CONTENTS : FINAL DOCUMENTS

PURCHASER: DSME CO.,LTD

SHIP No. : 5261/5262/5263

**COMMODITY: GAS DETECTION SYSTEM** 

MODEL : SD-705RID-18S + RM-590-F44/K3-12S

VESSEL TYPE : 320,000 DWT CRUDE OIL TANKER

REV	DATE	PAGE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	OCT20,2003	ALL	APPROVAL DOCUMENTS	SJ.KIM	HS.KIM	JM.SHIN
1	JUL26,2004	ALL	WORKING DOCUMENTS	SJ.KIM	HS.KIM	JM.SHIN
2	JAN20,2006	ALL	FINAL DOCUMENTS	WY.LEE	HS.KIM	JM.SHIN

R.FILE No.: RK-D5261/2/3-3

RIKEN KEIKI KOREA CO.,LTD

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### SYSTEM. SYSTEM1:

# SPECIFICATION AND DRAWINGS FOR GAS DETECTION SYSTEM(FOR CARGO PUMP ROOM)

#### **\*SUMMARY**

This gas detection system is designed to measure the presence of HC gas and Oxygen, Hydrogen sulfide in cargo pump room. For the 12 (HC,O2,H2S) points, HC, O2 and H2S are monitored. This gas detection system is composed control panel and detection panel.

The control panel is installed in the cargo control room and detection panel is installed in ship's office of safety space. This detection system is sequential sampling type. This system indicates gas concentration and give an alarm whenever gas concentration exceeds preset alarm level(10%LEL).

Also supply gas audible and visual alarm to common repeater alarm panel located in wheel house. This system supply alarm contacts to shut down the cargo pump whenever the HC gas exceeds the preset alarm level (30%LEL).

#### SYSTEM2:

## SPECIFICATION AND DRAWINGS FOR GAS DETECTION SYSTEM(FOR W.B.T AND F.P.Tank etc.)

#### **\*SUMMARY**

This gas detection system is designed to measure the presence of H.C gas in W.B.T and F.P.Tank etc. This gas detection system is composed control panel and detection panel. The control panel is installed in the cargo control room and detection panel is installed in ship's office of safety space. The detection system is sequential sampling type.

This system indicates gas concentration and give an alarm whenever gas concentration exceeds preset alarm level (30% LEL). Also supply gas audible and visual alarm to common repeat alarm panel located in wheel house.

According to the rule, this gas detection system of W.B.T is to be shut down when the gas concentration inside panel exceeds 30%LEL.

In this case, the "GAS INSIDE PANEL" lamp and buzzer of repeater alarm panel in Wheel house will be activated.

#### 2. SYSTEM COMPOSITIONS

CICIEM COM COTTON
(1)SYSTEM COMPOSIONS OF SAMPLING PANEL
1)Detection panel for pump room(DWG No. RK-D5261/2/3-10001) 1 panel.
The following items are housed into the panel;
a)HC gas detector head, model GD-A8 2 ea.
(For Pump room and Panel inside)
b)Oxygen detector head, model GD-F44 1 ea.
c)H2S detector head, model GD-K3 1 ea.
d)sampling pump 1 ea.
e)stand-by sampling pump 1 ea
f)flame arrestors 13 ea.
g)gas flow meter with flow sensor1 ea.
h)solenoid valve for all sampling lines 1 lot.
i)control unit for detection system control 1 set
●Stop valve 13 EA.
●Gas inlet port(cone) 12 EA.
On-line filter 12 EA.
• Air horn 1 EA
Patrol light(P/R entrance) 1 EA

- 2
2)Detection panel for W.B.T(DWG No. RK-D5261/2/3-10001)
The following items are housed into the panel;
a)Gas analyzer with detector head 1 set.
(gas analyzer with infrared detecting sensor: model SD-705RID)
b)flame arrestors 19 ea.
c)sampling pump 1 ea.
d)gas flow meter with flow sensor 1 ea.
e)solenoid valve for all sampling lines 1 lot.
f)control unit for detection system control 1 set.
g)miniature valve 15 ea.
h)mist separator 1 ea.
i)ball valve 2 ea.
j)water sensor 1 ea.
●stop valve
●on-line filter
•gas inlet port(cone)
•gas inlet port(cone) with filter 2 EA
●bulk head union
(2)SYSTEM COMPOSIONS OF CONTROL PANEL
1)Control panel for pump room and W.B.T
a)Indicator/alarm unit, model GP-591 2 ea.
(For Pump room and panel inside)
HC, 0-100%LEL.
b)Indicator/alarm unit, model OX-591 1 ea. O2, 0-25VOL%.
c)Indicator/alarm unit, model EC-592 1 ea. H2S, 0-30PPM
d)single case, 590-SRI 4 ea
e)measuring/alarm & condition lamp SW for W.B.T & pump room 1set
f)audible alarm buzzer 1 ea.
g)HC display unit 1 ea
(3)REPEATER ALARM PANEL 1 panel
(Dwg No. RK-D5261/2/3-40000, in wheel house)
(4) an and name for two years openation
(4) SPARE PARTS FOR TWO YEARS OPERATION.
1)Pump diaphragm sheet
for Sampling pump(W.B.T)
2) Pump diaphragm sheet
for measuring pump(Pump room)
3) on-line filter
4)filter for flame arrestor 7 ea
5)3-way solenoid valve2 ea
6)2-way solenoid valve2 ea
7)Spare sensor, Model HW-62111 ea
8) Filter for gas inlet port with filter 4 ea
9)Fuse 5A
10)Fuse 3A
11/netay 220V 2 ea

	(5)CALIBRATION KIT.
	1)calibration gas, i-C4H10 53%LEL 10 bt
	2) calibration gas, O2 5%VOL 2 btl.
	3)sampling bag(40L) 1 ea
	4)can regulator 1 ea
	5)H2S ampoule (10 ea per 1pkg) 1 ea
	6) Tedler bag(40L) for H2S gas 1 ea
	7) ampoule crusher 1 ea
	8)hand aspirator 1 ea
	9)steel box for calibration kit 1 box
	10)magnet control key for SD-705RID 1 ea
	11)hexagon wrench for SD-705RID 1 ea
	12)hexagon wrench for GD-A8 1 ea
	13)polyurentane tube 2m(8pie) 1 ea
	14)Trox driver
	0.0000000000000000000000000000000000000
•	SYSTEM DIAGRAM.
	Refer to Dwg No. RK-D5261/2/3-20001

#### 3.

Refer to Dwg No. RK-D5261/2/3-30001

#### 4. BASIC SPECIFICATIONS

- 4-1.BASIC SPECIFICATIONS OF CARGO PUMP ROOM SYSTEM.
  - 1). Measuring gas: Combustible gas(HC), Oxygen(O2), Hydrogen sulfide(H2S)
  - 2). Detection principle: catalytic combustion method(HC), Galvanic cell(O2), Electrochemical(H2S)
  - 3).Measuring range: 0~100%LEL(HC), 0~25VOL%(O2), 0~30PPM(H2S)
  - 4).Alarm setting: \* HC: 10%LEL(Adjustable), O2: 19VOL%(Adjustable),

H2S: 10PPM(Adjustable)

- 5) Measuring point: 12 points + 1 point (Panel inside)
- 6).sampling type: Scanning type continuously + Disffusion type(Panel inside)
- 4-2.BASIC SPECIFICATIONS OF W.B.T and F.P.Tank etc.
  - 1).Measuring gas: Combustible gas(HC)
  - 2). Detection principle: Non-Dispersive Infrared Ray Absorption(NDIR).
  - 3).Measuring range: 0~100%LEL.
  - 4).Alarm setting: 30%LEL(Adjustble).
  - Measuring point: 17points + 1 point(Panel inside) (Auto/Manual scanning).

#### 4-3.BASIC SPECIFICATIONS OF SAMPLING PANEL.

- 1).DWG.No. RK-D5261/2/3-10001/10002/10003/10004.
- 2)Structure: self standing type.
- 3) Painting color: Munsell o. 7.5BG 7/2 half gross
- 4) Dimensions: W700 x H1,800 x D550 mm
- 5) Sampling pipe connection: Right side of panel.
- 6) Cable connection: bottom of panel.
- 7) Connecting pipe: O.D.100,1t, O.D.120,1t, O.D.150,1t
- 8) Total power consumption: about 550VA
- 9) Power supply: AC220V,60Hz.

#### 4-4.BASIC SPECIFICATIONS OF CONTROL PANEL.

- 1)DWG.No. RK-D5261/2/3-21001/21004.
- 2)Structure: Wall mounting type.
- 3) Painting color: Munsell No. 7.5BG 7/2 half gross
- 4) Dimensions: W700 x H950 x D400 mm
- 5) Cable connection: Bottom of panel.
- 6) Power supply: AC220V,60Hz.

#### 5. GUARANTEE

# RIKEN KEIKI KOREA STANDARD WARRANTY GAS DETECTION INSTRUMENTS

RIKEN KEIKI KOREA 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 delivery of vessel from DSME Co.,Ltd. after satisfied function by inspection & testing. 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) Fuses
- b) Pump diaphragms
- c) Filter elements
- d) On-line filter

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.

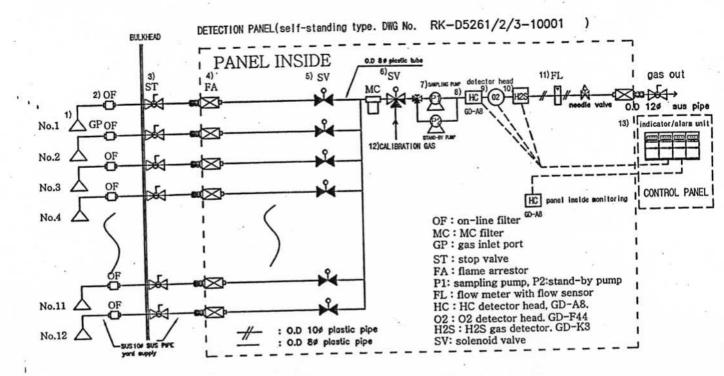
THIS WARRANTY IS EXPRESSLY IN LIEU OF ANY AND ALL OTHER WARRANTIES AND REPRESENTATIONS, EXPRESSED OR IMPLIED, AND ALL OTHER OBLIGATIONS OR LIABILITIES ON THE PART OF RIKEN KEIKI KOREA CO., LTD. INCLUDING BUT NOT LIMITED TO, THE WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL RIKEN KEIKI KOREA CO., LTD. BE LIABLE FOR INDIRECT, INCIDENTAL OR CONSEQUENTIAL LOSS OF 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 KOREA CO., LTD.

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

## 6. Name and functions of the each equipment.

#### 6-1 PUMP ROOM



- 1)Gas inlet port : Sample the gas and remark this is the end of gas sampling line.
- 2)On-line filter : Remove dust, obstacles.
- 3)Stop valve : In order to isolate safety area and hazardous area.
- 4)Flame arrestor: Prevent flame from spreading outside in case of ignition in the flow line within the panel.
- 5)Solenoid valve(2-way): This solenoid valve opens just one flow circuit through current conduction by means of an automatic scanning circuit or manual push button.
- 6)Solenoid valve(3-way): This solenoid valve change the flow direction by means of an automatic scanning circuit or manual push button.
- 7)Sampling pump: Sucks the sample gas for sampling.
- 8)HC gas detector head: This detector head(model GD-A8) detects HC gas and give signal to indicator/alarm unit(GP-591).

  This GD-A8 is based on the detection principle of catalytic combustion. Inside detector head, there is a HC sensor.

  The model number is HW-6211.
- 9)02 detector head: This detector head(model GD-F44) detects O2 and given signal to indicator/alarm unit(OX-591).

  This GD-F44 is based on the detection principle of electrochemica method. Inside detector head, there is a O2 sensor.

The model number is OS-B11.

10)H2S gas detector head: This detector head(model GD-K3) detects H2S gas and give signal to indicator/alarm unit(EC-592).

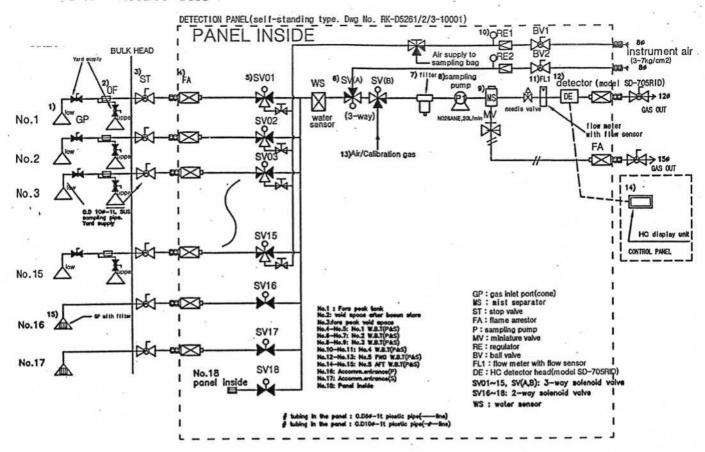
This GD-K3 is based on the detection principle of electrochemial method. Inside detector head, there is a H2S sensor.

The model number is ES-937.

11)Flow meter with sensor: When flow go down, given a signal "Flow Fail"

12)Calibration gas: This is can type. The gas is i-C4H10 50%LEL in air balance and O2 5%VOL in N2 balance.

13)Indicator/alarm unit: Please refer to the instruction manual.



1)Gas inlet port : Sample the gas and remark this is the end of gas sampling line.

2)On-line filter : Remove dust, obstacles.

3)Stop valve : In order to isolate safety area and hazardous area.

4)Flame arrestor: Prevent flame from spreading outside in case of ignition in the flow line within the panel.

5)Solenoid valve(2-way): This solenoid valve opens just one flow circuit through current conduction by means of an automatic scanning circuit or manual push button.

6)Solenoid valve(3-way): This solenoid valve change the flow direction by means of an automatic scanning circuit or manual push button.

7)Filter/drainer : Accumulates mist & water temporary.

8)Sampling pump : Sucks the sample gas for sampling.

Model N026ANE. AC220V, 60Hz. 20L/min.

9)Mist seperator : Separates mist & water from sampled gas.

10) Regulator: This controls the pressure of instrument air while purging.

11) Flow meter with sensor: When flow go down, give a signal "Flow Fail"

12)HC detector head/indicator(Model SD-705RID): This detector head/indicator detects HC gas in W.B.T etc and display the gas concentration with LCD display. This SD-705RID give alarm contact(1st/2nd)/trouble alarm contact/4-20mA signal.

Refer to the Instruction manual of SD-705RID.

13) Calibration gas: This is can type. The gas is i-C4H10 50% LEL in air balance.

This gas is for calibrate the SD-705RID detector every 6 months. Refer to "How to calibration" of instruction manual of SD-705RID.

14)LED display: Indication of HC gas concentration for W.B.T

#### 7. OPERATION

#### 7-1. PREPARATION

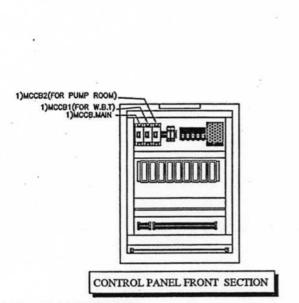
Supplying power should be AC220V,60Hz.

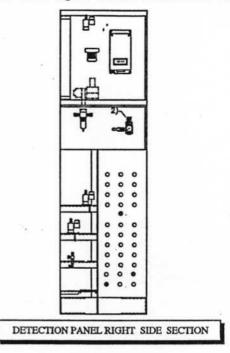
All stop valves fully open.(Stop valves are installed between panel and bulk head)

- 1)Power on with MCCB MAIN ,MCCB1(For W.B.T) & MCCB2(For pump room) in the gas control panel.
- 2)The indication value of regulator from instrument air is 2.5kg/cm2~4kg/cm2.

How to adjust value: To adjust value of regulator, push up the knob.

and then, turn left or turn right. When a finished adjust





#### 7-2. DETECTION

- \*For Gas Control Panel
  - (1) Cargo pump room system
    - 1. The lamp of "AUTO SCAN LAMP S/W" LIGHTS UP.
    - The display of indicator/alarm units GP-591 & EC-592 & OX-591 will be flicker for 50 seconds.

This remarks warming-up time. After 50 seconds, power lamps(green)

of GP-591 & EC-592 &OX-591 on front of the GAS CONTROL PANEL light on.

And then, the display indicate 0 (HC AND H2S) AND 20.9 (Oxygen).

If the display not indicate 0 and 20.9, must be adjust zero.

"How to adjust zero" is mentioned in the instruction manual of Model RM-590.

- 3. The mode will be change into "AUTO SCAN MODE" and starts sampling.
- 4. The flow rate indicates minimum 4L/min.

#### (2) W.B.T system

- 1. Power lamp on the W.B.T panel lights up.
- 2. The lamps of "AUTO SCAN LAMP S/W" and "AUTO PURGE LAMP" lights up.
- Auto purge will be done for 1 cycle in order to remove the sea water/mist inside sampling pipe.
- 4. After one cycle of auto purge, the mode will be change into "AUTO SCAN MODE".
- 5. Sequential sampling starts from 1st line.

## 8. Several functions in switch/lamp board of control panel

LOCATION WEASURING AUARM LAMP	LOCATION MEASURING/ALARM LAMP W/MANUAL POINT SKIP SW	CONDITION LAMP/SWITCH
Below P/R Floor (5) am am \$5  Below P/R Floor (5) am am \$5  Adove P/R Floor (5) am am \$5  Acres P/R Floor (5) am am \$5  Vent trunk for low 5 am am \$5  P/R DRITANCE am am \$5  P/R DRITANCE am am \$5  P/R USD SPACE am am \$5  Vent trunk for mid.5 am am \$5  Vent trunk for upp.5 am am	F.P.TANK (max. A.m.) \$33  BOSUM STORE (max. Ann.) \$33  F.P.NOID SPACE (max. Ann.) \$33  No.1 W.B.T(P) (max. Ann.) \$35  No.2 W.B.T(P) (max. Ann.) \$35  No.2 W.B.T(P) (max. Ann.) \$35  No.3 W.B.T(P) (max. Ann.) \$35  No.3 W.B.T(P) (max. Ann.) \$35  No.4 W.B.T(S) (max. Ann.) \$35  No.5 W.B.T(S) (max. Ann.) \$35	D) AND SCATE  F) SITURE
		Model RKK-20001K RIKEN KEIKI KOREA CO.,LTD

1)MEAS lamp(A): This lamp indicates this point is sampling/detecting.

2)ALARM lamp(B): This lamp indicates gas alarm.

3)"MEAS. STOP" lamp/switch(C)

When measurement is not necessary at an optional sampling point, in the AUTO SCAN mode, it is stopped at the sampling point. By pressing the MEAS STOP pushbutton switch on the gas detecting/alarm panel, measurement is stopped at the sampling point and the MEAS STOP lamp light at the sampling point.

[ In case of water full inside W.B.T]

The measurement is switched to the next sampling point. This manual measuring stop is reset by pressing the MEAS STOP pushbotton switch again. In this case, must do manual purge for the released skip point in order to remove seawater inside pipe. When the flow trouble catchs by flow sensor, auto purge system will be done. After counter-purge, the system will suck the certain point. If the flow trouble happens agian, "MEAS.STOP" lamp will be flickered. This flickering means point skip by flow trouble, not pressing "MEAS.STOP" switch.

#### 4)Auto scan(D) of sampling points

The sampling points are automatically switched every certain time to measure each sampling point sequentially.

(1)Non-alarm time

In order to prevent the gas absored at the last sampling point from being left in the sampling line of the gas detecting/alarm panel when absorbing the gas from on optional sampling point, the first half 30 seconds of the sampling time is set as a non-alarm time, and various outputs (or alarm reset decisions) by gas alarm are not excuted during this time. However, the buzzer can be stopped sounding by the buzzer stop pushbutton switch, and also, the flickering of the alarm indicator lamp can be stopped by the lamp reset pushbutton switch.

The MEAS. indicator lamp flickers during the non-alarm time.

#### (2)Alarm time

The alarm time is defined as the second half 30 seconds obtained by subtracting the non-alarm time from the sampling time at an optional point when absorbing the gas from sampling points. Various outputs (or alarm reset decisions) are done by an gas alarm during this time. The MEAS. indicator lamp flickers during the alarm time.

<Operation>

By turning on the AUTO SCAN pushbutton switch(D) on the gas detecting/alarm, the pushbutton switch lights, and the auto switching measuring mode is selected.

#### 5)Manual scan(E) of sampling point

It is to consecutively measure 1 optional sampling point.

When switching it from the Auto scan, model to the Manual scan mode, after elapsing the non alarm time. It comes to be the alarm working fixation measurement after then.

<Operation>

By pressing the Manual scan, pushbutton SW found on the panel surface, the Manual scan lamp is lit, the Manual scan mode is given, and optional sampling points are consecutively measured. Later on, sampling points are switched one after other by pressing the pushbutton SW.

#### 6)Manual purge(F)

The sampling line can be purged. The instrumentation air is introduced by making the sampling line in the inverse direction.

<Operation>

- (1) The sampling line being desired to purge is called out by the Manual scan, pushbutton SW found on the panel surface.
- (2)By pressing the purge pushbutton SW found on the panel surface, the sampling line and the instrumentation air line are connected, and the instrumentation air is introduced during sampling line called in (1).

in the inverse direction.

Besides, the purge is informed by the lighting.

At the time of gas calibration in the gas detection part, calibration gas incorporated in the panel is introduced into the detection part. In this respect, for adjustment after introducing calibration gas, refer to separately individual instruduction manuals (indicating alarm unit and gas detection part).

#### <Operation>

By pressing the cal SW(F) found in the panel to the calibration mode, the sampling line in the panel is switched to the span calibration line, and span gas is introduced manually from the span gas can to the gas detection part.

it is released by pressing CAL.SW again. How to calibration is refer to 10-2)Calibration.

- 8)Element Fail alarm(H): In the element (gas sensor) incorporated in the gas detection part, in case the disconnection is produced, it is considered as the element trouble alarm, and various alarm circuit work.
- 9)Flow fail alarm(I): In case the state that cannot secure the sampling flow for more than 5 seconds successively in the optional sampling line, the flow drop alarm is considered, and various alarm sircuits work. The function is installed in the main sampling line in order to stop introducing water etc.
- 10)GAS INSIDE PANEL(W.B.T)(J): When the gas alarm happens inside W.B.T panel, this alarm lamp lights on continuous with red color.
- 11)GAS INSIDE PANEL(P/R)(K): When the gas alarm happens inside Pump room panel, this alarm lamp lights on continuous with red color.

## 9. How to adjust zero and span

- 1)Zero adjustment method
  - a)Confirm with a portable gas detector that the atmosphere around sampling panel is clean and does not contain any flammable gas. If any flammable gas exits inside panel, fill the gas sampling bag with high-purity air or external fresh air. Attach the sampling bag filled with high-purity air to the calibration gas inlet house inside panel and allow the air to flow for about 2 minutes. Then, proceed to zero adjustment.
  - b)For zero and span adjustments, enter the adjustment mode. In this case, press an attached control key to the MAINTENANCE/ESC switch for about 3 seconds while the unit is in the normal gas detection state. (On entering the adjustments mode, the "4-20mA" output provides output of 2.5mA)
  - c)The "ZERO"lamp flickers in about 3 seconds. Once in the zero adjustment mode, release the control key. In this case, the LCD indication may changed because the zero suppression function active in the normal gas detection state is cancelled, with the true valve indicated instead. If this true valve is shifted to the "+" side, Press the control key to the DOWN switch ▼ till the indication becomes zero. On the other hand, press the control key to the up switch ▲ till the indication becomes zero when the true value is shifted to the "-" side.

    (Adjustment with ▼ and ▲ switches causes the ZERO lamp to change from flickering

(Adjustment with ▼ and ▲ switches causes the ZERO lamp to change from flickering to continous lighting, which indicates that the zero point has been shifted)

#### 2)Calibration

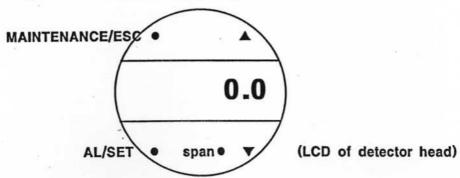
Push down calibration S/W(F) of switch/lamp board.

a)Prepare about 6L of calibation 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.

b)Using magnet key, press MAINTENANCE/ESC switch • . LCD indication is 1.2 FF .

press the magnet key to the UP switch • . LCD indication will be changed 2.5 P n

Press AL/SET switch • . SPAN red lamp will be flicker.



c)Connect the sampling bag to calibration gas inlet hose inside panel.

d)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 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. After match the calibration gas concentration

and indicated value of LCD, press AL/SET switch.

- e)Upon completion of the span adjustment, remove the sampling bag from the calibration gas inlet hose and press the control key to the MODE switch to return from the span adjustment mode to the normal gas detection state. Then, proceed to the zero adjustment of (a) above again.
- f)If the indication can not be matched to the value of calibration gas concentration as a result of the span adjustment of (c) above, the gas sensor is at its service limit. Turn Off the power supply and replace the gas sensor. For the gas sensor replacement method, refer to attached instruction manual.

## 10. How to adjust LCD display

Normally this adjusting is no need, when the indication of LCD display not show 000, adjust as follows;

- 1. Push SET switch for 3 second.
- 2. SET display and flicker.
- 3. Push down DOWN switch.
- 4. Zero adjustment of LCD display is completed.

### 11. Power shut down

According to the rule, this gas sampling system has power shut-down function when the gas inside panel exceed 30%LEL. In this case, the repeat alarm panel in wheel house will indicate the 'POWER OFF" by power-off lamp. In order to turn the power on again, turn the main MCCB1 and MCCB2 to ON position by your hand.

## 12 In case that W.B.T is filled by sea water

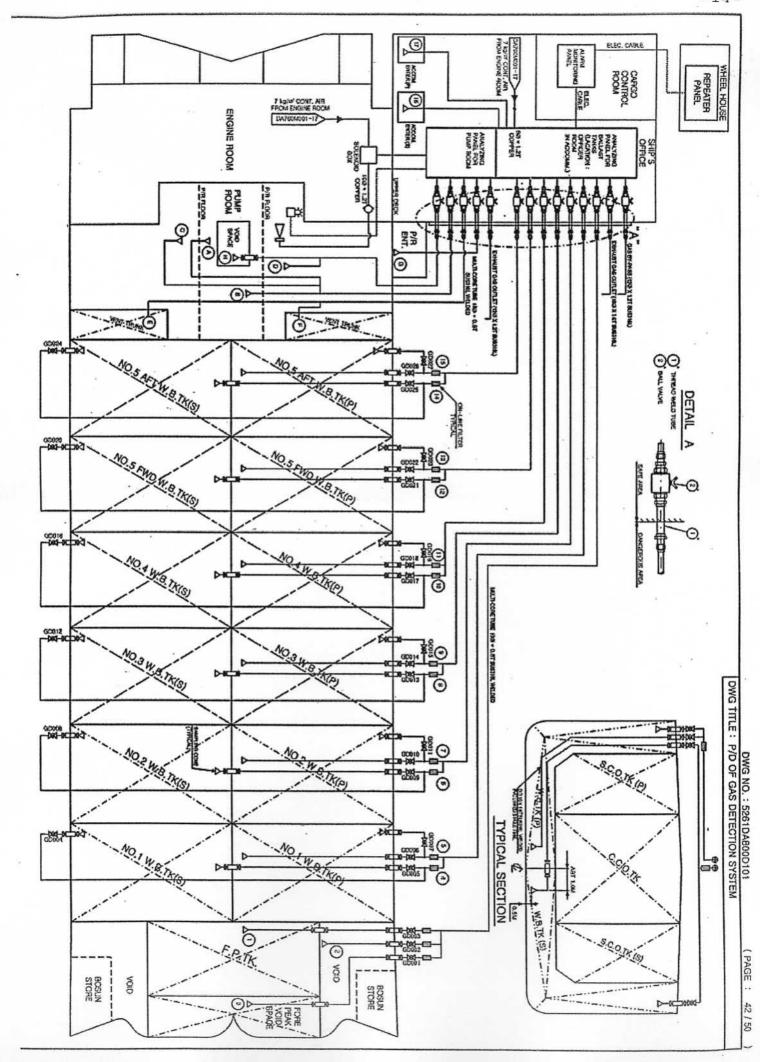
When the W.B.T is filled by sea water, the operator should manage not to introduce sea water into panel through sampling line.

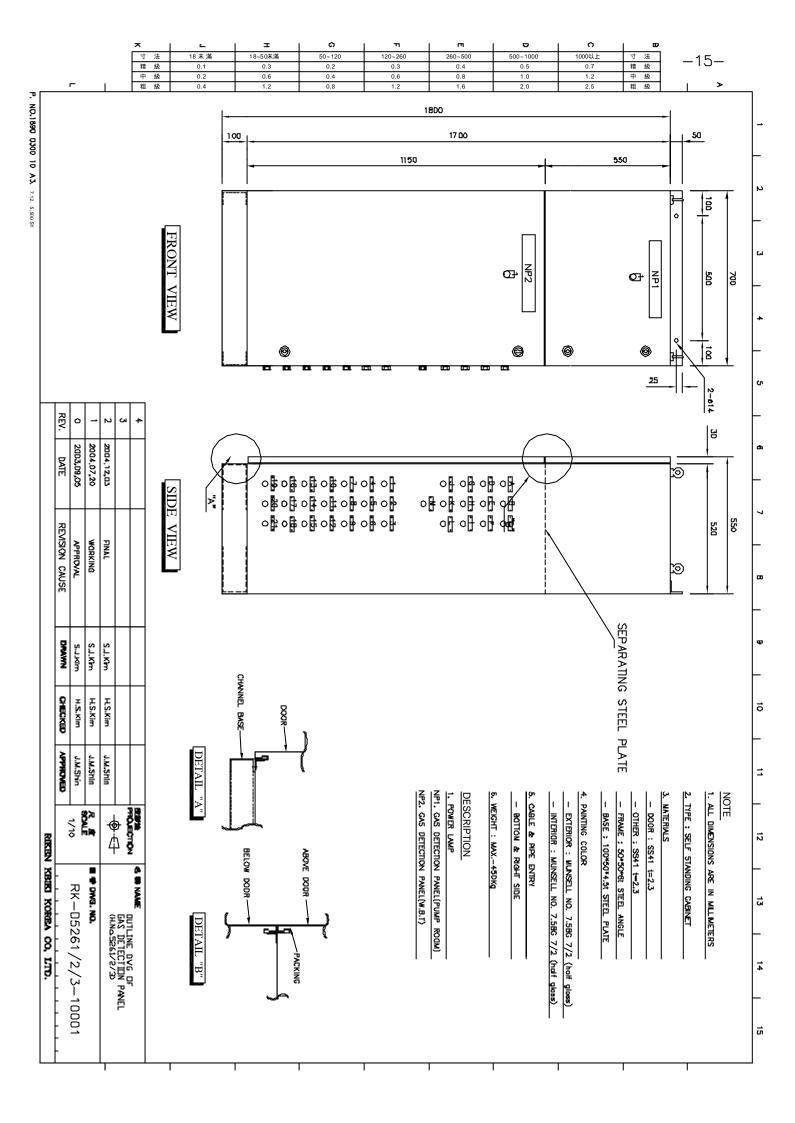
 By using skip switch(Meas.stop switch). As we explained in 9-3), by pushing "Meas.stop switch", operator can skip the sampling for the certain point which is filled by sea water.

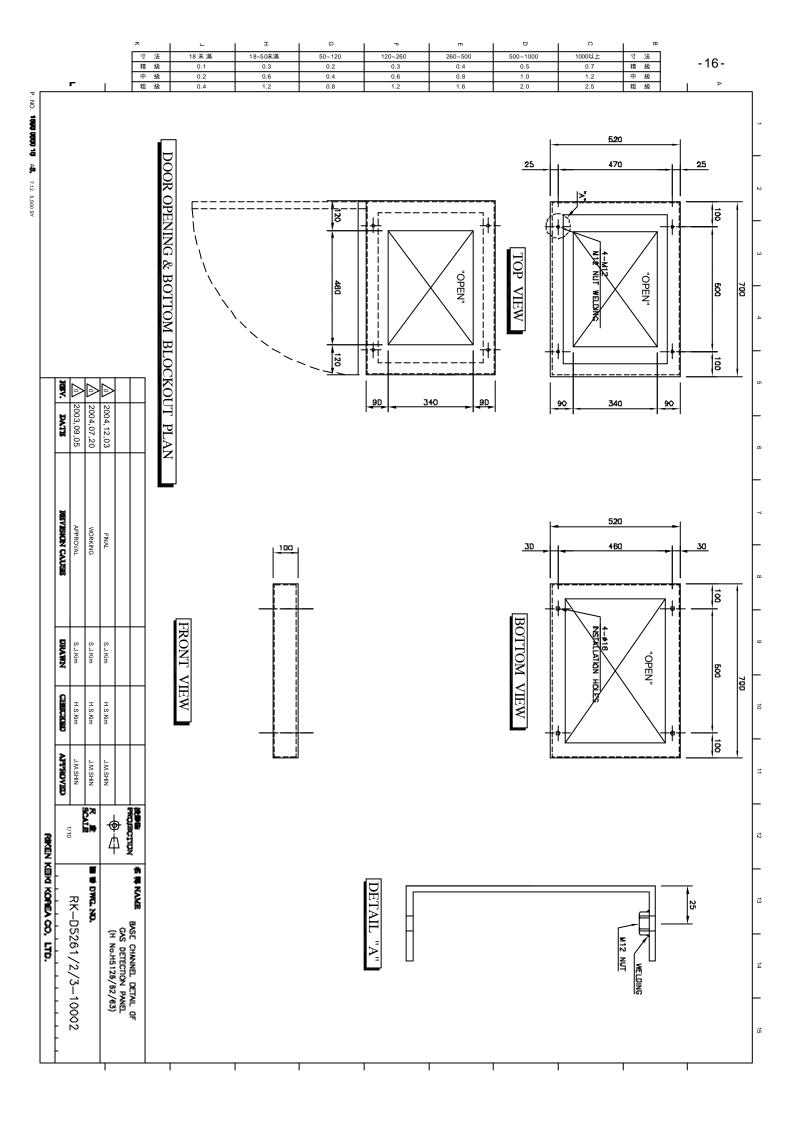
## 13 Repeat alarm panel in wheel house

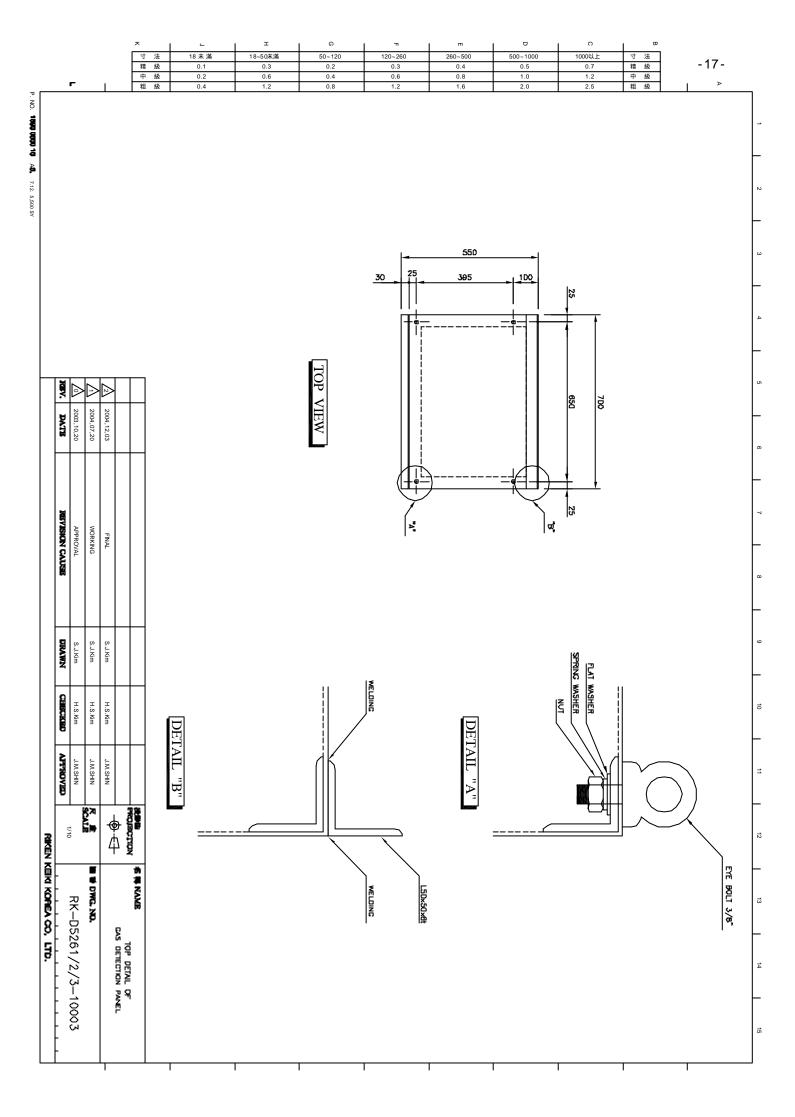
The repeat alarm panel is installed in wheel house.

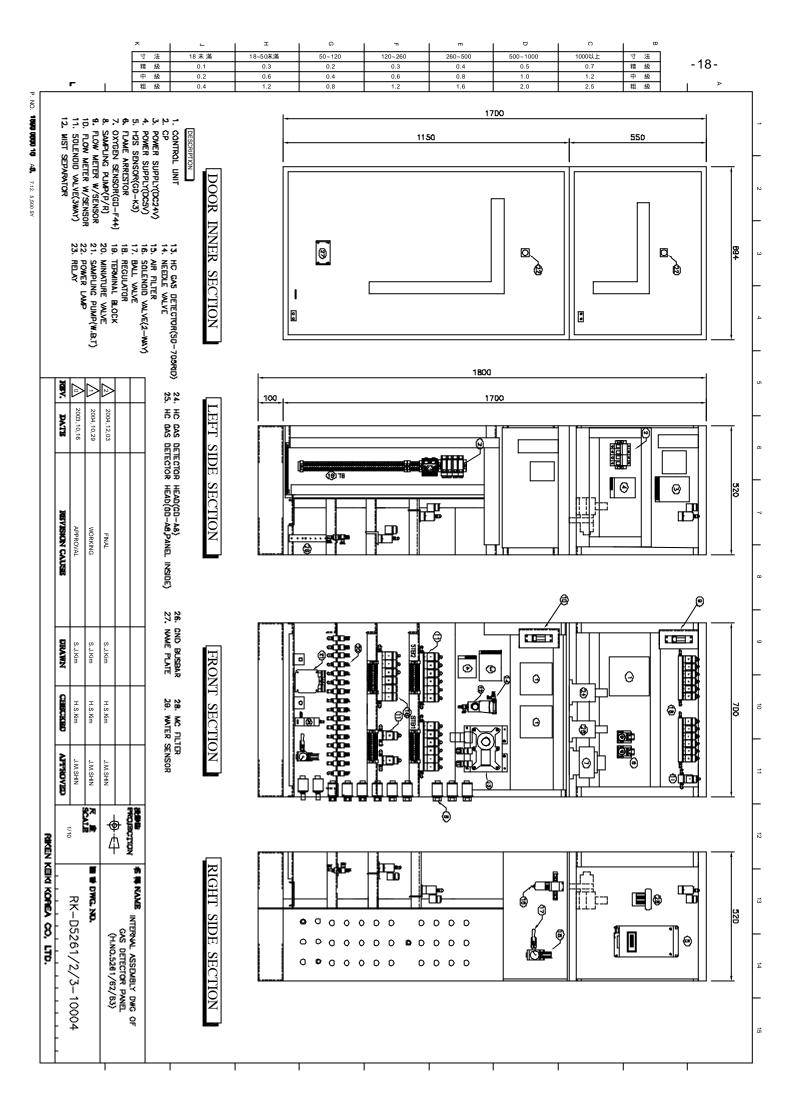
- 1)Supply AC220V power to repeat alarm panel.
- 2)Open the small door, and turn the power switch on. The power lamp will be lighting.
- 3)In order to dim all lamps on the repeat alarm panel, push alarm test switch and buzzer stop switch together for 3 seconds. After 3 seconds pushing, the buzzer sound two times. And then push ▼▲ with adjusting lighting degree.











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P. NO.

1880 0800 10 A8. 7.12. 5,500 SY

2004,07,20

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ISSUED FOR APPROVAL

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RIKEN KEIKI KOREA CO, LTD.

H.S.KIM

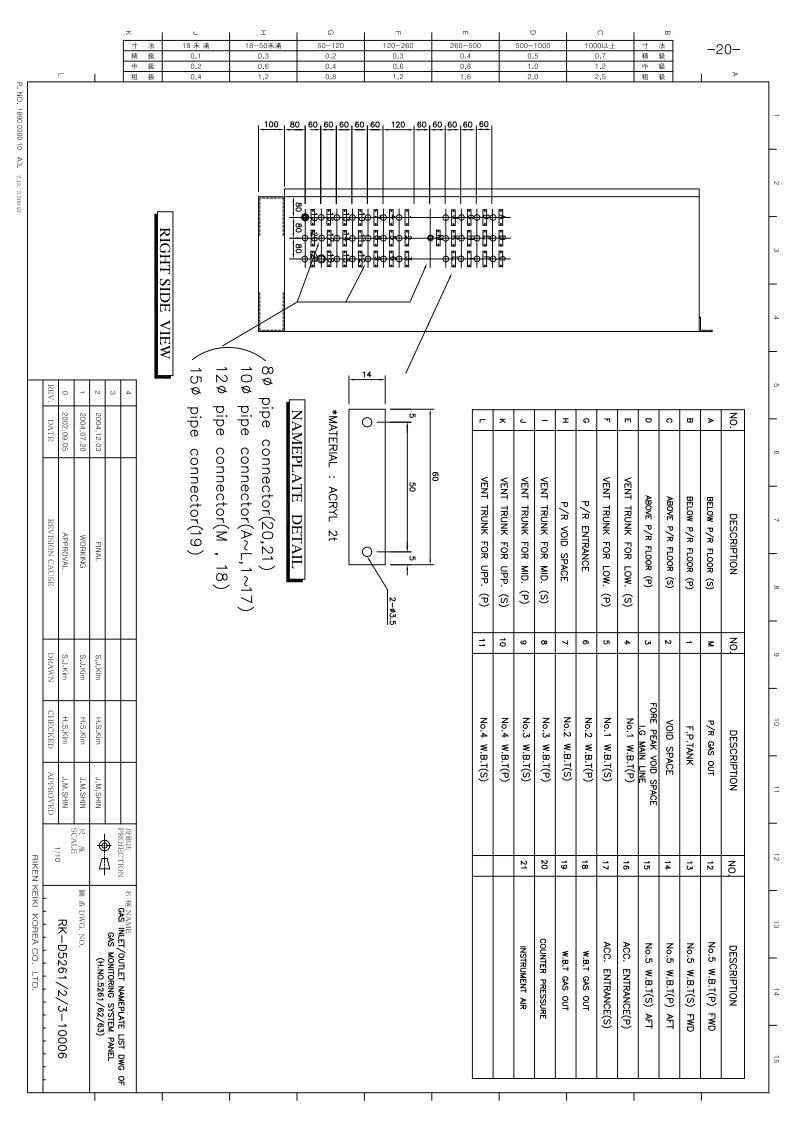
SCALE

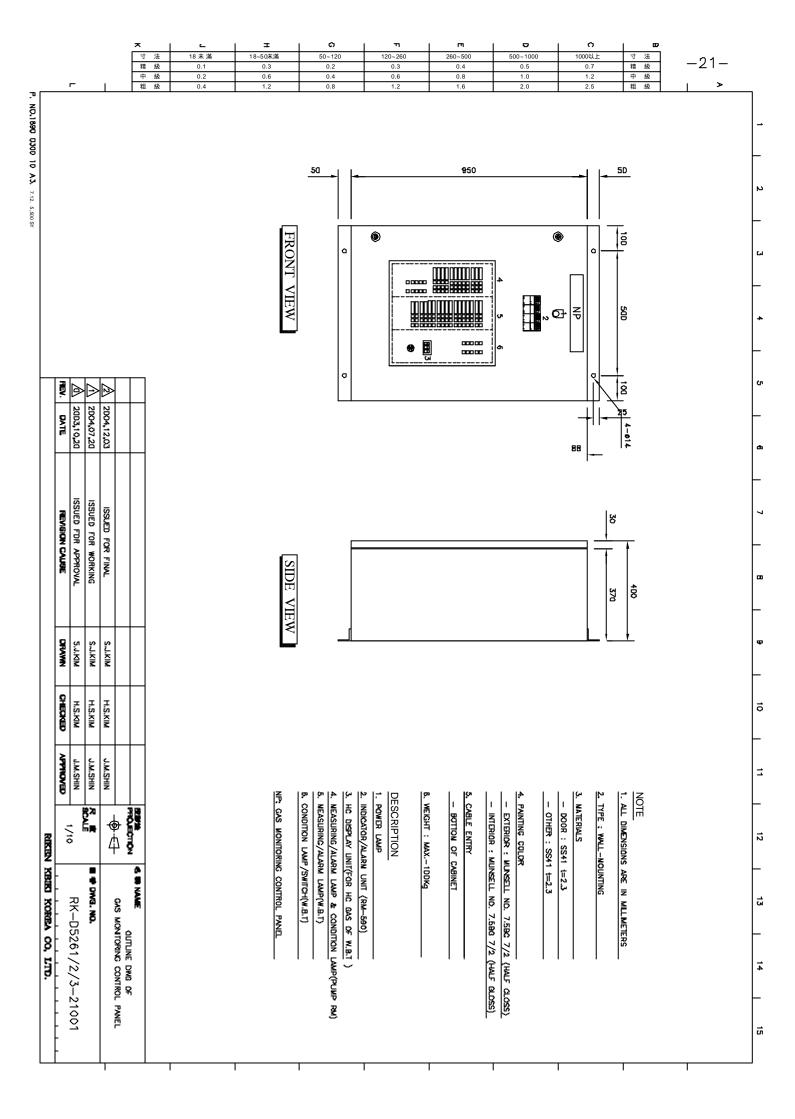
■ ■ DWG. NO.

RK-D5261/2/3-10005

S.J.KIM

2003,10,20 **DATE** 





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2. MCCB1(FOR W.B.T)
3. MCCB2(FOR PUMP ROOM)
4. POWER SUPPLY(DC24V)
5. POWER SUPPLY(DC5V) DESCRIPTION LHHT SIDE • • • • • 6 SECTION € 6. GP
7. INDICATOR ALARM UNIT(FOR PLINP RM)
8. HC DISPLAY UNIT(FOR W.B.T)
9. MEASURING/CONDITION LAMP&SWITCH(FOR PUMP RM)
10. MEASURING/ALARM LAMP(FOR W.B.T) 2004,10,29 FRONT SECTION 700 0 11. CONDITION LAMP&SMITCH(FOR W.B.T)
12. POWER LAMP
13. RELAY
14. TERMINAL BLOCK
15. GND BUSSBAR
16. CONTROL UNIT
17. BOOK POCKET
18. BUZZER ISSUED FOR FINAL RIGHT SIDE S.J.KIM 0 H.S.KIM 6 SECTION J.M.SHIN PROJECTION 4 DOOR INNER SECTION A W NAME ∂ 3 INTERNAL ASSEMBLY DWG OF GAS MONITORING CONTROL PANEL 0 9 2 6 ⊠.∲ 0

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P. NO. 1883 0800 10 A8. 7.12. 5,500 SY

2003,10,20 2004,07,20

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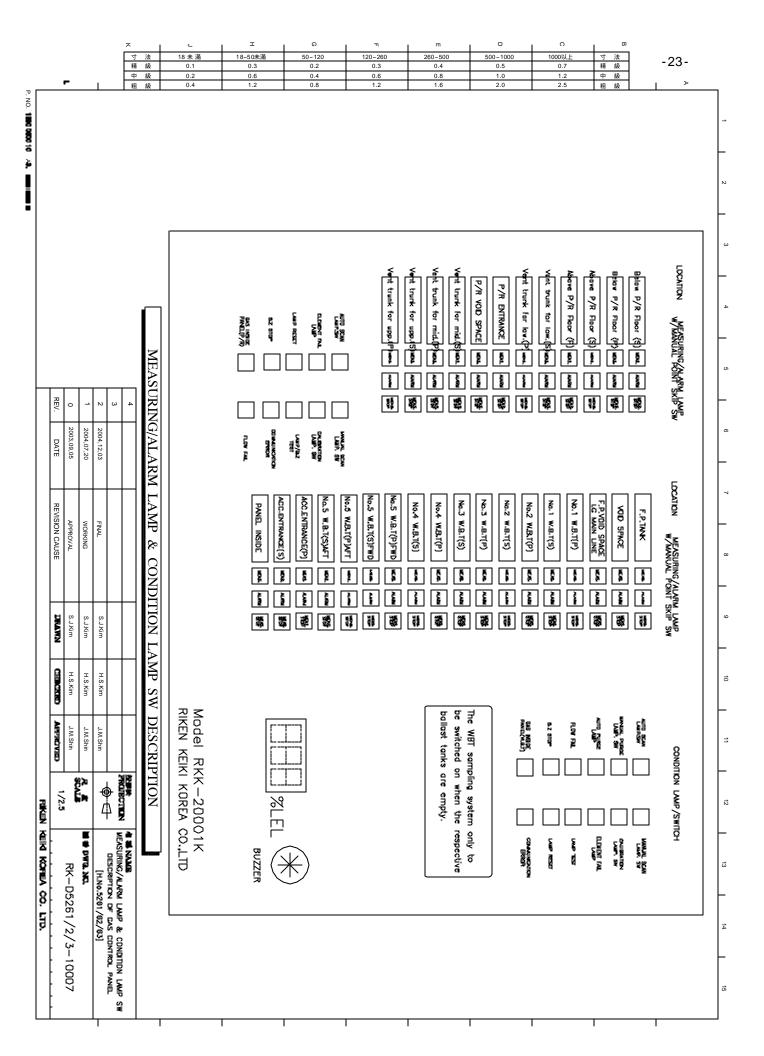
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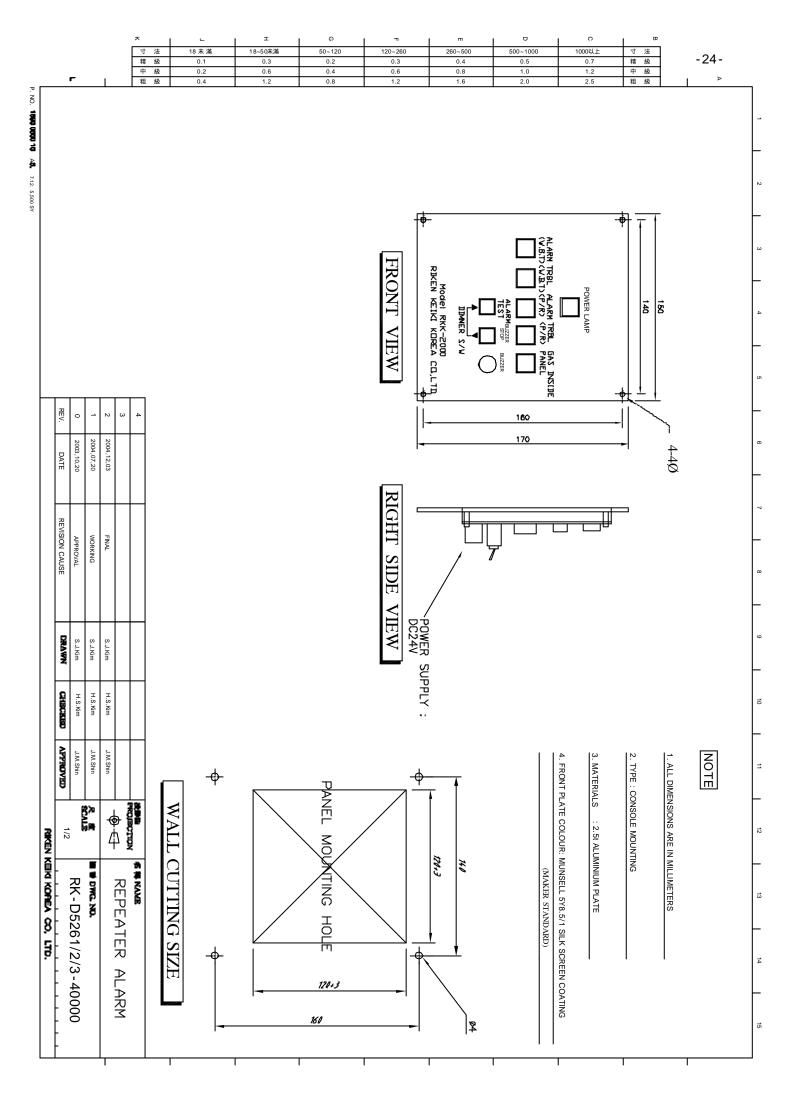
J.M.SHIN

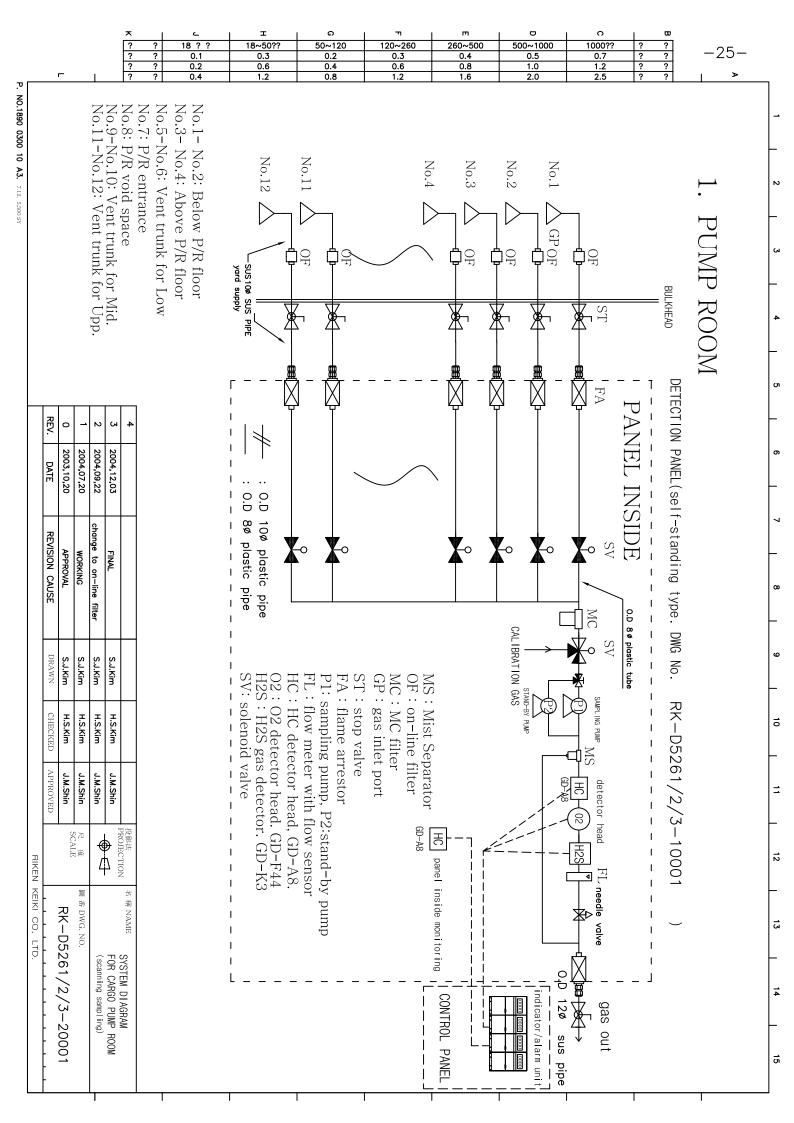
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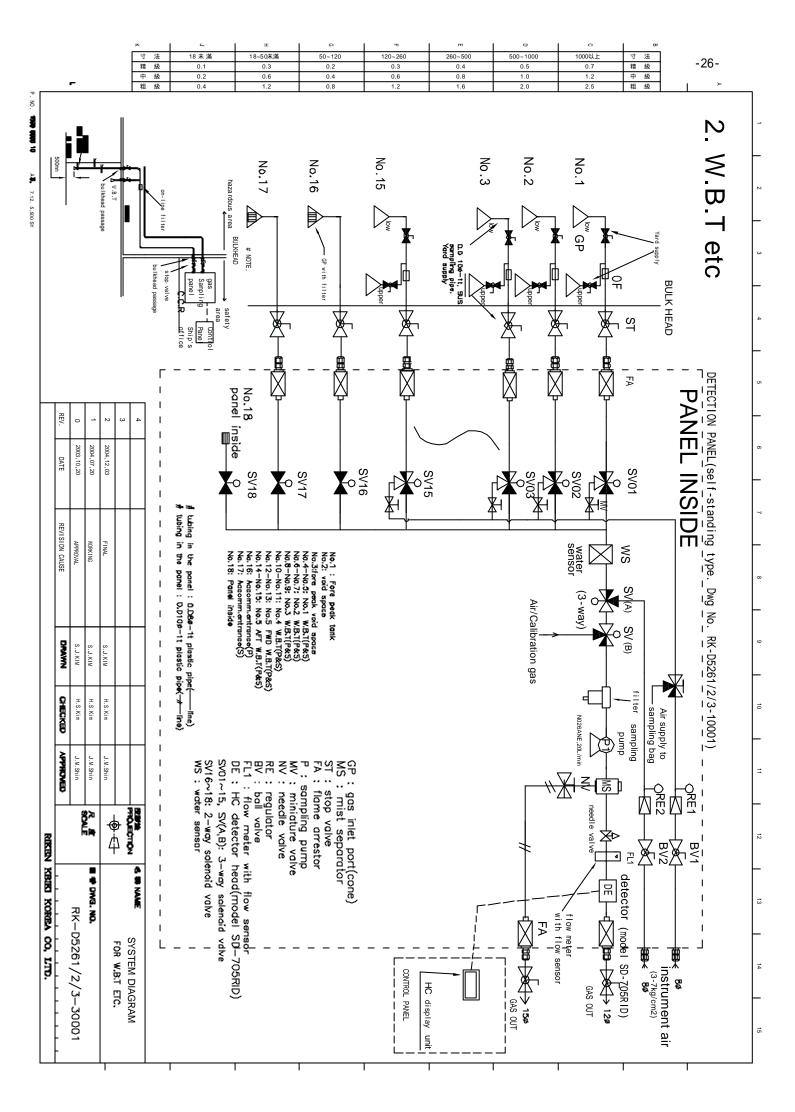
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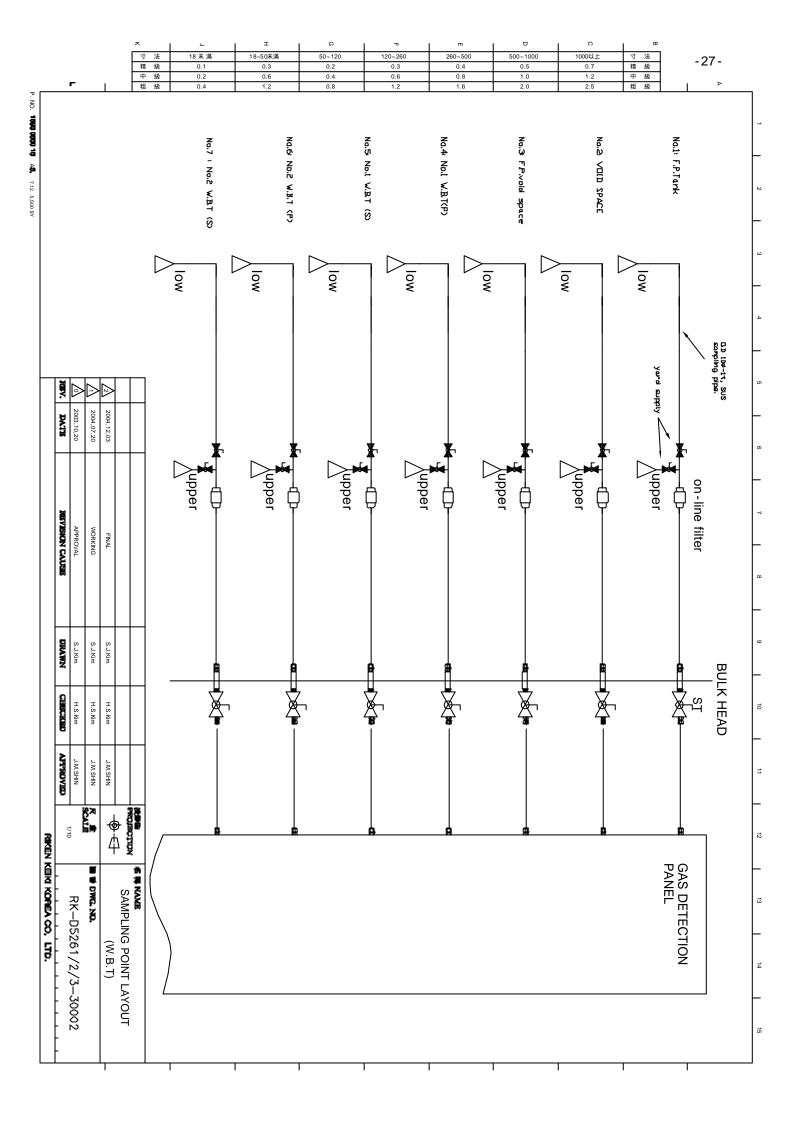
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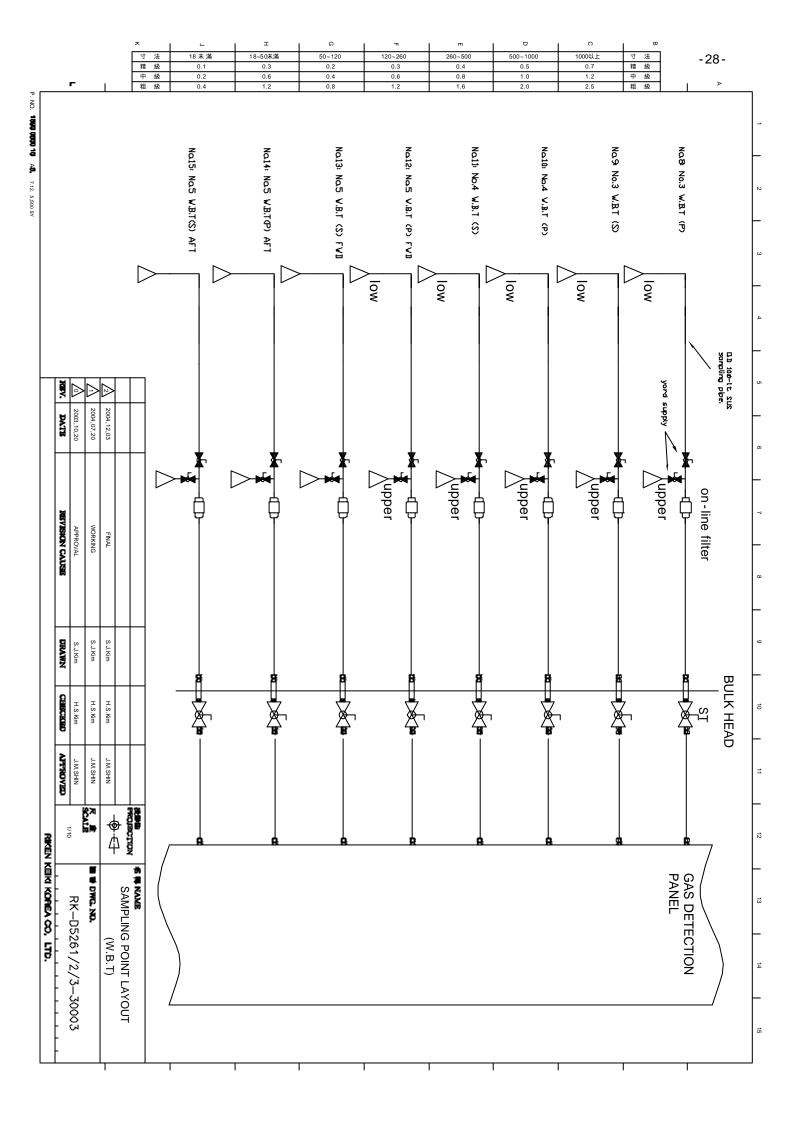


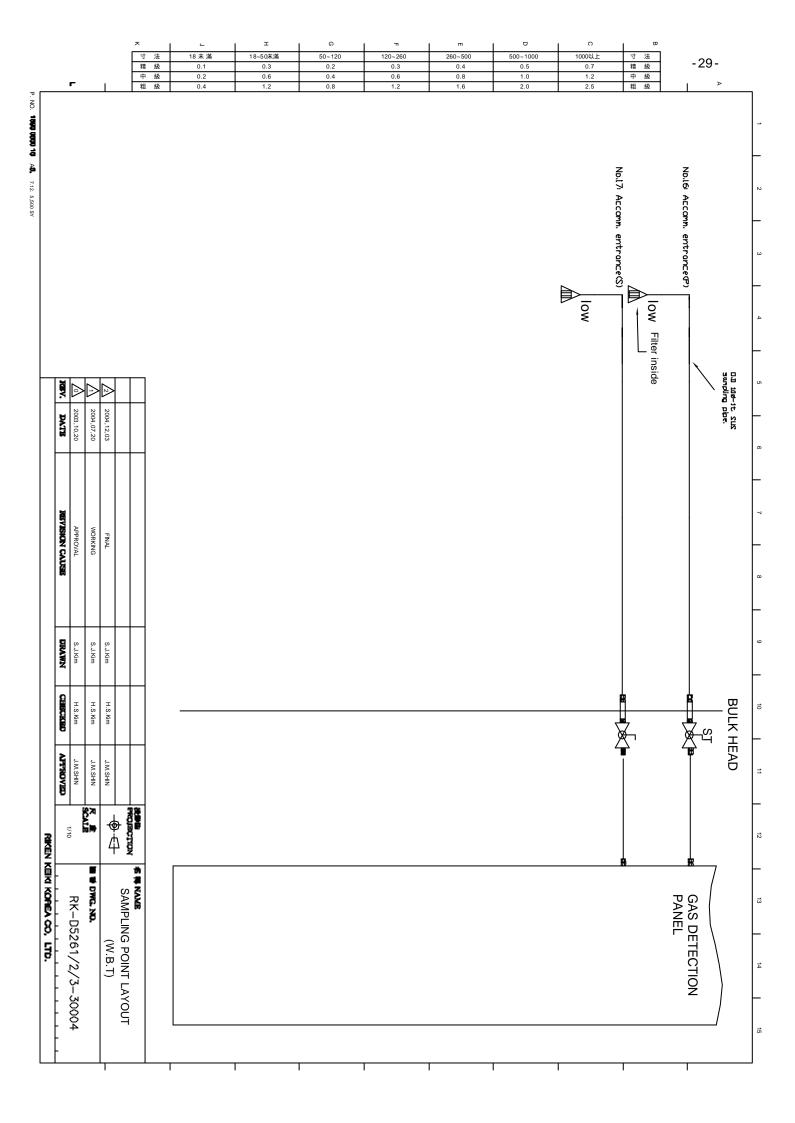


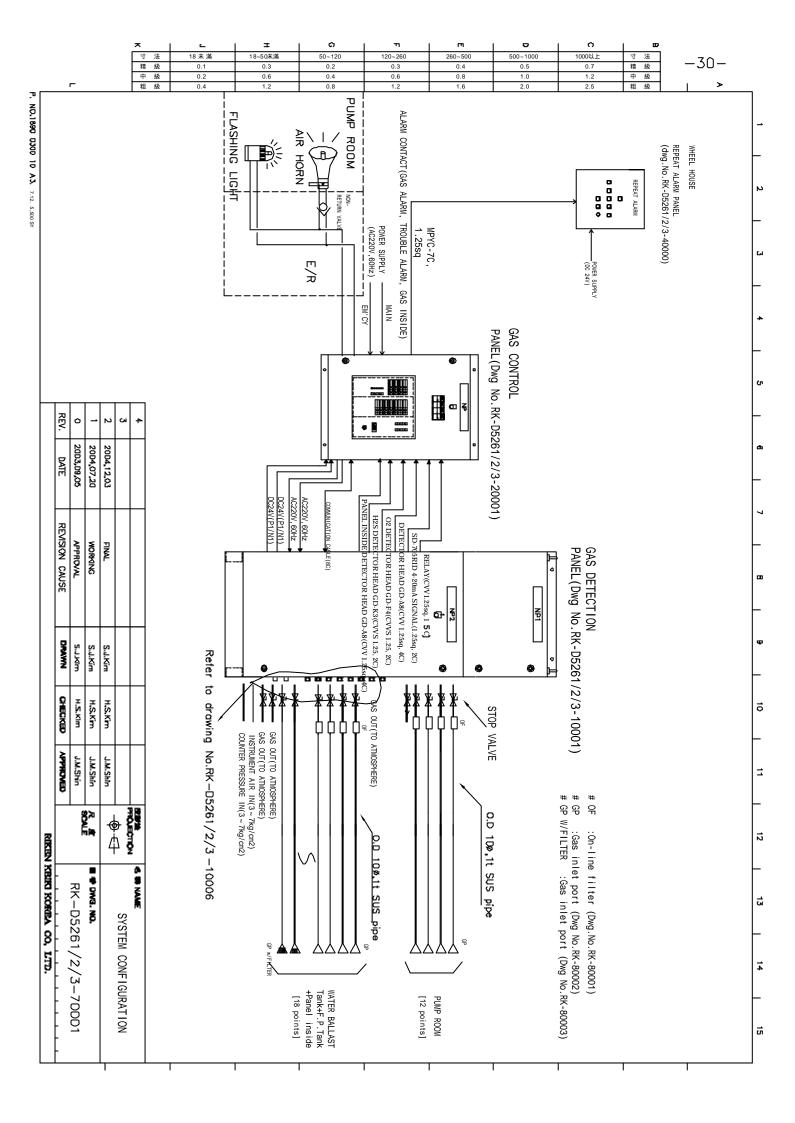


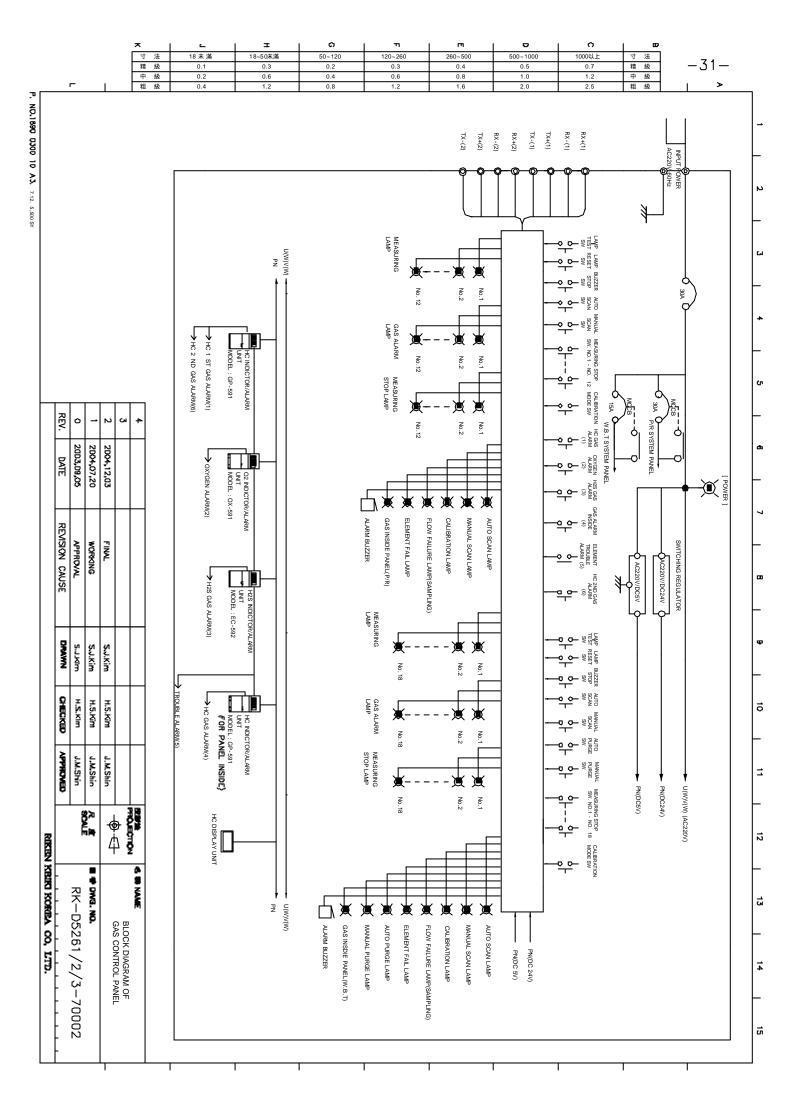


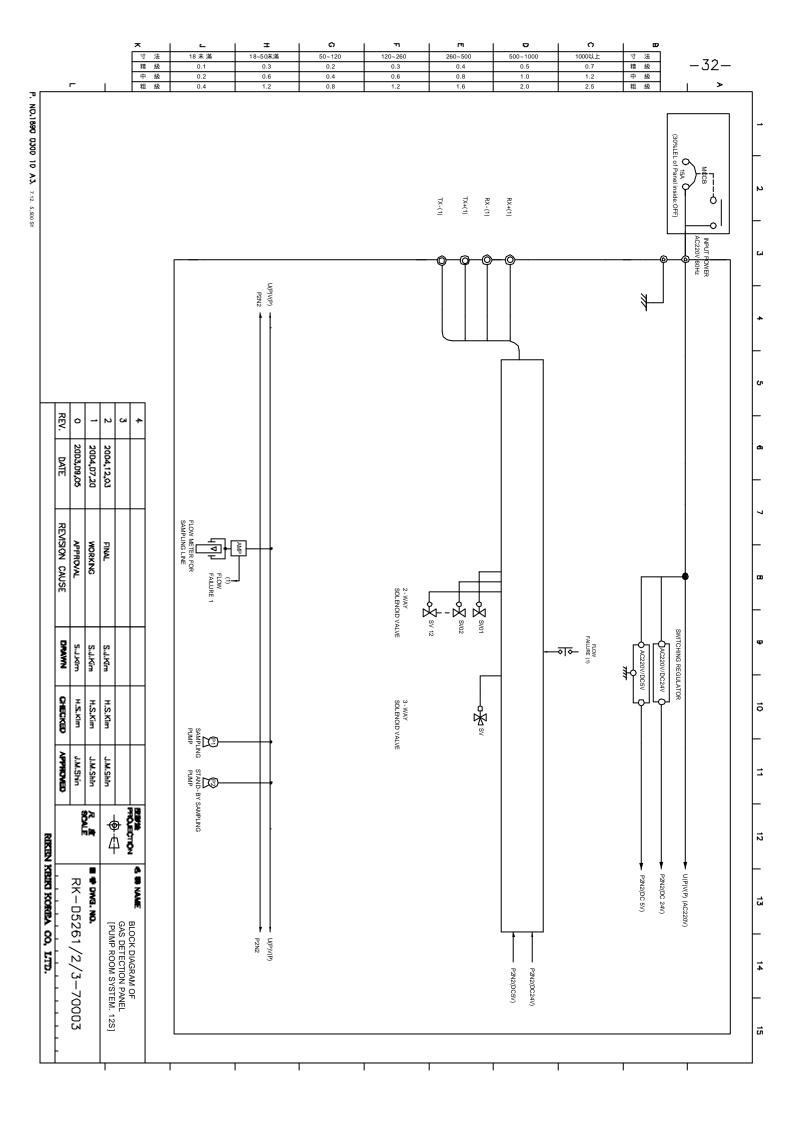


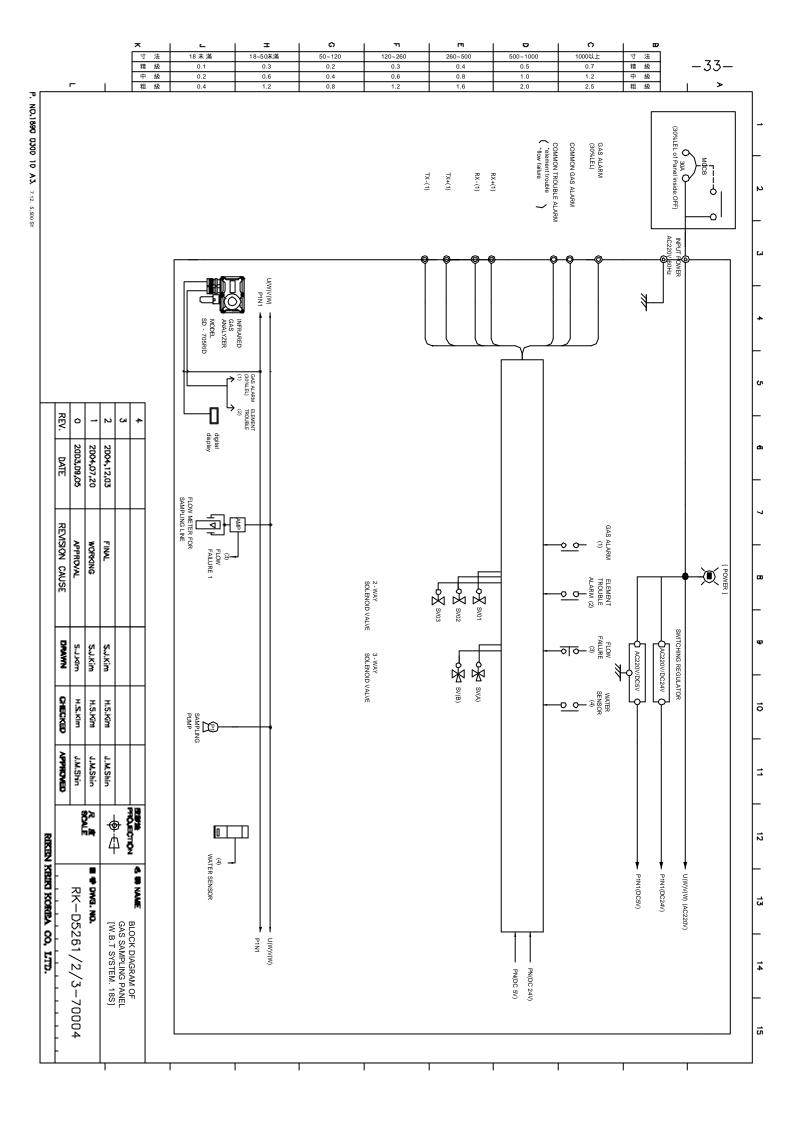


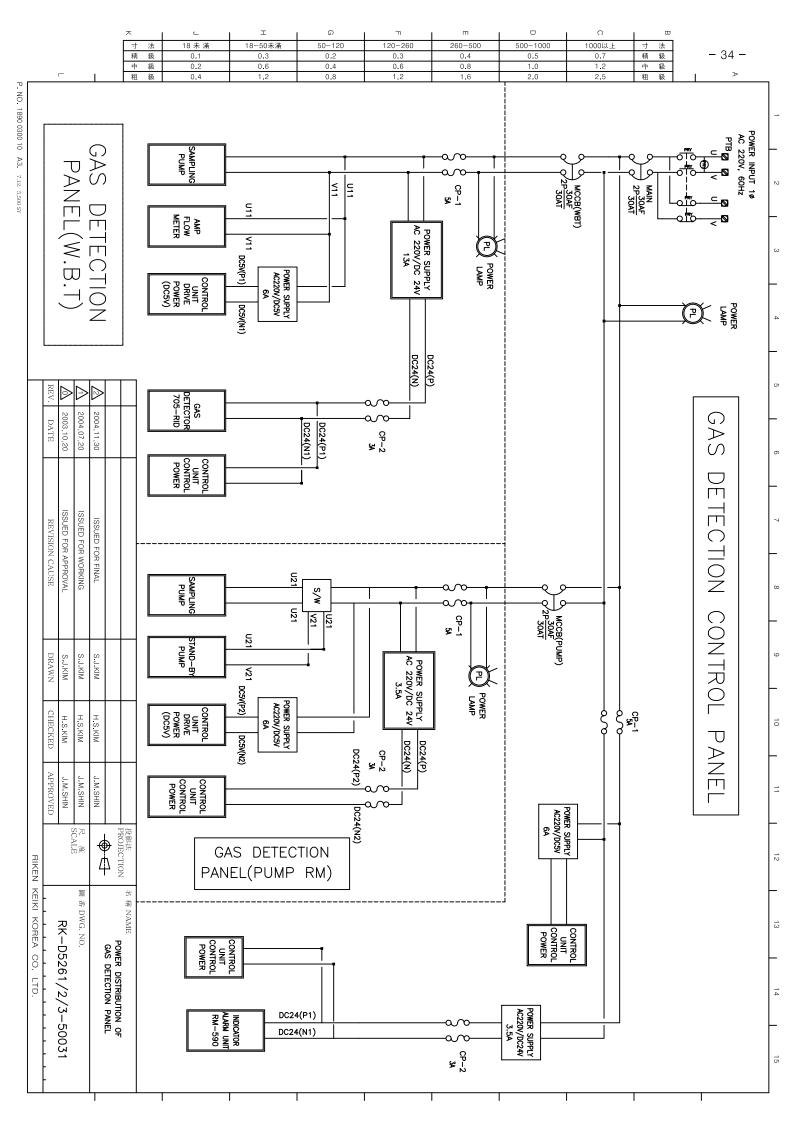


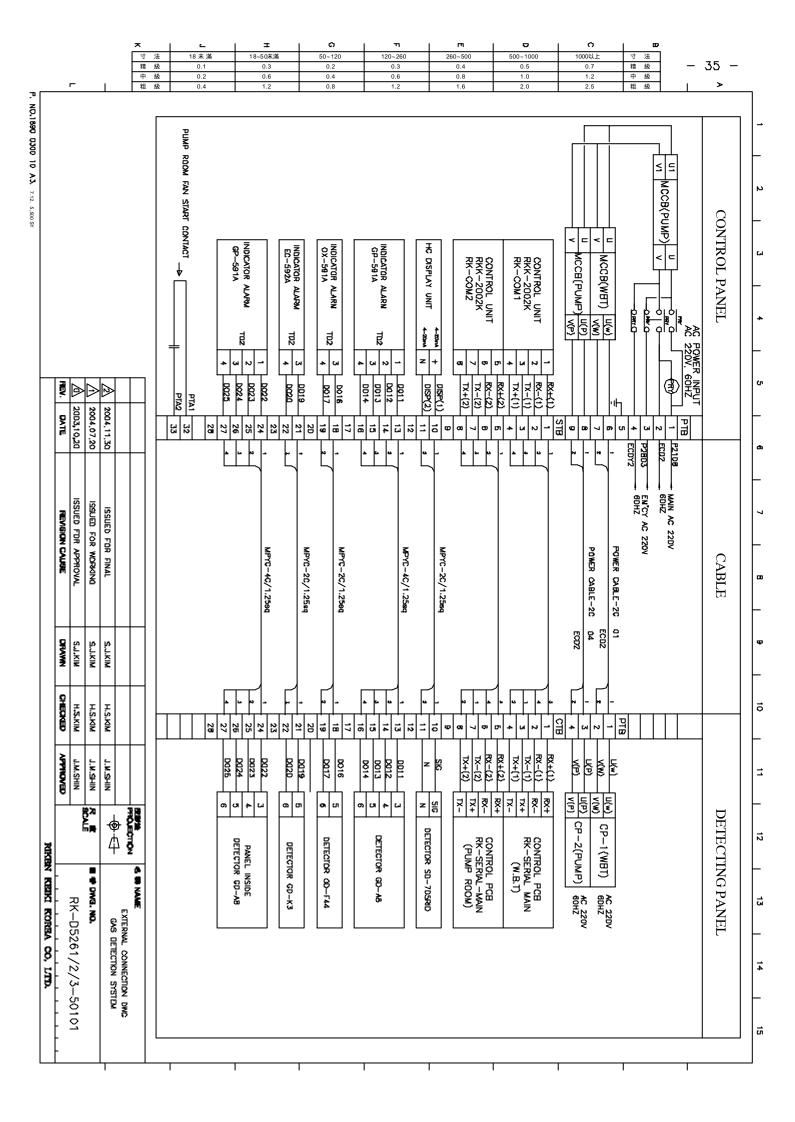


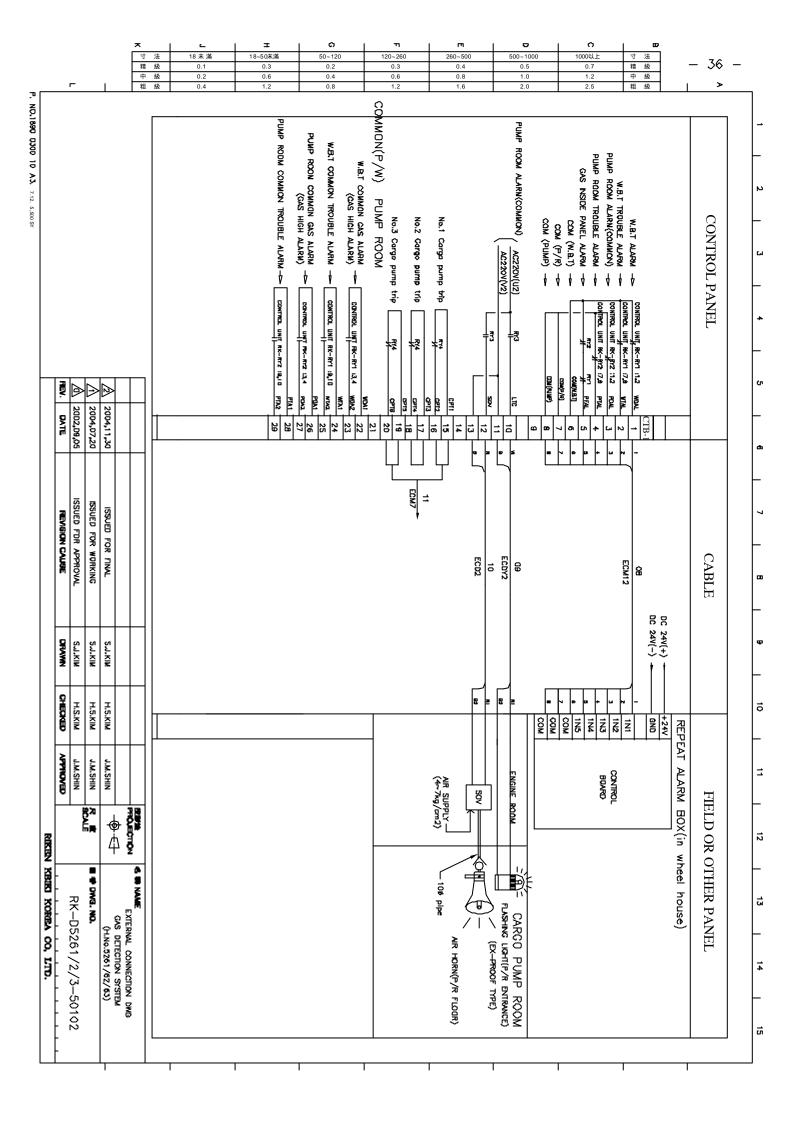


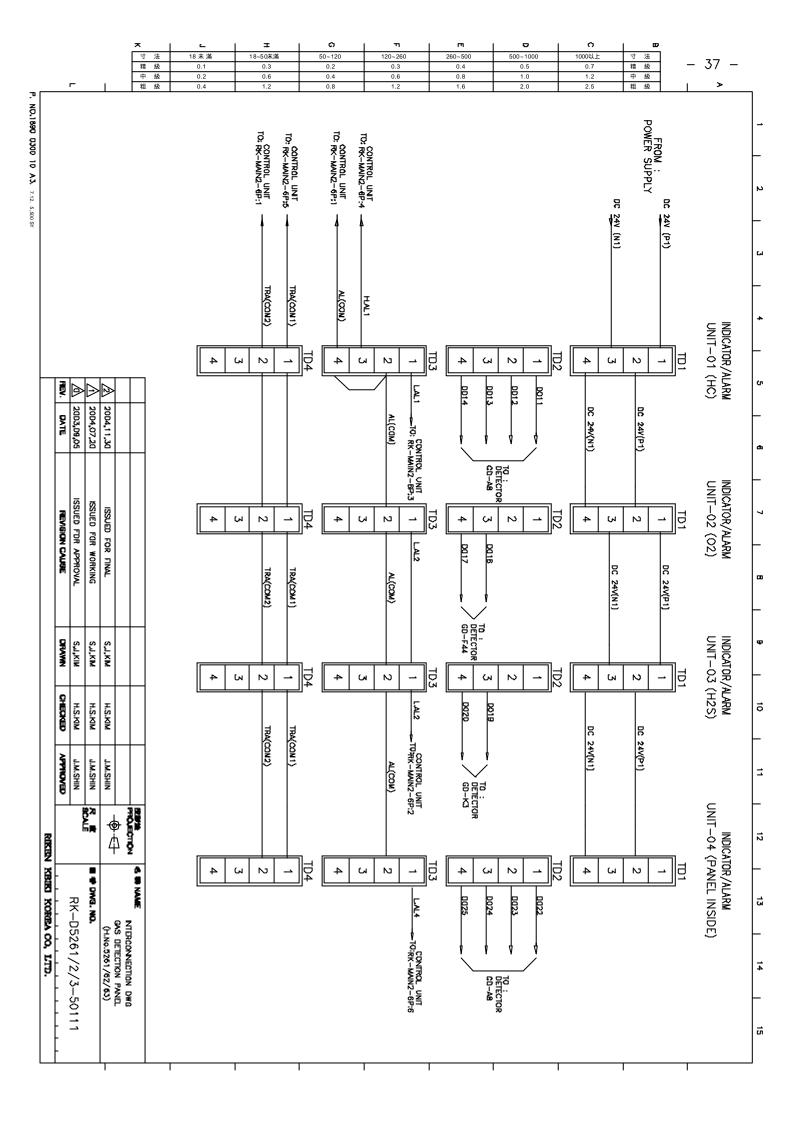


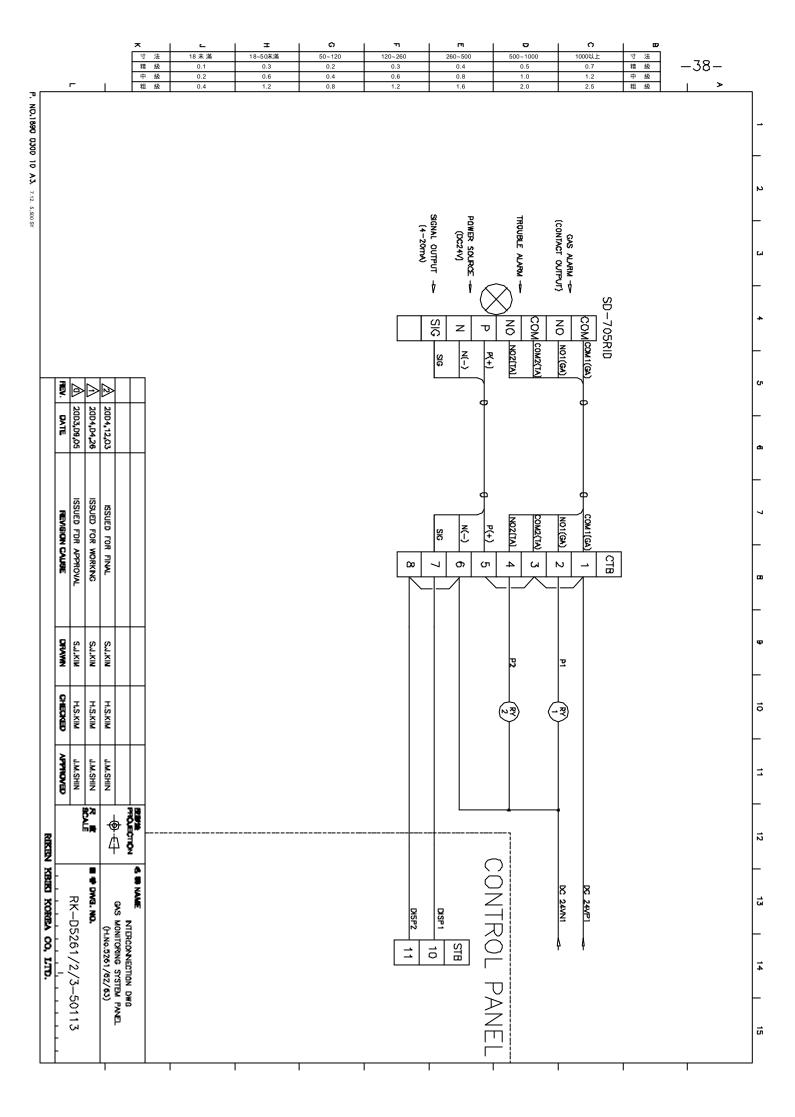












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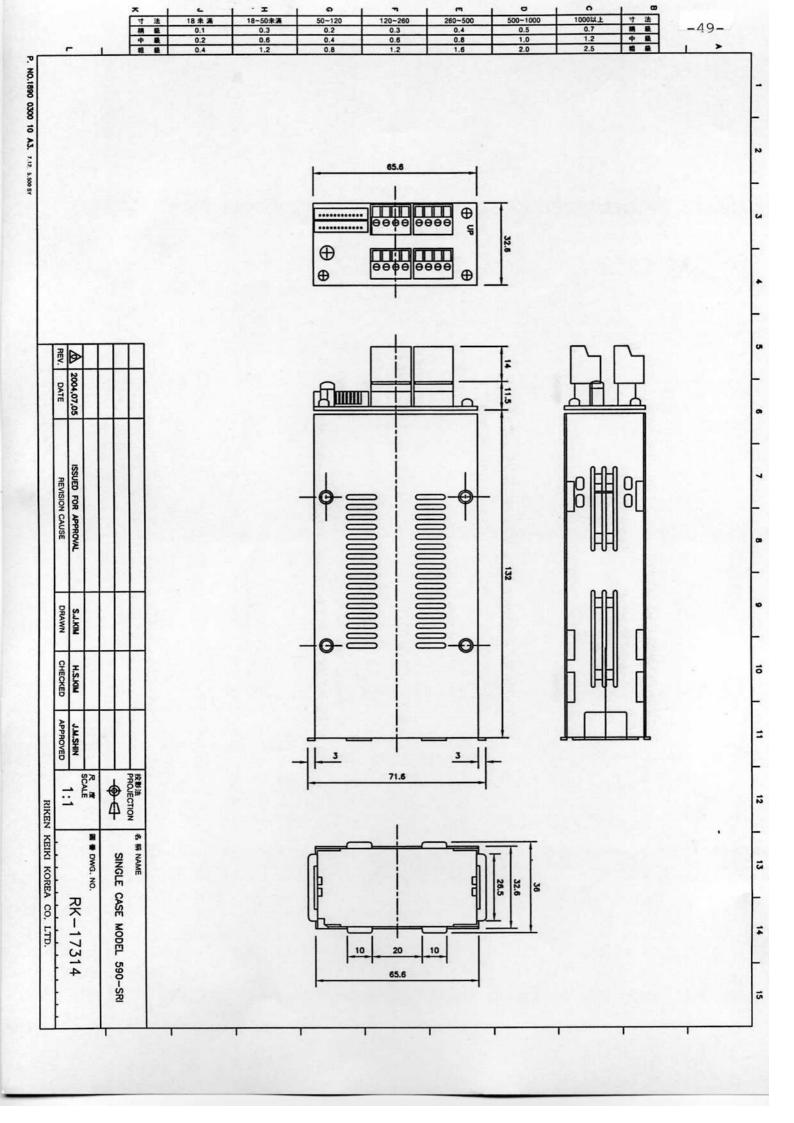
#### **HOUSING (SINGLE CASE)**

( for Indicator / alarm & Buzzer unit )

Model	590-SRI
Structure	Panel mounting type
Dimentions	36(W) × 144(H) × 167(D)mm
Cable connecting	0.14~1.5sq

#### SIGNAL LIST

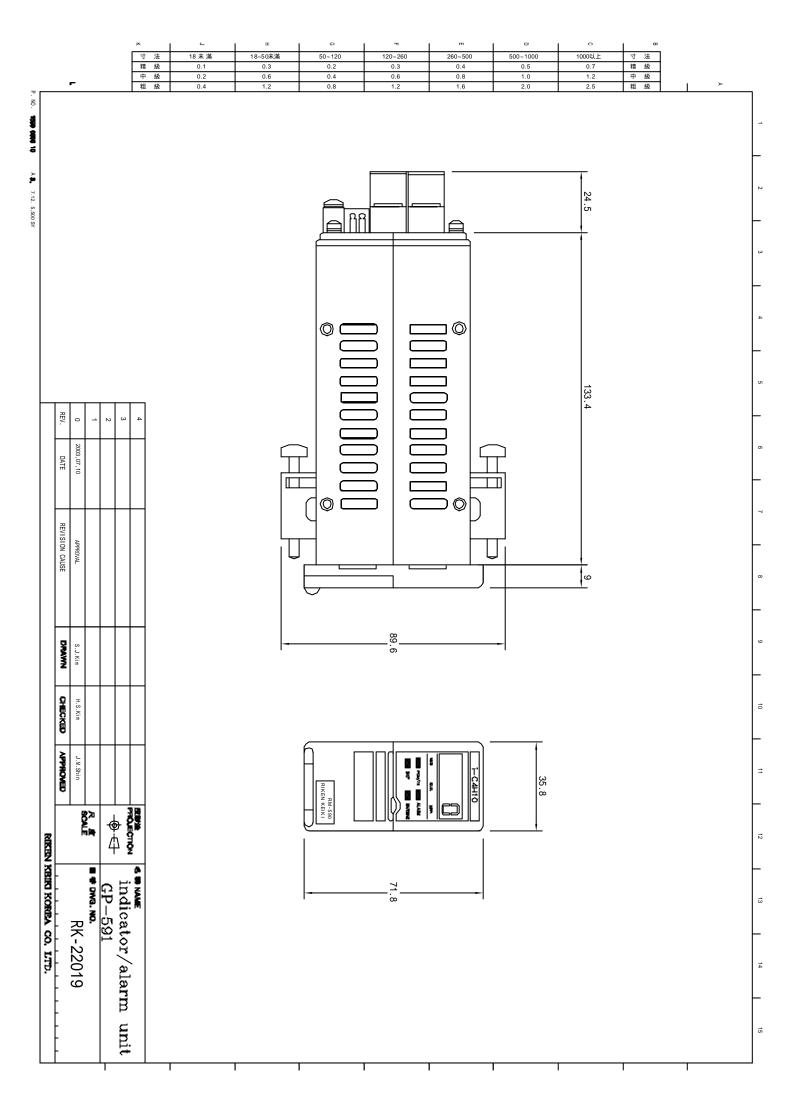
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	4	GND	_		4	AL2	CONTACT
	0	3	DETECTOR HEAD®		0	mp	TROUBLE
	2	4	DETECTOR HEAD4		2	TR	ALARM CONTACT
TD 2	3	5	DETECTOR HEADS	TD 4	3	4-20	+ DC 4-20mA
	4	6	DETECTOR HEAD®		4	4-20	- OUTPUT



#### -50-

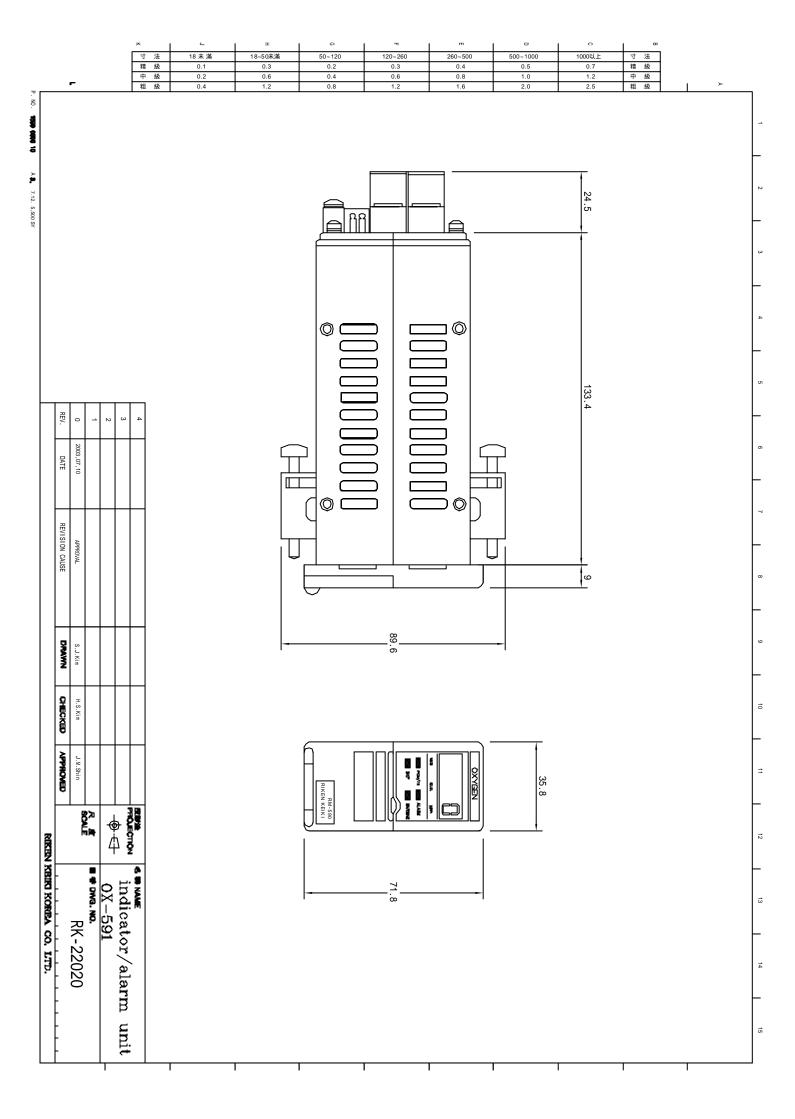
# INDICATOR / ALARM UNIT SPECIFICATIONS

GP-591
Catalytic combustion
Combustible gases
0 ~ 100 %LEL
4 digit digital LED , Gas concentration indication
Within ±25% for indication value
0~50° C,90%RH
DC 24V ±10%
10W (DC)
1st alarm flashing LED(orange), Latched mode 2nd alarm flashing LED(red), Latched mode
1a or 1b(Both 1st and 2nd alarm) latched mode, Non-latched mode after reset
4~20mA DC
0-60 sec., adjustable in 1 second increments.
4~20mA transmission
Green LED flashing, non-latched  1a or 1b, non-latched



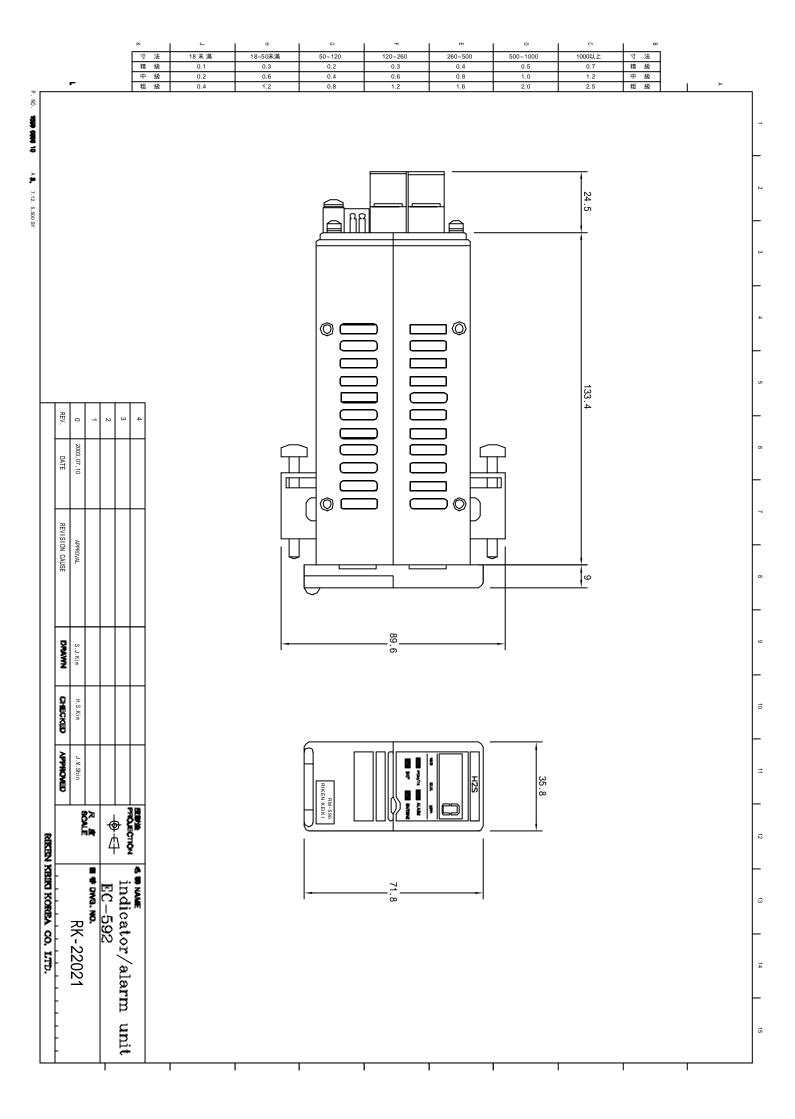
## INDICATOR / ALARM UNIT SPECIFICATIONS

Model	OX-591
Detection principle	Galvanic cell
Gas detected	Oxygen
Measuring range	0 ~ 25 VOL%
Indication	4 digit digital LED , Gas concentration indication
Alarm accuracy	Within ±25% for indication value
Operating temperature & humidity	0~50° C,90%RH
Power supply	DC 24V ±10%
Power consumption	5W (DC)
Alarm indication	1st alarm flashing LED(orange), Latched mode 2nd alarm flashing LED(red), Latched mode
Alarm contact	1a or 1b(Both 1st and 2nd alarm) latched mode, Non-latched mode after reset
Output signal	4~20mA DC
Alarm delay circuit	0-60 sec., adjustable in 1 second increments.
Transmission method	4~20mA transmission
Trouble alarm	Green LED flashing, non-latched



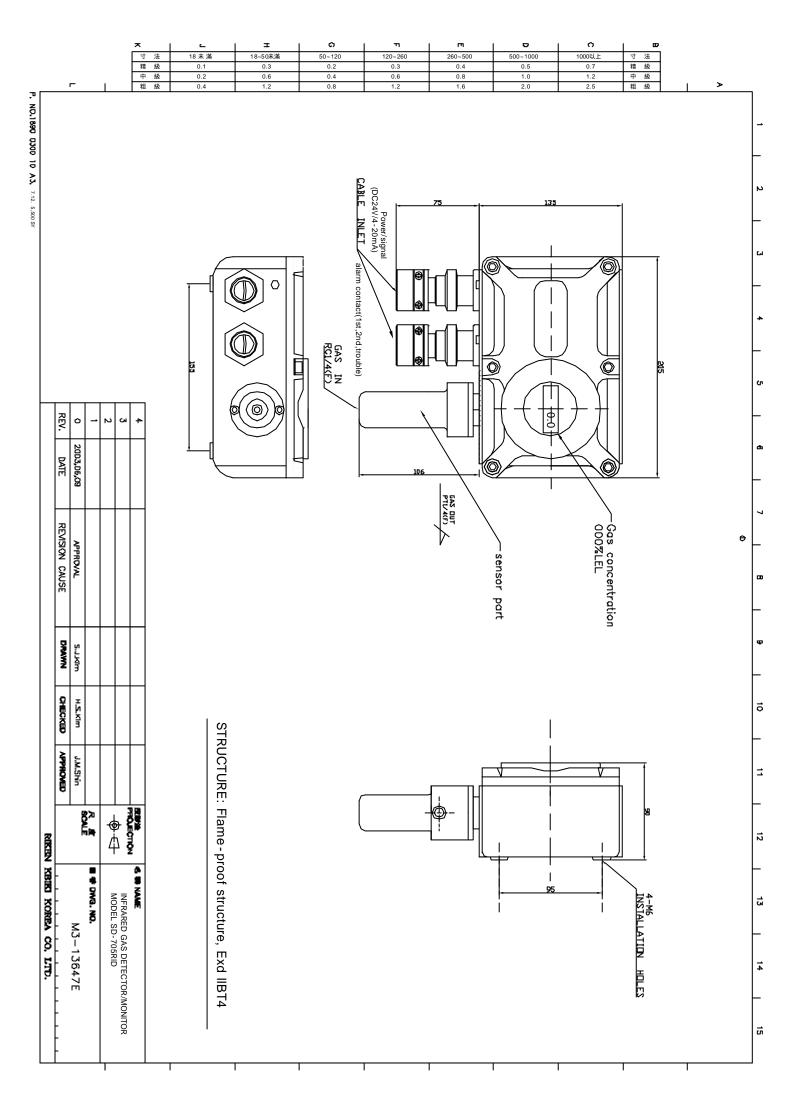
# INDICATOR / ALARM UNIT SPECIFICATIONS

	4 444 444 444
Model	EC-592
Detection principle	Electrochemical
Gas detected	Hydrogen sulfide(H2S)
Measuring range	0 ~ 30 PPM
Indication	4 digit digital LED , Gas concentration indication
Alarm accuracy	Within ±25% for indication value
Operating temperature & humidity	0~50° C,90%RH
Power supply	DC 24V ±10%
Power consumption	5W (DC)
Alarm indication	1st alarm flashing LED(orange), Latched mode 2nd alarm flashing LED(red), Latched mode
Alarm contact	1a or 1b(Both 1st and 2nd alarm) latched mode, Non-latched mode after reset
Output signal	4~20mA DC
Alarm delay circuit	0-60 sec., adjustable in 1 second increments.
Transmission method	4~20mA transmission
Trouble alarm	Green LED flashing, non-latched  1a or 1b, non-latched



# SMART DETECTOR HEAD/TRANSMITTER SPECIFICATIONS

Model	SD-705RID
Detection principle	Non-dispersive infrared Ray Absorption method
Gas detected	Hydrocarbon(HC)
Measuring range	0 ~ 100%LEL
Signal transmission	3 wires analog transmission
Structure	Wall mounting type Explosion proof (Flame proof) EXdIIBT4
Output signal	*Gas density output : 4-20mA(Linear)  *Malfunction : 0.5mA  *At manintenance mode and initial clear time:2.5mA
Transmission distance	Max. 1.25km by CVVS 1.25sq cable
Reponse time	Within 30sec to get 60% of final reading
Signal transmission	3 wires analog transmission
Contact output	1)Gas alarm: 1st/normal open ans 2nd/Normal open. 2)Trouble alarm: Normal open.
Display function	Gas concentration and others by LCD and LED
Adjustment method	ZERO and SPAN adjustment by control key (non-contract)
Power requirement	DC24V ±10% Max 4W
Dimension & weight	205(W) x 230(H) x 90(D) mm Approx 5.2kg





### 防爆構造電気機械器具型式検定合格証

申 請 者	東京都板橋区小豆沢2丁目7番6号 理研計器株式会社
製 造 者	東京都板橋区小豆沢2丁目7番6号 理研計器株式会社
品名	ガス濃度計(吸引式)
型式の名称	SD-705RID
防爆構造 の 種 類	耐圧防爆構造
対象ガス又は蒸気の 爆発等級及び発火度	пвт4
定格	電源 DC24V 160mA
	ガスセンサ部 光源 DC5V 200mA センサ DC10V 5mA
	伝送信号出力 DC24V 30mA 接点出力 AC125V 0.3A DC30V 1A
使 用 条 件	
型式検定合格番号	第 C14401 号
	平成12年03月01日 から 平成15年02月28日 まで - 関目性温温に
	平成12年03月01日 から 平成15年02月28日 まで <u></u>
有効期間	平成 年 月 日 から 平成 年 月 日 まで
	平成 年 月 日 から 平成 年 月 日 まで

機械等検定規則による型式検定に合格したことを証明する。 平成12年03月01日



### CERTIFICATE OF EXPLOSION-PROOF TEST FOR ELECTRICAL EQUIPMENT

Applicant	RIKEN KEIKI CO., LTD.	
	2-7-6 Azusawa Itabashi-ku, Tokyo	
Name of manufacturer	RIKEN KEIKI CO., LTD.	
	2-7-6 Azusawa Itabashi-ku, Tokyo	
Name of equipment	Gas detector (Sample-drawing)	
Model designation	SD-705RID	
Kind of explosion-proof construction	Flame proof explosion proof structure	}
Ignition group & explosion class	II BT4	
of objective gas or vapour		
Rating	Power source : DC 24V, 160mA	v.
	Gas sensor part	•
	Light source : DC 5V, 200mA	
	Sensor : DC10V, 5mA	
	Transmission signal output	
	: DC24V, 30mA	
	Contact capacity	
	: AC125V 0.3A	•
	DC30V 1A	
Operating condition		
Test certificate number	No. C14401	,
	From Mar. 1, 2000 to Feb. 28, 2003	Approved stamp
Terms of validity	From Mar.1, 2003 to Feb.28, 2006	Approved stamp
	From to	
	From to	

We hereby certify that the above equipment meets with the requirements specified by the regulation for certifying the explosion-proof electrical apparatus.

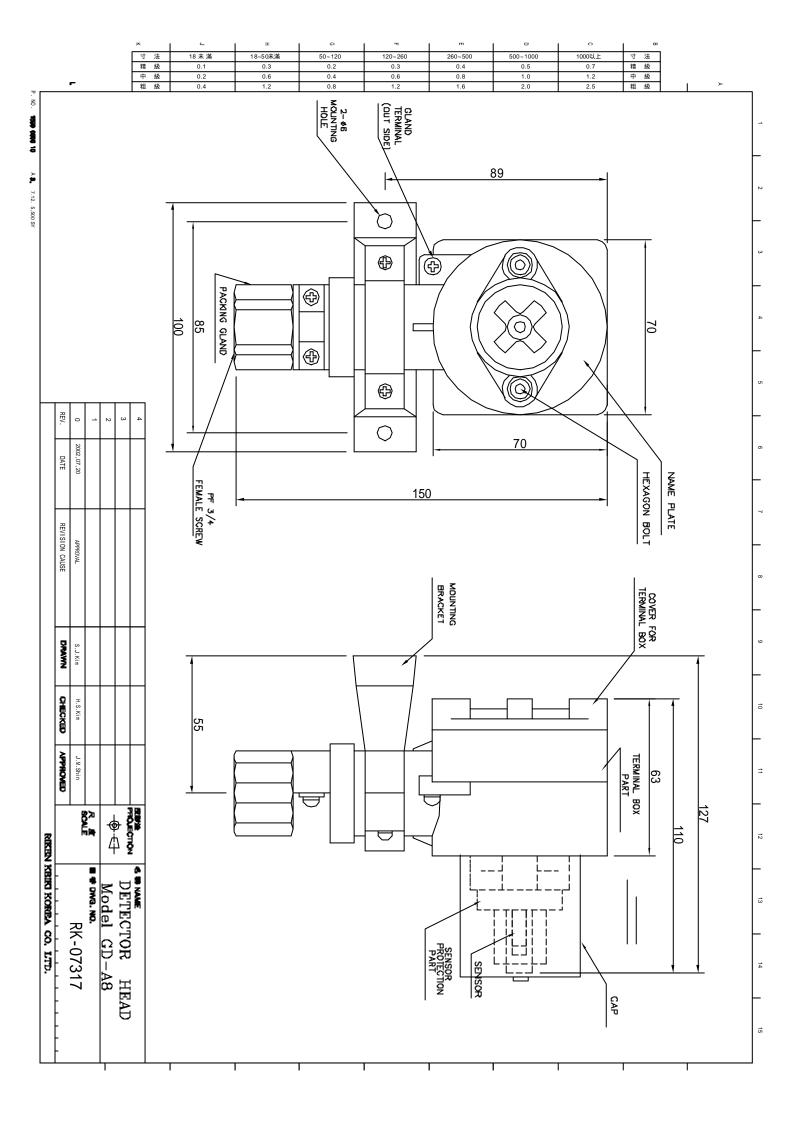
March 1, 2000

Director

Technical Institution of Industrial Safety Japan, Certifying Organization Authorized by Ministry of Labour

### **DETECTOR HEAD SPECIFICATIONS**

Model	GD-A8	
Detection principle	Catalytic combustion	
Gas detected	Hydrocarbon(HC)	
Measuring range	0 ~ 100%LEL	
Explosion proof	Flameproof d3aG4 Approval No. 43642 (By Ministry of Labour, Japan)	
Structure	Wall mounting type 2B(50A) (Drip water proof)	
Sampling method	Flow-thru type : for C.P.R     diffusion type : for panel inside	
Ambient temperature & humidity	0~50° C , Less than 95%RH	
Reponse time	Within 20 sec	
Connection cable	2sq. CVV-4C	
Cable conduct	Flame proof packing method PF 3/4 Cable dia ø13(Install) ø11, ø12(Accessory)	
Outer dimension	Approx. 110(L) × 70(W) × 150(H) mm	
Weight	Approx. 0.9kg	
Painting color	Detector head Munsell N-5 Name plate Munsell red	



### KOREA INSTITUTE OF MACHINERY & MATERIALS(KIMM)

. EX23FLP973

Cert. No.

An independent, government designated, nonprofit institute for ship safety

10th Nov., 2003

### ADEDLEDRAD DEAD

OF

ELECTRICAL APPARATUS FOR EXPLOSIVE GAS ATMOSPHERES

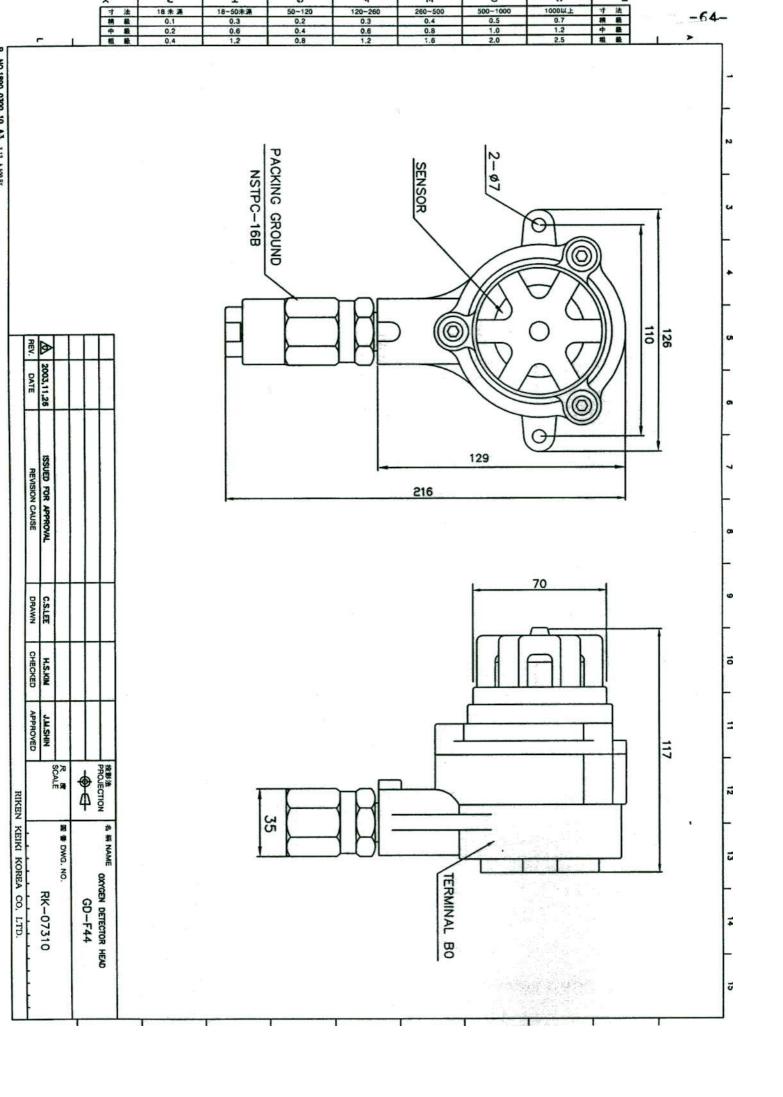
(Issued under Authority vested by the Government of Republic of Korea)

Description of apparatus	: Gas Detector
Model(Type)	: GD-A8
Applicant	Riken Keiki Korea Co., Ltd.
Manufacturer	: 2-7-6, Azusawa, Itabshi-ku, Tokyo 174-8744, Japan
Drawing No.	: M2GD-0A8-00-006E
Manufacturer's serial No.	: not applicable
inspected by KIMM in accordand has been found to control of the co	MM No. H23099E-1  MM No. EX23FLP973, Ex d IIC T4  Chun-Ha Lee, Ph. D.  Director, Explosion Proof Department,
Industrial Safety Research	h Center Industrial Safety Research Center

Mailing Address: Korea institute of Machinery & Materials(Kimm) industrial safety center 29-1, sechul-ri, baebang-myun, Asan-kun, Chungchbongnam-do, 33-795, korea, Phone: (041)540-5367, FAX: (041)540-5360, email: choibs@office.hoseo.ac.kt 2003EX-V-S-01

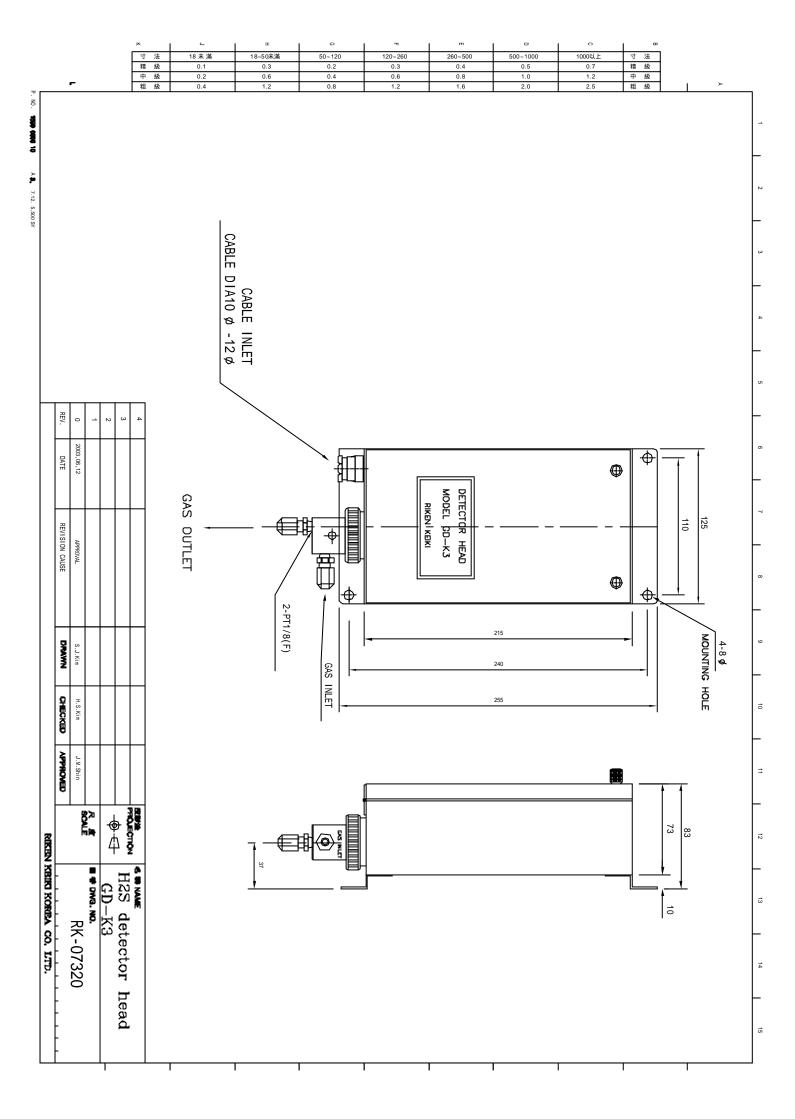
# OXYGEN DETECTOR HEAD SPECIFICATIONS

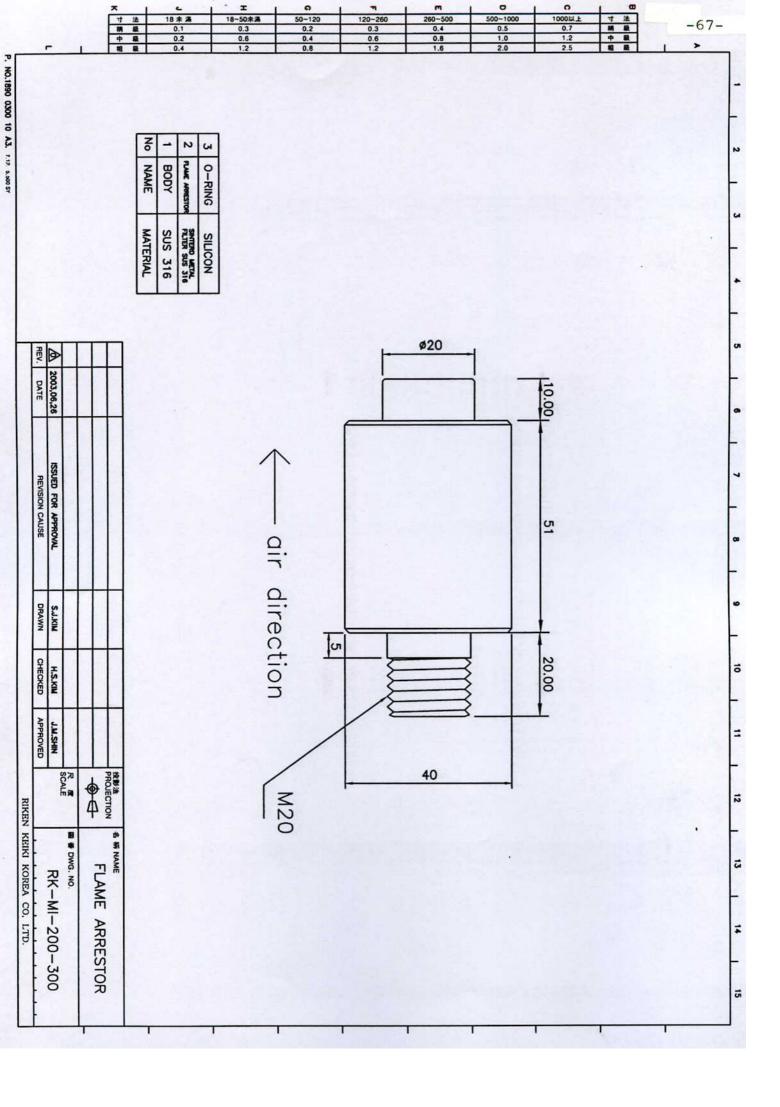
Model	GD-F44	
Detection principle	Electrochemical (Galvanic cell)	
Gas detected	Oxygen (O2)	
Measuring range	0 ~ 25 VOL%	
Structure	Wall mounting type	
Connecting cable	2sq, CVVS-2C	
Ambient temperature & humidity	0~50° C,90%RH	
Cable conduit	Flame proof packing method PF 1/2 Cable dia Ø13, Ø11,12	
Painting color	Melamine coating (Munsell N5)	
Dimensions	Approx. 126(W)×216(H)×117(D)mm	
Weight	Approx. 1.8 Kg	
Sensor type used applicable	OS-B11	

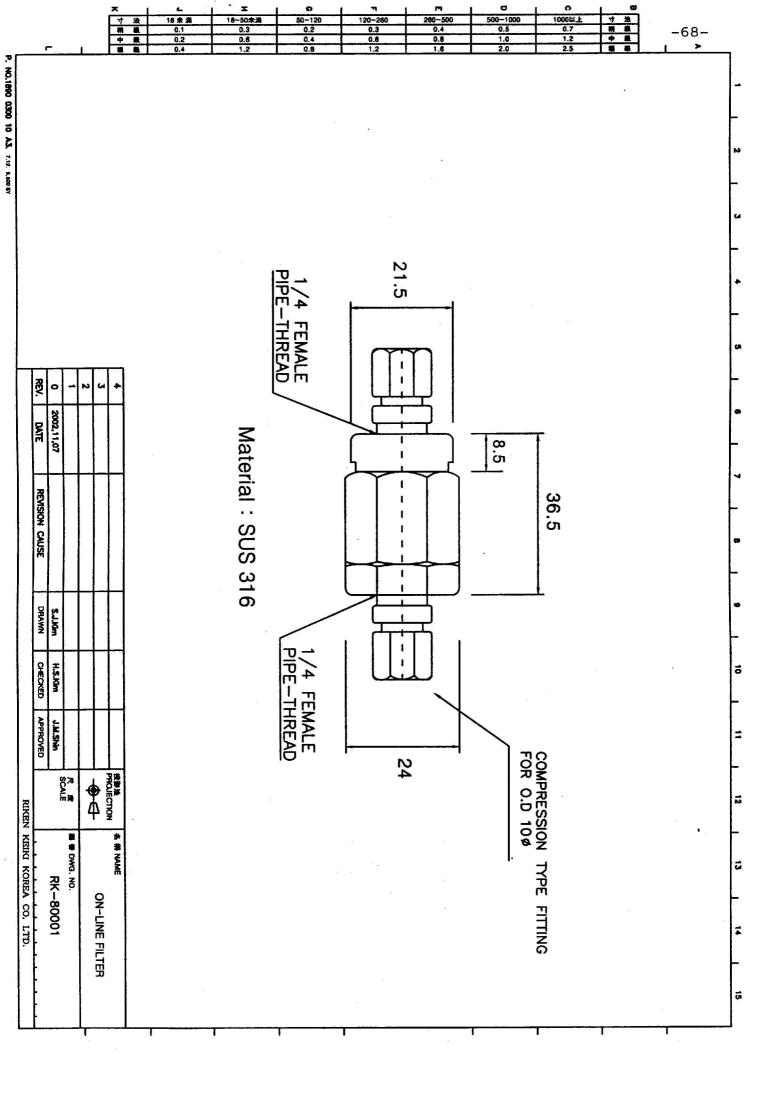


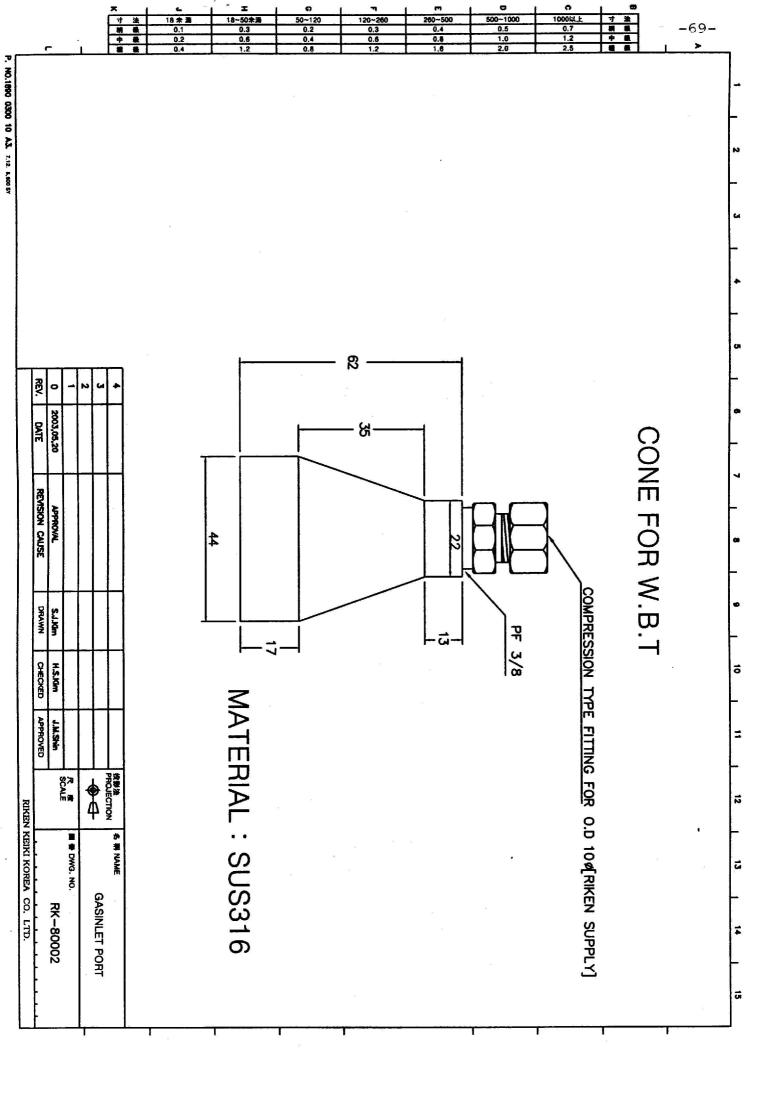
### HYDROGEN SULFIDE DETECTOR HEAD SPECIFICATIONS

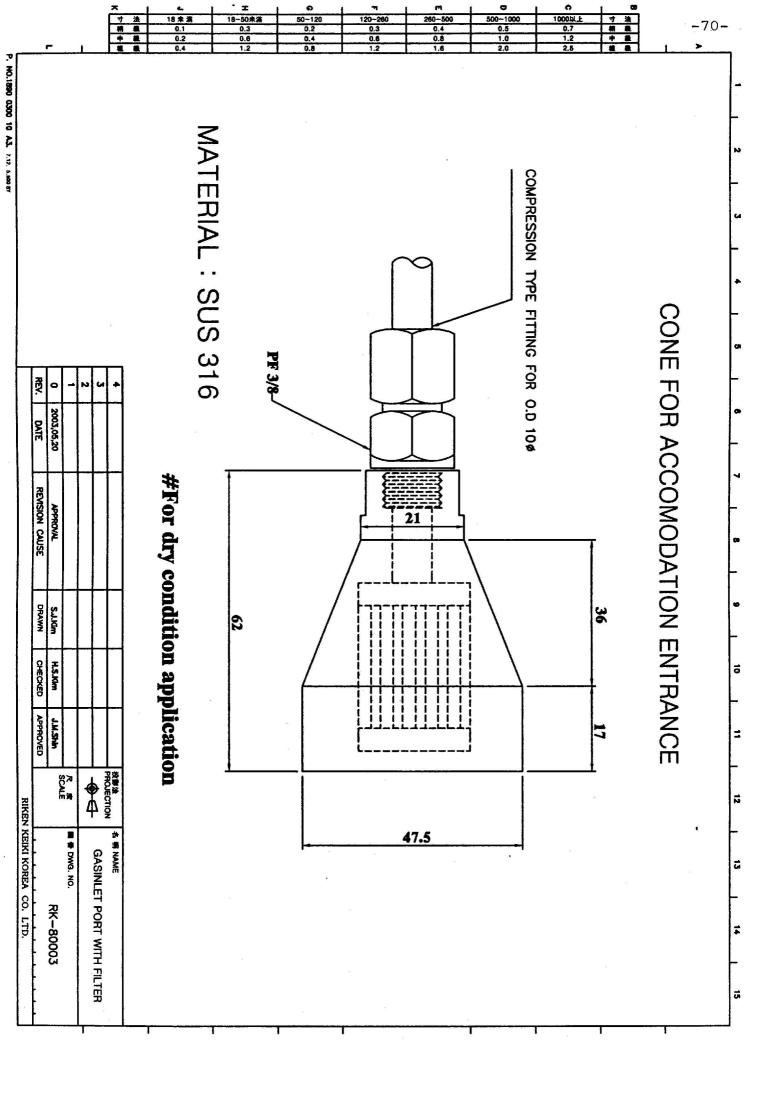
Model	GD-K3
Detection principle	Electrochemical method
Gas detected	Hydrogen sulfide (H2S)
Measuring range	0 ~ 30 PPM
Accuracy	Better than ±10% of full scale
Structure	Static diffusion, wall mounting type (Weather-and-dust-proof enclosures)
Sensor type	ES-937P
Ambient temperature & humidity	0~50° C,90%RH
Reponse time	Within 30 sec to 90% response.
Output	2-wire method 4-20mA
Dimensions	120(W) × 255(H) × 83(D) mm
Weight	Approx. 1.7Kgs











SHIP No.		SPARE PARTS		U S E		SETS PER VESSEL
5261/62/63 GAS DETECTION SYSTEM			SD-715RID-18S+ RM-591-F4A/K3-8S		1	
ITEM No.				DUTLINE QUANTITY		REMARKS
1	Filter for flame arrestor				7	
2	DI	APHRAM SHEET		0	2	Diaphragm for NMPB31KNE maker:KNF
3	יום	APHRAM SHEET		600	2	Diaphragm for NI22ANE. maker:KNF
4	Ог	n-line filter			11	
5	3-	WAY SOLENOID VALVE			2	model 6014
6	2-WAY SOLENOID VALVE				2	model 6 <b>1</b> 13
7	F	USE 5A			4	
8	F	USE 3A			2	
9		SPARE SENSOR			1	HW-6211
10		Filter for gas inlet port			4	
11	Re	elay 220V			2	

SHIP No.		. CALIBRATION KIT		U S E		SETS PER VESSEL
5261/62/63 GAS DET		GAS DETECTION SYSTEM	SD-715RID-18S+ RM-591-F4A/K3-			1
ITEM No.	NAME OF PART		DUTLINE QUANTITY		REMARKS	
1	1 STANDARD GAS CAN			þ	10	i-C4H1L, 53%LEL in air bal. 961mL, 8.5kg/cm2, can type
2	ST	ANDARD GAS CAN			2	02, 5.0%VOL in N2 bal. 96lmL, 8.5kg/cm2, can type
3	Ş.A	MPLING BAG 40L	_		1	
4	can regulator				1	
5	H25 ampoule 11ea per 1 pkg				1	
6	Telder bag 41L  for H2S gas				1	
7	Ampoule crucher				1	
8	Har	nd aspirator	V		1	
9	s.	TEEL BOX	É		1	
10	Ca	ntral key for SD-705RID			1	
11	HE	XAGON RENCH FOR SD-705RID			1	
12	HE	XAGON RENCH FOR GD-A8			1	
13	TRO	OX DRIVERS FOR SOLENOID VALVE	<b>E</b>		1	
14	pol	yurentane tube			2m	8ø

# REFERENCE LIST FOR PARTS

RIKENKEIKI KOREA CO.,LTD

	KIIX	ENKLIKI KORLA CO.,LTD
NAME OF PART	OUT LINE	MODEL NAME
Sampling pump for W.B.T		RKP-36
Sampling pump for P/R		RKP-930
FLAME ARRESTOR		RKFA-01
FILTER FOR FLAME ARRESTOR		RKFA-SM
SOLENOID VALVE FOR 2-WAY TYPE: MANIFOLD		RK-2SV-M
SOLENOID VALVE FOR 2-WAY TYPE : SINGLE		RK-2SV-S
SOLENOID VALVE FOR 3-WAY TYPE: MANIFOLD		RK-3SV-M
SOLENOID VALVE FOR 3-WAY TYPE : SINGLE		RK-3SV-S
MIST SEPARATOR		RK-MS
FLOW METER		Q20
ON LINE FILTER	<b>□</b> □□□	RK0F-01
GAS INLET PORT		RK-IP
FILTER FOR GAS INLET PORT		RK-IPF
STOP VALVE		RK-ST

# REFERENCE LIST FOR PARTS

RIKENKEIKI KOREA CO.,LTD

		EMMEM NOMEN CO.,ETD
NAME OF PART	OUT LINE	MODEL NAME
HC DETECTOR HEAD		GD-A8
H2S DETECTOR HEAD		GD-K3
02 DETECTOR HEAD		GD-F44
HC DETECTOR HEAD(IR TYPE)		SD-705RID
SENSOR ELEMENT FOR GD-A8(HC)		HW-6211
SENSOR ELEMENT FOR GD-K3(H2S)		ES-937X
SENSOR ELEMENT FOR GD-F44(02)	- Car	0S-B11
SENSOR ELEMENT FOR SD-705EC(H2S)		ES-837RP
IR HC SENSOR SINTERED METAL/CABLE FOR SD-705, 805RI/RID		RK-IR-HC
IR HC SENSOR SINTERED METAL/CABLE FOR SD-705, 805RI/RID		RK-IR-CH4
INDICATOR ALARM UNIT, HC 0-100%LEL		GP-591
INDICATOR ALARM UNIT, 02 0-25%		0X-591
INDICATOR ALARM UNIT, H2S 0-100PPM		EC-592 (CONNECTED WITH GD-K3)
INDICATOR ALARM UNIT, H2S 0-100PPM		RI-593 (CONNECTED WITH SD-705EC)

# REFERENCE LIST FOR PARTS RIKENKEIKI KOREA CO.,LTD NAME OF PART OUT LINE MODEL NAME SAF-3000 AIR FILTER

CONTACT POINT : RIKEN KEIKI KOREA CO.,LTD

#301-16, BUGOK1-DONG, KUEMJUNG-GU, BUSAN, KOREA

TEL: 82-51-518-3613-5, FAX: 82-51-518/7736

E-MAIL: master@rikenkeiki.co.kr

## SIGNAL INPUT/OUTPUT CABLE FOR . RM-590 SINGLE CASE(590-SRI)

## OPERATING INSTRUCTION MANUAL

#### Safety precautions

- Read and understand the instructions in this manual before using this cable.
- 2. Keep manual accessible at all times.
- 3. This signal input/output cable cannot be used for any other purpose than what is specified in this manual.
- 4. Follow all the instructions in this manual, any deviation will compromise the safety, quality and performance of RM-590 series.
- 5. We accept no responsibility for an accident caused by the user not following the instructions in this manual.

# RIKEN KEIKI CO., LTD., FINE 2-7-6 Azusawa Itabashi-ku Tokyo, 174-8744 Japan

: 81-3-3966-1113 Phone : 81-3-3558-9110 GIII Fax

: intdept@rikenkeiki.co.jp

In the beginning

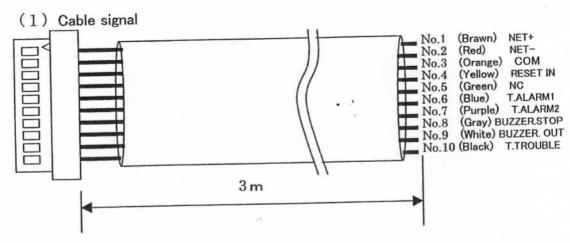
When control signals from client are connected with single case of RM-590 series or RM-590 single case is used without buzzer unit TAN-590, it is difficult to connect common signals such as buzzer signal, RESET signal, NET signal, etc. to the single case.

To solve this problem, the Signal input/output Cable with connector(Parts No.2440-0334-00) is provided as optional accessories.

This manual describes how to use the signal input/output cable with connector. For the detailed operating instruction for the unit of RM-590 series, please refer to individual manual.

Cable signal

Name of each cable signal and its signal arrangement are shown below.



#### (2) Signal arrangement

No. of pin	Color of wire	Name of signal
1	Brawn	NET+Signal
2	Red	NET-Signal
3	Orange	COM (Common terminal)
4	Yellow	RESET signal input
5	Green	Unused
6	Blue	Output of total gas alarm(1st)
7	Purple	Output of total gas alarm(2nd)
8	Gray	Input of buzzer stop signal *
9	White	Output of buzzer signal
10	Black	Output of total trouble alarm



#### WARNING

Connect the connector side to CN2 or CN3 in single case and the other end to cable for system configuration. Make necessary end treatment for unused wiring not to make short-circuit between housing and signal cables.

#### \* NOTE

The buzzer stop signal is functioned only when alarm pattern of indicator/alarm unit is specified as "lock-in" version.

The buzzer stop operation in latched mode and non-latched mode(self-reset) version is done with the reset signal.

Definition of word

#### ①NET+、-signals

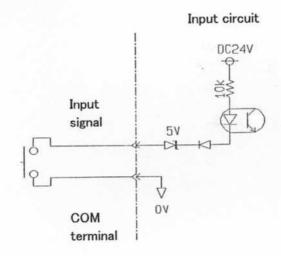
The NETsignal is used to communicate both sides between indicator/alarm unit and upper system. To use this signal, it is required to make system design in combination with upper system.

Please contact with our nearest agent or Riken Keiki if the arrangement of NET signal is required.

#### 2 Input signal (Connect with COM terminal).

This is for reset terminal at gas alarm and trouble alarm. Connect the switch between wires of this terminal and COM terminal.

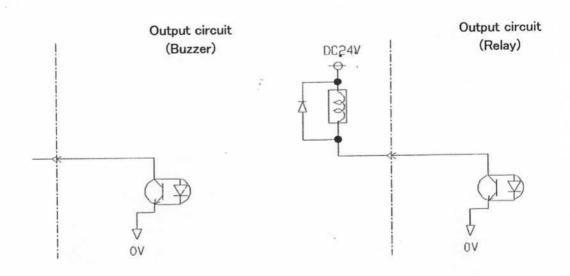
#### Input circuit



#### 3Output signal

Signals of buzzer, total gas alarm and total trouble alarm are output.

#### Output circuit



#### A

#### CAUTION

In case of inductive load such as relay etc., connect a diode in series to absorb the counter electromotive force.



#### WARNING

Load to the connector side shall be below 50mA at 24VDC.

# 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 WARRNTY 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.

# OPERATING INSTRUCTION MANUAL FOR INDICATOR/ALARM UNIT GP-591

#### FOR USERS

#### Safety Precautions

- 1. Read and understand the instructions in this manual before operating this instrument.
- 2. Keep manual accessible at all times.
- 3. This (instrument, monitor, indicator/alarm) cannot be used for any other purpose than what is specified in this manual..
- 4. Follow all the instructions in this manual, an deviation will compromise the safety, quality and performance of this instrument.
- 5. We accept no responsibility for an accident caused by the user not following the instructions in this manual.



#### EN RIKEN KEIKI CO., LTD.

2-7-6 Azusawa Itabashi ku Tokyo, 174-8744 Japan

Phone : 81-3-3966-1113 Fax : 81-3-3558-9110 GIII E-mail : intdept@rikenkeiki.co.jp

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#### 1.PRODUCT OUTLINE

#### 1-1. In the beginning

First of all, we wish to express our heartfelt thanks for your purchase of our indicator/alarm unit GP-591.

This instruction manual is just a guide book to operate indicator/alarm unit GP-591 of RM-590 series. Your kind reading of this manual is requested not only for first user but for already experienced staff.

#### 1-2. Application for use

- O This is an exclusive indicator/alarm unit to be used in combination with our catalytic combustion sensor type combustible gas detector head..
- O Combustible gas leaked into ambient air is detected with combustible gas detector head which is connected with this indicator/alarm unit..

  Detection results(Gas concentrations) are displayed with 4-digit LED indicator.
- O This unit outputs 4-20mADC as gas concentration signal.
- O This unit provide 2 relay contacts for outer gas alarm.

#### 1 - 3 Identification of each cautional marks



Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. This signal word is to be limited to the most extreme situation.

#### **▲** WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

### A CAUTION

Indicates a potentially hazardous situation which, it not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

\* NOTE

This means "ADVICE" at operation;

#### 2. IMPORTANT INSTRUCTION FOR THE SAFETY

#### 2-1. Danger items



DANGER

This is not a explosion proof unit. Do not use it at hazardous area.

#### 2-2. Warning items

#### WARNING .

#### · Detector head

Do not connect other detector head than designated combustible gas detector head. If connected, you can not detect gas. Furthermore, this unit or other connected unit may be broken.

#### Power source

Before supplying the power, confirm that the power source is a designated voltage.

#### · Necessity of protective grounding

Do not cut inside or outside wire for earth, nor disconnect the wire from earth terminal.. In any case, the unit becomes dangerous conditions.

#### · Defect of protective function

Do not operate the unit if protective functions such as protective grounding or fuse are seems to be defective. Also, before operating the unit confirm that there is no defect for protective functions.

#### · Fuse

Use the designated rating (current, voltage, type) fuse to prevent fire.

Replacement of fuse shall be done after put off the initial power source and put off the power switch of this unit. Do not use other fuse than designated one, nor make short circuit for fuse holder.

#### · External connections

After making protective grounding firmly, connect to external control circuit or detection objective.

#### · Counteraction at gas alarm

When detect high concentration gas than preset alarm level, it is very dangerous. It is required to take an appropriate measures by customer's decision.

#### · Mounting/dismounting

Locking mechanism may be broken if the unit is mounted into the case with disengagement lever up position. Make correct procedure for mounting/dismounting...

#### 2-3. Cautional items

#### CAUTION

· Do not use walky-talky near this unit.

When this unit receives the electric waves by walky-talky etc near from the cable, this will effect the reading. When use the walky-talky, operate it at the place where there is no influence of electric wave ejection.

When make power on again, make it after an interval of over 5 seconds.

When make power on within 5 seconds, there may be no normal operation,

When operate it not to follow this manual, repair it by other rating parts or modify it on his own, the safety and quality of products can not be secured. Then, when an accident take place by it, we cannot assure our responsibility on them.

Take enough consideration for instrumentation to keep safety even if disconnection of power and signal lines, defect of operation or trouble would be happen due to unexpected reason.

This is an electrical applied instrument.

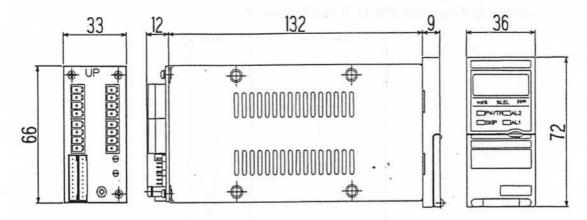
Be care it may be effected by power noise, electrostatic and electromagnetic noise.

When use under such conditions, make protective treatment for use.

#### 3. PRODUCT FUNCTION

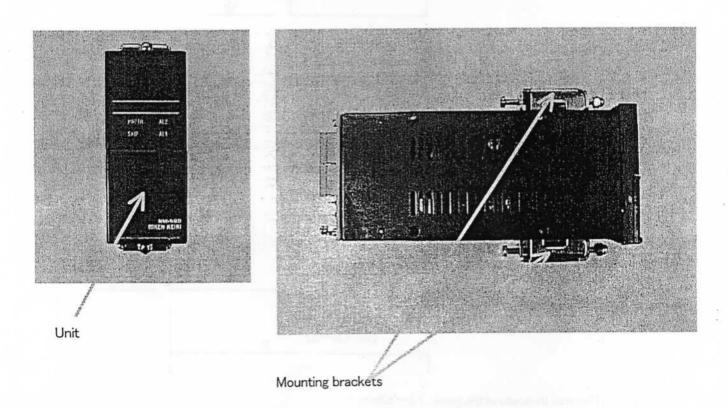
#### 3-1. External drawing (with single case)

\*Refer to the operating instruction manual for multi-unit case when multi-unit case is used.

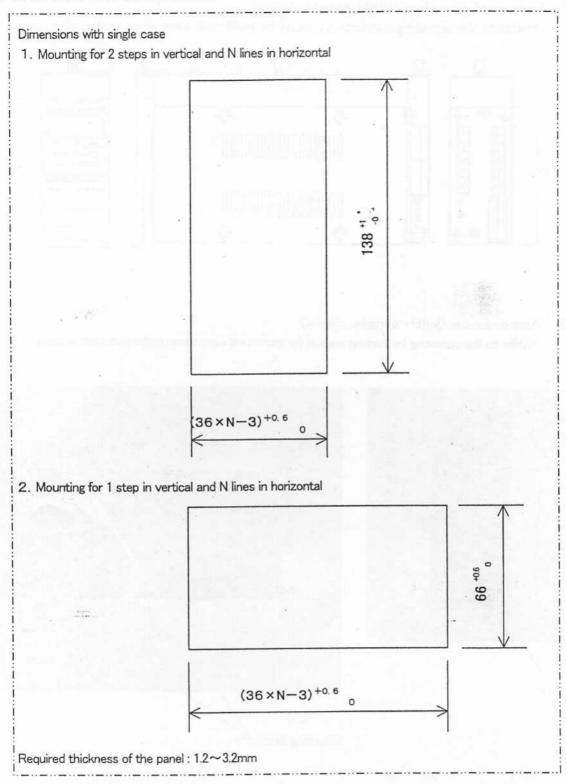


#### 3-2. Apperance (with single case)

\*Refer to the operating instruction manual for multi-unit case when multi-unit case is used.



#### 3-3. Panel cut-out dimensions



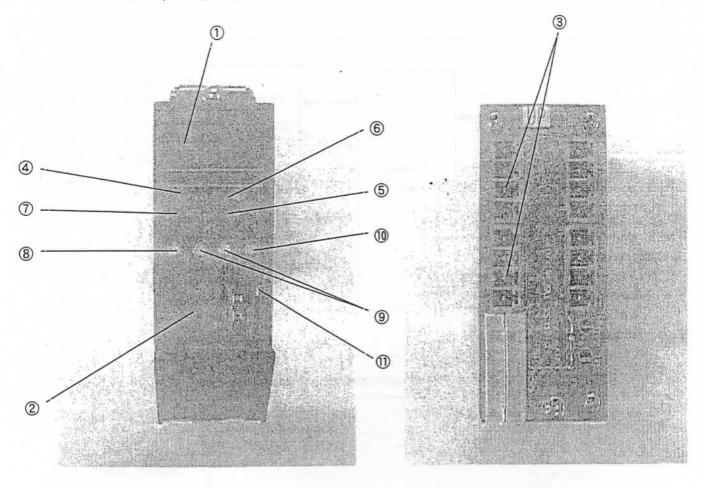
Refer to the instruction manual for multi-unit case if installed the unit to multi-unit case.

#### A CAUTION

Please consult us or with our agent for installation method or installation quantity to avoid trouble caused by radiating heat.

#### 3-4. Name of each part and function

\*The below pictures show indicator/alarm unit with single case.



(1)LED display ..... Indicates gas concentration.

②POWER switch · · · · · · · ON/OFF switch

3 Terminal plates ..... Connects cables from outside.

For multi-unit case refer to instruction manual for multi-unit case.

4)PW/TR light ..... Combination light for power and trouble indication.

Steady light: Power ON, normal operation

Flashing : Trouble

⑤AL1 light····· Flashes at gas alarm (1st alarm)

6AL2 light Flashes at gas alarm (2<sup>nd</sup> alarm)

⑦SKIP light · · · · Flashes during maintenance mode.

(8)MODE switch ..... Uses at maintenance work.

@UP/DOWN switch ..... Uses to select items at maintenance mode, increase or decrease reading

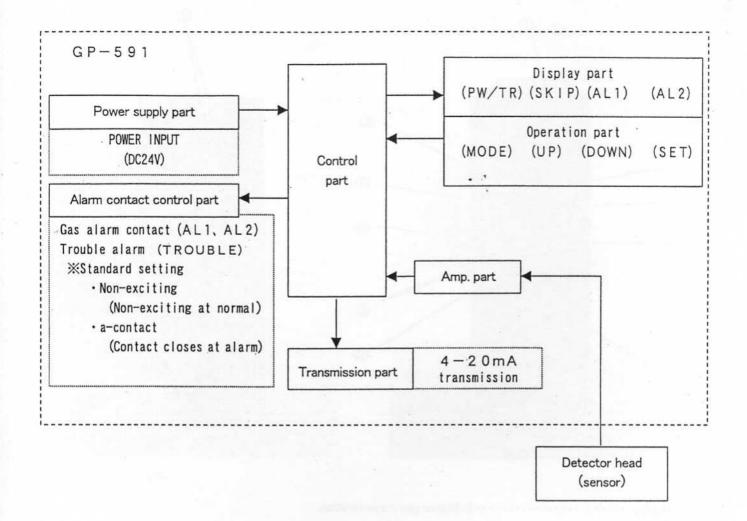
at zero and span adjustments, and to increase or decrease reading at

alarm test

① SET switch · · · · · · · · · · · · · Uses to change for alarm test mode.

① HEAT control knob · · · · · · · · · · · · · · · Uses to adjust the heater voltage of the sensor.

1 Disengagement lever • • • • • • Locks the indicator/alarm unit.



#### 4. HOW TO USE

#### 4-1. Before operation

Be sure to keep cautional items of use not only for first user but for already experienced staff.

If not keep these cautional items, the unit may be defective and correct gas detection may not be performed.

#### 4-2. Mounting/dismounting procedures

Indicator/alarm unit for RM-590 series shall be used after housing it in either exclusive single case or multi-unit case.

#### (1) Mounting method

- ·Open the front cover of this unit.
- · Confirm that the power switch is at OFF
- •With the disengagement lever at down position, mount into the case.

  (Confirm that the edge connector is put in firmly)
- · Confirm that the disengagement lever is turned upward when indicator/alarm unit is mounted into the case firmly.
- · After confirmation of lever position, put ON the power switch, and then, close the cover.

#### (2) Removal of the unit

- ·Open the front cover of this unit.
- ·Confirm that the power switch is at OFF.
- ·Push disengagement lever down to release the lock.
- ·Pull out the unit from the case.
- ·Turn the lever upward and close the cover.

#### A CAUTION

Mounting/dismounting of indicator/alarm unit shall be done according to the above procedures. If not, stopping metal of the unit may be transformed and the cover can not be closed.

#### 4-3. Installation place

#### A CAUTION

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.

Do not install at the place where it is danger for maintenance service such as high voltage cable, etc.

This unit is required to make maintenance regularly.

Then, do not install at the place where there is danger at maintenance time.

Do not install it where it is unable to make maintenance.

When required to stop the system at maintenance time, unable to maintain if not remove a part of system or unable to detach the case due to the pipe or rack etc. do not install such place.

System housing that grounding construction is not enough.

Be sure to ground when install.

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

#### A 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 50msec.  (For power failure of 50msec, 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 lighting 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 (Protection resistor, zero diode etc.) and is designed to protect the apparatus. But as the signal may be attenuated due to the lightning arrester, check the action and it is required to use.
Grounding	Surge noise shall be generated from the thunder lightning or except it.  To protect detector from these cause, be sure to make grounding.

<sup>\*</sup> 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).

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 contents.

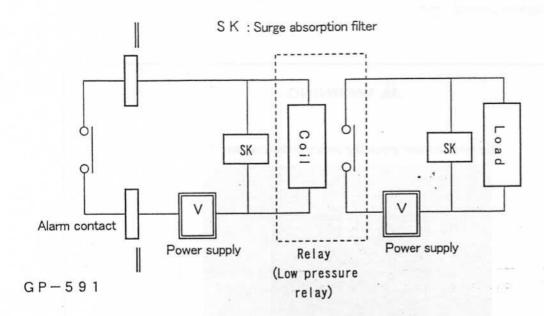
- Relayed by the low voltage relay and operate by connecting CR circuit (Spark Killer: SK) (Diode etc for DC) suited for relay coil directly to relay.
- · Add CR circuit to the load side of relay on the request.

#### A CAUTION (FOR USE OF NORMALY-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.

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 GP-591 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 no work.
- · High voltage is put inside of indicator/alarm 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.

#### A CAUTION

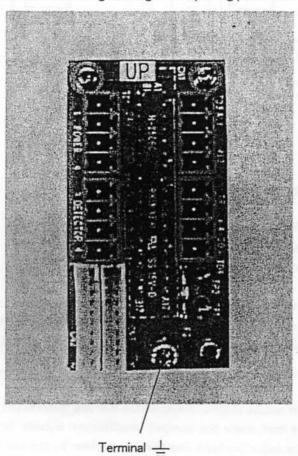
- The inductive load shall not be used in principle(Do not use fluorescent lamp).
- When use the inductive load, make the contact amplification outside, but the outside relay coil belongs to the inductive load, use the relay driven by the low voltage(within AC100V) and it is protected by an appropriate surge killer.
- When control the light inductive load directly, protect the contacts by an appropriate surge killer by all means.
- \* As the inductive load, there are following samples.
  - Patlight \* External relay \* Buzzer \*Siren \*Fan \*Fluorescent lamp \* Motor etc.

#### 4-5. Grounding

Make grounding with terminal =

#### **M** WARNING

Be sure to make grounding before putting power ON.

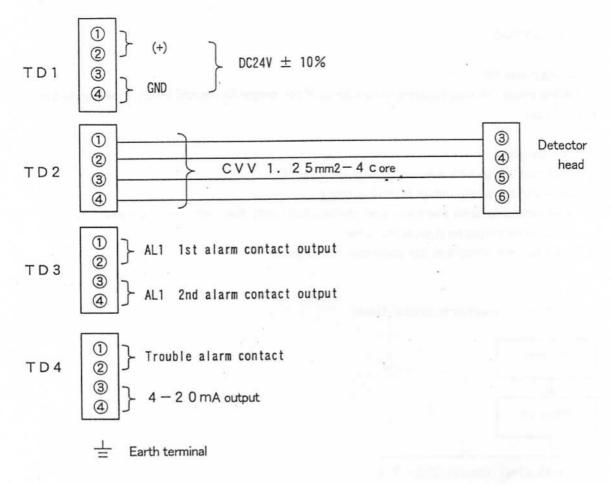


\* The above fig. shows the unit with single case. In case of multi-unit case, refer to instruction manual for multi-unit case.

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

#### 4-6. Wiring

(In case of single case)



Maximum cable length: 1. 25 km

For multi-unit case, refer to operating instruction for multi-unit case.

#### A CAUTION

- ·Use CVV 1.25mm2 cable for connection.
- Do not distribute power cable and signal cable together with power line for motor, etc.
- •This unit applies a connector type terminal plate for easy wiring. Be care not to give a high load to the connector.
- ·We can not warrant the performance of this unit if undesignated cable is used.

#### 5. OPERATION METHOD

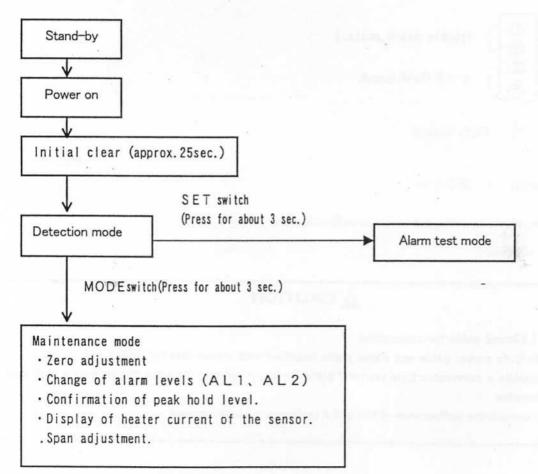
#### 5 - 1. Start-up

Before putting power ON .....

Before putting power ON, keep following caution items. If not, danger for electric shock or damage to the unit will be happen.

- (1) Make grounding.
- (2) Check that wirings with outer units are made correctly.
- (3) Check that the supply voltage is within a rating.
- (4) Relay contact for outer alarm may work during adjustments. Even relay contact works, treat that any influence will not be given to the outer.
- (5) To prevent fire, check that the designated fuse is used.

#### 5 - 2. Basic performance flow



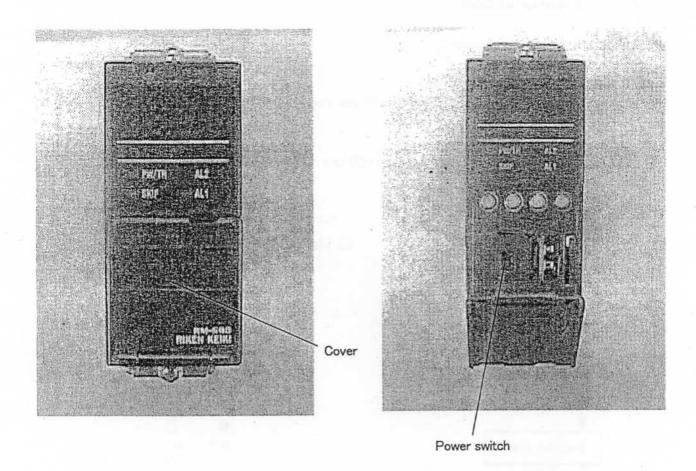
#### A CAUTION

Maintenance mode shall be performed by the specialized service man,

Do not operate it without permission.

#### 5-3. Start-up method

#### 5-3-1. Power on



- 1) Before making power on, check that the unit is connected correctly.
- 2) The power switch can be seen when the front cover is opened.
- 3) Put the power switch upward to ON and downward to OFF.
- 4) Put the power switch on, and power light illuminates.
- 5) Status of initial clear (about 25 sec.) is displayed as "----".
  - · Checking of the system (Self-diagnosis)
  - · Output signal: Approx 2.5mA
  - · Gas alarm, trouble alarm (light, contact) shut-off.

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

#### 5-4-1. Display action

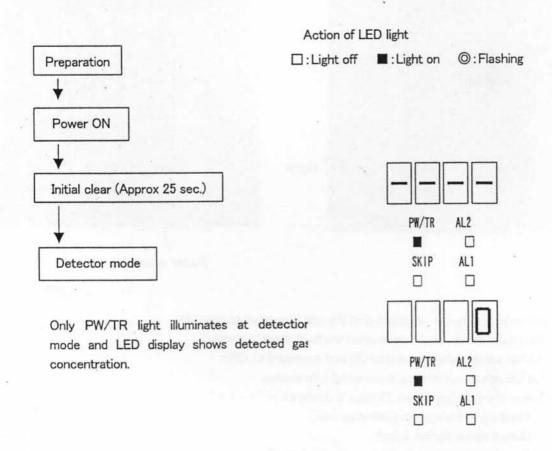
There are following two kinds of displays.

(1)LED display : Shows gas concentrations.

(2)LED light :Shows power/trouble (PW/TR), 1st gas alarm (AL1), 2nd gas alarm (AL2) and maintenance

(SKIP) condition.

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



Gas alarm condition

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

The right  $\lceil -0 \rfloor$  is displayed when it gets down to minus (-) side more than 10% of full scale.

ulae	-	0
PW/TR	AL	2
	[	]
SKIP	AL	.1
П	ſ	7

#### **A** WARNING

When it shows  $\Gamma$ -0], accurate gas reading is impossible and make zero adjustment.

#### Trouble condition

When any of trouble arises on gas detection, PW/TR light flashes and content of trouble is shown on LED display.

(LED display) (Content of trouble)

E-00 System trouble

E-01 Sensor/detector head disconnection or not yet connected.

PW/TR AL	_2
0	
SKIP A	L1

#### 5-4-2. External output action

#### 1. 4-20mA output version

(1)Signal transmission method : Electric current transmission (Non isolation)

(2)Transmission path : CVV (3)Transmission distance : Below 1 km (4)Resistive load for connection : Below 300  $\Omega$ 

(5)Status signal level

①Detection mode : 4-20mA (Depends on gas concentration),

②Gas alarm : 4-20mA (By indication valve)

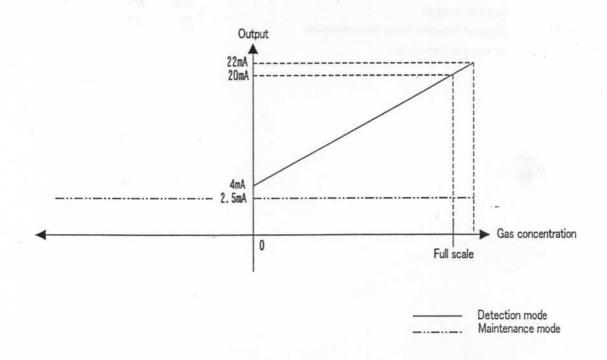
③Initial clear : 2.5mA (Fixed) ④Maintenance mode : 2.5mA (Fixed)

⑤Alarm test : 4-20mA (By indication valve)

(6)Trouble alarm : 0.5mA (Fixed) (7)Point skip : 2.5mA (Fixed)

(6)Power shut-off : 0mA

Relations between [Gas concentration] and [Output] are shown below.



#### A CAUTION

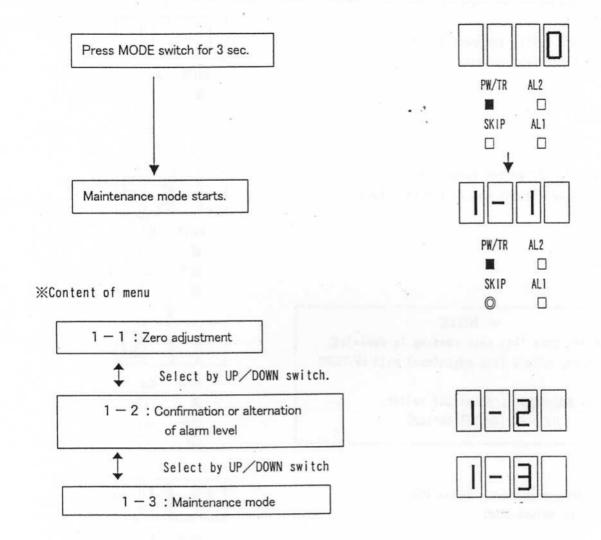
4-20mA outputs are already adjusted. If re-adjustment is required after installation, specialized service man will make re-adjustment.

Do not make this adjustment without permission.

#### 5-5. Maintenance and adjustment

#### 5-5-1. Maintenance mode

When make each adjustment, make it on maintenance mode.



#### A CAUTION

Do not operate  $\Gamma$ 1-3: Regular maintenance mode] without our permission. Please contact with our nearest agent or RIKEN KEIKI if it is required.

#### A WARNING

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

#### 5 - 5 - 2. Zero adjustment

#### \* NOTE

When make zero adjustment, supply fresh air to the detector head and adjust it after reading gets stable.

 Press MODE switch for over 3 sec. to start maintenance mode. PW/TR AL2

SKIP AL1

② Press TEST/SET switch twice. The display flashes and it can be zeroed.

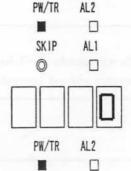
#### \* NOTE

There is the case that zero reading is deviated. At that time, make a fine adjustment with UP/DOWN switch.

After this adjustment, press SET switch.
(Zero is set by pressing SET switch).

- 3 After this adjustment, press MODE switch to return MENU.
- When return to detection mode, press MODE switch for over 3 sec. SKIP light gets off which shows that it is detection mode.

# PW/TR AL2 SKIP AL1 PW/TR AL2 SKIP AL1 SKIP AL1



SKIP

AL1

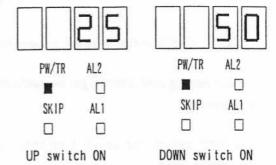
#### A CAUTION

Gas alarm is not triggered except in detection mode. When leave it alone on maintenance mode, this returns to detection mode automatically after 10 hours.

## 5-5-3. Confirmation of alarm level

This section is used to check preset alarm level.

① Press UP switch in detection mode, and the 1st alarm level (AL1) is shown. Press DOWN switch in detection mode, the 2nd alarm level (AL2) is shown.



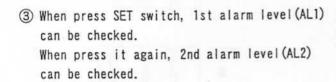
PW/TR

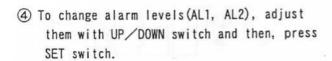
AL2

## 5-5-4. Change of alarm level

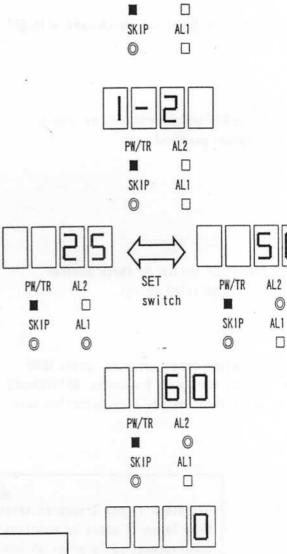
This section is used to change alarm levels.

- Press MODE switch for over 3 seconds, and maintenance mode starts.
- ② Select 「1-2」 with UP/DOWN switch.





(5) To return detection mode, press MODE switch for over 3 seconds. SKIP mode light turns off which shows detection mode.



PW/TR

SKIP

AL2

AL1

## A CAUTION

Gas alarm is not triggered except in detection mode. When leave it alone on maintenance mode, this returns to detection mode automatically after 10 hours.

## 5-5-5. Confirmation of peak hold level

The highest reading level is held if gas concentration above preset alarm level in detection mode is detected.

1	Press	MODE	switch	for	above	3	seconds	to	start
	maint	enance	e mode.						



② Select 「1 −P」 with UP/DOWN switch.

PW/TR	1		AL1	AL2
	-	-		
l			(C) VALINTE	MINE

3 Peak hold level can be checked with SET switch.

PW/TR	-		AL1	AL2
	Ь	U	0	
			@W.III	THUNCE

Press SET switch for above 3 seconds to to release peak hold level..

PW/TR	60	AL1	AL: © Enwice
PW/TR ■	I-P	AL1	AL: © ENWICE

(5) Press SET switch to check whether it is cancelled or not.

PW/TR			AL1	AL
		U		0
		] [	(C) MAINT	ENANCE

⑥ To return detection mode, press MODE switch for above 3 seconds. MAINTENANCE light turns off to show detection mode.

PW/TR		AL1	AL2
	Ш		
		OWAINT	ENANCE

## A CAOUTION

Gas alarm is not triggered except in detection mode. When leave it alone on maintenance mode, this returns to detection mode automatically after 10 hours.

## 5-5-6. Alarm test

This section is used to confirm alarm light, alarm buzzer, alarm relay contact and transmission condition to the outer equipment by giving same gas concentration signal (4-20mA) output.

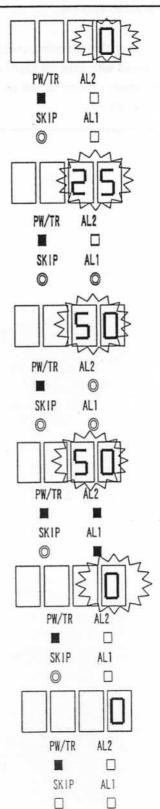
## **WARNING**

When make alarm test, (transmission test), announce it to respective department beforehand. Carry it out after making proper treatment (External signal output, alarm contact).

- ①Press SET switch for above 3 seconds to start alarm test mode. When it gets to alarm test mode, both SKIP light and display flash.
- ②Increase the reading with UP switch. When it reaches the first alarm level, AL1 light flashes and buzzer sounds (first alarm contact works). When it reaches the second alarm level, AL2 light flashes and buzzer sounds (2<sup>nd</sup> alarm contact works).

③To stop the buzzer sound, press RESET switch. In this occation, alarm light changes to steady light and it becomes self reset mode. To decrease reading below alarm level with DOWN switch, alarm light and alarm contact are cancelled.

Press SET switch for above 3 seconds, and it returns detection mode. SKIP light turns off which shows detection mode.



## 5-6. How to finish operation

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

## **WARNING**

- When finish this operation, do it after making point ship 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 excitation (option), alarm contact works when make power (DC24V) off.

## 6.KINDS OF ALARM AND PERFORMANCE

#### 6-1. Kinds of alarm

There are two kinds of alarms such as gas alarm and trouble alarm.

· Gas alarm: When detection gas reaches preset alarm level or exceeds it, this starts alarm.

《Latched mode→Self reset after reset operation.》

#### \* NOTE

Alarm levels are adjusted at 1/3 (1st alarm) and 2/3 (2nd alarm) of full scale.

• Trouble alarm: Abnormal condition in this unit is detected and gives a trouble alarm.

Except system trouble "E-00", it is non-latched mode.

When return to normal from trouble condition, it starts again from the action of initial clear after power on [See section 9. TREATMENT AT ABNORMAL CASE].

#### 6-2. Gas alarm

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

#### (1)Display

(1)Gas concentration

When exceeds detection range (Over scale), LED shows " $\cap \cap \cap \cap$ ".

2)Power light (Power: Green)

It keeps steady light.

3Alarm light (AL1: Orange), (AL2: Red)

There two alarm levels. When reading reaches each preset alarm level, or exceeds each preset alarm, level, this starts flashing and then returns to continuous lighting after reset operation, (Standard).

#### (2)External output

14-20mA output

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

2 Alarm contact

When gas concentration reaches preset alarm level or it exceeds preset alarm level, relay contact work.

Alarm relay contact is a latched mode. It returns self-reset mode when gas concentration decreases below preset level after reset operation.

#### \* NOTE

Alarm pattern is shown in the attached sheet.

## 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.

- 2Based 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.
- ⑤After 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. MAINTENANCE CHECK

This is an important for security and safety. To maintain the security and enhance the reliability of safety, the reliability of safety, the regular maintenance check for it shall be absolutely necessary.

## 7-1. Frequency of maintenance and check items.

## 7-1-1. Daily check

This is the check items carried out by customer.

①Check of PW/TR light.

In normal operation, the light is at on condition.

(2)Check of LED reading

Check that LED reading is zero (0).

If it is not "0", check that gas is free around detector head and make zero adjustment at detector head side.

## A CAUTION

For the accurate zero adjustment, check it by "1-1 Zero adjustment" of maintenance mode.

(3) Alarm test

Check that the alarm light flashes and buzzer sounds.

## CAUTION

For the alarm test, refer to "5-5-5 Alarm test."

## 7-1-2. Regular maintenance check

The following items shall be checked at regular check.

- 1 Daily check
- 2Cleaning of this unit
- 3 Adjustments
- 4)Function check
- 5 Parts replacement
- 6)Others

## 7-2. Maintenance contract for regular check

To maintain the safety operation of the unit, 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 our nearest service agent or Riken Keiki.

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

## CAUTION

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

- 7-4. Treatment when operation is stopped or its installation place is moved.
- 7-4-1. Stop at normal operation

Make the power switch off on the front panel. 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] about its moving place. Then, for wiring refer to [4-5. Caution at wiring].

## A 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 service agent or Riken Keiki.

7-5. Storage and treatment when not use for a long time.

This unit shall be stored in the following environment condition.

1)Temperature

:0°C~40°C

2Humidity

:10~90%RH (No condensing)

(3)Environment condition

:To be an environment where there is no generation of gas, solvent and vapor etc.

## A CAUTION

- ·When re-use it, be sure to make gas calibration.
- The re-adjustment and parts replacement etc including the gas calibration shall be contacted to our nearest agent or Riken Keiki.

## 8. SCRAP OF PRODUCTS AND SENSORS

Scrap of products

• Regarding detector complete, treat it in the same as industrial scrap (Non-flammable goods).

### 9. TREATMENT AT ABNORMAL CASE

## 9-1. Trouble alarm

Flashing of PW/TR light

•When PW/TR light is flashing, it is the condition that the following trouble may be caused. Reseach its cause and take an appropriate action.

•The output from the unit at trouble shall be as follows.

4~20mA output

: Fixed at 0.5mA

Trouble alarm contact: Relay contact works.

LED display	Trouble content	Main cause
E-00	System trouble	Memory trouble in the unit. '
E-01	the control of the section of the second section of the section of the second section of the section	Detector head disconnection, sensor disconnection, sensor cable disconnection.

#### 9-2. Counteraction at trouble alarm

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

## 9-3. Before it is thought to be trouble

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

· Check the wirings including pherical equipment as well as detector head.

·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, electrical line filter, insulation transformer etc or those addition.

#### 9-4. Trouble shooting

#### (1)PW/TR light does not illuminate

<Cause and action>

·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 rating power voltage.

·Is this power switch turned on?.

Make power switch ON.

#### (2) Abnormal performance

<Cause and action>

• 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 oftentimes, take an appropriate action for noise.

### (3) No calibration available

< Cause and action >

Is the calibration gas concentration correct?
 Prepare the appropriate calibration gas.

·There is the possibility for sensor sensitivity drop.

The sensor replacement is required.

## (4) PW/TR light flashing

①. System trouble "E-00"

<Cause and action>

- Memory trouble inside of indicator/alarm unit.
   Contact our nearest agent or Riken Keiki.
- 2). Sensor connection trouble "E-01"

< Cause and action >

- ·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. If can not be recovered, contact our nearest agent or Riken Keiki.

## (5) Fuse disconnection

<Performance>

·This unit can not work.

<Cause and action>

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

# \* NOTE

The fuse rating for this unit is "250V/1A T".

#### 10. DEFINITION OF WORD

LEL

The abbreviation LEL stands for Lower Explosive Limit.

Lower explosive limit

This represents the lowest concentration which can be ignited by source of ignition, hence the lowest concentration which can produce an explosion.

Calibration

Matching the equipment indication, reaching or set valve to the calibration gas concentration valve by using the calibration/standard gas.

Maintenance mode

When make maintenance of this unit, shut off the alarm 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 unit. Press MODE switch for over 3 seconds to start the maintenance.

Initial clear

The output from the detector head fluctuates for a while after power on. This function is to suppress alarm during this period. Also, signal output showing initial clear condition is given on external output.

Alarm delay time

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

#### 11. PRODUCT SPECIFICATION

## 1 - 1. Specifications

Model designation : GP-591

Detection gas : Combustible gases

Applicable detector head : Catalytic combustion sensor type detector head

Detection signal : Direct signal from the sensor
Detector head cable : CVV 4-core or equivalent

Detector head cable
Distance to the detector

head: Max 1.25km with CVV (1.25mm2) cable.

Output signal :  $4 \sim 20$ mADC, non-isolation (Resistive load below  $300\,\Omega$ )

Gas concentration :  $4 \sim 20$ mADC(Linear up to 22mA)

At trouble : 0.5mADC
At initial clear : 2.5mADC
At maintenance : 2.5mADC

Alarm performance : Latched mode (Standard), non-latched mode (option)

or lock-in(option)

1st alarm : Orange light (AL1) flashing(steady light after reset operation)
Relay contact : Non-exciting at normal(exciting at alarm .....standard) or

Relay contact: Non-exciting at normal (exciting at alarm .....standard)
exciting at normal (non-exciting at alarm ..... option)

Potential free contact 1a(standard) or 1b(option)

2nd alarm : Red light(AL2) flashing(steady light after reset operation)
Relay contact : Non-exciting at normal(exciting at alarm .....standard) or

exciting at normal(non-exciting at alarm ..... option)
Potential free contact 1a(standard) or 1b(option)

Contact rating : 0.5A at 100VAC, 1.5A at 30VDC (Resistive load)

Trouble alarm

Alarm performance : Non-latched mode

Alarm display : Green light (PW/TR) flashing

Relay contact: Non-exciting at normal (exciting at alarm .....standard) or

exciting at normal (non-exciting at alarm ..... option)
Potential free contact la(standard) orlb(option)

Self-diagnostic function : System failure, detector head connection failure.

Initial clear time : Approx 25 seconds

Several settings : By remote PC (uses exclusive cable) Operating temp. & humidity :  $0 \sim 40^{\circ}$ C,  $10 \sim 90\%$ RH (Non-condensing)

Power requirement : 24VDC  $\pm$  10% Applicable power cable : CVV 2-core

Power consumption : Max 10W (with single case) or

(including detection head) Max 17VA(with multi-unit case)

Structure : Housing type for the case, front identification card type,

non-explosion proof type.

Dimensions & weight : Aprox 36 (W) x 72 (H) 134 (D) mm

approx 0.1kg(unit only)

<sup>\*</sup> Specifications subject to change without notice.

## 11-2. Product compositions

## Standard compositions

- · Indicator/alarm unit Model GP-591
- · Operating instruction manual ····· 1 vol.

# 12. WARRANTY <u>RIKEN KEIKI STANDARD WARRANTY</u> 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 provided 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 costs, local repair costs, transportation costs, 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 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.

# OPERATING INSTRUCTION MANUAL FOR

INDICATION/ALARM UNIT OX-591
(Lo-LoLo ALARM)

FOR USERS

## Safety Precautions

- 1. Read and understand the instructions in this manual before operating this instrument.
- 2. Keep manual accessible at all times.
- 3. This (instrument, monitor, indicator/alarm) cannot be used for any other purpose than what is specified in this manual..
- 4. Follow all the instructions in this manual, an deviation will compromise the safety, quality, and performance of this instrument.
- 5. We accept no responsibility for an accident caused by the user not following the instructions in this manual.



Phone : 81-3-3966-1113 Fax : 81-3-3558-9110 GIII E-mail : intdept@rikenkeiki.co.jp

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ates a potentially hazardous situation which, if not avoided, could result in death	
	T REPORT TO THE PARTY
	2007/2014

## 1. PRODUCT OUTLINE

## 1-1. In the beginning

First of all, we wish to express our heartfelt thanks for your purchase of our indicator/alarm unit OX-591. This instruction manual is just a guide book to operate indicator/alarm unit OX-591 of RM-590 series. Your kind reading of this manual is requested not only for first user but for already experienced staff and after well understanding this "How to" preceding to start operation actually would be kindly requested.

## 1-2. Application for use

- O This is an exclusive indicator/alarm unit to be used in combination with our oxygen detector head.
- Oxygen concentration in ambient air being detected with our oxygen detector head is displayed with 4-digit LED indicator.
- O The main purpose to measure oxygen concentration is to prevent accident caused by oxygen deficiency.

## 1-3. Identification of each cautional marks



Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. This signal word is to be limited to the most extreme situation.



Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.



This means "ADVICE" at operation.

## 2. IMPORTANT INSTRUCTION FOR THE SAFET

## 2-1. Danger items



## DANGER

This is not a explosion proof unit. Do not use it at hazardous area.

## 2-2. Warning items



## WARNING

· Detector head

Do not connect other detector head than designated oxygen detector head. If connected, this unit or detector head may be broken.

Power source

Before supplying the power, confirm that the power source is a designated voltage.

Necessity of protective grounding

Do not cut inside or outside wire for earth, nor disconnect the wire from earth terminal... In any case, the unit becomes dangerous conditions.

· Defect of protective function

Do not operate the unit if protective functions such as protective grounding or fuse are seems to be defective. Also, before operating the unit confirm that there is no defect for protective functions.

Fuse

Use the designated rating (current, voltage, type) fuse to prevent fire.

Replacement of fuse shall be done after put off the initial power source and put off the power switch of this unit. Do not use other fuse than designated one, nor make short circuit for fuse holder.

· External connections

After making protective grounding firmly, connect to external control circuit or detection objective.

· Measures at gas alarm

When detect low concentration oxygen than preset alarm level, it is very dangerous. It is required to take an appropriate measures by customer's decision.

Mounting/dismounting

Locking mechanism may be broken if the unit is mounted into the case with disengagement lever up position. Make correct procedure for mounting/dismounting...

## 2-3. Cautional items

## **CAUTION**

· Do not use walky-talky near this unit.

When this unit receives the electric waves by walky-talky etc near from the cable, this will effect the reading. When use the walky-talky, operate it at the place where there is no influence of electric wave ejection.

When make power on again, make it after an interval of over 5 seconds.

When make power on within 5 seconds, there may be no normal operation.

When operate it not to follow this manual, repair it by other rating parts or modify it on his own, the safety and quality of products can not be secured. Then, when an accident take place by it, we cannot assure our responsibility on them.

Take enough consideration for instrumentation to keep safety even if disconnection of power and signal lines, defect of operation or trouble would be happen due to unexpected reason.

This is an electrical applied instrument.

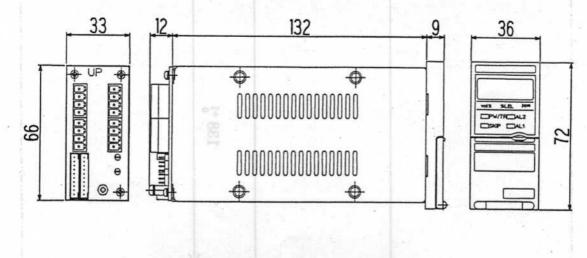
Be care it may be effected by power noise, electrostatic and electromagnetic noise.

When use under such conditions, make protective treatment for use.

## 3. PRODUCT FUNCTION

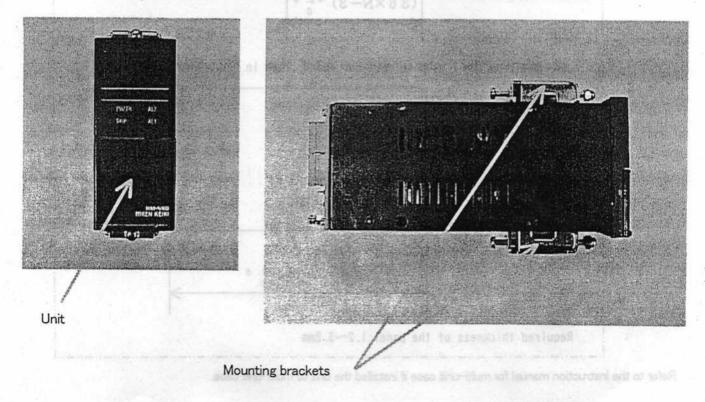
## 3-1. External drawing(with single case)

\*Refer to the operating instruction manual for multi-unit case when multi-unit case is used.

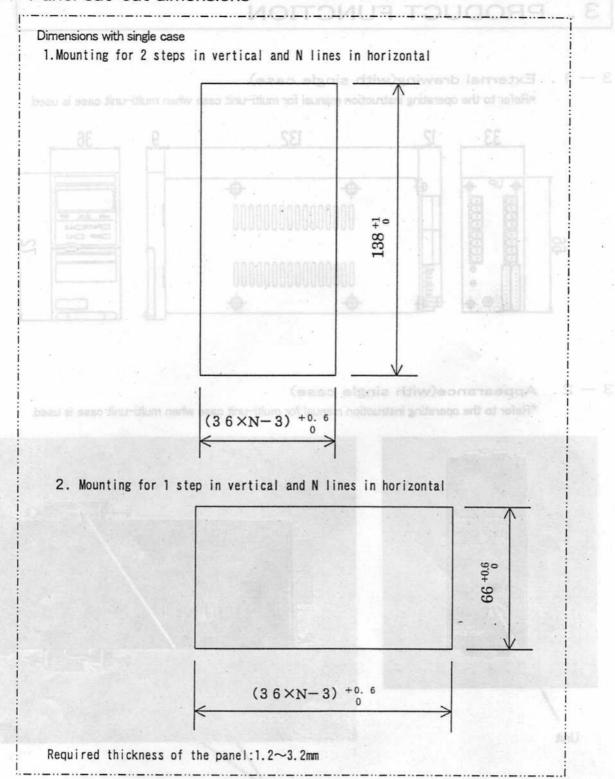


## 3-2. Appearance(with single case)

\*Refer to the operating instruction manual for multi-unit case when multi-unit case is used.



## 3 - 3. Panel cut-out dimensions



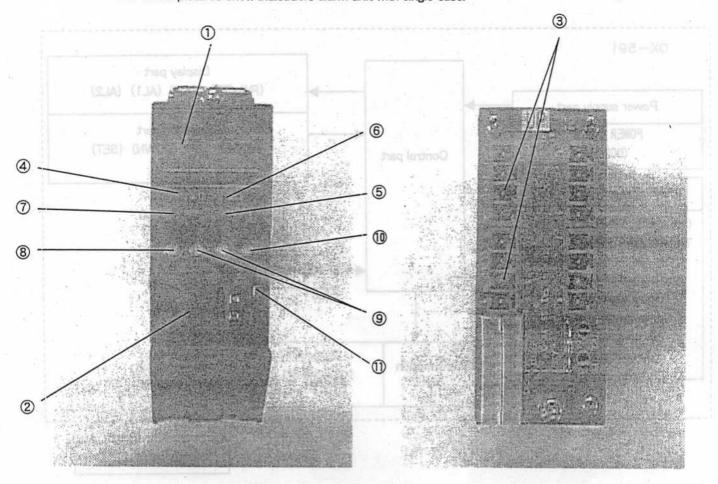
Refer to the instruction manual for multi-unit case if installed the unit to multi-unit case.

## A CAUTION

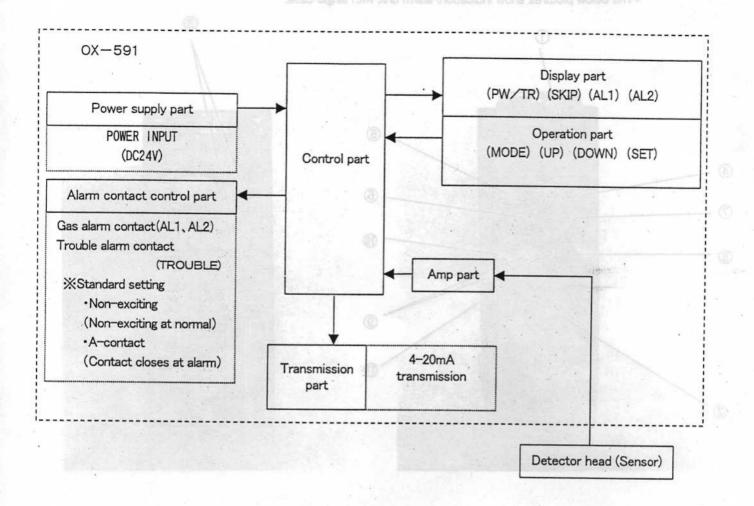
Please consult us or with our agent for installation method or installation quantity to avoid trouble caused by radiating heat.

## 3-4 . Name of each part and function

\*The below pictures show indication/alarm unit with single case.



①LED display · · · · · · · · · · · · · · · · · · ·	Indicates gas concentration.
②POWER switch · · · · · · · · ·	ON/OFF switch.
③Terminal plates · · · · · · · · · · · · · · · · · · ·	Connects cables from outside.
	For multi-unit case, refer to instruction manual
	for multi-unit case.
④PW/TR light ····································	Combination light for power and trouble indication.
	Steady light : Power ON, normal operation
	Flashing : Trouble
⑤AL1 light · · · · · · · · · · · · · · · · · · ·	Flashes at gas alarm (1st alarm)
⑥AL2 light · · · · · · · · · · · · · · · · · · ·	Flashes at gas alarm (2nd alarm)
⑦SKIP light · · · · · · · · · · · · · · · · · · ·	Flashes during maintenance mode.
®MODE switch · · · · · · · · · · · · · · · · · · ·	Uses at maintenance work.
⑨UP/DOWN switch · · · · · · · · · · · · · · · · · · ·	Uses to select items at maintenance mode, increase
	or decrease reading at zero and span adjustments,
	and to increase or decrease reading at alarm test.
10 S E T switch · · · · · · · · · · · · · · · · · · ·	Uses to change for alarm test mode.
	This is also used to set the contents of maintenance
	mode during maintenance mode.
Disengagement lever · · · · · · · · · · · · · · · · · · ·	Locks the indicator/alarm unit.



Flashing : Trouble

Flashing : Trouble

Flashing at gas alarm (1st alarm)

Flashes at gas alarm (2nt alarm)

Flashes at gas alarm (2nt alarm)

Flashes at gas alarm (2nt alarm)

MODE switch

Uses at maintanance work

OUP/DOWN switch

Uses to select items at maintanance

or decrease reading at zero and soon

and to increase reading at zero and soon

This is also used to set the contents

This is also used to set the contents

mode during maintanance mode.

## 4. HOW TO USE

## 4-1. Before operation

Be sure to keep cautional items of use not only for first user but for already experienced staff.

If not keep these cautional items, the unit may be defective and correct gas detection may not be performed.

## 4-2. Mounting/dismounting procedures

#### (1) Mounting method

- ·Open the front cover of this unit.
- ·Confirm that the power switch is at OFF
- •With the disengagement lever at down position, mount into the case. (Confirm that the edge connector is put in firmly)
- ·Confirm that the disengagement lever is turned upward when indicator/alarm unit is mounted into the case firmly.

Do not put the system jointly each, "Do not wire the cable in parallel nor take acr

After confirmation of lever position, put ON the power switch and then, close the cover.

#### (2) Removal of the unit

- ·Open the front cover of this unit.
- ·Confirm that the power switch is at OFF.
- ·Push disengagement lever down to release the lock.
- •Pull out the unit from the case.
- ·Turn the lever upward and close the cover.

## A CAUTION

When required to stop the system at maintenance time, unable to maintain if not remove a part of system

Mounting/dismounting of indicator/alarm unit shall be done according to the above procedures. If not, stopping metal of the unit may be transformed and the cover can not be closed.

## 4-3. Installation place

## A CAUTION

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.

Do not install at the place where it is danger for maintenance service such as high voltage cable, etc.

This unit is required to make maintenance regularly.

Then, do not install at the place where there is danger at maintenance time.

Do not install it where it is unable to make maintenance.

When required to stop the system at maintenance time, unable to maintain if not remove a part of system or unable to detach the case due to the pipe or rack etc. do not install such place.

System housing that grounding construction is not enough.

Be sure to ground when install.

## 4-4. Caution in the system engineering

## A 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 on and 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% MAGN TO SEU HOTO MOTTUAO
Power failure	Approx 50msec. (For power failure above 50msec, it re-starts)
tolerance time	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	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 lighting 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 (Protection resistor, zero diode etc.) and is designed to protect the apparatus. But as the signal may be attenuated due to the lightning arrester, check the action and it is required to use.
Grounding	Surge noise shall be generated from the thunder lightning or except it.  To protect detector from these cause, be sure to make grounding.

<sup>\*</sup> 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).

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 contents.

- •Relayed by 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 relayed relay on the request.

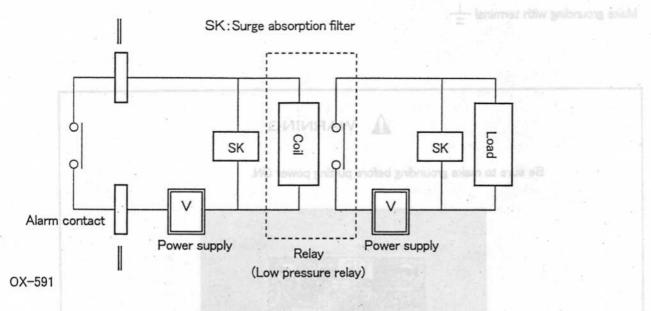
## A CAUTION (FOR USE OF NORMALY-CLOSED CONTACT)

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.

the inductive lightning surge generating from the thursden.

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 OX-591 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 no work.
- ·High voltage is put inside of indicator/alarm 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.

## A CAUTION

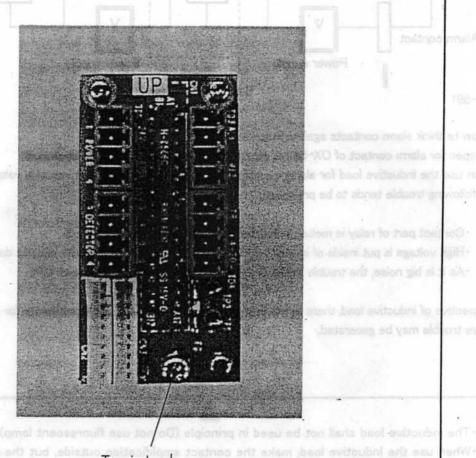
- The inductive load shall not be used in principle (Do not use fluorescent lamp).
- •When use the inductive load, make the contact amplification outside, but the outside relay coil belong, use the relay driven by the low voltage (within AC100V) and it is protected by an appropriate surge killer.
- •When control the light inductive load directly, protect the contacts by an appropriate surge killer by all means.
- \* As the inductive load, there are following samples.
- •Patlight \* External relay \* Buzzer \* Siren \* Fan \* Fluorescent lamp \*Motor etc.

## 4-5. Grounding

Make grounding with terminal ----.

**WARNING** 

Be sure to make grounding before putting power ON.

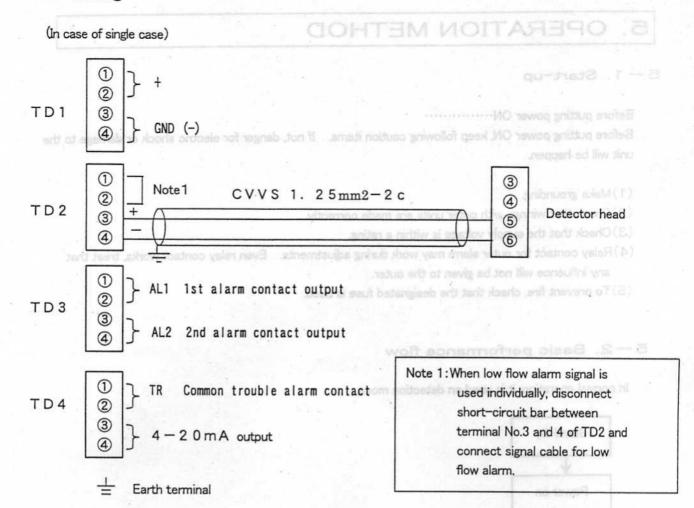


belong, one the relay doven by the low

\* The above fig. shows the unit with single case. In case of multi-unit case, refer to instruction manual for multi-unit case.

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

## 4-6. Wiring



Maximum cable length: 600m

For multi-unit case, refer to operating instruction for multi-unit case.

## A

#### CAUTION

- ·Use CVVS 1.25mm2 cable for connection.
- ·Do not distribute power cable and signal cable together with power line for motor, etc.
- •This unit applies a connector type terminal plate for easy wiring. Be care not to give a high load to the connector.
- ·We can not warrant the performance of this unit if undesignated cable is used.

## 5. OPERATION METHOD

## 5-1. Start-up

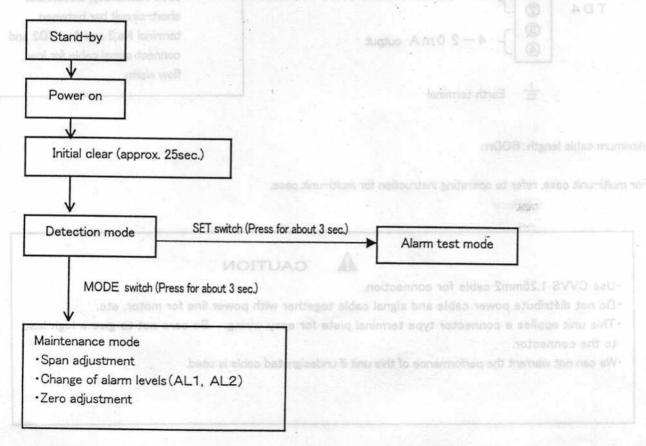
Before putting power ON.....

Before putting power ON, keep following caution items. If not, danger for electric shock or damage to the unit will be happen.

- (1) Make grounding.
- (2) Check that wirings with outer units are made correctly.
- (3) Check that the supply voltage is within a rating.
- (4) Relay contact for outer alarm may work during adjustments. Even relay contact works, treat that any influence will not be given to the outer.
- (5) To prevent fire, check that the designated fuse is used.

## 5-2. Basic performance flow

In normal operation, it is used on detection mode.

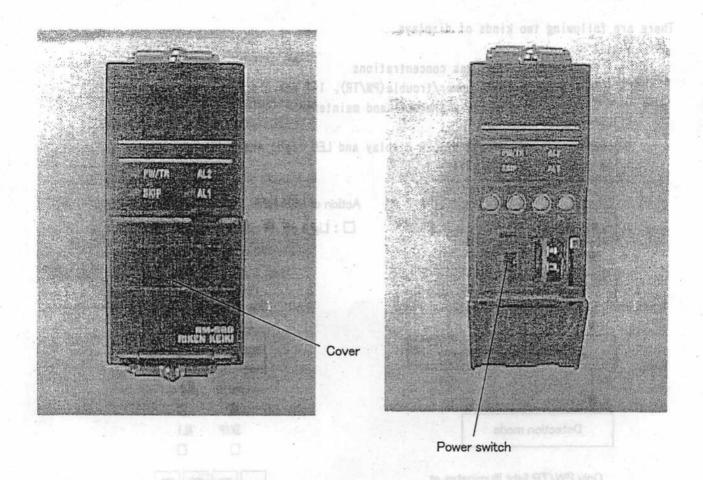


## A CAUTION

Maintenance mode except for span adjustment and change of alarm levels shall be performed by the specialized service man. Do not operate it without permission.

## 5-3. Start-up method

## 5-3-1. Power on



- 1) Before making power on, check that the unit is connected correctly.
- 2) The power switch can be seen when the front cover is opened.
- 3) Put the power switch upward to ON and downward to OFF.
- 4) Put the power switch on, and power light illuminates.
- 5) Status of initial clear (about 25 sec.) is displayed as "---".
  - · Checking of the system (Self-diagnosis)
  - Output signals: Approx 17.5mA
  - · Gas alarm, trouble alarm(light, contact) shut-off

H

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

### 5-4-1. Display action

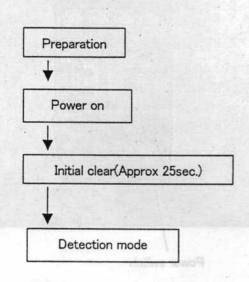
There are following two kinds of displays

(1) L E D display: Shows gas concentrations

(2) L E D light : Shows power/trouble(PW/TR), 1st gas alarm(AL1),

2nd gas alarm(AL2) and maintenance (SKIP) condition.

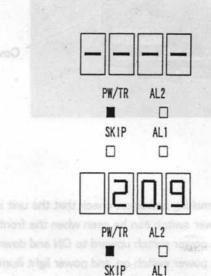
\*Contents of indications by LED display and LED light are different from the condition of the unit.



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

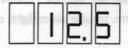
## Action of LED light

□ : Light off ■ : light on ◎ : Flashing



## Gas alarm condition

When detect gas below AL1,AL2, it shows gas concentrations and AL1,AL2 alarm lights flash.



PW/TR AL2

SKIP AL1

O

Trouble condition

When any of trouble arises on detector head, PW/TR light om flashes and content of trouble is shown on LED display.

(LED display) (Content of trouble)

E - 00

System trouble

E - 0.1

Sensor/detector head disconnection or not yet connected.

PW/TR AL2 0 SKIP AL1 

Maintenance mode

## 5-4-2. External output action

## 1. 4-20 mA output version

(1) Signal transmission method: Electric current transmission (Non isolation)

(2) Transmission path : CVVS

(3) Transmission distance

: Below 1km

(4) Resistive load for connection : Below 3 0 0  $\Omega$ 

(5) Status signal level

(Detection mode : 4~20mA (Depends on gas concentration)

: 4~20mA (By indication value)

3 Initial clear

: 17.5mA (Fixed)

4Maintenance mode: 2.5mA (Fixed)

(5) Alarm test

: 4~20mA (By indication value)

(6) Trouble alarm : 0.5mA (Fixed)

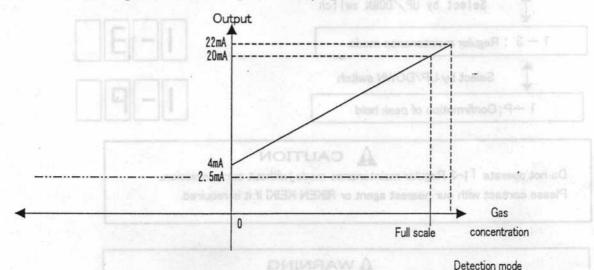
(7)Point skip

: 2.5mA (Fixed)

(6) Power shut-off

: OmA

Relations between Tgas concentration and Toutput are shown below



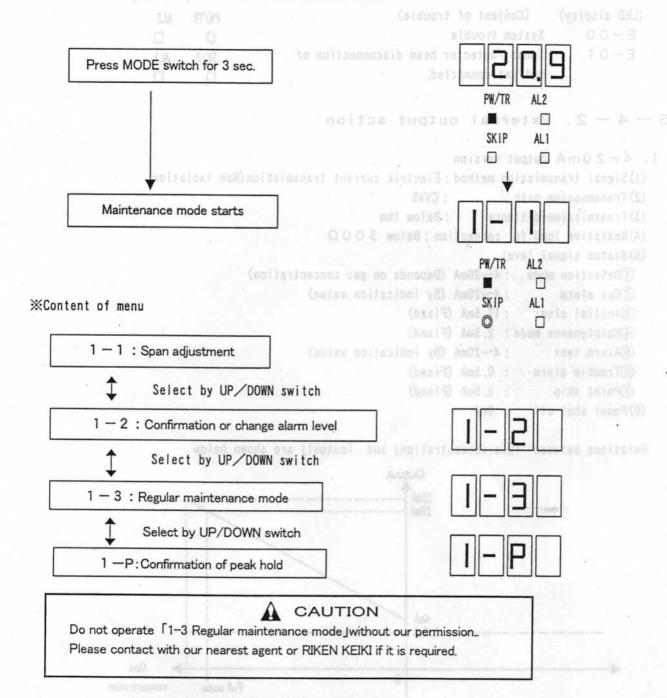
CAUTION

4~20mA outputs are already adjusted. If re-adjustment is required after installation, specialized service man will make re-adjustment. Do not this adjustment without permission.

## 5-5. Maintenance and adjustment

# When any of trouble arises on detector head, PM/TR Highor model 1.7-5-5

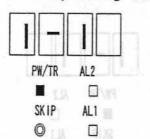
When make each adjustment, make it on maintenance mode.



## WARNING

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

## 5-5-2. Span adjustment



Press SET switch

20,6

Press MODE aw SLAT | RT/W9 er 3 seconds, and

AL1

. 🗆

SKIP

PW/TR

SKIP

0

Supply fresh air

①Select menu  $\Gamma 2-3J$  with UP/DOWN switch and press SET switch to make ready for span adjustment.

②After the reading get stable by supplying fresh air to the detector head, adjust reading at 20.9% with UP/DOWN switch and then, press SET switch.

After reading get
stable, adjust reading
at 20.9% with UP/DOWN
switch and press SET
switch.

③Indication flashes by pressing SET switch and then, returns to menu. Now, span adjustment has been completed.

#### \* NOTE

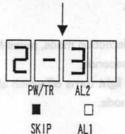
Be sure to press SET switch after adjusting the span. If not press SET switch, adjusting results can not be stored. Supply fresh air until indication flashes and it returns menu.

Press MODE switch for above 3 seconds to return detection mode.

After indication flashes, it returns to switch.

П

AL1



SKIP

After indication flashes, it returns to menu.



PW/TR AL2

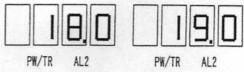
■ □

SKIP AL1

## 5-5-3. Confirmation of alarm level

This section is used to check preset alarm levels.

①Press UP switch in detection mode, and the 1st alarm level(AL1) is shown. Press DOWN switch in detection mode, and the 2nd alarm level(AL2) is shown.



SKIP AL1

PW/TR AL2

■ □

SKIP AL1

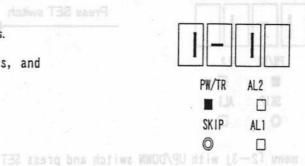
UP switch ON

DOWN switch ON

## 5-5-4. Change of alarm level

This section is used to change alarm levels.

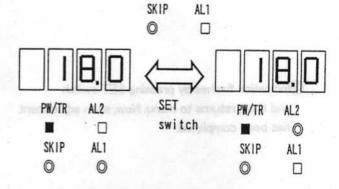
①Press MODE switch for over 3 seconds, and maintenance mode starts.



②Select 「1-2」 with UP/DOWN switch.

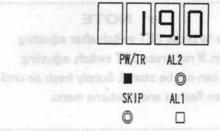
3When press SET switch, 1st alarm level (AL1) can be checked.
When press it again, 2nd alarm level(AL2) can be checked.

- To change alarm levels(AL1,AL2), adjust them with UP/DOWN switch and then, press SET switch.
- ⑤To return detection mode, press MODE switch for over 3 seconds.
  SKIP mode light turns off which shows detection mode.



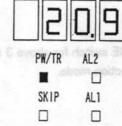
PW/TR

AL2



# A CAUTION

Gas alarm is not triggered except in detection mode. When leave it alone on maintenance mode, this returns to detection mode automatically after 10 hours.



## 5-5-5. Confirmation of peak hold level

The lowest reading level is held if gas concentration reaches or passes preset alarm level in detection mode is detected.

①Press MODE switch for above 3 seconds to start maintenance mode.	PW/TR ■	carry it out after me	AL1 AL2  MAINTENANCE
②Select 「1-P」 with UP/DOWN switch.	PW/TR	I-P	AL1 AL2  MAINTENANCE
③Peak hold level can be checked with SET switch.	PW/TR [	16,0	AL1 AL2  O   MAINTENANCE
Press SET switch for above 3 seconds to release peak hold level.	PW/TR [	16,0	AL1 AL2  O OMAINTENANCE
LIA STARS brown	PW/TR [	I-P	AL1 AL2  O  NAINTENANCE
⑤Press SET switch to check whether it is cancelled or not.	PW/TR [	20,9	AL1 AL2  O  NAINTENANCE
©To return detection mode, press MODE switch for above 3 seconds.  MAINTENANCE light turns off to show	PW/TR [	209	AL1 AL2  CHAINTENANCE

## A CAUTION

Gas alarm is not triggered except in detection mode.

Be sure to return detection mode after completion of working.

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

## 5-5-6. Alarm test

This section is used to confirm alarm light, alarm buzzer, alarm relay contact and transmission condition by giving same gas concentration signal (4–20mA) to the outer equipment

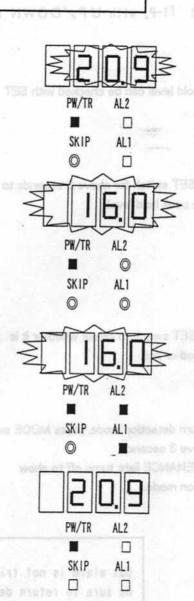
## A WARNING

When make alarm test(transmission test), announce it to respective department beforehand. Carry it out after making proper treatment(External signal output, alarm contact).

①Press SET switch for above 3 seconds to start alarm test mode.

When it gets to alarm test mode, both SKIP light and display flash.

- ②Decrease the reading with DOWN switch. When it reaches the first alarm level, AL1 light flashes and buzzer sounds(1st alarm contact works). When it reaches the second alarm level, AL2 light flashes and buzzer sounds (2nd alarm contact works).
- To stop the buzzer sound, press RESET switch. In this occasion, alarm light changes to steady light and it becomes self reset mode. To increase reading above alarm level with UP switch, alarm light and alarm contact are cancelled.
  - Press SET switch for above 3 seconds, and it returns detection mode. SKIP light turns off which shows detection mode.



# 5-6. How to finish operation

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

# A 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 excitation (option), alarm contact works when make power(DC24V) off.

(Confirmation of indication valve

# 6. KINDS OF ALARM AND PERFORMANCE

### 6-1. Kinds of alarm

There are two kinds of alarms such as gas alarm and trouble alarm.

 Gas alarm: When detection gas reaches preset alarm level or passes it, this starts alarm.

《Latched mode → Self reset after reset operation》

#### \* NOTE 1900 Mass 1975 level 2989 19

.....

Both 1st and 2nd alarms have been set at 18% as standard.

To prevent false alarm, the alarm delay time is set for 2 seconds.

 Trouble alarm: Abnormal condition in this unit is detected and gives a trouble alarm.

It is a non-latched mode expect for system trouble" E-00."
When return to normal from trouble condition, it starts
again from the action of initial clear after power on
(See section 9.TREATMENT AT ABNORMAL CASE).

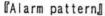
### 6-2. Gas alarm

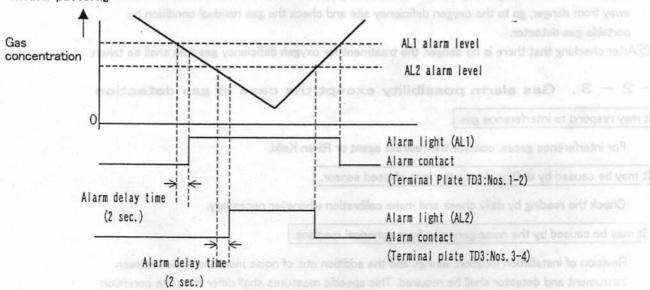
## 6-2-1. Gas alarm action

(1) Display

- ① Gas concentration display When exceeds detection range/Over scale). LED shows "∩∩∩∩".
- ② Power light (POWER: Green)

  It keeps steady light.
- 3 Alarm light (AL1:Orange, AL2:Red)





### (2)External output

1 4~20mA output

Electric current proportional to gas concentration.

In case of over scale, the maximum output is 22mA.

② Alarm contact an assaulte level mask taxang zenesa zag moifceteb menW classic zag

When gas concentration reaches preset alarm level or it passes preset alarm level, is strate alarm level, is strate alarm level, is strate alarm level, is strate alarm level or it passes preset alarm level, is strate alarm level.

Alarm relay contact is a latched mode. It returns self-reset mode when gas concentration increased above preset level after reset operation.

# 6-2-2. Counteraction at gas alarm

# When detecting oxygen deficiency gas;

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

Generally, the following action is taken.

### Confirmation of indication valve

#### \* NOTE

Instantaneous oxygen deficiency gas leak may return normal condition at confirmation time.

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

- 2 Based on oxygen deficiency alarm control concentration, it keeps the safety by keeping away people from the monitoring area.
- 3 When low gas concentration display is continued, close the gas valve for oxygen deficiency and confirm that oxygen concentration returns safety level.
- 4 Suppose that the leak gas is to remain and provide yourself with protection attire and tool away from danger, go to the oxygen deficiency site and check the gas residual condition by portable gas detector.
- 5 After checking that there is no danger, the treatment for oxygen deficiency 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 long elapsed sensor.

Check the reading by daily check and make calibration whenever necessary.

### It may be caused by the noise generate 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. MAINTENANCE CHECK

This is an important for security and safety. To maintain the security and enhance the reliability of safety, the regular maintenance check for it shall be absolutely necessary.

### 7 - 1. Frequency of maintenance and check items

### 7 - 1 - 1 . Daily check if no beggots at not ment ment then T . A

This is the check items carried out by customer.

- Check of PW/TR light.
   In normal operation, the light is at on condition.
- ② Check of LED reading
  Check that LED reading is "20.9".

  If it is not "20.9", check that gas is free around detector head and make span adjustment in maintenance mode.

# A CAUTION

For the accurate span adjustment, check it by "1-1 Span adjustment" in maintenance mode.

3 Alarm test Check that the alarm light flashes and buzzer sounds.

### A CAUTION

For the alarm test, refer to "5-5-5 Alarm test."

### 7-1-2. Regular maintenance check

The following items shall be checked at regular check.

- (1) Daily check
- 2 Cleaning of this unit
- 3 Adjustments
- 4 Function check
- ⑤ Parts replacement
- 6 Others

#### 7 - 2. Maintenance contract for regular check

To maintain the safety operation of the unit, 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 our nearest service agent or Riken Keiki.

## 7 - 3. Replacement of sensor and parts

## CAUTION TO A STATE OF THE STATE

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

- 7 4. Treatment when operation is stopped or its installation place is moved.
- 7-4-1. Stop at normal operation

Make the power switch off on the front panel. 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" about its moving place. Then, for wiring, refer to "4-5. Caution at wiring."

## A CAUTION

When move its installation place, be sure to make span adjustment.

7-5. Storage and treatment when not use for a long time.

This unit shall be stored in the following environment condition.

1 Temperature : 0°C~40°C

2 Humidity : 10 ~ 90%RH (Non-condensing)

3 Environment condition: To be an environment where there is no generation of gas, solvent and vapor etc.

# **A**AUTION

- · When re-use it, be sure to make span adjustment.
- The re-adjustment and parts replacement etc. shall be contacted to our nearest agent or Riken Keiki.

# 8. SCRAP OF PRODUCTS AND SENSORS

Scrap of products

·Treat indicator/alarm unit and sensor as industrial scrap(Non-flammable goods.)

Memory trouble inside of indicator/alarm unit

# TREATMENT AT ABNORMAL CASE

### 9 - 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 from the unit at trouble shall be as follows.

4~20mA output : Fixed at 0.5mA

4~20mA output : Fixed at 0.5mA

Trouble alarm contact : Replay contact works.

LED display	Trouble content	Main cause
E-00	System trouble	Memory trouble in the unit
E-01	Connection Trouble of detector head	Detector head disconnection, sensor cable disconnection

# 9-2 . Counteraction at trouble alarm

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

## 9 - 3. Before trouble to be considered

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

- Check the wirings including physical equipment as well as detector head.
- 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, electrical line filter, insulation transformer etc or those addition.

### 9 - 4. Trouble shooting

# (1) PW/TR light does not illuminate

<Cause and action>

- · Is it OK with power cable connection? Connect power cable.
- · Is fuse disconnected?

Search the cause of disconnection and replace it after closing counter-measures.

- Is power voltage normal?
  - Supply the rating power voltage.
- Is this power switch turned on? Make power switch ON.

### (2) Abnormal performance

< Cause and action >

- 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 oftentimes, take an appropriate action for noise.

### (3) No span adjustment

< Cause and action >

- · Is there any gas around detector head? Prepare the gas free (fresh) air.
- There is the possibility for sensor sensitivity drop. The sensor replacement is required.

(4) PW/TR light flashing

① System trouble "E - 0 0"

< Cause and action >

- · Memory trouble inside of indicator/alarm unit
- Contact our nearest agent or Riken Keiki.
- ② Sensor connection trouble "E-0.1"

<Cause and action>

- Non-connection of sensor, contact failure of connector and disconnection of sensor cable.
- of sensor cable.

   Check "whether sensor is connected" or "the sensor cable connector is connected to the sensor." If can not be recovered, contact our nearest agent or Riken Keiki.

## (5) Fuse disconnection

<Performance>

· This unit can not work.

< Cause and action >

The trouble of this unit 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 \*\* NOTE \*\*

9 - 3. Before trouble to be considered

Is it OK with power cable connection?

The fuse rating for this unit "250V/1A T"

## DEFINITION OF WORD

### Calibration

By using calibration (standard) gas etc, it seeks for instrument reading, display value or set value and true value.

### Maintenance mode

When make maintenance of this unit, shut off the alarm 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 unit.

Press MODE switch for 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.

### Alarm delay time

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

System fallure, detector head connection fallure

## 1 1. PRODUCT SPECIFICATION

### 1 1 - 1. Specifications

Model designation : OX - 591

Detection gas : Oxygen

Applicable detector head : Galvanic cell type detector head

Detection signal : 4 ~ 20mADC

Detector head cable : CVVS 2-core or equivalent

Output signal : 4 ~ 20mADC, non-isolation(Resistive load below 300 Ω)

Gas concentration signal : 4 ~ 20mADC(Linear up to 220mA)

At trouble : 0.5mADC

At initial clear : 17.5mADC
At maintenance : 2.5mADC

Alarm performance : Latched mode(standard), non latched mode(option)

or lock-in (option)

1st alarm : Orange light(AL1) flashing(steady light after rest operation)

Relay contact : Non-exciting at normal(exciting at alarm ... standard)

or exciting at normal(non-exciting at alarm ... option)
Potential free contact 1a(standard) or 1b(option)

2nd alarm : Red light (AL2) flashing(steady light after reset operation)

Relay contact : Non-exciting at normal(exciting at alarm ... standard)

or exciting at normal(non-exciting at alarm ... option)
Potential free contact 1a(standard) or 1b(option)

Contact rating : 0.5A at 100VAC, 1.5A at 30VDC(Resistive load)

Trouble alarm

Alarm performance : Non-latched mode

Alarm display : Green light (PW/TR) flashing

Relay contact : Non-exciting at normal(exciting at alarm ... standard)

or exciting at normal(non-exciting at alarm ... option)
Potential free contact 1a(standard) or 1b(option)

Contact rating : 0.5A at 100VAC, 1.5A at 30VDC

Self-diagnostic function : System failure, detector head connection failure

Initial clear time : Approx 25 second

Several settings : By remote PC(uses exclusive cable)

Operating temp. & humidity : 0~40°C, 10~90%RH (Non condensing)

Power requirement : 24VDC±10%
Applicable power cable : CVV 2-core

Power consumption : Max 5W(with single case)
(including detector head) Max 8VA(with multi-unit case)

Structure : Housing type for the case, front identification card type,

non-explosion type.

Dimension & weight : Approx 0.1kg(unit only)

\* Specifications subject to change without notice.

### 11-2. Product compositions

# IZ. WARRANTY

### Standard compositions

- Indicator/alarm unit ModelOX-592
- · Operating instruction manual······1 vol.

# RIGEN KEND STANDARD WARRANTY FOR FIXED CAS DETECTION INSTRUMENT

FRICEN ICENC CO., L.TD. warrants gas alarm equipment manufactured and sold by use to be free from defects in materials and workmanship for a period of one year from date of chapment form RIGEN KEIJO CO., L.TD. 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 cleared, repaired or consumption in normal service, and which must be cleared, repaired.

The alarm contact output specified in this system is provide for the use of buzzer and larry 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 oustomers.

- Store the sam streetly
- 2. Stop the notion of system which uses gast.
  - 3. Let the pervious without fair operated.
- Let stop the work of the stuffs in the area by the auto paging system and escaped, to the outside from there.
  - 2. Lot the slarm transmitted to a remote place by auto consmunication system.
  - 5. Let the elern betramitted by the lamp and buzzer to this area and that area.
    - 7 Others

But, we do not assume the responsibility for the secondary demage, which may be senarated by this interiodiens estion because it is not in our scope of recognition.

Then, we cannot strike the sales contract or the matufacture in the scope to reimbutes.

This secondary divines.

warranty is voided by inhuse including rough handling, medicanical demand, operation, or repair procedures not in accordance with instruction manual. This warranty indicates the full estant of our liability, and we are not responsible for enrowed or replacement onat, local repair coats, transportation coats or conflicted expense nounced without our prior approval.

This warranty cavers instruments and petits sold (to users) only by suthorized distributors, dealers, and representations as appointed 1900EN MERC CO. 1.TO.

We do not assume the indemnification for any against of densine coursed by the operation of this gas monitor and our wainanty is limited to discrept legislight on parts on our complete coods.

## 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 cervices exhaust fan operated.
- 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.

**FOR** 

INDICATION/ALARM UNIT EC-592

## FOR USERS

#### Safety Precautions

- 1. Read and understand the instructions in this manual before operating this instrument.
- 2. Keep manual accessible at all times.
- 3. This (instrument, monitor, indicator/alarm) cannot be used for any other purpose than what is specified in this manual..
- 4. Follow all the instructions in this manual, an deviation will compromise the safety, quality and performance of this instrument.
- We accept no responsibility for an accident caused by the user not following the instructions in this manual.



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## PRODUCT OUTLINE

## 1-1. In the beginning

First of all, we wish to express our heartfelt thanks for your purchase of our indicator/alarm unit EC-592. This instruction manual is just a guide book to operate indicator/alarm unit EC-592 of RM-590 series. Your kind reading of this manual is requested not only for first user but for already experienced staff.

## 1-2. Application for use

- O This is a exclusive indicator/alarm unit to be used in combination with our electrochemical sensor type toxic gas detector head.
- O Toxic gas leaked into ambient air is detected with toxic gas detector head which is connected with this indicator/alarm unit. Detection results (Gas concentrations) are displayed with 4-digit LED indicator.
- O This unit outputs 4-20mADC as gas concentration signal.
- O This unit provides 2 relay contacts for outer gas alarm.

## 1-3. Identification of each cautional marks



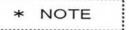
Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. This signal word is to be limited to the most extreme situation.



Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.



This means "ADVICE" at operation.

# 2. IMPORTANT INSTRUCTION FOR THE SAFET

### 2-1. Danger items



This is not a explosion proof unit. Do not use it at hazardous area.

## 2-2. Warning items



**WARNING** 

· Detector head

Do not connect other detector head than designated toxic gas detector head. If connected, you can not detect gas. Furthermore, this unit or other connected unit may be broken.

Power source

Before supplying the power, confirm that the power source is a designated voltage.

· Necessity of protective grounding

Do not cut inside or outside wire for earth, nor disconnect the wire from earth terminal.

In any case, the unit becomes dangerous conditions.

Defect of protective function

Do not operate the unit if protective functions such as protective grounding or fuse are seems to be defective. Also, before operating the unit confirm that there is no defect for protective functions.

Fuse

Use the designated rating (current, voltage, type) fuse to prevent fire.

Replacement of fuse shall be done after put off the initial power source and put off the power switch of this unit. Do not use other fuse than designated one, nor make short circuit for fuse holder.

· External connections

After making protective grounding firmly, connect to external control circuit or detection objective.

· Counteraction at gas alarm

When detect high concentration gas than preset alarm level, it is very dangerous.

It is required to take an appropriate measures by customer's decision.

Mounting/dismounting

Locking mechanism may be broken if the unit is mounted into the case with disengagement lever up position. Make correct procedure for mounting/dismounting..

### -3. Cautional items

## A CAUTION

· Do not use walky-talky near this unit.

When this unit receives the electric waves by walky-talky etc near from the cable, this will effect the reading. When use the walky-talky, operate it at the place where there is no influence of electric wave ejection.

- · When make power on again, make it after an interval of over 5 seconds.
  - When make power on within 5 seconds, there may be no normal operation.
- When operate it not to follow this manual, repair it by other rating parts or modify it on his own, the safety and quality of products can not be secured. Then, when an accident take place by it, we cannot assure our responsibility on them.

Take enough consideration for instrumentation to keep safety even if disconnection of power and signal lines, defect of operation or trouble would be happen due to unexpected reason.

This is an electrical applied instrument.

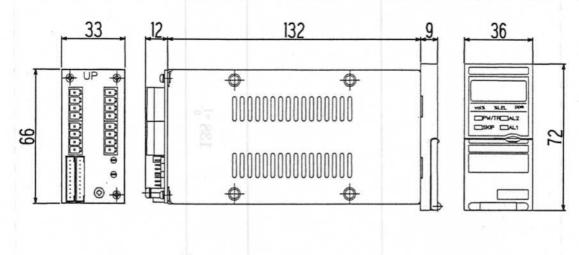
Be care it may be effected by power noise, electrostatic and electromagnetic noise.

When use under such conditions, make protective treatment for use.

# 3. PRODUCT FUNCTION

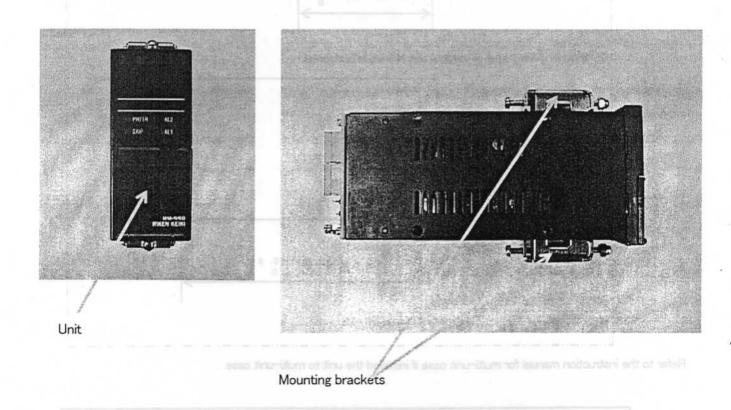
### 3-1. External drawing (with single case)

\*Refer to the operating instruction manual for multi-unit case when multi-unit case is used.

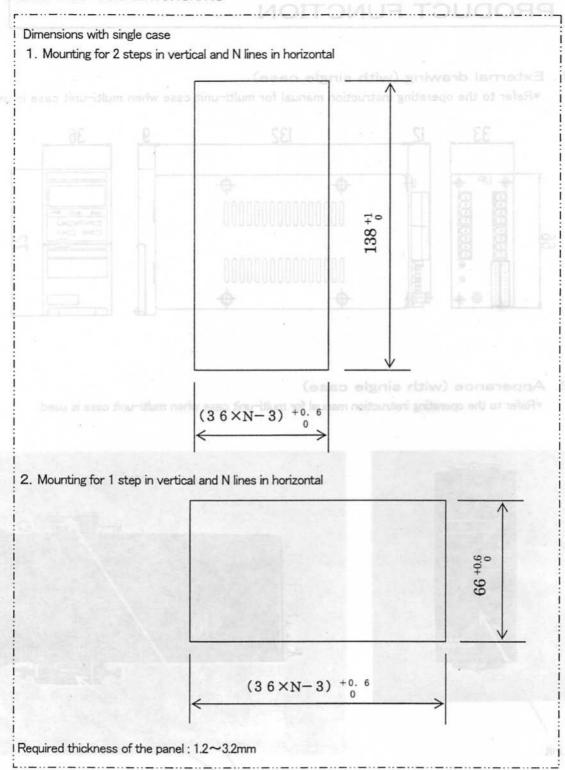


### 3-2. Apperance (with single case)

\*Refer to the operating instruction manual for multi-unit case when multi-unit case is used.



### 3-3. Panel cut-out dimensions



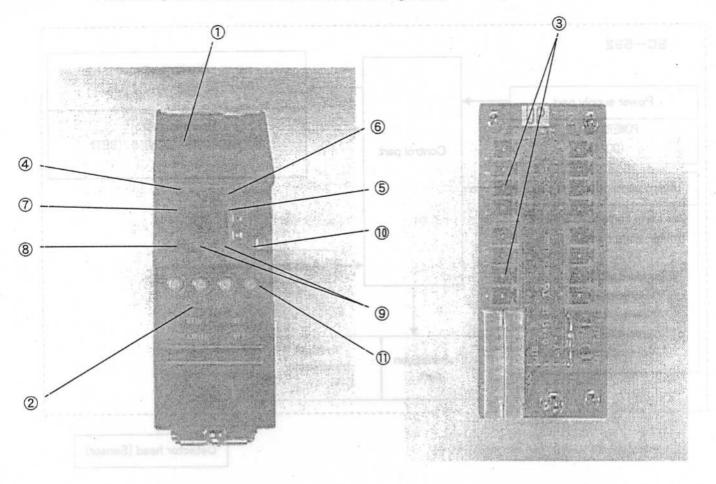
Refer to the instruction manual for multi-unit case if installed the unit to multi-unit case.

## A CAUTION

Please consult us or with our agent for installation method or installation quantity to avoid trouble caused by radiating heat.

### 3-4. Name of each part and function

\*The below pictures show indicator/alarm unit with single case.



①LED display · · · · Indicates gas of	concentration.
---------------------------------------	----------------

②POWER switch · · · · · · · · · ON/OFF switch

3Terminal plates ..... Connects cables from outside.

For multi-unit case refer to instruction manual for multi-unit case.

4PW/TR light ..... Combination light for power and trouble indication.

Steady light: Power ON, normal operation

Flashing : Trouble

⑤AL1 light····· Flashes at gas alarm (1st alarm)

⑥AL2 light····· Flashes at gas alarm (2<sup>nd</sup> alarm)

⑦SKIP light · · · · Flashes during maintenance mode.

(8)MODE switch ..... Uses at maintenance work.

9UP/DOWN switch ...... Uses to select items at maintenance mode, increase or decrease reading

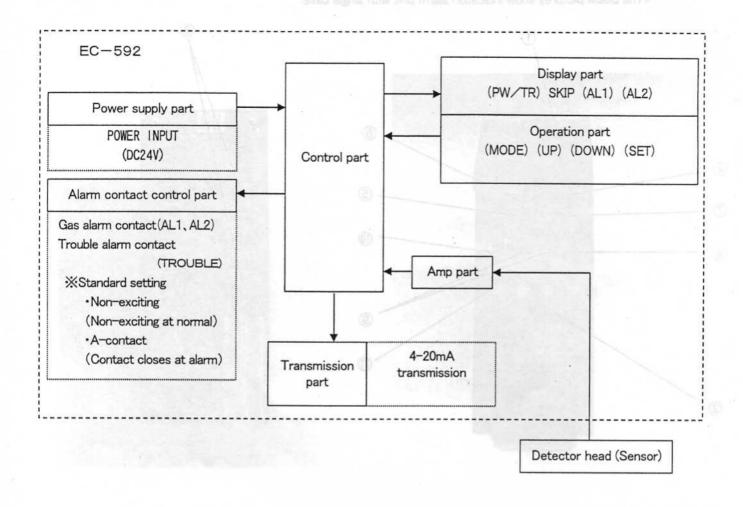
at zero and span adjustments, and to increase or decrease reading at

alarm test.

**®SET** switch ...... Uses to change for alarm test mode.

This is also used to set the contents of mode during maintenance mode.

Disengagement lever ..... Locks the indicator/alarm unit.



# 4. HOW TO USE

### 4-1. Before operation

Be sure to keep cautional items of use not only for first user but for already experienced staff.

If not keep these cautional items, the unit may be defective and correct gas detection may not be performed.

## 4-2. Mounting/dismounting procedures

### (1) Mounting method

- ·Open the front cover of this unit.
- · Confirm that the power switch is at OFF
- ·With the disengagement lever at down position, mount into the case.

(Confirm that the edge connector is put in firmly)

- · Confirm that the disengagement lever is turned upward when indicator/alarm unit is mounted into the case firmly.
- · After confirmation of lever position, put ON the power switch, and then, close the cover.

# (2) Removal of the unit as a let non lelleng in aldes ett anw ton alle i doss vitnio mateva adt tug ton ett

- ·Open the front cover of this unit.
- · Confirm that the power switch is at OFF.
- ·Push disengagement lever down to release the lock.
- ·Pull out the unit from the case.
- •Turn the lever upward and close the cover.

# A CAUTION

Mounting/dismounting of indicator/alarm unit shall be done according to the above procedures. If not, stopping metal of the unit may be transformed and the cover can not be closed.

## 4-3. Installation place

# A CAUTION

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.

Do not install at the place where it is danger for maintenance service such as high voltage cable, etc.

This unit is required to make maintenance regularly.

Then, do not install at the place where there is danger at maintenance time.

Do not install it where it is unable to make maintenance.

When required to stop the system at maintenance time, unable to maintain if not remove a part of system or unable to detach the case due to the pipe or rack etc. do not install such place.

System housing that grounding construction is not enough.

Be sure to ground when install.

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

## A 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 50msec.  (For power failure of 50msec, 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 lighting 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 (Protection resistor, zero diode etc.) and is designed to protect the apparatus. But as the signal may be attenuated due to the lightning arrester, check the action and it is required to use.
Grounding	Surge noise shall be generated from the thunder lightning or except it.  To protect detector from these cause, be sure to make grounding.

<sup>\*</sup> 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).

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 contents.

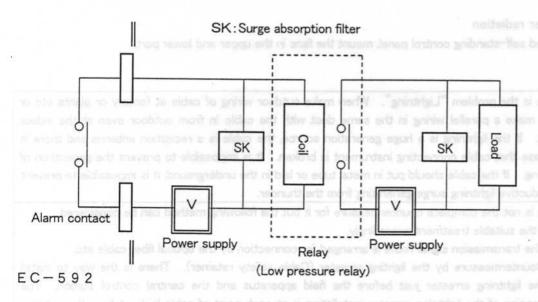
- •Relayed by the low voltage relay and operate by connecting CR circuit (Spark Killer: SK) (Diode etc for DC) suited for relay coil directly to relay.
- · Add CR circuit to the load side of relay on the request.

# A CAUTION (FOR USE OF NORMALY-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.

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 EC-592 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 no work.
- ·High voltage is put inside of indicator/alarm 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.

# A CAUTION

- •The inductive load shall not be used in principle (Do not use fluorescent lamp).
- •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.
- •When control the light inductive load directly, protect the contacts by an appropriate surge killer by all means.
- \* As the inductive load, there are following samples.
- •Patlight \*External relay \*Buzzer \*Siren \*Fan \*Fluorescent lamp \*Motor etc.

14

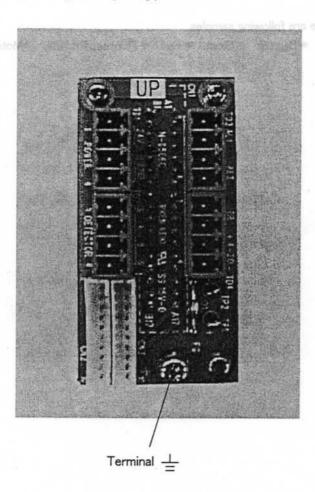
Be sure to make grounding for safety surpose and to keep stable operation of this unit.

### 4-5. Grounding

Make grounding with terminal  $\pm$ .

**A** WARNING

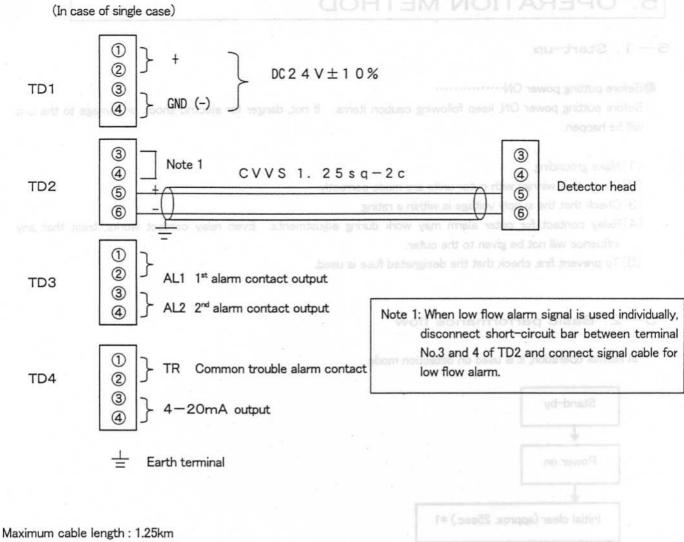
Be sure to make grounding before putting power ON.



\*The above fig shows the unit with single case. In case of multi-unit case, refer to instruction manual for multi-unit case.

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).



For multi-unit case, refer to operating instruction for multi-unit case.

# A CAUTION

- ·Use CVVS 1.25mm2 cable for connection.
- Do not distribute power cable and signal cable together with power line for motor, etc.
- ·This unit applies a connector type terminal plate for easy wiring. Be care not to give a high load to the connector.
- ·We can not warrant the performance of this unit if undesignated cable is used.

## OPERATION METHOD

### 5-1. Start-up

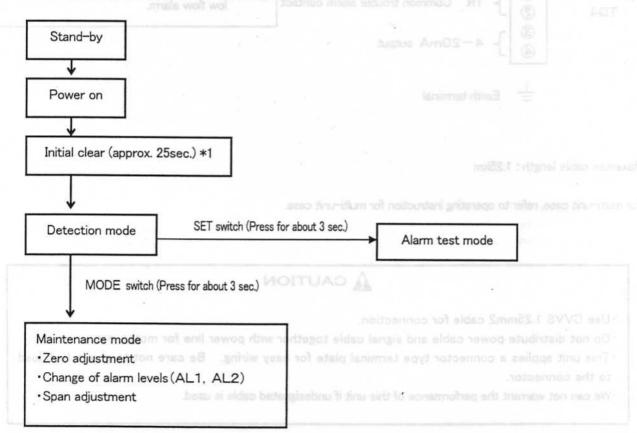
●Before putting power ON······

Before putting power ON, keep following caution items. If not, danger for electric shock or damage to the unit will be happen.

- (1) Make grounding.
- (2) Check that wirings with outer units are made correctly.
- (3) Check that the supply voltage is within a rating.
- (4) Relay contact for outer alarm may work during adjustments. Even relay contact works, treat that any influence will not be given to the outer.
- (5) To prevent fire, check that the designated fuse is used.

### 5-2. Basic performance flow

In normal operation, it is used on detection mode.

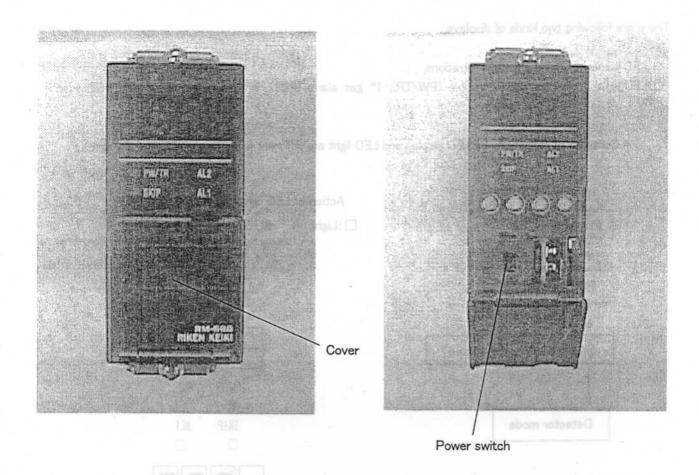


## **A** CAUTION

Maintenance mode shall be performed by the specialized service man. Do not operate it without permission.

### 5-3. Start-up method

### 5-3-1. Power on



- 1) Before making power on, check that the unit is connected correctly.
- 2) The power switch can be seen when the front cover is opened.
- 3) Put the power switch upward to ON and downward to OFF.
- 4) Put the power switch on, and power light illuminates.
- 5) Status of initial clear (about 25 sec.) is displayed as "---".
  - · Checking of the system (Self-diagnosis)
  - · Output signal: Approx 2.5mA
  - · Gas alarm, trouble alarm (light, contact) shut-off.

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

### 5-4-1. Display action

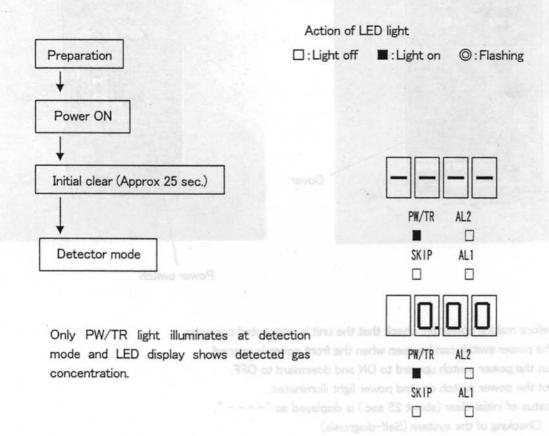
There are following two kinds of displays.

(1)LED display : Shows gas concentrations.

(2)LED light : Shows power/trouble (PW/TR), 1st gas alarm (AL1), 2nd gas alarm (AL2) and maintenance

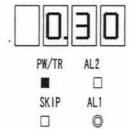
(SKIP) condition.

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

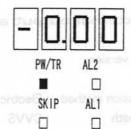


Gas alarm condition

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



The right  $\lceil -0.00 \rfloor$  is displayed when it gets down to minus (-) side at above 10% full scale.



# **WARNING**

When it shows  $\Gamma$ -0.00J, accurate gas reading is impossible and make zero adjustment.

Trouble condition

When any of trouble arises on gas detection, PW/TR light flashes and content of trouble is shown on LED display.

(LED display) (Content of trouble)

E-00 System trouble

E-01 Sensor/detector head disconnection or not yet connected.



PW/TR AL2

0

SKIP AL1

## 5-4-2. External output action

#### 1. 4-20mA output version

(1)Signal transmission method : Electric current transmission (Non isolation)

(2)Transmission path : CVVS

(3)Transmission distance : Below 1 km

(4)Resistive load for connection : Below 300  $\Omega$ 

(5)Status signal level

①Detection mode : 4-20mA (Depends on gas concentration)

②Gas alarm : 4-20mA (By indication valve)

③Initial clear : 2.5mA (Fixed)

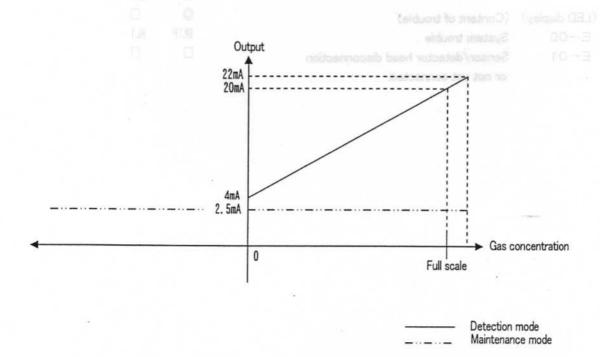
(4) Maintenance mode : 2.5mA (Fixed)

⑤Alarm test : 4-20mA (By indication valve)

(6) Trouble alarm : 0.5mA (Fixed)
(7) Point skip : 2.5mA (Fixed)

(6)Power shut-off : 0mA

Relations between [Gas concentration] and [Output] are shown below.



## A CAUTION

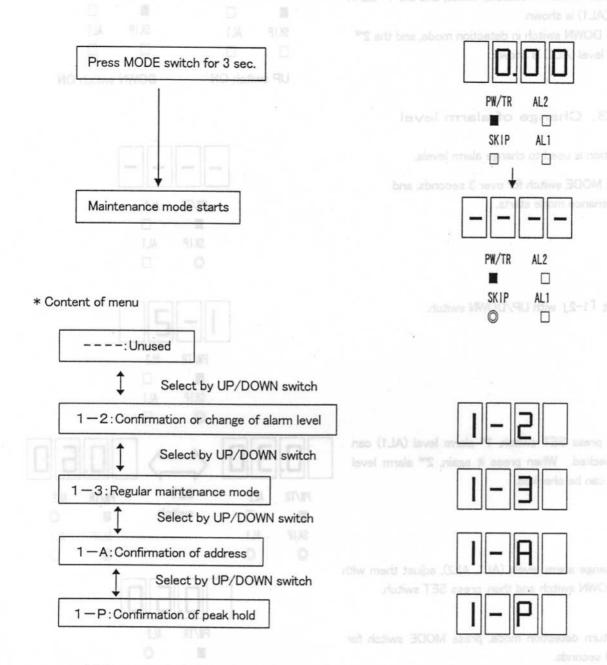
4-20mA outputs are already adjusted. If re-adjustment is required after installation, specialized service man will make re-adjustment.

Do not make this adjustment without permission.

## 5-5. Maintenance and adjustment

## 5-5-1. Maintenance mode

When make each adjustment, make it on maintenance mode.



## A CAUTION

Do not operate 「1-3: Regular maintenance mode」 without our permission. Please contact with our nearest agent or RIKEN KEIKI if it is required.

## **A**WARNING

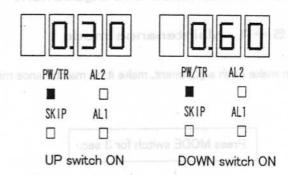
When maintenance mode starts at gas alarm, alarm contact and external output signal (gas alarm signal) will be cancelled.

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

This section is used to check preset alarm level.

1) Press UP switch in detector mode, and the 1st alarm level (AL1) is shown.

Press DOWN switch in detection mode, and the 2<sup>nd</sup> alarm level (AL2) is shown.



## 5-5-3. Change of alarm level

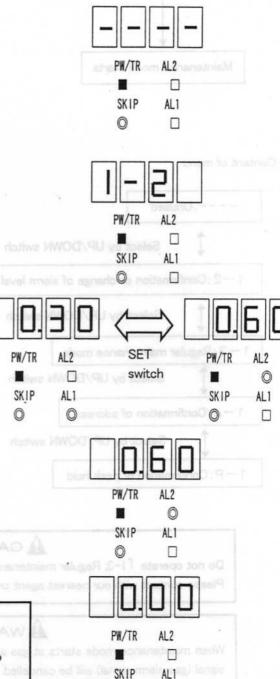
This section is used to change alarm levels.

1) Press MODE switch for over 3 seconds, and maintenance mode starts.

②Select 「1-2」 with UP/DOWN switch.

- 3When press SET switch, 1st alarm level (AL1) can be checked. When press it again, 2<sup>nd</sup> alarm level (AL2) can be checked.
- 4)To change alarm levels (AL1, AL2), adjust them with UP/DOWN switch and then, press SET switch.
- ⑤To return detection mode, press MODE switch for over 3 seconds.

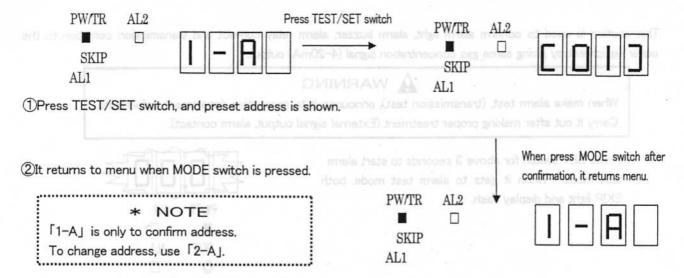
SKIP mode light turns off which shows detection mode.



#### CAUTION

Gas alarm is not triggered except in detection mode. When leave it alone on maintenance mode, this returns to detection mode automatically after 10 hours.

#### 5-5-4. Confirmation of address



## 5-5-5. Confirmation of peak hold level

MAINTENANCE light turns off to show detection

mode.

The highest reading level is holded if gas concentration above preset alarm level in detection mode is detected.

1) Press MODE switch for above 3 seconds to start AL2 maintenance mode. **MAINTENANCE** 2Select [1-P] with UP/DOWN switch. AL1 AL2 **MAINTENANCE** 3 Peak hold level can be checked with SET switch. AL2 **WAINTENANCE** AL2 4) Press SET switch for above 3 seconds to release peak hold level. **CHAINTENANCE** AL2 AL1 **MAINTENANCE** PW/TR AL2 5)Press SET switch to check whether it is cancelled or not. (C) MA INTENANCE 6To return detection mode, press MODE switch for above 3 seconds.

#### 5-5-6. Alarm test

This section is used to confirm alarm light, alarm buzzer, alarm relay contact and transmission condition to the outer equipment by giving same gas concentration signal (4-20mA) output.

## **MARNING**

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

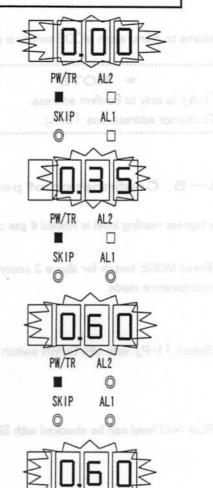
Carry it out after making proper treatment (External signal output, alarm contact).

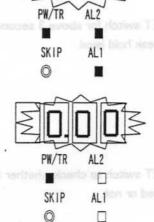
①Press SET switch for above 3 seconds to start alarm test mode. When it gets to alarm test mode, both SKIP light and display flash.

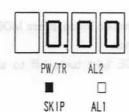
②Increase the reading with UP switch. When it reaches the first alarm level, AL1 light flashes and buzzer sounds (first alarm contact works). When it reaches the second alarm level, AL2 light flashes and buzzer sounds (2<sup>nd</sup> alarm contact works).

③To stop the buzzer sound, press RESET switch. In this occation, alarm light changes to steady light and it becomes self reset mode. To decrease reading below alarm level with DOWN switch, alarm light and alarm contact are cancelled.

Press SET switch for above 3 seconds, and it returns detection mode. SKIP light turns off which shows detection mode.







П

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

## **M** WARNING

- When finish this operation, do it after making point ship 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 excitation (option), alarm contact works when make power (DC24V) off.

# 6. KINDS OF ALARM AND PERFORMANCE

#### 6-1. Kinds of alarm

There are two kinds of alarms such as gas alarm and trouble alarm.

• Gas alarm: When detection gas reaches preset alarm level or exceeds it, this starts alarm.

《Latched mode→Self reset after reset operation.》

# don to flo furle so has terrog to \* 1 NOTE of 7 does not be largely at the

Alarm levels are adjusted at 1/3 (1st alarm) and 2/3 (2nd alarm) of full scale.

• Trouble alarm: Abnormal condition in this unit is detected and gives a trouble alarm.

Except system trouble "E-00", it is non-latched mode.

When return to normal from trouble condition, it starts again from the action of initial clear after power on [See section 9. TREATMENT AT ABNORMAL CASE].

#### 6-2. Gas alarm

## 6-2-1. Gas alarm action

(1)Display

1 Gas concentration

When exceeds detection range (Over scale), LED shows " $\cap \cap \cap \cap$ ".

2 Power light (Power: Green)

It keeps steady light.

3 Alarm light (AL1: Orange), (AL2: Red)

There two alarm levels. When reading reaches each preset alarm level, or exceeds each preset alarm, level, this starts flashing and then returns to continuous lighting after reset operation, (Standard).

#### (2)External output

1)4-20mA output

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

2 Alarm contact

When gas concentration reaches preset alarm level or it exceeds preset alarm level, relay contact work.

Alarm relay contact is a latched mode. It returns self-reset mode when gas concentration decreases below preset level after reset operation.

#### \* NOTE

Alarm pattern is shown in the attached sheet.

#### 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.

- ②Based 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. MAINTENANCE CHECK

This is an important for security and safety. To maintain the security and enhance the reliability of safety, the regular maintenance check for it shall be absolutely necessary.

## 7-1. Frequency of maintenance and check items.

## 7-1-1. Daily check

This is the check items carried out by customer.

1) Check of PW/TR light.

In normal operation, the light is at on condition.

2Check of LED reading

Check that LED reading is zero (0).

If it is not "0", check that gas is free around detector head and make zero adjustment at detector head side.

## A

#### CAUTION

that there is no danger, the treatment for gas leak shall

For the accurate zero adjustment, check it by "1-1 Zero adjustment" of maintenance mode.

3 Alarm test

Check that the alarm light flashes and buzzer sounds.

## A CAUTION

For the alarm test, refer to "5-5-6 Alarm test."

# 7-1-2. Regular maintenance check

The following items shall be checked at regular check.

- 1 Daily check
- 2Cleaning of this unit
- 3 Adjustments
- 4) Function check
- 5 Parts replacement
- 6Others

## 7-2. Maintenance contract for regular check

To maintain the safety operation of the unit, 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 our nearest service agent or Riken Keiki.

7—3. Replacement of sensor and parts.

#### CAUTION

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

- 7-4. Treatment when operation is stopped or its installation place is moved.
- 7-4-1. Stop at normal operation

Make the power switch off on the front panel. 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] about its moving place. Then, for wiring refer to [4-5. Caution at wiring].

#### CAUTION of the world at the stoll

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

7-5. Storage and treatment when not use for a long time.

This unit shall be stored in the following environment condition.

①Temperature

:0°C~40°C

2)Humidity

:10~90%RH (No condensing)

3 Environment condition

: To be an environment where there is no generation of gas, solvent and vapor etc.

#### CAUTION

- ·When re-use it, be sure to make gas calibration.
- •The re-adjustment and parts replacement etc including the gas calibration shall be contacted to our nearest agent or Riken Keiki.

# 8. SCRAP OF PRODUCTS AND SENSORS

Scrap of products and newed and the most of newcood markly the sale in

· Regarding detector complete, treat it in the same as industrial scrap (Non-flammable goods).

## TREATMENT AT ABNORMAL CASE

#### 9-1. Trouble alarm

Flashing of PW/TR light

- ·When PW/TR light is flashing, it is the condition that the following trouble may be caused. Reseach its cause and take an appropriate action.
- The output from the unit at trouble shall be as follows.

4~20mA output : Fixed at 0.5mA aggosts at not being one dw them them.

Trouble alarm contact: Relay contact works.

LED display	Trouble content	Main cause
E-00	System trouble	Memory trouble in the unit.
E-01	Connection trouble of detection head	Detector head disconnection, sensor disconnection, sensor cable disconnection.

## 9-2. Counteraction at trouble alarm

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

## 9-3. Before it is thought to be trouble

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

- Check the wirings including pherical equipment as well as detector head.
- •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, electrical line filter, insulation transformer etc or those addition.

#### 9-4. Trouble shooting

## (1)PW/TR light does not illuminate

<Cause and action>

- ·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 rating power voltage.

·Is this power switch turned on?.

Make power switch ON.

## (2) Abnormal performance

< Cause and action >

· 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 oftentimes, take an appropriate action for noise.

#### (3) No calibration available

<Cause and action>

- ·Is the calibration gas concentration correct?
  - Prepare the appropriate calibration gas.

·There is the possibility for sensor sensitivity drop.

The sensor replacement is required.

#### (4) PW/TR light flashing

1. System trouble "E-00"

< Cause and action >

- · Memory trouble inside of indicator/alarm unit. Contact our nearest agent or Riken Keiki.

  ②. Sensor connection trouble "E-01"

<Cause and action>

- ·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. If can not be recovered, contact our nearest agent or Riken Keiki.

## (5) Fuse disconnection fine sint no ythrebnequent to be the sine of some street Press MODE switch for 3 seconds and the maintenance mode start

<Performance>

·This unit can not work.

< Cause and action >

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

#### Supply lightering the next of the second \* NOTE

The fuse rating for this unit is "250V/1AT". Supply as long of some male and some male and

## 10. DEFINITION OF WORD

#### Calibration

By using calibration (standard) gas etc, it seeks for instrument reading, display value or set value and true value.

#### Maintenance mode

When make maintenance of this unit, shut off the alarm 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 unit.

Press MODE switch for 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.

#### Alarm delay time

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

## 11. PRODUCT SPECIFICATIONS

#### 11-1. Specifications

Model designation:

EC-592

Detection gas:

Toxic gases

Applicable detector head:

Electrochemical sensor type detector head

Detection signal:

4-20mADC

Detector head cable:

CVVS 2-core or equivalent

Distance to the detector head: Max 1.25km with CVVS (1.25mm2) cable

Output signal:

4-20mADC, non-isolation (Resistive load below 300 Ω)

Gas concentration signal:

4-20mADC (Linear up to 22mA)

At trouble:

0.5mADC

At initial clear:

2.5mADC

At maintenance:

2.5mADC

Alarm performance:

Latched mode (standard), non latched mode (option) or lock in (option)

1st alarm:

Orange light (AL1) flashing (steady light after reset operation).

Relay contact:

Non-exciting at normal (exciting at alarm···standard) or exciting at normal

(non-exciting at alarm···option)

Potential free contact 1a (standard) or 1b (option)

2nd alarm:

Red light (AL2) flashing (steady light after reset operation).

Relay contact:

Contact rating:

Non-exciting at normal (exciting at alarm···standard) or exciting at normal

(non-exciting at alarm···option)

Potential free contact 1a (standard) or 1b (option) 0.5A at 100VAC, 1.5A at 30VDC (Resitive load)

Trouble alarm

Alarm performance:

Non-latched mode

Alarm display:

Green light (PW/TR) flashing

Relay contact:

Non-exciting at normal (exciting at alarm···standard) or exciting at normal

(non-exciting at alarm---option)

Potential free contact 1a (standard) or 1b (option)

Contact rating:

0.5A at 100VAC, 1.5A at 30VDC

Self-diagnostic function:

System failure, detector head connection failure, detector head low flow, zero

follower function failure.

Initial clear time:

Approx 25 seconds

Several settings:

By remote PC (uses exclusive cable)

Contact interests

Operating temp. & humidity: 0-40°C, 10-90%RH (Non-condensing)

Power requirement: 24VDC ± 10%

Applicable power cable: CVV 2-core

Power consumption: Max 5W (with single case) or (Including detector head) Max 8VA (with multi-unit case)

Structure: Housing type for the case, front identification card type, non-explosion type.

Dimensions & Weight: Approx 36(W) X 72(H) X 134(D) mm, Approx 0.1kg (unit only)

## 11-2. Product composition and model and composition

#### Standard compositions

- ·Indicator/alarm unit Model EC-592
- · Operating instruction manual…1 vol.

<sup>\*</sup> Specification subject to change without notice.

## 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 cervices 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.

## RIKEN GAS DETECTOR WITH SIGNAL CONVERTER

This manual contains the following hedIRZOT-dours the sate and effective operation.

## 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.

FINE 2-7-6 Azusawa Itabashi-ku Tokyo, 174-8744, Japan

Phone: Tokyo (03) 3966-1113
Telex: 272 2638 RKNFNE
Fax: (03) 3558-9110 GIII
Cable: RIKENFINE TOKYO

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.

A

## 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

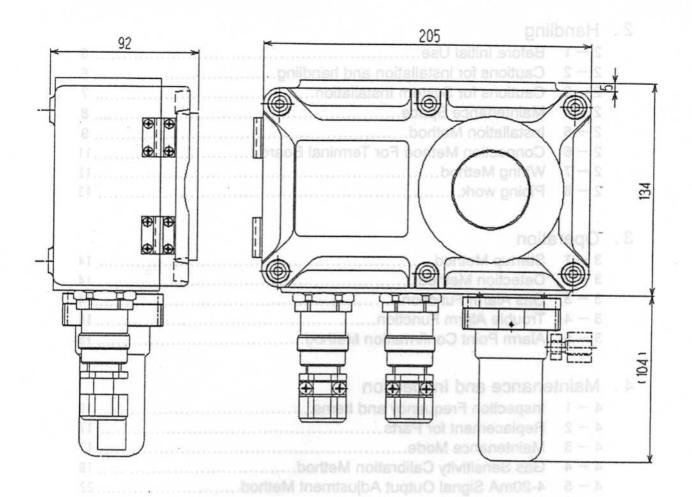
Means minor damage to the human body or properties unless the operation or measures of this manual are observed.

→ Remarks

Means advise concerning handling and operation.

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# Overall View and Name of Each Part ...... Jouboid ent to anothous . I



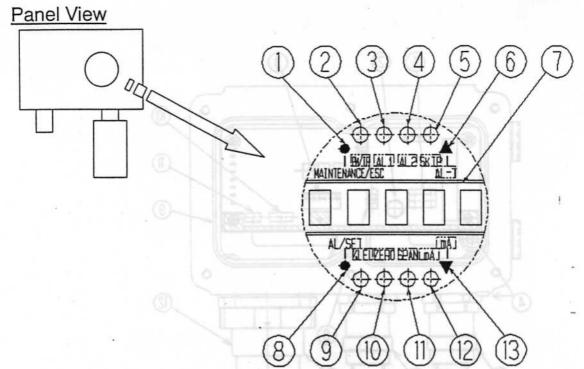
## Control key





# 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.



①Maintenance/ESC switch · · Used for entering into the maintenance mode with the control key. And used for cancel the maintenance mode. On continuously when the equipment is working (power lamp). And flickers in the case of abnormality in the equipment. 3AL1 lamp ..... On when 1<sup>st</sup> alarm is activating. On when 2<sup>nd</sup> alarm is activating. ⑤SKIP lamp····· On when point skip is selected. And flickers in the maintenance mode. Used for increase in the value with the control key. ⑥AL-T/UP switch······ (during maintenance mode.) Indicates the gas concentration and error code. ®AL/SET switch ..... Used for confirmation of alarm point. And used for decision in the maintenance mode.

9%LEL lamp .....

@mA lamp·····

13MA/DOWN switch · · · · · · · · ·

@ZERO lamp.....

①SPAN lamp·······

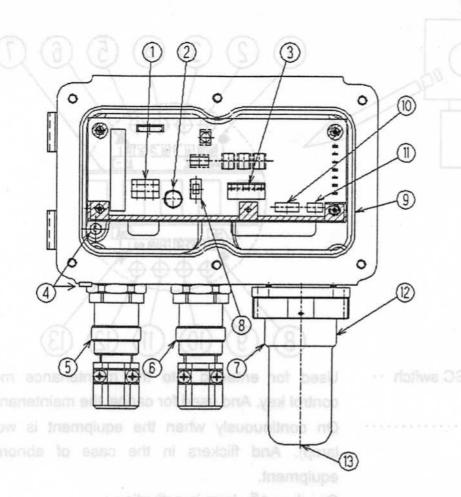
On continuously when the gas concentration is to be indicated in "%LEL". (This lamp is used also as a power lamp.)

Flickers in the zero adjustment mode. (On continuously when the adjustment is over.)

Flickers in the span adjustment mode. (On continuously when the adjustment is over.)

ON with the current output indicated on the LCD (during maintenance).

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 a	nd 4-2	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.
- 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.
- Seal packing ...... Used to protect equipment from water and dust.
- ⑤ 5p connector for detector ... Connected to cable for detector (sensor). (sensor)
- ① 2p connector for detector ... Connected to cable for detector (lamp). (lamp)
- Gas outlet ...... Connected to metallic pipe of gas outlet side.

## illi 2. Handling

## 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.

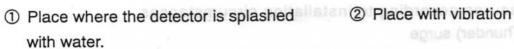
This detector may also be sensitive to gases other than the applicable one. When the detector detects the gas and issues alarm, find out whether this is caused by the applicable gas or other gases not covered by the detector. In view of its duty, the gas detector must always be in the normal operation 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. For the system to use this detector, it is required to make design based on this

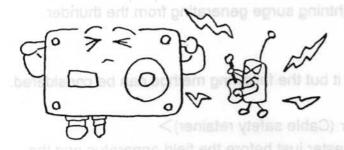
## 2 – 2 Cautions for Installation and Handling

Never use the detector in the following places.

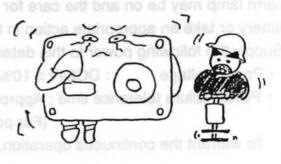


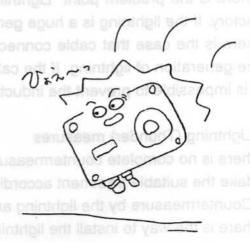


(Use an optional drip-proof cover when the detector is to be installed out of doors.)

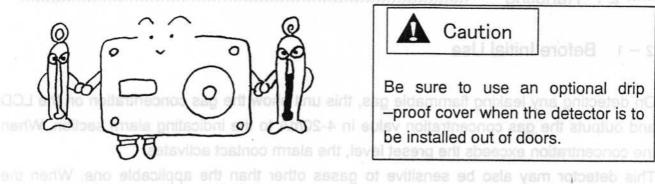


③ Place with radio wave and noise.





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 it is a second but a second about the second asp and below -10℃ or +40℃ or more by dibanavoor for seaso refito to asp eldablique

## 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.

detector must always be in the normal operation with the power supply ON. Therefore, it is

## (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

: DC24V±10%

· Power failure tolerance time : Approx. 10msec or less

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

Never use the detector in the following places.

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

## (2) Noise measures according to installation circumstances.

## ①Lightning (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.

## ②Lightning (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.

## 3 Power 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.

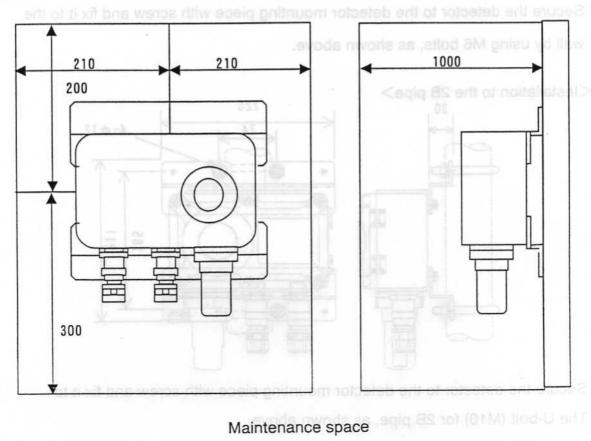
Make electrical isolation such as using metal installation pipe for power cable, installing Isolation plate between power cable and electrostatic shield, and install them into exclusive metallic duct.

## (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.

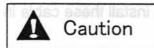
## 2 - 4 Maintenance Space

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.



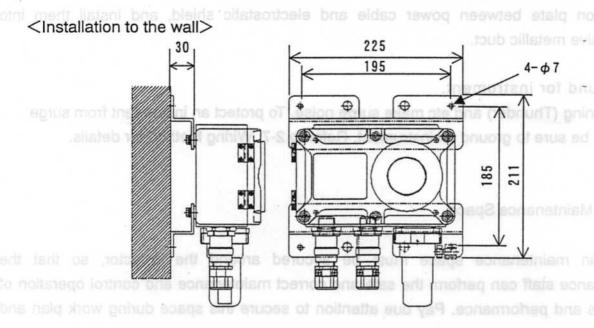
#### 2 - 5 Installation Method

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

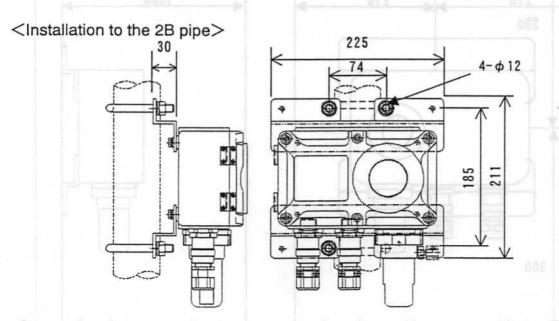


During installation, take care not to drop or throw the detector.

Otherwise, the strong impact may cause damage to the equipment.



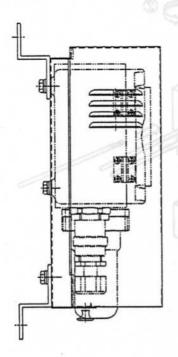
Secure the detector to the detector mounting piece with screw and fix it to the wall by using M6 bolts, as shown above.

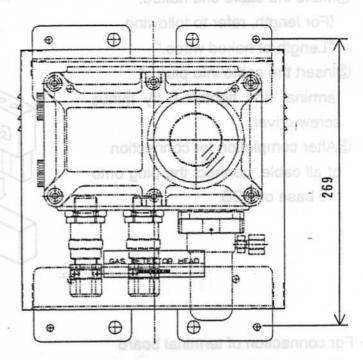


Secure the detector to the detector mounting piece with screw and fix it to The U-bolt (M10) for 2B pipe, as shown above.

<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 grand (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.

Peel (ength of cable and : 7mm (3p terminal), 6.5mm (6p terminal)

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

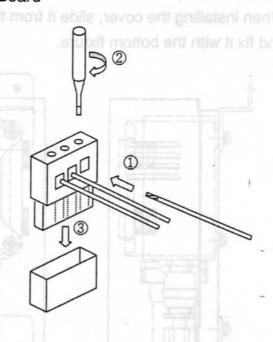
Washer inside diameter (mm)	Packing inside diameter (mm)	Cable finish O.D.
φ13	φ11	φ10~10.5
φ13	φ12	φ11~12

(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 (9000 1000g-gib a galau nottalistent)

①Make 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.
- 3After 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 Al series (Maker : Phoenix Contact)

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

Torque for terminals loos bedoelds at woled elder ed in award applying to end.

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

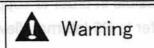
Alarm relay contact cable : CVVS 1.25sq



#### Caution

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

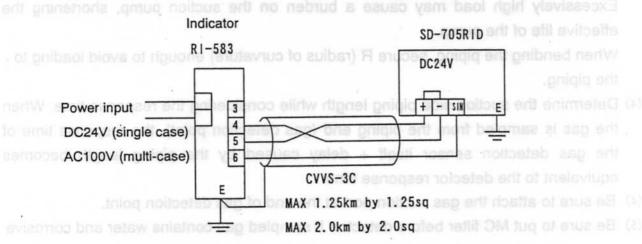
Refer to 2-7. Wiring Method for connection of terminals.



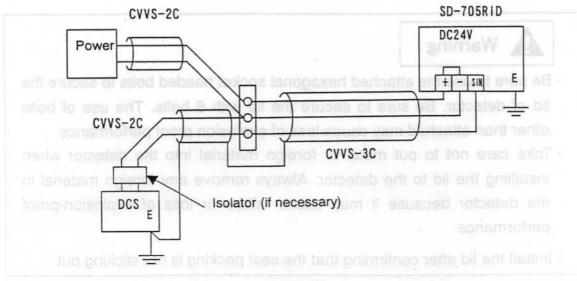
 The supply voltage of this unit is DC24V±10%. Operation of this unit with the voltage other than specified may cause failure or damage to the equipment or malfunction.

## 2-7 Wiring Method

- After installation of detector, confirm that there is no error in installation, and carry out connection between equipment as follows.
- ①Connection of the SD-705RID to the indicating alarm section (RI-583 type)



②Connection 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

- Use metallic pipes (cupper 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.

## 3-1 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. Appeted has a side of your

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 as no aswood flill (halls clear) that are made in the conditions are sent as the condition of the cond

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 1<sup>st</sup> alarm and 2<sup>nd</sup> alarm. And each alarm performs individually.

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

Whenever alarm signals from gas detectors are used with normally-closed

Performance of 2<sup>nd</sup> alarm is same as 1<sup>st</sup> 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.
- ②Based on gas alarm control density, it keeps the safety by keeping away people from the monitoring area.
- ③When gas density display show, close the gas value and confirm that gas density gets lower enough.
- 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.

With power ON to the unit, the "PW/TR" LED lam

indication window shows "---" for about 40 second

⑤After 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 and adjust 1 - 2 of refer 20X-2" not solid light right

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

# \* Caution (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.

## 

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 of believed to enulish ni gnitiluses

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

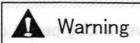
Inspection point/item	Description	Alville se esp Judgment deulbs
Lamp check		The "PW/TR" LED lamp must be ON. If flickering, take an appropriate measure according to 5-2. Troubleshooting guide.
Gas concent. indication check		The gas concentration indication must be zero in the clean atmosphere. If not, carry out zero adjustment according to the zero adjustment method.
Equipment installation state check		No obstruction for gas detection. If any, remove such obstruction or move the unit to another place.
Sensor check	covered with dust or	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
- ☆ To maintain the safety operation of detector, it is recommended to keep the maintenance contract with service agent fro regular maintenance, adjustment and overhaul etc including the gas sensitivity adjustment.

For the detail of maintenance contract, contact nearest agent.



- This is a safety instrument and the inspection every 6 months or more is mandatory to ensure the safety. It 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 noboegani li	
1.	1.2 E +	Zero adjustment mode	
2.	2.5 P m	Span adjustment mode	
3.	3.0 u t	4mA adjustment mode	
4. 90	4.A L	Alarm point set mode	
5.	5.8 5 8	Alarm test mode	
6.	6.P S	Point skip set mode	

<Common operation~To enter maintenance mode>

- To enter maintenance mode, press MAINTENANCE switch● by control key for 3 seconds in normal measuring mode.
- 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.

Attach the sampling bag filled with high-purity air to the MC filter inlet and allow the

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.
- When entered measuring mode, SKIP lamp goes off and indicating as it is measuring mode.

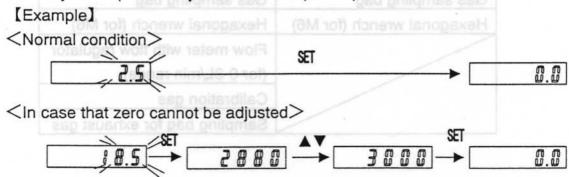
## 4 - 4 Gas Sensitivity Calibration Method (1990 al Institution OF 35) belaulbe

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

b - (1) When zero point is left from zero excessively, indication is not "0.0". In this

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

- (1) Zero adjustment method <a href="ebom sonaremism reins of moderage normo"> (1) Zero adjustment method</a>
- 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 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.)



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.

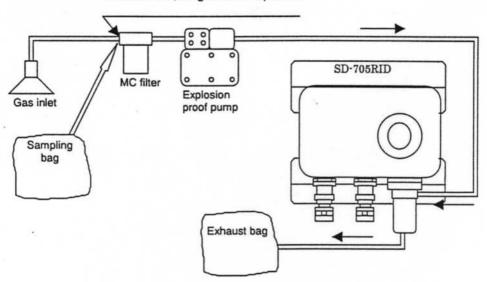
### (2) Span adjustment

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>

Introduce zero/cal. gas from this position.



- 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

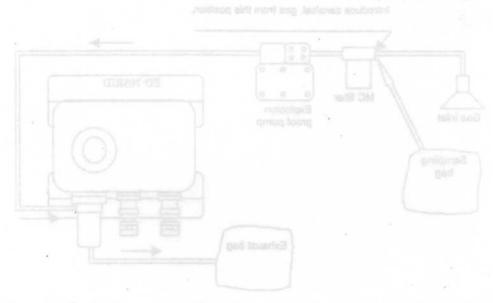
A dedicated tool is necessary for the span adjustment. It is recommended to request this adjustment to our service company.

In a gas sampling bag for each unit

<Example for piping>

### (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.



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 A or DOWN switch V to allow the indication to match to the calibration as concentration.

After adjustment, press SET switcher 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.

Upon completion of the span adjustment, remove the sampling bag from the IN side of the gas check adapter and press the control key to MAINTENANCE switch.

4 - 5	4-20mA	Signal	Output	Adjustment	Method
-------	--------	--------	--------	------------	--------

- Press SET switch in MENU display
   When signal output adjustment mode is entered
   4.0 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.

scale) can be changed. (4-20mA output is also changed according to indication)

\*: 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 2<sup>nd</sup> alarm can be alternated individually.

- ① Press SET switch in menu display 4.8 L.
  - ② When alarm set mode is entered, AL lamp is on and current 1<sup>st</sup> 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▲.
  - ① Current 2<sup>nd</sup> alarm point is displayed on LCD. And AL2 lamp is lighting.
  - 8 2<sup>nd</sup> alarm point can be changed as same as 1<sup>st</sup> alarm point.

## 4 - 7 Alarm (Transmission) Test Method Tes

Alarm functions can be confirmed. ① Press SET switch● in menu display ② Press UP switch ▲ or DOWN switch▼ to select whether alarm contact is activated (3) Adjust indication value to 4mA (zero) on indication part\* of DSC and ton no high is [: ☐ F F (No operation) ⇔ [: ☐ ☐ (Operation) ③ Press SET switch● to decide. 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. and object (Ammere) to check pins you be 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.) Visubolibri balamella ed neo mala "S bna mala Test level exceeds 2<sup>nd</sup> alarm point, 2<sup>nd</sup> alarm is activated. (After alarm delay time passed, AL2 lamp is lighting, and 2<sup>nd</sup> alarm contact is activated if "ON" is chosen.) (5) After adjustment, press SET switch @ to decide. After decision, AL1 lamp is

### 4 - 8 Point Skip Set Method

Maintenance mode can be set compulsorily.

isgs1

4-20mA : 2.5mA (Fix) if animals of subscore a adhoast notice and

Alarm contact

: OFF

Alarm lamp

: OFF

Press SET switch● in menu display

6.P 5

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

00

, and to cancel point skip condition, change as

. Then, press SET switch to decide.

After decision, SPAN lamp is lighting.

### 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)
- Install the attached fuse (0.5A), install the lid and 6 hexagonal socket headed screws. and tighten these screws.
- Turn ON power supply to this unit. Confirm that the operation is normal. If not, refer to 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℃

Humidity

: 85%RH or less

Environmental conditions: Place without organic solvent and gas generation.

## 3. Abnormality and Countermeasures

### 5 - 1 Trouble indication and Countermeasure alugmon les ed non some sons retriem

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	alb unem ni @/ Counter 22919 (f)
E - 8 8	Indicated when any abnormality occurs in the equipment.	Turn on power again. If not restored, consult with nearest agent.
E-G:	Indicated when wire breakage occurs in the sensor.	Consult with nearest agent.  Check the connector cable and repair the default point.
E - B 4	Indicated when sensor zero point is excessively drifted.	When the trouble cannot be cleared by zero adjustment, consult with nearest agent.
remove the fusion (we) headed screw	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.	

Turn ON power supply to this unit. Confirm that the operation is normal. If not, refer to

(7) Indication rises without gas

(B) No control key available

(2) Abnormal performance

Cause	Countermeasure	
Sudden surge noise can be	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	
nd weather proof cover (option	noise. noirellatani	

(3) No Zero Adjustment available

3 ) No Zero Adjustment	available was a value of the same of the s
cause telegren	s amse as prish Countermeasure b batsmatis
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
influenced from and in propod	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	atew bas while and Countermeasure	
Supposed that main body or external power supply have	Find the cause and care for it. Then, replace the fuse with the designate one.	
trouble.	Influence from external Reduce influence	

★ Remarks

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

(7) Indication rises without gas

Cause amatruo0	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	ng Vibenco ett eet. Countermeasure nottstdilso	
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	Press control key correctly on the panel.	
Press control key correctly?		
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.	

Response time

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%.

Digital gas concentration indication, 4-20mA in PW/TR...Power/Trouble indication (Green litch

4-20mA (current discharge type) Resista

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 in a long COUI MO sewood selfs abroome 04

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

Output: 4-20mA output - 0.5mA out

ZERO/SPAN adjustment (non-contact) with the cordinate

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

## 

Type SD-705RID

Detection principle Non-dispersed infrared type Methane or hydrocarbon (HC) Gas to be detected

Suction type (suction pump available separately) Detection method

0-100%LEL mi beta petni noanea erfi not elgioning a ai airiT Detection range

Detection accuracy F.S. ±5% or less and to algioning .8 of refer alligable and no 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

2 level alarm output Alarm output

· Contact output : 1a or 1b · Contact rating : DC30V 1A

1st: 25% LEL 2nd: 50% LEL Preset alarm point

(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.

Concentration indication: LCD 4-1/3 digits, 7-segment, Indication function

Digital gas concentration indication, 4-20mA indication

PW/TR...Power/Trouble indication (Green/flickering or lighting)

AL1 ... 1st alarm indication (Yellow/flickering or lighting) AL2 ... 2<sup>nd</sup> 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 → 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±10%

Power consumption: Max.4W

Operating Temperature/humidity -10~+40°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

Approx.5.2kg Weight

Explosion proof Pressure resistant explosion-proof construction

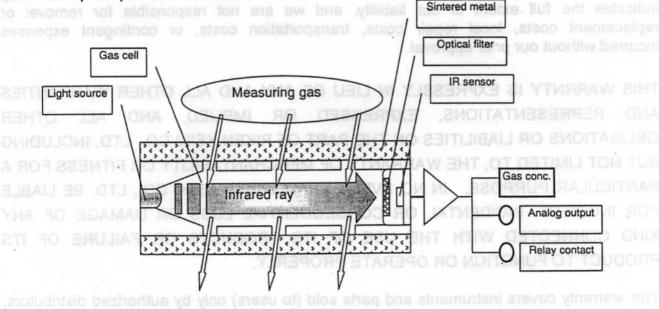
No.C14401 (Explosion-proof class: ExdIIBT4X)

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.



. We do not assume the indemnifical aruthurs? A accident or damage caused by the

# 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 enacted by the latter sale and the latter sale a
- b) Pump diaphragms and valves
- c) Absorbent cartridges
- Then, there is no sensitivity against CO2 and CO etc which have streets and co etc.
  - wave from seasoning gas. Then there is no sensitivity against N2 representations of

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 WARRNTY 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.

(Issued on July, 1986)

Please read this instruction manual carefully when operate RIKEN DIFFUSION

### INSTRUCTION MANUAL

FOR

RIKEN DIFFUSION SAMPLING TYPE SOLD IN DETECTOR HEAD MODEL GD-A8

cable is used for the (COTALYTIC COMBUSTION METHOD) ent to best at all the

This detector head GD-AS is based on the detection principle of catalytic combustion. And the values of LEL Clower Explosive Limit) concentration

reads amos tol leades same cases

(Burgers Wheeler's Law)

ie : Concentration at the lower explosive Hait (LEL)

is a detection principle of combustible gas detector which is used

vention of explosion, a method to measure the calorific value of combusts is the most nuitable and ideal.

Combustible gas is introduced to the sensor preheated to an appropriate

electric resistance of platinum filament due to the then senerated heat of

directly in proportion to the concentration of cumbustible gas in air.

RIKEN RIKEN KEIKI CO., LTD.
2-7-6 Azusawa Itabashi-ku Tokyo, 174, Japan

Phone: Tokyo (03) 3966-1113 Telex: 272 2638 RKNFNE

Fax : (03) 3558-9110 GIII Cable : RIKENFINE TOKYO

and the second second

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

#### 1. SPECIFICATIONS

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...

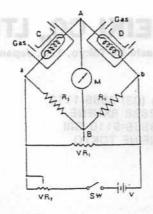
(Burgers Wheeler's Law)

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 cumbustible gas in air.



D : Detecting sensor

C : Compensating sensor

R1, R2: Fixed resistor

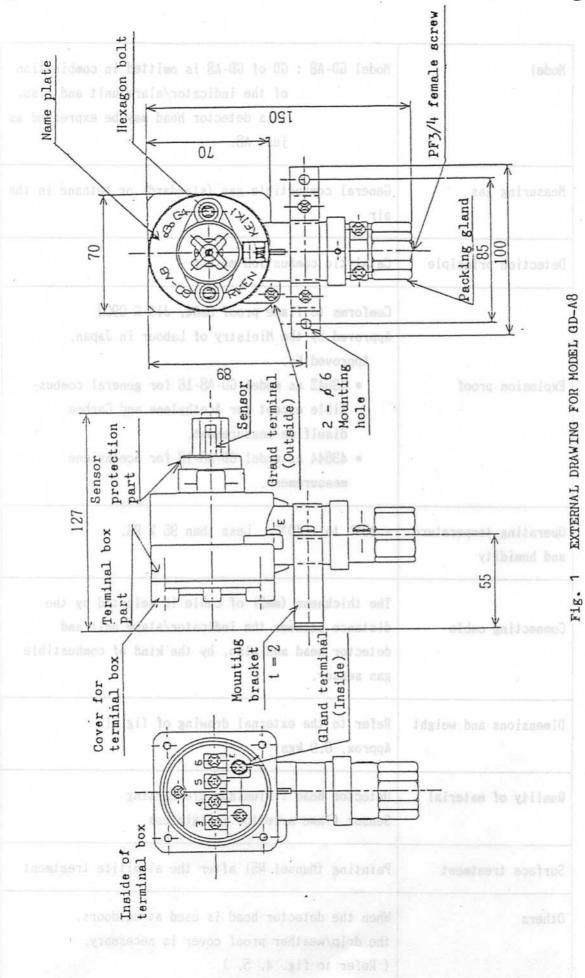
(R1, R2 modulized)

M : Meter

VR1 : Zero adj. potentiometer

CR2 : Voltage adj. potentiometer

Model Season	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		
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 Acethylene and Carbon disulfide measurement.  * 43644 as model GD-A8-18 for Acethylene measurement.		
Operating temperature and humidity	- 10°C to + 40°C, Less than 95 % RH.		
Connecting cable	The thickness (mm2) 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. )		



- 2. HOW TO INSTALL THE DETECTOR HEAD AND HOW TO MAKE EXPLOSION-PROOF CABLE CONNECTION WORK
  - 2-1. Caution in the cable connection work posteb and vinished flatenia
    - \* Take care of the following items (1)  $\sim$  (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

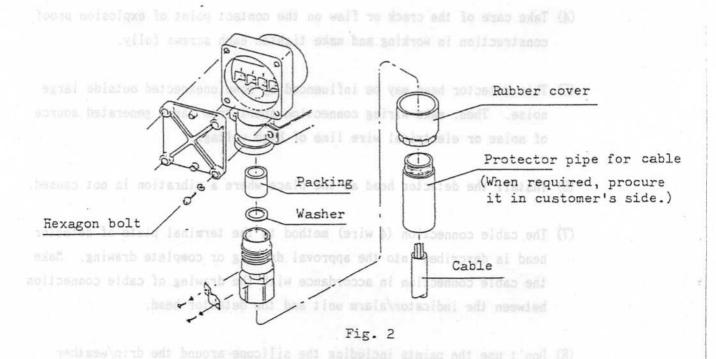
- \* Install certainly the detector head and carry out the cable connection working for explosion-proof construction in accordance with the following procedure from item No. 1 to item No. 9.
- (1) Carry out the installation of the mounting bracket and fix the detector head.

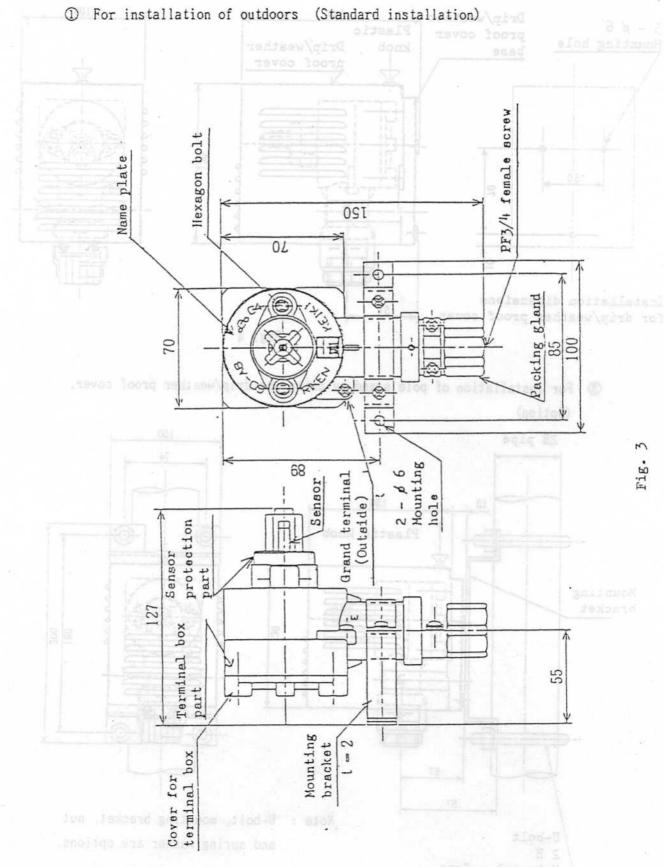
  There are following three installation methods for the detector head.

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

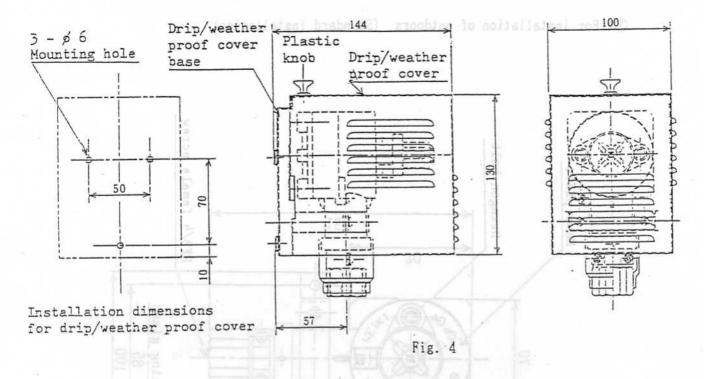
  After the installation of the mounting bracket or the drip/weather proof cover base, fix the detector head temporarily so that the terminal box should be in oblique direction to the left or right side of front side.

  (Direction for easy wire connection.)





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



Tor installation of pole stand by using the drip/weather proof cover.

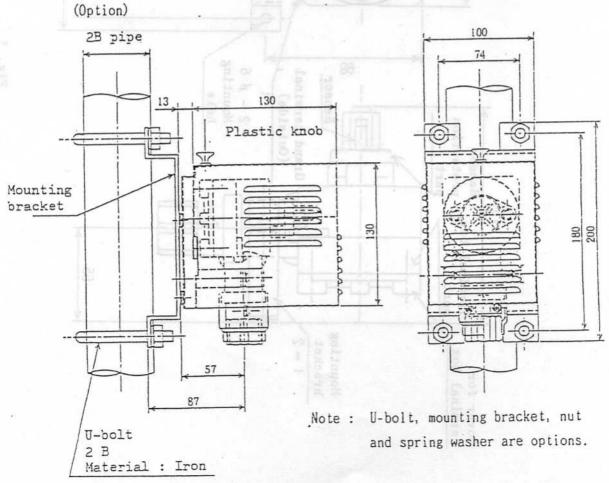


Fig. 5

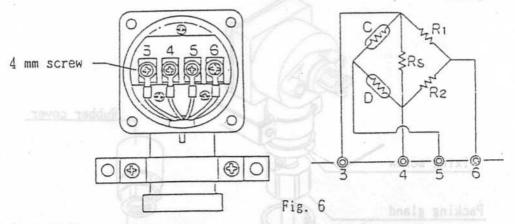
- (2) Put the cable into the terminal box of the detector head after passing through the rubber cover, packing gland, washer and packing. Install the terminal lug for 4 mm screws to the end of cable (4 core). (Refer to fig. 2)
  - \* Note: The washer and pressure-proof packing consists of following three kinds and is included as one of accessories in the table.

    Select and install an suitable parts depending upon the outer diameter of cable.

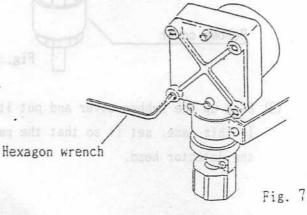
Outer diameter of cable	Inner diameter of packing (mm)	Inner diameter of washer (mm)
φ 11.0~ φ 11.9	φ12	φ13
φ 10.0~ φ 10.9	φ11	φ12

(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.)

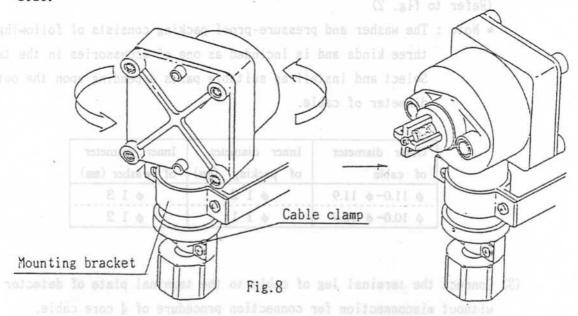
The numbers of 3, 4, 5, 6 are marked on the terminal plate of detector head as following fig. 6. Then, take care so that any cable can not be pinched when the cover for terminal box is installed.



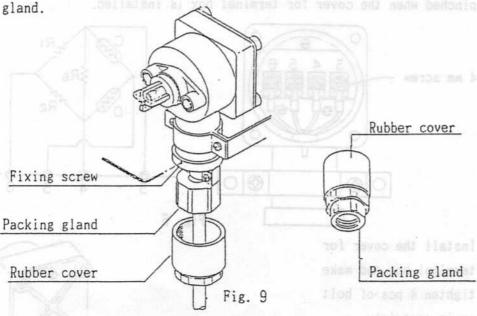
(4) Install the cover for terminal box and make tighten 4 pcs of bolt on it certainly.



(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.



- (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 tighting the screw of cable clamp for the packing



(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.
  - ❸ For the use of the box type drip/weather proof cover
    - \* Installation to the wall etc 10000 loos redisewiging equi

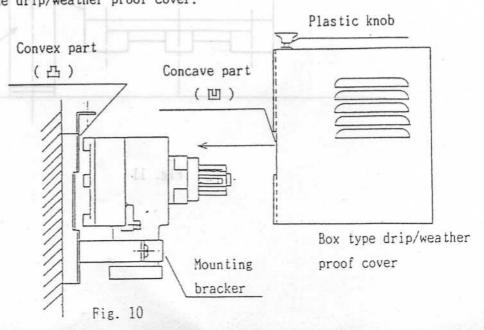
When the detector head is installed to the wall etc by using the drip/weather proof cover, fix the drip/weather proof cover base to the wall etc and fix the detector head to the mounting bracket temporarily. (Refer to fig. 4)

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.



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.



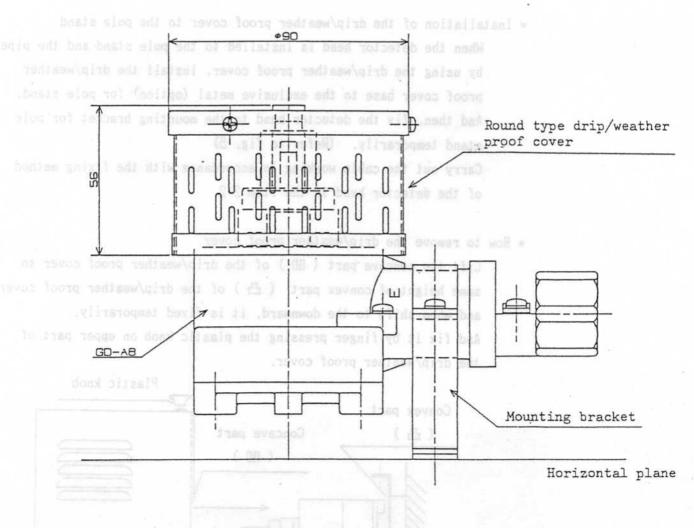
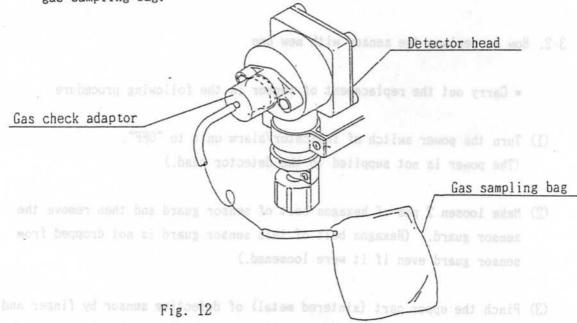


Fig. 11

### 3. MAINTENANCE AND CHECK suite williams ask edi not steed to liveer at (c)

- 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. The best result 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.



(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 0-ring can be also removed.

  (When the 0-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 (凹) part of socket hole. The sensor can be further inserted deeply by pushing this sensor.

## GAS DETECTION INSTRUMENTS

- (5) Insert the 0-ring removed on item (3) or new 0-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.

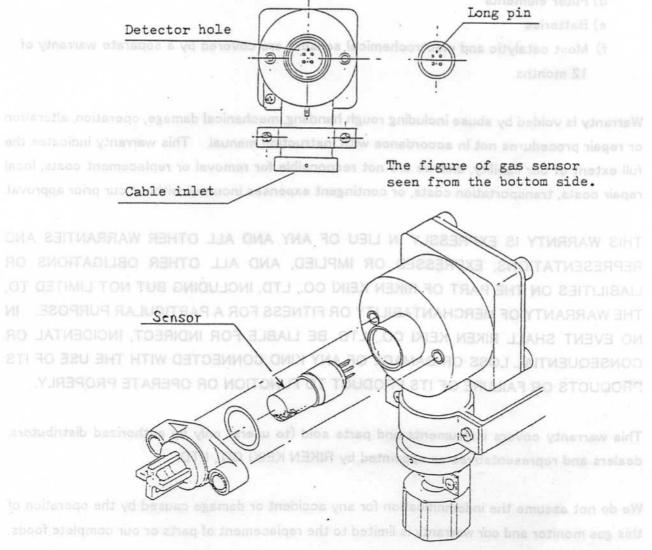


Fig. 13

## 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 Tempor to the setup of the control o
- 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 WARRNTY 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.

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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. Before operation, read this instruction manual correctly and you are kindly requested to operate it

when this was operated wrongly in a way that is not described in this manual or modified without

FOR
RIKEN DIFFUSION SAMPLING TYPE
OXYGEN DETECTOR HEAD

## MODEL GD-F44

### (GALVANIC CELL)

- (1) then sake the installation, consider the maintenance to replace the Oxygen secure etc and sake
- the gas sensitivity adjustment as the place with planty of dust and mist, the mounting of which install it at the outdoor site or the place with planty of dust and mist, the mounting of weather proof cover (playing the role of dust cover) shall be required (This weather-proof
  - (3) At construction, the much care must be taken not only for the some part on the explosion projection scale, but make the screw up of each part perfectly.
- (4) Though this detector head (galvanic cell type sensor) is less influenced from the external notice use chiefled cable and make the wirings apart from the big noise generating source and high lengton cable time.
  - (5) Install it at the place free of vibration as possible as can be.
- (5) For the wiring connection (2-core) to the terminal block of the detector head, make the wirings correctly by scalar the institutent wiring diagram attached to the approval descripts or complete drawings atc.
- (7) As this is a safety instrument, the daily check for it shall be required. If any trushe for it could be found, contact our measure agent or us.
- (3) To obtain the salety, make "the maintenance check required by law" or if it is not regulated by

## RIKEN KEIKI CO.,LTD.

2-7-6 AZUSAWA ITABASHI-KU TOKYO 174 JAPAN

PHONE : 03-3966-1113

TELEFAX : 03-3558-9110

TELEX : 272 2638 RKNFNE J

Before operation, read this instruction manual correctly and you are kindly requested to operate it with correct operation method.

When this was operated wrongly in a way that is not described in this manual or modified without any permission, we-Riken Keiki-cannot assume any responsibility caused by it.

### CAUTION AT INSTALLATION

RIKEN DIFFUSION SAMPLING TYPE

(1) When make the installation, consider the maintenance to replace the Oxygen sensor etc and make the gas sensitivity adjustment at the place likely to be leaked and deposited.

(2) When install it at the outdoor site or the place with plenty of dust and mist, the mounting of weather proof cover (playing the role of dust cover) shall be required (This weather-proof cover is an option).

(3) At construction, the much care must be taken not only for the seam part on the explosion protection goods, but make the screw up of each part perfectly.

(4) Though this detector head (galvanic cell type sensor) is less influenced from the external noise, use shielded cable and make the wirings apart from the big noise generating source and high tension cable line.

(5) Install it at the place free of vibration as possible as can be.

(6) For the wiring connection (2-core) to the terminal block of the detector head, make the wirings correctly by seeing the instrument wiring diagram attached to the approval drawings or complete drawings etc.

(7) As this is a safety instrument, the daily check for it shall be required. If any trouble for it could be found, contact our nearest agent or us.

(8) To obtain the safety, make "the maintenance check regulated by law" or if it is not regulated by a law, the check for over every 6 months shall be required.

OB RIKEN KEIKI CO,LTD,

WANT

THEREAS: INT-2558-9110 THERES: 272 SENS SCHEME

- EXPLOSION PROOF WIRING CONSTRUCTION As this detector head is designed to install at hazardous area, be sure to makes explosion proof wiring construction.
  - (1) Connect indicator/alarm unit and detector head with 2-core shielded cable (CWS, 1.25sq or 2.0sq).
  - (2) Connect core wire with terminals (+) and (-) in terminal box through piercing metal. Do not connect shielded wire but insulate it.
  - (3) Make wiring connection apart from large generated source of noise or electrical wire line of high voltage.
  - (4) Tighten each parts with screws.
  - (5) These are two wiring construction methods shown in Fig 1 and Fig 2.

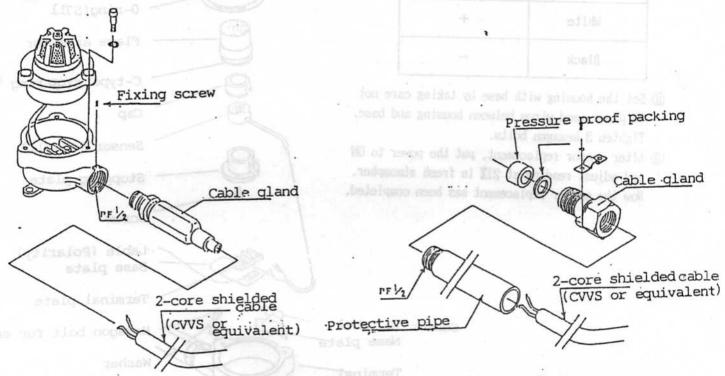


Fig 1 Standard method

Fig 2 Cable conduit construction

### 2. CALIBRATION

- (1) Check that the meter in indicator/alarm unit is 21% when exposing the fresh air in regular
- (2) If not, adjust reading with SPAN potentiometer in indicator/alarm unit.
- (3) Replace the sensor with new one when you can not adjust reading at 21%.

### 3. SENSOR REPLACEMENT

- ① Put the power switch to OFF position in indicator/alarm unit.
- ② Remove 3 hexagon bolts for housing and take off the housing. Take care not to cut the sensor lead wire by pulling it so strongly.
- 3 Remove 2 lead wires from terminal plates.

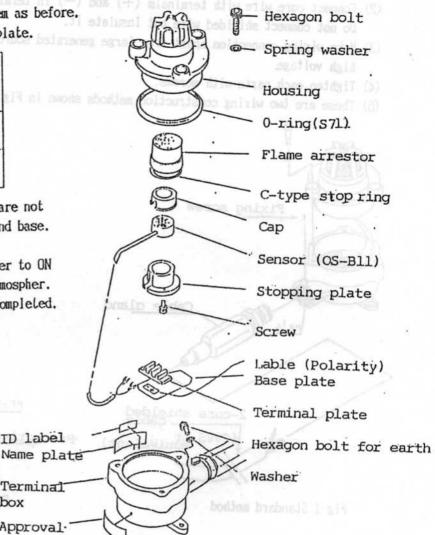
EXPLOSION PROOF WHILK CONSTRUCTION

- 4 Remove 3 screws to be fixed with stopping plate and take off the cap and sensor from the sensor holder to replace it with new one. (1) Connect Indicator/slarm unit and detector head with
- Take off the sensor from the sensor holder and replace it with new one. wood landered at (-) bos (+
- 6 Mount the new sensor and assemble them as before.
- ① Connect 2 sensor leads with terminal plate.

Color of leads	ldentification of terminal label
White	+
Black	

- Set the housing with base by taking care not to pinch lead wires between housing and base. Tighten 3 hexagon bolts.
- After sensor replacement, put the power to ON and adjust reading at 21% in fresh atmospher. Now the sensor replacement has been completed.

xod g 2 Cable conduit construction



religion of the death and unfacque ment the all the employed sold Fig 3 Assembled drawing

### CAUTION

Take care of the rack or flaw on the contact point of explosion proof construction.

Sensor ID label

Terminal

Approval: label.

## RIKEN KEIKI STANDARD WARRANTY

## GAS DETECTION INSTRUMENTS

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- a) Lamp bulbs and fuses
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- 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 WARRNTY 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.

## T1291E-2

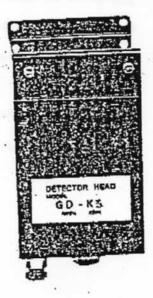
INSTRUCTION MANUAL

FOR

DETECTOR HEAD GD-K3 OF

RIKEN FIXED TYPE SINGLE CHANNEL CONTINUOUS SYSTEM

FOR CO OR HES



Rikem Keiki Co., Ltd. 2-7-6 Azusawa Itabashi-ku Tokyo, 174

JAPAN

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Thank you for buying a Riken fixed type toxic gas monitor/alarm system.

Please carefully read through this instruction manual to make sure that the system is correctly used.

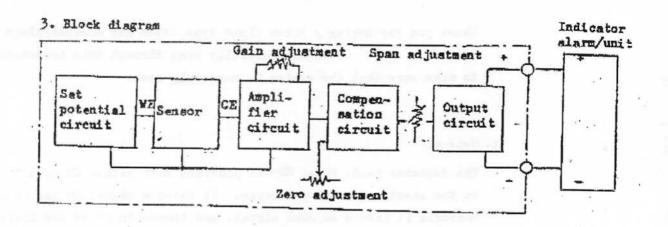
#### 1. General

The detector head, Hodel GD-K3, provided with either CO or H2S operating on the electrochemical principle. It detects either CO gas or H2S gas, converts it into 4 to 20mA signal, and transmits it to the indicator/alarm unit.

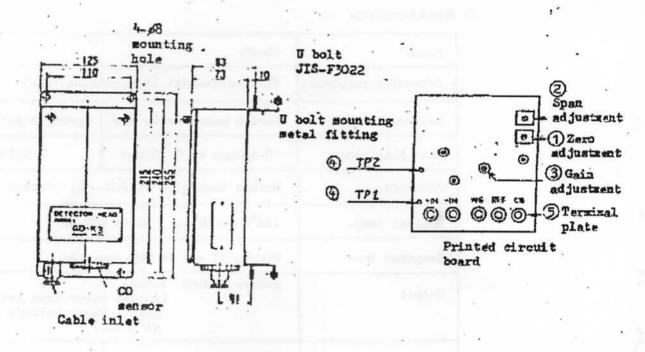
Adding a zenner barrier box makes model GD-K3 an intrinsically safe enclosure. (Arrangements under way for submitting an application to the Ministry of Labour for explosion-proof certification).

### 2. Specifications

Model	GD-K3 -	
Detection principle	Electrochemical (3-electrode type)	
Measurable gas	Carbon monoxide in air	Eydrogen sulfide in air
Measuring range	0-150ppm or 0-300ppm	0-30ррт
Accuracy	Better than ±10% of F.S. (At constant temp.)	
Ambient temp.	-10°C to 40°C, 30 to 90% RH	
Response time	Within 30 sec to 90% response	
Output	2-wire method 4-20mA (Duplex power from Indicator/alam unitPower voltage above 14V at 20mA.)	
Sensor type	ES-93% for $\infty$	ES-937 for H2S
Structure	Static diffusion, wall mounting type (Weather-and dust-proof enclosures) 120(W) x 255(H) x 83(D) mm, Approx. 1.7 kgs.	



4. Name of each part and Outer dimensions



The weather-proof cover, U bolt (for 2B pipe installation) and U bolt metal are not standard parts, but option parts.

### 5. Functions of each part

(1) Zero adjusting variable resistor

Adjust so that the output current will be 4mA when there is gas-free around the sensor. (Or it may be adjusted so that the meter of the indicator/alars unit will indicate zero.)

2) Span adjusting variable resistor

Give calibration gas to the sensor and adjust this variable remistor so that the specified output current value can be obtained.

How to calculate the current value

Ex. Suppose that calibration gas concentration is 100ppm by use of indicator unit for CO with the range of 0 to 150ppm, the current value can be calculated as follows:

(Or it may be adjusted so that the meter of the indicator/ ... alarm unit will indicate the specified value.)

(3) Gain adjusting variable resistor

When the sensor was replaced, adjust this variable resistor to the sensitivity of the new sensor so that the electric circuit will perform the best.

Set the SPAN adjusting variable resistor ② to gain the middle, give calibration gas, and adjust the variable resistor so that the required output current will be available. Subsequent adjustment should be made with the SPAN adjusting variable resistor ②.

(4) . Check pins

Used for checking the output current of this system. Connect the (+) lead of an ammeter to TP-2 and the (-) lead to TP-2.

(5) Terminal plate

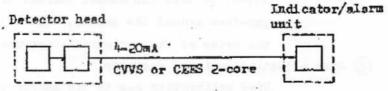
Connect the cables from the indicator/alarm unit to +IN and -IN. Connect the cables from the sensor to WE, and CE.

WE (black)

CE (white)

### 6. Connection with indicator/alarm unit

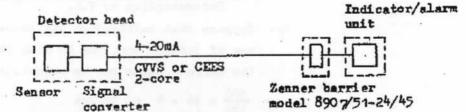
1. Non-explosion-proof design



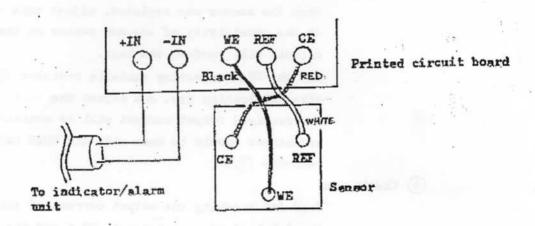
Sengor Signal convertor

Maximum distance of cable between indicator/slarm unit and detector head is Zkm (2,000m)

2. Intrinsically safe design



Maximum distance of cable between indicator/alarm unit and detector head is 0.7km (700m).



### 7. Now to operate

- (1) Check to ensure that there are no errors in the connection with the indicator/alarm unit.
- (2) Remove the sensor keeper from the sensor and assemble the sensor into the detector head. Connect the three wires CE,Refand WE correctly to the required positions of the printed circuit board.
- (3) Turn on the power switch of the indicator/alarm unit.
- (4) It takes some time until the meter needle stabilizes. Leave it alone for approx. an hour until the meter needle stabilizes.
- (5) After the meter needle has stabilized, connect an ammeter between TP1 and TP2, and adjust the zero adjusting variable resistor so that the ammeter will register 4mA.
  - (Note) Make sure that there is gas-free around the sensor. Connect the (+) lead of the ammeter to TP1 and the (-) lead to TP2.
- (6) Give calibration gas to the sensor and adjust the span adjusting variable resistor so that the output current will reach the specified value. (Note) For details on gas adjustment, refer to Item "10". Connection

of the armeter is the same as described in above. Calibration gas concentration x 16 + 4

(Ex) Suppose that calibration gas concentration is 100ppm by use of indicator unit for CO with the range of O to 150ppm, the current value can be calculated as follows:

Current value =

(Note) After the sensor has been removed from the sensor keeper, set the sensor in the detector head as early as possible and turn on the power switch of the indicator/alarm unit.

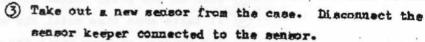
The longer the time from when the sensor is removed from the keeper to when the power switch is turned on, the longer the time is required before stabilization.

### 8. Maintenance check

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### 8-1. Replacement of sensor

- To replace the sensor, remove the screws of the detector head box and open the cover. When the cover is opened, the inside is exposed as shown in Fig. 2.
- 2 Since the sensor is connected to the circuit, disconnect and take it out.



(Fig. 4) of the circuit.

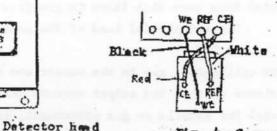
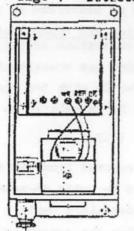


Fig. 4 Connection Diagram

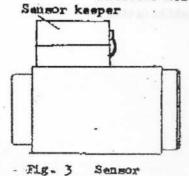


(5) Turn on the power switch of the indicator/slars unit.

Leave it alone for more than an hour until the indication stabilizes.

(Note) To make span adjustment, first set the span adjusting variable resistor (2) to the middle and then make span coarse adjustment with the gain adjusting variable resistor (3). Then make span fine adjustment with the span adjusting variable resistor (2).

Fig. 2 Inside view of Detector head



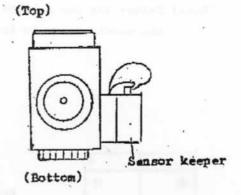
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Cantion in sensor storage

When the sensor is to be independently stored, pay attention to the following points.

- (1) Do not leave it alone in a place exposed to high temperatures.
- (2) Since the sensor of the detector head contains electrolyte, make sure that it is stored in upright position in a cool, dark place as shown in the right side.

(Keep the sensor keeper connected.)



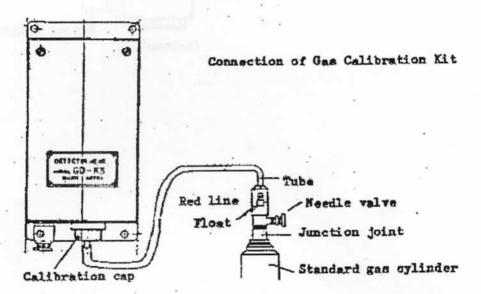
### 9. Sensitivity adjustment

Sensitivity adjustment should be made preferably once every month by the following procedures, using standard gas cylinder.

For gas sensitivity adjustment, have a special accessory, the gas calibration kit, ready.

- 1) Turn on the power supply of the indicator/alarm unit.
- (2) Before gas calibration, make zero adjustment under fresh air.
- (Note) Before the gas calibration kit as shown below.

  (Note) Before the gas calibration kit is set, check to ensure that
  the needle valve is in closed position-



- (4) Adjust the needle valve so that the float will be positioned near the center of the red line.
- (5) After the meter needle has stabilized, turn the span adjusting variable remistor with the attached plain screwdriver so that the meter needle can coincide with the gas concentration.