

(Issued on July, 1986)

INSTRUCTION MANUAL

FOR

RIKEN DIFFUSION SAMPLING TYPE DETECTOR HEAD MODEL GD-A8

(CATALYTIC COMBUSTION METHOD)

Please read this instruction manual carefully when operate RIKEN DIFFUSION SAMPLING TYPE DETECTOR HEAD MODEL GD-A8 correctly.

This gas detector head is installed in combination of I versus I with an indicator/alarm unit. Generally, the indicator/alarm unit is installed in the non-hazardous area, 4-core cable is used for the detector head and the indicator/alarm unit.

This detector head GD-A8 is based on the detection principle of catalytic combustion. And the value of LEL (Lower Explosive Limit) concentration are almost the same except for some cases.

$C_a = B - \text{const.}$
 (Burgers Wheeler's Law)
 C_a : Concentration at the lower explosive limit (LEL)
 B : Catalytic value of combustion per mol (kcal/mol)

As a detection principle of combustible gas detector which is used for prevention of explosion, a method to measure the calorific value of combustion is the most suitable and ideal.

Combustible gas is introduced to the sensor prepared to an appropriate temperature so that its catalytic combustion is caused, and the changes in electric resistance of platinum filament due to the heat generated heat of combustion are detected on the Wheatstone bridge. This electric output is directly in proportion to the concentration of combustible gas in air.



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INSTRUCTION MANUAL

1. SPECIFICATIONS

FOR

This gas detector head is installed in combination of 1 versus 1 with an indicator/alarm unit usually.

Generally, this gas detector head is installed in the hazardous area and the indicator/alarm unit is installed in the non-hazardous area. 4-core cable is used for the wiring connection between the detector head and the indicator/alarm unit.

This detector head GD-A8 is based on the detection principle of catalytic combustion. And the values of LEL (Lower Explosive Limit) concentration are almost the same except for some cases.

Ce. Q = const...

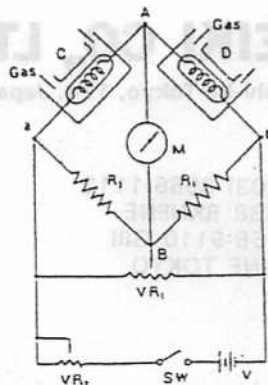
(Burgers Wheeler's Law)

Ce : Concentration at the lower explosive limit (LEL)

Q : Calorific value of combustion per mol (kcal/mol)

As a detection principle of combustible gas detector which is used for prevention of explosion, a method to measure the calorific value of combustion is the most suitable and ideal.

Combustible gas is introduced to the sensor preheated to an appropriate temperature so that its catalytic combustion is caused, and the changes in electric resistance of platinum filament due to the then generated heat of combustion are detected on the wheatstone bridge. This electric output is directly in proportion to the concentration of combustible gas in air.



- D : Detecting sensor
- C : Compensating sensor
- R1, R2 : Fixed resistor
(R1, R2 modulized)
- M : Meter
- VR1 : Zero adj. potentiometer
- VR2 : Voltage adj. potentiometer

Model	Model GD-A8 : GD of GD-A8 is omitted in combination of the indicator/alarm unit and also, this detector head may be expressed as just A8.
Measuring gas	General combustible gas (standard) or Methane in the air
Detection principle	Catalytic combustion method
Explosion proof	Comforms to flame proof 3aG4, JIS C-0903 Approved by the Ministry of Labour in Japan. Approved No. * 43642 as model GD-A8-16 for general combustible except for Acetylene and Carbon disulfide measurement. * 43644 as model GD-A8-18 for Acetylene measurement.
Operating temperature and humidity	- 10°C to + 40°C, Less than 95 % RH.
Connecting cable	The thickness (mm ²) of cable is selected by the distance between the indicator/alarm unit and detector head and also, by the kind of combustible gas sensor.
Dimensions and weight	Refer to the external drawing of fig. 1, Approx. 0.9 kgs
Quality of material	Detector head : Aluminum die casting Sensor flame arrestor : Stainless
Surface treatment	Painting (Munsel N5) after the alumilite treatment
Others	When the detector head is used at outdoors, the drip/weather proof cover is necessary. (Refer to fig. 4, 5.)

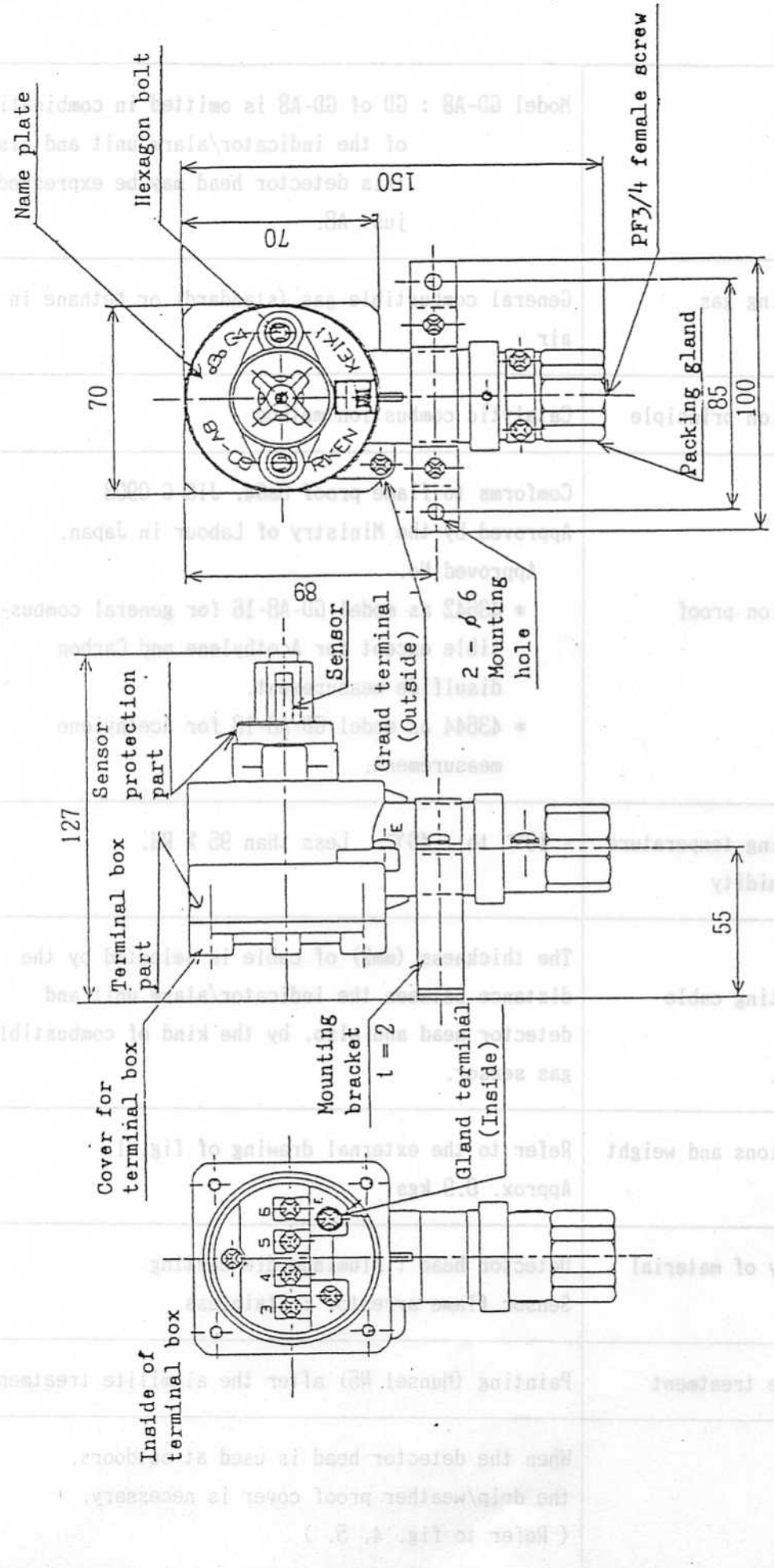


Fig. 1 EXTERNAL DRAWING FOR MODEL GD-A8

2. HOW TO INSTALL THE DETECTOR HEAD AND HOW TO MAKE EXPLOSION-PROOF CABLE CONNECTION WORK

2-1. Caution in the cable connection work

* Take care of the following items (1)~(8) when make this work.

- (1) Make the cable connection working for explosion proof construction when detector head is installed in a hazardous area.
- (2) When the detector head is installed, consider easy maintenance for gas calibration and sensor replacement etc at the place suited for the detection of gas leakage or gas stagnation.
- (3) When the detector head is installed at the outdoors or at much existent place of dust and mist, install the drip/weather proof cover on the detector head certainly. (Drip/weather proof cover is option.)
- (4) Take care of the crack or flaw on the contact point of explosion proof construction in working and make tighten each screws fully.
- (5) This detector head may be influenced by some unexpected outside large noise. Then, make wiring connection apart from large generated source of noise or electrical wire line of high voltage.
- (6) Install the detector head at the place where a vibration is not caused.
- (7) The cable connection (4 wire) method to the terminal plate of detector head is described into the approval drawing or complete drawing. Make the cable connection in accordance with the drawing of cable connection between the indicator/alarm unit and the detector head.
- (8) Don't use the paints including the silicone around the drip/weather proof cover or the detector head. If silicone vapour should exist around the detector head, the sensor may be damaged.

2-2. How to fix the detector head

* Install certainly the detector head and carry out the cable connection working for explosion-proof construction in accordance with the following procedure from item No. 1 to item No. 9.

- (1) Carry out the installation of the mounting bracket and fix the detector head.

There are following three installation methods for the detector head.

Select one installation from following three method (① to ③).

After the installation of the mounting bracket or the drip/weather proof cover base, fix the detector head temporarily so that the terminal box should be in oblique direction to the left or right side of front side. (Direction for easy wire connection.)

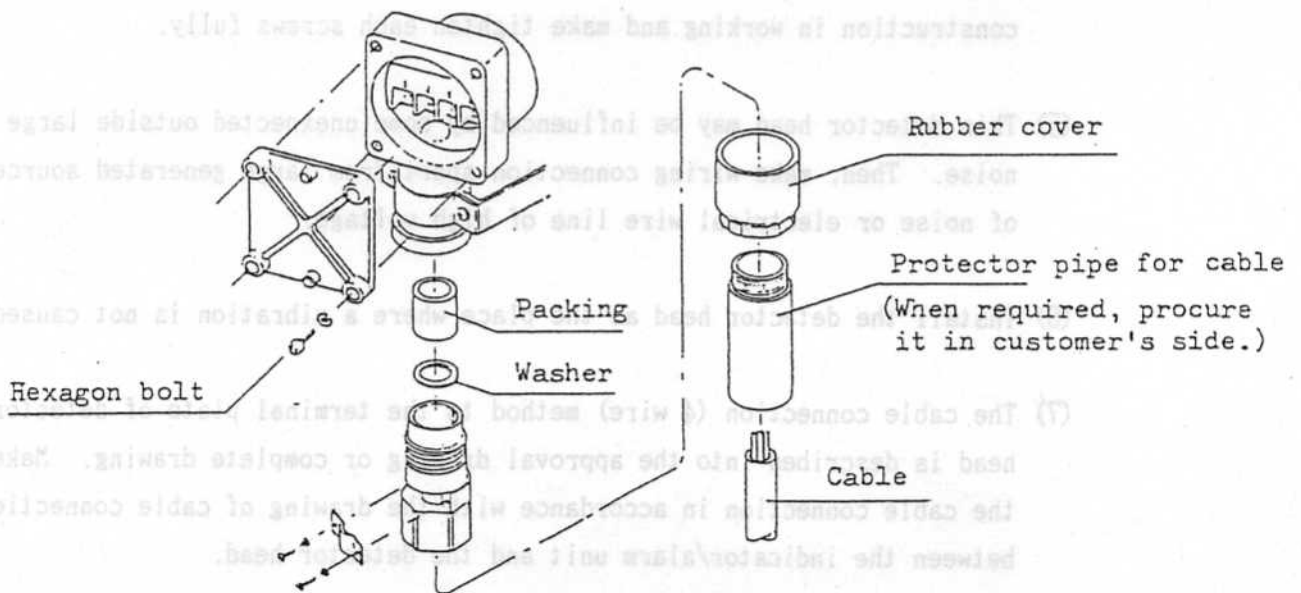


Fig. 2

For the use of drip/weather proof cover (Option)

① For installation of outdoors (Standard installation)

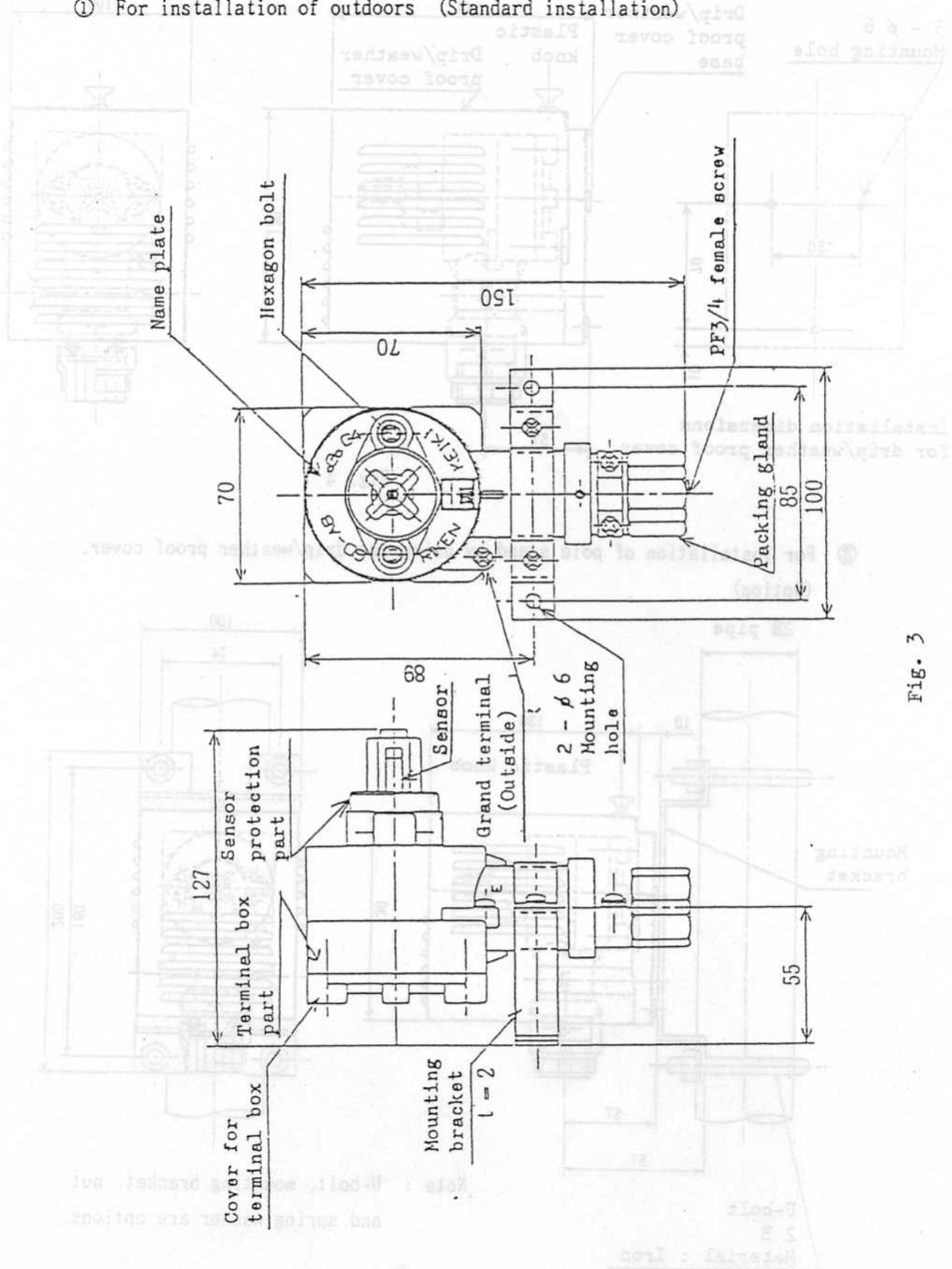


FIG. 3

② For the use of drip/weather proof cover (Option)

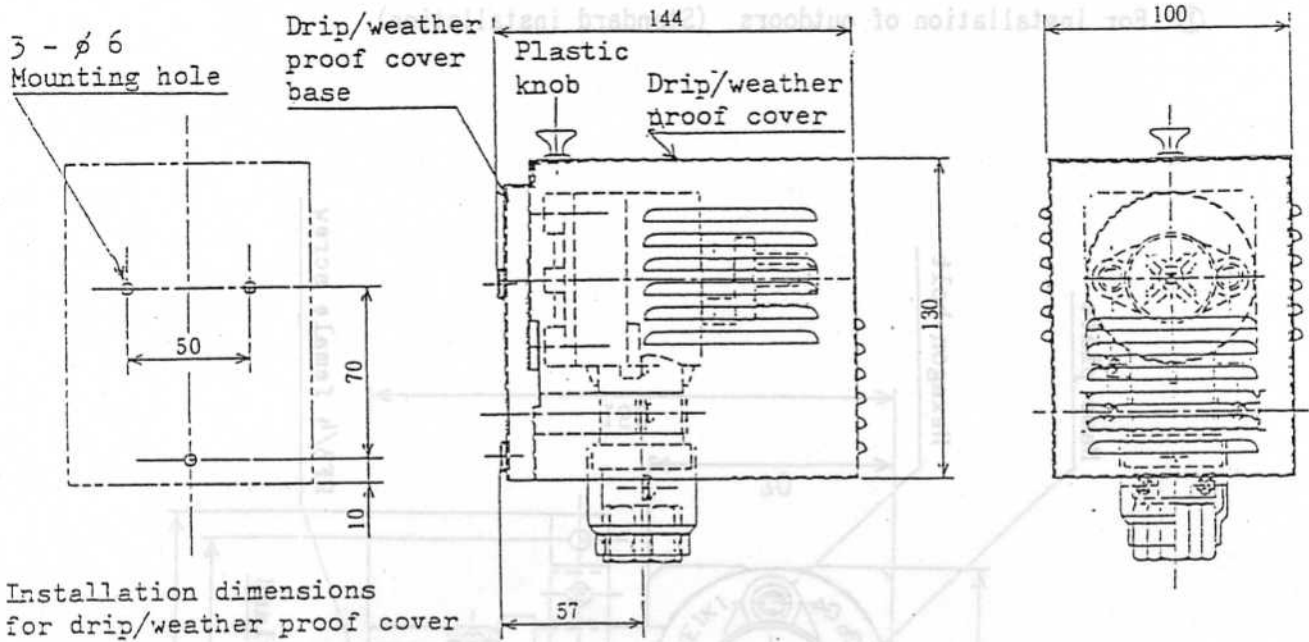


Fig. 4

③ For installation of pole stand by using the drip/weather proof cover.
(Option)

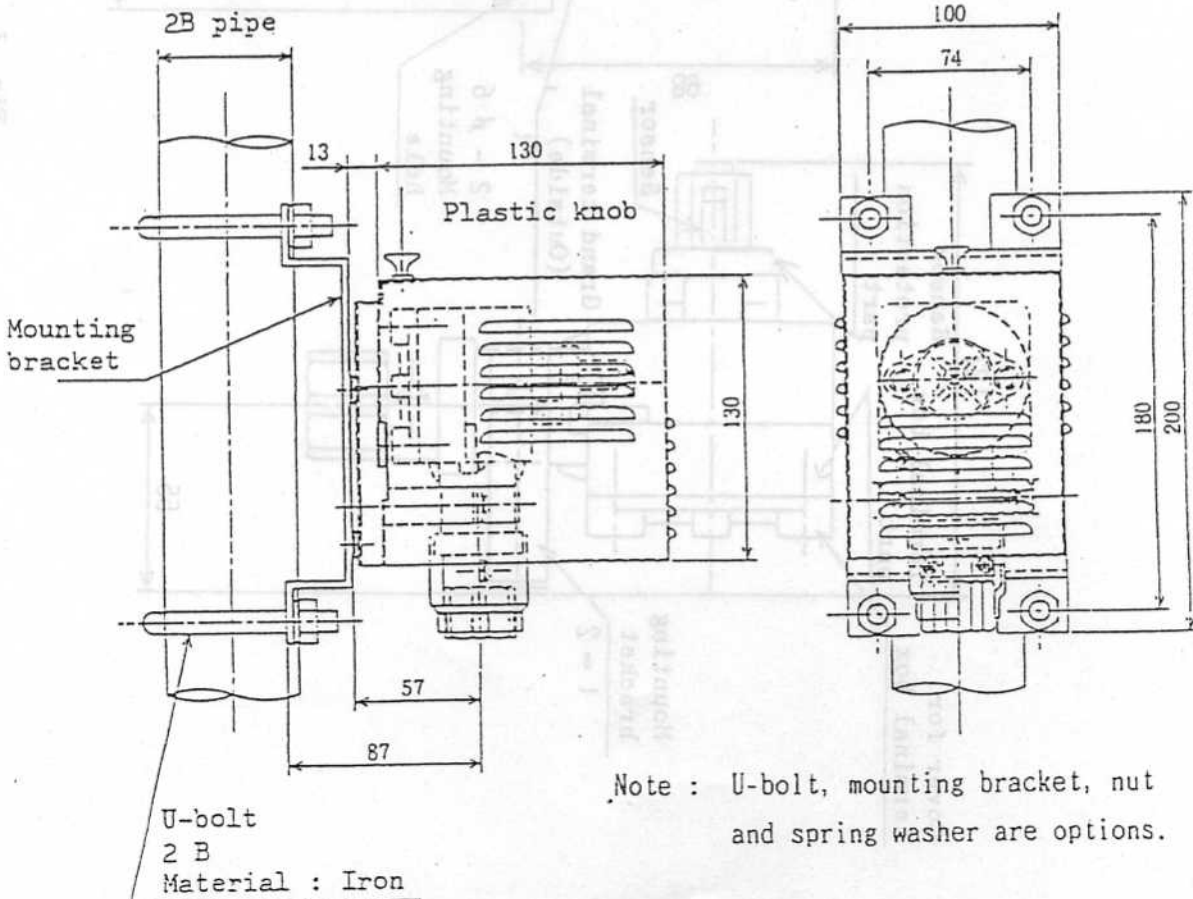


Fig. 5

(2) Put the cable into the terminal box of the detector head after passing through the rubber cover, packing gland, washer and packing.

Install the terminal lug for 4 mm screws to the end of cable (4 core).

(Refer to fig. 2)

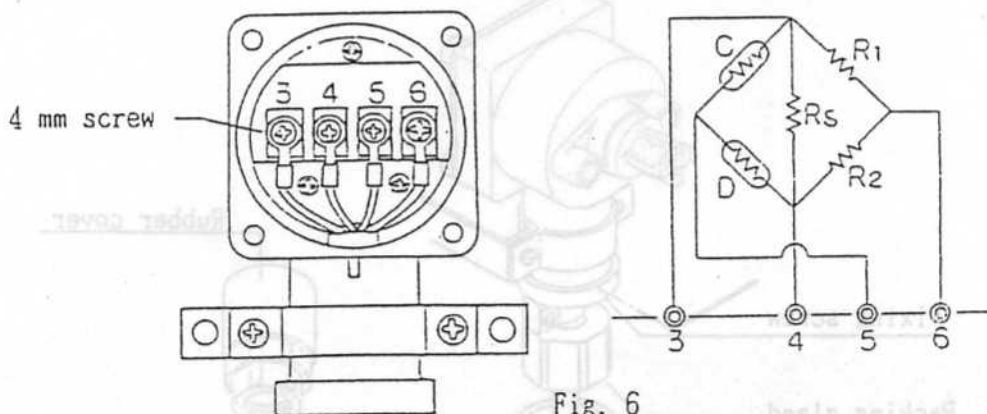
* Note : The washer and pressure-proof packing consists of following three kinds and is included as one of accessories in the table. Select and install an suitable parts depending upon the outer diameter of cable.

Outer diameter of cable	Inner diameter of packing (mm)	Inner diameter of washer (mm)
ϕ 11.0~ ϕ 11.9	ϕ 1 2	ϕ 1 3
ϕ 10.0~ ϕ 10.9	ϕ 1 1	ϕ 1 2

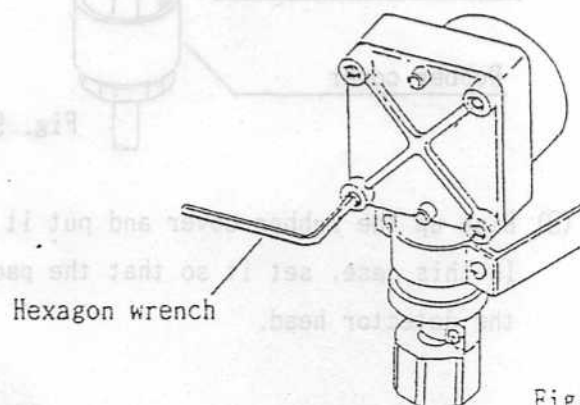
(3) Connect the terminal lug of cable to the terminal plate of detector head without misconnection for connection procedure of 4 core cable.

(In this case, it is easy to work if make tighten the packing gland to the detector head temporarily.)

The numbers of 3, 4, 5, 6 are marked on the terminal plate of detector head as following fig. 6. Then, take care so that any cable can not be pinched when the cover for terminal box is installed.



(4) Install the cover for terminal box and make tighten 4 pcs of bolt on it certainly.



- (5) Make loosen the mounting bracket and turn the detector head to direction of left side. Fix the detector head after turning the sensor for front side.

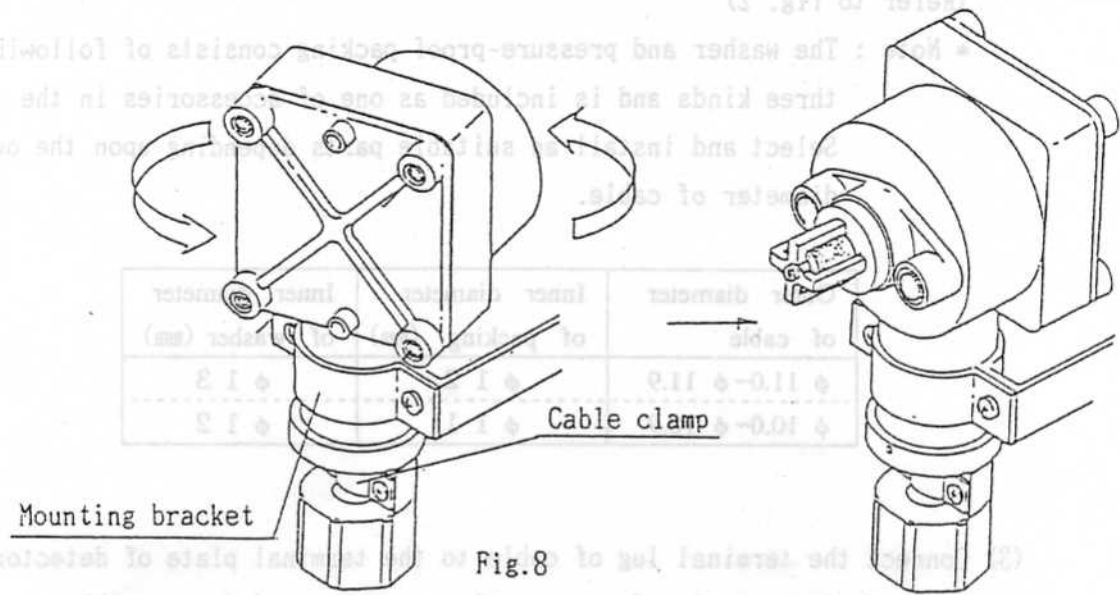


Fig. 8

- (6) After screwing the cable packing gland into the detector head, fix the packing gland with fixing screw of flange. (Refer to fig. 9)
- (7) Fix the cable after tightening the screw of cable clamp for the packing gland.

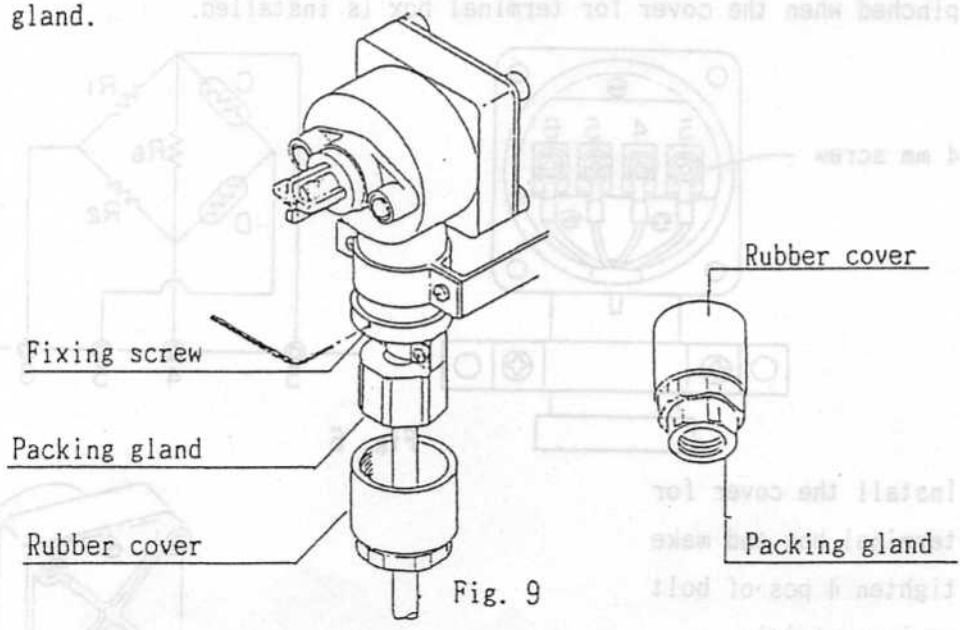


Fig. 9

- (8) Rise up the rubber cover and put it into the cable gland and flange. In this case, set it so that the packing gland is met with polygon of the detector head.

(9) Carry out the installation of the drip/weather proof cover in accordance with the following procedure.

● For the use of the box type drip/weather proof cover

* Installation to the wall etc

When the detector head is installed to the wall etc by using the drip/weather proof cover, fix the drip/weather proof cover base to the wall etc and fix the detector head to the mounting bracket temporarily. (Refer to fig. 4)

Carry out the cable working in accordance with fixing method of the detector head in the item 2-2 on this instruction manual.

* Installation of the drip/weather proof cover to the pole stand

When the detector head is installed to the pole stand and the pipe by using the drip/weather proof cover, install the drip/weather proof cover base to the exclusive metal (option) for pole stand. And then, fix the detector head to the mounting bracket for pole stand temporarily. (Refer to fig. 5)

Carry out the cable working in accordance with the fixing method of the detector head in the item 2-2.

* How to remove the drip/weather proof cover

Lift the concave part (凹) of the drip/weather proof cover to same height of convex part (凸) of the drip/weather proof cover and when shift to the downward, it is fixed temporarily.

And fix it by finger pressing the plastic knob on upper part of the drip/weather proof cover.

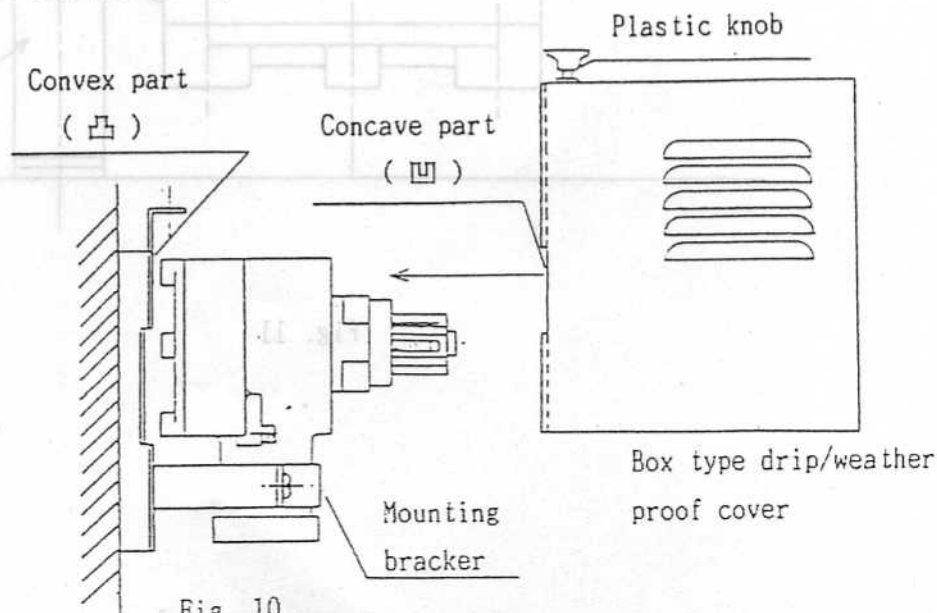


Fig. 10

- For use of the round type drip/weather proof cover

When use the round type drip/weather proof cover for general use or ship use, install the detector head horizontally and cover the round type drip/weather proof cover on it as following fig. 11.

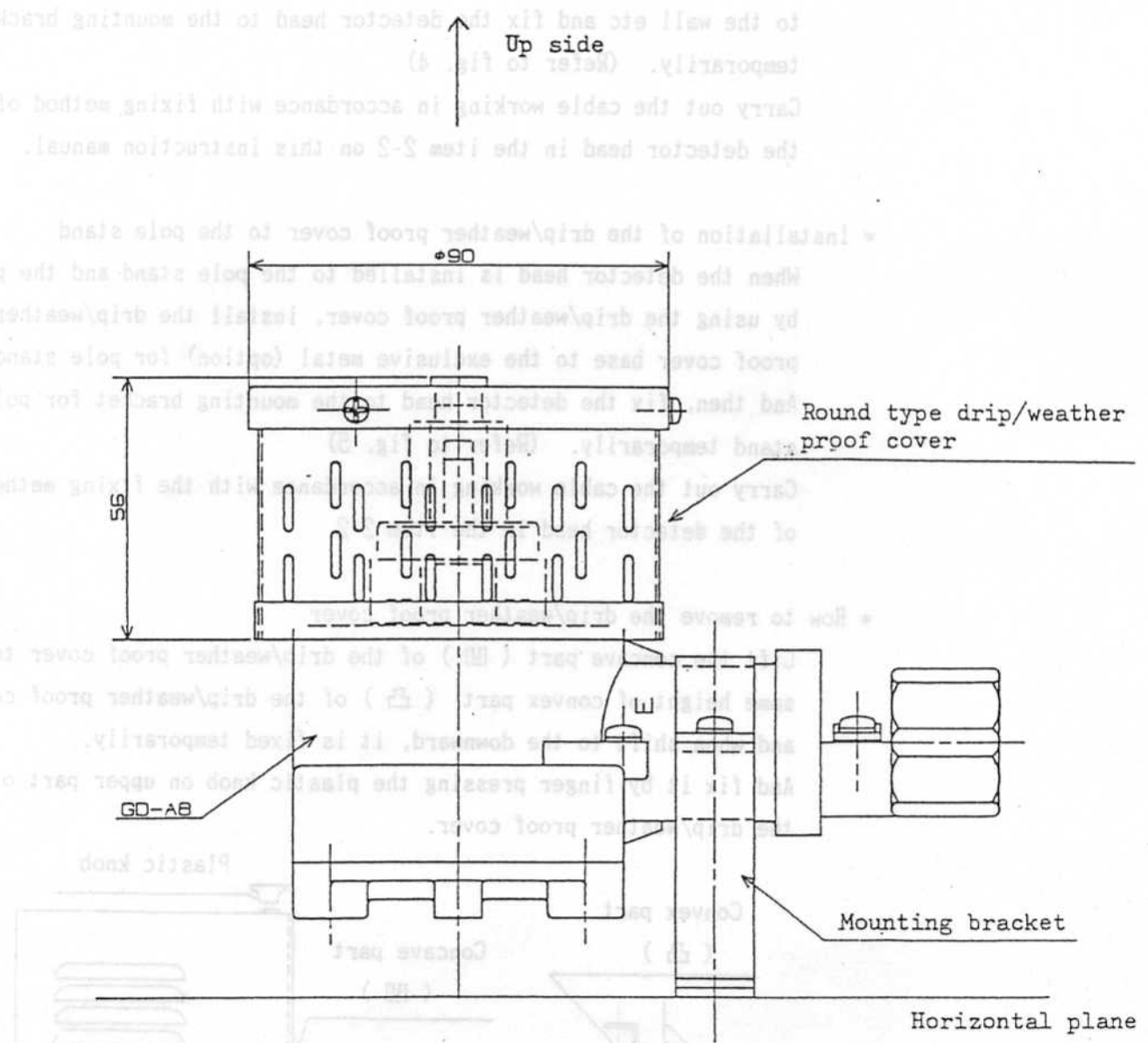


Fig. 11

3. MAINTENANCE AND CHECK

3-1. Gas sensitivity (calibration) adjustment method

* Carry out the gas sensitivity adjustment with the calibration gas in accordance with following method every 3 to 6 months.

- (1) Prepare the known gas concentration of calibration (around $1/2$ of LEL = 50 % LEL) to the gas sampling bag.
- (2) Connect the gas check adaptor to the tube end of the gas sampling bag.
- (3) After covering the gas check adaptor to the detector head, introduce the calibration gas into the detector head by squeezing slightly the gas sampling bag.

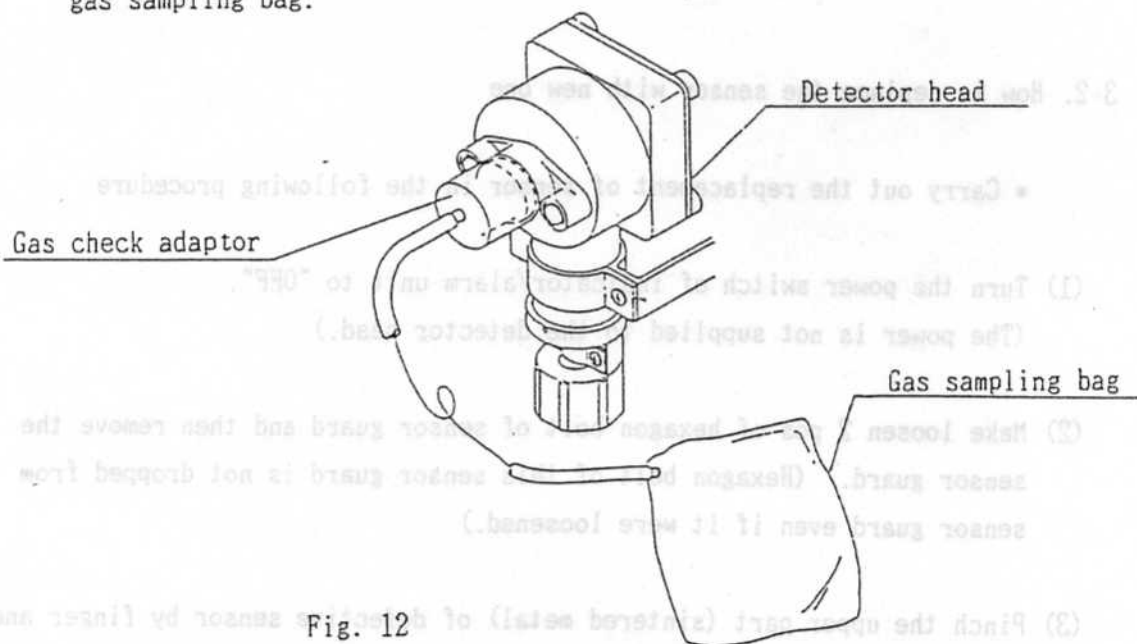


Fig. 12

- (4) When the calibration gas starts being introduced into the detector head, the indication of the indicator/alarm unit goes up and gets stable after some decade seconds.

When the reading does not coincide with the reading of calibration gas, adjust the reading of the indicator/alarm unit to the reading of calibration gas by use of "cal screw (CAL)".

When it can be adjusted to the reading of calibration gas, the gas sensitivity adjustment procedure is finished.

(5) As result of check for the gas sensitivity adjustment at item (4), when the sensitivity can not be obtained by turning cal screw at maximum, the sensor life is terminated. And then replace the sensor with new one after make the power switch "OFF". See item 3-2 for the replacement of gas sensor.

Note) When the sensor is replaced with new one, confirm the sensor type stuck on the detector head.


(6) When the sensor is replaced with new one, confirm the voltage (bridge voltage) and electrical current for new sensor.

Carry out the sensitivity calibration in accordance with item (1) - (4).

* (a) Calibration gas (standard gas), (b) gas sampling bag and (c) gas check adaptor are option and supplied by us or our nearest agent if required.

3-2. How to replace the sensor with new one

* Carry out the replacement of sensor in the following procedure

- (1) Turn the power switch of indicator/alarm unit to "OFF".
(The power is not supplied to the detector head.)
- (2) Make loosen 2 pcs of hexagon bolt of sensor guard and then remove the sensor guard. (Hexagon bolt of this sensor guard is not dropped from sensor guard even if it were loosened.)
- (3) Pinch the upper part (sintered metal) of defective sensor by finger and pull out to front side. At this time, the O-ring can be also removed.
(When the O-ring is not crooked or damaged, it can be recycled.)
- (4) Prepare the new sensor and confirm that one of five pins on the bottom of sensor is longer than other four pins. Insert slightly (shortly) this long pin to the socket of hole of detector head as fig. 12.
When the long pin is fitted with the socket of hole of detector head by turning the sensor to left or right side slightly, the pin can be inserted into the concave () part of socket hole. The sensor can be further inserted deeply by pushing this sensor.

GAS DETECTION INSTRUMENTS

- (5) Insert the O-ring removed on item (3) or new O-ring to the ditch correctly between the sensor and detector hole.
- (6) Cover the sensor guard on the sensor and make tighten 2 pcs of hexagon bolt.
- (7) After the finishment of replacement of sensor, make the power switch of indicator/alarm unit "ON" and make the check of sensor voltage (sensor bridge voltage) or electrical current in the indicator/alarm unit. (Refer to the instruction manual for the indicator/alarm unit.)
- (8) In approx. 10 minutes after power switch "ON", make the adjustment of gas sensitivity in accordance with item 3-1.

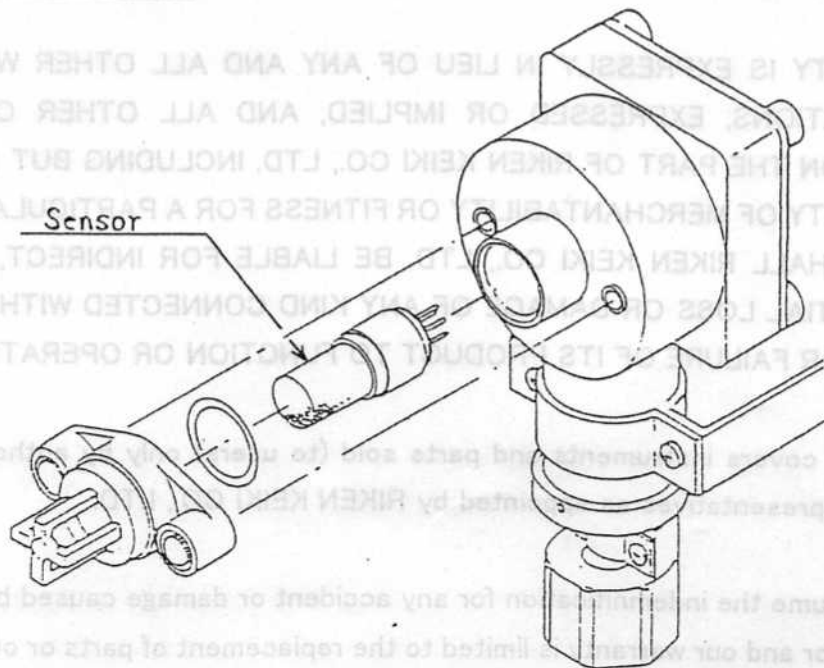
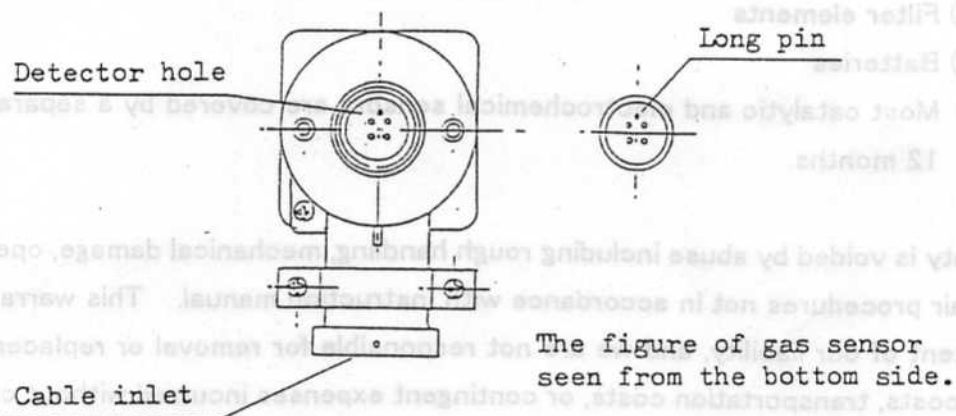


Fig. 13

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
- f) Most catalytic and electrochemical sensors are covered by a separate warranty of 12 months.

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 foods.