

# **RKI INSTRUMENTS, INC. INSTRUCTION MANUAL**

**For**

**DETECTOR HEAD GD-F4A**

The accompanying instrument is sold and serviced in the USA by RKI Instruments, Inc. Please contact RKI Instruments for any follow up service needs, including questions, warranty issues, repairs, and spare parts and sensors. Thank you for selecting this fine instrument for your use. With proper care and maintenance, it will provide you with many years of reliable service.

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## 1. GENERAL

The GD-F4A is an oxygen detector head to monitor the oxygen gas concentration continuously.

The concentration of oxygen is detected by giving the sample gas through pressure or pump compulsively into the detector head.

But as this is of drip-proof enclosures, this can be installed as it stands even outdoors.

This sensor developed by our own technology excels well in the stability and then designed to make periodical sensor replacement and maintenance easily.

If this is combined with optional zener barrier, this can be used as a system of intrinsically safe design.

## 2. SPECIFICATIONS

- |      |                            |   |                                                                                                   |
|------|----------------------------|---|---------------------------------------------------------------------------------------------------|
| 2.1  | Model                      | : | GD-F4A                                                                                            |
| 2.2  | Structure                  | : | Wall mounting with drip-proof design                                                              |
| 2.3  | Detection principle        | : | Electrochemical (Galvanic cell)                                                                   |
| 2.4  | Flow rate                  | : | 1.0 ℓ ± 0.3 ℓ / min                                                                               |
| 2.5  | Measurable gas             | : | Oxygen in gas or air                                                                              |
| 2.6  | Measurable range           | : | (Standard) 0 ~ 25 VOL %<br>(Specified) _____                                                      |
| 2.7  | Response time              | : | Within 20 sec. to get 90% response of standard gas. But when put gas directly into detector head. |
| 2.8  | Ambient temp. and humidity | : | -10 ~ 40 °C, Less than 90% RH                                                                     |
| 2.9  | Cable                      | : | 2-core shield cable such as CVVS. Max600m<br>Packing gland : Suitable cable dia<br>φ8 ~ φ11       |
| 2.10 | Pipe                       | : | Copper pipe φ8 × φ6<br>Connection port : Half union (C3601BD)                                     |
| 2.11 | Painting color             | : | Munsell 7.5 BG 6/1.5                                                                              |
| 2.12 | Dimensions                 | : | Approx 140 (W) × 175 (H) × 85 (D)                                                                 |

- 2.13 Weight : Approx. 1.1 Kg  
 2.14 Sensor type used applicable : OS - B11

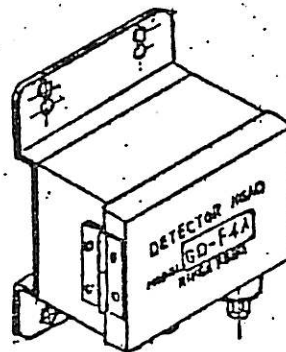
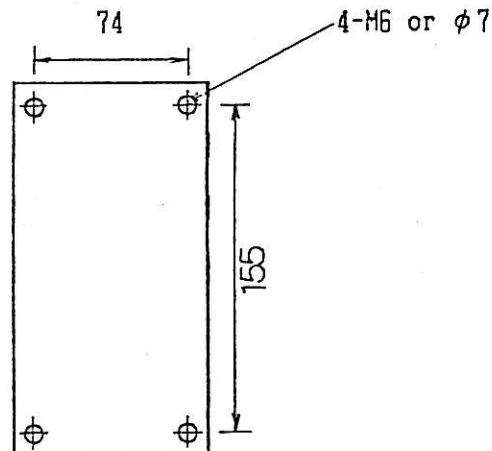
3. INSTALLATION WORKS  This is fixed with sampling device in this case.

3.1 This installation is made by selecting the place where kept from the direct sunshine and strong radiative heat, and the maintenance can be easily made.

3.2 The installation shall be made in either of following 2 ways.

Installation works

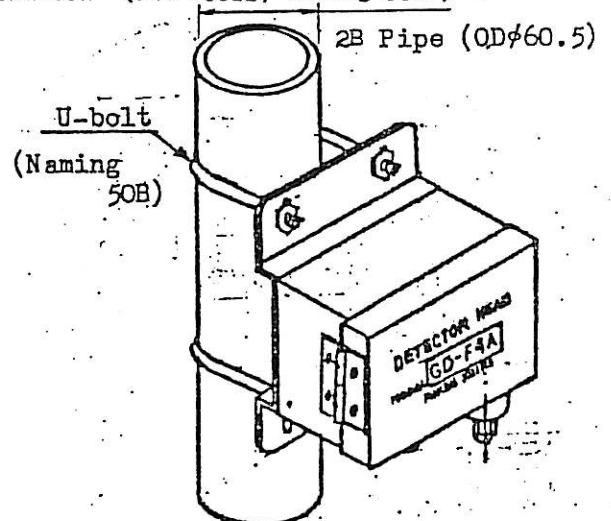
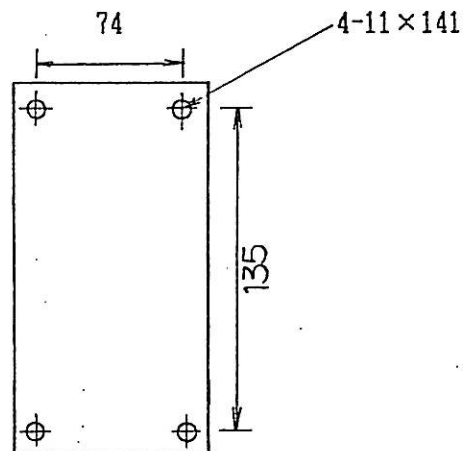
① Wall mounting method



Mounting hole size

② Pipe mounting method

This mounting hole is for U bolt fixation (JIS F3022, naming 50B)

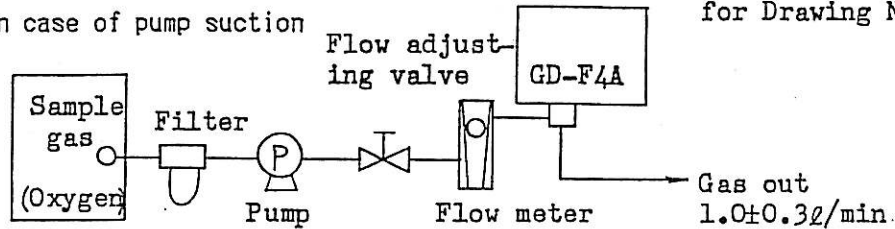


Note) : This "U" bolt (hex nut, spring washer provided) is option.

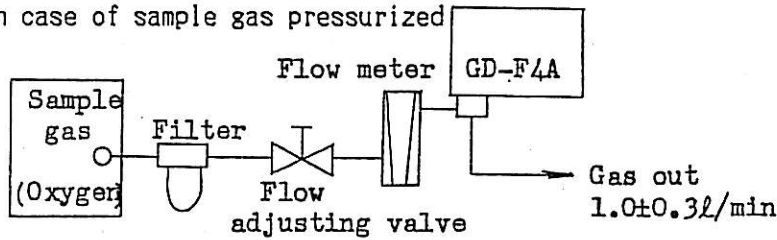
4. PIPING WORKS

See the separate drawing for Drawing No. A3-05297.

4.1 In case of pump suction

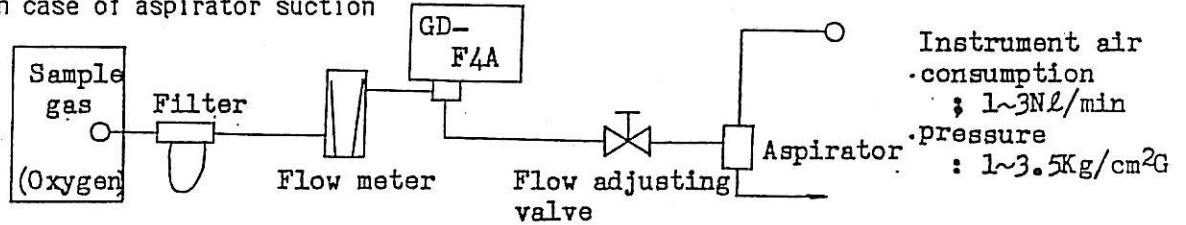


4.2 In case of sample gas pressurized



(Note) Under the condition that the sample gas fluctuates, use the stabilized valve and make the flow constant.

4.3 In case of aspirator suction



In this method, the reducing pressure degree of detector head must be kept as small as possible and make it at the maximum of -20mmHg.

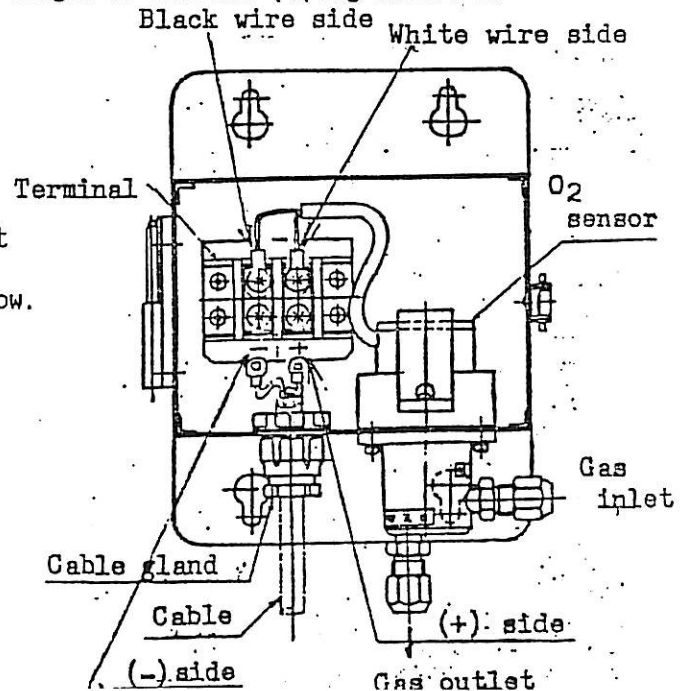
As this increases the damage to the oxygen sensor, this must be made only when the pump can not be used.

4.4 Open the gas outlet to air in principle.

Exceptionally when make the external piping, select the piping diameter so that the pressure loss produced by the length of external piping should be within 10mmHg.

5. WIRING CONNECTION

- 5.1 When finish the procedure of instrument installation, make wiring as shown below.
- 5.2 Use CVVS cable (2-core/1.25mm<sup>2</sup>) or equivalent.
- 5.3 The shield wire of CVVS cable must be floated inside of the case.



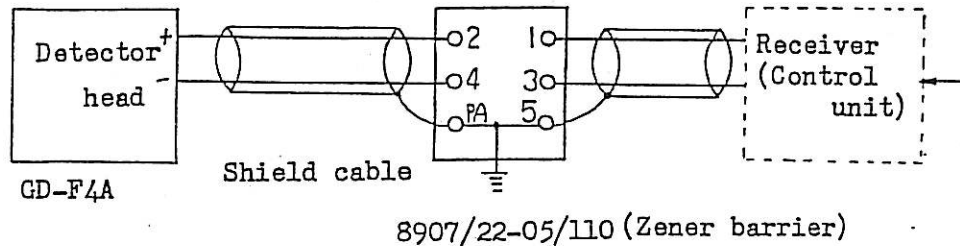
5.4 In case of intrinsically safe design, take care of the followings.

5.4-1 If this is combined with designated zener barrier, this enables the system of intrinsically safe design.

In this case, as the alteration and modification except following 3 items are not allowed, the care must be taken.

- \* Connection of external induction conduit.
- \* Replacement of O<sub>2</sub> sensor and the connection to the terminals.
- \* Replacement of "O" ring for the installation part of O<sub>2</sub> sensor.

5.4-2 Diagram of system composition



Conditions of system composition

1. The earthing of zener barrier must be made according solely to the grounding construction of division 1.
2. The following approved type of zener barrier must be used,  
Approved No.22211 (Manufactured by YAMATAKE HONEYWELL CO.,LTD. )  
Zener barrier type 8907/22-05 /110
3. Make the inductance of safety circuit and external wiring at 2mH or below and their capacitance at 0.2  $\mu$ F or below.
4. The following shield cable is used for this system,  
For example, In the case of CEES 1.25mm<sup>2</sup> : Below 1.5Km  
CVVS 1.25mm<sup>2</sup> : Below 1.5Km
5. This detector head is systemized in combination with the zener barrier and general equipment.  
Regarding the installation of equipment, execution of relevant wiring, the operation of instrument and the maintenance check, see to it that there is no loss of intrinsical safety for this system.

## 6. MAINTENANCE CHECK

### 6.1 Calibration procedure

Put the fresh air or calibration gas (Previously known oxygen concentration) into the detector head.

When it is fresh air, adjust it to 21.0 % but when it is calibration gas, adjust it to the named oxygen concentration of calibration gas.

But regarding the adjustment procedure, see the separate instruction manual for indicator/alarm unit.

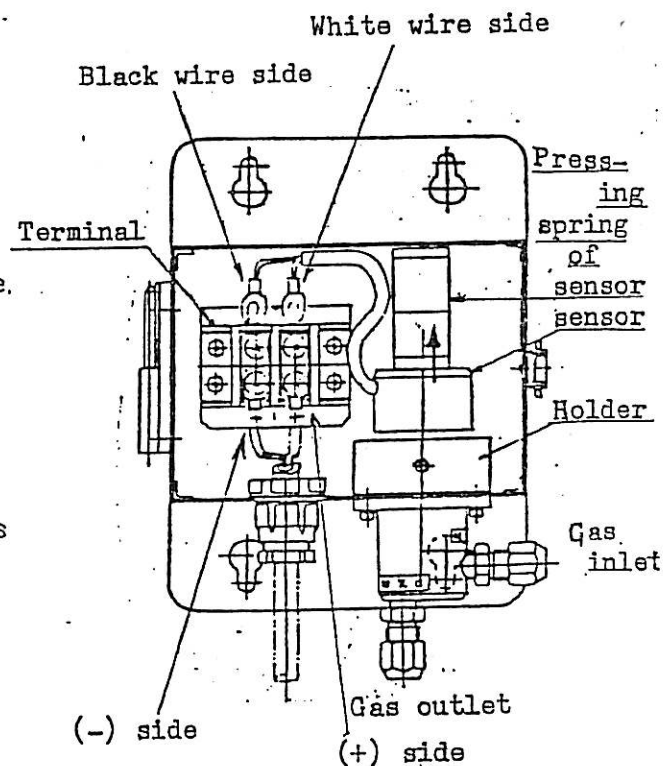
### 6.2 Sensor replacement period

The sensor life is above 1 year but to keep the maintenance for reliability, it is recommended to replace the O<sub>2</sub> sensor with new one every 1 year periodically.

Then, when turn the span adjusting knob to the fully clockwise and the meter reading can not be above 23%, the sensor shall be replaced.

### 6.3 Oxygen sensor replacement

- ① Unlock the hasp of detector head and open the door.
- ② There is the oxygen sensor in the right side and terminal plate in the left side. Take off 2 pcs of lead wires of oxygen sensor from the terminal plate.
- ③ As this the oxygen sensor is pressed by spring, push the parts of hook for pressing spring down with finger tip and when pull inside it to you, the pressing spring of oxygen sensor can be removed.
- ④ Remove the old sensor from the holder.



- ⑤ Plug in the new oxygen sensor till it comes to the end of the holder.
- ⑥ Hang the pressing spring of oxygen sensor on the screws of the holder.
- ⑦ Fix two lead wires of oxygen sensor to the terminal plate.  
Put the white lead to (+) side and black lead to (-) side.
- ⑧ When close the door with the hasp, this procedure is finished.

## 7. NOTICE IN OPERATION

- 7.1 When the piping works are finished, clean the inside of pipes with air purge and remove the alien substances in it.
- 7.2 Keep the pipes from any instruction of water or other liquid.
- 7.3 When the temp difference between the sensor storage place and sensor installation place is large, make calibration procedure sometime (20~30min) after the oxygen sensor is fixed to the detector head.
- 7.4 Make sensitivity adjustment periodically (once in 2 or 3 months ) to keep the reliability of this detector head.

## 8. FEATURES OF GD-F4A

As the detection principle of this oxygen sensor is galvanic cell, the followings are featured by it and take note of them.

- 8.1 The influence of meter readings (indication) by the variation of atmospheric pressure.

As the sensor output is directly proportional to the partial pressure of oxygen.

For example, after adjusting the meter reading to 21% in atmospheric pressure (1013mb) and when this atmospheric pressure fluctuates  $\pm 20$ mb, the meter reading fluctuates  $\pm 0.4$  %.



## 8.2 Relative humidity and oxygen concentration

The oxygen gas concentration is changed by the ratio occupied in water vapour. The value of this ratio makes the difference of 0.2% by volume when the humidity is changed from 40% to 80% at 20°C.

## 8.3 Response time

When the temp. drops down to below 5°C, the response time will be longer as a feature of galvanic cell oxygen sensor.

## 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 goods.