



## INDEX

<b>1. PRODUCT OUTLINE</b>	
1-1. Preface .....	3
1-2. Application for use .....	3
1-3. Identification of each signal word .....	3
<b>2. IMPORTANT INSTRUCTION FOR THE SAFETY</b>	
2-1. Danger items.....	4
2-2. Warning items.....	4
2-3. Caution items.....	5
<b>3. PRODUCT FUNCTION</b>	
3-1. External drawing.....	6
3-2. Product composition	
3-2-1 Major components.....	7
3-2-2 Unit detaching .....	8
3-3. Installation pitch. ....	9
3-4. Name of each part and functions	
3-4-1 Front view .....	10
3-4-2 Inside view .....	11
3-5. Block diagram	
3-5-1 Electric diagram.....	12
3-5-2 Tubing diagram.....	12
<b>4. HOW TO USE</b>	
4-1. Before operation.....	13
4-2. Installation place .....	13
4-3. Caution in the system engineering .....	14
4-4. Grounding .....	17
4-5. Caution at wiring construction .....	17
4-6. Applicable cable	
4-6-1 Power/signal cable .....	18
4-6-2 Relay output signal cable .....	18
4-6-3 Specifications of terminal.....	18
4-6-4 Terminal plate .....	19
4-7. Example of cable connection	
4-7-1 Connection with indicator/alarm unit(GH-573A, GH-583).....	19
4-7-2 Connection with indicator unit, DCS,PLC .....	19
4-8. Cautions at piping construction .....	20
<b>5. OPERATION METHOD</b>	
5-1. Preparation before start up .....	21
5-2. Basic performance flow.....	21
5-3. Start up method	
5-3-1. Power on .....	22
5-3-2. Flowmonitor(Sensor flow) adjustment .....	23
5-4. Explanation of performance (Detection mode)	
5-4-1. Display action. . ....	24
5-4-2. External output action .....	26

5-5. Maintenance and adjustment	
5-5-1. Maintenance mode	27
5-5-2. Confirmation of alarm level	28
5-5-3. Alarm test	29
5-6. How to finish operation	30
<b>6. KINDS OF ALARM AND ITS FUNCTION</b>	
6-1. Kinds of alarm	31
6-2. Gas alarm	
6-2-1. Gas alarm action	31
6-2-2. Counteraction at gas alarm	32
6-2-3. Gas alarm possibility except the case of gas detection	32
<b>7. MAINTENANCE CHECK</b>	
7-1. Frequency of maintenance and check items	
7-1-1. Daily check	33
7-1-2. Regular maintenance check	33
7-1-3. Maintenance contract for regular check	33
7-2. Calibration method (Zero adjustment, calibration with gas, etc.)	34
7-3. Replacement of sensor and parts	34
7-4. Treatment when operation is stopped or its installation place is moved.	
7-4-1. Stopping the normal operation	34
7-4-2. Installation when move its place	34
7-5. Storage or treatment when not in use for a long time	35
7-6. List of recommendable spare parts for regular maintenance	36
<b>8. TREATMENT AT ABNORMAL CASE</b>	
8-1. Trouble alarm	37
8-2. Counteraction at trouble alarm	37
8-3. Before it is thought to be a trouble	37
8-4. Trouble shooting	38
<b>9. DEFINITION OF TERMS</b>	40
<b>10. DETECTION PRINCIPLE</b>	41
<b>11. LIST OF PRODUCT SPECIFICATIONS</b>	
11-1. Specifications	42
11-2. Product composition	43
<b>12. WARRANTY</b>	44

# 1 . PRODUCT OUTLINE

## 1 — 1 . Preface

First of all, we wish to express our heartfelt thanks for your purchase of our smart gas detector GD-V77D.

This manual is just a guide book to operate our gas detector GD-V77D.

Your kind reading of this manual is requested not only for the first user but for already experienced staff.

## 1 — 2 . Application for use

This is a fixed type gas detector to be used in semiconductor manufacturing factories, etc. Combustible • toxic gases leaked into ambient air are sampled with internal pump and are detected with semiconductor gas sensor. Detection results(Gas concentrations) are displayed with 4-digit LED indicator.

The GD-V77D transmits gas concentration signals with 4~20mADC to upper system.

This detector provides 2 relay outputs for outer gas alarm.

## 1 — 3 . Identification of each signal word



Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury or serious damage to the product.



Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury or damage on the human body or object.



Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury or some damage on the human body or objects.



This means “ADVICE” at operation.

## 2. IMPORTANT INSTRUCTION FOR THE SAFETY

### 2-1. Danger items



This is not an explosion proof detector.

Never to detect high concentration gas beyond their lower explosive limit.

### 2-2. Warning items



- Power source  
Before turning the power on, check that the supplied voltage is within the specified voltage. Then, turn the power on.
- Necessity of grounding  
Do not cut the wire for protective ground both inside and outside of instrument. Or, do not disconnect the connection of the ground terminals.
- Defect of protective function  
Before starting the operation, check if any defect is not found on the protective grounding. If there is any defect on the protective functions such as protective grounding or fuse, do not start the operation.
- Fuse  
To protect the instrument from fire, use the specifically rated fuse. When replacing the fuse, turn off the power inside of the panel, and the power source as well. Do not use fuse that is not specified, or do not make a short-circuit inside of the fuse holder.
- Operation in gas  
Do not operate the instrument in a atmosphere of combustible gases, explosive gases or steam. It is very dangerous to operate the instrument under such circumstances.
- External connections  
After making the protective grounding, start connecting the instrument to detecting object and other external control circuit.
- Treatment at gas alarming  
It is very dangerous if the instrument detects the gas exceeded the alarm points. Take any treatment based on your judgment at that time.

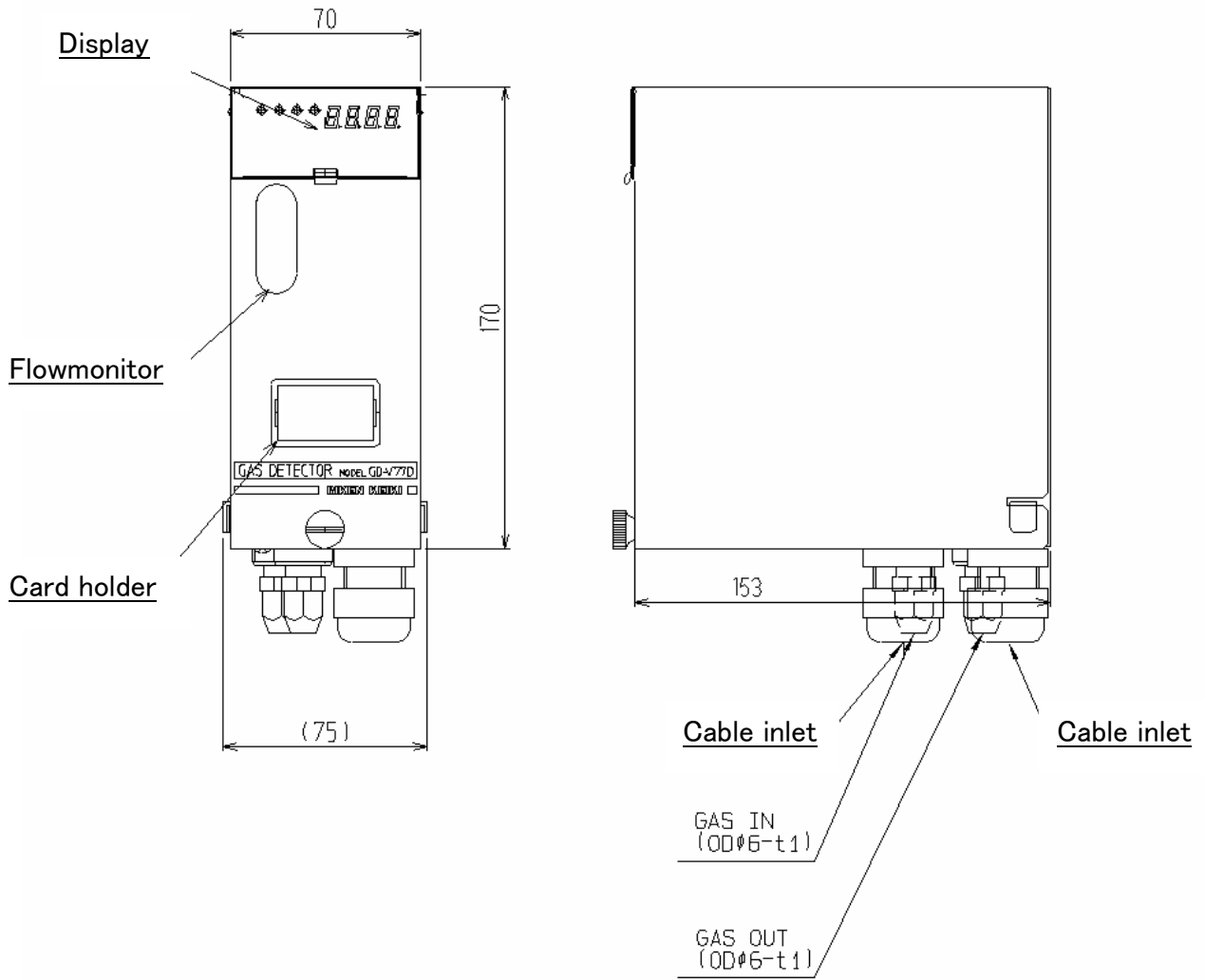
## 2 — 3. Caution items

 CAUTION

- Do not use a walky-talky around the instrument.  
The indication might be affected by the electromagnetic wave generated by the walky-talky if it is used near the instrument. When the walky-talky is used, be away enough from the instrument not to affect.
- Take at least 5 seconds interval when re-turning the power on.  
Normal operation cannot be performed if the power is re-turned on within 5 seconds.
- Confirm the float of the flowmonitor is above red bar.  
If the float gets below the red bar, the correct gas detection cannot be performed.  
Adjust the flow rate.
- Equip a dust filter to outside of the detector if it is used in a dusty place.  
The dust filter depends on a measuring gas. Consult our sales agents.
- Take care not to drop the cover when taking it out.  
Dropping the cover might cause a serious injure. Take care.
- Do not control other equipment by using outputs of this detector.  
This is not a control equipment. It is prohibited to control other equipment by using outputs of this detector.

# 3 . PRODUCT FUNCTION

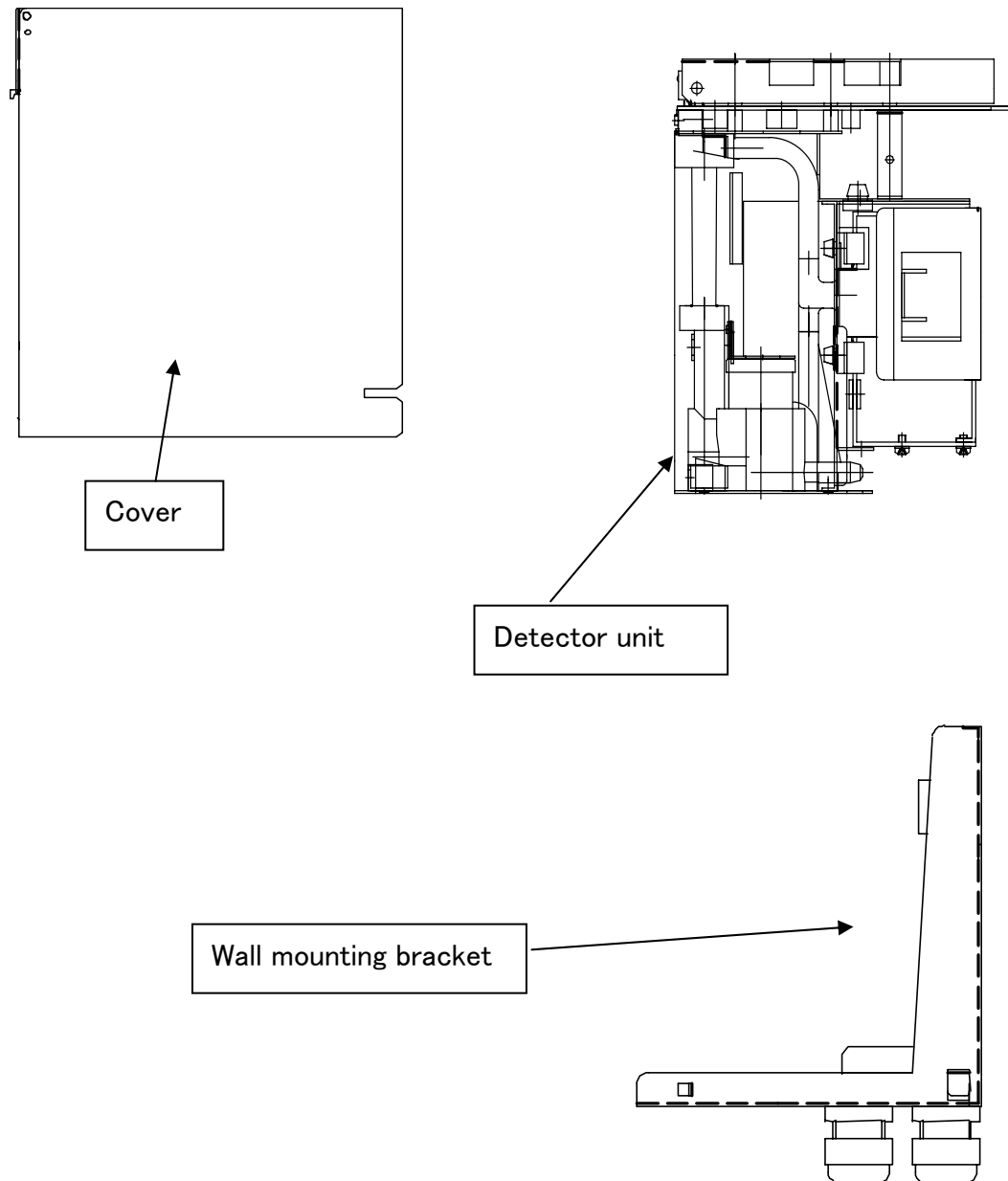
## 3 - 1 . External drawing



### 3 — 2 . Product composition

#### 3 — 2 — 1 . Major components

This detector is composed of the following units.





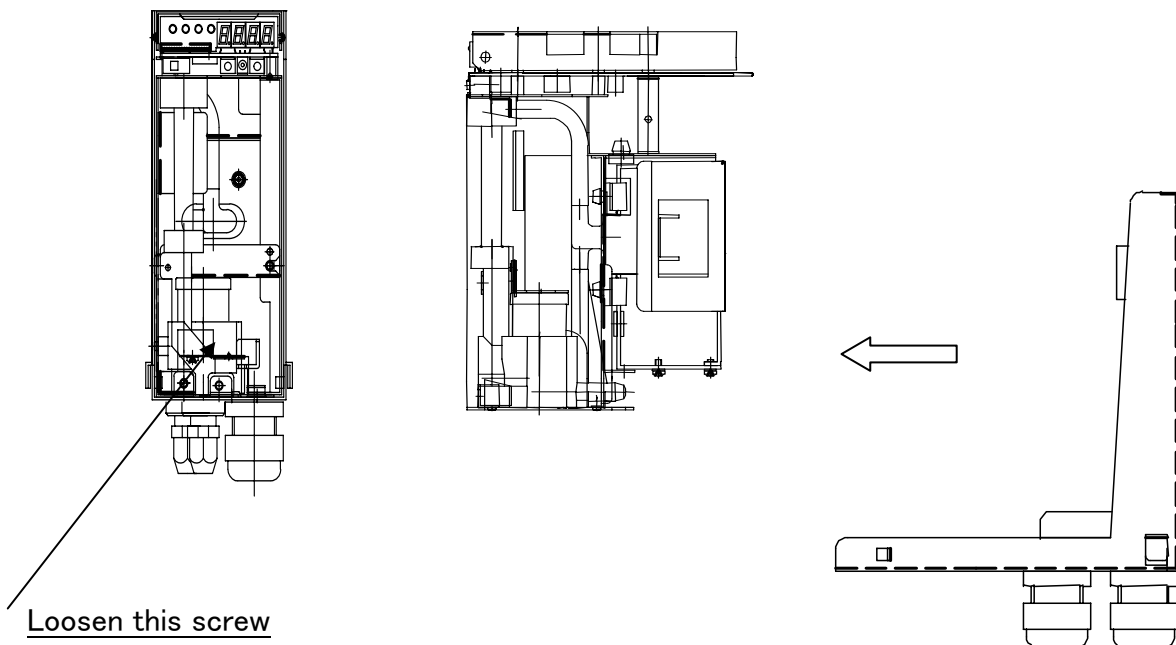
### 3 — 2 — 2 . Unit detaching

After taking the cover out, procedure to detach the detector unit from the wall mounting bracket is as follows.

1. Loosen the knurling type screw at the front of detector and remove the cover.
2. Loosen the screw on the lower part of detector unit.
3. Remove the detector unit from the wall mounting bracket.

#### \* NOTE

Perform the things above opposite to assemble the unit.  
When the wiring is arranged, detach the detector unit first.



#### CAUTION

When the detector unit is being taking out, take care not to drop it.  
If it drops, there might be some damages on yourselves and the instrument.

### 3 — 3 . Installation pitch

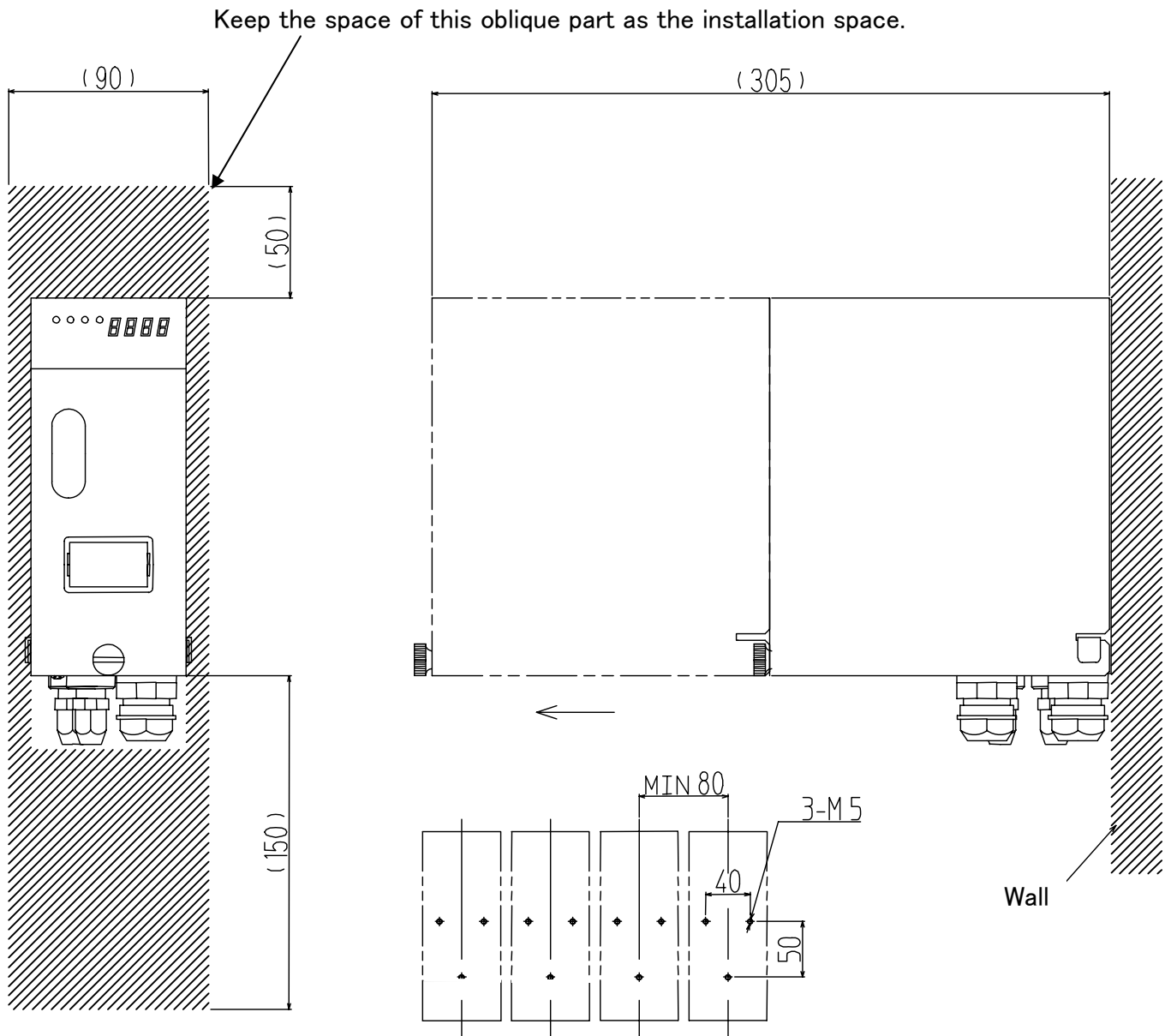


Fig. 1: Dimension of mounting pitch

- (1) Install the wall mounting bracket on the wall.
- (2) Put the detector unit on the wall mounting bracket.
- (3) Fix the detector unit with screw on the lower part of detector unit.



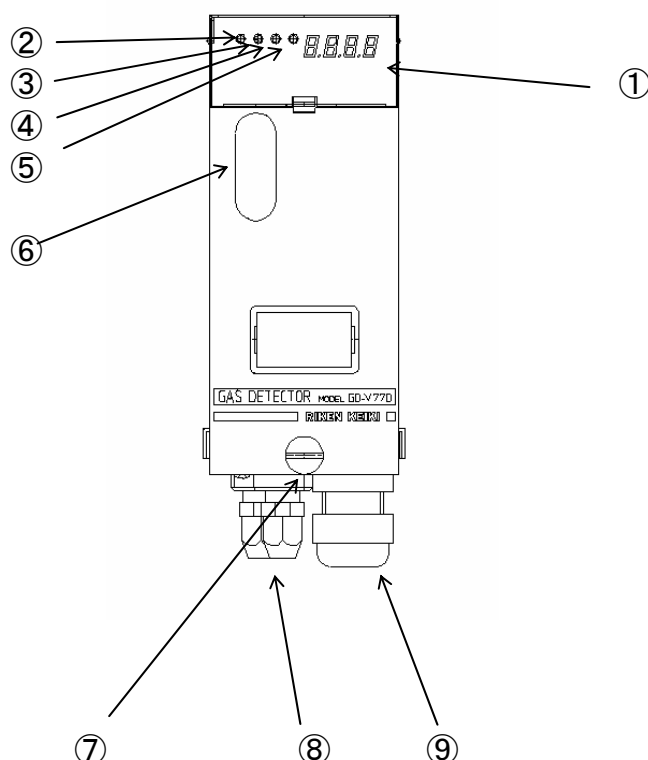
#### CAUTION

Confirm that the detector unit is surely fixed to the wall mounting bracket after finishing the job.

If it is not surely fixed, the detector unit might drop and cause injury or damage itself.

### 3 — 4 . Name of each part & functions

#### 3 — 4 — 1 . Front view



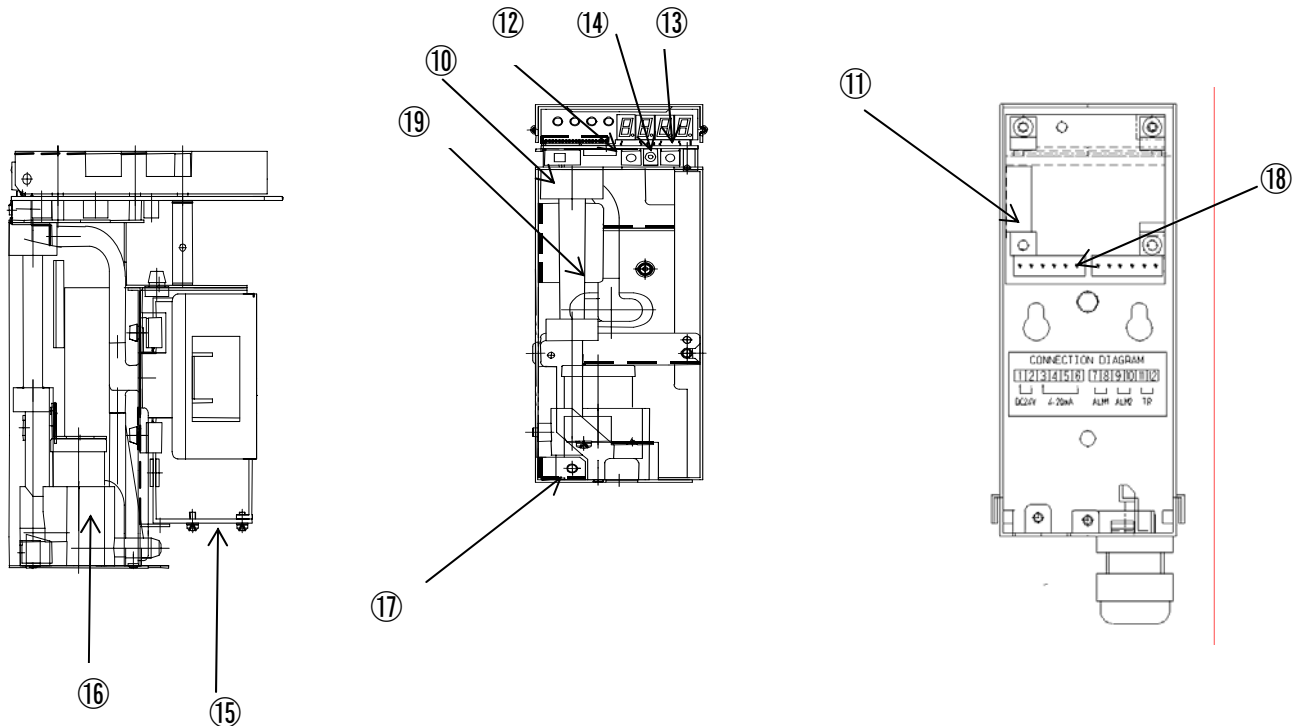
- |                             |   |
|-----------------------------|---|
| ① LED indicator.....        | It indicates the gas concentration.(used at maintenance)  |
| ② PW/TR light(Green) .....  | For both the power and trouble.<br>Lighting : The power is on. Normal operation.<br>Flashing : Trouble      |
| ③ ALM1 light(Yellow) .....  | It turns ON at (1st) gas alarming.  |
| ④ ALM 2 light(Red) .....    | It turns ON at (2nd) gas alarming.<br>(ALARM 1 is also ON).   |
| ⑤ SKIP light(Green) .....   | It turns ON during the skip mode.<br>(Detection being suspended).   |
| ⑥ Flowmonitor .....         | It turns flashing at the maintenance mode.<br>For sample flow confirmation. The standard rate is 500mL/min. |
| ⑦ Knurling type screw ..... | It is used at opening/ closing the cover.   |
| ⑧ Tubing for sampling ..... | GAS IN : Tubing for sample gas in.<br>GAS OUT: Tubing for sample gas out.                                   |
| ⑨ Cable inlet .....         | For the power supply cable, output signal and relay output.   |

3 — 4 — 2 . Inside view

【Front view of detector unit】

【Front view of wall mounting unit】

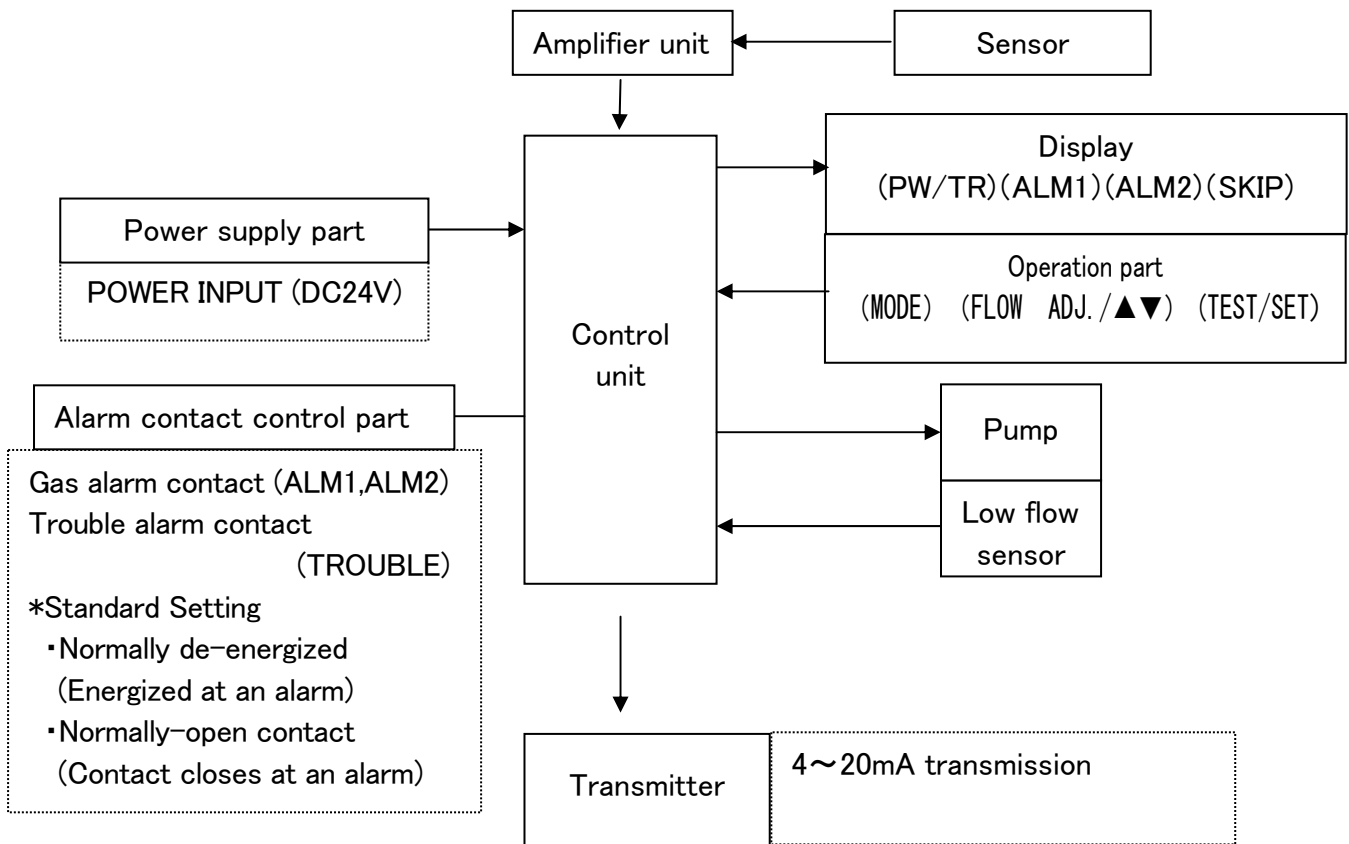
【Side view of detector unit】



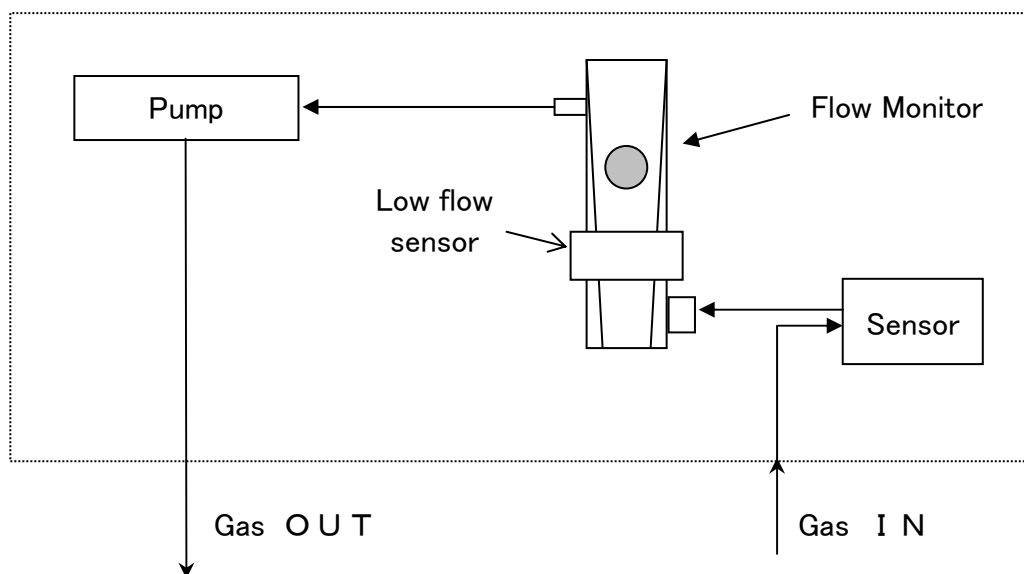
- ⑩ Power switch (POWER) ..... ON/OFF switch for power supply(24VDC).
- ⑪ Fuse ..... Fuse for power
- ⑫ MODE switch (Grey)..... Switch that changes from detection mode to maintenance mode and changes the mode back to the detection mode.
- ⑬ TEST/SET switch(Red)..... Switch that turns the mode into the alarm testing mode, and sets the further mode during the maintenance mode.
- ⑭ FLOW ADJ./▲▼ switch..... Switches that adjust the flow rate, looking at the flow monitor. Or, these are used to choose the items at the maintenance mode, to adjust the zero point, span point and to increase the indication at alarm testing.
- ⑮ Pump ..... To sample the detection gas.
- ⑯ Sensor ..... To detect the sampled gas
- ⑰ Detector unit fixing screw..... To fix the detector unit with wall mounting unit.
- ⑱ Terminal plate ..... To connect external cables
- ⑲ Flowmonitor ..... To confirm sample flow rate.

### 3 - 5 . Block Diagram

#### 3 - 5 - 1 . Electric diagram



#### 3 - 5 - 2 . Tubing diagram



## 4. HOW TO USE

### 4-1. Before operation

Be sure to keep caution items of use not only for first user but for already experienced staff. If not keep these caution items, the unit may be defective and correct gas detection may not be performed.

### 4-2. Installation place

#### CAUTION

Detection gas sampling from high dusty places.

- Use the designated dust filter to avoid adsorption of gas or influence caused by ambient dust.
- Stop the suction pump before replacing filter.
- Put the designated dust filter at the inlet of sample tubing if it is used other than clean room.

Do not install at places where direct sun drought or where the temperature is drastically changed.

Keep away the system from direct sun drought or where the temperature of the system is drastically changed.

Do not install it where vibration or shocks may take place.

The system consists of fine electronics parts.  
Install them where to be stable not to crush or fall down.

Keep the system from the equipment which may generate the noise (Unit & cable).

Keep the system from the equipment which may give a high frequency in the surroundings and install it.

- Do not put the system jointly each.
- Do not wire the cable in parallel nor take access.

Do not install it where the detection gas is deposited around.

- Do not install and make gas detection at the place where the sample gas is deposited.
- In this case, extend the length of sampling hose etc. and sample the gas.

Do not install it where it is attended with danger at maintenance work

This detector requires regular maintenance.

Do not install the detector where it is attended with danger at maintenance work.

Do not install it where it is difficult to make maintenance

Do not install the detector at places where;

- \* It is required to stop operation of the equipment where gas detector is installed at maintenance work.
- \* It cannot make maintenance without taking off a part of equipment.
- \* Casing cannot be removed by pipings, rack, etc.

Do not install it in an equipment that grounding construction is not enough.

Be sure to ground when install.

#### 4-3. Caution in the system engineering

##### CAUTION

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

##### (1) Stable power used

While the system gets stable at power failure, the external output and alarm contact 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 unit .

Power voltage	DC24V±10%
Power failure tolerance time	Approx 10msec. (For power failure of 10msec, it re-starts) To warrant the continuous operation, install the standby battery outside.
Others	Do not contact with power involving high power load and high frequency noise. According to requirement, use line filter and separate it from noise source.

##### (2) Designing to consider radiation

When install the closed self-standing control panel, mount the fans in the upper and lower part.

## (3) Lightning measures

Lightning surge	There is the problem "Lightning". When make outdoor wiring of cable at factory or plants etc or when make a parallel wiring in the same duct with the cable in from outdoor even at the indoor wiring. 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 or laid in the underground, it is impossible to prevent the inductive lightning surge generating from the thunder.
Lightning measures	There is not the complete countermeasure for it but the following method can be considered. Make the suitable treatment accordingly. a) The transmission signal route is arranged for connection by the optical fiber cable etc. b) 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. Please contact with the manufacturer of lightning arrester in details.
Grounding	Surge noise shall be generated from the thunder lightning or except it. To protect detector from these cause, be sure to make grounding.

\* In the lightning rod, there is the circuit to remove the surge voltage to be a cause of damage from field instruments.

By installing the lightning rod, the signal may be attenuated. When install the lightning rod, it is required to check the performance in advance.

## (4) Alarm contact

- Alarm contacts shall be used only for external buzzer and alarm light, and do not use it for the controlling use (such as solenoid valve control etc).

**CAUTION** (FOR USE OF NORMALLY-CLOSED CONTACT)

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

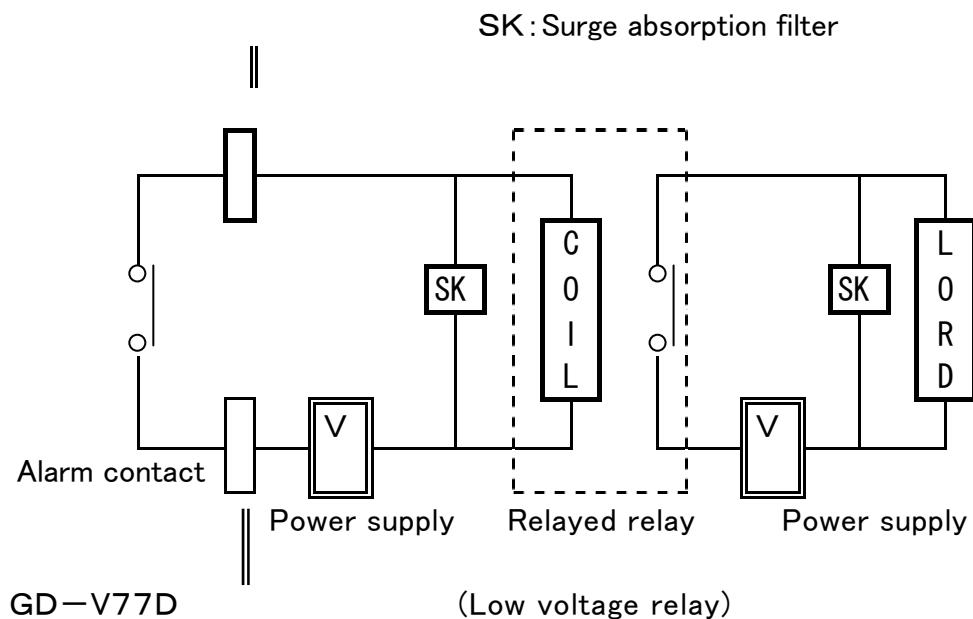
Whenever alarm signals from gas detectors are used with normally-closed contact, please put delayed-circuit (for about one second) to receiver side of normally-closed contact to avoid such phenomenon.

When control the external load, the bad influence may be given to the system according to the load characteristics. In such case, the following countermeasure shall be taken to stabilize the action and protect the contact.

- Make relay(contact amplification) with the low voltage relay and operate by connecting CR circuit (Spark Killer: SK) (Diode etc for DC) suited for relay coil directly to relay.
- Add CR circuit to the load side of relay on the request.



Reference: By the condition of load, CR circuit may be better to install in the contact side but it is required to put in by checking the action of load.



—How to think alarm contacts against inductive load—

The spec for alarm contact of GD-V77D is described by the conditions of resistive load.

When use the inductive load for alarm contacts, the very high reverse electromotive voltage may be generated and the following trouble tends to be produced.

- Contact part of relay is melted adhesively and the contacts can not work.
- High voltage is put inside of detector unit and then, electrical parts may be damaged.
- As it is big noise, the trouble action may be taken by the reckless drive of CPU.
- Irrespective of inductive load, there is the possibility of unforeseeable noise instruction for contact.

Above trouble may be generated

### ⚠ CAUTION


- The inductive load shall not be used in principle (Do not use fluorescent lamp, motor, etc.).
- When use the inductive load, make the contact amplification outside, but the outside relay coil belong, use the relay driven by the low voltage (within AC100V) and it is protected by an appropriate surge killer.

\* As the inductive load, there are following samples.

- Patlight \* External relay \* Buzzer \* Siren \* Fan \* Fluorescent lamp \* Motor etc.

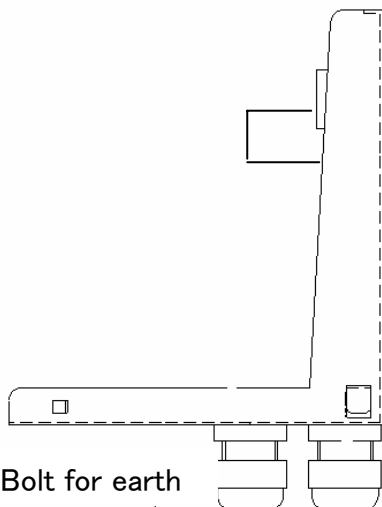
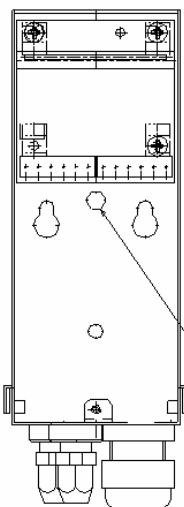
## 4 — 4. Grounding

Make grounding with inside or outside terminals marked **E**

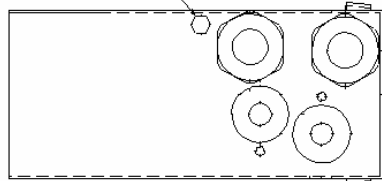


**WARNING**

Be sure to make grounding before putting power ON.


Bolt for earth



Bolt for earth

Be sure to make grounding for safety purpose and to keep stable operation of this unit. Do not connect each wire with gas pipe. Make grounding corresponding to D-class grounding (Grounding resistance : below 100 ohms)

## 4 — 5. Caution at wiring construction



**CAUTION**

- When make wiring construction, take care not to damage the internal electronics circuit.
- When handle the detector unit, put in at horizontal position. If put it vertically, it tends to fall back and damage the detector.
- For power cable, and signal cable, they should not be laid out with motive power cable such as motor etc.
- When use twisted cable, take care not to contact a part of core cable with other core cable.

**4—6. Applicable cable****4—6—1. Power/Signal cable**

[3-wire 4~20mA version]

Power & signal cable : Use CVVS 1.25mm<sup>2</sup>, 3-core cable

[4-wire 4~20mA version]

Power cable : Use CVV 1.25mm<sup>2</sup>, 2-core cableSignal : Use CVVS 1.25mm<sup>2</sup>, 2-core cable**CAUTION**Size of leading cable to GD-V77D is upto 1.25mm<sup>2</sup>When use the cable exceeding 1.25mm<sup>2</sup>., use the junction box etc.**4—6—2. Relay output signal cable**Relay contact cable : Use VCTF 0.75mm<sup>2</sup>, 6-core cable**4—6—3. Specifications of terminal**Terminal specifications

- Rated voltage : AC250V
- Rated current : 13A

Connectable conditions

- Cable : 0.14mm<sup>2</sup>~1.5mm<sup>2</sup>
- Cable with barterminal :  
(w/o insulation sleeve) : 0.25mm<sup>2</sup>~0.5mm<sup>2</sup>
- Cable with barterminal  
(with insulation sleeve) : 0.5mm<sup>2</sup>~1.0mm<sup>2</sup>
- Length of naked wires : Approx 6mm
- Screw clamp torque : 5~8kg.
- Applicable screw driver : Minus screw driver(width below 3mm)

Appropriate bar terminal

When use the bar terminal, the following can be used.

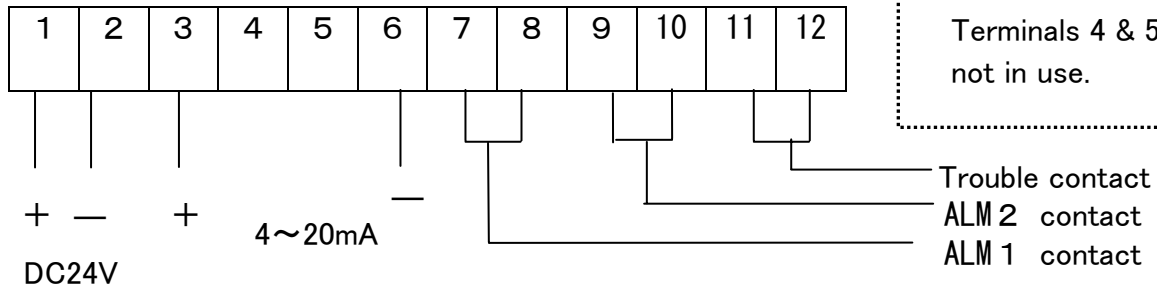
Bar terminal :Model AI series(Phoenix contact make)

Terminal lug tool :Model CRIMPFOX UD 6(Phoenix contact make)

**CAUTION**

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

4 - 6 - 4 . Terminal plate

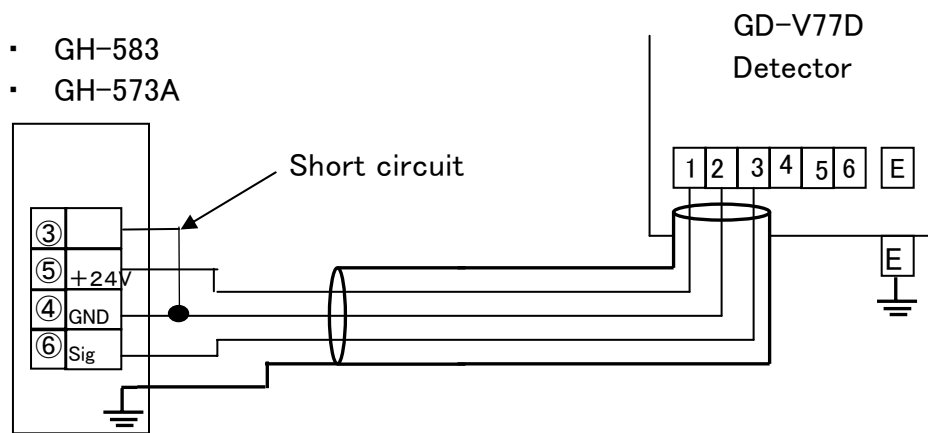


**\* NOTE**  
Terminals 4 & 5 are not in use.

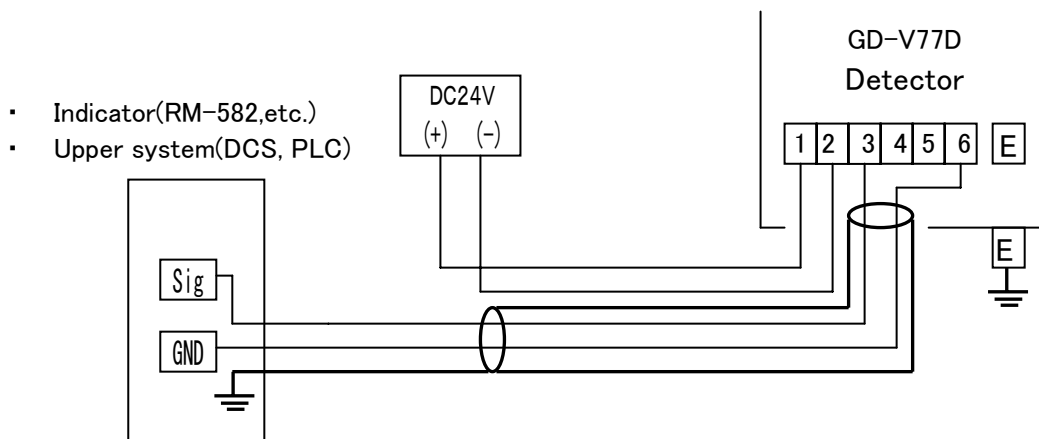
4 - 7 . Example of cable connection

4 - 7 - 1 . Connection with indicator/alarm unit

(GH-583, GH-573A): (3-wire type)



4 - 7 - 2 . Connection with indicator unit, DCS, PLC  
(4-wire type)



**\* NOTE**  
In case of 4-wire type, power supply unit(DC24V) is required separately.

## 4-8. Caution at piping construction



### WARNING

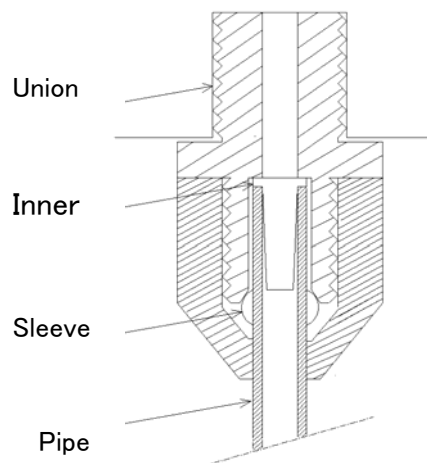
This is designed to draw sample gas in an atmosphere of atmospheric pressure. When the exceeding pressure is given to the sampling pipe(GAS IN, GAS OUT), the internal pipe is removed and it is dangerous by the leak of detection gas. Use it so that the excessive pressure cannot be given.

For exhaust gas, after detection, exhaust it to the safety zone by connecting the exhaust hose to GAS OUT on the bottom of detector.

#### (1) Piping port of detector

For this detector, PT 1/4 male screw thread is cut for sampling pipe port(GAS IN, GAS OUT) and polypropylenes union is provided. As this is deviated from the kind of gas used, specify it at the time.

This pipe used is  $\phi 6$ (OD) –  $\phi 4$ (ID) PTFE tube. When make piping, take care not to leak by putting accessory sleeve. The kind of piping material is different by kind of detection gas.



#### (2) Sample flow rate

- The flow rate of this detector is above 500cc/min.
- When suck from removed place, consult the nearest agent or RIKEN KEIKI.

#### (3) Piping material

For detection gas, there is strongly adsorptive gas and corrosive gas. By considering these points, this must be decided..



### CAUTION

It is required to decide the connection tubing(length, material). Contact the nearest agent or RIKEN KEIKI for detail.

## 5. OPERATION METHOD

### 5-1. Preparation before start up

- Before marking power on, take care of the following. If do not keep this, there is the danger of electrical shock and damage of detector.

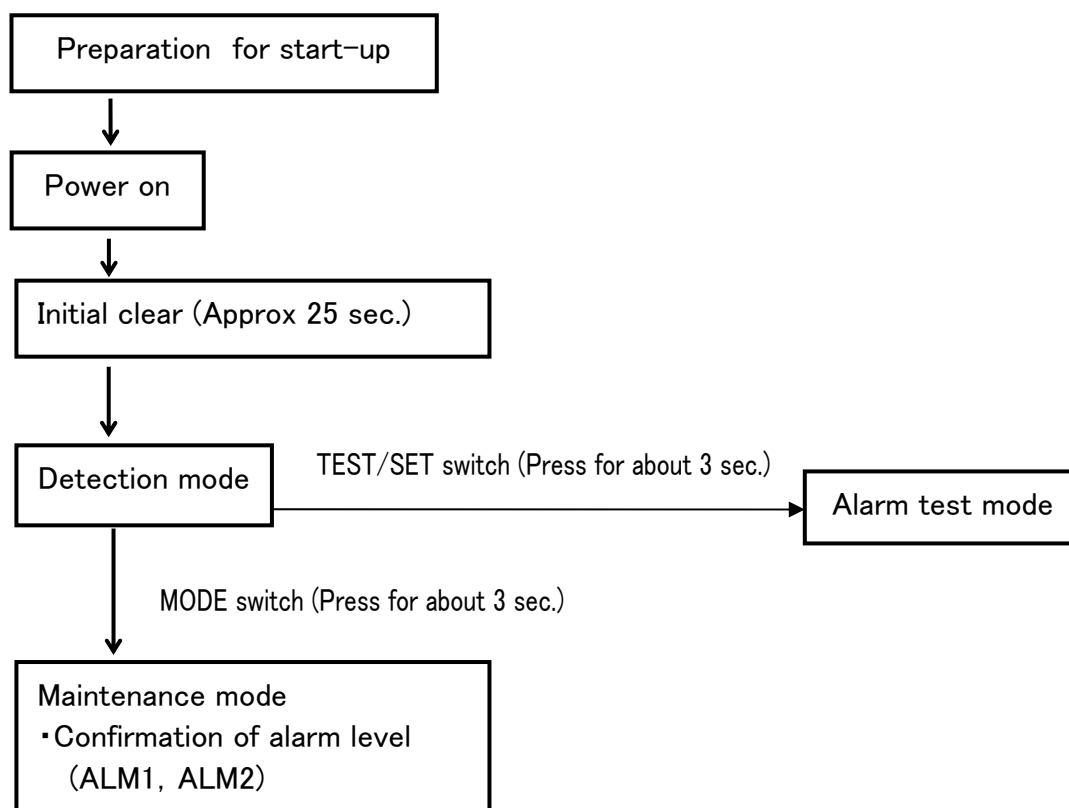
- (1) Make grounding.
- (2) Check that the wiring with outer unit is made correctly.
- (3) Check that the power voltage is within the rating.
- (4) During adjustment, there is the case to work alarm relay contact.  
Arrange not to affect the outside even if the contact work.
- (5) Check that the dust filters are connected correctly or not.

**⚠ CAUTION**  
Filters are designated by kind of detection gas.

- (6) For security purpose, check that it is a designated rated fuse or not.

### 5-2. Basic performance flow

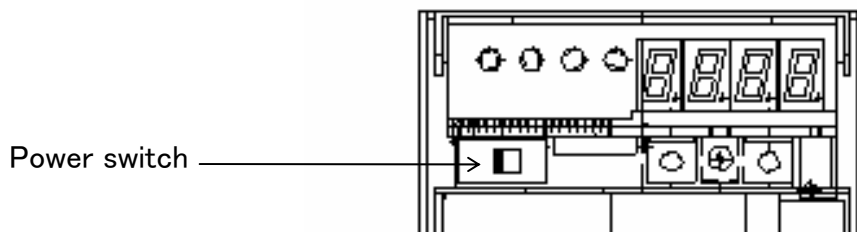
Normally this is used in detection mode after making power on.



## 5-3. Start up method

### 5-3-1. Power on

- Before making power on, check that this detector is connected correctly.
- The position of power switch is located on the front panel(Open front window).
- When turn the ON/OFF power switch to right, it gets "ON" and when turn to left, it gets "OFF".



- When make power switch "ON", the POWER light turns on and the pump start working after 15 seconds.
- Initial clear (Approx 25 sec.)
  - Detector system check
  - Output signal : Approx 2.5mA
  - Alarm, trouble action shut-off (Alarm light, contact)



### CAUTION

The semiconductor type sensor to be used with this detector requires warm-up time for stabilization.

Warm-up time varies according to the non-electricity time.

Take an appropriate treatment referring to the table below.

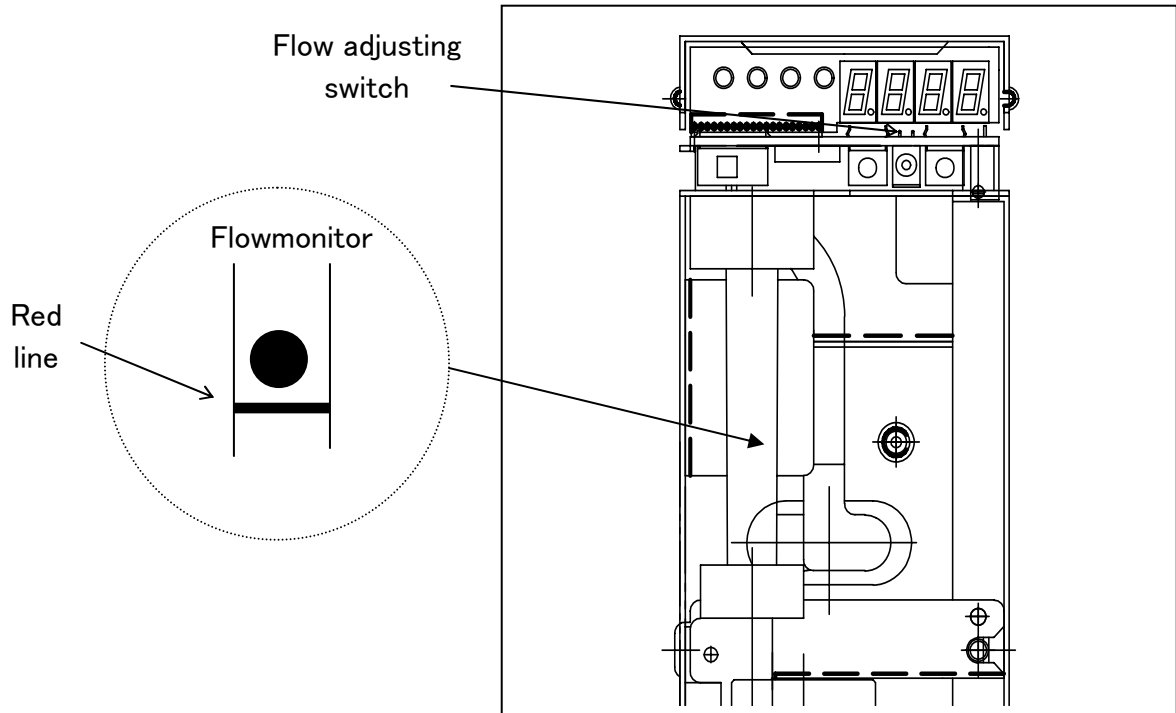
Total non-electricity time	Required warm up time
Within 24 hours	Above 4 hours
Within 72 hours	Above 24 hours
Within 10 days	Above 2 days
Within 1 month	Above 7 days
Within 3 months	Above 14 days
Above 3 months	Above 1 month

Alarm action and output signal will not be stable during warm-up time.

When make power ON, announce it to respective department beforehand to avoid any abnormal actions.

### 5 — 3 — 2. Flowmonitor(Sensor flow) adjustment

- Check that the ball in glass pipe of the flowmonitor is above red line.
- When the ball is not above red line, adjust it by turning the flow adjusting switch (FLOW ADJ/▲▼).





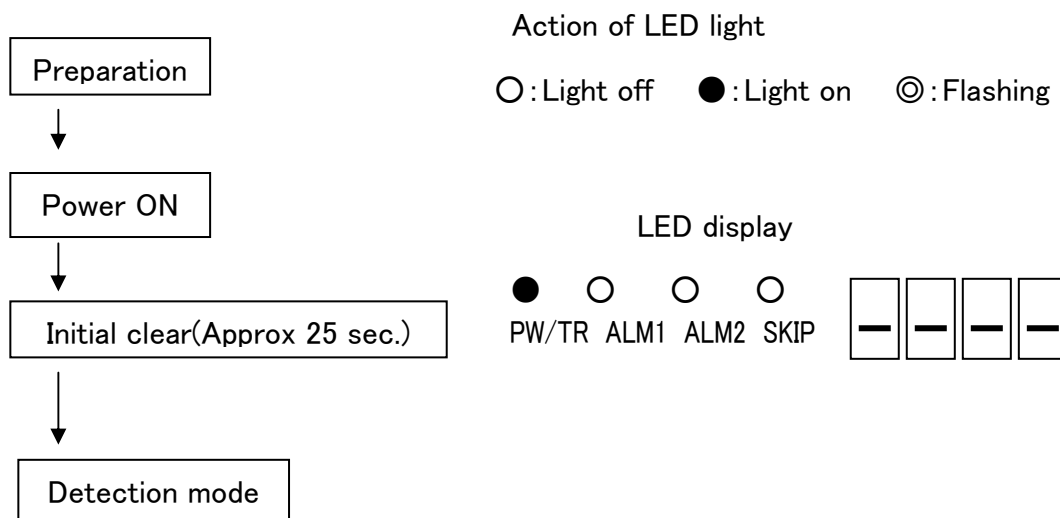
## 5-4. Explanation of performance (Detection mode)

### 5-4-1. Display action

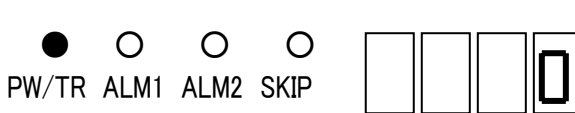
There are following two kinds of displays.

- (1) LED display : Shows gas concentrations.
- (2) LED light : Shows power/trouble (PW/TR), 1st gas alarm (AL1), 2nd gas alarm (AL2) and skip(SKIP) condition.

\*Contents of indications by LED light are different from the condition of the unit.



Only PW/TR light illuminates at detection mode and LED display shows detected gas concentration.



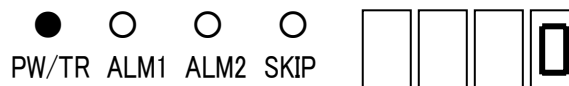
#### Gas alarm condition

When detect gas above AL1, AL2, it shows gas concentrations and AL1, AL2 alarm lights turn ON.

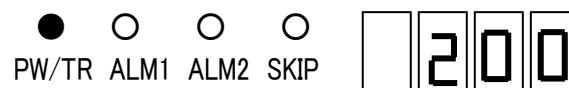


### Zero suppression

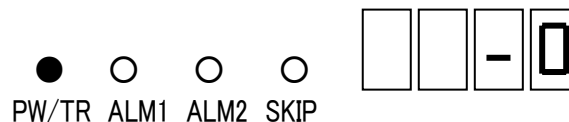
During detection mode operation,  
below +10% of full scale shows as "0".



During detection mode operation,  
this shows actual reading from above  
+10% of full scale.



The right 「-0」 is displayed when it  
gets down to minus(-)side more than  
10% of full scale.



### ⚠ WARNING

When it shows 「-0」, the accurate gas reading is impossible. Ask to our nearest agent or RIKEN KEIKI to make zero adjustment and gas calibration.

### Trouble condition

When any of trouble arises on detector,  
content of trouble is shown.



(LED display) (Content of trouble)

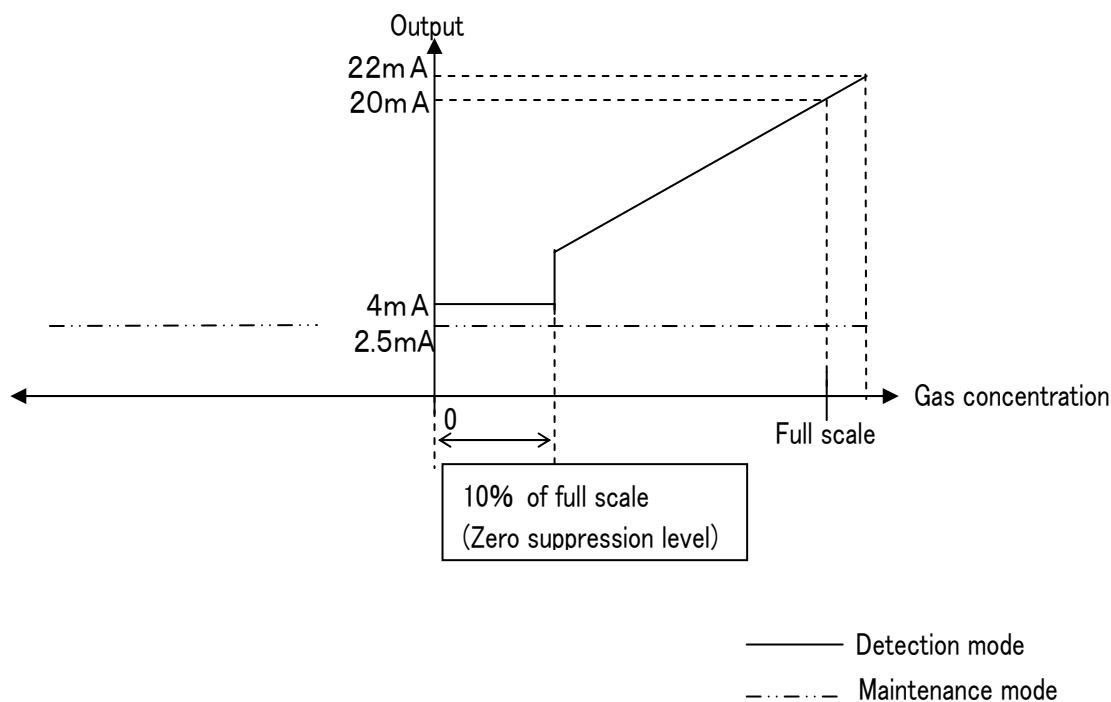
- E-00 System trouble
- E-01 Sensor disconnection or not yet connected.
- E-05 Low flow

## 5-4-2. External output action

### 4~20mA output version

- (1)Signal transmission method : Electric current transmission (not isolated)  
 (2)Transmission path : CVVS  
 (3)Transmission distance : Below 1Km  
 (4)Max loop load : 300Ω at 24VDC  
 (5)Status signal levels
- ① Detection mode : 4~20mA(depends on gas concentration)
  - ② Gas alarm : 4~20mA(depends on gas concentration)
  - ③ Initial clear : 2.5mA(Fix)
  - ④ Maintenance mode : 2.5mA(Fix)
  - ⑤ Alarm test : 4~20mA(depends on gas concentration)
  - ⑥ Trouble alarm : 0.5mA(Fix)
  - ⑦ Point skip : 2.5mA(Fix)
- (6)Power interruption : 0mA

Relations between gas concentration and output are shown below;



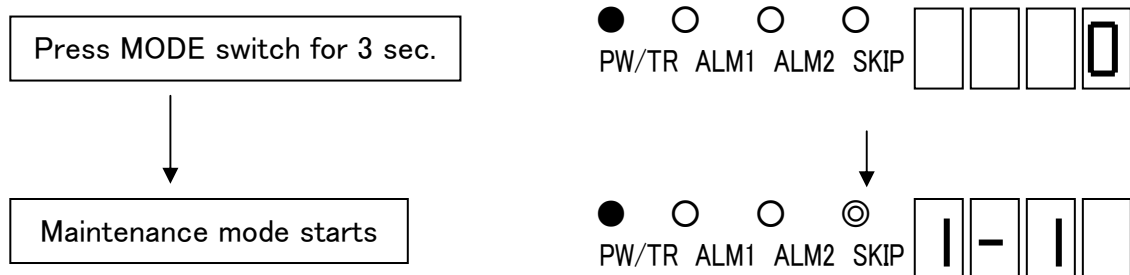
### ⚠ CAUTION

4~20mA output has been adjusted. Even if re-adjustment is required after installation, do not operate without our permission.  
 Please contact with our nearest agent or RIKEN KEIKI if it is required.

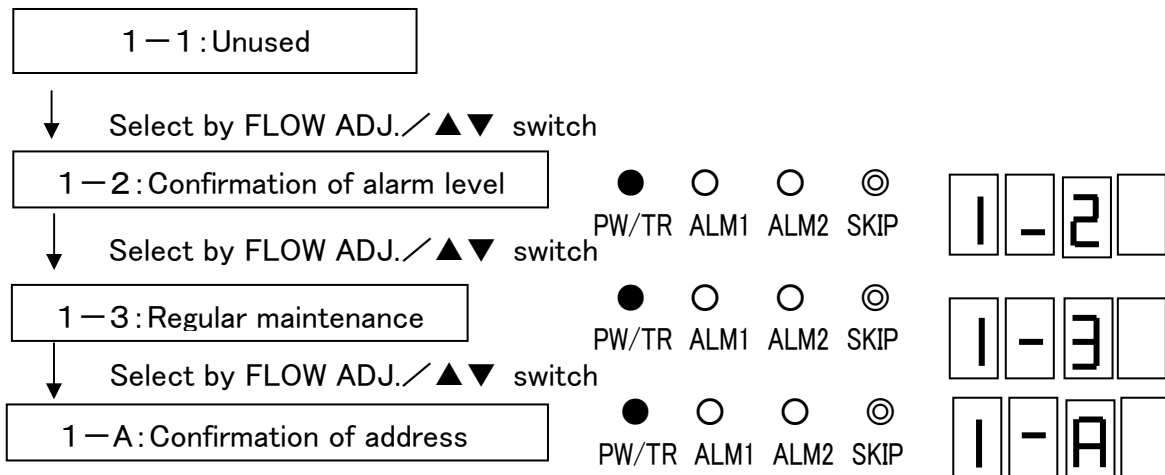
## 5-5. Maintenance and adjustment

### 5-5-1. Maintenance mode

When make each adjustment, make it on maintenance mode.



※Content of menu



#### CAUTION

Do not operate 「1-3: Regular maintenance mode」 and 「1-A;Confirmation of address」 without our permission.

Please contact with our nearest agent or RIKEN KEIKI if it is required.



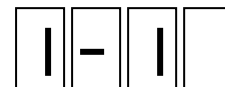
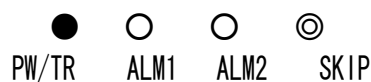
#### WARNING

When maintenance mode starts during gas alarm, alarm contact and external output signal(gas alarm signal) will be cancelled.

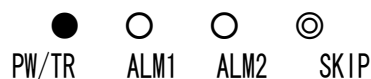
## 5 - 5 - 2 . Confirmation of alarm level

This is used to check alarm levels.

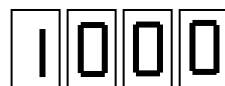
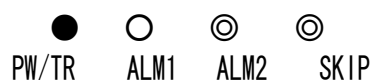
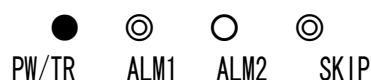
- ① Press MODE switch for above 3 seconds, and maintenance mode starts.



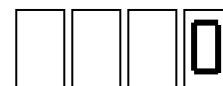
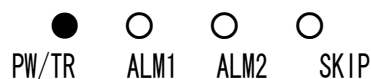
- ② Select 「1-2」 with FLOW ADJ./▲▼ switch.



- ③ Press TEST/SET switch to check the 1st alarm level (ALM 1).  
Press TEST/SET switch again to check the 2nd alarm level (ALM 2).



- ④ To return detection mode, press MODE switch for above 3 seconds. SKIP light turns OFF which shows detection mode.



### WARNING

After completion of this operation, be sure to return detection mode(Only PW/TR light turns ON) by pressing MODE switch.



### CAUTION


When leave it alone on maintenance mode, this returns detection mode automatically after 10 hours.

### \* Note

To change alarm levels, please contact with our nearest agent or RIKEN KEIKI.

## 5 — 5 — 3 . Alarm test

This section is used to confirm the transmission condition to the outer equipment by giving same gas concentration signal(gas concentration data) output.


**WARNING**

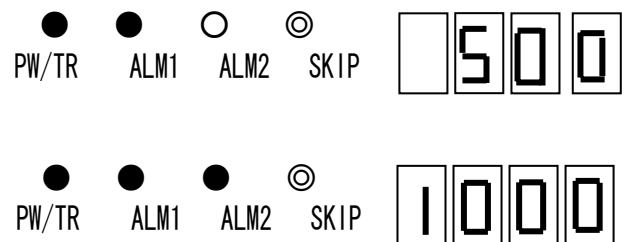
When make alarm test, (transmission test) announce it to respective department beforehand.

Carry it out after making proper treatment(External signal output, alarm contact).

- ① Press TEST/SET switch for above 3 seconds to start alarm test mode. When it gets to alarm test mode, both SKIP light and display flash.



- ② Increase the reading with FLOW ADJ/▲▼ switch. When it reaches the first alarm level, AL1 light turns on. When it reaches the second alarm level, AL2 light turns on.



### \* Note

Alarm contact does not work during alarm test even if the reading reaches alarm level.

To confirm the operation of alarm contact, additional setting is required.

Please contact with our nearest agent or RIKEN KEIKI.

## 5—6. How to finish operation

When finish this operation, turn off power switch of this detector unit and turn off the main power(DC24V).



### WARNING

- When finish this operation, do it after making point skip with the upper system (Centralized system).
- When finish this operation, check the external output and function of outer equipment to be connected with external alarm contact. Then, judge whether power can be shut off or not.
- When alarm contact is set on energized condition(optional), alarm contact works when power supply(DC24V) to this unit is OFF.  
In case of energized alarm contact, only power switch of this unit shall be put OFF.
- In case of detecting high adsorptive gases, turn off the power after making cleaning enough by fresh air.

## 6. KINDS OF ALARM AND ITS FUNCTION

### 6-1. Kinds of alarm

There are two kinds of alarms — gas alarm and trouble alarm — in this detector.

Gas alarm : When the detection gas reaches to preset alarm level or exceeds it, this starts to function. 《Non-latched mode》

#### \* NOTE

Alarm levels are adjusted at 1/4(1st alarm) and 1/2 (2nd alarm) of full scale as standard.

To prevent error of performance, this is provided with alarm delay time for 2 seconds.

\* Trouble alarm : Trouble is detected in the detector and it gives an alarm as trouble alarm.

Except system trouble “E-00”, it is non-latched. When return to normal from trouble condition, it starts again from the performance 《Initial clear》 after power on. [See “8. TREATMENT AT ABNORMAL CASE”]

### 6-2. Gas alarm

#### 6-2-1. Gas alarm action

##### (1) Display

##### ① Gas concentration display

When exceed detection range, LED display shows “□□□□”.

##### ② Power light (POWER : Green)

It keeps continuous lighting.

##### ③ Alarm light (ALM1 : Orange), (ALM2 : Red)

There are two alarm levels. When the reading goes to alarm preset level or exceeds it, this turns to on.

##### (2) External output

##### ① 4~20mA output

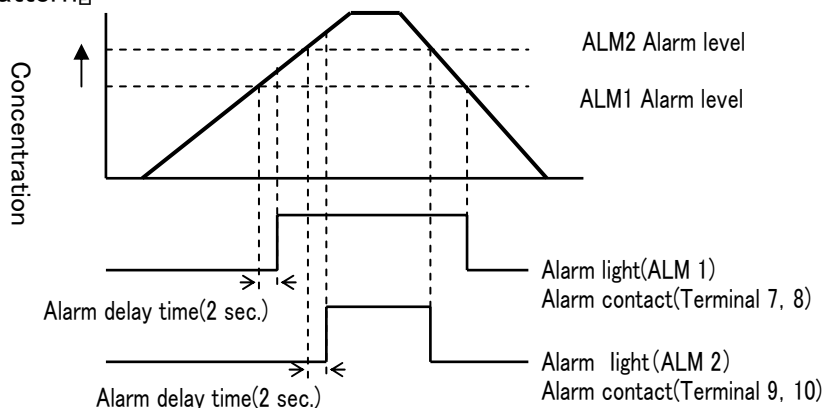
Electric current in proportion to gas concentration is output. In case of over scale, the maximum output is approx 22mA

##### ② Alarm contact

When gas concentration reaches preset alarm level or exceeds it, the relay contact for outer alarm works.

Relay contact is a non-latched condition. It returns automatically when gas concentration decreases under preset alarm level.

#### 『Alarm pattern』





## 6 — 2 — 2. Counteraction at gas alarm

### Reaction to leak gas

The counteraction at gas alarm shall follow to the client rule and immediate reaction shall be required.

Generally, the following action is taken.

#### ① Confirmation of indication value.

#### \* NOTE

Instantaneous gas leak may get lower at confirmation time.

Except gas alarm, it gets alarm condition temporarily by noise or any other accidental conditions.

② Based on gas alarm control concentration, it keeps the safety by keeping away people from the monitoring area.

③ When gas concentration display is continued, close the gas valve and confirm that gas concentration 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 gas detector.

⑤ After checking that there is no danger, the treatment for gas leak shall be taken.

## 6 — 2 — 3 . Gas alarm possibility except the case of gas detection

### It may respond to interference gas

For interference gases, contact the nearest agent or Riken Keiki.

### It may be caused by drifting due to the change of long time elapsed sensor

Check the reading by daily check and make calibration through authorized service agent whenever necessary.

### It may be caused by the noise generated from spherical machine

Revision of installation location, wirings and the addition etc. of noise measure parts between instrument and detector shall be required. This specific measures shall differ from the condition of each site.

It may receive a temporarily noise such as by thunder lightning etc.

When the cause and effects are understood, the measure for surge according to the condition can be taken.



## 7 — 2. Calibration method (Zero adjustment, calibration with gas, etc.)



### CAUTION

For gas calibration, contact our nearest agent or Riken Keiki.

## 7 — 3. Replacement of sensor and parts.



### CAUTION

For replacement of sensors and parts etc, contact our nearest agent or Riken Keiki.

## 7 — 4. Treatment when operation is stopped or its installation place is moved.

### 7 — 4 — 1. Stopping the normal operation

Make the power switch off on the front side.

Make the power (DC24V) off at the supply side.

### 7 — 4 — 2. Installation when move its place

When move its place, refer to “4-2. Installation place”. Then, for wiring construction, refer to “4-5. Caution at wiring construction”. When move its installation place, make shortest the power interruption time.



### CAUTION

When move its installation place, be sure to make gas calibration. The re-adjustment work including gas calibration shall be requested to contact our nearest agent or Riken Keiki.

## 7 — 5. Storage or treatment when not in use for a long time.

This detector shall be stored in the following environment condition.

- ①Temperature : 0°C~40°C
- ②Humidity : 30%RH~85%RH(Non-condensing)
- ③Environment condition : To be an environment where there is no generation of gas, solvent and vapor etc.



### CAUTION

The semiconductor type sensor to be used with this detector requires warm-up time for stabilization.

Warm-up time varies according to the non-electricity time.

Take an appropriate treatment referring to the table below.

Total non-electricity time	Required warm up time
Within 24 hours	Above 4 hours
Within 72 hours	Above 24 hours
Within 10 days	Above 2 days
Within 1 month	Above 7 days
Within 3 months	Above 14 days
Above 3 months	Above 1 month

Alarm action and output signal will not be stable during warm-up time.

When make power ON, announce it to respective department beforehand to avoid any abnormal actions.

## 7-6. List of recommendable spare parts for regular maintenance

No.	Name of parts	Maintenance interval	Replacement Interval(year)	Q'ty/unit
1	Pump (without diaphragm)	6 months	1~3	1
2	Pump diaphragm	6 months	1~2	1
3	Pump holder	1year	3~6	1
4	Internal tubing (Rubber)	6 months	3~6	1
5	Internal tubing (PTEE)	6 months	3~8	1
6	Fuse	1 year	8	1
7	Main PCB	---	7~8	1
8	Sub PCB	---	9~10	1
9	Packing	1 year	3~6	1
10	O-ring (Sensor adaptor)	1 year	3~6	1
11	O-ring (Chamber)	1 year	3~6	1
12	O-ring (Flowmonitor part)	1 year	3~6	2
13	Flowmonitor ass'y	1 year	7~8	1
14	Dust filter (Outside use)	6 months	0.5~1	1

### \* Note

\* The above replacement interval is just a standard and it depends upon operating conditions. Also, this does not show a guarantee period.

Replacement interval changes according to the result of regular maintenance check..

\* PCB is caused by deterioration of capacitor, etc.

\* Use pre-adjusted PCB when it is required to replace.

## 8. TREATMENT AT ABNORMAL CASE

### 8-1. Trouble alarm

#### Flashing of PW/TR light

- When PW/TR light is flashing, it is the condition that the following trouble may be caused.

Research its cause and take an appropriate action.

- The output of detector at trouble shall be as follows.

Output from GD-V77D: 0.5mA(Fix)

LED display	Trouble content	Main cause
E-00	System trouble	Memory trouble in the detector
E-01	Abnormal of sensor connection	Connector contact failure, Sensor cable disconnection
E-05	Low flow	Filth of filter or deterioration of pump

### 8-2. Counteraction at trouble alarm

When any trouble was found on this gas detector, contact our nearest agent or Riken Keiki.

If trouble should take place, we try best to search its cause and prevent its cause.

### 8-3. Before it is thought to be a trouble

It may be originated from disconnection and short circuit between units.

- Check the wirings around the related equipment as well as this detector.

There is the case that operation of detector is not correct including piping work etc.

- Re-check the detection system and contact our nearest agent or Riken Keiki.

There is the case of electrical line trouble such as shut-off of power.

- This will be treated by the re-check of stand-by battery, power line filter, insulation transformer etc or those addition.

## 8 — 4. Trouble Shooting

(1) PW/TR light is not ON. (Power is not supplied.)

<Cause and Treatment>

- Is it OK with power cable connection ?  
Connect power cable.
- Is fuse disconnected ?  
Search the cause of disconnection and replace it after making counter-measures.
- Is power voltage normal ?  
Supply the rated power voltage.
- Is this power switch turned on ?  
Make power switch ON.

(2) Abnormal performance

<Cause and Treatment>

- Sudden surge noise can be considered. When recover it, turn off the power and turn on the power again for re-start of operation. When such takes place often times, take an appropriate action for noise.

(3) No calibration available

<Cause and Treatment>

- Is the concentration of calibration gas correct ?  
Prepare the appropriate calibration gas.
- There is the possibility for decreasing of sensor sensitivity.  
The sensor replacement is required.

(4) PW/TR light flashing.

① System Trouble “E-00”

<Cause and Treatment>

- Memory trouble inside of detector.  
Contact our nearest agent or Riken Keiki.

② Sensor connection trouble “E-01”

<Cause and Treatment>

- Non-connection of sensor, contact failure of connector and disconnection of sensor cable.  
Check “whether sensor is connected” or “the sensor cable connector is connected to the sensor or amplifier board.”  
If can not be recovered, contact our nearest agent or Riken Keiki.

③ Low flow trouble “E-05”

<Cause and Treatment>

- Drop of pump function  
Even though the ball of flowmonitor can not be up the red line with FLOW ADJ/▲▼ switch, replace the pump with new one.
- Check that the detector unit is mounted firmly or the fixing screw of detector unit is fastened firmly.
- Due to the clog of dust filter, the pump can not suck.  
Replace the dust filter with new one.
- The pipe at gas-inlet side or gas-outlet side is broken or clogged.  
In this case, repair the defective part.

## (5) Slow Response

## &lt;Cause and Treatment&gt;

- Is the dust filter clogged ?  
Replace the dust filter.
- Is the pipe at gas inlet side or gas outlet side broken or clogged ?  
Repair or replace defective part.
- Check whether detector unit is firmly connected.

## (6) Fuse disconnection

## &lt;Action&gt;

- The detector does not operate at all.

## &lt;Cause and Treatment&gt;

- The trouble of detector or trouble of external power source can be considered. Search this cause and after taking its measures, replace the fuse with the designated one.

**\* NOTE**

The rating of this fuse for this detector is 125V 2A



## 9. DEFINITION OF TERMS

### Flowmonitor

Gas sample flow rate supplied to the sensor is indicated. The standard flow rate of this detector is 500cc/min.

### Low flow alarm

When the sample flow rate to the sensor is dropped, this is the function to give an alarm. PW/TR light flashes and "E-05" is shown on LCD.

### External output signal

The external output signals of this detector head are as follows;

- Gas concentration signal output, status signal(working condition): Electric current signal.
- Alarm contact output (1st, 2nd, trouble)

### External dust filter

When use it at dusty atmospheric place, it is recommended to put on dust filter outside. The kind of filter is different by the detection gas. Please ask to our nearest agent.

### PPM

This is the unit of gas concentration showing a volume at a part per million.

### Calibration

By using calibration gas etc, it seeks relations between instrument reading, display value or set value and true value.

### Maintenance mode

When make maintenance of detector, cut off the alarm contact and the output of signal showing the maintenance mode condition is displayed on the external output signal.

By this, the maintenance is carried out independently on this detector.

Press MODE switch for above 3 seconds, and the maintenance mode starts.

### Initial clear

The reading will be unstable for a few seconds after power on. In this moment to prevent the error of running, the alarm contact shall be cut off. Then, signal output showing initial clear condition is given on external output.

### Zero suppression

This is the function to blur the environment change or the influence of interference gas.

### Alarm delay time

To prevent the alarm error by noise intruded from the outside, this is the function to suspend the running temporarily.

**Alarm response time**

It is the time until the alarm is given when exposed to gas concentration of 1.6 times alarm preset level. (This does not involve the time when connect suction pipe outside)

Alarm response time for this detector is within 30 seconds.

**Point skip**

For the convenience of maintenance etc, the function of gas detection is stopped temporarily.

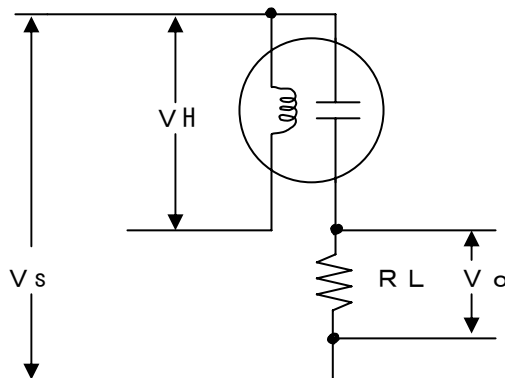
**10. DETECTION PRINCIPLE**

The model GD-V77D is based on the semiconductor method. The gas sensitive semiconductor sensor is composed of the sintered metal oxides( $\text{SnO}_2$ ,  $\text{ZnO}$ , etc) and the heater.

In the sintered metal oxides, one pair of electrode is embedded.

In the presence of explosive or toxic gases, the gas molecules are adsorbed on its surface.

This, in turn, causes move of free electrons in the semiconductor, with increase in electric resistance for deductive gases or decrease in electric resistance for oxide gases corresponding to the concentration of explosive or toxic gases. This change of electric resistance is detected with electrodes and outputs as gas concentration.



$R_L$ : Load resistance       $V_o$  : Output voltage  
 $V_H$ : Heater voltage       $V_s$  : Sensor voltage

# 11 LIST OF PRODUCT SPECIFICATIONS

## 11—1. Specifications

Model	: GD-V77D
Transmission method	: Electric current transmission method, 3-wire(or 4-wire), 4~20mADC
Gas concentration signal	: 4~20mA(Linear upto 22mA)
Initial clear signal	: 2.5mA
Maintenance signal	: 2.5mA
Trouble signal	: 0.5mA, non-isolated (max. load : 300Ω at 24VDC)
Applicable sensor	: Semiconductor sensor
Detection gas	: Toxic gases*combustible gases
Detection range	: Depends on detection gas
Gas detection method	: Sample drawing method(with low flow alarm detection circuit)
Sample flow rate	: 500cc/min
External tubing	: φ6-φ4 PTFE tubing (Provided with P.P. coupling)
Gas alarm	: 2 levels (Non-latched mode)
Preset level	: Depends on detection gas and range.
Indication	: LED light
Relay output	: Dry contact, normally-open for both 1st and 2nd alarm, rated 0.25A at 125VAC/0.5A at 24VDC(Resistive load).
Alarm delay time	: Within 30sec(Time to get an alarm when exposed to gas concentration of 1.6times alarm level, excluding delay by external tubing).
Initial clear time	: 25 sec. after power ON.
Zero suppression level	: 10% of full scale
Self-diagnostic function	
	Contents : Low flow, system error, sensor disconnection.
Trouble indication	: Flashing of POWER light, message of content.
Relay output	: Dry contact, normally-open, rated 0.25A at 125VAC/0.5A at 24VDC(Resistive load).
Display function	
Gas concentration	: 4 digit LED(7 segment)
Status	: LED light
	①Power/trouble indication: PW/TR(continuous/flashing)
	▪Normal·····Green/continuous
	▪Trouble·····Green/flashing
	②Gas alarm 1st: ALM1 light on (Orange)
	2nd: ALM2 light on (Red)
	Normal·····Light off
	Alarm ·····Orange, Red light on
	③Maintenance: SKIP light flashing
	④Function interruption : SKIP light on
	▪OFF during measurement, ON at SKIP.

Setting	: By remote PC (Use exclusive cable)
Power source	
Required voltage	: 24VDC $\pm$ 10%
Consumption	: Approx 10W
Applicable cable	: CVVS, 1.25mm <sup>2</sup> , 3-core
	(*When power cable and signal cable are separated, use following cables)
	Power source : CVV 1.25mm <sup>2</sup> , 2-core
	Signal : CVVS 1.25mm <sup>2</sup> , 2-core
Operating condition	
Temperature	: 0~40°C
Humidity	: 30~85%R.H.(standard)
	(Consult with us other humidity).
Structure	: Box type, wall mounting type
Outer dimensions	: 70(W)X170(H)X153(D)mm
Weight	: Approx 2.0kg.

**\* NOTE**

Specifications subject to change without notice for improvement

## 1 1 — 2. Product composition

### Standard compositions

- Gas detector GD-V77D
- Accessories.
  - Dust filter .....1 pce.
  - Gas inlet/outlet cap.....2 pcs.
  - Fuse.....Depends on ordered quantity

Q'ty/order	Fuse supplied
1 ~ 10 sets	1 pce
11 ~ 20 sets	2 pcs.
21 ~ 50 sets	3 pcs.
51 sets and above	5 pcs.

## 12. WARRANTY

### RIKEN KEIKI STANDARD WARRANTY FOR FIXED 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 form 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.

The alarm contact output specified in this system is provide for the use of buzzer and lamp to be communicated to the other external place than the system installed. But to secure the safety, there may be the case that the following interlocking performance shall be made by use of alarm contact output from customers.

1. Stop the gas supply.
2. Stop the action of system which uses gas.
3. Let the services exhaust fan operated.
4. Let stop the work of the staffs in the area by the auto paging system and escaped to the outside from there
5. Let the alarm transmitted to a remote place by auto communication system.
6. Let the alarm transmitted by the lamp and buzzer to this area and that area.
7. Others

But, we do not assume the responsibility for the secondary damage, which may be generated by this interlocking action because it is not in our scope of recognition. Then, we cannot strike the sales contract or the manufacture in the scope to reimburse this secondary damage.

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 cost, local repair costs, transportation cost, or contingent expenses incurred without our prior approval.

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