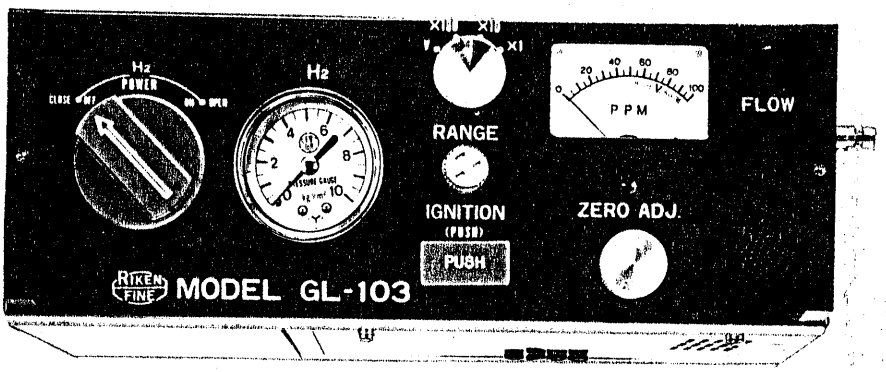
OPERATING INSTRUCTIONS

FOR

RIKEN HYDROCARBON GAS LEAK DETECTOR

M O D E L G L – 1 0 3



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CONTENTS

1. GENERAL DESCRIPTION

RIKEN MODEL GL-103 is a small rugged, portable hydrocarbon vapor detector applying the flame ionization principle.
The Model GL-103 is designed to detect and measure the hydrocarbon compounds with especially carbon number from 1 to 5 in the parts per million ranges in petro-chemical industry, natural gas transmission and distribution system, underground gas system.
The Model GL-103 has been designed to minimize the oxygen effect and to provide very fast response. The meter utilizes for readout of the flame ionization detector. In addition to convenient meter readout, the flame-on or flame-out indications are provided by the colour change of the ignition indicator from white to red.

2. FEATURES

* EASY TO USE AND MAINTAIN
* RAPID RESPONSE AND HIGH SENSITIVITY
* LIGHT WEIGHT AND COMPACT CONSTRUCTURE
* NO APPRECIABLE EFFECT ON AN INORGANIC COMPOUNDS SUCH AS H_2, NO, NO_2, CO, CO_2, ETC.
* CARTRIDGE HYDROGEN GAS CONTAINER IS EASILY REPLACEABLE
* ONE HAND OPERATION
* TRIPLE MEASURING RANGE
* ADJUSTABLE ALARM POINT DEPEND UPON GAS CONCENTRATION
* CONTINUOUS 3 HOURS OPERATION
* EASY TO CONFIRM IGNITION CONDITION
* LOW BATTERY AND FLAME-OUT ALARMS

3. PRINCIPLE

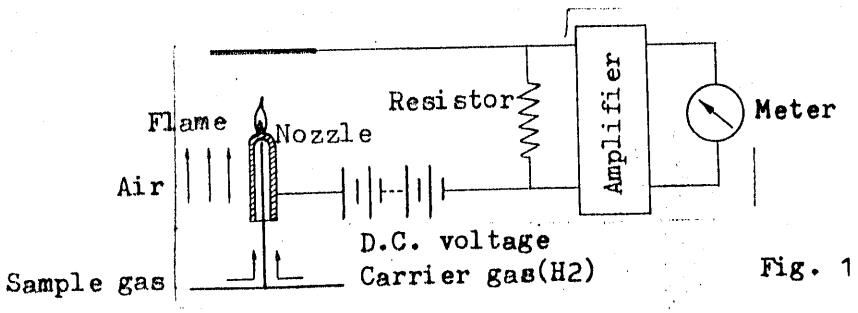


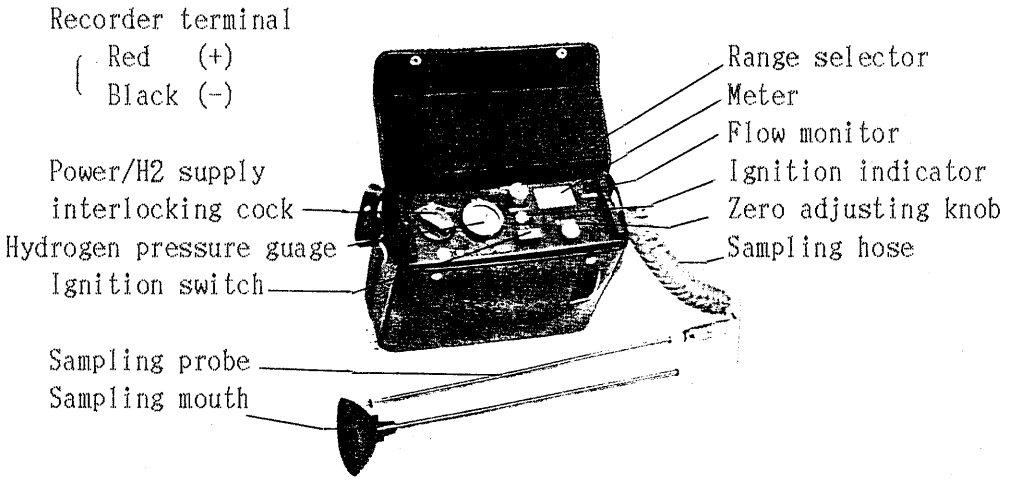
Fig. 1

A volume of air is continuously introduced to the combustion cell where the sample gas comes near a small hydrogen flame. At this point both the flame and the sample are acrossed between cathode and collector where there is an ingredient. Any Hydrocarbon molecules included in the sample gas are ionized in the flame and then the ions are drawn to the oppositely charged electrode creating a tiny current. The portion of this current produced by the negatively charged ions moving toward the positive collector is "seen" by the electrometer. This current is directly proportional to the concentration of hydrocarbons in the sample.

4. SPECIFICATIONS

1) Model	GL-103
2) Principle	Flame Ionization Detector (FID)
3) Measuring gas	Hydrocarbon materials in air
4) Measuring range	0-100, 0-1,000 and 0-10,000ppm as three ranges (CH_4 cal)
5) Warm up time	1 minute after the ignition
6) Indication method	Direct indication on meter scale
7) Reproducibility	a) Better than ±5% of F.S in the position of selector switch at "13A" (At const. circumstance) b) Better than ±15% of F.S in the position of selector switch at "6B" (At const. circumstance)
8) Response time	Better than 7 seconds to 90% response
9) Alarm indication	Gas alarm : Audible alarm for 0.5 sec. Low battery : Audible continuous alarm Flame extinguishment : Audible intermittent alarm and the colour change of ignition indicator (Ignition..Red, Extinguishment..White)
10) Alarm set	Available to set the alarm between 30% and 100% of F.S at each range by variable resistor (G.AL.)
11) Sample flow rate	1 liter/min. (by diaphragm pump)
12) Fuel gas consumption	Continuous 3 hrs operation by one pure hydrogen gas canister.
13) Power supply	Dry cells (UM-2) x 4 pcs. Continuous operation time (No alarm at 20 ° C) Neo High top type dry cells ... Approx. 6 hours High top type dry cells ..... Approx. 4 hours
14) Dimensions	242(W) x 90(H) x 194(D) mm
15) Weight	Approx. 4 kgs

5. DESIGNATIONS



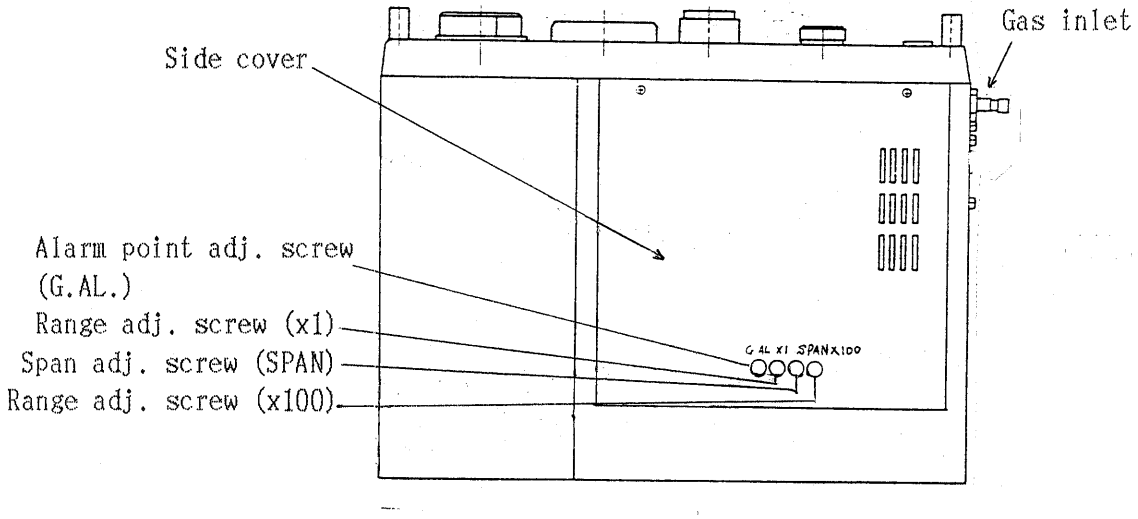


Fig. 2

6. BLOCK DIAGRAM

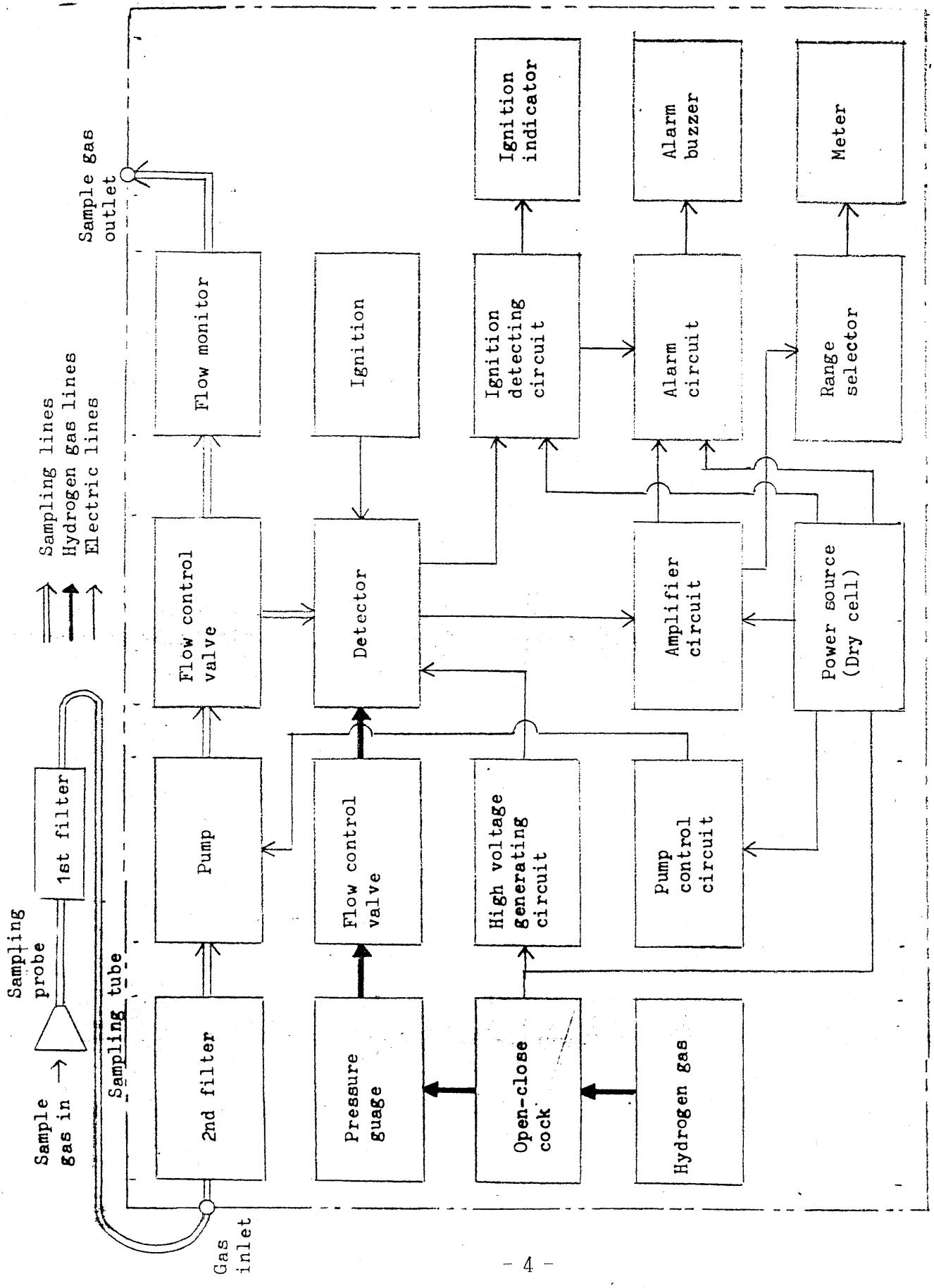


Fig. 3

7. HOW TO OPERATE

7.1. Preparation

7.1.1. Installation of Hydrogen gas container

1) Open a left side cover of instrument proper, set hydrogen gas container to a hole of container valve and turn it clockwise fully (See fig. 5)

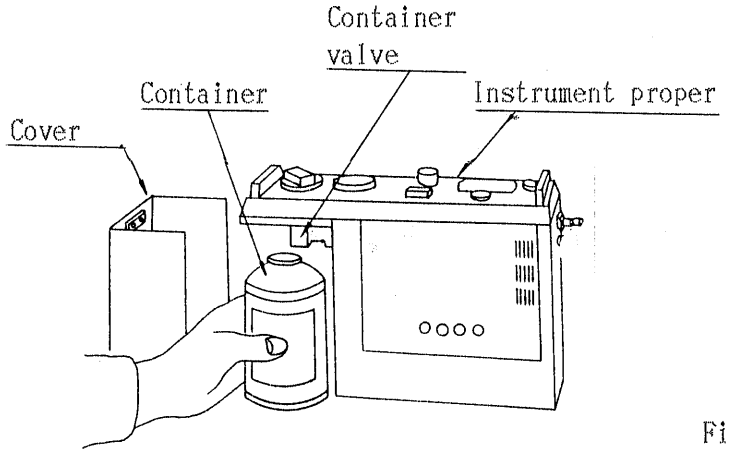


Fig. 4

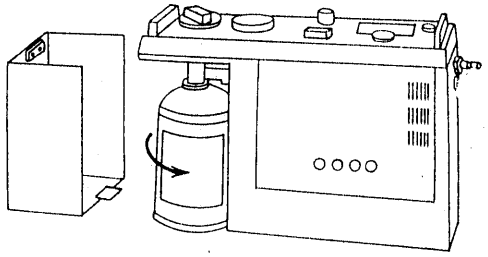


Fig. 5

2) When "Power/H2 supply interlocking cock" (hereinafter call interlocking cock) is turned to "ON, OPEN" position, pressure of container will be indicated on a hydrogen pressure gauge. (Operating range 7.5 - 0.5 kg/cm2)
If an amount of the pressure gauge drops suddenly, please confirm the following points;

① Check whether the installation of gas container is normal or not.
② Check the packing (transformation or existence)

7.1.2. Connection of sampling probe

1) Connect sampling tube and probe to sample inlet. Connector used for sample inlet is of the "quick-connect" type, which is released by pulling the coupling away from the joint to release as shown in Fig. 6.

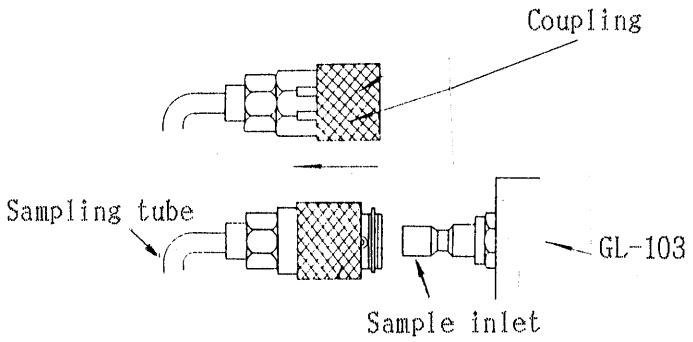


Fig. 6 Connection of sampling hose to sample inlet

7.1.3. Check of filters

The first filter is located in the sampling probe, which can be removed by rotating the filter part counterclockwise.
The second filter is located at the right side of the instrument, which can be removed by pulling out the filter holder.
Check whether they are dirt or not. If they are dirt, replace with new ones.

7.1.4. Electrical zero adjustment

1) Turn interlocking cock to "ON, OPEN" position.
2) Turn the range selector to "V" position. Meter should rise to within the red zone near top of scale. If it is not within a zone, batteries need replacement.
3) Check zero setting by turning range selector to "X 1" position. Meter should read close to zero. Lift and turn ZERO knob to bring reading to exactly 0. Check zero setting for ranges "X10" and "X100" with the same procedure.

7.1.5. Ignition

1) Turn range selector to "X100" position
2) Leave it for few minutes, then push ignition switch. As far as it is ignited, the colour of the ignition indicator changes from white to red.
If the interlocking cock is left under position of "ON, OPEN" at no ignition, the extinction detection circuit will work about two minutes later on and the intermittent audible tone will sound. Intermittent audible tone will be stopped automatically when it is ignited (Push ignition switch).

3) Return range selector to "X1" position and leave it for five minutes for warm-up. Please note that hydrocarbons exist about 10ppm in back ground.
4) Now the instrument is ready for use.

7.1.6. Gas leak test

1) Put the sample probe close to the test leak source. When it is found to leak, the gas concentration to be detected can be read out from the meter. And if the meter needle exceeds the alarm preset point, alarm lamp will illuminate with a burst of alarm buzzer sound for 0.5 seconds.
2) When the meter needle of indicator becomes full scale over, change the range selector to "X10" and "X100" respectively.

7.1.7. Finishment of procedure

1) Turn the interlocking cock to "OFF, CLOSE" position.
2) Check whether pressure of hydrogen gas becomes to "0".

8. SPAN ADJUSTMENT

1) Turn range selector to "X10" position.
2) Pack the standard gas (mixture of approx. 800ppm CH4 and air) into the sampling bag.
3) Connect the rubber hose of the sampling bag to sampling probe.
4) Adjust reading to the concentration of standard gas by using SPAN adjusting screw located on a side cover of the instrument.

9. ALARM

9.1 Gas alarm

1) When detecting hydrocarbons above preset alarm level, the instrument gives warning for 0.5 seconds by audible tone.
2) Alarm point can be adjusted by using G.AL (alarm point adjusting screw) located on a side cover of the instrument.
   To adjust; Turn range selector to "X1" position. Lift and turn zero adjusting knob to bring the reading to desired alarm level. Then turn G.AL screw until the alarm will sound. After completion of adjustment, return to 0 position by using zero adjusting knob.
   The standard one is set at 80 (80, 800 and 8,000ppm).

9.2. Low battery alarm

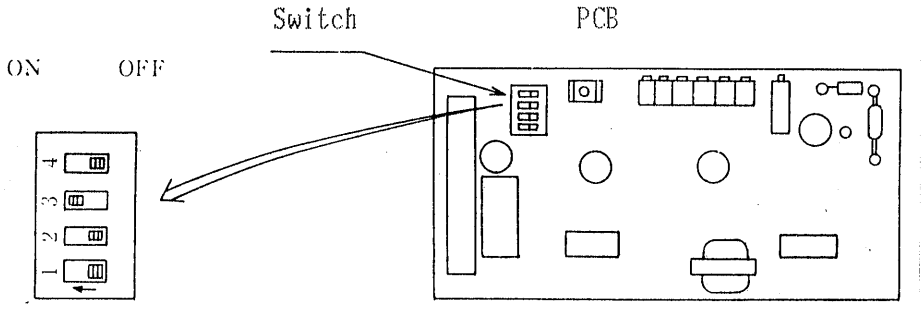
When battery voltage drops within a allowable range, the instrument gives continuous audible sound.
In such the case, replace batteries with new ones.

9.3. Extinction alarm

If the flame would be extinction during operation, intermittent audible tone is actuated and the colour of the ignition indicator changes from red to white.
In such the case, push ignition switch to ignit.

10. SELECTION OF ALARM PATTERN

The standard instrument provides alarm pattern described before. It can be altered as following by changing switch position in the PCB.

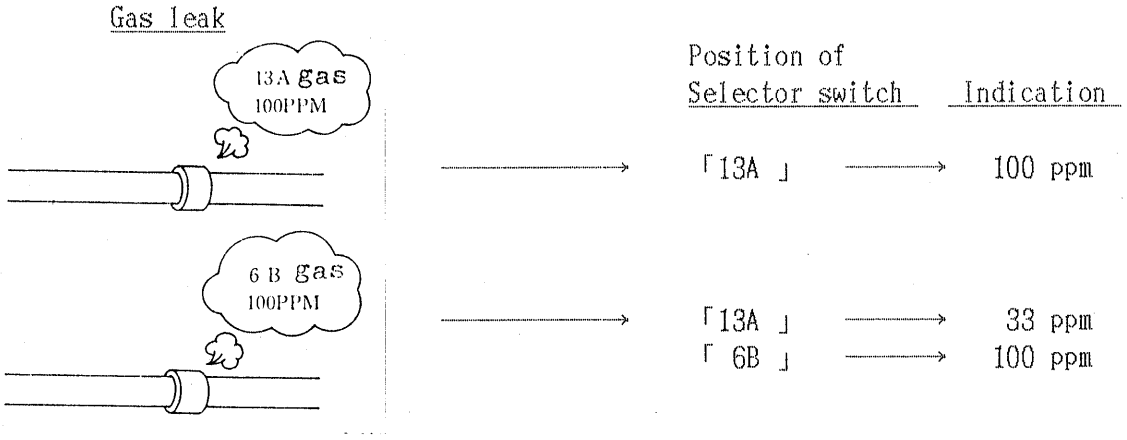


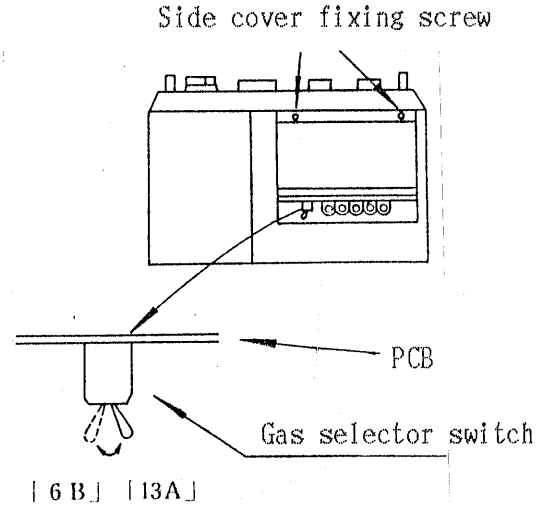
(Switch No. 3 has been set at ON position as standard)

Kind of alarm	Switch position
To change continuous audible tone for gas alarm (others are unchanged)	No. 4 switch to ON position. Others to OFF positions.
To change not to actuate gas alarm (others are unchanged)	No. 2 switch to ON position. Others to OFF positions.
To change not to actuate for all alarms.	No. 1 switch to ON position. Others to OFF positions.

11. GAS SELECTION SWITCH

The composition of the city gas is different from each city gas company. Hereinafter we describe about our domestic application.
There are two different city gases classified by "13A" and "6B". The content of hydrocarbons is different from each other. If two of them would be leaked with the same condition, detection sensitivity of "6B" gas by FID detector is about 1/3 of that of for "13A" gas.
Though the standard one has been set for "13A" gas, its sensitivity is amplified 3 times by setting the selector switch at "6B" position. This selector switch is mounted on the PCB.





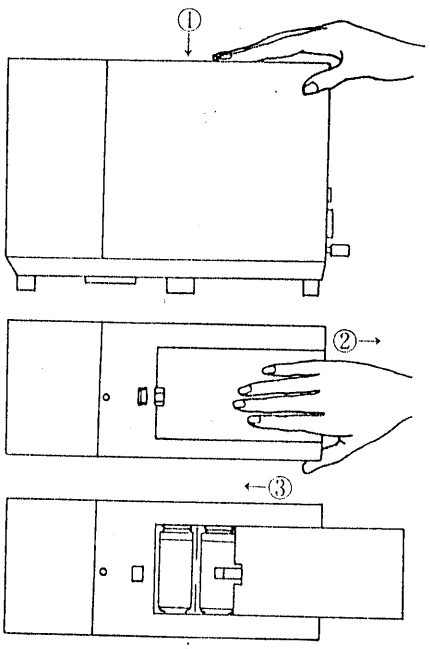
For your information, compositions of "13A" and "6B" gases are refered in page 11.

12. BATTERY REPLACEMENT

1) Press battery lid softly with finger tips and slide the lid to the allow marked direction ②.

2) Replace batteries with new ones.

3) Make slide-in the battery lid.



13. CAUTION

1) If hydrogen gas has decreased below 0.5 kg/cm2, change the container with new one by turning interlocking cock to "OFF, CLOSE" position.
Concerning the old container, remove the left pressure by making more than two holes at the bottom of it at no fire place and then throw it away.

2) During the measurement, if as high concentration of gas as an indicator needle indicates over is detected for many hours, it may cause trouble of indicator, so please change a measuring range.

3) Hydrogen gas container should be stored where it is below 40° C, without sunshine and it will be bearable for drop and shock.

4) If alarm should sound when range selector is set at "V" position, this is not a trouble, because alarm sounds when indicator needle indicates over the present alarm point.

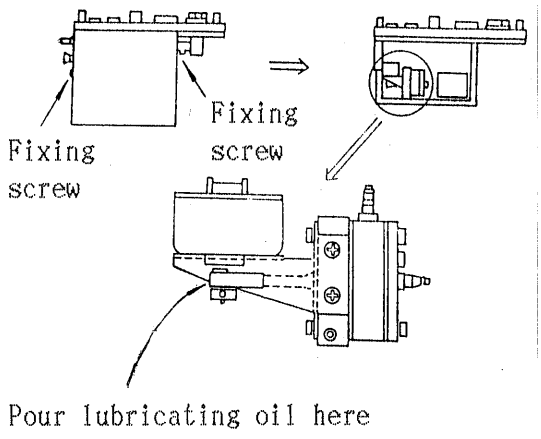
5) Keep from fire during detection.

6) Take care to put water and liquid.

7) Avoid unnecessary shaking and shocking because precision parts are included.

8) This is not designed as explosion-proof. It is recommendable to pack the sample gas into the sampling bag, then measure at non-hazardous area.

14. MAINTENANCE

Check point	Procedures
Meter	Check the mechanical zero on the meter with the condition of power switch OFF. Adjust if necessary.
Sampling part	Check block of sampling lines and dirt of filter with proper interval. Make clean or replace if necessary.
Pump	Pour libricating oil into the pump bearing with proper interval. 
Span adjustment	Calibrate the instrument periodically by using standard gas.

COMPOSITIONS OF "6B" AND "13A" GASES

"6B" gases

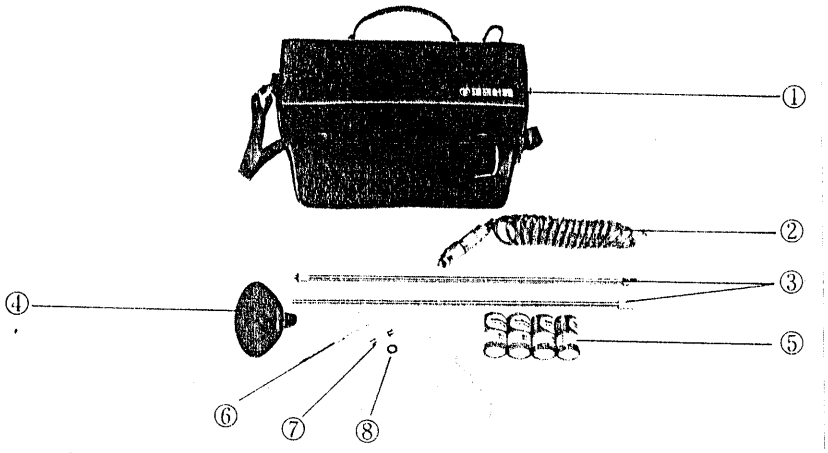
H2	: 37.2%	CO	: 4.6%
CH4	: 26.7	CO2	: 10.1
C2H4	: 4.8	O2	: 2.1
C3H8	: 1.3	N2	: 12.7
C4H10	: 0.5		

"13A" gases

CH4	: 87.5%
C2H4	: 5.7
C3H8	: 6.0
C4H10	: 0.8

15. ACCESSORY LIST

15-1. Standard accesories



① Carrying case with shoulder strap 1

② Sampling hose, 1m (with 1st filter) 1

③ Sampling probe, 77cm 1

④ Sampling mouth 1

⑤ Dry batteries 4

⑥ Screwdriver 1

⑦ Fuse, 1A 1

⑧ Packing for hydrogen container 1

⑨ 2nd filters 5

⑩ Hydrogen container 2

15-2. Optional accessories

1) Canned standard gas (800ppmCH4/air mixture)

   1. 1tr. x 8 kg/cm2

2) Standard gas with high pressure cylinder (800ppmCH4/air mixture)

   3.4 1tr. x 120 kg/cm2

3) Pressure regulator for item 2)
4) Gas sampling bag