

RIKEN GAS DETECTOR WITH SIGNAL CONVERTER**SD-705RID****INSTRUCTION MANUAL****Caution**

- Be sure to read through the manual with care before use.
- Store the manual in a readily accessible place.
- When this manual has been taken out for reference during the work, be sure to return it to the original position.
- This gas detector cannot be used for purpose other than intended.
- When this unit is used without complying with the instruction manual or is modified independently by a user or repaired with unspecified parts, the safety and quality of the product cannot be guaranteed. We will not bear any responsibility either for the accident caused by the above measures.

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Introduction

Thank you for purchasing our stationary gas detector with signal converter, SD-705RID. This is a gas detector to detect the inflammable gas leaking into the atmosphere, thereby preventing explosion of such a gas. This manual is a guidebook for use of the SD-705RID. All persons who use this detector for the first time and who has ever used the detector are requested to read through the manual to understand the content before use. This manual contains the following headings to ensure the safe and effective operation.



Danger

Means vital damage directly to the human life and body or properties due to contact with the high voltage, etc.



Warning

Means vital damage to the human body or properties unless the operation or measures of this manual are observed.



Caution

Means minor damage to the human body or properties unless the operation or measures of this manual are observed.



Remarks

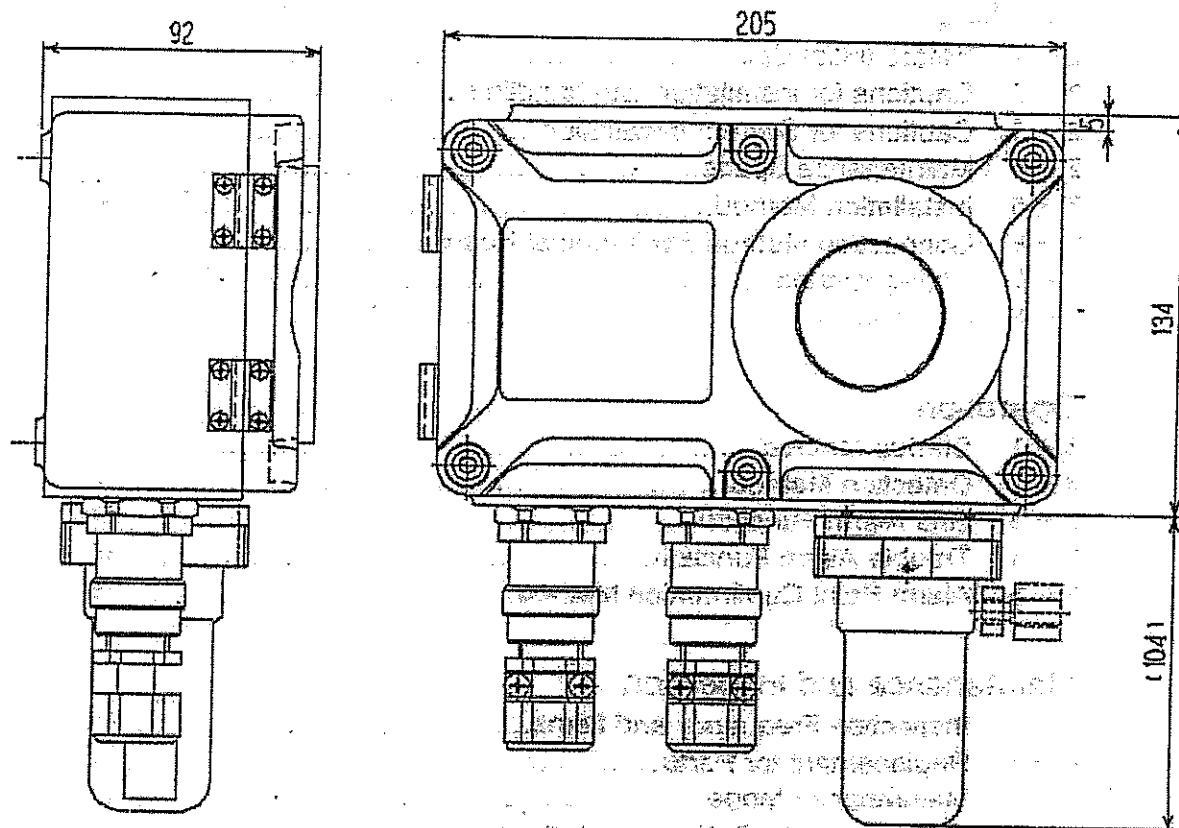
Means advise concerning handling and operation.

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1. Functions of the Product

Overall View and Name of Each Part



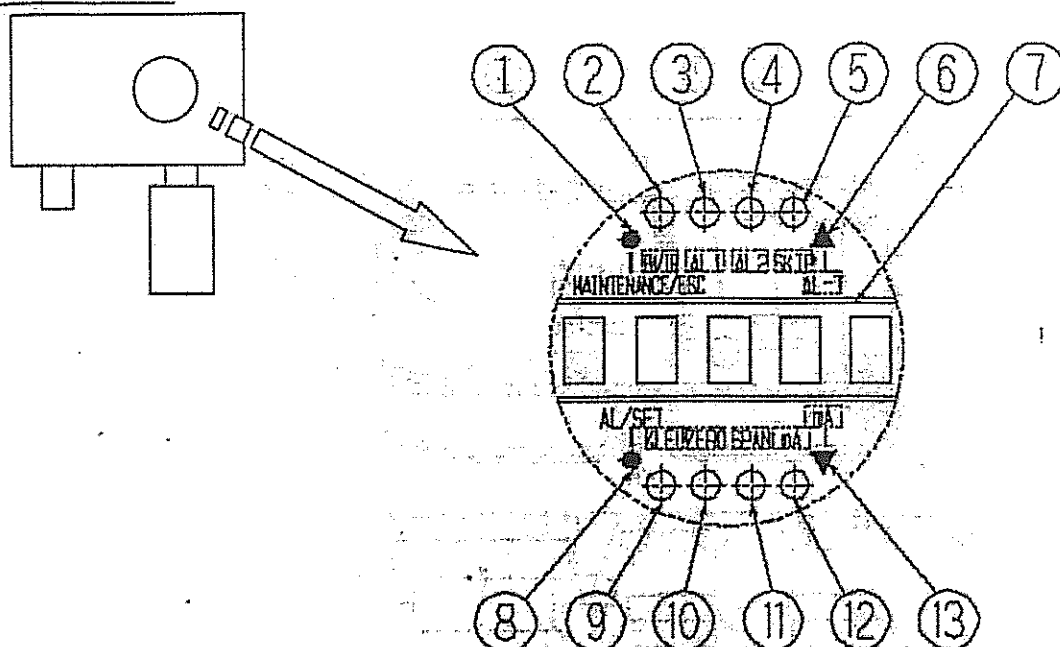
Control key



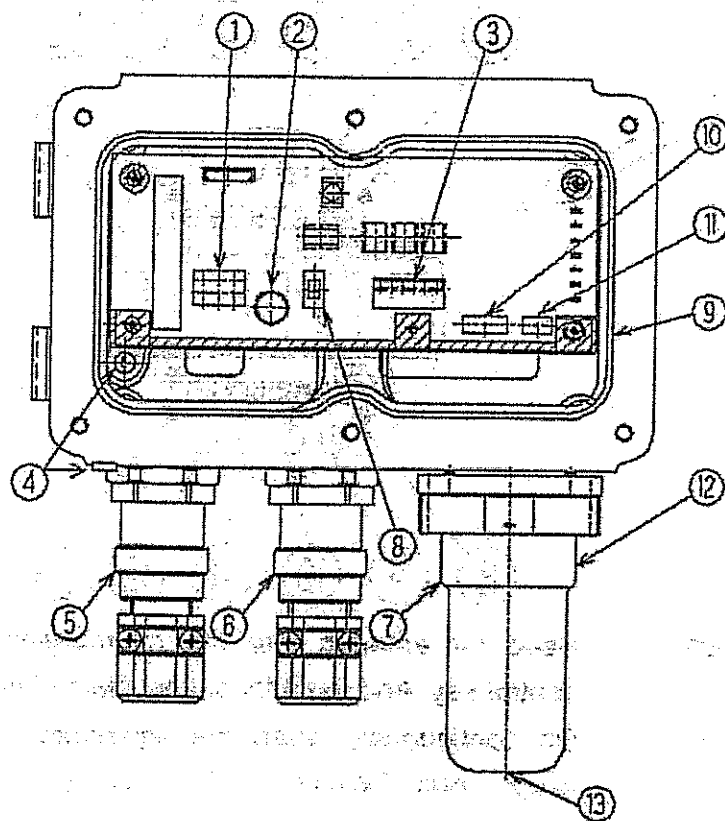
Warning

The control key used for adjustment is made from a powerful magnet. If it is brought nearer to a credit card, ID card, or other magnetic products, this key may damage the store data.

Panel View



- ① Maintenance/ESC switch .. Used for entering into the maintenance mode with the control key. And used for cancel the maintenance mode.
- ② PW/TR lamp..... On continuously when the equipment is working (power lamp). And flickers in the case of abnormality in the equipment.
- ③ AL1 lamp..... On when 1st alarm is activating.
- ④ AL2 lamp..... On when 2nd alarm is activating.
- ⑤ SKIP lamp..... On when point skip is selected. And flickers in the maintenance mode.
- ⑥ AL-T/UP switch..... Used for increase in the value with the control key. (during maintenance mode.)
- ⑦ LCD..... Indicates the gas concentration and error code.
- ⑧ AL/SET switch..... Used for confirmation of alarm point. And used for decision in the maintenance mode.
- ⑨ %LEL lamp..... On continuously when the gas concentration is to be indicated in "%LEL". (This lamp is used also as a power lamp.)
- ⑩ ZERO lamp..... Flickers in the zero adjustment mode. (On continuously when the adjustment is over.)
- ⑪ SPAN lamp..... Flickers in the span adjustment mode. (On continuously when the adjustment is over.)
- ⑫ mA lamp..... ON with the current output indicated on the LCD (during maintenance).
- ⑬ MA/DOWN switch..... Used for indicating current output on the LCD. And used for decrease in the indication in the maintenance mode.



Internal View

- ① Power terminal board Connected to power source and 4-20mA signal output.
- ② Fuse Power fuse
- ③ Relay output terminal Connected to alarm relay output cable.
- ④ Earth terminal Used for protect earth terminal.
- ⑤ Cable inlet Used to lead into the cable from the indicating alarm section. (With the pressure resistant packing grand)
- ⑥ Relay output cable inlet Used to lead into the cable from alarm relay output. (With the pressure resistant packing grand)
- ⑦ Sensor Sensor connected.
- ⑧ Power switch Power ON/OFF switch.
- ⑨ Seal packing Used to protect equipment from water and dust.
- ⑩ 5p connector for detector ... Connected to cable for detector (sensor). (sensor)
- ⑪ 2p connector for detector ... Connected to cable for detector (lamp). (lamp)
- ⑫ Gas inlet Connected to metallic pipe of gas inlet side.
- ⑬ Gas outlet Connected to metallic pipe of gas outlet side.

2. Handling

2-1 Before Initial Use

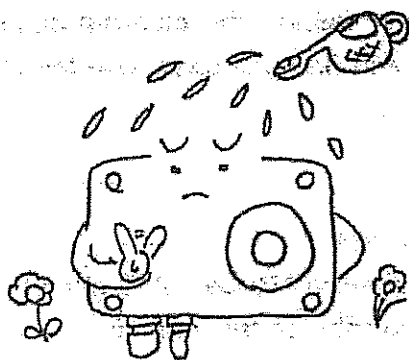
On detecting any leaking flammable gas, this unit show the gas concentration on the LCD and outputs the gas concentration value in 4-20mA to the indicating alarm section. When the concentration exceeds the preset level, the alarm contact activates.

This detector may also be sensitive to gases other than the applicable one. When the detector detects the gas and issues alarm, find out whether this is caused by the applicable gas or other gases not covered by the detector. In view of its duty, the gas detector must always be in the normal operation with the power supply ON. Therefore, it is essential to confirm its operation daily.

For the operation confirmation, refer to 4-1, Inspection Frequency and Items.

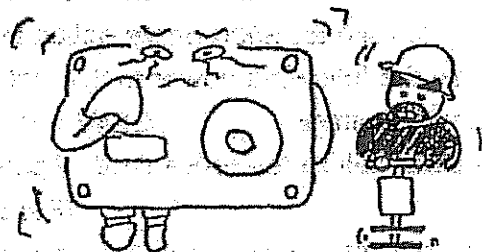
2-2 Cautions for Installation and Handling

Never use the detector in the following places.

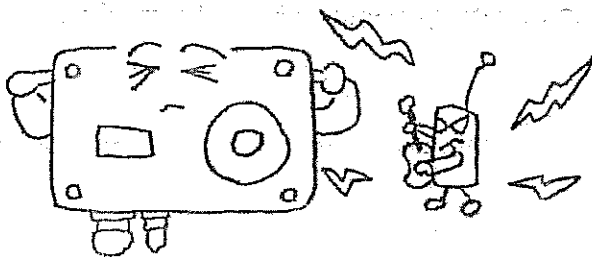


- ① Place where the detector is splashed with water.

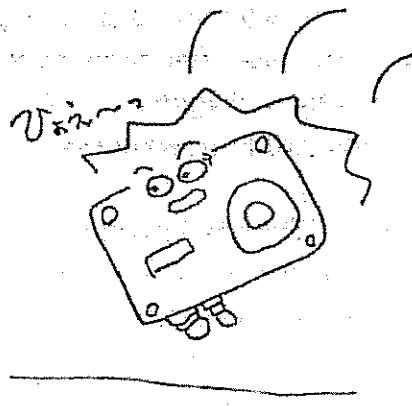
(Use an optional drip-proof cover when the detector is to be installed out of doors.)



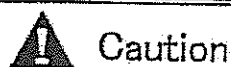
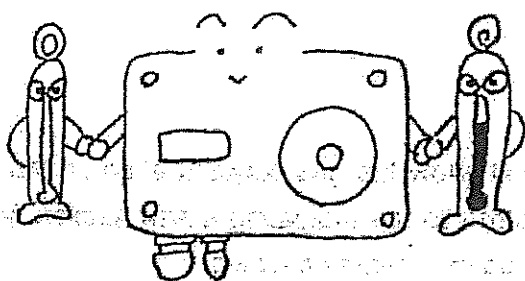
- ② Place with vibration



- ③ Place with radio wave and noise



- ④ Place where the detector is dropped or exposed to strong impact readily.

**Caution**

Be sure to use an optional drip
-proof cover when the detector is to
be installed out of doors.

- ⑤ Place where the temperature is
below -10°C or $+40^{\circ}\text{C}$ or more

2 - 3 Cautions for System Installation

Unstable power supply and noise may cause error of performance and alarm.
For the system to use this detector, it is required to make design based on this
manual description.

(1) Stable power used

While the system gets stable at power on and power failure, the external output and alarm lamp may be on and the care for it must be taken. In such case, use the standby battery or take an appropriate action in the receiver side.

Supply the following power to this detector.

- Power voltage : $\text{DC}24\text{V} \pm 10\%$
- Power failure tolerance time : Approx. 10msec or less

(For power failure of more 10msec, it re-starts)

To warrant the continuous operation, install the standby battery outside.

(2) Noise measures according to installation circumstances.

① Lightning (Thunder) surge

There is the problem point "Lightning (Thunder)" when installing the detector outside of factory. If the lightning is a huge generation source, the cable is a reception antenna and there is the case that cable connecting instrument is broken. It is impossible to prevent the generation of lightning. If the cable should put in metal tube, laid in the underground, it is impossible to prevent the inductive lightning surge generating from the thunder.

② Lightning (Thunder) measures

There is no complete countermeasure for it but the following method can be considered.
Make the suitable treatment accordingly.

<Countermeasure by the lightning arrester (Cable safety retainer)>

There is the way to install the lightning arrester just before the field apparatus and the central control station. The position of the lightning arrester installation is at each point of cable laid out from the outdoor to the indoor.

The lightning arrester builds in the circuit to remove the surge voltage to be the source for the damage of field apparatus.

③Power cable

Following is available to reduce the influence of electromagnetic induction noise and electrostatic induction noise from power cable.

<Isolation from power cable>

Isolate the signal cable and the power cable, and avoid to install these cable in parallel. When cross these cable, cross them vertically.

<Installation of electrostatic shield>

Use signal cable with a shield and ground.

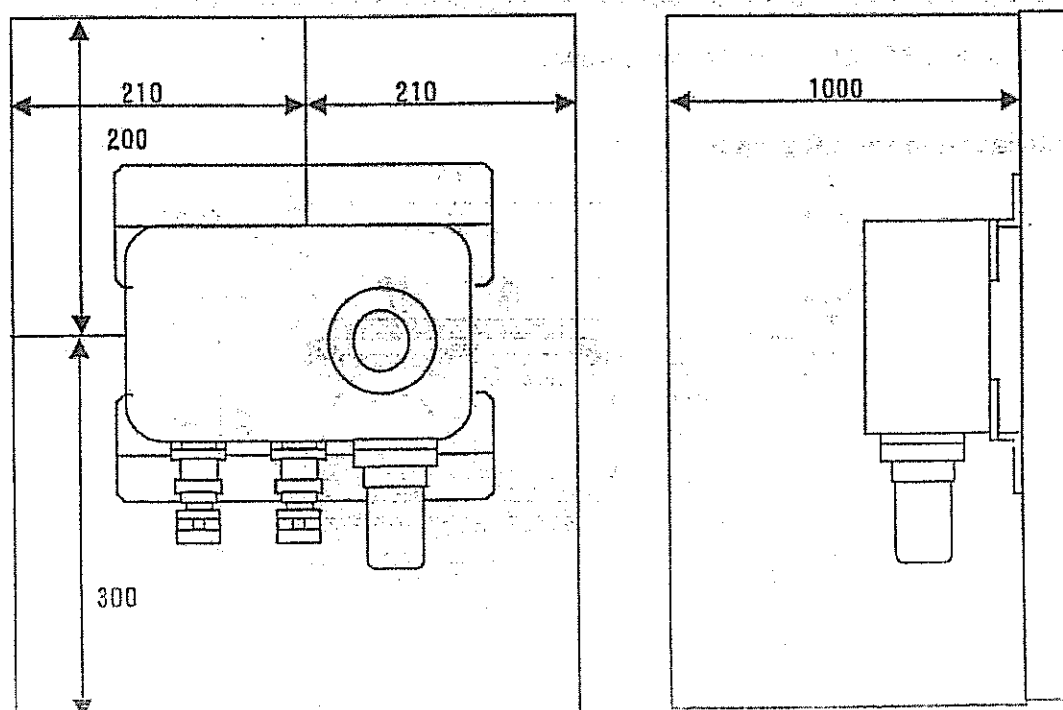
Make electrical isolation such as using metal installation pipe for power cable, installing isolation plate between power cable and electrostatic shield, and install them into exclusive metallic duct.

(3) Ground for Instrument.

Lightening (Thunder) and etc make surge noise. To protect an instrument from surge noise, be sure to ground an instrument. Refer to 2-7. Wiring Method for details.

2 - 4 Maintenance Space

A certain maintenance space must be secured around the detector, so that the maintenance staff can perform the safe and correct maintenance and control operation of functions and performance. Pay due attention to secure this space during work plan and execution.



Maintenance space

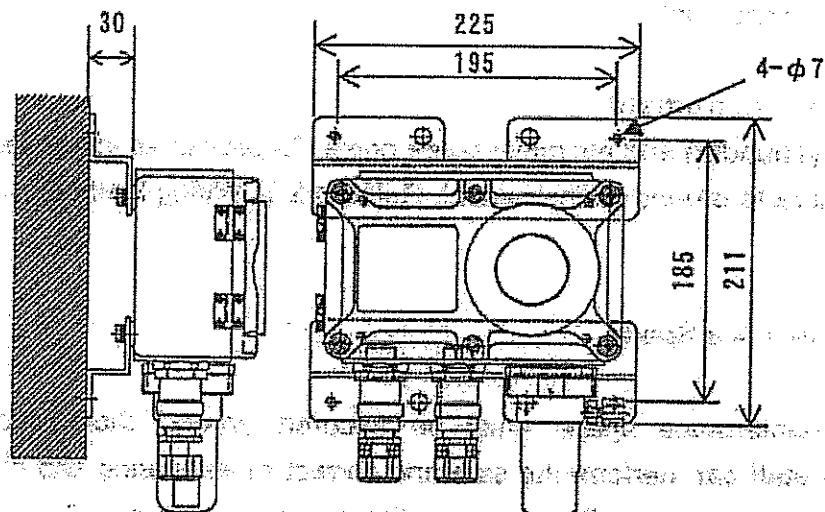
2 - 5 Installation Method

- (1) Install the detector body to a firm surface (wall surface, etc.) with M6 bolts.
Use an optional mounting piece when installing.

**Caution**

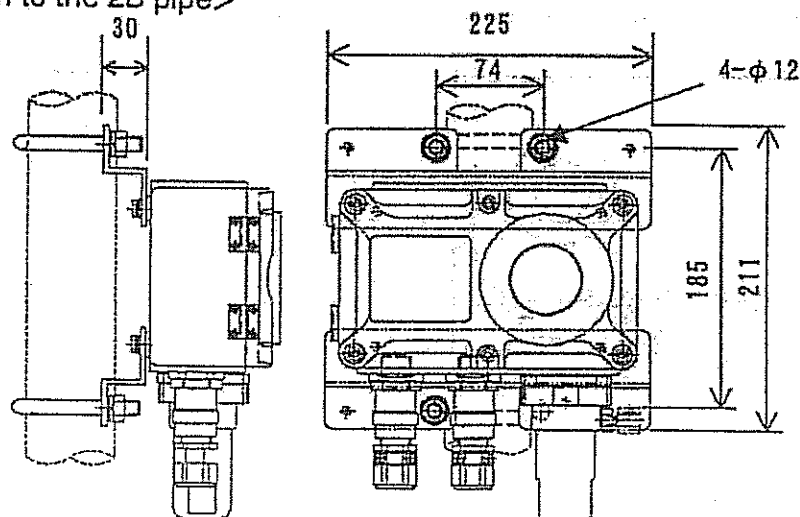
During installation, take care not to drop or throw the detector.
Otherwise, the strong impact may cause damage to the equipment.

<Installation to the wall>



Secure the detector to the detector mounting piece with screw and fix it to the wall by using M6 bolts, as shown above.

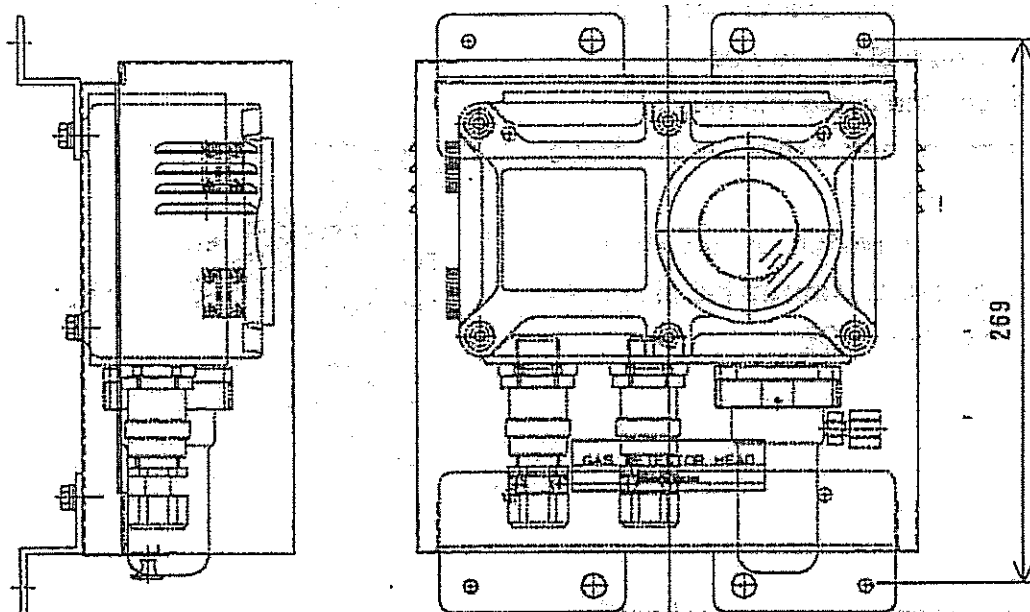
<Installation to the 2B pipe>



Secure the detector to the detector mounting piece with screw and fix it to the U-bolt (M10) for 2B pipe, as shown above.

<Installation using a drip-proof cover (option)>

When installing the cover, slide it from the top downward along the groove and fix it with the bottom fixture.



- (2) Insert a packing gland (lower) → washer → packing → packing gland (upper)

In this order onto the cable.

Lead the cable into the detector terminal box and attach a stick-type crimp terminal plate to the end of cable.

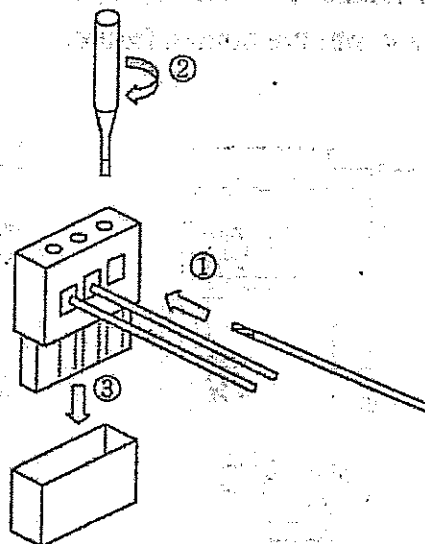
One of packings shown in the table below is attached according to the cable size.

Cable finish O.D.	Packing inside diameter (mm)	Washer inside diameter (mm)
$\phi 10 \sim 10.5$	$\phi 11$	$\phi 13$
$\phi 11 \sim 12$	$\phi 12$	$\phi 13$

- (3) Loosen the hexagonal socket headed screws (6 points) of the detector and remove the lid, and the power terminal board (3 points) and relay output terminal board (6 points) appears. The power terminal plate (3P) has "+(DC24V)", "-(DC24V)" and "Sig" marks from left to right. The "-(DC24V)" terminal is a common terminal (-) for the DC24V input and Sig output (DC4~20mA) output. Therefore, both the +(DC24V) and -(DC24V) terminals are for DC24V input and both the Sig and -(DC24V) are for DC4~20mA output. The relay output terminal plate (6P) has "First alarm relay output terminal (2P)", "Second alarm relay output terminal (2P)" and empty terminal (2P) from left to right.

2-6 Connection method for Terminal Board

- ① Make the cable end naked.
(For length, refer to following
"Length of naked wires.")
- ② Insert the cable into plug of
terminal and tighten it by minus
screw driver.
- ③ After completion for connection
of all cable, connect the plug onto
the base of PCB.



• For connection of terminal board

<In case of direct connection>

Peel length of cable end : 7mm (3p terminal), 6.5mm (6p terminal)

※Do not make preliminary solder.

<In case of using the compressed ground terminal>

Bar terminal : Model AI series (Maker : Phoenix Contact)

Terminal lug tool : Model CRIMPFOX UD6 (Maker : Phoenix Contact)

• Torque for terminals

Torque : 0.5~0.8 Nm (3p terminal), 0.2~0.25Nm (6p terminal)

Applicable driver : Minus screw driver (Width below 3mm)

**Caution**

Be sure to use the exclusive use bar terminal. When used with other make bar terminal than above, the function of this detector can not be warranted.

• Cables

Power / Signal cable : CVVS 1.25~2.0sq

Alarm relay contact cable : CVVS 1.25sq

**Caution**

During wiring work, take care not to damage the internal electric circuit.

Refer to 2-7. Wiring Method for connection of terminals.



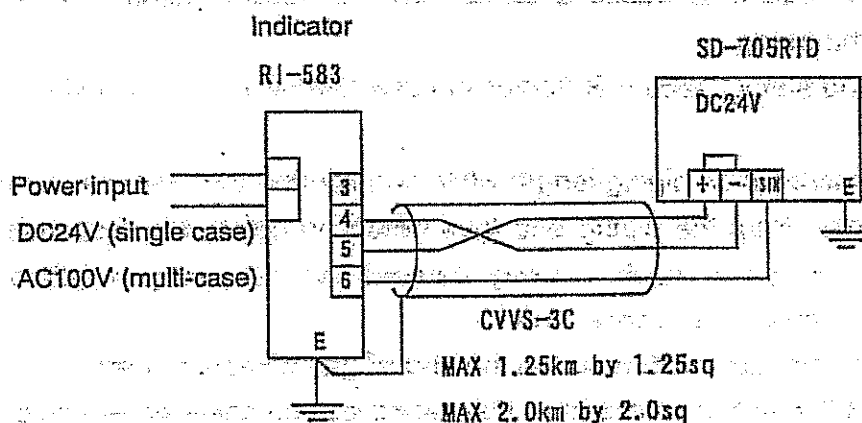
Warning

- The supply voltage of this unit is $DC24V \pm 10\%$. Operation of this unit with the voltage other than specified may cause failure or damage to the equipment or malfunction.

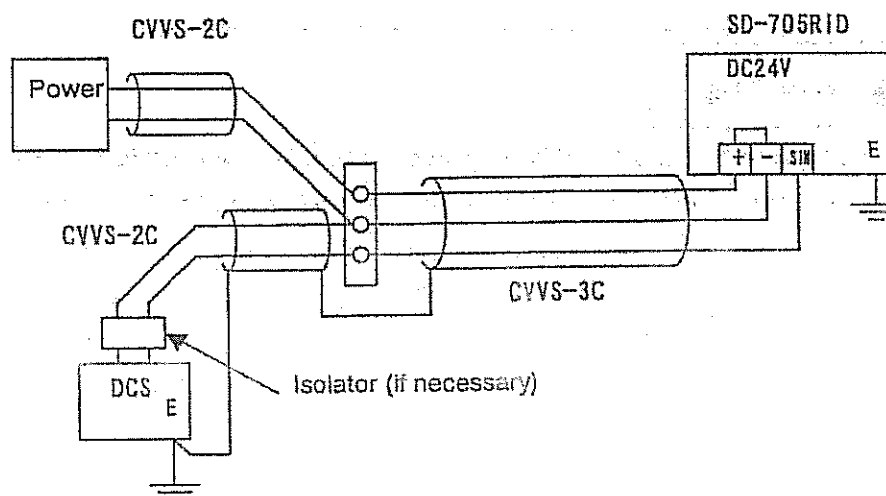
2-7 Wiring Method

- (1) After installation of detector, confirm that there is no error in installation, and carry out connection between equipment as follows.

① Connection of the SD-705RID to the indicating alarm section (RI-583 type)



② Connection of 4-20mA of the SD-705RID to the DCS, etc. (Example)



- (2) For safety and to protect an instrument from external noise, be sure to make ground before power on. Use cable as thick and short as possible in order to suppress resistance. Use internal of instrument or "E" bolt (Refer to P5 Internal View) on the bottom of instrument for ground.



Warning

- Be sure to make ground as the instrument is flame proof design.
- Make ground under : Ground resistance is below 100Ω.
- Be sure not to connect ground cable to gas pipes.

2 - 8 Piping Work

- (1) Use metallic pipes (copper pipes, etc.) of O.D ϕ 8-1t for piping.
- (3) Carry out piping as straight as possible while avoiding bending at a right angle. Excessively high load may cause a burden on the suction pump, shortening the effective life of the pump.
When bending the piping, secure R (radius of curvature) enough to avoid loading to the piping.
- (4) Determine the suction side piping length while considering the response time. When the gas is sampled from the piping end (gas detection point), the response time of the gas detection sensor itself + delay caused by the piping length becomes equivalent to the detector response time.
- (4) Be sure to attach the gas suction port at the end of gas detection point.
- (5) Be sure to put MC filter before detector. If sampled gas contains water and corrosive gas, removal device is required separately.
- (6) After piping, install the lid and 6 hexagonal socket headed bolts and tighten these bolts firmly.



Warning

- Be sure to use the attached hexagonal socket headed bolts to secure the lid of detector. Be sure to secure the lid with 6 bolts. The use of bolts other than attached may cause loss of explosion proof performance.
- Take care not to put metal or foreign material into the detector when installing the lid to the detector. Always remove any foreign material in the detector because it may cause failure or loss of explosion-proof performance.
- Install the lid after confirming that the seal packing is not sticking out.

3. Operation

3 - 1 Startup Method

- (1) Confirm that the power is not supplied to the unit and removes 6 hexagonal socket headed bolts and lid.

Turn ON the power switch inside the unit.

In this case, the LED and LCD do not go ON because the power is not supplied to the unit.

- (2) Install the lid and 6 hexagonal socket headed bolts.

Tighten these bolts firmly and supply power to the unit.

- (3) With power ON to the unit, the "PW/TR" LED lamp goes ON and the LCD in the indication window shows "----" for about 40 seconds during which warming-up and self-diagnosis are made. (During the period, the 4-20mA output provides output of 2.5mA.)

- (4) In about 40 seconds, the LCD shows the gas concentration value ("0", etc). When any abnormality is detected in the course of self-diagnosis, PW/TR lamp is flickering and "E-XX" is indicated instead of the gas concentration value.

With this indication "E-XX", refer to 5-1, Trouble Indication and Countermeasure.

- (5) When the gas concentration value is indicated, carry out zero and span adjustments according to 4-4, Gas Sensitivity Calibration Method.

3 - 2 Detection Method

When the steps of 3-1, Startup Method are over, the unit performs continuous detection.

3 - 3 Gas Alarm Function

When sucked gas exceeds preset alarm level (alarm point), alarm relay contact and alarm lamp activates. Gas alarm has 1st alarm and 2nd alarm. And each alarm performs individually.

When sucked gas exceeds 1st alarm point, 1st alarm relay contact activates and AL1 lamp is lighting. When sucked gas decrease less than 1st alarm point, 1st alarm relay contact is restored, and AL1 lamp is off (Self restoration).

Performance of 2nd alarm is same as 1st alarm.

The action at gas alarm shall follow to the client rule and immediate refuge shall be required. Generally, the following action is taken.

- ① Confirmation of reading at this detector.
- ② Based on gas alarm control density, it keeps the safety by keeping away people from the monitoring area.
- ③ When gas density display show, close the gas value and confirm that gas density gets lower enough.
- ④ Suppose that the leak gas is to remain and provide yourself with protection attire and tool away from danger, go to the leak site and check the gas residual condition by portable leak detector.
- ⑤ After checking that there is no danger, the treatment for gas leak shall be taken.

* Remarks

- Instantaneous gas leak may get lower at confirmation time.
- Except gas alarm, it gets alarm condition temporarily by noise or any other accidental conditions.

3 - 4 Trouble Alarm Function

When the abnormality is detected in the instrument, trouble alarm lamp activates.

When the abnormality is detected in the instrument, PW/TR lamp is flickering. All except for memory trouble (E-00) is self-restoration. When recovered from trouble condition into normal condition, make restart (initial clear) with power on again.

For each trouble alarm, refer to 5-1. Trouble Indication and Countermeasure.

3 - 5 Alarm Point Confirmation Method

- (1) Press AL/SET switch● by control key. When the switch is being pressed, 1st alarm point and 2nd alarm point are indicated by turns in every 1 second on LCD. When 1st alarm is indicated, AL1 lamp is lighting. And 2nd alarm as well.
- (2) When release the control key, indication goes back to gas concentration.

* **C a u t i o n** (FOR USE OF NORMALLY-CLOSED CONTACT)

Normally-closed contact (Break contact) at non-existing condition may change to open contact in a moment due to physical shock.

Whenever alarm signals from gas detectors are used with normally-closed contact, please put delayed-circuit (for about one second) to receiver side of normally-closed contact to avoid such phenomenon.

4. Maintenance and Inspection

The gas detection alarm is kept in continuous operation over a long period of time and must perform a vital role as a safety device. For this purpose, periodical inspection must be made. The High-pressure Gas Safety Act sets forth the obligation of periodical inspection of the gas detection alarm.

4-1 Inspection Frequency and Items

The inspection includes a daily inspection which a person in charge of control and operation of the gas detection alarm performs inspection before work once a day, and periodical inspections conducted by the service personnel of a manufacturer. The inspection items are confirmation of the concentration indication on the detector side and confirmation of lamps, concentration indication and alarm function on the indicating alarm side. It is also necessary to carry out gas calibration at least every 6 months. The law sets forth that the unit must issue the alarm during the circuit inspection related to alarm while providing normal operation, at least, once a month.

• Daily check by user

Inspection point/item	Description	Judgment
Lamp check	Check if the "PW/TR" LED lamp (power lamp) is ON.	The "PW/TR" LED lamp must be ON. If flickering, take an appropriate measure according to 5-2. Troubleshooting guide.
Gas concent. indication check	Check if the gas concent. Indication of the indicator is zero.	The gas concentration indication must be zero in the clean atmosphere. If not, carry out zero adjustment according to the zero adjustment method.
Equipment installation state check	Check if there is any Obstruction for detection of the gas concerned.	No obstruction for gas detection. If any, remove such obstruction or move the unit to another place.
Sensor check	Check if the gas inlet is covered with dust or water or if it is discolored.	No abnormality in gas inlet. If it is covered with dust or water, remove and carry out zero and span adjustments according to 4-4 Gas Sensitivity Calibration Method.
Alarm test	Check if alarm lamp is activated by switch.	Alarm lamp is activated normally. If not, confirm internal set value and circuits.

• Periodical inspection

Following items are performed in periodical inspection.

- ①Daily check ②Cleaning of device ③Calibration
④Function check ⑤Parts replacement ⑥etc.

☆ To maintain the safety operation of detector, it is recommended to keep the maintenance contract with service agent for regular maintenance, adjustment and overhaul etc including the gas sensitivity adjustment.

For the detail of maintenance contract, contact nearest agent.



Warning

- This is a safety instrument and the inspection every 6 months or more is mandatory to ensure the safety. If the unit is used by continuously without inspection, the sensor sensitivity may change, resulting in failure of correct detection.
- Before zero adjustment, confirm with a portable gas detector that there is no flammable gas in the neighborhood. If zero adjustment is made in an atmosphere containing flammable gas, no correct calibration is expected. If gas leakage actually occurs, the unit shows the low concentration value, possibly leading to a hazardous state.



Remarks

Be sure to inform sections concerned beforehand when performing adjustment of the gas sensitivity.

4 - 2 Replacement for Parts

Following parts are required to be replaced periodically. For replacement, consult with nearest agent.

Sensor : Approx. every 3 years (Depending on use condition)

Seal packing : Approx. every 5 years (Depending on use condition)

4 - 3 Maintenance Mode

Adjustment is performed by control key in maintenance mode without opening the lid.

In maintenance mode, 4-20mA output becomes 2.5mA and SKIP lamp is flickering.

Following is a menu of maintenance mode and common operation method.

All operation is performed by control key.

	LCD Indication	Menu
1.	1.2 E F	Zero adjustment mode
2.	2.5 P n	Span adjustment mode
3.	3.0 w t	4mA adjustment mode
4.	4.0 L	Alarm point set mode
5.	5.5 S t	Alarm test mode
6.	6. P S	Point skip set mode

<Common operation~To enter maintenance mode>

- ① To enter maintenance mode, press MAINTENANCE switch● by control key for 3 seconds in normal measuring mode.
- ② When entered maintenance mode after 3 seconds, 4-20mA output becomes 2.5mA and SKIP lamp is flickering. Release control key after entered.
- ③ Change indication number with pressing UP▲ or DOWN▼ switch by control key. And press SET switch● when the mode you want to enter is indicated.

<Common operation~To change the mode>

- ① Display goes to MENU when press MAINTENANCE switch● during each mode.
- ② Change indication number with pressing UP▲ or DOWN▼ switch by control key. And press SET switch● when the mode you want to enter is indicated.

<Common operation~To cancel maintenance mode>

- ① Display goes to MENU when press MAINTENANCE switch● during each mode.
- ② To recover measuring mode, press MAINTENANCE switch● for 3 seconds during MENU.
- ③ When entered measuring mode, SKIP lamp goes off and indicating as it is measuring mode.

4-4 Gas Sensitivity Calibration Method

The following tools and jigs are necessary for zero and span adjustments.

Zero adjustment	Span adjustment
Control key	Control key
Gas sampling bag	Gas sampling bag
Hexagonal wrench (for M6)	Hexagonal wrench (for M6)
	Flow meter with flow regulator (for 0-3L/min range)
	Calibration gas
	Sampling bag for exhaust gas

(1) Zero adjustment method

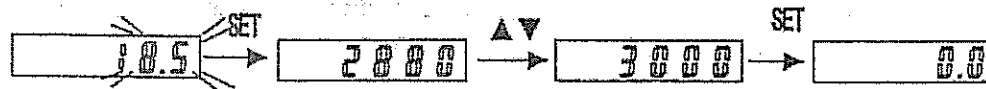
- ① If the power of SD-705RID is on, zero adjustment can be done immediately. But if is off, perform zero adjustment after warming up for 30 minutes or more.
- ② Confirm with a portable gas detector that the atmosphere around the detector and measuring gas inlet is clean and does not contain any flammable gas.
If any flammable gas exists around the detector and measuring gas inlet, fill the gas sampling bag (separately available) with high-purity air or external fresh air.
Attach the sampling bag filled with high-purity air to the MC filter inlet and allow the air to flow for about 2 minutes (In case of 1L/min. If flow rate is smaller than 1L/min, stabilize time is longer. And stabilize time is also changed depending on piping distance). Then, proceed to zero adjustment.
- ③ To make zero adjustment and span adjustment, enter the maintenance mode.
- ④ Press SET switch● in MENU mode 1.2 E F
Zero adjustment mode enters and ZERO lamp and indication value is flickering.
In this time, there is a case that the indication value is alternated. This is caused by that the actual value is indicated with cancellation of zero suppression which is worked in normal measuring mode.
- ⑤ Confirm that fresh air is introduced and press SET switch●.
 - a – ZERO lamp is changed from flickering to lighting, and indication value on LCD goes to zero (from flickering to lighting). And indicating that zero point is adjusted. (ZERO adjustment is completed.)
 - b – (1) When zero point is left from zero excessively, indication is not "0.0". In this case, 4-digit number is lighting on LCD. Zero lamp is still flickering.
(2) Press UP switch▲ or DOWN switch▼ to adjust the value 2950~3050 and press SET switch●. ZERO lamp is changed from flickering to lighting, and indication value on LCD goes to zero. And indicating that zero point is adjusted. (ZERO adjustment is completed.)

【Example】

<Normal condition>



<In case that zero cannot be adjusted>



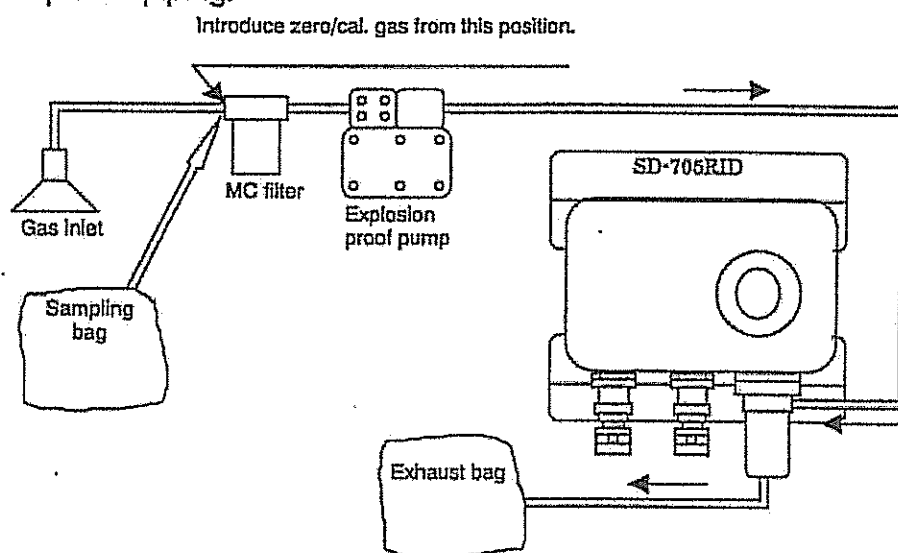
- ⑤ If indication value does not become zero after zero adjustment, check the instrument and piping, and make zero adjustment again. But it cannot be still adjusted zero, gas sensor has trouble. Put the power off. And consult with nearest agent.

(2) Span adjustment

Be sure to adjust span after completion of zero adjustment.

- ① Prepare about 5L of calibration gas whose concentration has been confirmed beforehand (the appropriate concentration is around 1/2 of the LEL, that is 50%LEL) in a gas sampling bag for each unit.
- ② Install an exhaust bag.
- ③ Install the sampling bag for calibration gas as prepared above① to the MC filter end.
- ④ Press SET switch● In MENU display **2.5 P n** . When span adjustment mode is entered, SPAN lamp and indication value on LCD are flickering.

<Example for piping>



- ⑤ When the calibration gas is introduced into the sensor, the indication of the indicator rises. If the indication is not equal to the concentration value of calibration gas in 2 minutes (In case the flow rate is 1L/min. If flow rate is smaller than 1L/min., the time until stable indication is longer than 2 minutes) after start of introduction, press the control key to the UP switch▲ or DOWN switch▼ to allow the indication to match to the calibration gas concentration.
- ⑥ After adjustment, press SET switch● to decide.
SPAN lamp is changed from flickering to lighting, indication value on LCD is changed from flickering to lighting and indicating that SPAN adjustment is completed.
- ⑦ Upon completion of the span adjustment, remove the sampling bag from the IN side of the gas check adaptor and press the control key to MAINTENANCE switch ●. Then, proceed to the zero adjustment again.


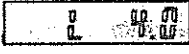
*** Remarks**

A dedicated tool is necessary for the span adjustment. It is recommended to request this adjustment to our service company.

(3) Span adjustment method by substitute gas

Fundamentally, span adjustment shall be done by actual gas. When it is difficult to prepare the actual gas, make span adjustment by substitute gas. Following is the difference point between span adjustment by actual gas and by substitute gas. Refer to (2) for other points.


4 - 5 4-20mA Signal Output Adjustment Method

- ① Press SET switch ● in MENU display 
- ② When signal output adjustment mode is entered  is displayed on LCD, and signal output becomes 4mA (value : zero).
- ③ Adjust indication value to 4mA (zero) on indication part* of DSC and etc which is connected separately by pressing UP switch▲ and DOWN switch▼.
- ④ After adjustment, press SET switch● to decide. When it is decided, SPAN lamp is lighting.

* : If indication value cannot be confirmed on indication part, signal output can be confirmed by connecting a tester (Ammeter) to check pins between TP10(+) and TP11(-).

4 - 6 Alarm Point Change Method

1st alarm and 2nd alarm can be alternated individually.

- ① Press SET switch ● in menu display .
- ② When alarm set mode is entered, AL lamp is on and current 1st alarm value is displayed on LCD.
- ③ When changing alarm point, press SET switch●.
- ④ Then, AL1 lamp is changed from lighting into flickering, and alarm point on LCD is changing as same. Press UP switch▲ and DOWN switch▼ to adjust.
- ⑤ After adjustment, press SET switch ● to decide. After decision, AL1 lamp is lighting. When cancel the adjusted value, press MAINTENANCE switch● and return to ①.
- ⑥ Then, press UP switch▲.
- ⑦ Current 2nd alarm point is displayed on LCD. And AL2 lamp is lighting.
- ⑧ 2nd alarm point can be changed as same as 1st alarm point.

4-7 Alarm (Transmission) Test Method

Alarm functions can be confirmed.

- ① Press SET switch ● in menu display **5.5.5.5**.
- ② Press UP switch ▲ or DOWN switch ▼ to select whether alarm contact is activated or not.
5.5.5.5 (No operation) ⇔ **5.5.5.5** (Operation)
- ③ Press SET switch ● to decide.
- ④ When alarm test mode is entered, test level (zero value) is flickered on LCD display. When "ON" is selected at this time, ZERO lamp and SPAN lamp are flickering simultaneously.
- ⑤ To press UP switch ▲ or DOWN switch ▼, test level (between 0 to full scale, over scale) can be changed. (4-20mA output is also changed according to indication).
- ⑥ Test level exceeds 1st alarm point, 1st alarm is activated.
 (After alarm delay time passed, AL1 lamp is lighting, and 1st alarm contact is activated if "ON" is chosen.)
- ⑦ Test level exceeds 2nd alarm point, 2nd alarm is activated.
 (After alarm delay time passed, AL2 lamp is lighting, and 2nd alarm contact is activated if "ON" is chosen.)

4-8 Point Skip Set Method

Maintenance mode can be set compulsorily.

4-20mA : 2.5mA (Fix)

Alarm contact : OFF

Alarm lamp : OFF

① Press SET switch● in menu display **6.P.S** .

② When point skip set mode is entered, current set condition is displayed on LCD.

③ To set point skip condition, press UP switch▲ or DOWN switch▼ to change as

OFF → **on** , and to cancel point skip condition, change as **on** → **OFF** . Then, press SET switch● to decide.

After decision, SPAN lamp is lighting.

4-9 Fuse Change Method

① Turn OFF power supply to the unit.

② Remove 6 hexagonal socket headed screws and lid in the front, and remove the fuse on the internal board. (For the fuse position, refer to Page 5. Internal View)

③ Install the attached fuse (0.5A), install the lid and 6 hexagonal socket headed screws, and tighten these screws.

④ Turn ON power supply to this unit. Confirm that the operation is normal. If not, refer to 5. Abnormality and Countermeasures.

4-10 Measures for Storage or Long-time Shutdown

(1) Store the sensor as attached to the detector in a place not exposed to dust and water splash.

(2) Storage conditions

Temperature : -10~+35°C

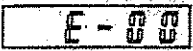
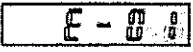

Humidity : 85%RH or less

Environmental conditions : Place without organic solvent and gas generation.

5. Abnormality and Countermeasures

5-1 Trouble Indication and Countermeasure

This section describes a procedure to determine the fault location when any trouble is found as a result of 4. Maintenance and Inspection.

Indication	Content	Counter
	Indicated when any abnormality occurs in the equipment.	Turn on power again. If not restored, consult with nearest agent.
	Indicated when wire breakage occurs in the sensor.	Consult with nearest agent. Check the connector cable and repair the default point.
	Indicated when sensor zero point is excessively drifted.	When the trouble cannot be cleared by zero adjustment, consult with nearest agent.
	Circumstance temperature is drastically alternated.	Direct sun shine and device exhausting high temperature may cause sensor zero point alternated. Put protection cover and etc., not to alternate temperature around detector.

5-2 Troubleshooting

(1) No light-on for PW/TR lamp (No power supply)

Cause	Countermeasure
Power cable connected correctly?	Connect power cable correctly.
Isn't fuse disconnected?	Search the cause of disconnection and replace it after closing counter-measures.
Is power voltage normal?	Supply the rating power voltage.

(2) Abnormal performance

Cause	Countermeasure
Sudden surge noise can be considered.	To recover, turn off and turn on the power again for re-start of operation. When such takes place oftentimes, take an appropriate countermeasure for noise.

(3) No Zero Adjustment available

Cause	Countermeasure
Fresh air supplied to sensor?	Supply fresh air.
Sensor is condensed.	Normal measurement is impossible when condensing.
Sensor sensitivity is reduced.	When the sensor is covered with water splash, dust and etc., the adjustment is difficult to perform. In such case, consult with nearest agent.

(4) No Span Adjustment available

Cause	Countermeasure
Calibration gas prepared correctly?	Use the correctly prepared gas for re-calibration.
Zero adjustment performed?	Be sure to perform zero adjustment before span adjustment.
Calibration gas supplied correctly to the sensor?	Carry out calibration according to 4-4. Gas Sensitivity Calibration Method

(6) Fuse disconnection (Detector does not work.)

Cause	Countermeasure
Supposed that main body or external power supply have trouble.	Find the cause and care for it. Then, replace the fuse with the designate one.

* Remarks

The fuse rating for SD-705RID is AC125V 0.5A.

(7) Indication rises without gas

Cause	Countermeasure
Gas leakage	Dispose according to 3-3. Gas Alarm function.
Temperature alternated drastically?	Direct sunshine, drastic temperature alternation and etc. may cause the indication rising. Change of installation point and weather proof cover (option) are effective for them.
Humidity alternated drastically?	Drastic humidity alternation may cause the indication rising as same as temperature. Keeping appropriate distance between detector and the ground is effective.
Influenced from external noise?	Reduce influence from noise referring to 2-2.Cautions for installation and handling, and 2-3.Cautions for system installation.
Atmospheric pressure is alternated.	IR type detector is influenced from, and in proportional to atmospheric pressure.

(8) Indication is full scale overed.

Cause	Countermeasure
Gas leakage	Dispose according to 3-3. Gas alarm function.
Sensor cable is damaged.	There is a case that trouble alarm is not activated due to damaged sensor cable. Confirm the damage of sensor cable.
Sensor is disconnected.	There is a case that trouble alarm is not activated due to it. Confirm the sensor is connected firmly.
Dirtiness inside of sensor.	The indication is influenced when inside of the sensor has dirty and water splashed. Do not make detector dirty. Change of installation point and drip proof cover (option) are effective.
Influence from external noise.	Reduce influence from noise referring to 2-2.Cautions for installation and handling, and 2-3.Cautions for system installation.

(9) No control key available

Cause	Countermeasure
Press control key correctly?	Press control key correctly on the panel.
Control key normal condition ?	Function is reduced when it has dirty and damage.
Operation is done correctly?	Latching time of about 3 seconds is required on some operation for protection of error performance.

6. Definition

Non-dispersed infrared type

This is a principle for the sensor integrated into this detector.

For the details, refer to 8. Principle of the Sensor

Initial clear

The output from the detector fluctuates for a while after power application.

This function is to suppress alarm during this period.

Full scale

The maximum value of the detection range.

%LEL

The unit with the lower explosive limit of the flammable gas to be detected being 100%.

Calibration

Matching the equipment indication to the calibration gas concentration value by using the calibration gas.

Zero suppression

Function to make sensor drift not to be noticeable.

Alarm delay time

Function to hold operation temporarily in order to prevent error alarm by external noise.

Point skip

Function to stop gas detection temporarily during the maintenance and etc.

7. Specifications

Type	SD-705RID
Detection principle	Non-dispersed infrared type
Gas to be detected	Methane or hydrocarbon (HC)
Detection method	Suction type (suction pump available separately)
Detection range	0-100%LEL
Detection accuracy	F.S. $\pm 5\%$ or less
Response time	T60 30sec or less (excluding the dead time for 1-2L/min.) Since the response time varies depending on the type of gas, Inquire the type of hydrocarbon gas.
Transmission method	3-wire type analog transmission (power, signal, common)
Transmission distance	1.25 km or less with CVVS (1.25 sq.) cable 2 km or less with CVVS (2.0 sq.) cable
Alarm output	2 level alarm output • Contact output : 1a or 1b • Contact rating : DC30V 1A
Preset alarm point	1 st : 25%LEL 2 nd : 50%LEL (Adjustable at any level during 10-100%LEL)
Alarm delay time	About 2 seconds
External output	4-20mA (current discharge type) • Resistance load : max 300 Ω 0.5mA ... at fault 2.5mA ... in the maintenance mode and during initial operation Note : Linear up to 22mA.
Indication function	Concentration indication : LCD 4-1/3 digits, 7-segment, Digital gas concentration indication, 4-20mA indication PW/TR...Power/Trouble indication (Green/flickering or lighting) AL1 ... 1 st alarm indication (Yellow/flickering or lighting) AL2 ... 2 nd alarm indication (Red/flickering or lighting) SKIP ... Maintenance mode indication (Green/flickering or lighting) %LEL ... %LEL range (Green/lighting) ZERO ... Zero adjust. mode (Red/flickering or lighting), etc. (off) SPAN ... Span adjust. mode (Red/flickering or lighting), etc. (off) mA ... mA indication (Green/lighting), etc. (off)
Self-diagnosis function	Gas sensor wire breakage, zero abnormality Indication : PW/TR (Green/flickering), LCD message "E-XX". Output : 4-20mA output \rightarrow 0.5mA output (fix)
Initial clear	40 seconds after power ON (LCD indication "—")
Zero suppression	6% of F.S. (standard)
Power supply	Supply voltage : DC24V $\pm 10\%$ Power consumption : Max.4W
Operating Temperature/humidity	-10 \sim +40 $^{\circ}$ C, 95%RH or less (no dewing)
Setting & adjustments	ZERO/SPAN adjustment (non-contact) with the control key
Overall dimensions	Approx.205(W) x 134(H) x 92(D)mm
Weight	Approx.5.2kg
Explosion proof	Pressure resistant explosion-proof construction No.C14401 (Explosion-proof class : ExdIIBT4X)

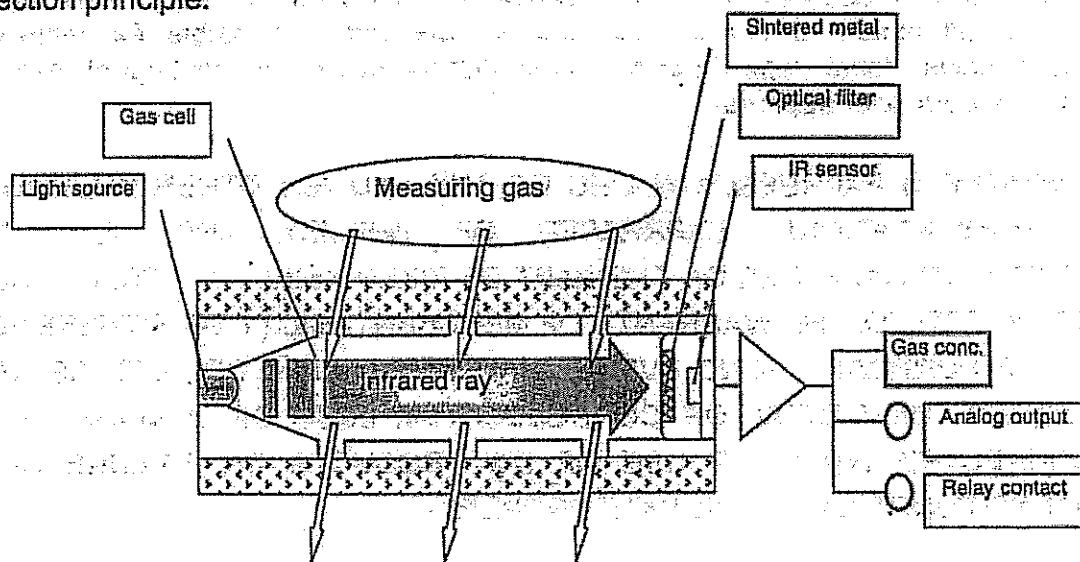
8. Detection principle

Model SD-705RID is based on NDIR (Non-Dispersive Infrared) and this structure is shown below.

The infrared beam emitted from the light source passes through the measuring cell, and optical band pass filter which can pass the absorption wave of measuring gas and attains measuring cell is absorbed by the measuring gas when measuring gas is supplied into the measuring cell and will decrease according to its density.

The variable amount of Infrared is measured by the infrared sensor and it is displayed as gas concentration.

Then, there is no sensitivity against CO₂ and CO etc which have the different absorption wave from the measuring gas. Then there is no sensitivity against N₂ and H₂ etc which cannot absorb infrared. As compared with the conventional catalytic combustion method, there is no poisoning material to be absorbed and almost no sensitivity drop on this detection principle.



Structure

RIKEN KEIKI STANDARD WARRANTY
GAS DETECTION INSTRUMENTS

RIKEN KEIKI CO., LTD. warrants gas alarm equipment manufactured and sold by us to be free from defects in materials and workmanship for a period of one year from date of shipment from RIKEN KEIKI CO., LTD. Any parts found defective within that period will be repaired or replaced, at our option, free of charge, F.O.B. Factory. This warranty does not apply to those items which by their nature are subject to deterioration or consumption in normal service, and which must be cleaned, repaired or replaced on a routine basis. Such items may include :

- a) Lamp bulbs and fuses
- b) Pump diaphragms and valves
- c) Absorbent cartridges
- d) Filter elements
- e) Batteries

Warranty is voided by abuse including rough handling, mechanical damage, operation, alteration or repair procedures not in accordance with instruction manual. This warranty indicates the full extent of our liability, and we are not responsible for removal or replacement costs, local repair costs, transportation costs, or contingent expenses incurred without our prior approval.

THIS WARRANTY IS EXPRESSLY IN LIEU OF ANY AND ALL OTHER WARRANTIES AND REPRESENTATIONS, EXPRESSED OR IMPLIED, AND ALL OTHER OBLIGATIONS OR LIABILITIES ON THE PART OF RIKEN KEIKI CO., LTD. INCLUDING BUT NOT LIMITED TO, THE WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL RIKEN KEIKI CO., LTD. BE LIABLE FOR INDIRECT, INCIDENTAL OR CONSEQUENTIAL LOSS OR DAMAGE OF ANY KIND CONNECTED WITH THE USE OF ITS PRODUCTS OR FAILURE OF ITS PRODUCT TO FUNCTION OR OPERATE PROPERLY.

This warranty covers instruments and parts sold (to users) only by authorized distributors, dealers and representatives as appointed by RIKEN KEIKI CO., LTD.

We do not assume the indemnification for any accident or damage caused by the operation of this gas monitor and our warranty is limited to the replacement of parts or our complete goods.