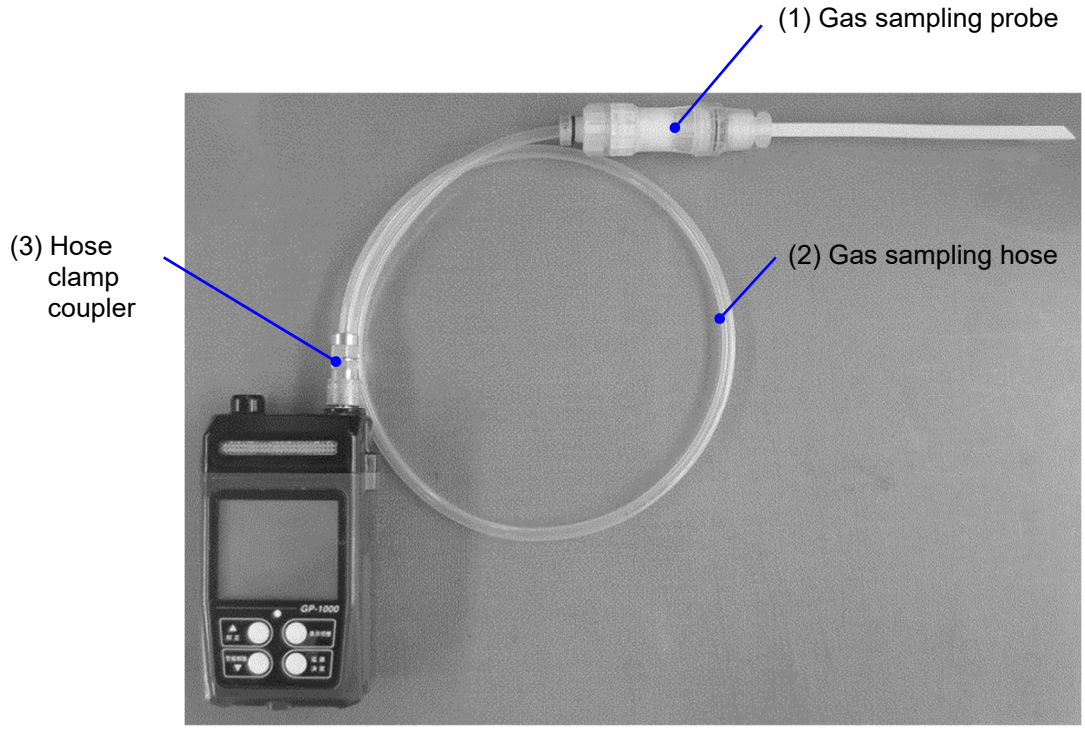



| No. | Name | Function |
|---|---|---|
| (1) | Operating state display | Displays the operating status in the detection mode. Normal: Blinking |
| (2) | Flow check display | Displays the drawing status. Normal: Rotating |
| (3) | Range mode display | Displays an icon of Lo/Hi/Auto indicating range mode. |
| (4) | Battery level icon | Displays a reference of the battery level. |
| (5) | Gas name display | Displays detected gases name. |
| (6) | Concentration and unit display | Displays gas concentration and unit. |
| (7) | Full scale and bar display | Displays the level of gas concentration with the bar meter as well as the full scale value. |
| (8) | Clock display | Displays the current time. |

### NOTE

- The meanings of battery level icons are as follows:
  : Sufficient / : Low / : Needs charging
  If the battery level is lower than the above, the inside of the battery icon starts to blink ( ).
- Range mode display
  • Lo: Fixed to the low range (0 - 1000 ppm)
  • Auto: Automatic switch between the low and high ranges
  • Hi: Fixed to the high range (0 - 10000 ppm)

## Gas sampling probe and gas sampling hose




| No. | Name | Function |
|---|---|---|
| (1) | Gas sampling probe | Placed in a detection area to collect a gas.<br>The probe includes a dust filter. |
| (2) | Gas sampling hose | A resin hose through which the sampled gas goes. |
| (3) | Hose clamp coupler | A joint that connects with the main unit. |

# 4

# How to Use

## 4-1. Before using the gas detector

Not only the first-time users but also the users who have already used the gas detector must follow the operating precautions.
Ignoring the precautions may damage the unit, resulting in inaccurate gas measurement.

## 4-2. Preparation for start-up

**CAUTION**

- The display is covered by the protective film to prevent scratches from shipping.
- Be sure to remove this film before use.
- Gas monitor with this film will not satisfy the explosion-proof performance.

Before starting gas detection, check the followings.

- Check that the protective film attached on the display from shipping is removed
- The batteries are installed (with sufficient battery level).
- The dust filter is not contaminated.
- The gas sampling probe is not loose.
- The hose clamp coupler is connected securely.

### 4-2-1. Battery replacement procedure

When the gas detector is used for the first time, or when the battery level is low, attach new AA alkaline batteries according to the following procedures.

**1 Check that the power of the gas detector is turned off.**
Turn off the power if it is turned on.

**2 Release the lock and open the battery cover.**

Lock plate

**3 Remove old batteries and then put new batteries while observing the correct polarity.**


**4 Close the battery cover and lock it.**
A clicking sound is heard when the cover is locked.

**DANGER**

- The requirements of explosion-proof standard of the gas detector include the use of TOSHIBA dry batteries. To use the unit as an explosion-proof product, use four AA alkaline dry batteries (LR6) manufactured by TOSHIBA CORPORATION.

**CAUTION**

- Be sure to turn off the power of the gas detector before replacing the batteries.
- Replace the batteries in a safe area.
- Replace all the four batteries with new ones at one time.
- Pay attention to the polarities of the batteries in replacing.
- If the battery cover is not completely locked, the dry batteries may drop off or water may get in through the clearance. Water may also get in if a minute foreign substance is caught beneath the battery cover.

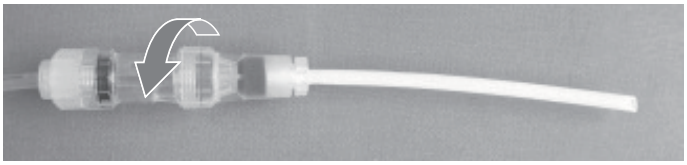
## 4-2-2. Gas sampling probe maintenance

Check the dust filter inside the gas sampling probe visually.
• Check that the dust filter is not contaminated.

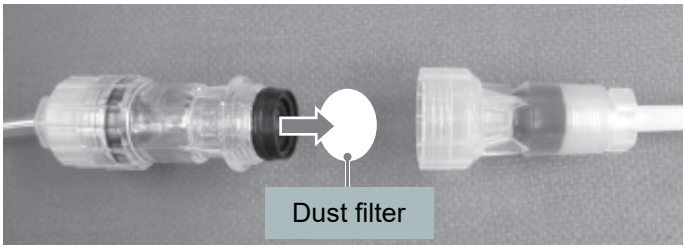
### <Dust Filter Replacement Procedure>

Check the dust filter inside the gas sampling probe for contamination visually.
If the dust filter is contaminated, replace it following the procedure below.

**1 Hold the middle section (filter case) of the gas sampling probe and remove the tip section by turning it counterclockwise.**



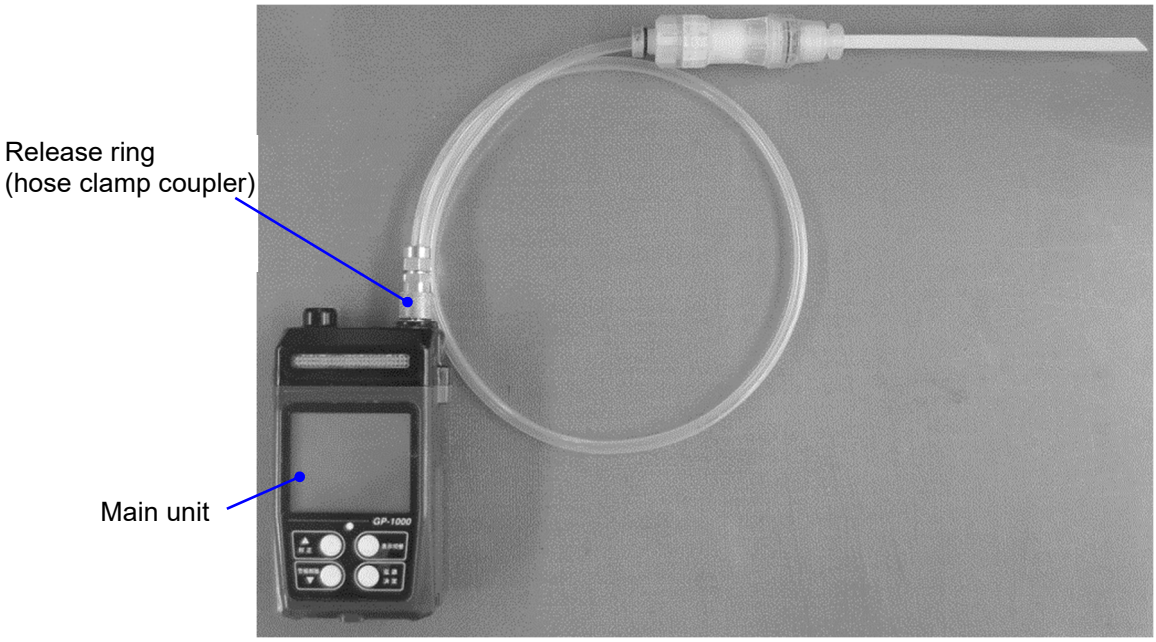
**2 Remove the contaminated dust filter from the middle section (filter case) and then put a new filter in the case.**
There are no differences between the front and back sides of the dust filter.




**3 Connect the tip section by turning it clockwise.**
Tighten it securely. Loose connection may cause a leak. Tighten it by hand.

## <Assembly>

Connect the gas sampling probe to the main unit as shown in the following figure.
Insert the hose clamp coupler into the gas inlet of the main unit while pulling the release ring, and then release the release ring.




**CAUTION**

- Use only a gas sampling hose specified by RIKEN KEIKI.
- Use the gas detector with the gas sampling probe connected to the gas sampling hose so that no foreign substance is drawn into the gas sampling hose.
- Be sure to connect the gas sampling probe to the gas sampling hose by hand. If they are fastened too tightly using a tool, the plastic part of the gas sampling probe may be broken.

**NOTE**

- To connect the hose release coupler to the gas inlet (GAS IN), push the coupler until it clicks.

# 4-3. How to start the detector

When the power is turned on, a self-diagnostic starts, and then the gas detector enters the detection mode.

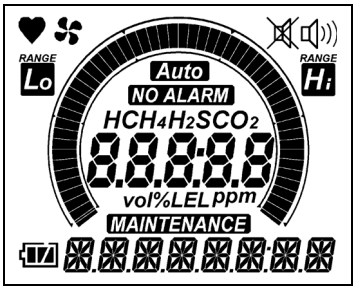
## Power-on

Press and hold the POWER button until the buzzer blips (one second or longer) to turn on the power. When the power is turned on, the LCD display changes automatically as shown below, and the gas detector enters the detection mode.

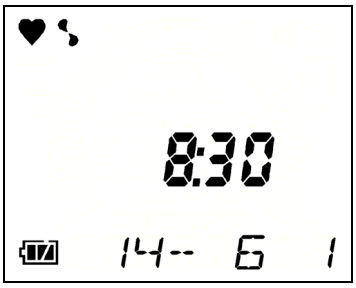
### 1 Press and hold the POWER button for one second or longer.

Hold down the button until all LCDs light up, the alarm lamp lights up, and the buzzer blips.

All LCDs light up.

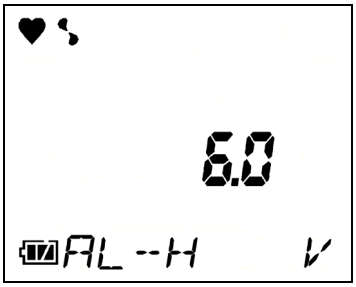



Date/time display



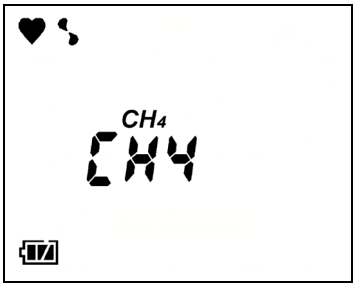

Display example:
Monday, June 01, 2015
8:30

Battery voltage display
Alarm type display



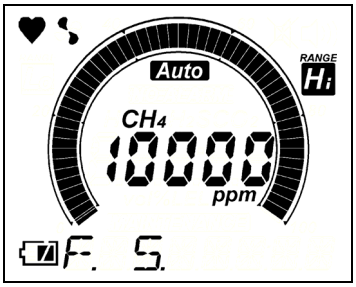

Display example:
Battery voltage: 6.0 V
Alarm type: AL-H (self-latching)
* Alarm type
Self-latching: AL-H (Alarm-Hold)
Auto-reset: AL-A (Alarm-Auto)

Gas name display



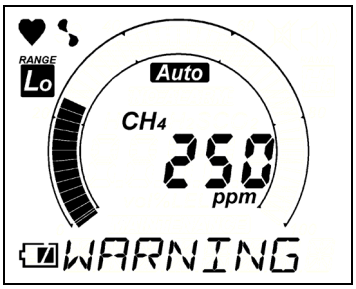

Display example:
CH4

Full scale Display



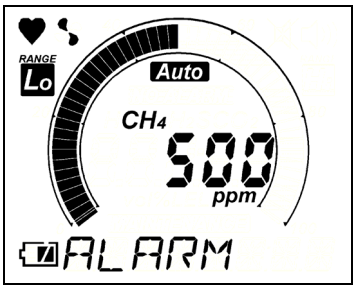

Display example: 10000 ppm

WARNING setpoint display



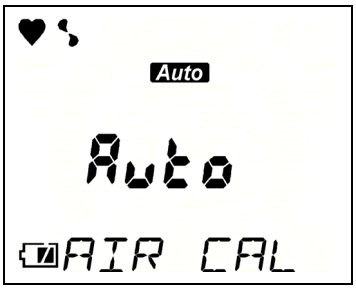

Display example: 250 ppm

ALARM setpoint display



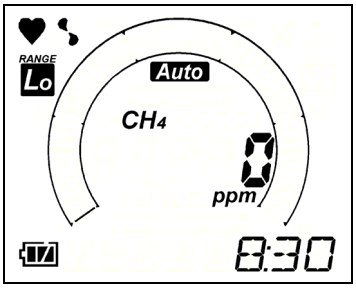

Display example: 500 ppm

Automatic air calibration Display




The buzzer blips once and the detection mode is displayed.

Detection mode



## WARNING

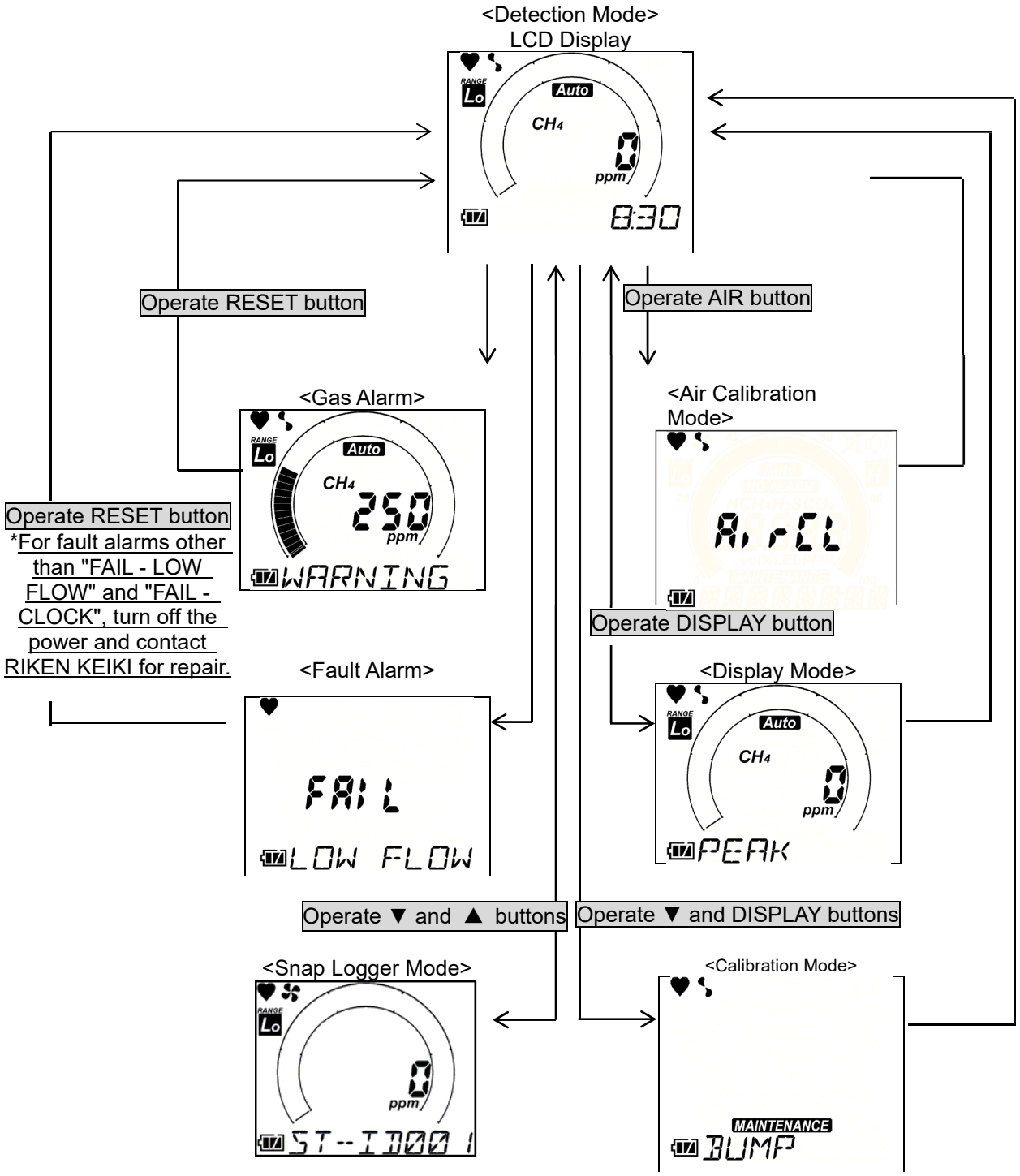
- Before turning on the power, check that the gas detector is connected to the gas sampling probe and the surrounding air is fresh. When the gas detector is powered on, zero adjustment is performed by air calibration automatically. Therefore, if the power is turned on under a gas atmosphere, incorrect gas concentration will be displayed.
- If automatic air calibration is not performed normally at power-on, presence of some gas in the power-on environment is suspected. In this case, turn off the power and then turn it on again in an environment with fresh atmospheric air. If the situation does not improve after several times of power cycling, there may be a problem in the sensor. Contact RIKEN KEIKI immediately. Gas measurement cannot be performed with a faulty sensor.
- If the main unit is dropped or given a shock, the reading may remain high. In this case, perform air calibration in a location with fresh atmospheric air.

## NOTE

- The range mode used at the last power off is retained.
- If there is an abnormality in the built-in clock, a fault alarm "FAIL CLOCK" may be triggered. In this case, contact RIKEN KEIKI immediately.

# 4-4. Basic operating procedures

The detection mode is used after power-on.




## NOTE

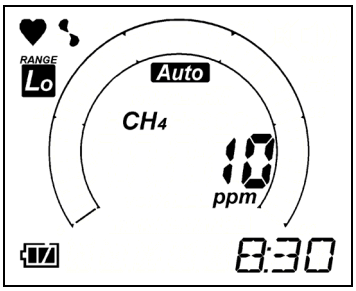
- Of the fault alarms, only the low flow rate alarm "FAIL - LOW FLOW" can be reset by pressing the RESET button after removing the cause of low flow rate. For other fault alarms, turn off the power and then promptly contact RIKEN KEIKI.
- The backlight goes off after 20 seconds or so of no operation. It lights up continuously while an alarm is activated.

# 4-5. Performing air calibration

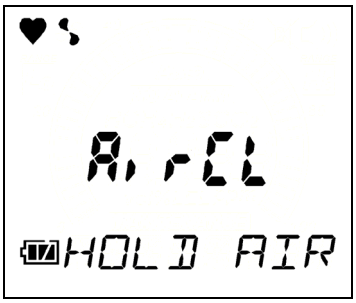
Perform air calibration at maintenance before starting work or if the zero point deviates even though fresh air is drawn.
* Before performing air calibration, check that the surrounding air is fresh.

LCD display

**1 Press and hold the AIR button in the detection mode.**

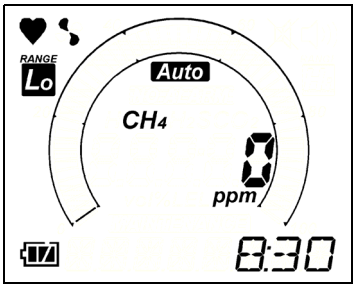



**2 Release the AIR button when the display changes from "AirCL - HOLD AIR" to "AdJ - RELEASE".**
(Buzzer: Three times <blip, blip, blip>)





The zero adjustment is done and the gas detector returns to detection mode.
(Buzzer: Once <blip>)




If air calibration fails, "FAIL - AIR CAL" is displayed. Press the RESET button to reset the alarm. The gas detector returns to the detection mode (before adjustment).

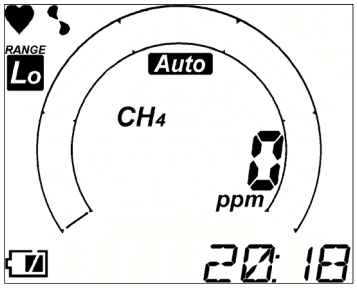
**NOTE**

- Perform air calibration under pressure and temperature/humidity conditions close to those in the operating environment and in fresh air.
- Perform air calibration after the reading is stabilized.
- If there is a sudden temperature change of 15ºC or more between the storage and operational locations, turn on the power of the gas detector, let it stand for about 10 minutes in a similar environment to the operational location, and perform air calibration in fresh air before using it.

# 4-6. How to detect

When the preparation for start-up and air calibration have been completed, put the probe close to the detection area in the detection mode and perform gas detection.

**Reading display (example)**
- CH4 concentration: 0 ppm
- Detection range: 0 - 1000 ppm (Low RANGE)
- Range mode: Automatic switching (Auto)
- Battery level: Low
- Time: 18 minutes past eight in the evening




## DANGER

- While conducting measurement in a manhole or confined space, do not lean over or look into the manhole or closed space. It may lead to dangers because oxygen-deficient air or other gases may blow out.
- Oxygen-deficient air or other gases may blow out from the gas exhausting outlet. Never inhale the air or gases.
- High-concentration combustible gases may blow out. Never use fire near it.

## WARNING

- The gas detector is designed to draw gases around it under the atmospheric pressure. If excessive pressure is applied to the gas inlet and outlet (GAS IN, GAS OUT) of the gas detector, detected gases may leak out from its inside and may cause dangerous conditions. Be sure that excessive pressure is not applied to the gas detector while used.
- Do not connect the sampling hose directly to a location with a pressure higher than the atmospheric pressure. The internal piping system may be damaged.
- When the fresh air adjustment is performed in the atmosphere, check the atmosphere for freshness before beginning the adjustment. If other gases exist, the adjustment cannot be performed properly, thus leading to dangers when the gas leaks.
- Issuance of a gas alarm indicates that there are extreme dangers. Take proper actions based on your judgment.
- Before use, check that there remains sufficient battery power. When the gas detector is not used for a long period, the batteries may be exhausted. Be sure to replace them with new ones before use.
- If a low battery alarm occurs, gas detection cannot be conducted. If the alarm is triggered during use, turn off the power and promptly replace the batteries in a safe area.
- Do not block the buzzer sound opening. No alarm sound can be heard.
- If the main unit is dropped or given a shock, the reading may remain high. In this case, perform air calibration in a location with fresh atmospheric air.

## CAUTION

- Before performing gas detection, attach the gas sampling probe provided with the gas detector to prevent disturbances by air dust.

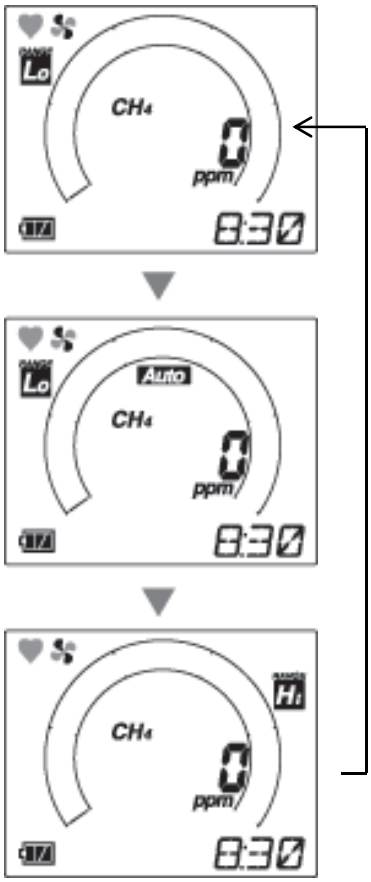
**NOTE**

- Use only a gas sampling hose specified by RIKEN KEIKI.
- Use the gas detector with the gas sampling probe connected so that no foreign substance is drawn into it.
- An oxygen concentration higher than a certain level is required for the sensor of the gas detector to correctly detect gases and display concentrations.
- Correct detection may not be performed under the presence of high-concentration combustible gas due to insufficient oxygen concentration. Once a gas exceeding 10000 ppm is detected, the over display (∩∩∩∩) is held even if the combustible gas concentration drops.
- Long-time detection of a high-concentration combustible gas may adversely influence the sensor.
- In a low-temperature environment, the operating time is shortened due to the battery performance property.
- At a low temperature, the response of the LCD display may get slow down.
- If a combustible gas with a higher concentration than 10000 ppm is drawn, some gas may remain in the gas sampling hose due to adsorption in the hose, gas sampling probe, etc. After drawing a high-concentration combustible gas, clean the gas detector to remove the adsorbed gas (draw fresh air and check that the reading becomes zero).
  Performing fresh air adjustment before cleaning it completely will result in inaccurate adjustment, giving adverse influence on measurement. In such a case, remove the gas sampling hose before performing fresh air adjustment to avoid inaccurate adjustment.

## Switching the range mode

The range mode can be switched between the <Lo> low range (0 - 1000 ppm), <Auto> automatic switch and <Hi> high range (0 - 10000 ppm) to use the gas detector.
<Auto> switches the range mode between low and high automatically.

**Press the POWER button.**
A single press of the button causes the buzzer to blip once and the range to change.




<Lo> Low range
Fixed to (0 - 1000 ppm)

<Auto>
Automatic switch

* With <Auto> selected, the active range icon (Lo or Hi) also lights up.

<Hi> High range
Fixed to (0 - 10000 ppm)

### NOTE

- The range mode used at the last power off is retained.

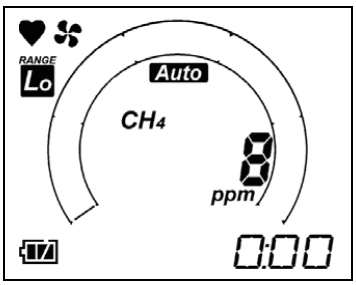
# 4-7. Snap logger

Any instantaneous value during measurement can be recorded.
Up to 256 points of data can be recorded. When the number of recorded data points reaches the maximum, recorded data will be overwritten, starting from the oldest data.

LCD display

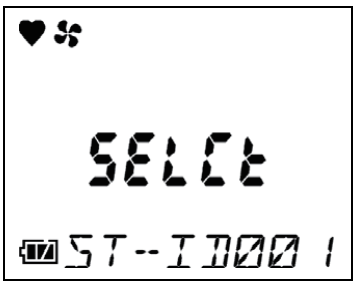
**1 Press the ▼ and ▲ buttons.**

The station ID selection screen of the snap logger mode is displayed.

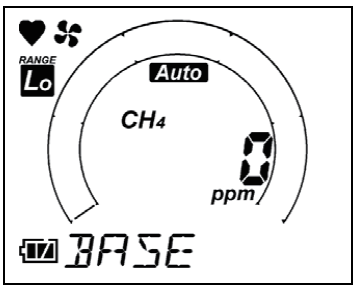



**2 Select a station ID using the ▼ or ▲ button and then press the ENTER button.**

The BASE record screen is displayed.

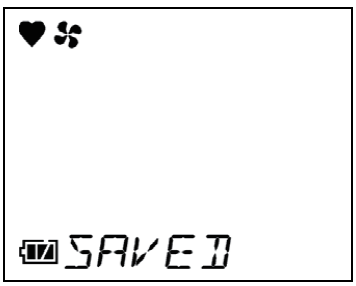



**3 Press the ENTER button.**



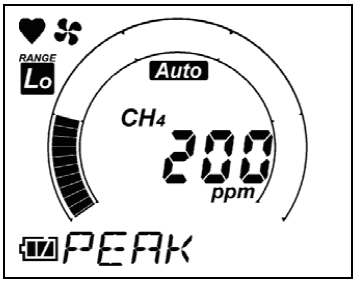

▼

The BASE record is saved and then the PEAK record screen is displayed.

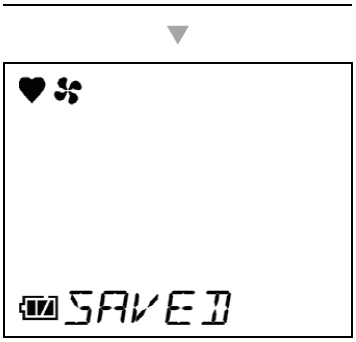



If air calibration fails, "FAIL - AIR CAL" is displayed. Press the RESET button to reset the alarm. The gas detector returns to the detection mode (before adjustment).

**4 Press the ENTER button.**



The PEAK record is saved and then the station ID selection screen is displayed.




To continue recording logs, operate from the station ID selection described in the step 2.
To end log recording, press the DISPLAY button to return to the detection mode.

## 4-8. Power-off

Press and hold the POWER button (at least three seconds) until the buzzer blips four times ("TURN OFF" disappears) to turn off the power.

**CAUTION**

- Do not turn off the power while the gas concentration display indicates a high value.
  A high-concentration gas that remains in the gas detector may adversely affect the sensor.

# 5

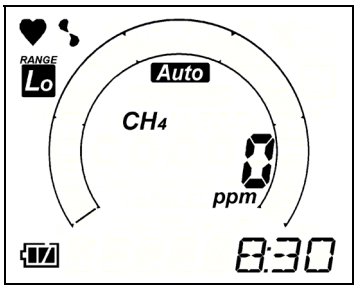
# Display Mode Setting

## 5-1. Entering display mode

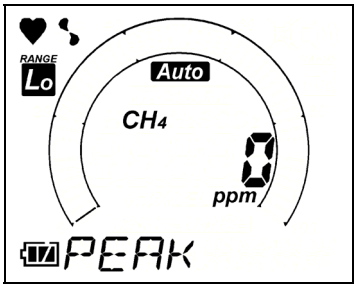
This mode allows users to view and change various display settings.

**1** **Press the DISPLAY button in the detection mode.**
The peak display in the display mode appears.

LCD display




**2** **Press the DISPLAY button again to display a desired menu.**
The display mode setting screen switches to another every time the button is pressed.

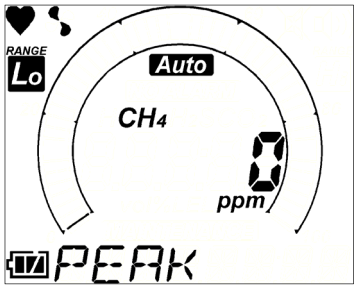
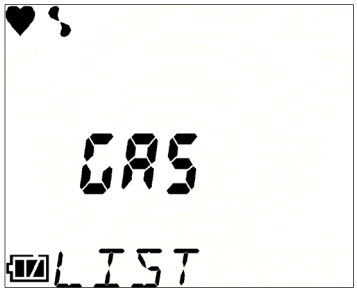
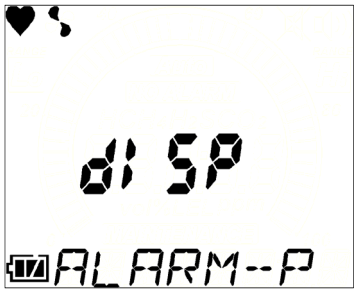
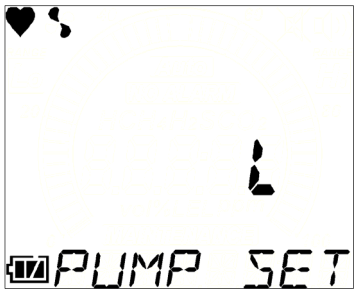
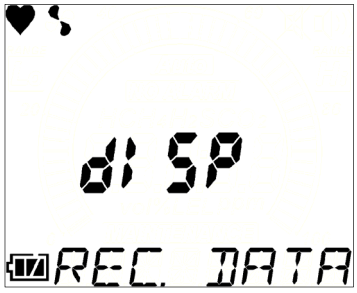


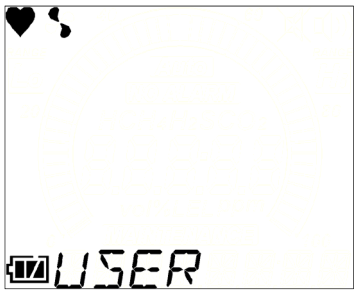
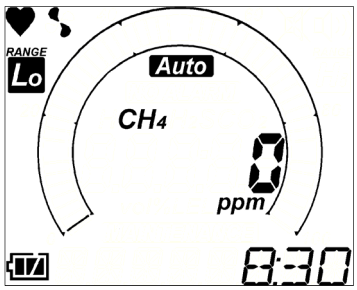

* Press the ▲ or ▼ button to select a desired menu and press the ENTER button to perform the setting.

**NOTE**

- The gas detector automatically returns to the detection mode after 20 seconds or so of no operation.
- The backlight goes off after 30 seconds or so of no operation.
- Gas detection is continued in the display mode and an alarm can be activated.

# Overview of display mode

| Item | LCD display | Details |
|---|---|---|
| **Peak display** |  | Displays the maximum concentration detected during the period from power-on to the point of checking.<br>* To clear the peak display, press and hold the RESET button until "CLEAR - RELEASE" is displayed. |
| **Concentration displayed gas reading setting** |  | By changing the setting to the pre-registered gas in the gas detector, the converted concentration from the detection target gas (HC or CH4) will be displayed.<br>(P. 31) |
| **Alarm setpoint display** |  | Displays the alarm setpoint of the gas detector.<br>* Press the ENTER button while the alarm setpoint is displayed to perform alarm test for the setting.<br>(P. 34) |
| **Pump suction volume setting** |  | Changes (in small measure) the pump suction volume.<br>(P. 36)<br>* L: Low (suction volume <low>)<br>H: High (suction volume <high>) |
| **Log data display** |  | Displays the data recorded by the snap logger.<br>(P. 38) |

| | | |
|---|---|---|
| **Entering user mode** |  | Enters the user mode.<br>(P. 40) |
| **Detection mode** |  | Returns to the detection mode. |

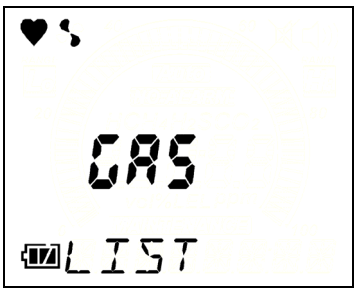
# 5-2. Concentration displayed gas reading setting

Normally, the concentration display of the gas detector is either "methane (CH4)" or "general combustible gases (HC)" depending on the specification; however, a pre-registered gas can be read instead to display its concentration.

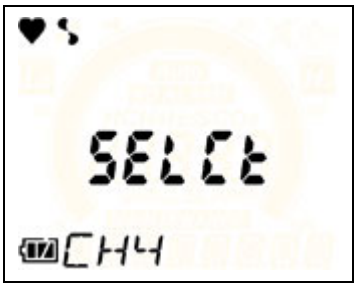
LCD display

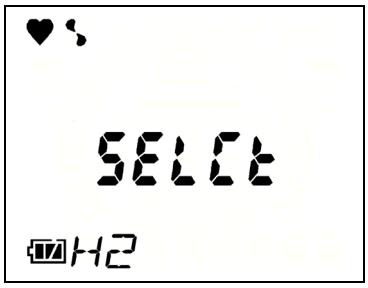
**1 Press the ENTER button.**

The gas reading setting mode is entered.



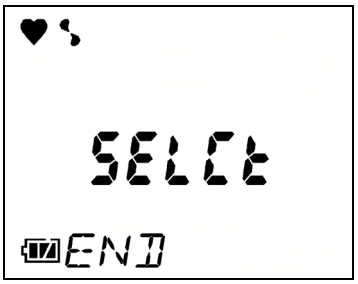

**2 Select a gas name to read using the ▼ or ▲ button and then press the ENTER button.**

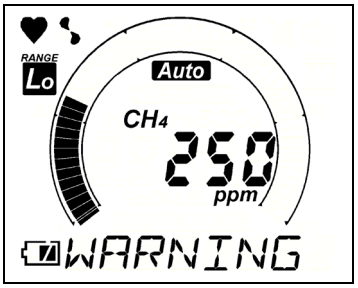


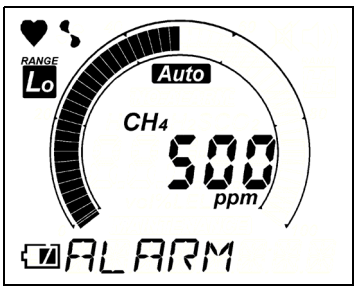



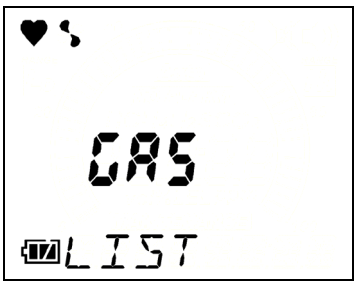

* Press the DISPLAY button to cancel the operation.

After "END" is displayed, the WARNING and ALARM setpoints are displayed before returning to the display mode menu.






**CAUTION**

- To perform the concentration displayed gas reading setting, see the "NC-1000 gas list" in the following page.
- Some gases cannot be read with an optional spiral hose. Use an appropriate hose.

**NOTE**

- The alarm accuracy and alarm delay time on the specification are applied to the calibration gas (CH4 or HC) only.
- The concentration displayed for a converted reading is a reference value. To display an accurate concentration, calibration using the gas to be measured is required. Therefore, request RIKEN KEIKI to perform calibration using the gas to be measured.
- See "NC-1000 gas list" in the following page for a list of gases available for reading.
- The gas detector provides two different specifications for target combustible gases: "general combustible gases (HC)" and "methane (CH4)". Some gases cannot be read depending on the specification. See "NC-1000 gas list" in the following page.

## NC-1000 gas list

| No. | Gas type | Display | Read from CH4 | Read from i-C4H10 | Spiral hose | Hose for solvent |
|---|---|---|---|---|---|---|
| 1 | Methane | CH4 | ○ | × | ○ | ○ |
| 2 | Isobutane | i-C4H10 | ○ | | ○ | ○ |
| 3 | Hydrogen | H2 | ○ | | ○ | ○ |
| 4 | Methanol | CH3OH | ○ | | × | ○ |
| 5 | Acethylene | C2H2 | ○ | | ○ | ○ |
| 6 | Ethylene | C2H4 | ○ | | ○ | ○ |
| 7 | Ethane | C2H6 | ○ | × | ○ | ○ |
| 8 | Ethanol | C2H5OH | ○ | | × | ○ |
| 9 | Propylene | C3H6 | ○ | | × | ○ |
| 10 | Acetone | C3H6O | ○ | | × | ○ |
| 11 | Propane | C3H8 | ○ | × | ○ | ○ |
| 12 | Butadiene | C4H6 | ○ | | × | ○ |
| 13 | Cyclopentane | C5H10 | ○ | | × | ○ |
| 14 | Benzene | C6H6 | ○ | | × | ○ |
| 15 | n-Hexane | n-C6H14 | ○ | | × | ○ |
| 16 | Toluene | C7H8 | ○ | | × | ○ |
| 17 | Heptane | n-C7H16 | ○ | | × | ○ |
| 18 | Xylene | C8H10 | ○ | | × | ○ |
| 19 | Ethyl acetate | EtAc | ○ | | × | ○ |
| 20 | IPA | IPA | ○ | | × | ○ |
| 21 | MEK | MEK | ○ | | × | ○ |
| 22 | Methyl methacrylate | MMA | ○ | | × | ○ |
| 23 | Dimethyl ether | DME | ○ | | × | ○ |
| 24 | Methyl isobutyl ketone | MIBK | ○ | | × | ○ |
| 25 | Tetrahydrofuran | THF | ○ | | × | ○ |

# 5-3. Alarm setpoint display

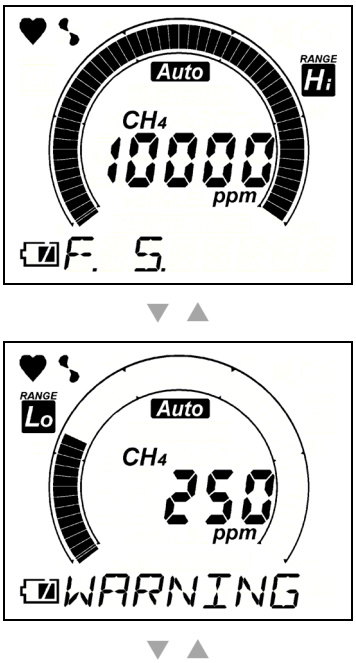
The alarm setpoint display and alarm activation can be tested.

LCD display


**1 Press the ENTER button.**
The alarm setpoint display appears.

* Press the DISPLAY button to cancel the operation.

**2 Select a target alarm value using the ▼ or ▲ button.**

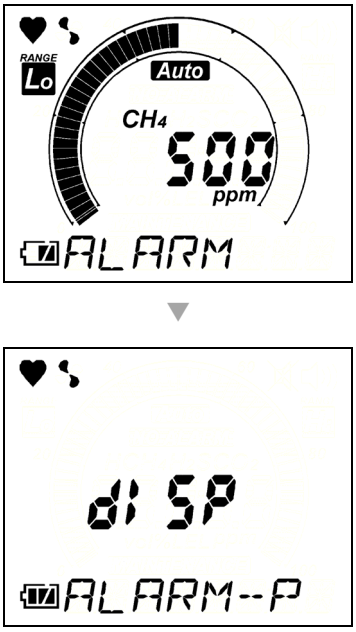



* F.S., WARNING and ALARM can be checked.

* Press the ENTER button to test the selected alarm activation. Press any button to reset the alarm.

**3 Press the DISPLAY button.**

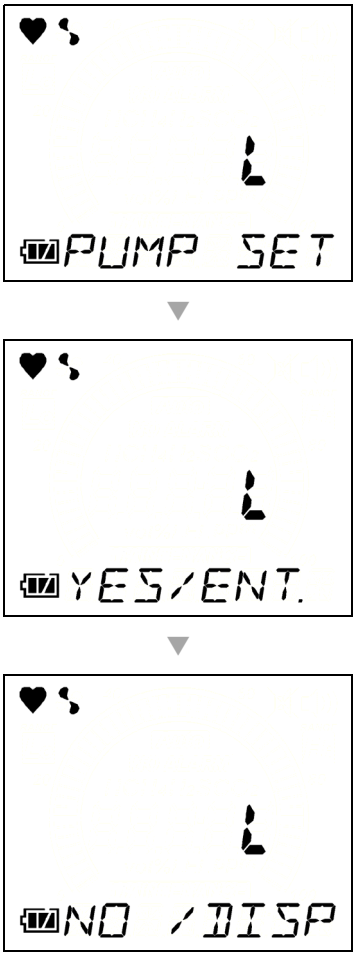
The display mode menu returns.



# 5-4. Pump suction volume setting

The pump suction volume can be set to L (Low: suction volume <low>) or H (High: suction volume <high>).

LCD display



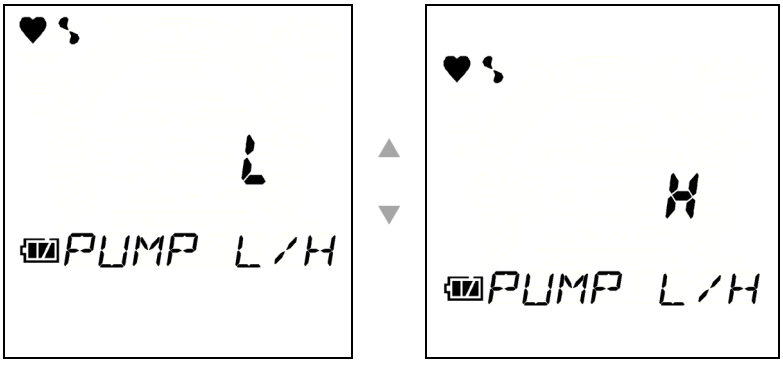

**1 Press the ENTER button.**

The pump suction volume setting mode is entered.

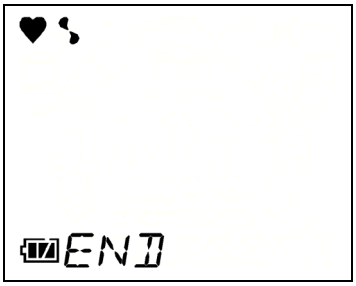
* Press the DISPLAY button to cancel the operation.

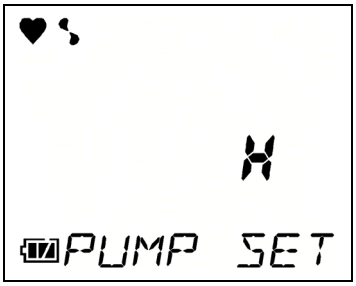
**2 Select a pump suction volume using the ▼ or ▲ button and then press the ENTER button.**

* L (Low: suction volume <low>)
H (High: suction volume <high>)




After "END" is displayed, the gas detector returns to the display mode menu.






**NOTE**

- When the gas detector is restarted, the pump suction volume is set to L (suction volume <low>).

# 5-5. Log data display

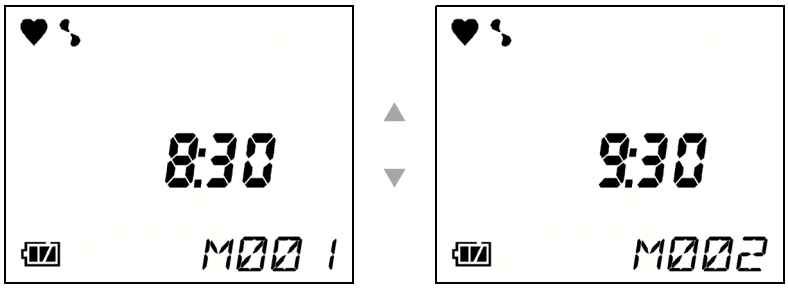
The data recorded by the snap logger can be viewed.

LCD display

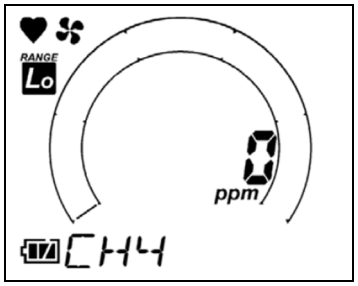

**1 Press the ENTER button.**
The log data display appears.

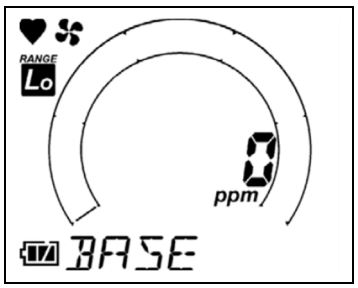
* Press the DISPLAY button to cancel the operation.

**2 Select a desired log memory number using the ▼ or ▲ button and then press the ENTER button.**



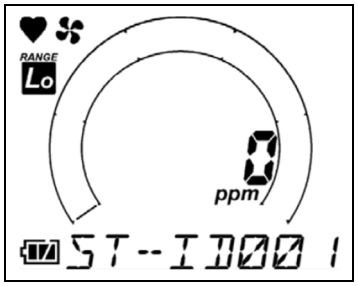
The contents of the selected log (gas name, BASE and PEAK record values and station ID) are displayed in turn.

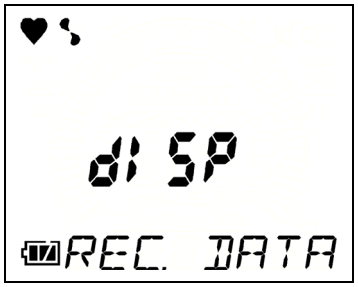



**3 Press the DISPLAY button to end.**

The display mode menu returns.




* To continue the log data display, press the ENTER button and repeat the steps from 2.

# 6

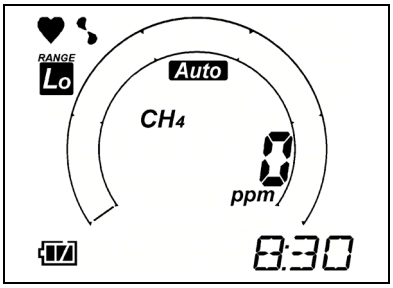
# User Mode Setting

## 6-1. Entering user mode

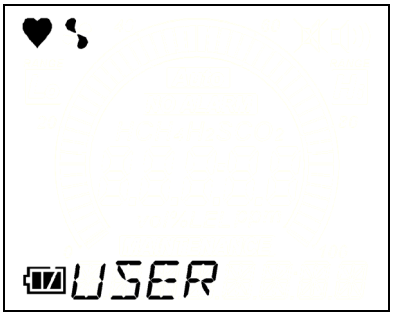
The maintenance including internal clock correction can be performed.

LCD display

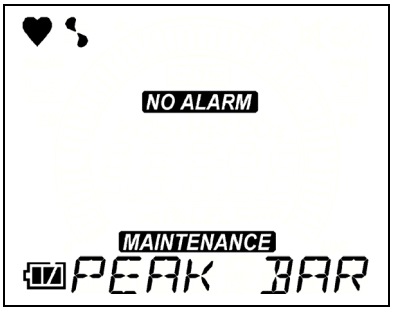
**1 Press the DISPLAY button six times in the detection mode to enter the user mode.**




**2 Press the ENTER button.**




The peak bar display setting screen is displayed.




* Press the ▲ or ▼ button to select a desired menu and press the ENTER button to perform the setting.

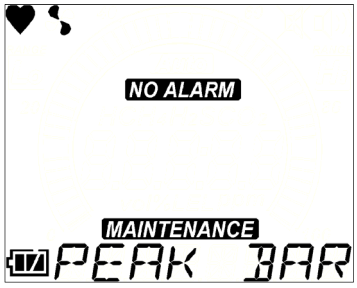
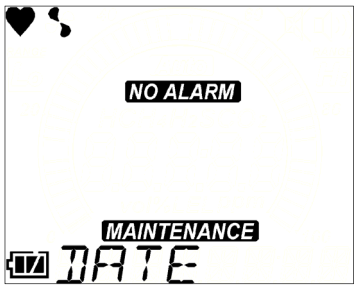
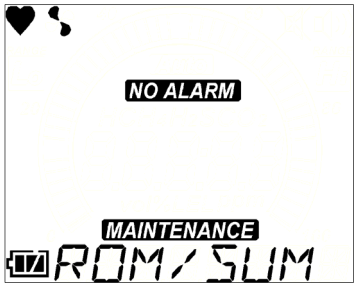
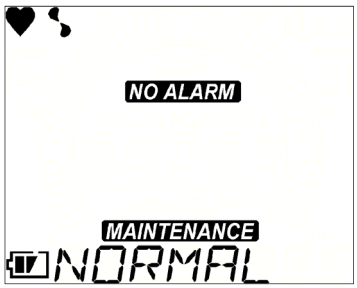
**CAUTION**

- Return to the detection mode after use. The gas detector returns to the detection mode from the user mode after 15 minutes or so of no operation.
- Neither gas detection nor alarm activation occurs in the user mode.

**NOTE**

- The backlight goes off after 30 seconds or so of no operation.

# Overview of user mode

| Item | LCD display | Details |
|---|---|---|
| **Peak bar display setting** |  | Turns on/off the display of blinking bar graph for the maximum concentration detected during the period from power-on to the point of checking on the bar graph. (P. 43) |
| **Date/time setting** |  | Set the date/time of the internal clock. (P. 44) |
| **ROM/SUM display** |  | Displays the program number and SUM value of the gas detector.<br>* This is not typically used by the user. |
| **Entering detection mode** |  | To end, press the ENTER button to return to the detection mode. |

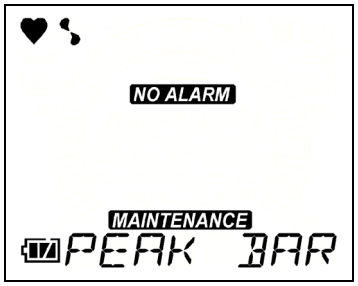
# 6-2. Peak bar display setting

A peak of the detected gas concentration can be displayed on the bar.

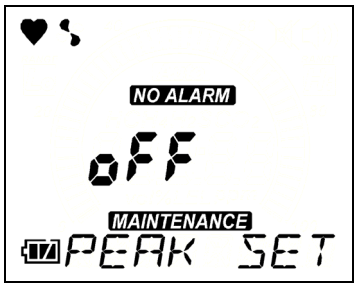
LCD display

**1 Press the ENTER button.**

The peak bar display setting mode is entered.



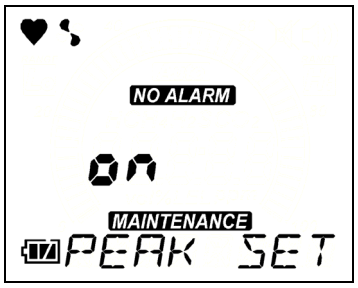

**2 Select <on>/<oFF> for the peak bar display using the ▼ or ▲ button.**




* This is disabled <oFF> by default.

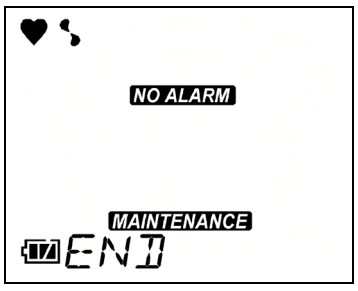
▼ ▲

**3 Press the ENTER button to confirm the selection.**

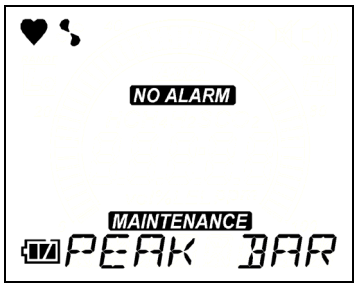



▼

After "END" is displayed, the gas detector returns to the user mode menu.




▼

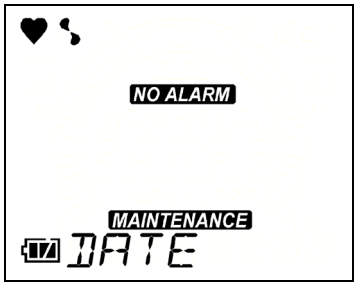


# 6-3. Date/time setting

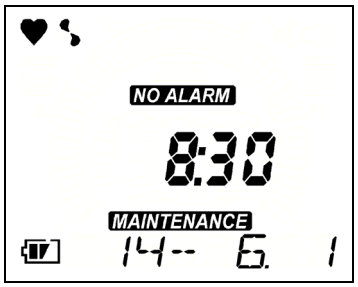
Set the date/time of the internal clock.

LCD Display

**1 Press the ENTER button.**
The date/time setting mode is entered.

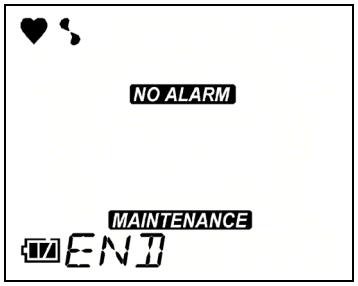



**2 Adjust the date/time using the ▲ or ▼ button and then press the ENTER button.**

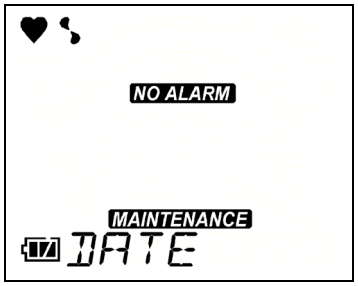



**3 Set the date/time in the order of year -> month -> day -> hour -> minute.**

When the "minute" value is confirmed, "END" is displayed and then the gas detector returns to the user mode menu.




▼



# 7

# Calibration

## 7-1. Preparation for air and span calibration

Prepare the followings before performing maintenance such as bump test and air calibration.

### Preparation for air calibration

Perform air calibration at maintenance before starting work or if the zero point deviates even though fresh air is drawn. Before performing air calibration, check that the surrounding air is fresh.

・ Air calibration (P. 22, P. 52)

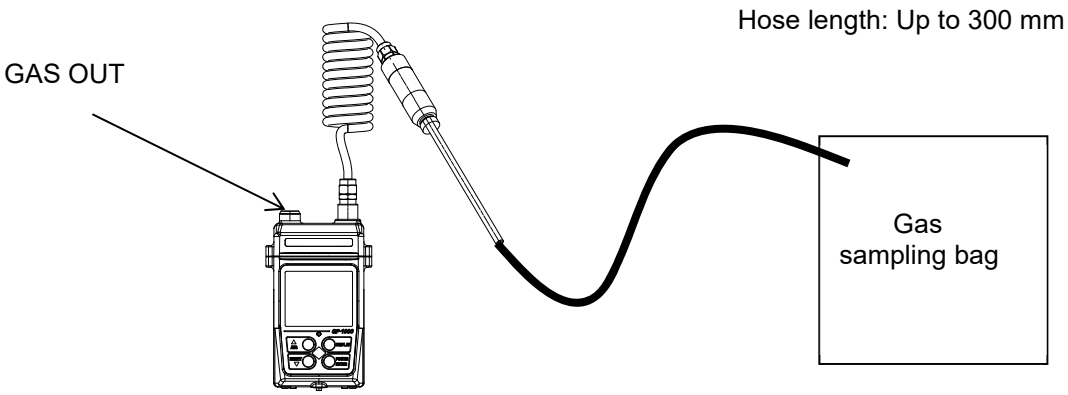
### Preparation for span calibration

#### <Prepared Items>

・ Calibration gas CH4 or i-C4H10 (*1, *2) 5000 ppm ±500 ppm (recommended)
・ Gas sampling bag (*2)
・ Stopwatch
*1 Depends on the type of gas detector.
*2 Optional parts

#### <Connection>

Connect the gas detector as shown in the figure below.
Connect a gas sampling bag at an appropriate timing.




Perform span calibration in a single step using the concentration of the prepared calibration gas preliminarily set to the gas detector, or perform it manually by adjusting to the concentration of the prepared calibration gas.

・ AUTO CAL (P. 53)
・ ONE CAL (P. 55)

**CAUTION**

- Do not use a lighter gas to check the sensitivity of the gas detector. A constituent of the lighter gas may deteriorate the sensor performances.

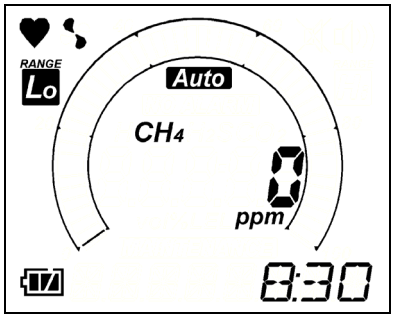
# 7-2. Entering calibration mode

The maintenance including bump test and air calibration can be performed.

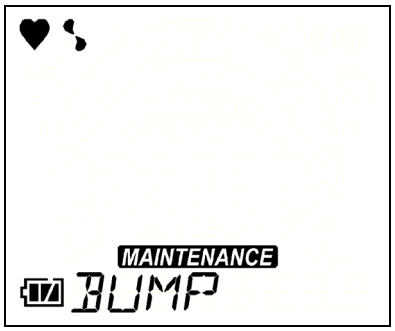
LCD display

**1 Press and hold the ▼ and DISPLAY buttons together in the detection mode.**

The bump test screen in the calibration mode is displayed.




**2 Press the ▼ or ▲ button to display a desired menu.**




* Press the ▲ or ▼ button to select a desired menu and press the ENTER button to perform the setting.
* When the password has been set in the calibration mode, the password entry screen appears.

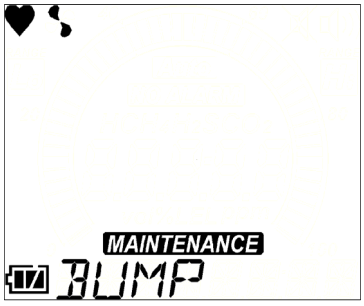
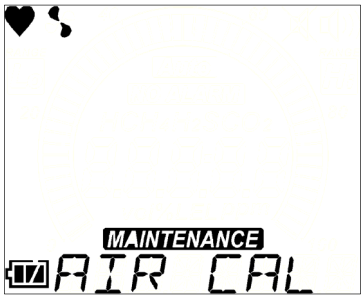
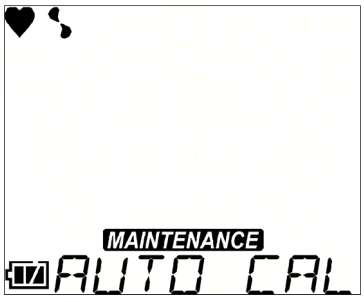
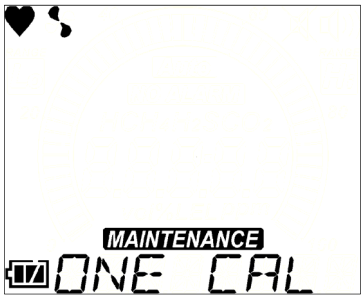
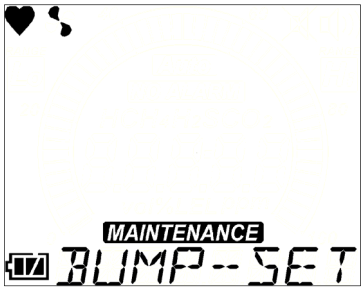
## CAUTION

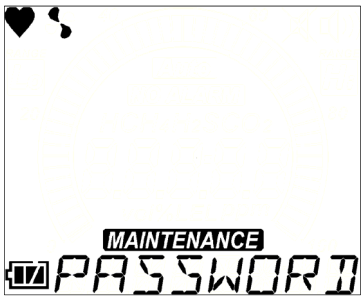
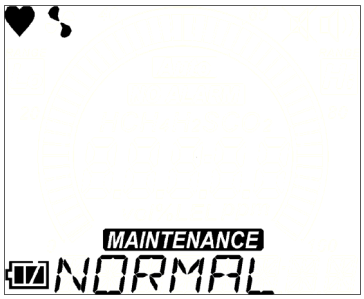
- Return to the detection mode after use. The gas detector returns to the detection mode from the calibration mode after 15 minutes or so of no operation.
- Neither gas detection nor alarm activation occurs in the calibration mode.

## NOTE

- The backlight goes off after 30 seconds or so of no operation.

# Overview of calibration mode

| Item | LCD display | Details |
|---|---|---|
| **Bump test** |  | Conducts the function test using a test gas.<br>(P. 50) |
| **Air calibration** |  | Performs air calibration (zero adjustment).<br>(P. 52) |
| **Auto calibration** |  | Automatically adjusts to the preset concentration value of the prepared calibration gas in a single step.<br>(P. 53) |
| **One calibration** |  | Manually adjusts to the concentration value of the prepared calibration gas.<br>(P. 55) |
| **Bump test condition setting** |  | Sets the various operating conditions of bump test.<br>(P. 57) |

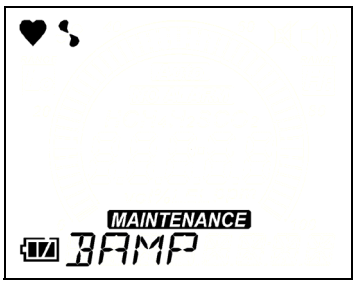
| | | |
|---|---|---|
| **Password setting** |  | Sets a password used to protect the entry to the calibration mode.<br>(P. 59) |
| **Returning to detection mode** |  | To end, press the ENTER button to return to the detection mode. |

# 7-3. Bump test

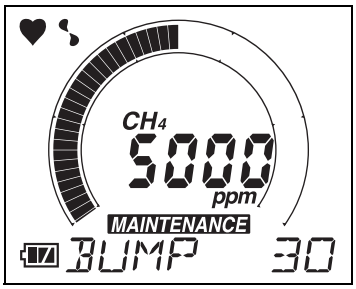
The function is tested using a test gas. The result will be displayed as "P" (Pass) or "F" (Failure). If the function is diagnosed as "F" (Failure), perform span calibration, etc.

LCD display

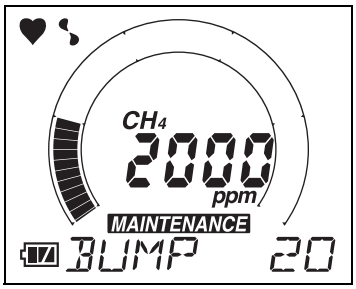
**1 Press the ENTER button.**
The bump test mode is entered.

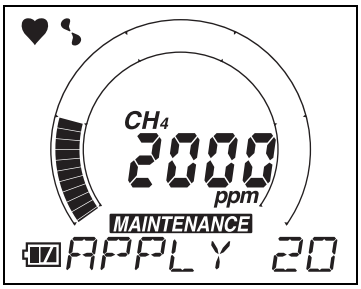



**2 Supply the test gas and press the ENTER button.**

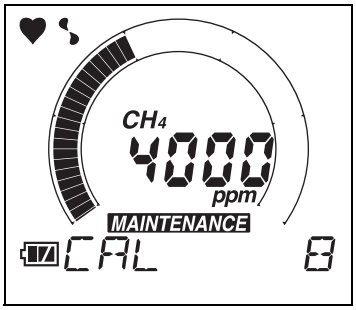


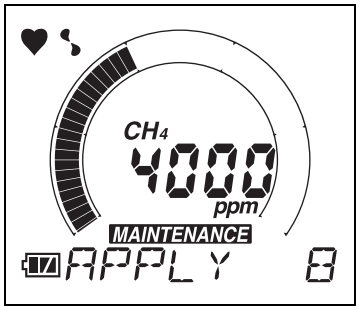

"BUMP" and "APPLY" are displayed alternately and the countdown is started. When the count reaches zero, diagnosis is performed.



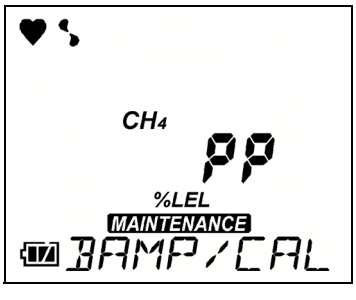




When CAL is set to ON, "CAL" and "APPLY" are displayed alternately next and the countdown is started. When the count reaches zero, calibration is performed. When the calibration is completed, the diagnosis result is displayed.



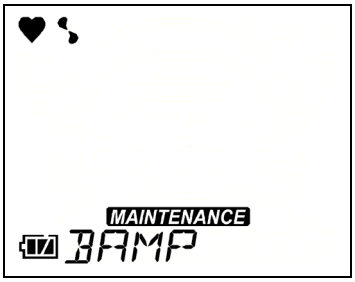




**3 Press the ENTER button.**




* PP: Pass
FF: Failure

The gas detector returns to the calibration mode menu.

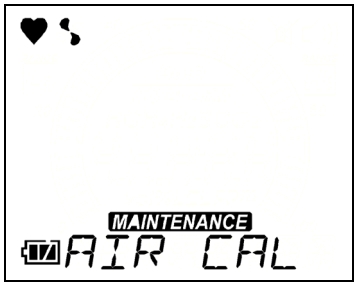


# 7-4. Air calibration

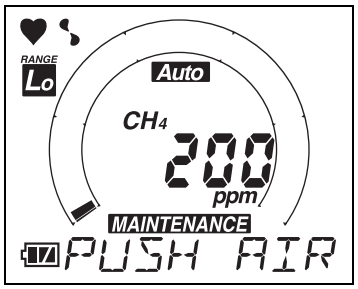
Perform the air calibration.

LCD display

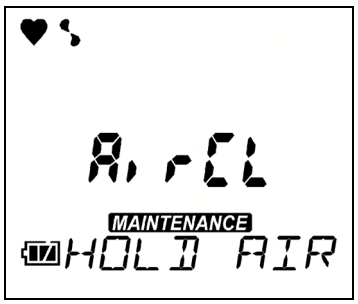
**1 Press the ENTER button.**
The air calibration mode is entered.



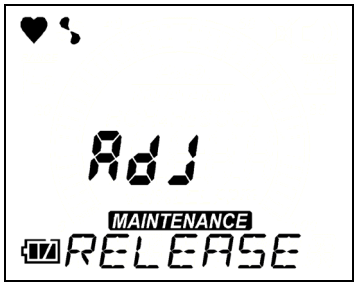

**2 Hold down the AIR button.**

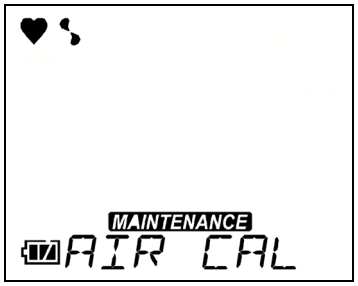



**3 Release the AIR button when the display changes from "AirCL - HOLD AIR" to "AdJ - RELEASE".**
(Buzzer: Three times <blip, blip, blip>)




When zero adjustment is completed, "END" is displayed and then the gas detector returns to the calibration mode menu.
(Buzzer: Once <blip>)



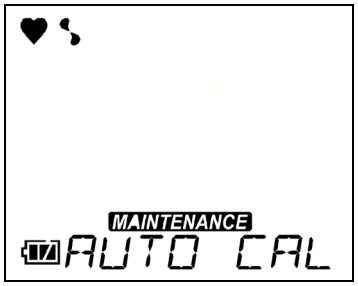

* If air calibration fails, "FAIL" is displayed. Press the RESET button to reset the alarm.

# 7-5. AUTO CAL

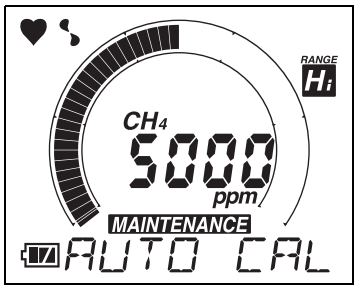
This is how to preset the concentration value of the prepared calibration gas to the gas detector and perform calibration in a single step.

LCD display

**1 Press the ENTER button.**
The AUTO CAL mode is entered.

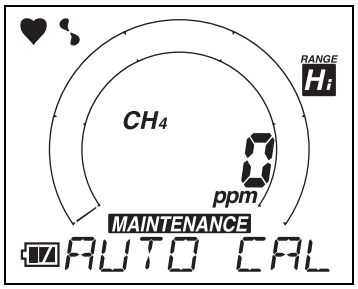



**2 When the preset adjustment value is displayed, press the ENTER button.**

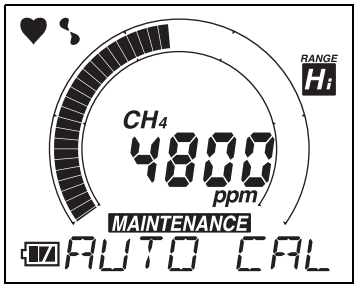


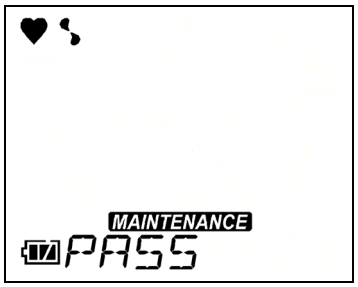

The value of AUTO CAL can be changed by using the ▼ and DISPLAY buttons.

"AUTO CAL" blinks and the system waits for the calibration gas to be introduced.



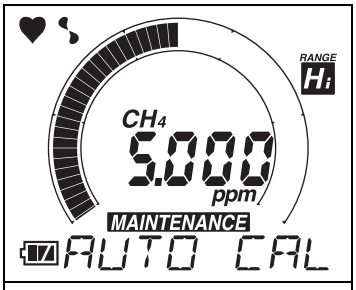

**3 Start supplying the calibration gas. Press the ENTER button after one minute.**



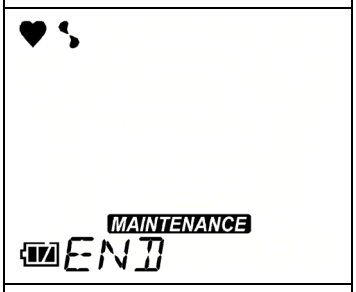




* If span calibration fails, "FAIL" is displayed. Press the RESET button to reset the alarm.

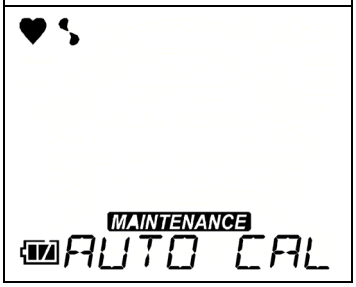
After span adjustment, the gas detector returns to the gas concentration display.




After "END" is displayed, the gas detector returns to the calibration mode menu. (Buzzer: Once <blip>)




**4 Stop supplying the calibration gas.**

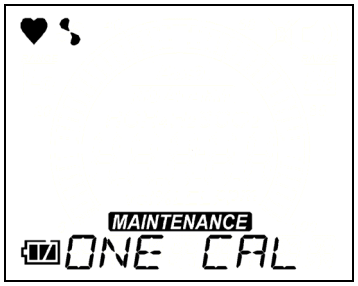


# 7-6. ONE CAL

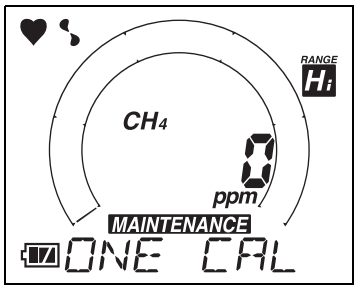
This is how to perform calibration with manually set to the concentration value of the prepared calibration gas.

LCD Display

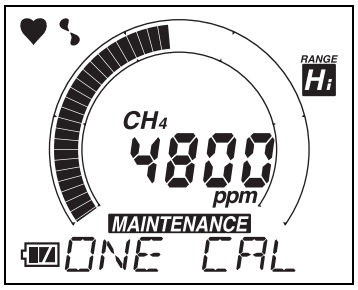
**1 Press the ENTER button.**
The ONE CAL mode is entered.



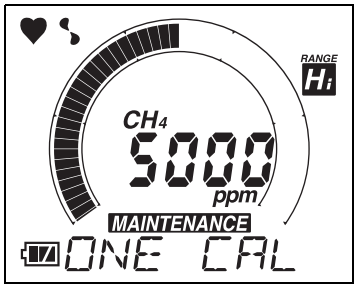

The concentration display blinks and the system waits for the calibration gas to be introduced.



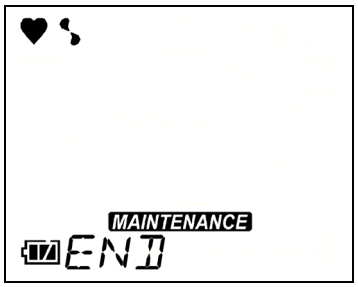

**2 Start supplying the calibration gas.**




**3 After one minute, adjust the value using the ▲ or ▼ button and then press the ENTER button.**

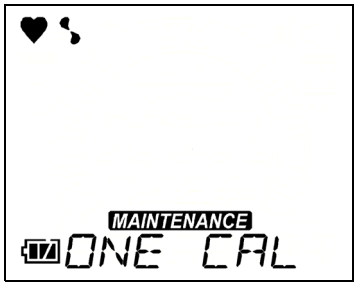



After span adjustment, "END" is displayed and then the gas detector returns to the calibration mode menu. (Buzzer: Once <blip>)




* If span calibration fails, "FAIL" is displayed. Press the RESET button to reset the alarm.

**4 Stop supplying the calibration gas.**

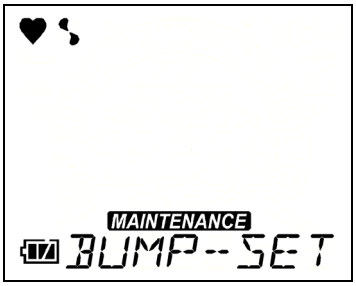


# 7-7. Bump test condition setting

Various conditions for conducting a bump test can be set.

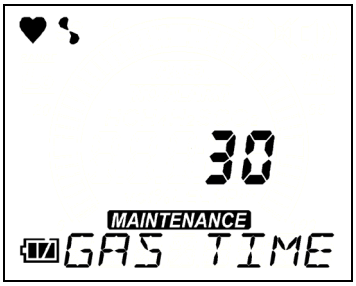
LCD display

**1 Press the ENTER button.**
The bump test condition setting mode is entered.



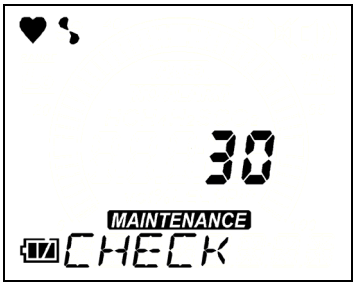

* Press the ▲ or ▼ button to select a desired menu and press the ENTER button to perform the setting.

**2 Set the time for introducing a test gas.**
Diagnosis is performed automatically when the set time has passed.



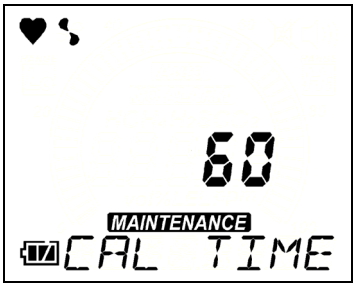

* Set range
30/45/60/90 seconds
Use the ▲ or ▼ button to select a value and press the ENTER button to confirm it.

**3 Set a threshold for checking a test gas.**



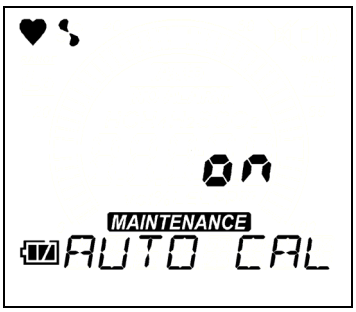

* Set range
±10/20/30/40/50%
Use the ▲ or ▼ button to select a value and press the ENTER button to confirm it.

**4 Set the calibration time.**
Span calibration is performed automatically when the set time has passed.




* Set range
60/90/120 seconds
Use the ▲ or ▼ button to select a value and press the ENTER button to confirm it.

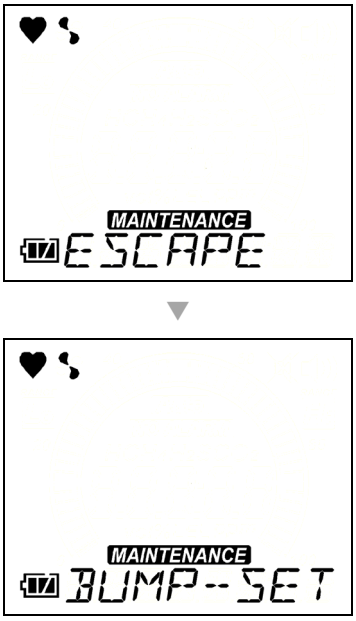
**5 Set whether or not to perform span calibration after "F" (Failure) is displayed as a diagnosis result.**




* Set range
on: Span calibration performed
off: Span calibration not performed
Use the ▲ or ▼ button to select a value and press the ENTER button to confirm it.

**6 With "ESCAPE" displayed, press the ENTER button.**

The gas detector returns to the calibration mode menu.

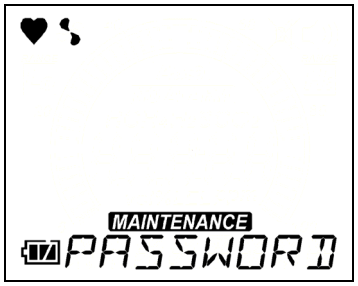


# 7-8. Password setting

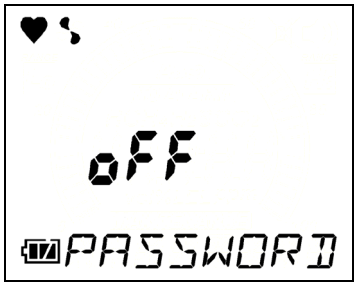
A password can be used to protect the entry to the calibration mode.

LCD display

**1 Press the ENTER button.**
The password setting mode is entered.



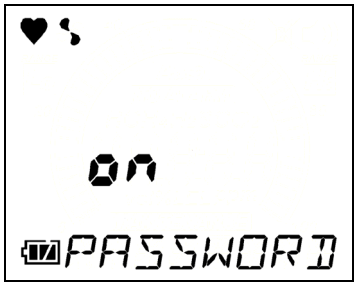

**2 Specify the use of password using the ▲ or ▼ button.**
The state of <on> or <oFF> for the current password protection setting is displayed.



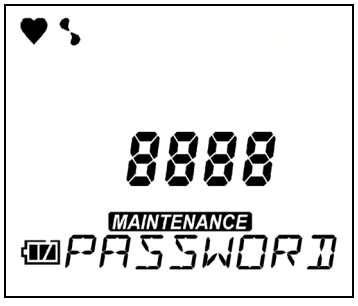

* This is disabled <oFF> by default.

▼

**3 Press the ENTER button.**
When <oFF> is confirmed, the gas detector returns to the calibration mode menu.

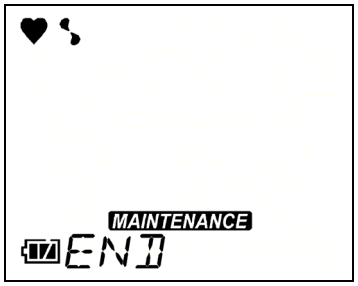



**4 When <on> is selected, use the ▲ or ▼ button to select a value and press the ENTER button to confirm it.**
The password is a four-digit number. Set one digit at a time.

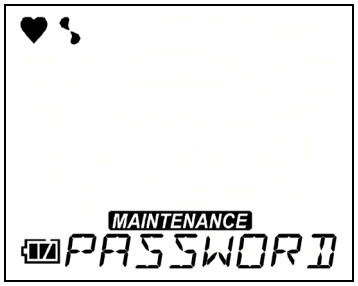



▼

After "END" is displayed, the gas detector returns to the calibration mode menu.
(Buzzer: Once <blip>)




▼


MAINTENANCE
PASSWORD

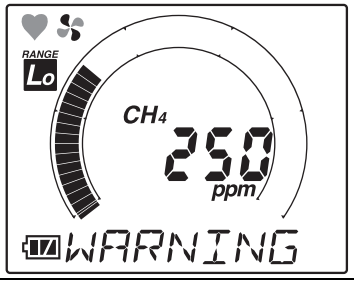
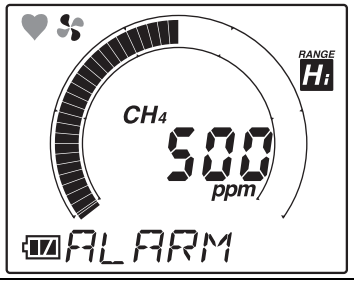
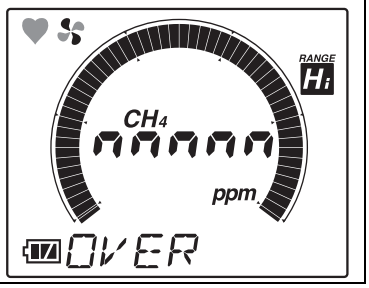
# 8

# Alarm Function

## 8-1. Gas alarm activation

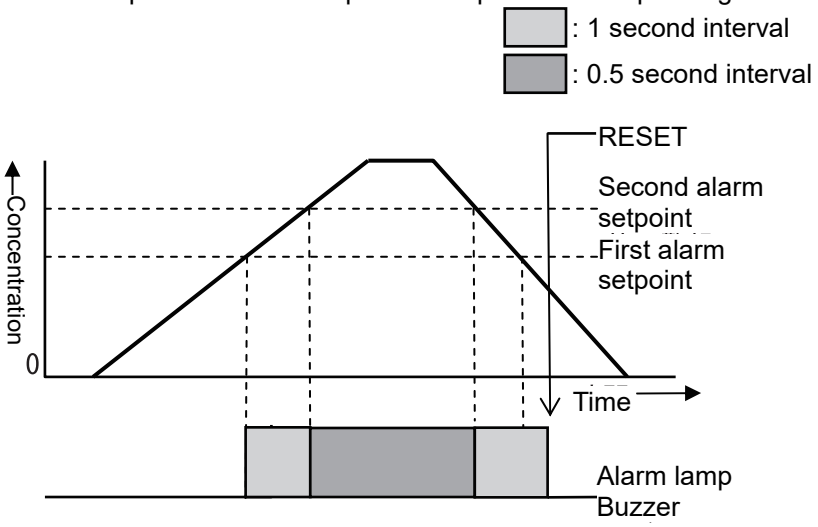
A "gas alarm" of the gas detector is triggered when the detected gas concentration reaches or exceeds an alarm setpoint, causing the alarm lamp to blink, the buzzer to sound, and the concentration display to blink. (Self-latching)

There are three types of gas alarm: first alarm (WARNING), second alarm (ALARM) and over scale alarm (OVER).

| **Alarm Type** | **First alarm 250 ppm** | **Second alarm 500 ppm** | Over scale alarm **10000 ppm** |
|---|---|---|---|
| Alarm lamp | Repeatedly blinks at about 1 second intervals. | Repeatedly blinks at about 0.5 second intervals. | Repeatedly blinks at about 0.5 second intervals. |
| Buzzer | Repeatedly sounds strong and weak beeps at about 1 second intervals. | Repeatedly sounds strong and weak beeps at about 0.5 second intervals. | Repeatedly sounds strong and weak beeps at about 0.5 second intervals. |
| LCD display | Gas concentration and WARNING display blink.   | Gas concentration and ALARM display blink.   | Gas concentration and OVER display blink.   |

## <Alarm Lamp and Buzzer Operation Pattern>

A slow or quick intermittent operation is performed depending on the alarm type.




## <How to Reset Alarm>

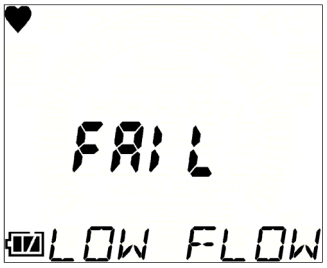
After the concentration of detected gas settles below the alarm setpoint value, press the RESET button to reset the gas alarm.

**NOTE**

- Even if the concentration of detected gas returns to below the alarm setpoint value, the operations of buzzer, alarm lamp and vibration continue (self-latching) until any button is pressed (the alarm is reset).
- If the concentration exceeds 10000 ppm and an over scale alarm is triggered, the OVER display is latched even if the detected gas concentration returns to below 10000 ppm.
  In this case, press the RESET button to reset the alarm. When the gas concentration at the time of reset is below the full scale value, the gas concentration display returns. However, when it exceeds the full scale value, an over scale alarm will occur again.

# 8-2. Fault alarm activation

A "fault alarm" is triggered when an abnormal operation is detected in the gas detector, causing the buzzer to sound and the alarm lamp to blink. (Self-latching)
When a fault alarm is triggered, LCD shows the fault detail as follows.
• System abnormalities: SYS□□□
• Sensor abnormalities: SENSOR
• Calibration abnormalities: AIR CAL
• Low battery voltage: BATTERY
• Low flow rate: LOW FLOW
• Clock abnormalities: CLOCK

| | |
|---|---|
| Alarm lamp | Repeatedly blinks at about 1 second intervals. |
| Buzzer | Repeatedly sounds strong and weak beeps at about 1 second intervals. |
| LCD display | Low flow rate (LOW FLOW) display example   |

If a fault alarm is triggered, determine the cause and take an appropriate action.
If the gas detector has problems and is repeatedly malfunctioning, contact RIKEN KEIKI immediately.

**NOTE**

- A low flow rate alarm (FAIL LOW FLOW) can be reset by pressing the RESET button. For other fault alarms, turn off the power and then promptly contact RIKEN KEIKI.
  Clock abnormalities (FAIL CLOCK) can also be reset by pressing the RESET button; however, the data logger cannot function normally due to internal clock malfunction.
- For information on malfunctions (error messages), see "Troubleshooting" (P. 70).

# 9

# Maintenance

The gas detector is an important instrument for the purpose of safety.
To maintain the performance of the gas detector and improve the reliability of safety, perform a regular maintenance.

## 9-1. Maintenance intervals and items

Perform the following maintenance regularly before use.

- Daily maintenance: Perform maintenance before beginning to work.
- Regular maintenance: Perform maintenance once or more for one year (Recommendation: once or more for six months).

| Maintenance item | Maintenance content | **Daily maintenance** | **Regular maintenance** |
|---|---|---|---|
| Battery level | Check that the battery level is sufficient. | ○ | ○ |
| Tube | Check for cracks and holes. | ○ | ○ |
| Filter | Check the dust filter for dust or clogging. | ○ | ○ |
| Operation of main unit | Check the LCD display for a fault indication. | ○ | ○ |
| **Concentration display check** | Make the gas detector draw in fresh air and check that the concentration display value is zero. When the value is other than zero, perform zero adjustment by air calibration after ensuring that no interference gases exist around. | ○ | ○ |
| **Span adjustment** | Perform span adjustment using a calibration gas. | — | ○ |
| **Gas alarm check** | Check the gas alarm using a calibration gas. | — | ○ |

**WARNING**

- If an abnormality is found in the gas detector, contact RIKEN KEIKI immediately.

**NOTE**

- The span adjustment requires dedicated equipment and creation of calibration gas. Therefore, contact RIKEN KEIKI for span adjustment.
- The built-in sensor of the gas detector has a validity period and must be replaced regularly.
- The sensor life has expired if, for example, the sensors cannot be calibrated in span adjustment, the readings do not come back after fresh air adjustment, or the readings fluctuate. In this case, contact RIKEN KEIKI. Note that the warranty period is one year.

# About maintenance services

We provide services on regular maintenance including span adjustment, other adjustments and maintenance.
To make a calibration gas, dedicated tools, such as a gas cylinder of the specified concentration and gas sampling bag must be used.
Our qualified service engineers have expertise and knowledge on the dedicated tools used for services, along with other products. To maintain the safety operation of the gas detector, please use our maintenance service.

The followings are typical maintenance services. Contact RIKEN KEIKI for more information.

<Main Services>

| Item | Details |
|---|---|
| **Battery level check** | Checks the battery level. |
| **Concentration display check** | Verifies that the concentration display value is zero by using a zero gas.<br>Performs air calibration if the reading is incorrect. |
| **Flow rate check** | Checks the flow rate indicator for abnormalities.<br>Checks the flow rate by using an external flow meter to verify the correctness of the flow rate indicator on the gas detector. If the flow rate is incorrect, performs the flow rate adjustment. |
| **Filter check** | Checks the dust filter for dust or clogging.<br>Replaces a dirty or clogged dust filter. |
| **Span adjustment** | Performs span adjustment using a calibration gas. |
| **Cleaning and repair of the unit (visual diagnosis)** | Checks dust or damage on the surface of the unit, cleans and repairs such parts.<br>Replaces parts which are cracked or damaged. |
| **Unit operation check** | Operates the buttons to check the operation of functions, parameters, etc. |
| **Replacement of consumable parts** | Replaces consumable parts, such as a sensor, filter and pump. |

# 9-2. How to clean

Clean the gas detector if it becomes extremely dirty. The detector must be turned off while cleaning it. Use a waste cloth or the like to remove dust. Do not use water or organic solvent for cleaning because they may cause malfunctions.

**CAUTION**

- When cleaning the gas detector, do not splash water over it or use organic solvents such as alcohol and benzine on it. It may cause discoloration or damage to the surface or sensor failure.

**NOTE**

- When the gas detector gets wet, water may remain in the buzzer sound opening or grooves. Drain water as follows:
  (1) Wipe away moisture on the gas detector thoroughly using a dry towel, cloth, etc.
  (2) While holding the gas detector firmly, shake it about ten times with the buzzer sound opening facing downward.
  (3) Wipe away moisture coming out from the inside thoroughly using a towel, cloth, etc.
  (4) Place the gas detector on a dry towel, cloth, etc. and let it stand at normal temperatures.

# 9-3. Parts replacement

## <Replacement of Regular Replacement Parts>

Replace the regular replacement parts of the gas detector according to the recommended intervals.

**List of recommended regular replacement parts**

| Name | Maintenance intervals | Replacement intervals | Quantity (pieces per unit) | Remarks |
|---|---|---|---|---|
| Pump unit (RP-12) | 6 months | 1 - 2 years | 1 | * |
| Gas sensor (NC-6307) | 6 months | 3 years | 1 | * |
| Rubber seal (sensor) | — | 2 years | 1 | |
| Rubber seal (main case) | — | 2 years | 1 | |
| Rubber seal (battery cover) | — | 2 years | 1 | |
| Alkaline manganese battery | — | — | 4 | |
| Filter (Teflon) set containing 10 pcs | 3 months | 0.5 years | 1 | |

* The operation must be checked after replacement by a qualified service engineer. For the stable operation of the gas detector and safety, ask a qualified service engineer to take care of replacement of the parts. Request it from RIKEN KEIKI.

**NOTE**

- The above replacement intervals are recommendation only. The intervals may change depending on the operating conditions. These intervals do not mean the warranty periods either. The result of the regular maintenance may determine when to replace the parts.

## <Battery Replacement>

See "Battery replacement procedure" (P. 15) for the battery replacement procedure.

## <Filter Replacement>

See "Dust Filter Replacement Procedure" (P. 16) for the dust filter replacement procedure.

**NOTE**

- Never fail to turn off the power of the gas detector before replacing the dust filter.
- Use the dedicated dust filter for this gas detector only. The use of similar products may cause inaccurate gas detection.

# 10

# Storage and Disposal

## 10-1. Procedures to store the gas detector or leave it for a long time

The gas detector must be stored under the following environmental conditions.
• In a dark place under the normal temperature and humidity away from direct sunlight
• In a place where gases, solvents or vapors are not present

Store the gas detector in a shipping carton, if any, in which the product was delivered.
Store the gas detector away from dust, etc. if the shipping carton is not available.

**CAUTION**

- If the gas detector is not used for a long time, store it after removing the batteries. Leaks from dry batteries may result in fire or injury.
- If the gas detector is not used for a long time, turn on the power at least once every six months and check that the pump draws in air (about three minutes). The gas detector, when not activated for a long time, may cease to work because of hardening of the grease in the pump motor.

## 10-2. Procedures to use the detector again

**CAUTION**

- When the gas detector is used again after a long-period storage, be sure to perform a calibration.
- Contact RIKEN KEIKI for readjustment including calibration.

## 10-3. Disposal of products

When the gas detector is disposed of, it must be treated properly as an industrial waste in accordance with the local regulations, etc.

**WARNING**

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

## <Disposal in EU Member States>

When disposing of the gas detector in EU member states, sort the batteries as specified.
Handle the removed batteries according to the classified refuse collection system and recycling system based on the regulations of EU member states.

**NOTE**

Crossed-out recycle dustbin mark

- This symbol mark is indicated on the products which contain the batteries which fall under EU Battery Directive 2006/66/EC. Such batteries need to be disposed of as specified by the latest Directive. This symbol mark indicates that the batteries need to be separated from the ordinary waste and disposed of appropriately.

# 11

# Troubleshooting

The Troubleshooting does not explain the causes of all the malfunctions which occur on the gas detector. This simply helps to find the causes of malfunctions which may frequently occur.
If the gas detector shows a symptom which is not explained in this manual, or still has malfunctions even though remedial actions are taken, please contact RIKEN KEIKI.

## 11-1. Abnormalities on unit

| Symptoms | Causes | Actions |
|---|---|---|
| **The power cannot be turned on.** | The battery level is too low. | Replace all the four batteries with new ones. |
| | The POWER button was released quickly. | For power-on, keep the POWER button pressed until a blip is heard. |
| | Improper installation of the battery unit | Check that the batteries are properly installed to the main unit. |
| **Abnormal operations** | Disturbances by sudden static electricity noise, etc. | Turn off the power once and then turn it on again (restart). |
| **Cannot operate the gas detector.** | Disturbances by sudden static electricity noise, etc. | Remove the batteries in a safe area. Then reinstall them and turn on the power to perform operations. |
| **System abnormalities**<br>**FAIL SYS□□□** | A circuit abnormality occurred. | Record the display content "FAIL - SYS□□□" and then contact RIKEN KEIKI for repair. |
| **A low battery voltage alarm is displayed.**<br>**FAIL BATTERY** | The battery level is low. | Turn off the power and replace the batteries with new ones in a safe area. |
| **Air calibration impossible**<br>**FAIL SENSOR** | Fresh air is not supplied around the gas detector. | Press the RESET button to reset the alarm. Supply fresh air and then perform air calibration again. |
| **Sensor abnormalities**<br>**FAIL SENSOR** | A sensor has failed. | Request RIKEN KEIKI to replace the sensor. |
| **A low flow rate alarm is displayed.**<br>**FAIL LOW FLOW** | The flow rate has decreased due to clogs at the sampling part, bended hose, etc. | After eliminating the cause such as clogging and bending, press the RESET button to reset the alarm. |
| | The pump has failed. | Request the dealer or Riken Keiki local representative to replace the pump. |

| Symptoms | Causes | Actions |
|---|---|---|
| | The unit has not been used for a long time (six months or longer). | Cycle the power several times. The pump may start operating. If the situation does not improve, request RIKEN KEIKI to replace the pump. |
| **Clock abnormalities**<br>**FAIL CLOCK** | Abnormalities of the internal clock | Request RIKEN KEIKI to repair. |

# 11-2. Abnormalities of readings

| Symptoms | Causes | Actions |
|---|---|---|
| **The reading rises (drops) and it remains so.** | Drifting of sensor output | Perform air calibration (zero adjustment). (P. 22) |
| | A high-concentration combustible gas has been drawn. | Supply fresh air and leave the unit for a while. |

# 12

# Product Specifications

## 12-1. List of product specifications

| | |
|---|---|
| Model | NC-1000 |
| Gas to be detected | Combustible gas (CH4, HC, etc. See the separate list for target gases) |
| Detection principle | New ceramic |
| Measurement range | 0-10000 ppm |
| Alarm type | Gas Alarm: Self-latching, two-step alarm<br>Fault alarm: Flow rate low, poor sensor connection, battery voltage low, circuit abnormality, and calibration range abnormality |
| Alarm operation | Gas Alarm: Continuous buzzer sound, blinking of red lamp and gas concentration display<br>Fault alarm: Intermittent buzzer sound, blinking of red lamp, fault detail display |
| Alarm setpoint | 1st: 250 ppm<br>2nd: 500 ppm |
| Detection method | Pump suction type with a flow rate of 0.30 L/min or more (pump L mode) |
| Display | LCD seven-segment numeric display, bar meter display (50 divisions) and status information display<br>Seven-segment digital display: 0 - 10000 ppm<br>Digital bar meter display: Auto range switching<br>L range: 0 - 1000 ppm<br>H range: 0 - 10000 ppm |
| Power supply | 4 AA alkaline dry batteries* |
| Continuous operating time | CH4 specification: Approx. 15 hours<br>HC specification: Approx. 20 hours<br>(new dry batteries, without alarms or lighting, at 25ºC) |
| Operating environment | Operating temperature range: -20 - +50ºC<br>Operating humidity range: Below 95% RH (Non-condensing)<br>Storage temperature range: -25 - +60ºC<br>Storage humidity range: Below 95% RH (Non-condensing) |
| External dimensions | External dimensions: 80 (W) x 124 (H) x 36 (D) mm (projection portions excluded) |
| Weight | Weight: Approx. 260 g (without batteries) |
| Drip-proof and dust-proof performances | Compliant to IP67 |
| Explosion-proof performance | Intrinsically safe explosion-proof structure<br>II1G Ex ia IIB T4 Ga(ATEX) / Ex ia IIB T4 Ga(IECEx) / Ex ia IIC T4(Japan Ex) |
| Functions | LCD backlight, data logger, log data display, peak display,<br>switching pump performance between strong and weak, changing a reading target |

| | |
|---|---|
| | gas |
| Accessories | Power supply: 4 AA alkaline dry batteries<br>Storage: Hand strap<br>Sampling: Gas sampling hose (1 m) and sampling probe |

* To meet the requirements for explosion-proof performance, use the batteries specified in the certification of explosion-proof electrical equipment.
* Specifications subject to change without notice.

# 12-2. Optional part list

- Hose
- Diluter
- Filter case
- Carrying case
- Shoulder strap
- Protection film
- Data logger management program

# 13

# Appendix

## 13-1. Definition of terms

| | |
|---|---|
| vol% | Gas concentration indicated in the unit of one-hundredth of the volume |
| ppm | Gas concentration indicated in the unit of one-millionth of the volume |
| LEL | The acronym of Lower Explosive Limit.<br>LEL refers to the lowest concentration of a combustible gas in air capable of causing explosion when ignited. |

320CE21004

# Declaration of Conformity

## We, RIKEN KEIKI Co., Ltd.

2-7-6, Azusawa, Itabashi-ku,
Tokyo, 174-8744, Japan

declare in our sole responsibility that the following product conforms to all the relevant provisions.

| | | | | |
|---|---|---|---|---|
| Product Name | : | Combustible Gas Monitor | | |
| Model Name | : | NC-1000 | | |
| Council Directives | : | EMC | : | 2014/30/EU |
| | | ATEX | : | 2014/34/EU |
| | | RoHS | : | 2011/65/EU |
| Applicable Standards | : | EMC | : | EN 50270:2015(Type2) |
| | | ATEX | : | EN IEC 60079-0:2018<br>EN 60079-11: 2012 |
| | | RoHS | : | EN IEC 63000:2018 |

Name and address of the ATEX Notified Body : DEKRA Certification B.V (NB 0344)
Meander 1051, 6825 MJ Arnhem
P.O.Box 5185,6802 ED Arnhem
The Netherlands

Number of the EU type examination certificate : DEKRA13ATEX0227

Name and address of the ATEX Auditing Organization : DNV GL Presafe AS (NB 2460)
Veritasveien 3
1363 Høvik
Norway

The Marking of the equipment or protective system shall include the following : Ⅱ1G Ex ia ⅡB T4 Ga

Year to begin affixing CE Marking : 2021

Place: TOKYO, Japan

Signature: T. Takakura
Full name: Toshiyuki Takakura

Date: July. 6, 2021

Title: General Manager,Quality control center