

Smart Transmitter/Gas Detector Head

SD-1GH

Operating Manual

Part Number: 71-0531
Revision: 0
Released: 1/23/2024

Operating Precautions

This instrument is a gas detector that detects combustible gases in the air and triggers a gas alarm. The gas detector is a safety unit, not an analyzer or densitometer which performs quantitative/qualitative analysis/measurement for gases.

Please fully understand the following points before using it, so that it can be used properly.

1. This detector may be interfered by gases and vapors other than the gas to be detected.
Please note that the alarm may be triggered by interference. In addition, it may be affected by environmental (temperature, humidity, etc.) changes in the installation site.
2. The alarm must be set within a range where the performance of the detector can be ensured.
In facilities compliant with the High Pressure Gas Safety Act, an alarm setting below our standard alarm setpoint may trigger a false alarm.
3. This is a safety unit, not a control unit.
The alarm contact output of the detector must be used for an external alarm lamp/buzzer, while the alarm signal output must be used for an indicator or external recorder.
If these outputs are used to control other units, we shall not be responsible for any malfunctions.
4. The gas sensing part of the sensor installed in this detector is made of metal porous sintered alloy permeated with an oxidation catalyst.
If silicon or sulfide compounds accumulate on the surface of porous sintered alloy, the gas sensing area becomes smaller, which may result in serious deterioration of its sensitivity.
For safety reasons, do not use the detector in the presence of silicon or sulfide compounds even in small amounts.
5. The detector must go through regular maintenance, including replacement and adjustment of the regular replacement parts as specified in the operating manual. In addition, because this is a safety unit, it is recommended that regular maintenance and a gas calibration are performed every six months in accordance with the regulations.

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1

Outline of the Product

1-1. Preface

Thank you for choosing the SD-1GH. Please check that the model number of the product you purchased is included in this manual's specifications.




This manual explains how to use the detector. It contains information required for using the detector properly. All users must read and understand the operating manual to enhance their knowledge and experience before using the detector.

Although the number of displayed digits varies depending on the detection range, this manual provides explanation using a detection range from 0 to 100.0 as examples.

1-2. Purpose of Use

- This detector is a fixed-type gas detector head that detects combustible/toxic gases and activates an alarm when the gas concentration rises above the setpoint.
- The detector is a safety unit, not an analyzer or densitometer which performs quantitative/qualitative analysis/measurement for gases. Please fully understand the features of the detector before using it, so that it can be used properly.
- The detector uses a built-in gas sensor to detect abnormalities in the air caused by presence of gases. The concentration of detected gas is displayed on the seven-segment LED display.
- The detector has a built-in alarm contact that can be used either as a gas alarm, fault alarm, or common (gas, fault) alarm.
- The detector outputs the gas concentration in 4 – 20 mA.

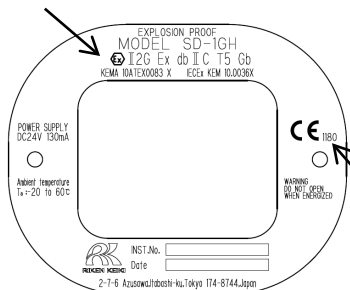
1-3. Definition of DANGER, WARNING, CAUTION, and NOTE

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

1-4. Confirming Standards and Explosion-proof Specification

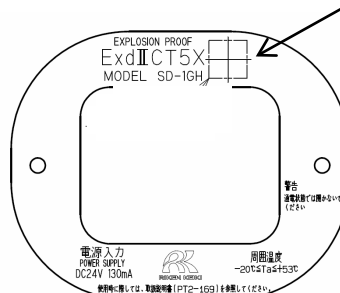
Some detector specifications depend on the standard and explosion proof certificate. Please confirm the detector specification before using. Please refer to the Declaration of Conformity at the end of this manual if you have CE marking type. You can confirm detector specification on the name plate as follows.

Ex marking



ATEX/IECEx, CE marking type name plate

TIIS certificate



TIIS type name plate

2

Important Notices on Safety

2-1. Danger Cases



DANGER

About explosion-proof

- The window plate material is a polycarbonate resin. Do not use organic solvents and alkali types (liquid or vapor) as they may change the color or shape of the window plate.
- Do not open the lid when applying current.
- Do not attempt to repair the detector.
- For the lid, use hexagon socket head bolts specified by RKI
- Do not apply a strong force or shock to the window plate. The explosion-proof performances may be deteriorated due to damages. The explosion protection conditions for the detector is "low (2J)" possibility of mechanical damage.
- Contact RKI if the transparent window has a crack or the explosion-proof joint surface is abnormal, or the clamping screw or bolt is changed, lost etc.
- Do not repair the explosion-proof joint surface.
- Be careful not to hit the window plate with a sharp object.

2-2. Warning Cases



WARNING

Power supply

Before turning on the detector, be sure the voltage is properly applied. Using an unstable power supply may cause malfunctions.

Need of grounding circuit

Do not cut the grounding circuit or disconnect the wire from the grounding terminal.

Defects in protective functions

Before starting the detector, check the protective functions (such as protective grounding) for defects. Do not start the detector if protective function defects are found.

External connection

Before connecting the detector to an external control circuit, securely connect it to a protective grounding circuit.

Zero adjustment in the atmosphere

Check the atmosphere for freshness before performing a zero adjustment. If gases exist in the atmosphere, the adjustment cannot be performed properly.

Response to gas alarm

A gas alarm condition indicates that there are extreme dangers. Take proper actions based on your judgment.

2-3. Precautions



CAUTION

Do not use a transceiver near the detector.

Radio waves from a transceiver near the detector or its cables may disturb the reading. If a transceiver is used, it must be used in a place where it does not disturb the reading.

Wait for five seconds or more before restarting the detector.

Restarting the detector within five seconds may cause errors.

Do not use the external output of the detector to control other units.

This is not a control unit.

Do not disassemble/modify the detector or change the settings unnecessarily.

Disassembling/modifying the detector will invalidate the warranty of the performance. Changing the settings without understanding the specifications may cause alarm malfunctions. Please use the detector properly in accordance with the operating manual.

Avoid applying solvents to the window plate.

The window plate material is a polycarbonate resin. When solvents (liquid or highly-concentrated vapor) are applied to the plate, its color and shape may change.

Perform regular maintenance.

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

2-4. Safety Information

Necessary information for explosion proof construction of Model SD-1GH.

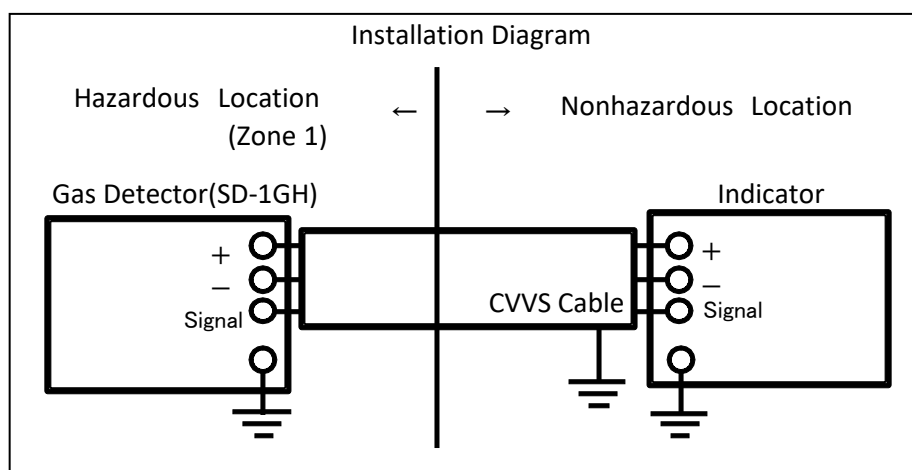
The Model SD-1GH is a fixed-mount, continuous-monitoring detector head and provides a 4-20mA signal proportional to the target gas reading for use by a gas monitoring controller, recording device, or programmable controller.

<ATEX/IECEx Specifications>

Technical Data

Protection Method	Flameproof enclosure “d”
Certificate Numbers	IECEx KEM 10.0036X KEMA 10ATEX0083 X
Group	II
Category	2G
Type of Protection and Marking Mode	Ex db IIC T5
Equipment Protection Level	Gb
Ambient Temperature	-20°C to +60°C
Electrical Data	Supply voltage: 24 V dc (Typ.) Output signal: 4 to 20 mA
Applicable Standard	IEC 60079-0: 2017, IEC 60079-1: 2014-06 EN IEC 60079-0: 2018, EN 60079-1: 2014

Installation

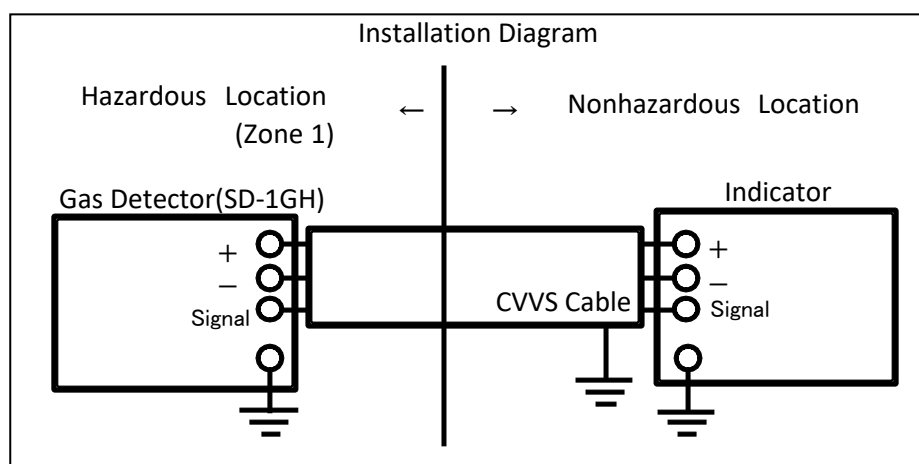


<TIIS Specifications>

Technical Data

Protection Method	Flameproof enclosure
Explosion-proof Class	Ex d IIC T5 X
Ambient Temperature	-20°C to +53°C
Electrical Data	Supply voltage: DC24V 130 mA Analog signal output: DC24V 25 mA Contact output (contact capacity): AC250V 0.5A (load resistance) DC30V 0.5A (load resistance)
Applicable Standard	JNIOHS-TR-NO. 43(2008)

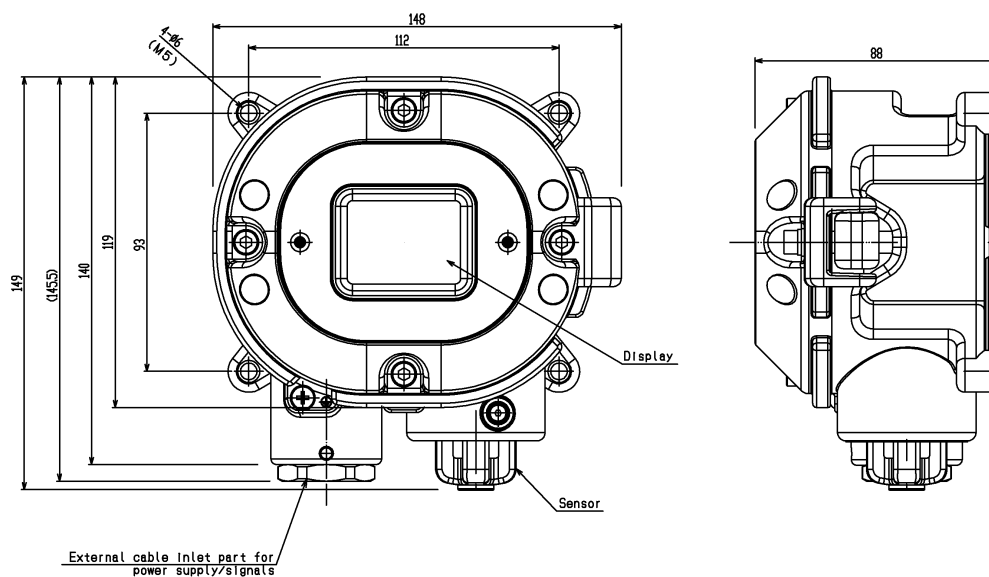
Installation



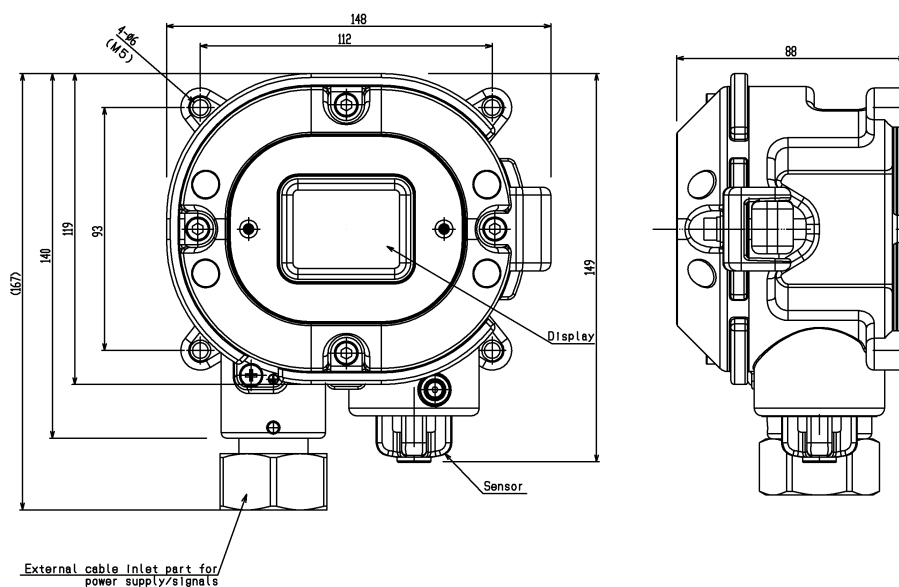
3 Product Components

3-1. Main Unit and Standard Accessories

<ATEX/IECEX Specification>



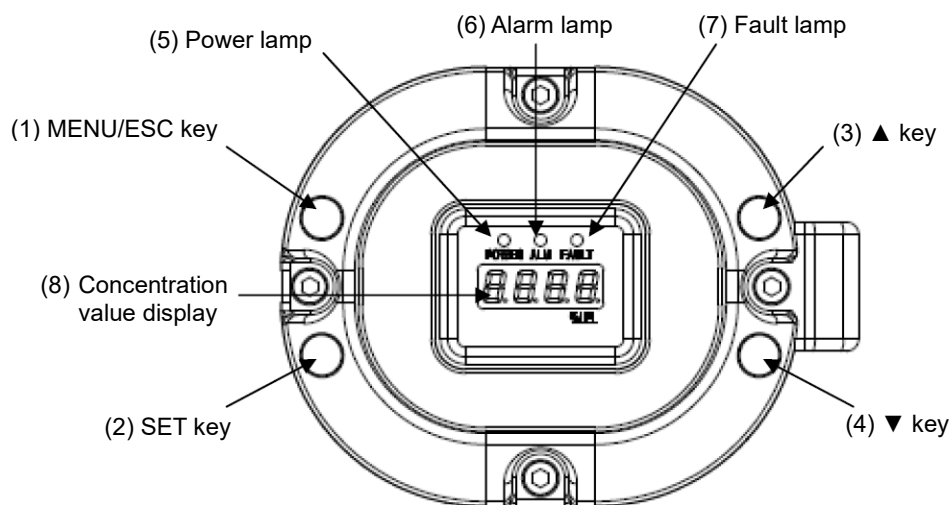
<TIIS Specification>



<Standard Accessories>

- Operating manual
- Dedicated handling lever (used for the wiring)
- Dedicated control key

3-2. Parts Description



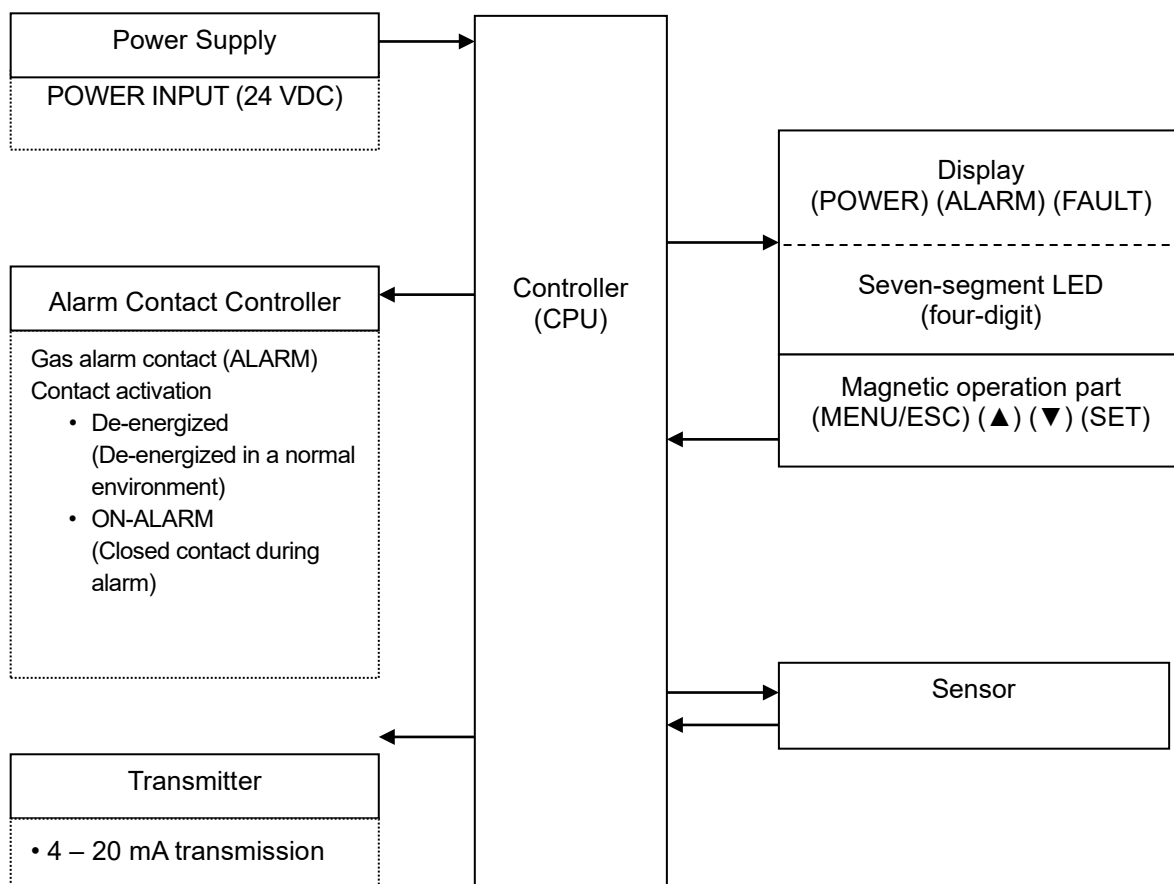
(1)	MENU/ESC key	Enter maintenance mode. Cancel in a specific mode.
(2)	SET key	Value confirmation.
(3)	▲ key	Switch menus or change a value (UP).
(4)	▼ key	Switch menus or change a value (DOWN).
(5)	Power lamp	Power lamp: Detection mode: Solid green. Maintenance mode: Flashing green.
(6)	Alarm lamp	Turns red when the alarm setpoint value is reached.
(7)	Fault lamp	Turns yellow when a detector abnormality is detected.
(8)	Concentration value display	Displays the gas concentration.



CAUTION

Use the supplied dedicated control key to operate the detector. If anything else is used, key operations cannot be accepted properly.

3-3. Electric Diagram



4

How to Use

4-1. Before Using the Detector

All users must follow the operating precautions. Ignoring the precautions may damage the detector, resulting in inaccurate gas detection.

4-2. Precautions for Installation Points



CAUTION

This is a precision device. Because the detector may not perform appropriately in some environments, check the installation environment and take appropriate actions, if necessary. Install as many detectors as necessary to properly monitor an environment. Because points where gases leak and collect vary depending on the types of gases and the working areas, carefully choose installation points and the number of units to be installed.

Do not install the detector in a place with vibrations or shocks.

The detector has sensitive electronic parts. The detector must be installed in a stable place without vibrations or shocks.

Do not install the detector in a place exposed to water, oil, or chemicals.

When selecting installation points, avoid a place where the detector is exposed to water, oil, or chemicals.

Do not install the detector in a place where the operating temperature range is exceeded.

The detector must be installed in a stable place where the operating temperature is maintained and does not change suddenly.

<ATEX/IECEX Specifications> -20 to +60°C

<TIIS Specifications> -20 to +53°C

Do not install the detector in a place exposed to direct sunlight or sudden changes in the temperature.

When selecting installation points, avoid a place where it is exposed to direct sunlight or radiant heat (infrared rays emitted from a high-temperature object) and where the temperature changes suddenly. Condensation may form inside the detector or the detector cannot adjust to sudden changes in the temperature.

Keep the detector (and its cables) away from noise sources.

When selecting installation points, avoid a place where high-frequency/high-voltage devices exist.

Do not install the detector in a place where maintenance of the detector cannot be performed or where handling the detector involves dangers.

Regular maintenance of the detector must be performed.

Do not install the detector in a place where the machinery must be stopped when maintenance is performed, where parts of the machinery must be removed to perform maintenance, or where the detector cannot be removed because tubes or racks prevent access to it. Do not install the detector in a place where maintenance involves dangers (for example, near a high-voltage cable).

Do not install the detector in machinery which is not properly grounded.

Before installing the detector in machinery, the machinery must be grounded properly.

Do not install the detector in a place where other gases exist around it.

The detector must not be installed in a place where other gases exist around it.

4-3. Precautions for System Designing



CAUTION

An unstable power supply and noise may cause malfunctions or false alarms.

The descriptions in this section must be reflected on the designing of a system using the detector.

Using a stable power supply

The external output and alarm contact of the detector may be activated when the power is turned on, when momentary blackout occurs, or while the system is being stabilized. In such cases, use a UPS or take appropriate actions on the receiving side of output signals.

The detector must be provided with the following power supply.

Power supply voltage	24 VDC (17 – 26.4 VDC): Terminal voltage of the detector	
Allowed time of momentary blackout	Up to 10 milliseconds (To recover from a momentary blackout longer than 10 milliseconds, restart the detector.)	<u>Example of actions</u> To ensure continuous operation and activation, install a UPS outside the detector.
Others	Do not use it with a power supply that has a large power load or high-frequency noise.	<u>Example of actions</u> Use a line filter to avoid the noise source.

Introducing protective measures against lightning

If cables are installed outside the factory/plant or if internal cables are installed in the same duct as the cables coming from outside the factory/plant, lightning will cause problems. Because lightning acts as a large emission source while cables act as a receiving antenna, devices connected to the cables may be damaged.

Lightning cannot be prevented. Cables installed in a metal conduit or under the ground cannot be completely protected from the inductive surge caused by lightning. Although complete elimination of damage caused by lightning is impossible, the following protective measures can be taken.

Protection against lightning	<u>Take appropriate measures in accordance with the importance of the facilities and the environment.</u> <ul style="list-style-type: none">• Provide protection using a lightning arrester (cable arrester). (Although an inductive surge can be transmitted through the cable, it can be prevented by installing a lightning arrester before the field devices and central processing equipment. For information on how to use a lightning arrester, please contact the manufacturer.)
Grounding	In addition to lightning, there are other sources of surge noise. To protect units from these noise sources, the units must be grounded.

* The lightning arrester has a circuit to remove a surge voltage so that signals may be attenuated. Before installing a lightning arrester, verify that it works properly.

Proper use of alarm contact

The detector's alarm contact is used to transmit signals to activate an external buzzer, an alarm lamp, or a rotating lamp. Do not use the detector for controlling purpose (e.g., controlling the shutdown valve.)

The specifications for the alarm contact of the detector are based on resistive load conditions. If an inductive load is used at the alarm contact, the following errors will occur easily because counter electromotive force is generated at the contact.

- Deposition, defective insulation, or defective contact at the relay contact
- Damage of any electric parts due to high voltage generated inside the detector
- Abnormal operations by an out-of-control CPU

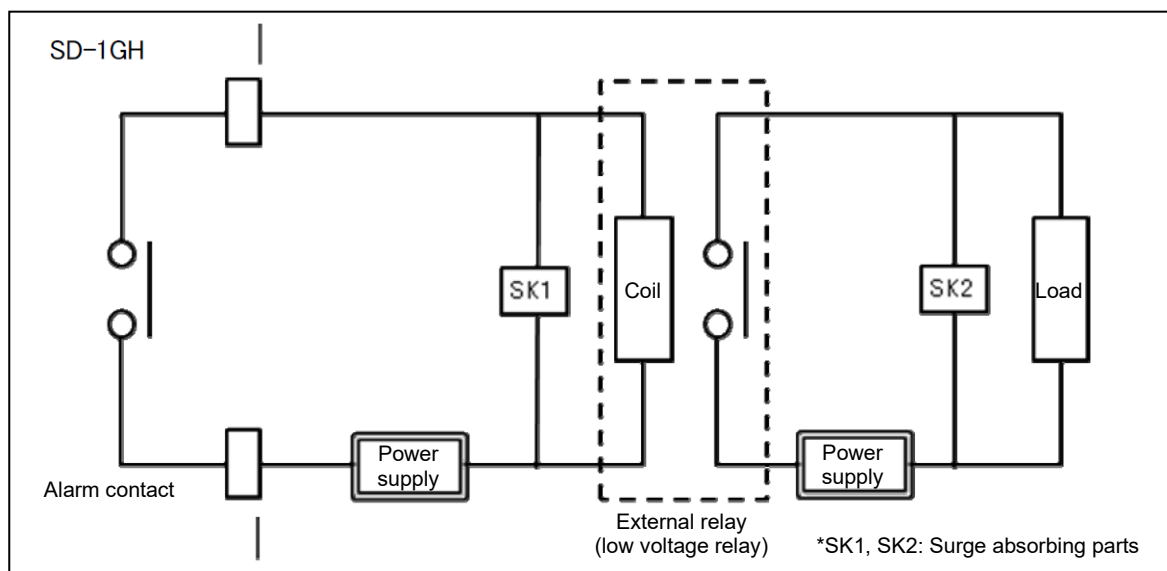


CAUTION

- In principle, do not activate an inductive load at the alarm contact of the detector. (In particular, never use an inductive load to activate a fluorescent lamp or motor.)
- If an inductive load is activated, relay it with an external relay (contact amplification). However, because the coil of an external relay also has an inductive load, select a relay at a lower voltage (100 VAC or below), and then protect the detector contact with an appropriate surge absorbing part, such as a CR circuit.

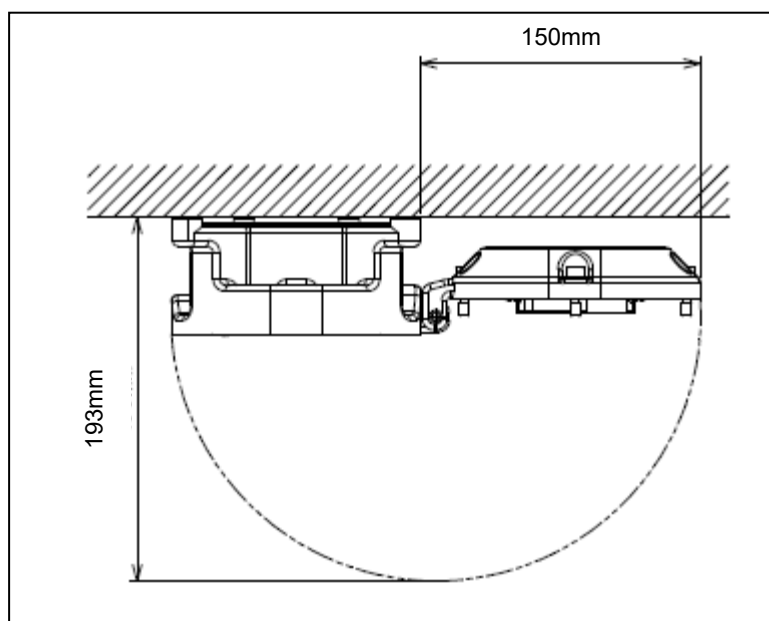
If load is to be activated, appropriate measures must be taken to stabilize the operation of the detector and protect the alarm contact referring to the following information.

- Relay it with an external relay at a lower voltage of 100 VAC or below (contact amplification). At the same time, the surge absorbing part, SK1 below, suitable for the specifications must be attached to the external relay.
- In addition, the surge absorbing part, SK2 below, must be attached to the loaded side of the external relay, if necessary.
- It may be recommended that the surge absorbing part be attached to the contact for certain load conditions. It must be attached to an appropriate position by checking how the load is activated.



4-4. How to Install

<Installation Dimensions and Maintenance Space>



1. Attach the detector to the mounting surface using four M5 screws.



CAUTION

Do not install the detector in a place where maintenance of the detector cannot be performed or where handling the detector involves dangers.

Regular maintenance of the detector must be performed.

Do not install the detector in a place where the machinery must be stopped when maintenance is performed, where parts of the machinery must be removed to perform maintenance, or where the detector cannot be removed because tubes or racks prevent access to it. Do not install the detector in a place where maintenance involves dangers, for example, near a high-voltage cable.

4-5. Wiring



CAUTION

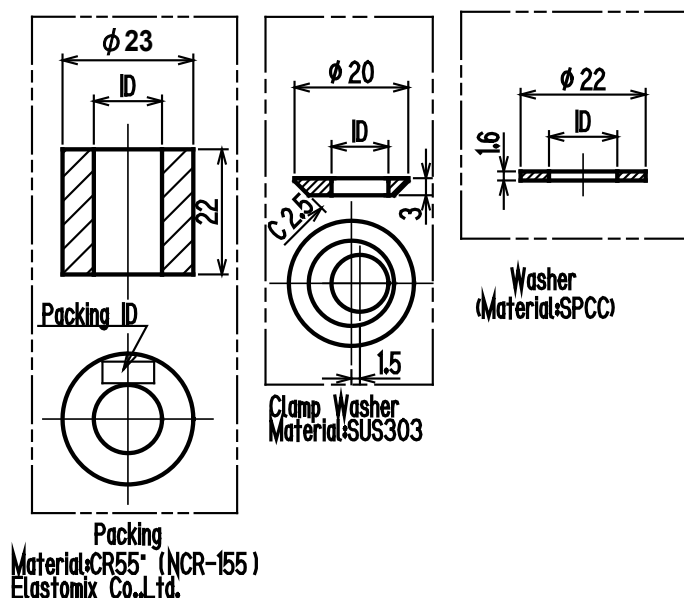
- Be careful not to damage the internal electronic circuit when wiring. In addition, be careful not to apply stresses on the detector when (overweight) cables are installed.
- The power cables and signal cables must not be installed together with the motor power cables, etc. When these cables must be installed together for unavoidable reasons, put the power cables and signal cables in a metal conduit. The conduit must be connected to a grounding circuit.
- When stranded wires are used, prevent wires from contacting each other.
- Use the dedicated handling lever to wire.
- Use appropriate wiring cables.

<Recommended Cable>

3-wire (when the contact is not used)	CVVS1.25 sq - 3-core
5-wire (when the contact is used)	CVVS1.25 sq - 5-core

<Parts. length table of outside conductor lead-in>

Cable overall outer diameter(mm)	Rubber seal inner diameter(mm)	Washer inner diameter(mm)	Clamp inner diameter(mm)
From $\Phi 9.6$ to less than $\Phi 10.5$	$\Phi 11$	$\Phi 12$	$\Phi 10.8$
From $\Phi 10.5$ to less than $\Phi 11.5$	$\Phi 12$	$\Phi 12$	$\Phi 11.8$
From $\Phi 11.5$ to less than $\Phi 12.5$	$\Phi 13$	$\Phi 14$	$\Phi 12.8$
From $\Phi 12.5$ to less than $\Phi 13.0$	$\Phi 13.5$	$\Phi 14$	$\Phi 13.8$

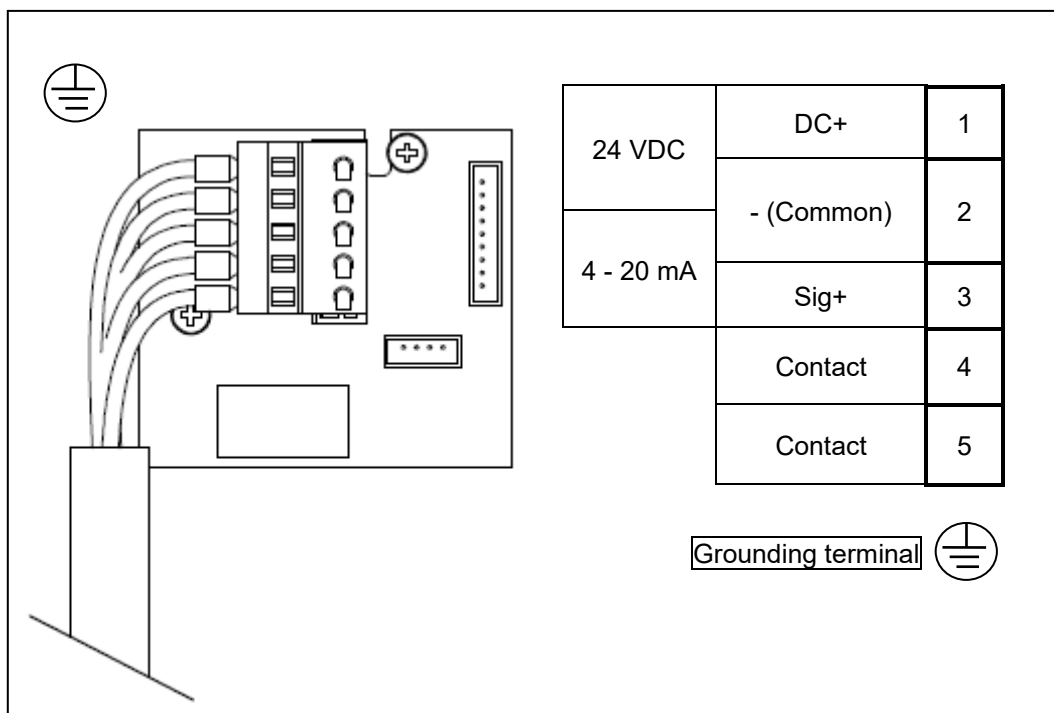


NOTE

- The following table shows an example of overall outer diameters of cables. Use them for reference.

Number of cores	CVV 1.25sq	CVV 2sq	CVVS 1.25sq	CVVS 2sq
2	Φ9.5	Φ10.5	Φ10.0	Φ11.0
3	Φ10.0	Φ11.0	Φ10.5	Φ11.5
4	Φ10.5	Φ11.5	Φ11.0	Φ12.0
5	Φ11.5	Φ12.5	Φ12.0	Φ13.0
6	Φ12.5	Φ13.5	Φ13.0	Φ14.0

<Terminal Plate Figure>



<Terminal Plate Specifications>

Specifications of terminal plate

- Rated voltage: 250 VAC
- Rated current: 12 A
However, it depends on cables to be used.

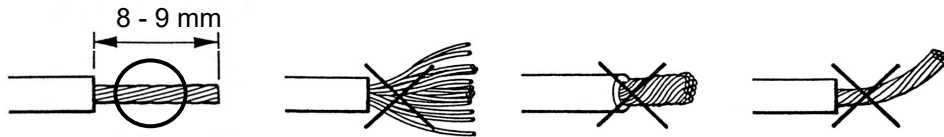
Connection conditions

- Cables: 0.25 - 2.5 mm²
- Bare wire length: 8 - 9 mm
- Connecting tool: Dedicated handling lever (accessory) or driver (edge 3.5 x 0.5 mm)



CAUTION

The specified bare wire length must be observed when the wire insulation is peeled off. Improper clamping of the wire due to a shorter bare wire length may cause defective electric conduction or heating. Catching the wire insulation due to a shorter bare wire length may cause defective electric conduction or heating. Exposing the wire due to a longer bare wire length may cause defective insulation or a short circuit. Be careful not to break up the wire. If the wire is broken up when inserted to the terminal, this may cause defective insulation or heating.



Compatible bar terminal

For a bar terminal, the following items are available.

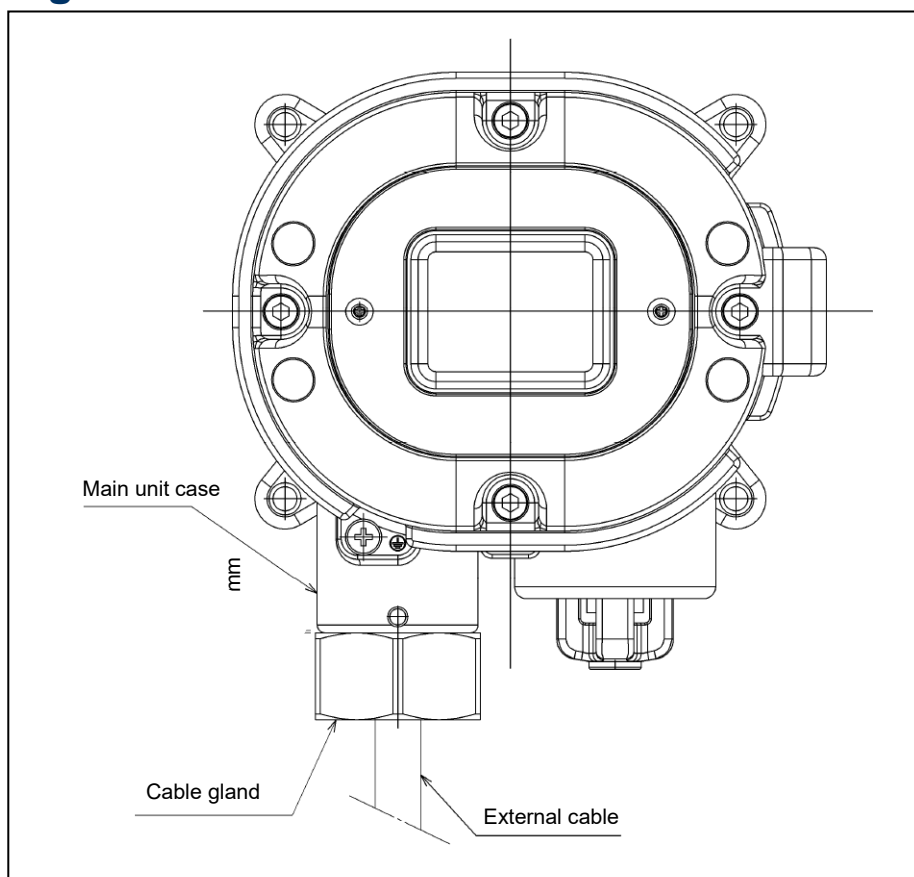
- Bar terminal (ferrule): Model 216 Series (manufactured by WAGO)
- Crimping tool: Model VarioCrimp 4 (206-204) (manufactured by WAGO)



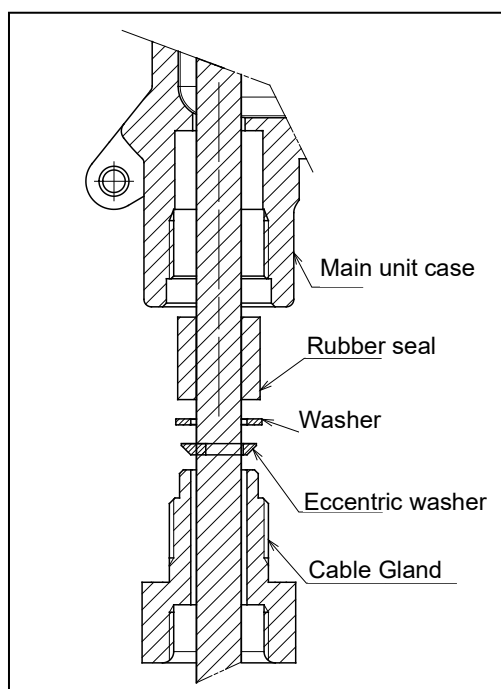
CAUTION

A bar terminal of the specified model must be used. Using other bar terminals invalidates the warranty of the performance.

<Attaching External Cable>



As shown on the figure below, attach the parts in the following order: cable gland, eccentric washer, washer, and rubber seal to the cable, then connect the cable into the main unit, then screw the cable gland to tighten the rubber seal.



CAUTION

- Ensure the tightening torque for the cable gland and seal plug to be 40 N·m or larger.
- If it is difficult to tighten the cable gland, grease its screw part and then tighten it with the tool.

<Grounding>

Connect the detector to your grounding terminal with the external terminal



WARNING

- Before turning on the detector, do not forget to connect it to a grounding terminal.
- For stable operation of the detector and safety, it must be connected to a grounding terminal. Do not connect the grounding wire to a gas pipe.
- The grounding must be made as D type grounding (below 100 Ω of grounding resistance).
- For the grounding wire, use cable lugs to safely connect it to a grounding terminal without looseness or twist.
- Use ring terminals to connect the grounding terminal with the ground and use the grounding wire with cross-sectional area of 4 mm² or more for the external grounding terminal.

<Connecting to the Terminal Plate>

When cables are connected to the connectors, use the dedicated lever or a flathead screwdriver as shown below.



CAUTION

The right tools must be used.

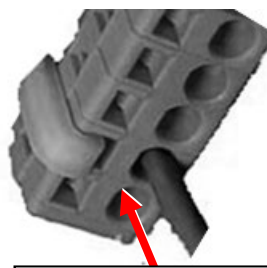
One wire can be connected to one wiring hole.

When the wire is inserted into the driver slot by mistake, it does not contact the conductive part. This may cause defective electric conduction or heating.

When the wire is inserted under the spring by mistake, it does not contact the conductive part. This may cause defective electric conduction or heating.



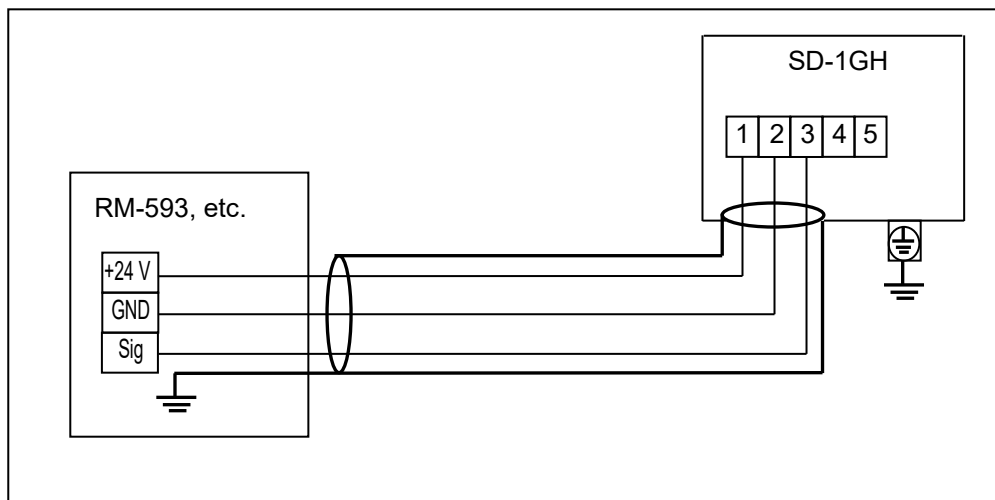
1. Push the lever with your finger to lower the spring.



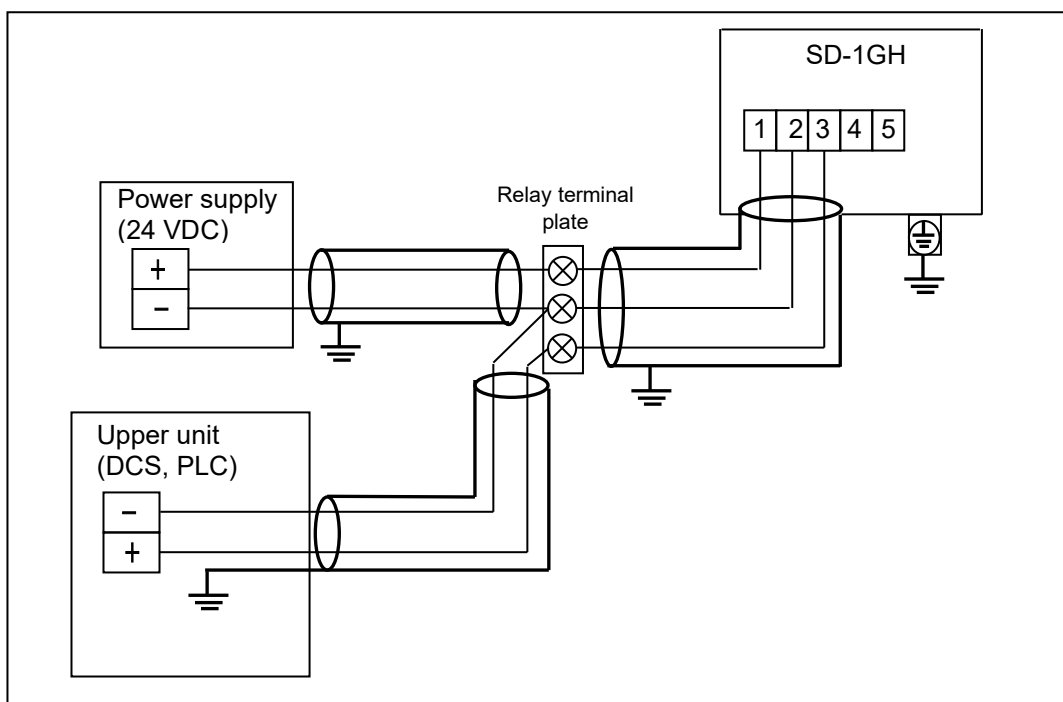
2. While holding down the lever, insert the wire into the (round) wiring hole until it reaches the deepest point.
3. Once the lever is released, the wire is secured.
4. Pull the wire gently to make sure it is secure.

<Wiring Diagrams>

Connecting to a Controller



Connecting to a DCS or PLC



5

How to Operate

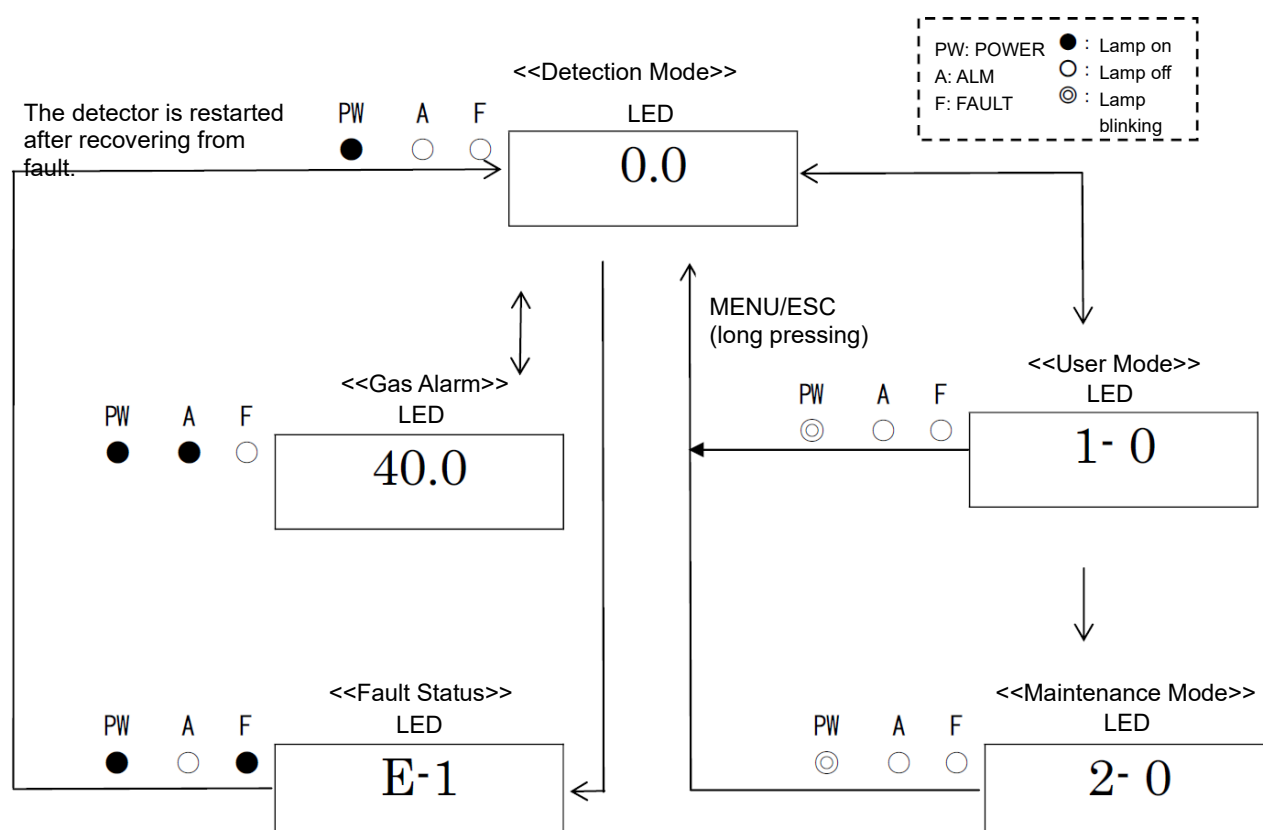
5-1. Preparing for Start-up

Before supplying power, read and understand the following precautions. Ignoring these precautions may cause an electric shock or detector damage.

- Connect the detector to a grounding circuit.
- Check that external device wiring is correct and secure.
- Check that the power supply voltage is compliant with the specifications.
- Because the external contact may be activated during startup, make sure an activated contact won't affect an external device.

5-2. Basic Operating Procedures

Detection mode is used for normal operations. (Detection Mode is activated after the power is turned on.)



WARNING

When the detector enters other mode from Detection Mode while an alarm is activated, the alarm is reset.

5-3. Starting the Detector

- Before supplying power (24 VDC) to the detector, check that the detector is installed properly.
- Supply power (24 VDC) to the detector (turn on the detector).
- After the detector completes the start-up, it enters Detection Mode.



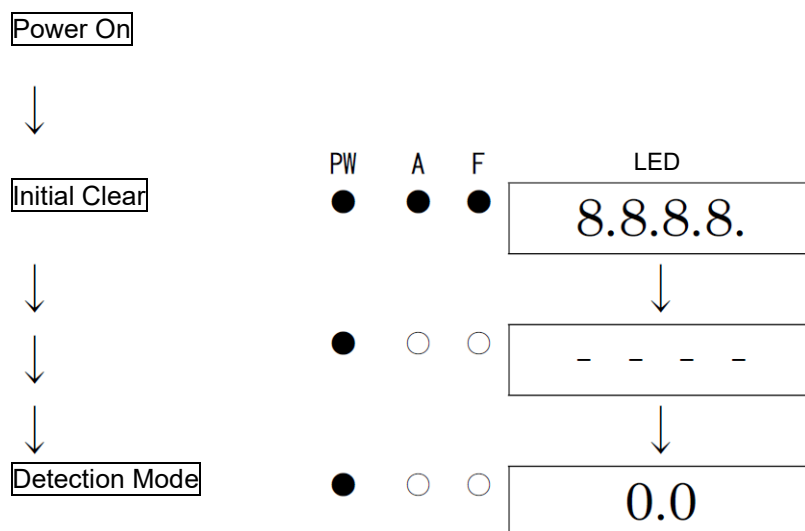
CAUTION

- Do not turn off the detector during the initial clear. The detector is reading the internal memory during the initial clear.
- If the detector is newly installed or if the sensor has been replaced, the sensor must be warmed up for a specified period after startup.
- After the warm-up is completed, perform a gas calibration.

NOTE

<<Start-up Operation Procedures>> (approximately 25 seconds for system check of the detector and alarm deactivation)

Power on -> Initial clear (approximately 25 seconds) -> Detection mode



NOTE

The semiconductor sensor used in the detector must be warmed up for a specified time after power is supplied. The required warm-up time depends on the unpowered time for the sensor. If it is not possible to allow a warm-up time as long as listed below, allow at least a 2 hour warm-up, perform a calibration, and then do another calibration 1 month later.

Unpowered Time	Warm-up Time
1 - 24 hours	4 hours
1 – 3 days	24 hours
3 – 10 days	2 days
10 – 31 days	7 days
1 - 3 months	14 days
3 months or more	1 month

5-4. Modes

Details on each mode are shown below.




CAUTION

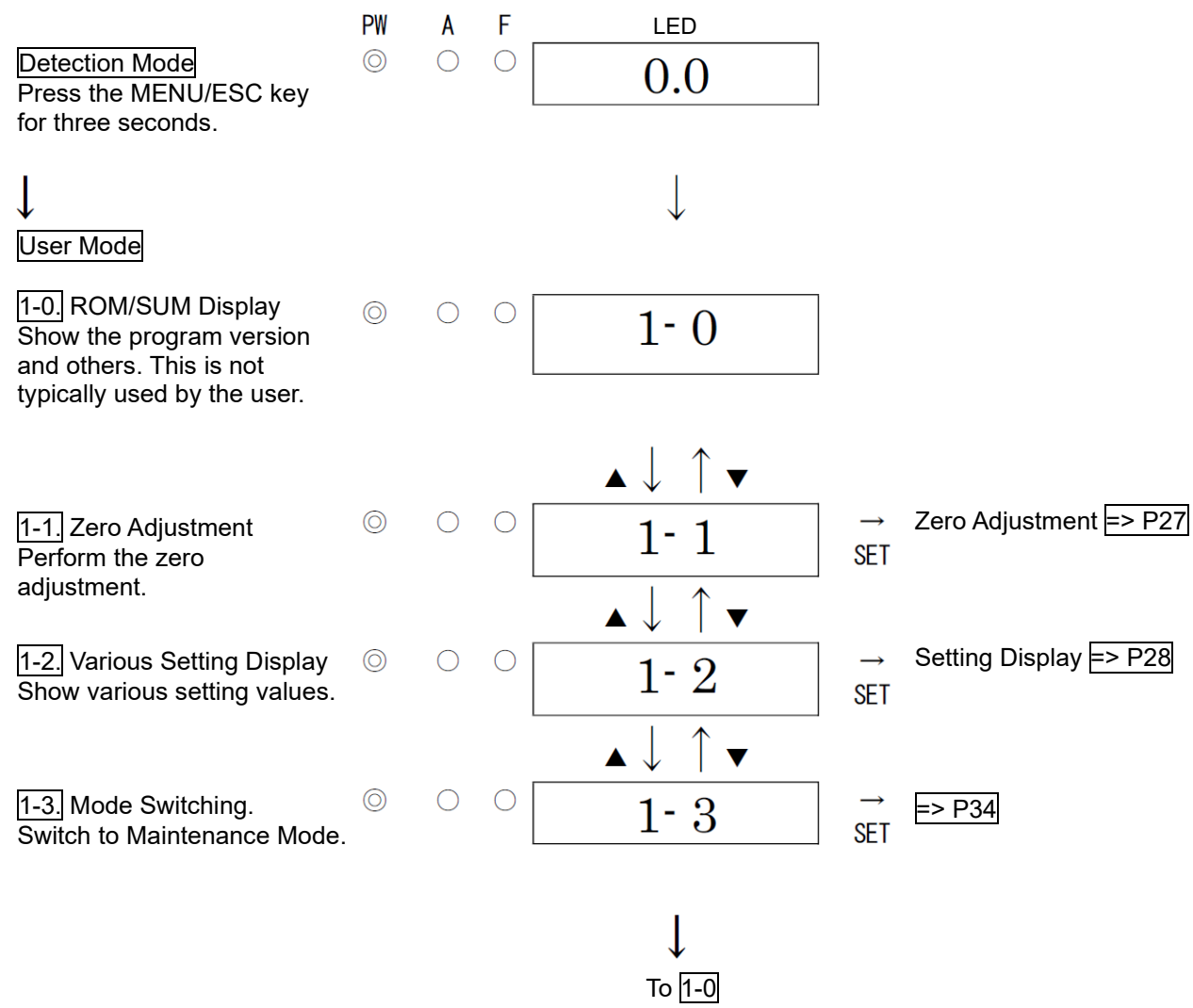
- Do not change the settings unnecessarily. Changing the settings without understanding the specifications may cause malfunctions.

Mode	Item	Display	Details
Detection Mode		Gas concentration	Normal state
User Mode	ROM/SUM Display	1-0	Show the program version and others. This is not typically used by the user.
	Zero Adjustment	1-1	Perform the zero adjustment.
	Setting Display	1-2	Show various setting values.
	Switch to Maintenance Mode	1-3	Switch to the regular maintenance mode.
Maintenance Mode	Test Mode	2-0	Perform various tests. 2-0.0 Gas Test 2-0.1 Alarm Test 2-0.2 Fault Test 2-0.3 LED Test 2-0.4 Memory Test
	Zero Adjustment	2-1	Perform the zero adjustment.
	Span Adjustment	2-2	Perform the span adjustment.
	Zero/Span Initialization	2-3	Initialize zero/span values.
	Environmental Setting	2-4	Used for various environmental settings. 2-4.0 Sensor Power Supply ON/OFF 2-4.1 INHIBIT Setting 2-4.2 Alarm Setpoint Setting 2-4.3 Alarm Delay Time Setting 2-4.4 Alarm Pattern Setting 2-4.5 Zero Suppression Pattern Setting 2-4.6 Zero Suppression Value Setting 2-4.7 Alarm Contact Specification Setting 2-4.8 Energized/De-energized Contact Setting 2-4.9 Zero Follower Selection 2-4.A Maintenance Mode External Output Setting 2-4.B External Output Adjustment 2-4.C Alarm Test External Output Setting 2-4.D Sensor Operation Start Setting 2-4.E Password Setting 2-4.F Sensor Fault Alarm Pattern Setting 2-4.H LOAD Voltage Adjustment
	Display	2-5	Display various electrical settings. This is not typically used by the user.
	Switch to Factory Mode	2-6	Not used.
	Switch to User Mode	2-7	Returns to the user mode.

5-5. User Mode


**WARNING**

After the adjustment is completed, press MENU/ESC to return to Detection Mode.
(If the detector remains in User Mode, it automatically returns to Detection Mode in ten hours.)

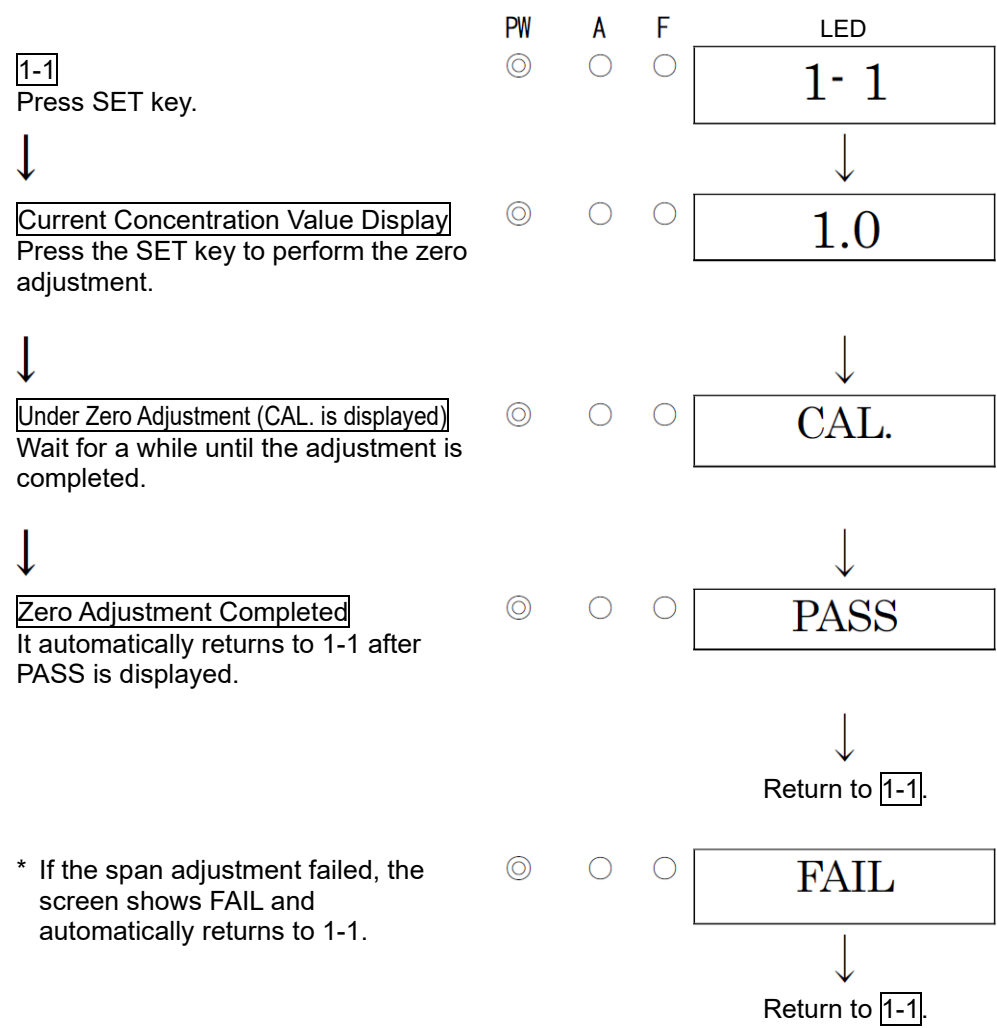


<Zero Adjustment "1-1">

This is used to perform a zero adjustment.

**WARNING**

To perform a gas calibration, you must perform both a zero adjustment and a span adjustment. Perform the zero adjustment and the span adjustment in this order. If they are performed in the wrong order or if only one of them is performed, accurate gas detection cannot be ensured.

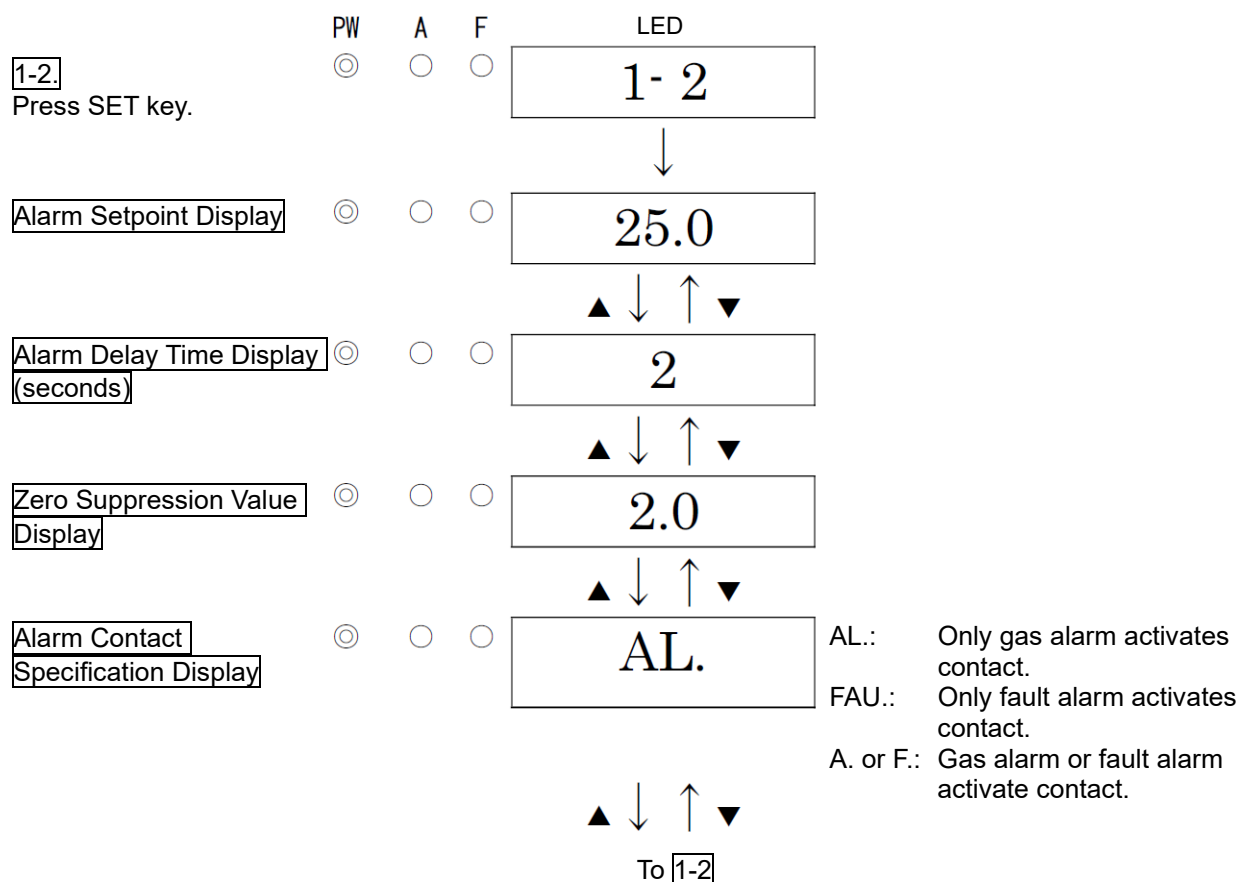


NOTE

- If the zero calibration fails, the detector returns to 1-1 after FAIL is displayed. In this case, the zero adjustment has not been completed.

<Setting Display "1-2">

Show various setting values.



5-6. Turning Off the Detector

To turn off the detector, turn off the power supply (24 VDC) to the detector.



WARNING

- When the detector is turned off, an alarm may be triggered on the upper (central) system.
- Before turning off the detector, INHIBIT (point skip) on the upper (central) system must be activated. Decide whether the power can be turned off by checking the operation of the devices connected to the external output or external contact output terminal of the detector.
- If the alarm contact is energized (option), it is activated when the detector is turned "OFF".

6

Operations and Functions

6-1. Gas Alarm Activation

Gas alarm: Triggered when the concentration of detected gas reaches or exceeds the alarm setpoint value.

NOTE

The alarm setpoint is factory-set. The alarm delay time (standard: 2 seconds) can be cancelled if not needed.

<Display Operation>

Gas Concentration Display

If the gas concentration rises above the detection range (Over Scale), "〇〇〇〇" is displayed.

Power Indicator Lamp (POWER: Green)

During operation, this lights up continuously.

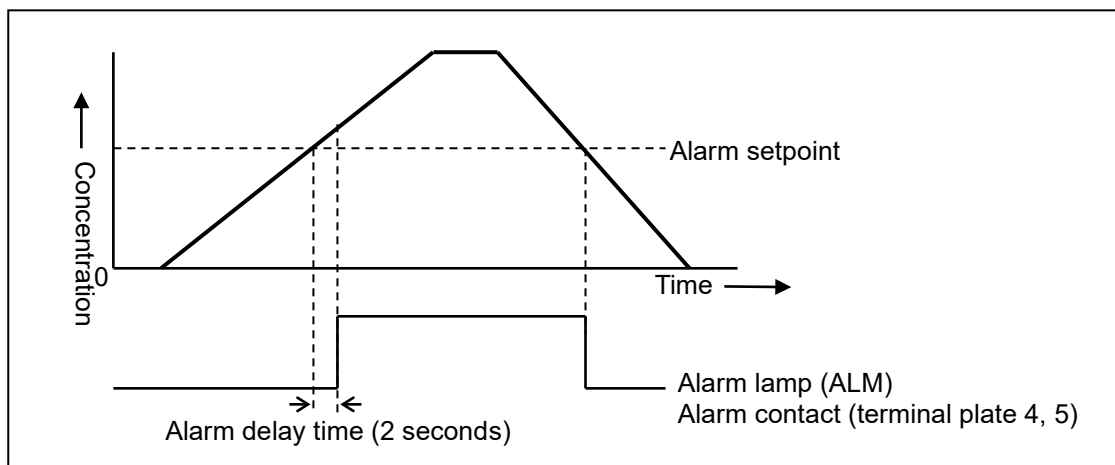
Alarm Indicator Lamp (ALM: Red)

It lights up when the alarm setpoint value is reached or exceeded.

<Contact Activation>

The contact is activated when the gas concentration reaches or exceeds the alarm setpoint value (only when the alarm is used).

The contact activation automatically resets when the gas concentration drops below the alarm setpoint value.



<Response to Gas Alarm>

A gas concentration value exceeds the alarm setpoint

When a gas alarm is triggered, take actions in accordance with your management rules for a gas alarm. Normally, take the following actions.

- Check the reading of the detector.

NOTE

If a gas leak is momentary, the reading may already have dropped by the time you check it. In addition, when the alarm is triggered by noise or other incidental conditions other than a gas, the reading may have already dropped.

- Based on your management rules for a gas alarm, no one can be allowed to access the monitored zone to ensure safety.
- If the gas concentration remains, close the main valve of the gas, and then check that the gas concentration drops.
- Equipped with protective gear, access the leak point and use a portable gas detector to confirm the absence of gas.
- Check that the area is free from dangers and take actions to fix the gas leak.

6-2. Fault Alarm Activation

A fault alarm is triggered when an abnormality is detected. The fault lamp (yellow) lights up and an error message appears on the display. Determine the cause(s) and take appropriate actions.

After the detector is recovers from the fault, it restarts with the process normally performed right after it is turned on (initial clear).

If the detector repeatedly malfunctions, contact RKI immediately.

NOTE

For information on malfunctions (error messages), see "9. Troubleshooting".

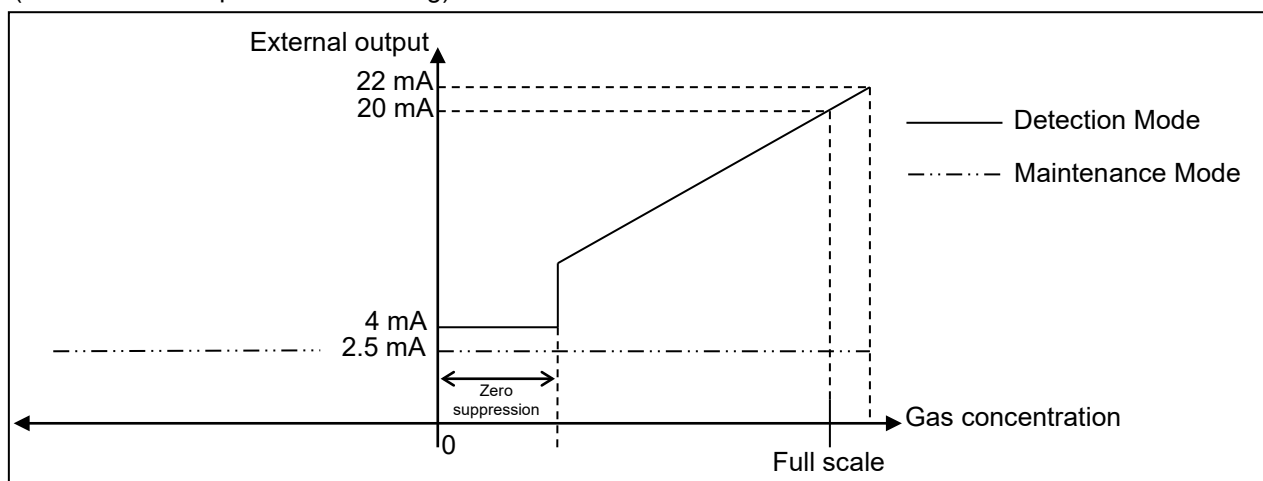
6-3. External Output Operation

Signal Transmission System		Electric current transmission (non-isolated) 4 – 20 mA
Transmission Path		CVVS
Transmission Distance		CVVS 1.25 sq: Maximum 1 km
Connection Load Resistance		Below 300 Ω
1	Detection Mode (No Alarm)	4 - 20 mA (concentration output)
2	Detection Mode (Gas Alarm)	4 - 20 mA (concentration output)
3	Initial Clear	Depending on the setting of section 4. <u>2.5 mA setting</u> : 2.5 mA <u>4 mA, HOLD, 4 - 20 mA setting</u> : 4 mA
4	Maintenance Mode	<u>2.5 mA setting</u> : 2.5 mA <u>4 mA setting</u> : 4 mA <u>HOLD setting</u> : The previous value retained <u>4 - 20 mA setting</u> : 4 - 20 mA (concentration output)
5	Alarm Test	<u>Output ON setting</u> : 4 - 20 mA (concentration output) <u>Output OFF setting</u> : 4 mA
6	Fault Alarm	0.5 mA (Fixed)

7	INHIBIT	Depending on the setting of section 4. <u>2.5 mA setting: 2.5 mA</u> <u>4 mA, HOLD, 4 - 20 mA setting: 4 mA</u>
8	Power Off	0 mA

Example of Gas Concentration and External Output

4 - 20 mA specification
(Maintenance output: 2.5 mA setting)



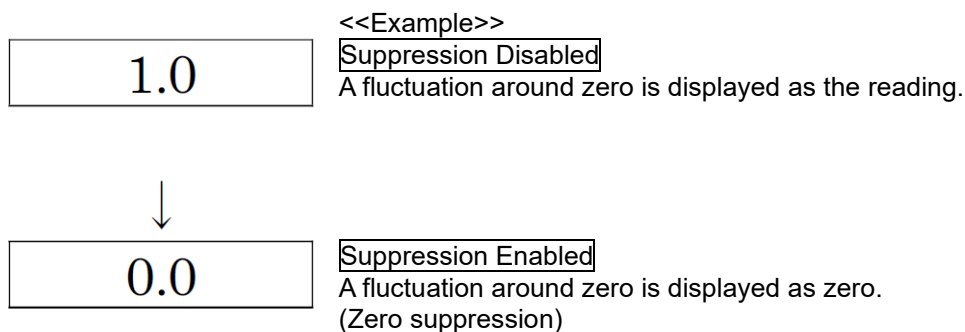
CAUTION

- The 4 - 20 mA output is already adjusted. In case of over scale, an output will not exceed 22 mA.
- Output during INHIBIT or initial clear is based on 4 - 20 mA output setting in Maintenance Mode. In particular, when the detector is started or the specification is changed, be careful about 4-20 mA output setting. Understand how the detector functions, and take actions, if necessary, so that the signal receiver side can prepare to avoid false alarms.

6-4. Suppression Function

The sensors used with the detector are influenced by environmental changes (temperature, humidity, and other characteristics) and interference gases, which affects the reading. Therefore, the reading might fluctuate around zero even in a normal environment.

The suppression function obscures influences by environmental changes and interference gases around zero that have no meaning for your management rules for a gas alarm. This function is used to hide (suppress) the fluctuation of the reading around zero.



NOTE

- The suppression function is factory-set. The standard setting value is 10% FS.
- In Maintenance Mode, this function is disabled and the fluctuation around zero is displayed.



CAUTION

A reading above zero is suppressed with the 10% FS suppression.
A reading that is 10% FS or more below zero is displayed as "-0.0". The detector needs a zero adjustment and span adjustment.

7

Maintenance

The detector is an important safety instrument.

To maintain the performance of the detector and improve the reliability of safety, perform regular maintenance.

7-1. Maintenance Intervals and Items

- Daily maintenance: Perform maintenance before beginning to work.
- Monthly maintenance: Perform maintenance on the alarm circuit (alarm test) once a month.
- Regular maintenance: Perform maintenance once or more for every six months to maintain the performance as a safety unit.

Maintenance Item	Description	Daily Maintenance	Monthly Maintenance	Regular Maintenance
Power Supply Check	Check that the power lamp is on.	○	○	○
Concentration Display Check	Check that the concentration display value is zero. If the reading is not zero, perform a zero adjustment and span adjustment.	○	○	○
Span Adjustment	Perform a span adjustment using calibration gas.	—	—	○

7-2. Maintenance Mode



WARNING

After the adjustment is completed, press MENU/ESC key to return to Detection Mode.
(If the detector remains in Maintenance Mode, it automatically returns to Detection Mode in ten hours.)

Mode	Item	LCD display	Details
Maintenance Mode	Test Mode	2-0	2-0.0 Gas Test 2-0.1 Alarm Test 2-0.2 Fault Test 2-0.3 LED Test 2-0.4 Memory Test
	Zero Adjustment	2-1	Perform a zero adjustment.
	Span Adjustment	2-2	Perform a span adjustment.
	Zero/Span Initialization	2-3	Initialize zero/span values.
	Environmental Setting	2-4	2-4.0 Sensor Power Supply ON/OFF 2-4.1 INHIBIT Setting 2-4.2 Alarm Setpoint Setting 2-4.3 Alarm Delay Time Setting 2-4.4 Alarm Pattern Setting 2-4.5 Zero Suppression Pattern Setting 2-4.6 Zero Suppression Value Setting 2-4.7 Alarm Contact Specification Setting 2-4.8 Energized/De-energized Contact Setting 2-4.9 Zero Follower Selection 2-4.A Maintenance Mode External Output Setting 2-4.B External Output Adjustment 2-4.C Alarm Test External Output Setting 2-4.D Sensor Operation Start Setting 2-4.E Password Setting 2-4.F Sensor Fault Alarm Pattern Setting 2-4.H LOAD Voltage Adjustment
	Display	2-5	Display various electrical settings. This is not typically used by the user.
	Switch to Factory Mode	2-6	Not used.
	Switch to User Mode	2-7	Returns to User Mode.

<Entering Maintenance Mode>

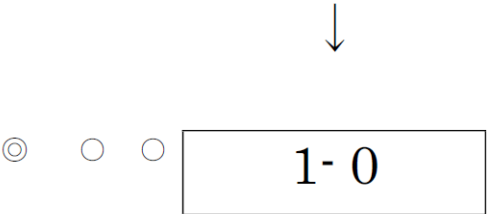
Detection Mode

While in Detection Mode, press and hold the MENU/ESC key for three seconds.



User Mode

1-0 ROM/SUM displays. Scroll to the 1-3 Mode Switching item.

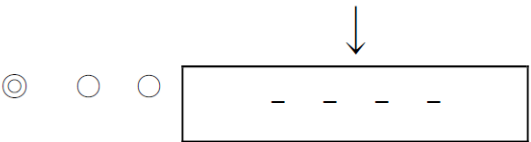


User Mode

In "1-3.", press the SET key.



Then press the SET key again for three seconds.



Maintenance Mode

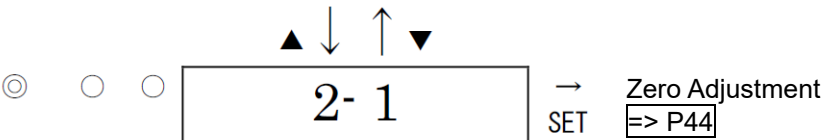
2-0 Test Mode

Perform various tests.



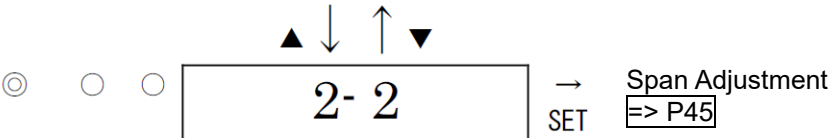
2-1 Zero Adjustment

Perform a zero adjustment.



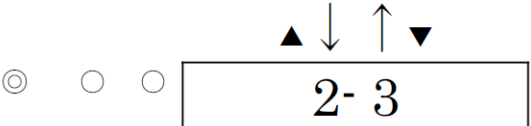
2-2 Span Adjustment

Perform a span adjustment.



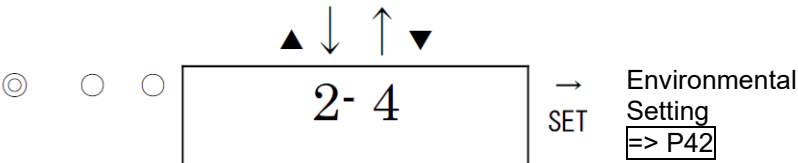
2-3 Zero/Span Initialization

Initialize the zero/span adjustment after the sensor is replaced.

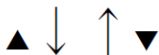


2-4 Environmental Setting

Set various operations and functions.



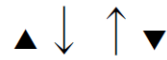
2-4.0 and 2-4.3 to 2-4.H are factory-set. They are not typically used by the user.



2-5. Various Electrical
Settings Display
Display various electrical
settings. This is not used by
the user.



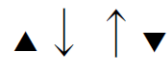
2- 5



2-6.
Enter Factory Mode. This is
not used by the user.



2-6



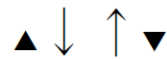
2-7.
Return to User Mode.



2-7

→
SET

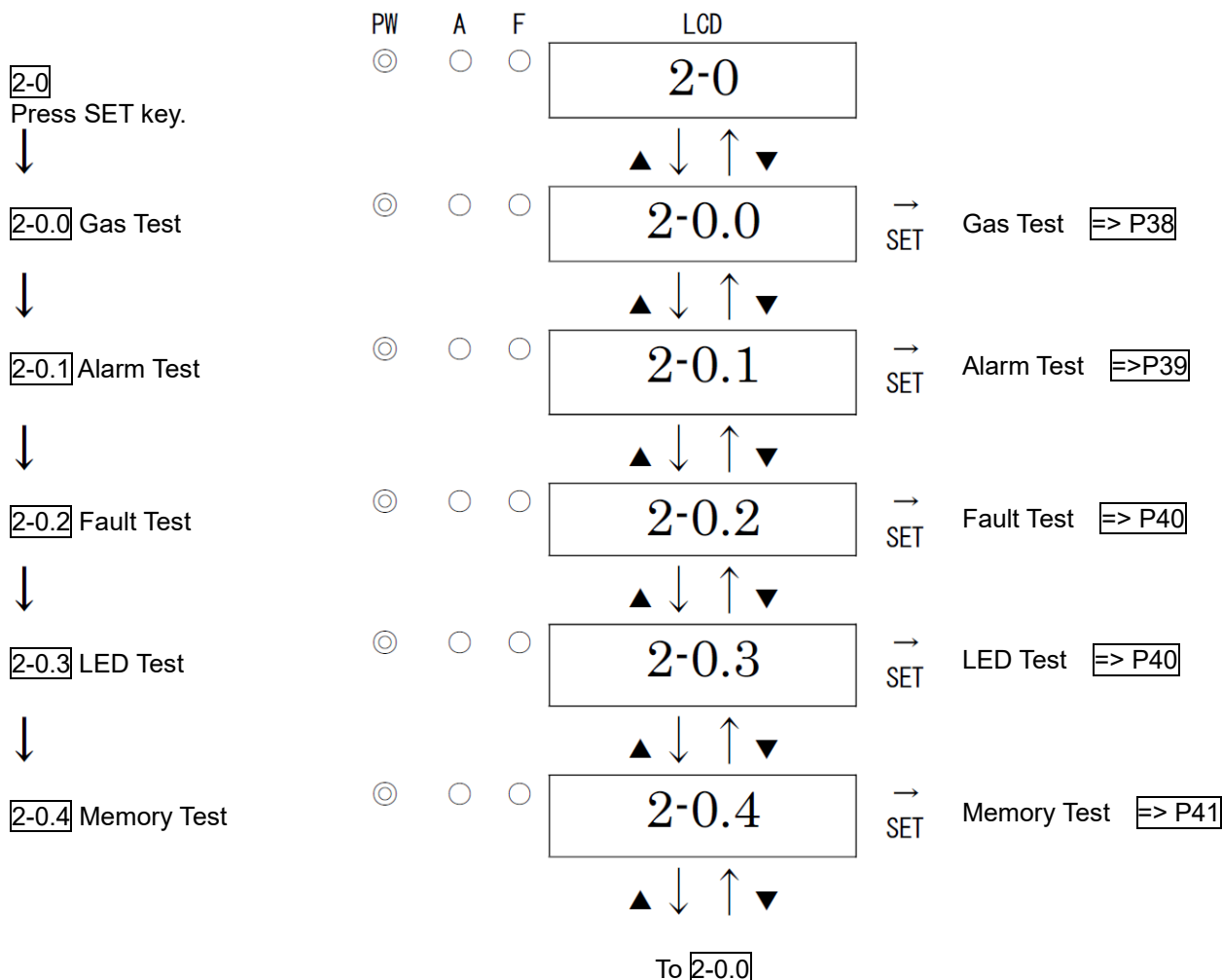
rET. is displayed.
Press the SET key
again to return to
User Mode.



To **2-0.** Test Mode

<Alarm Test Mode "2-0">

Enter Maintenance Mode as described on page 35.

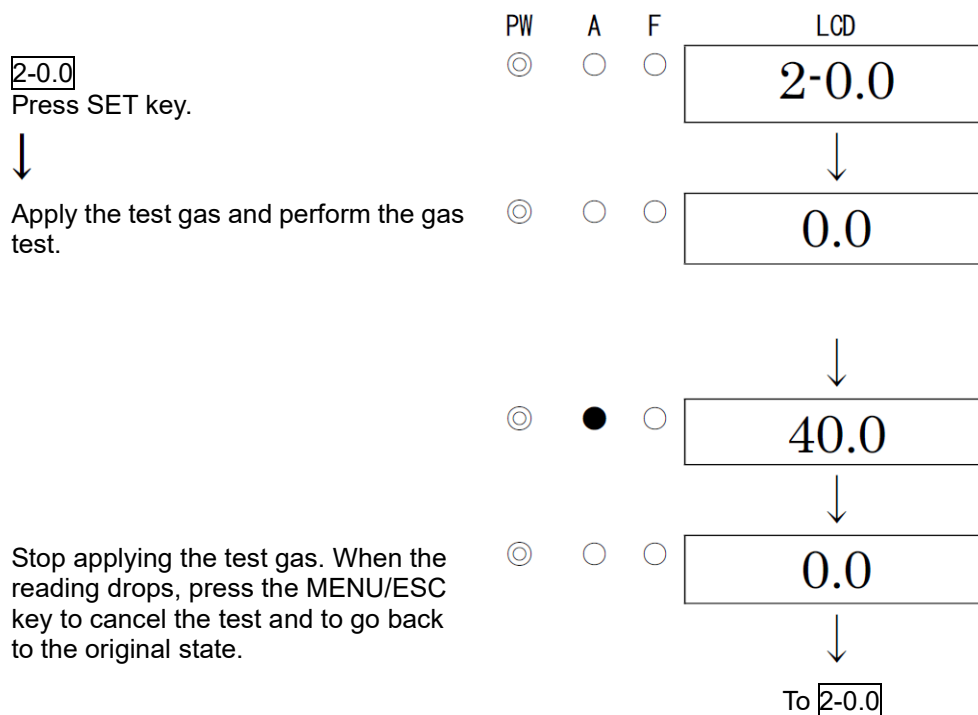


WARNING

- Before starting the alarm test (transmission test), inform related sections so that they can prepare for false abnormalities (external output signals and alarm contact). After the test is completed, press MENU/ESC key to return to Detection Mode. (If the detector remains in Alarm Test Mode, it automatically returns to Detection Mode in ten hours.)
- In Alarm Test Mode, the gas concentration equal to the reading is output depending on the Maintenance Mode setting. Take actions, if necessary, so that the signal receiver side can prepare for false alarms.

Gas Test "2-0.0"

Enter Alarm Test Mode as described on page 37.



WARNING

Because the contact and gas concentration output can be activated by a gas test, depending on the Maintenance Mode setting, be careful when performing this test.

Alarm Test "2-0.1"

Enter Alarm Test Mode as described on page 37 and scroll to 2-0.1.

2-0.1

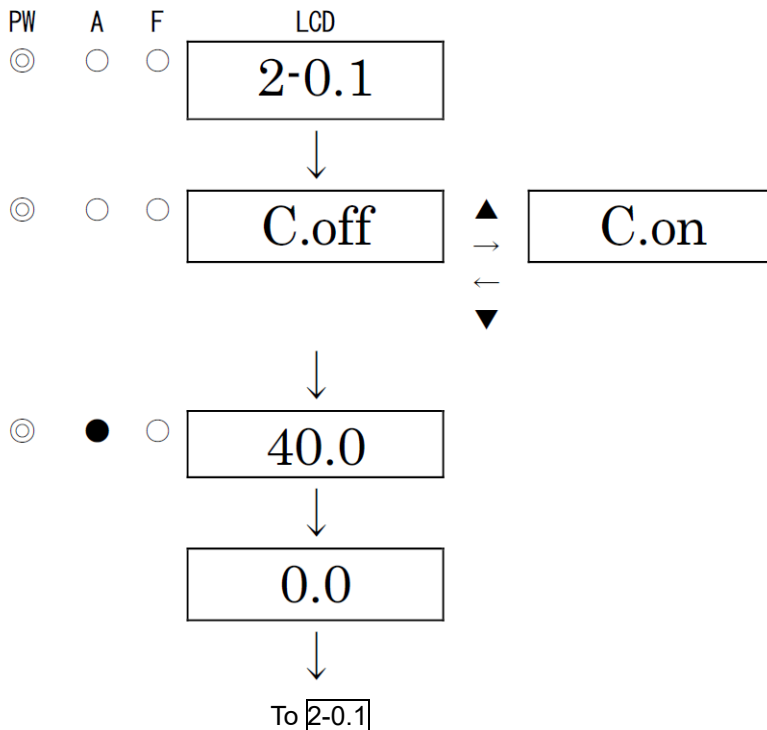
Press SET key.



Alarm Test ON/OFF

(The contact setting is "Alarm", or "Alarm or Fault")

Select either ON/OFF, and then press the SET key.

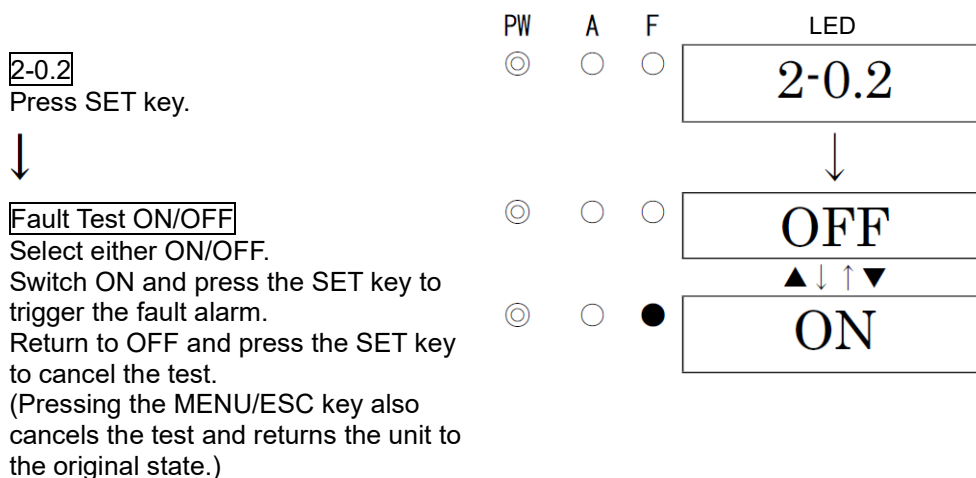


WARNING

Because the contact and gas concentration output can be activated by an alarm test, depending on the Maintenance Mode setting, be careful when performing this test.

Fault Alarm Test "2-0.2"

Enter Alarm Test Mode as described on page 37 and scroll to 2-0.2.

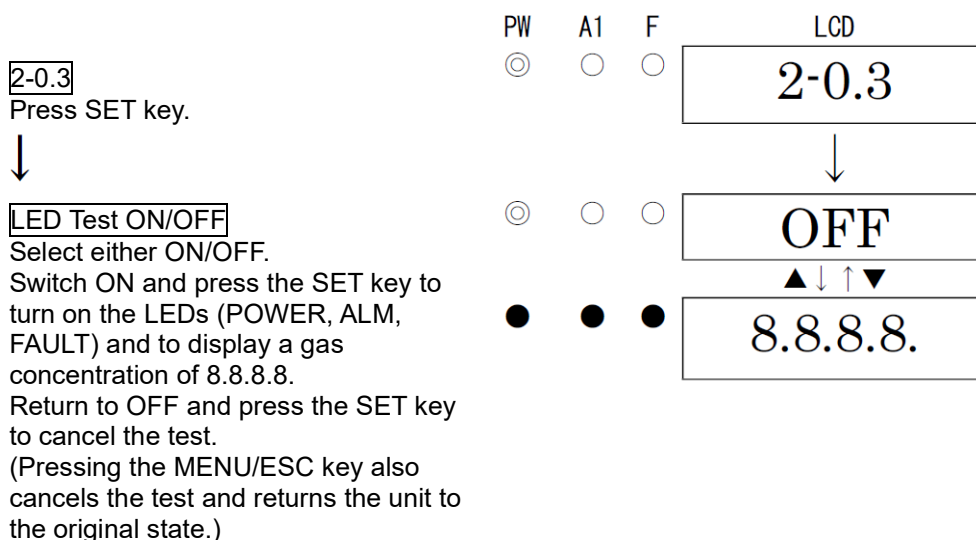


WARNING

Because the contact and gas concentration output can be activated by a fault alarm test, depending on the Maintenance Mode setting, be careful when performing this test.

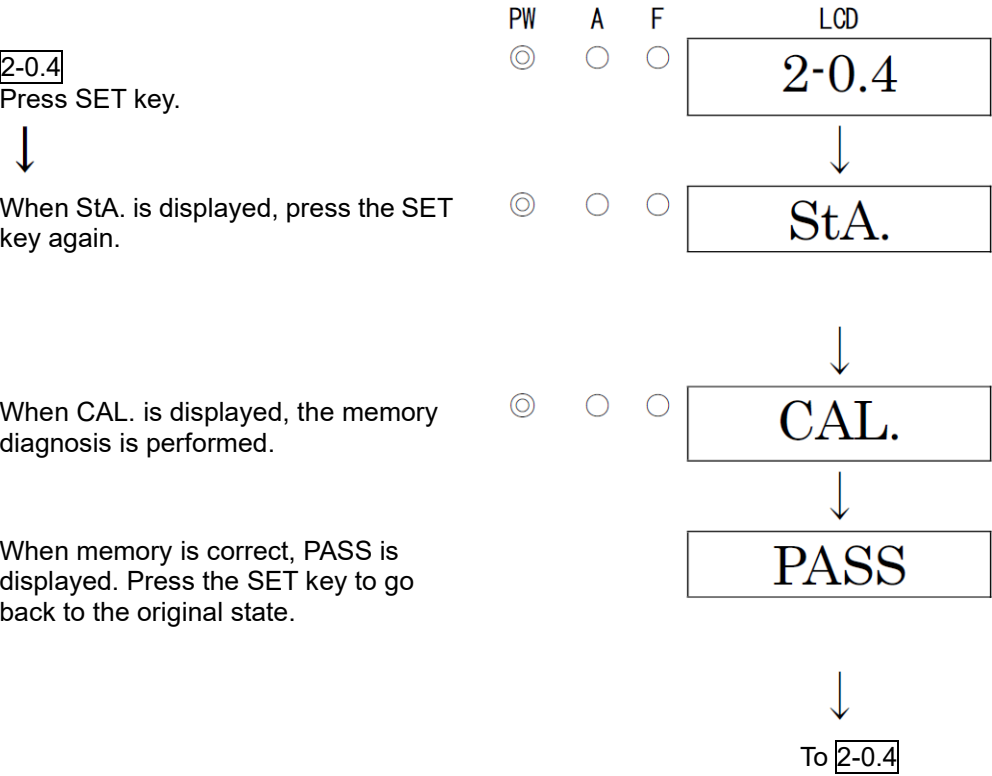
LED Test "2-0.3"

Enter Alarm Test Mode as described on page 37 and scroll to 2-0.3.



Memory Test "2-0.4"

Enter Alarm Test Mode as described on page 37 and scroll to 2-0.4.

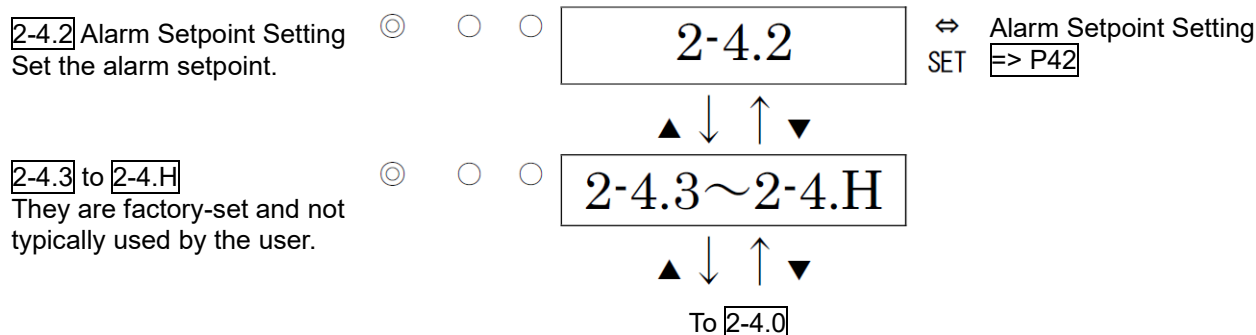
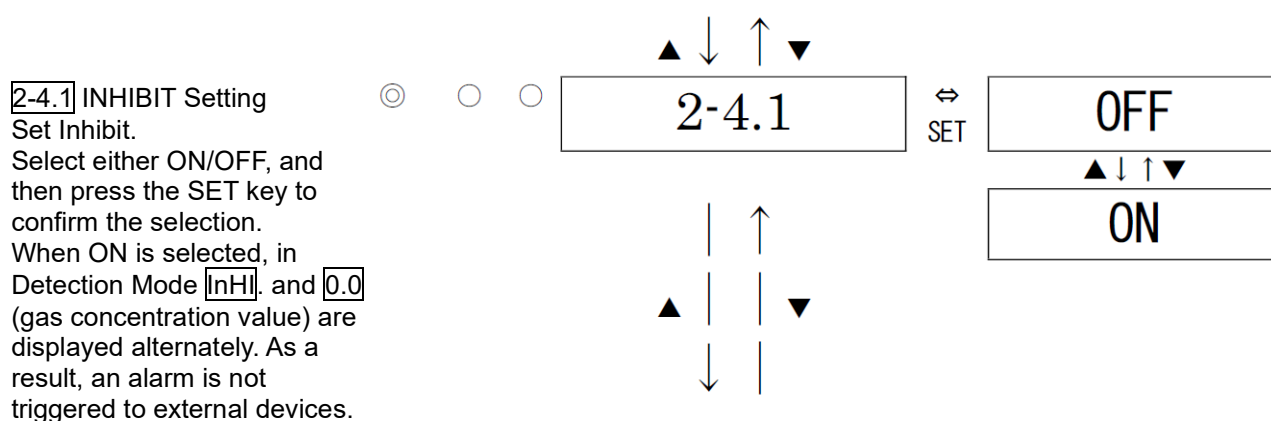
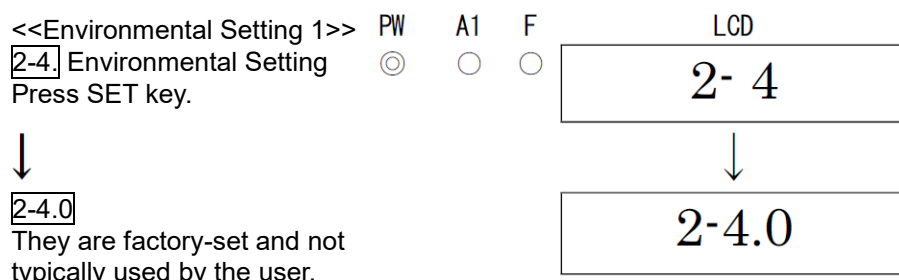


NOTE When abnormalities are found in the memory, F-RA is displayed for a RAM fault, and F-RO is displayed for a ROM fault. If there is a fault in the RAM and the ROM, F-RA and F-RO alternate.

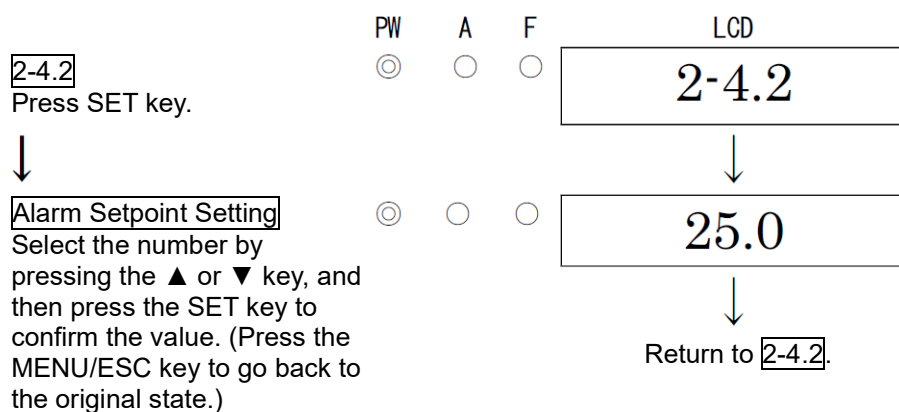
<Environmental Setting "2-4">

Set various operations and functions in the environmental setting.

Enter Maintenance Mode as described on page 35 and scroll to 2-4.



Alarm Setpoint Setting "2-4.2"



7-3. Performing a Calibration

Perform a zero adjustment and span adjustment as part of a complete calibration.

Materials:

- Zero adjustment gas
- Span adjustment gas
- 0.5 LPM fixed flow regulator (1.0 LPM fixed flow regulator for NH₃)
- Humidifier tube (not used for NH₃ gas because the humidifier absorbs NH₃)

Detection Gas	Full Scale	Calibration Gas/ Concentration	Calibration Value
C ₂ H ₅ OH (Ethanol)	2000 ppm	IPA: 1000 ppm	1300 ppm
	5000 ppm	IPA: 2000 ppm	2500 ppm
C ₃ H ₃ N (Acrylonitrile)	100 ppm	Isobutane: 50 ppm	70 ppm
C ₅ H ₁₀ O ₂ (Propyl acetate)	1000 ppm	IPA: 500 ppm	500 ppm
C ₆ H ₆ (Benzene)	100 ppm	Isobutane: 75 ppm	35 ppm
	500 ppm	Isobutane: 1000 ppm	300 ppm
C ₆ H ₁₄ (Hexane)	500 ppm	Hexane: 360 ppm	360 ppm
	3000 ppm	Hexane: 1800 ppm	1800 ppm
C ₈ H ₁₀ (Xylene)	1000 ppm	Isobutylene: 500 ppm	700 ppm
CH ₂ Cl ₂ (Methylene chloride)	500 ppm	Isobutane: 500 ppm	240 ppm
CH ₄ (Methane)	2000 ppm	Methane: 1000 ppm	1000 ppm
CHCl ₃ (Chloroform)	200 ppm	Isobutane: 2500 ppm	100 ppm
	300 ppm	Isobutane: 2500 ppm	100 ppm
EDC (Ethylene dichloride)	100 ppm	Methane: 1000 ppm	70 ppm
EO (Ethylene oxide)	1000 ppm	Hydrogen: 500 ppm	500 ppm
HC ₂ H ₃ O ₂ (Acetic acid)	500 ppm	Carbon Monoxide: 1000 ppm	400 ppm
MEK (Methyl ethyl ketone)	500 ppm	Hexane: 1100 ppm	200 ppm
NH ₃ (Ammonia)	500 ppm	Ammonia: 100 ppm	100 ppm
R404a	2000 ppm	Isobutane: 250 ppm	1000 ppm
* Not all listed cylinders have RKI part numbers (see pg. 58 for cylinder part numbers). Contact RKI if you need a cylinder that does not have a part number.			



WARNING

Always perform both a zero adjustment and a span adjustment in that order. If they are performed in a wrong order or only one of them is performed, accurate gas detection cannot be ensured.

<Zero Adjustment "2-1">



WARNING

Be sure the detector is in a fresh air environment before performing a zero adjustment. If the detector is not in a fresh air environment, a cylinder of zero air must be used to perform the zero adjustment.

Detection Mode

While in Detection Mode, press and hold the MENU/ESC key for three seconds.

User Mode

1-0. ROM/SUM displays.
Scroll to the 1-3 Mode
Switching item.

1-3
In "1-3.", press the SET key.

Then press the SET key
again for three seconds.

The 2-0 item in Maintenance
Mode displays.

2-1
Scroll to the 2-1 menu item.

2-1
Press SET key.



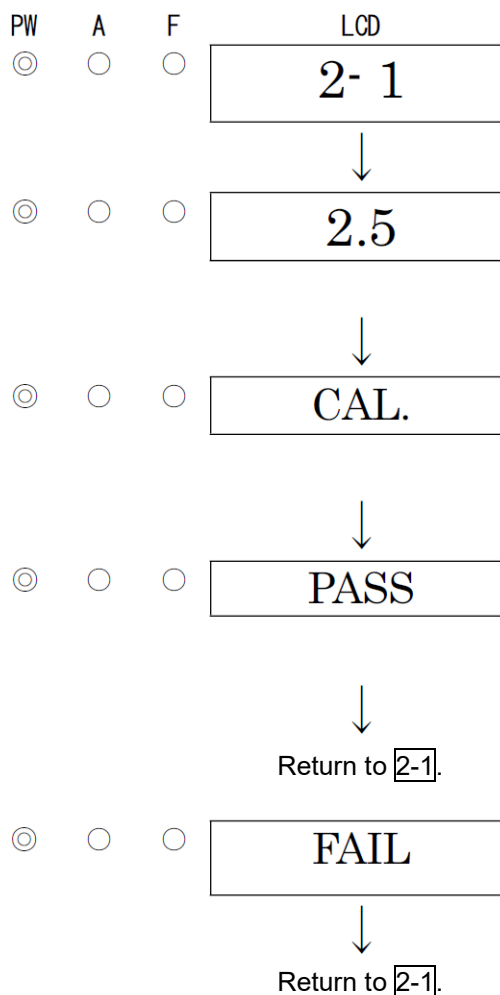
Current Concentration Value Display
Press the SET key to perform the zero
adjustment.



Under Zero Adjustment (CAL. is displayed)
Wait for a while until the adjustment is
completed.



Zero Adjustment Completed
The unit returns to 2-1 after PASS is
displayed.



* If the zero adjustment fails, it
automatically returns to 2-1 after FAIL
is displayed.

NOTE

- If the zero calibration fails, the detector returns to 2-1 after FAIL. In this case, the zero adjustment has not been completed.



CAUTION

- Before starting a span adjustment, provide the detector with the span adjustment gas and wait until the reading stabilizes.

2-2

Press SET key.

Gas Introduction

Screw the regulator into the cal cylinder, install the cal cup, and for all gases except NH3, connect the regulator to the cal cup's GAS IN fitting using the humidifier assembly (use regular flexible tubing for NH3). Turn the regulator knob counterclockwise to open it and allow gas to flow for 2 minutes.

Press the SET key.

Span Adjustment

When the reading blinks, adjust it to the introduced gas concentration by pressing the ▲ or ▼ key. After adjusting the value, press the SET key.



Span Adjustment Completed

The unit automatically returns to 2-2 after PASS is displayed.



Stop Gas Introduction

* If the span adjustment fails, the detector automatically returns to 2-2 after FAIL is displayed.



Stop Gas Introduction

Turn the regulator knob clockwise to close it.

Disconnect the humidifier assembly from the cal cup. *Hold the humidifier assembly by the clear tubes at the ends. Do not hold the humidifier tube itself.*

If you intend to check the gas response after calibrating an NH3 detector, only check it once. Repeated applications of dry NH3 calibration gas results in a lower response to the applied gas.

PW



A



F



LCD

2- 2



12.5



40.0



PASS



Return to 2-2.



FAIL

Return to 2-2.

NOTE: The gas response must be at least 10% of the full scale value before you can press the SET button.

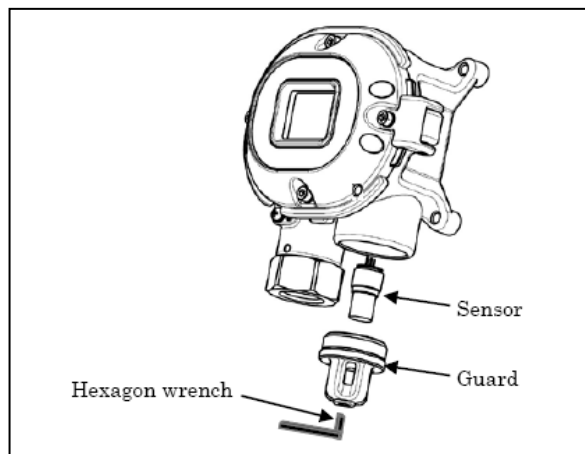
NOTE

- If the span adjustment fails, the detector returns to 2-2 after FAIL is displayed. In this case, the span adjustment has not been completed.
Be sure you are using the correct calibration gas and check the tubing for a leak. If there are mistakes, perform the span adjustment again.
If the span adjustment cannot be performed even when there is no mistake or after recalibration, the gas sensor life might have expired. Replace the sensor as described on page 46.

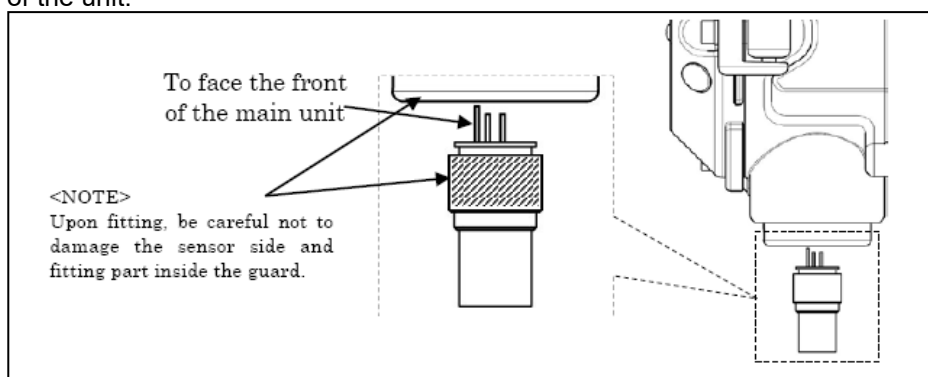
7-4. Parts Replacement

<Sensor Replacement>

1. Turn off power to the SD-1GH.
2. Use a 6 mm hexagonal screwdriver (Allen wrench) to unscrew the sensor guard.
3. Unplug the old sensor.



4. Line up the pins on the new sensor with the sockets in the sensor slot. The longest sensor pin faces to the front of the unit.



5. Rotate the sensor slightly to make sure the pins are engaged and then push the sensor all the way in.
6. Use a 6 mm hexagonal screwdriver (Allen wrench) to reinstall the sensor guard.
7. Turn on power to the SD-1GH.
8. Set the heater current.
 - a. While in Detection Mode, press and hold the MENU/ESC key for three seconds to enter User Mode.
 - b. Scroll to 1-3 and press and release SET.
 - c. Press and hold SET for 3 seconds to enter Maintenance Mode.
 - d. Scroll to 2-4 and press and release SET.
 - e. 2-4.0 displays.
 - f. Press and release SET.
 - g. The display shows **On**.

- h. Press and release SET.
- i. The existing heater current displays.
- j. Press and release SET.
- k. Adjust the heater current's first digit.

Detection Gas		Heater Current
C2H5OH (Ethanol)	2000 ppm	130 mA \pm 2 mA
	5000 ppm	167 mA \pm 2 mA
C3H3N (Acrylonitrile)		130 mA \pm 2 mA
C5H10O2 (Propyl acetate)		130 mA \pm 2 mA
C6H6 (Benzene)	100 ppm	130 mA \pm 2 mA
	500 ppm	130 mA \pm 2 mA
C6H14 (Hexane)	500 ppm	130 mA \pm 2 mA
	3000 ppm	167 mA \pm 2 mA
C8H10 (Xylene)		130 mA \pm 2 mA
CH2Cl2 (Methylene chloride)		260 mA \pm 2 mA
CH4 (Methane)		167 mA \pm 2 mA
CHCl3 (Chloroform)	200 ppm	280 mA \pm 2 mA
	300 ppm	280 mA \pm 2 mA
EDC (Ethylene dichloride)		280 mA \pm 2 mA
EO (Ethylene oxide)		150 mA \pm 2 mA
HC2H3O2 (Acetic acid)		167 mA \pm 2 mA
MEK (Methyl ethyl ketone)		130 mA \pm 2 mA
NH3 (Ammonia)		167 mA \pm 2 mA
R404a		130 mA \pm 2 mA

- l. Press and release SET.
 - m. Adjust the heater current's remaining digits.
 - n. Press and release SET.
 - o. The display shows **Load**, the heater current, **Load** again, and the heater current again.
 - p. Press and release SET to return to 2-4.0.
 - q. Press ESC to return to Maintenance Mode.
 - r. Press and hold ESC to return to Detection Mode.
9. Let the sensor warmup for the amount of time shown in the table below. If it is not possible to allow a warm-up time as long as listed below, allow at least a 2 hour warm-up, perform a calibration, and then do another calibration 1 month later.

Unpowered Time	Warm-up Time
1 - 24 hours	4 hours
1 – 3 days	24 hours
3 – 10 days	2 days
10 – 31 days	7 days
1 - 3 months	14 days
3 months or more	1 month

10. Initialize the zero/span.
- a. While in Detection Mode, press and hold the MENU/ESC key for three seconds to enter User Mode.
 - b. Scroll to 1-3 and press and release SET.
 - c. Press and hold SET for 3 seconds to enter Maintenance Mode.
 - d. Scroll to 2-3 and press and release SET.
 - e. When **CLE** appears, press and release AL/SET.
11. Set the load voltage.
- a. While in Detection Mode, press and hold the MENU/ESC key for three seconds to enter User Mode.
 - b. Scroll to 1-3 and press and release SET.
 - c. Press and hold SET for 3 seconds to enter Maintenance Mode.
 - d. Scroll to 2-4 and press and release SET.
 - e. Scroll to 2-4.h and press and release SET.
 - f. The display shows **Load** and then shows the current voltage setting in mV.
 - g. Press and release SET.

- h. Screw a 0.5 LPM regulator (1.0 LPM regulator for NH₃) into a calibration cylinder containing the full scale concentration of the target gas or an equivalent surrogate gas concentration equivalent to the target gas' full scale.

Detection Gas	Full Scale	Gas/Concentration for Load Voltage
C ₂ H ₅ OH (Ethanol)	2000 ppm	IPA: 1600 ppm
	5000 ppm	Pentane: 8000 ppm
C ₃ H ₃ N (Acrylonitrile)	100 ppm	Isobutane: 75 ppm
C ₅ H ₁₀ O ₂ (Propyl acetate)	1000 ppm	IPA: 1000 ppm
C ₆ H ₆ (Benzene)	100 ppm	Isobutane: 250 ppm
	500 ppm	Isobutane: 1600 ppm
C ₆ H ₁₄ (Hexane)	500 ppm	Hexane: 500 ppm
	3000 ppm	Hexane: 3000 ppm
C ₈ H ₁₀ (Xylene)	1000 ppm	Isobutylene: 1200 ppm
CH ₂ Cl ₂ (Methylene chloride)	500 ppm	Isobutane: 3600 ppm
CH ₄ (Methane)	2000 ppm	Methane: 2000 ppm
CHCl ₃ (Chloroform)	200 ppm	Isobutane: 5300 ppm
	300 ppm	Isobutane: 8200 ppm
EDC (Ethylene dichloride)	100 ppm	Methane: 1700 ppm
EO (Ethylene oxide)	1000 ppm	Hydrogen: 1000 ppm
HC ₂ H ₃ O ₂ (Acetic acid)	500 ppm	Carbon Monoxide: 1200 ppm
MEK (Methyl ethyl ketone)	500 ppm	Hexane: 3000 ppm
NH ₃ (Ammonia)	500 ppm	Ammonia: 500 ppm (properly ventilate area and/or use PPE)
R404a	2000 ppm	Isobutane: 1000 ppm
* Not all listed cylinders have RKI part numbers (see pg. 57 for cylinder part numbers). Contact RKI if you need a cylinder that does not have a part number.		

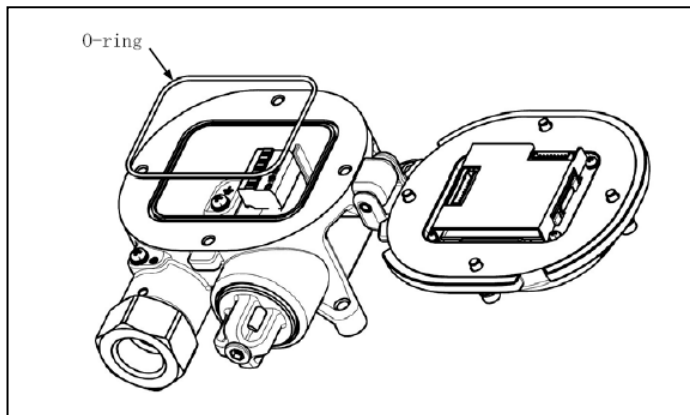
- i. Install the calibration cup.
- j. For gases other than NH₃: Use a humidifier to connect the regulator to the calibration cup's GAS IN fitting. *Hold the humidifier by the clear tubes at the end. Do not hold the humidifier tube itself.*
For NH₃: Use flexible tubing to connect the regulator to the calibration cup's GAS IN fitting.
- k. Turn the regulator knob counterclockwise to open it and allow the gas to flow for 2 minutes. Be sure the area is well ventilated and/or use appropriate PPE.
- l. Press and release SET.
- m. Turn the regulator knob clockwise to close it. Unscrew the regulator from the calibration cylinder. Leave the calibration cup and humidifier attached to perform a calibration in step 12.
- n. The load voltage is displayed. Adjust the load voltage to match the value shown below.

Detection Gas		Load Voltage
C ₂ H ₅ OH (Ethanol)	2000 ppm	6.0 V ± 0.2 V
	5000 ppm	6.0 V ± 0.2 V
C ₃ H ₃ N (Acrylonitrile)		4.0 V ± 0.2 V
C ₅ H ₁₀ O ₂ (Propyl acetate)		7.0 V ± 0.2 V
C ₆ H ₆ (Benzene)	100 ppm	4.0 V ± 0.2 V
	500 ppm	6.0 V ± 0.2 V
C ₆ H ₁₄ (Hexane)	500 ppm	6.0 V ± 0.2 V
	3000 ppm	6.0 V ± 0.2 V
C ₈ H ₁₀ (Xylene)		6.0 V ± 0.2 V
CH ₂ Cl ₂ (Methylene chloride)		4.0 V ± 0.2 V
CH ₄ (Methane)		4.0 V ± 0.2 V
CHCl ₃ (Chloroform)	200 ppm	4.0 V ± 0.2 V
	300 ppm	4.0 V ± 0.2 V
EDC (Ethylene dichloride)		4.0 V ± 0.2 V
EO (Ethylene oxide)		6.0 V ± 0.2 V
HC ₂ H ₃ O ₂ (Acetic acid)		4.0 V ± 0.2 V
MEK (Methyl ethyl ketone)		7.0 V ± 0.2 V
NH ₃ (Ammonia)		4.0 V ± 0.2 V
R404a		6.0 V ± 0.2 V

- o. Press and release SET.
 - p. The display will either show **PASS** or the load voltage will flash. If the load voltage flashes, adjust the voltage to the correct value, shown above, and press and release SET.
 - q. Press and release ESC to return to Maintenance Mode.
 - r. Press and hold ESC to return to Detection Mode.
12. Calibrate the detector as described on page 43.

<J-Box O-Ring Replacement>

1. Use a 4 mm hexagonal screwdriver (Allen wrench) to unscrew the 4 screws that secure the j-box lid to the body. The screws are captive and will not fall out.
2. Remove the old O-ring.
3. Install the new O-ring in the groove. Make sure it sits flat.



4. Close the j-box lid and tighten the screws to a torque of 215.6 ± 24.5 N cm (22.0 ± 2.50 kgf cm).

8

Storage, Relocation, and Disposal

8-1. Storing the Detector

The detector must be stored under the following environmental conditions.

- In a dark place with normal temperature and humidity away from direct sunlight
- In a place where gases, solvents or vapors are not present

8-2. Relocating the Detector

When the detector is relocated, select a new place in accordance with “4-2. Precautions for installation points” on page 13 and “4-4. How to install” on page 16.

For information on wiring, see 4-5. Wiring on page 17. The unpowered time must be minimized when the detector is relocated.



CAUTION

- When using a relocated or stopped/stored detector again, perform a gas calibration.

8-3. Disposal

When disposing of the detector, treat it as industrial waste in accordance with the local regulations.

9

Troubleshooting

The Troubleshooting section describes frequent malfunctions but does not explain the causes of all the malfunctions. If the detector shows a symptom which is not explained in this manual, or still has malfunctions even though remedial actions are taken, please contact RKI.

<Unit Abnormalities>

Symptom/Display	FAULT	Causes	Actions
<u>The detector cannot be turned on.</u>	—	The wiring is not correct.	Connect the wiring properly.
		The terminal plate is removed.	Connect the terminal plate properly.
		Abnormalities/momentary blackout of power supply system	Provide the rated voltage. Take measures such as checking or adding the UPS, power supply line filter and insulation transformer.
		Cable abnormalities (open circuit/not connected/short circuit)	Check the detector and device wiring.
<u>Abnormal operations</u>	—	Disturbances by sudden surge noise, etc.	Restart the detector. If the symptom is observed frequently, take appropriate measures to eliminate the noise.
<u>Sensor abnormalities</u> E-1	●	The sensor is not connected or is improperly connected.	Confirm the sensor cable is securely fastened to the terminal plate.
		Faults of the sensor	Replace the sensor.
<u>System abnormalities</u> E-9	●	The rated voltage is not supplied to the detector.	Check the power supply and supply the rated voltage.
		Abnormalities in the detector's ROM, RAM, or EEPROM	Please contact RKI.

<Reading Abnormalities>

Symptoms	Causes	Actions
<u>The reading rises or drops and stays there.</u>	Sensor output drift	Perform a zero adjustment and a span adjustment.
	Presence of interference gas	Disturbances by interference gases, such as solvents, cannot be eliminated completely.
	Slow leak	A very small amount of gas may be leaking (slow leak). Because ignoring it may cause dangers, take a remedial measure, i.e., taking actions the same as those for the gas alarm.
	Environmental changes	Perform a zero adjustment and a span adjustment.
<u>A gas alarm is triggered when there is no gas leak or other abnormalities at the detection point.</u>	Presence of interference gas	Disturbances by interference gases, such as solvents, cannot be eliminated completely.
	Disturbance by noise	Turn off and restart the detector. If the symptom is observed frequently, take appropriate measures to eliminate the noise.
	Sudden change in the environment	When the environment (temperature, etc.) changes suddenly, the detector cannot adjust to it and is affected by it. In some cases, the detector triggers an indication alarm. Because the detector cannot be used under sudden and frequent environmental changes, any preventive actions to eliminate them should be taken by the user.
<u>Slow response</u>	Deteriorated sensor sensitivity	Replace the sensor.
<u>Span adjustment impossible</u>	Improper calibration gas concentration	Use the proper calibration gas.
	Deteriorated sensor sensitivity	Replace the sensor.

10

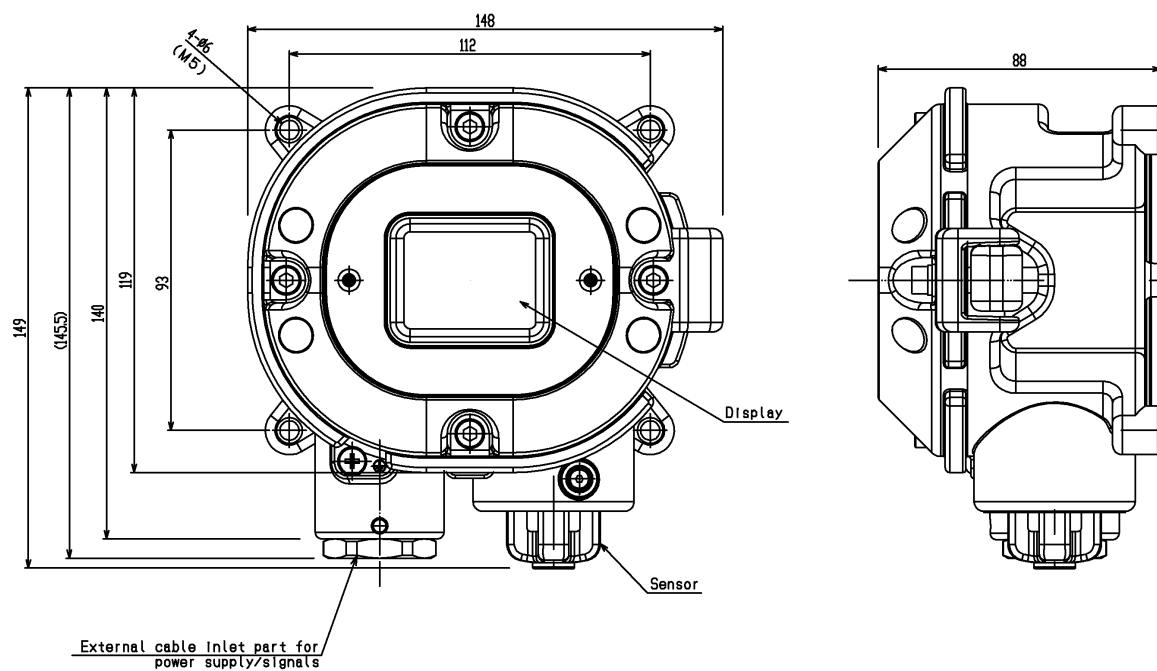
Product Specifications

10-1. ATEX/IECEx Specifications

Model	SD-1GH
Detection principle	Semiconductor
Gas to be detected	Combustible/toxic gas
Concentration display	Seven-segment LED (four-digit)
Detection range	See page 56
Display resolution	See page 56
Detection method	Diffusion type
Alarm setpoint	See page 56
Power display	POWER lamp on (green)
External output	Gas concentration signal/alarm contact (gas alarm or fault alarm, gas/fault common alarm)
Accuracy	Within $\pm 10\%$ of full scale
Response time	60 seconds
Gas alarm type	One-step alarm (H)
Gas alarm display	ALM lamp on (red)
Gas alarm pattern	Auto-reset
Fault alarm/self diagnosis	System abnormalities/sensor abnormalities
Fault alarm display	FAULT lamp on (yellow)/detail display
Fault alarm pattern	Auto-reset
Alarm contact	No-voltage contact 1a, de-energized (energized in response to an alarm) or energized (de-energized in response to an alarm)
Contact capacity	250 VAC - 0.5 A/30 VDC - 0.5 A (resistant load)
Transmission system	3-wire type analog transmission (common cable for power and signal <power, signal, common>)
Transmission specifications	4 - 20 mA DC (linear/load resistance under 300 Ω , resolution divided into 200)
Transmission cable	CVVS1.25 sq - 3-core or CVVS1.25 sq - 5-core (when the contact is used)
Transmission distance	Below 1.25 km
Functions	Alarm delay/suppression
Power supply	24 VDC (17 – 26.4 VDC)
Power Consumption	Maximum 3.1 W
Cable connecting port	Pressure proof packing gland (Cable gland<G3/4> or Adapter A<NPT1/2> or Adapter B<NPT3/4>)
Initial clear	Approx. 25 seconds
Operating temperatures	-20 - 60°C (at a constant condition)
Operating humidity	Below 95% RH (Non-condensing)
Structure	Wall mounting type
Explosion-proof structure	Flame-proof enclosures
Explosion-proof class	II 2G Ex db II C T5 Gb (ATEX) / Ex db II C T5 Gb (IECEx)
External dimensions	Approx. 148 (W) x 161 (H) x 88 (D) mm (projection portions excluded)
Weight	Approx. 2.0 kg
Outer color	Munsell 7.5BG5/2

* Specifications subject to changes without notice.

10-2. ATEX/IECEx Outline Drawing

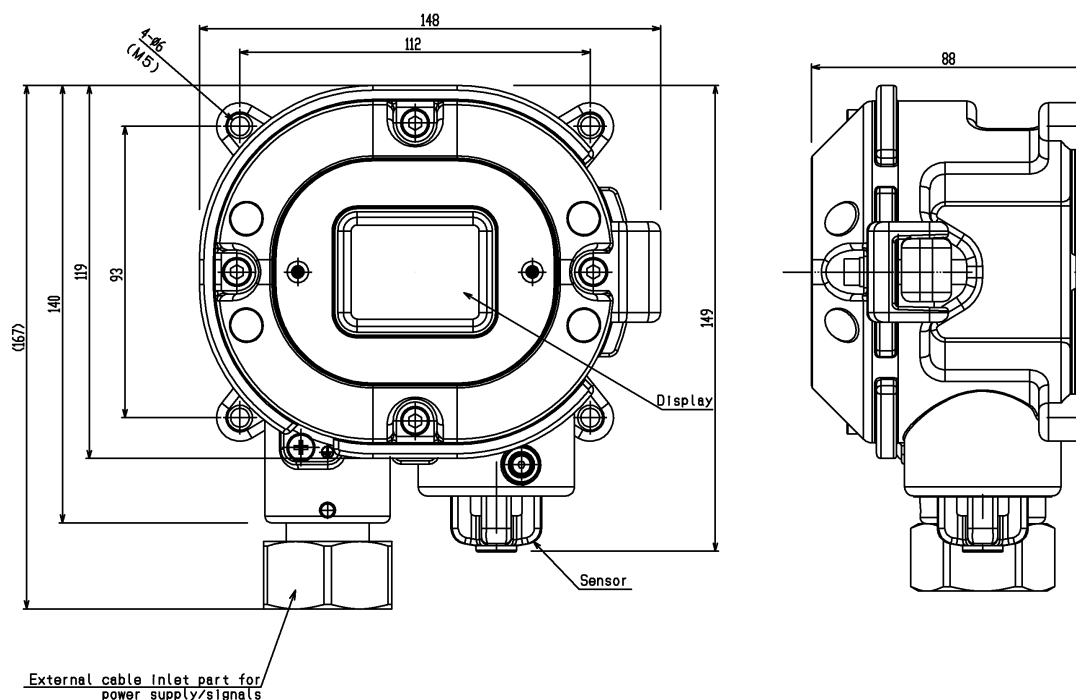


10-3. TIIS Specifications

Model	SD-1GH
Detection principle	Semiconductor
Gas to be detected	Combustible/toxic gas
Concentration display	Seven-segment LED (four-digit)
Detection range	See page 56
Display resolution	See page 56
Detection method	Diffusion type
Alarm setpoint	See page 56
Power display	POWER lamp on (green)
External output	Gas concentration signal/alarm contact (gas alarm or fault alarm, gas/fault common alarm)
Accuracy	Within $\pm 10\%$ of full scale
Response time	60 seconds
Gas alarm type	One-step alarm (H)
Gas alarm display	ALM lamp on (red)
Gas alarm pattern	Auto-reset
Fault alarm/self diagnosis	System abnormalities/sensor abnormalities
Fault alarm display	FAULT lamp on (yellow)/detail display
Fault alarm pattern	Auto-reset
Alarm contact	No-voltage contact 1a, de-energized (energized in response to an alarm) or energized (de-energized in response to an alarm)
Contact capacity	250 VAC - 0.5 A/30 VDC - 0.5 A (resistant load)
Transmission system	3-wire type analog transmission (common cable for power and signal <power, signal, common>)
Transmission specifications	4 - 20 mA DC (linear/load resistance under 300 Ω , resolution divided into 200)
Transmission cable	CVVS1.25 sq - 3-core or CVVS1.25 sq - 5-core (when the contact is used)
Transmission distance	Below 1.25 km
Functions	Alarm delay/suppression
Power supply	24 VDC (17 – 26.4 VDC)
Power consumption	Maximum 3.1 W
Cable connecting port	Pressure proof packing gland
Initial clear	Approx. 25 seconds
Operating temperatures	-20 - 53°C (at a constant condition)
Operating humidity	Below 95% RH (Non-condensing)
Structure	Wall mounting type
Explosion-proof structure	Flame-proof enclosures
Explosion-proof class	Ex d IIC T5 X (TIIS<Japan>)
External dimensions	Approx. 148 (W) x 161 (H) x 88 (D) mm (projection portions excluded)
Weight	Approx. 2.0 kg
Outer color	Munsell 7.5BG5/2

* Specifications subject to changes without notice.

10-4. TIIS Outline Drawing

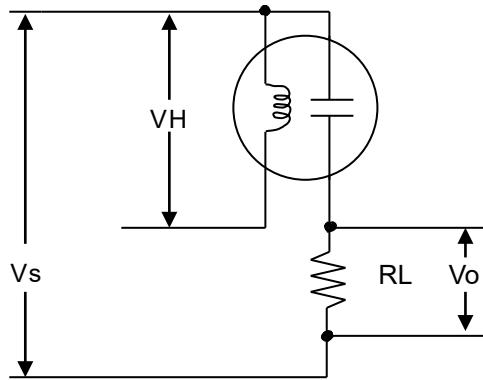


10-5. Full Scale, Alarm Point, Increments

Detection Gas	Full Scale	Alarm Point	Increment
C2H5OH (Ethanol)	2000 ppm	500 ppm	10 ppm
	5000 ppm	1000 ppm	25 ppm
C3H3N (Acrylonitrile)	100 ppm	25 ppm	0.5 ppm
C5H10O2 (Propyl acetate)	1000 ppm	200 ppm	5 ppm
	100 ppm	25 ppm	0.5 ppm
C6H6 (Benzene)	500 ppm	100 ppm	5 ppm
	500 ppm	100 ppm	5 ppm
C6H14 (Hexane)	3000 ppm	1000 ppm	25 ppm
	1000 ppm	200 ppm	5 ppm
C8H10 (Xylene)	1000 ppm	200 ppm	5 ppm
CH2Cl2 (Methylene chloride)	500 ppm	100 ppm	5 ppm
CH4 (Methane)	2000 ppm	500 ppm	10 ppm
CHCl3 (Chloroform)	200 ppm	30 ppm	1 ppm
	300 ppm	100 ppm	2 ppm
EDC (Ethylene dichloride)	100 ppm	25 ppm	0.5 ppm
EO (Ethylene oxide)	1000 ppm	200 ppm	5 ppm
HC2H3O2 (Acetic acid)	500 ppm	100 ppm	10 ppm
MEK (Methyl ethyl ketone)	500 ppm	200 ppm	5 ppm
NH3 (Ammonia)	500 ppm	100 ppm	5 ppm
R404a	2000 ppm	500 ppm	10 ppm

10-6. Detection Principle

Metal dioxide can measure a gas concentration based on changes in the electric conductivity of semiconductor caused by gas adsorbed on its surface.



RL: Load resistance, V_o : Output voltage
VH: Heater voltage, V_s : Sensor voltage

11

Calibration Parts List

NOTE: Contact RKL to order cylinders from pg. 43 and pg. 48 that are not listed below.

Description	Part Number
Calibration cup (for everything except NH3)	81-1148
Calibration cup (for NH3)	81-1148-RIGH
Flexible tubing (for use with NH3)	06-1248RK
Humidifier, 24", with tubing (not for use with NH3)	33-2002RK-01
Regulator, with gauge and knob, 0.5 LPM continuous flow, for 17 liter and 34 liter steel cylinders (cylinders with external threads)	81-1050RK
Regulator, with gauge and knob, 0.5 LPM continuous flow, for 34 liter aluminum, 58 liter, and 103 liter calibration cylinders (cylinders with internal threads)	81-1051RK
Regulator, with gauge and knob, 1.0 LPM continuous flow, for 34 liter aluminum, 58 liter, and 103 liter calibration cylinders (cylinders with internal threads)	81-1051RK-10
C4H10 (isobutane): 50 ppm in air, 34 liter steel calibration cylinder	81-0105RK-01
C4H10 (isobutane): 50 ppm in air, 103 liter calibration cylinder	81-0105RK-03
C4H10 (isobutane): 250 ppm in air, 34 liter steel calibration cylinder	81-0026RK-01
C4H10 (isobutane): 250 ppm in air, 103 liter calibration cylinder	81-0026RK-03
C4H10 (isobutane): 500 ppm in air, 34 liter steel calibration cylinder	81-0017RK-01
C4H10 (isobutane): 3600 ppm (20% LEL) in air, 34 liter steel calibration cylinder	81-0021RK
C5H12 (pentane): 8000 ppm in air, 34 liter steel calibration cylinder	81-9055RK-01
C5H12 (pentane): 8000 ppm in air, 103 liter calibration cylinder	81-9055RK-03
C6H14 (hexane): 360 ppm in air, 34 liter steel calibration cylinder	81-9005RK-01
C6H14 (hexane): 500 ppm in air, 34 liter aluminum calibration cylinder	81-0083RK-21
C6H14 (hexane): 500 ppm in air, 103 liter calibration cylinder	81-0083RK-23
C6H14 (hexane): 1100 ppm (10% LEL) in air, 103 liter calibration cylinder	81-0007RK-03
C6H14 (hexane): 1800 ppm (15% LEL) in air, 34 liter steel calibration cylinder	81-0007RK-01
CH4 (methane): 1000 ppm in air, 34 liter steel calibration cylinder	81-0085RK-01
CH4 (methane): 1000 ppm in air, 103 liter calibration cylinder	81-0085RK-03
H2 (hydrogen): 500 ppm in air, 34 liter steel calibration cylinder	81-0000RK-71
H2 (hydrogen): 500 ppm in air, 103 liter calibration cylinder	81-0000RK-73
H2 (hydrogen): 1000 ppm in air, 34 liter steel calibration cylinder	81-0000RK-01
H2 (hydrogen): 1000 ppm in air, 103 liter calibration cylinder	81-0000RK-03
IPA (isopropyl alcohol): 1000 ppm in air, 34 liter steel calibration cylinder	81-0035RK-01
IPA (isopropyl alcohol): 1000 ppm in air, 103 liter calibration cylinder	81-0035RK-03
IPA (isopropyl alcohol): 2000 ppm (10% LEL) in air, 17 liter calibration cylinder	81-0014RK
NH3 (ammonia): 100 ppm in air, 58 liter calibration cylinder	81-9066RK-02
NH3 (ammonia): 100 ppm in air, 34 liter aluminum calibration cylinder	81-9066RK-04
Zero air, 34 liter steel calibration cylinder	81-0076RK-01
Zero air, 103 liter calibration cylinder	81-0076RK-03

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Replacement Parts List

Description	Part Number
C2H5OH (Ethanol), 0 – 2000 ppm replacement sensor	SG-8565
C2H5OH (Ethanol), 0 – 5000 ppm replacement sensor	SG-8565
C3H3N (Acrylonitrile), 0 – 100 ppm replacement sensor	SG-8521
C5H10O2 ; MIB (Propyl acetate), 0 – 1000 ppm replacement sensor	SG-8521
C6H6 (Benzene), 0 – 100 ppm and 0 – 500 ppm replacement sensor	SG-8521
C6H14 (Hexane), 0 – 500 ppm replacement sensor	SG-8521
C6H14 (Hexane), 0 – 3000 ppm replacement sensor	SG-8511
C8H10 (Xylene), 0 – 1000 ppm replacement sensor	SG-8521
CH2Cl2 (Methylene chloride), 0 – 500 ppm replacement sensor	SG-8523
CH4 (Methane), 0 – 2000 ppm replacement sensor	SG-8511
CHCl3 (Chloroform), 0 – 200 ppm replacement sensor	SG-8513
CHCl3 (Chloroform), 0 – 300 ppm replacement sensor	SG-8513
EDC (Ethylene dichloride), 0 – 100 ppm replacement sensor	SG-8513
EO (Ethylene oxide), 0 – 1000 ppm replacement sensor	SG-8521
HC2H3O2 (Acetic acid), 0 – 500 ppm replacement sensor	SG-8511
MEK (Methyl ethyl ketone), 0 – 500 ppm replacement sensor	SG-8521
NH3 (Ammonia), 0 – 500 ppm replacement sensor	SG-8562
R404a, 0 – 2000 ppm replacement sensor	SG-8521

13

Definition of Terms

Semiconductor	This is a principle of the sensor installed in the detector.
Initial clear	Output from the detector head fluctuates for a while after turning on the power. This is a function to prevent alarm triggering during that time.
Full scale	Maximum value of the detection range.
%LEL	A concentration unit meaning percentage of the lower explosive limit.
ppm	A concentration unit meaning part per million of the detection gas.
Calibration	Adjusts the readings to the known calibration gas concentration value.
Zero suppression	A function to hide the sensor drift around zero.
Alarm delay time	A function which temporarily suspends alarm activation to prevent a false alarm caused by noise.
INHIBIT	The gas detection function is temporarily suspended during maintenance, etc. This is also called "point skip", which has the same function.

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 : Gas Detector
Model Name : SD-1GH, SD-1DGH, SD-1, SD-1D
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
EN60079-1:2014

RoHS : EN50581(2012)

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 : KEMA 10ATEX0083 X

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 : II 2G Ex db II C T5 Gb

Year to begin affixing CE Marking : 2017

Place: TOKYO, Japan

Signature: 
Full name: Toshiyuki Takakura

Date: Aug. 5, 2020

Title: Director, Quality control center