

OPERATING INSTRUCTION MANUAL
FOR
SMART GAS DETECTOR/TRANSMITTER
MODEL SD-705EC

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 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.



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Introduction

Thank you for purchasing our fixed type gas detector/transmitter Model SD-705EC.

This is a gas detector to detect toxic gases leaking into the atmosphere and transmit its signal to the central monitoring station to prevent accident caused by gas toxicity.

This manual is a guidebook for use of the SD-705EC. 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.

 **DANGER**

Means vital damage directly to the human life and body or properties due to contact with 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.

*** NOTE**

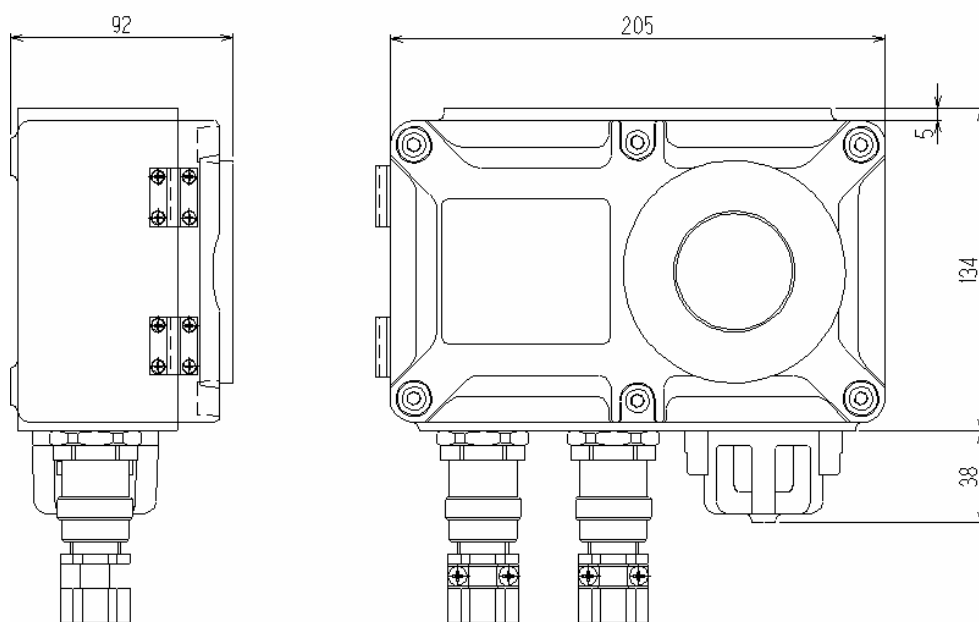
Means advice concerning handling and operation.

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1 . Function of the Product

Overall view and name of each part



[SD-705EC]

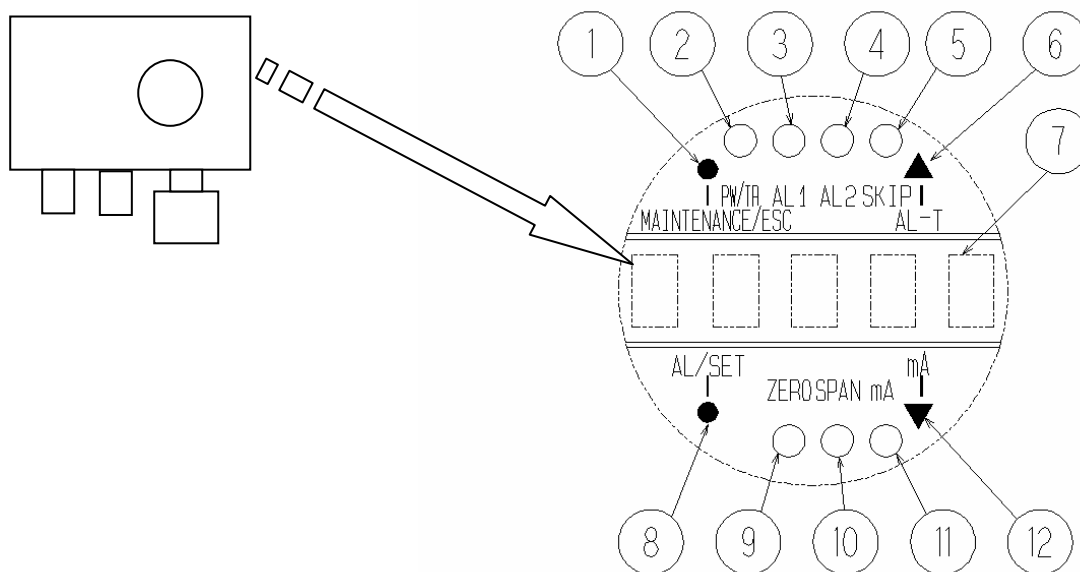


[Control Key]

WARNING

The control key used for adjustment is made from a powerful magnet. If it is brought nearer to a credit card, ID card, other magnetic products, this key may damage the stored data.

Display Part



- MAINTENANCE/ESC switch Used for entering into the maintenance mode with the control key. And used for cancel the maintenance mode.

- PW/TR light Illuminates continuously when the equipment is working (power light). And flickers in the case of abnormality in the equipment.

- AL1 light Illuminates when 1st alarm is activating.
- AL2 light Illuminates when 2nd alarm is activating.
- SKIP light..... Illuminated when point skip is selected. And flickers in the maintenance mode.

- AL-T() switch Used to increase the value with the control key.
- LCD Indicates the gas concentration and error code.

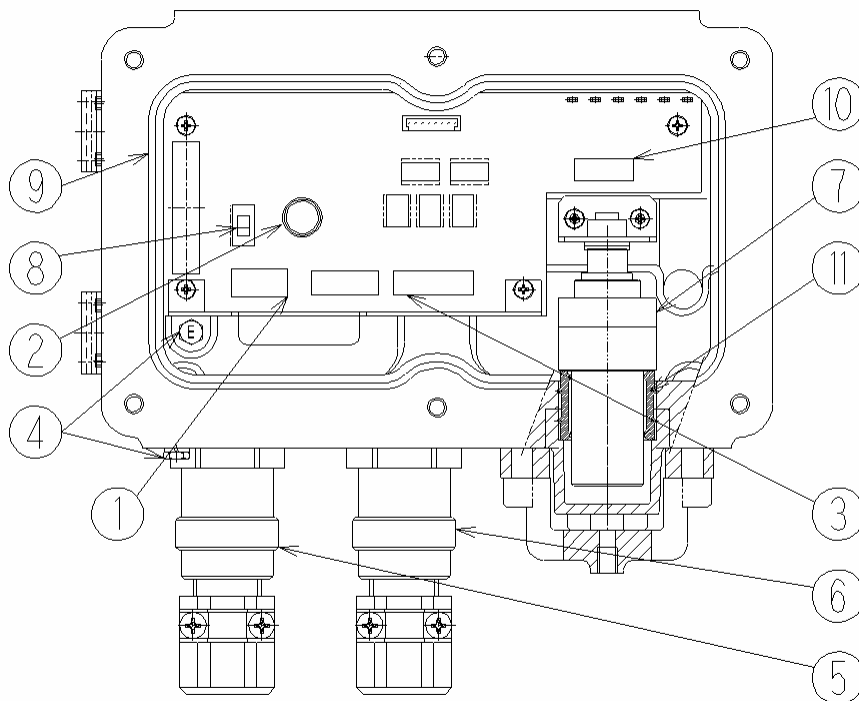
- AL/SET switch Used for confirmation of preset alarm level. And used for decision in the maintenance mode.

- ZERO light Flickers in the zero adjustment mode.(Steady light when the adjustment is over.)

- SPAN light Flickers in the span adjustment mode. (Steady light when the adjustment is over.)

- mA light..... Illuminates with the current output indicated on the LCD (during maintenance)

- mA ()switch Used for indicating current output on the LCD. And used to decrease the indication in the maintenance mode.



Internal View

- Terminal plate..... Connected to power source and 4-20mA signal output.
- Fuse..... Fuse for power(0.5A)
- Relay output terminal..... Connected to alarm relay output cable.
- Earth terminal..... Used to make grounding
- Cable inlet..... Used to lead the cable from the indicating alarm unit
(With the pressure proof packing gland)
- Relay output andUsed to lead the cable from alarm relay output.
communication cable inlet (With the pressure proof packing gland)
- Sensor..... Sensor connected.
- Power switch..... Power ON/OFF switch.
- Seal packing..... Used to protect equipment from water and dust.
- 7p connector for detector..... Connected to cable for detector(sensor).
(sensor)
- Packing..... Used to protect equipment from water and dust.

2 . Handling

2 - 1 Before Initial Use

On detecting a toxic gas leakage, this unit show the gas concentration on the LCD and outputs the gas concentration value in 4-20mA to the indicating alarm unit. When the concentration exceeds the preset level, the alarm contact activates.

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.

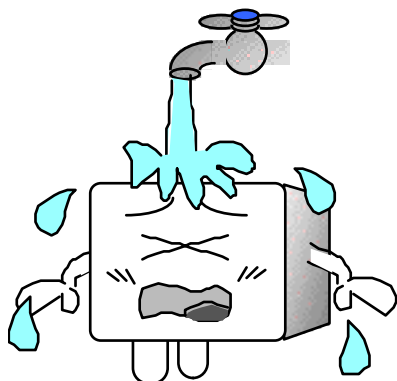


CAUTION

This detector may also be sensitive to gases other than objective gas. When the detector detects the gas and issues alarm, find out whether this is caused by the objective gas or other gases not covered by the detector.

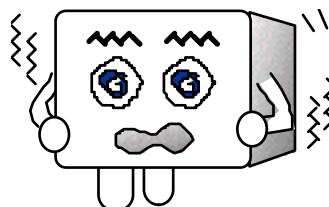
2 - 2 Cautions for Installation and Handling

Never use the detector in the following places.

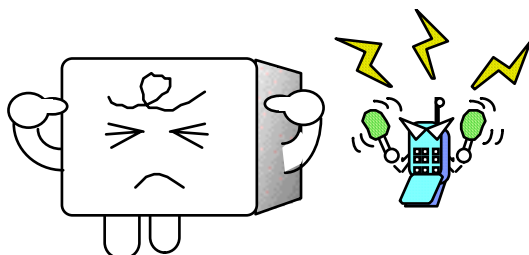


Place where the detector is splashed with water.

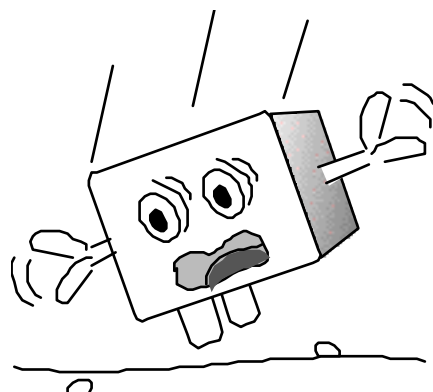
(Use an optional drip-proof cover when the detector is to be installed out of doors.)



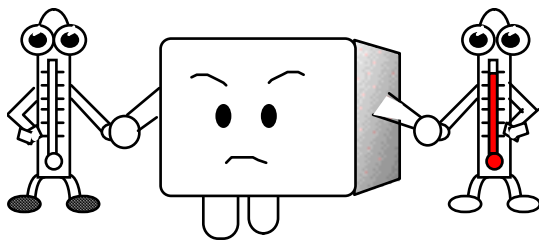
Place with vibration.



Place with radio wave and noise.



Place where the detector is dropped or exposed to strong impact readily.



Place where the temperature is
below 10 or +40 or more



Caution

Be sure to use an optional drip-proof cover when the detector is to be installed out of doors.



CAUTION

When intending to open the lid, wait for 30 seconds or more after powered OFF and then, open the lid.

2 - 3 Cautions for System Engineering

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.

(1) Stable power used

While the system gets stable at power on and power failure, the external output and alarm light 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 \pm 10%
- Power failure tolerance time :Approx. 50msec or less
(For power failure of more 50msec, it re-starts.)

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

(2) Noise measures according to installation circumstances.

Lightning(Thunder) surge measures

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.

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.

Power cable noise

Following is available to reduce the influence of electromagnetic induction noise and electrostatic induction noise from power cable.

<Isolation from power cable>

Use signal cable with a shield and ground.

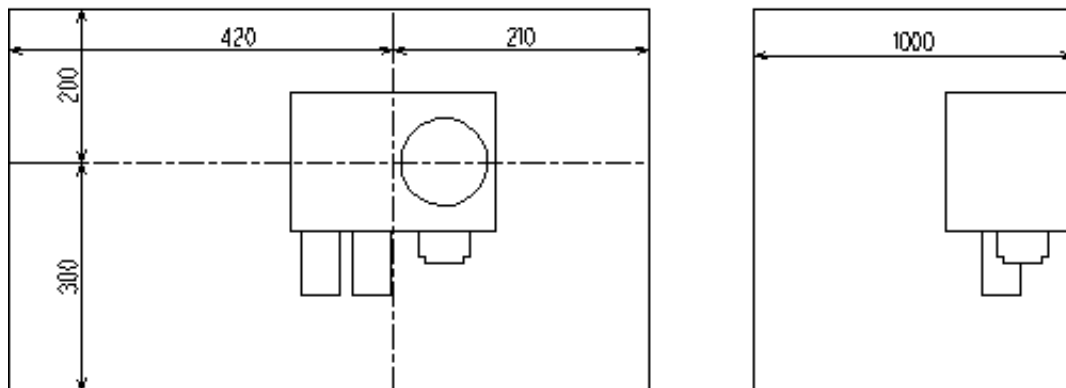
Make electrical isolation such as using metal installation pipe for power cable, installing Isolation plate between power cable and electrostatic shield, and install them into exclusive metallic duct.

(3) Grounding the instrument

Lightning(Thunder) and etc make surge noise. To protect an instrument from surge noise, be sure to ground an instrument. Refer to 2-6. 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.



Maintenance space

2 - 5 Installation Method

- (1) Install the detector body to a firm surface (wall surface, etc.) with M6 bolts.
Use an optional mounting piece when installing the detector to the 2B pipe.
(For the installation method, refer to Fig.1 through 4 below)

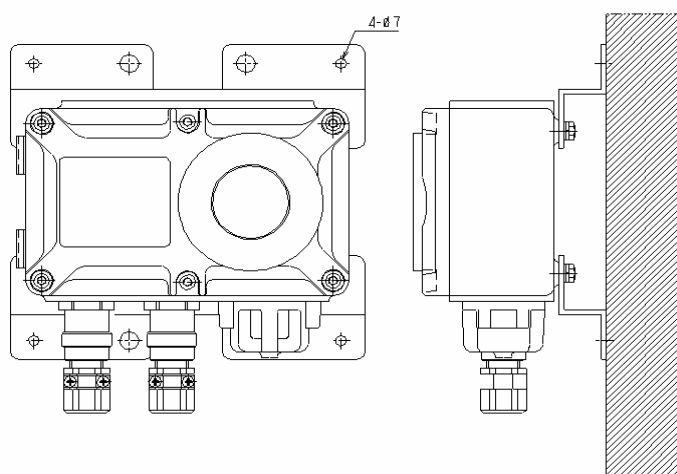


CAUTION

During installation, take care not to drop or throw the detector.
Otherwise, the strong impact may cause damage to the equipment

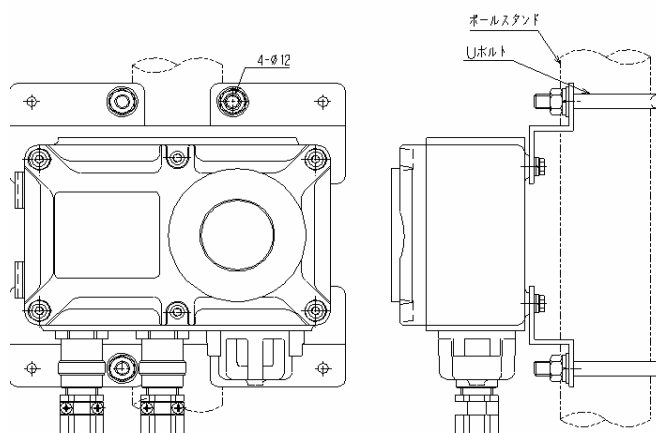
- (a) Installation without using drip-proof cover

- Installation to the wall (Fig.1)



Install to the wall after fixing the detector to the detector mounting piece with screw as shown above.

- Installation to the 2B pipe(Fig.2)

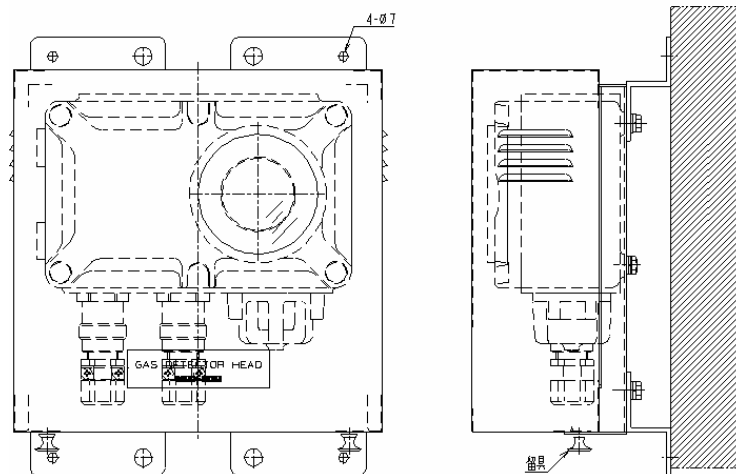


Secure the detector to the detector mounting piece with screw and fix it to the U-bolt(M10) for 2B pipe as shown above.

(b) Installation using a drip-proof cover(option)

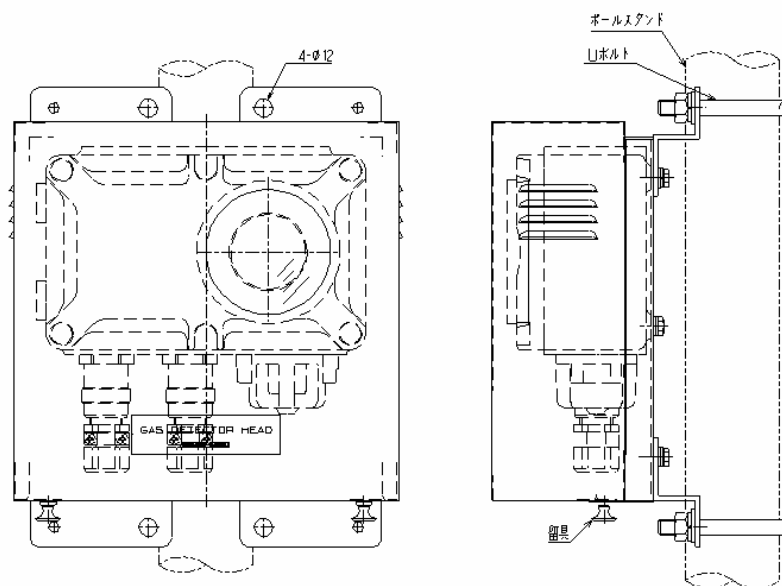
When installing the cover, slide it from the top to downward along the groove and fix it with the bottom fixture.

- Installation to the wall (Fig.3)



Install to the wall after fixing the detector to the detector mounting piece with screw as shown above.

- Installation to the 2B pipe (Fig.4)



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

- (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.

Cable finish O.D.	Packing inside diameter (mm)	Washer inside diameter (mm)
11 ~ 12	12	13

If cable finish O.D. does not meet with above packing gland, please contact with us.

- (3) Loosen the hexagonal socket headed screws (6 points) of the detector and remove the lid, and the power terminal plate(3 points) and relay output terminal plate(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). Therefore, both the +(DC24V) and -(DC24V) terminals are for DC24V input and both the Sig and -(DC24V) are for DC4 ~ 20mA output.

+	-	S I G
DC24V input	4 ~ 20mA output	

The relay output terminal plate (6P) has “First alarm relay output terminal (2P)”, “Second alarm relay output terminal (2P)” and trouble alarm relay terminal (2P).

1	2	3	4	5	6
Relay output for 1 st alarm		Relay output for 2 nd alarm		Relay output for trouble alarm(option)	



CAUTION

Be care not to damage the inner electronics circuit when making wiring construction.

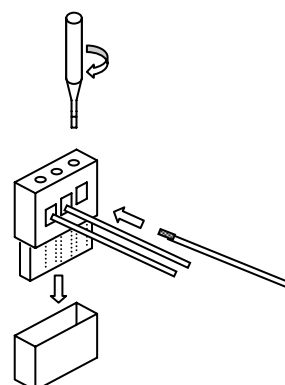
<<Connection method for Terminal Plate>>

Make the cable end naked.

(For length, refer to following “Length of naked wires.”)

Insert the cable into plug of terminal and tighten it by minus screw driver.

After completion for connection of all cables, connect the plug onto the base of PCB.



- For connection of terminal plate

- < In case of direct connection >

- Peel length of cable end: 7 mm (3p terminal), 7mm (6p terminal)

- Do not make preliminary solder.

- < In case of using the compressed ground terminal >

- Bar terminal : Model AI series(Maker : Phoenix Contact)

- Terminal lug terminal : Model CRIMPFOX UD6(Maker : Phoenix Contact)

- Torque for terminals

- Torque: 0.5 ~ 0.6 Nm (3p terminal), 0.2 ~ 0.25 Nm (6p terminal)

- Applicable tool: 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 - 6 Wiring Method for connection of terminals.



WARNING

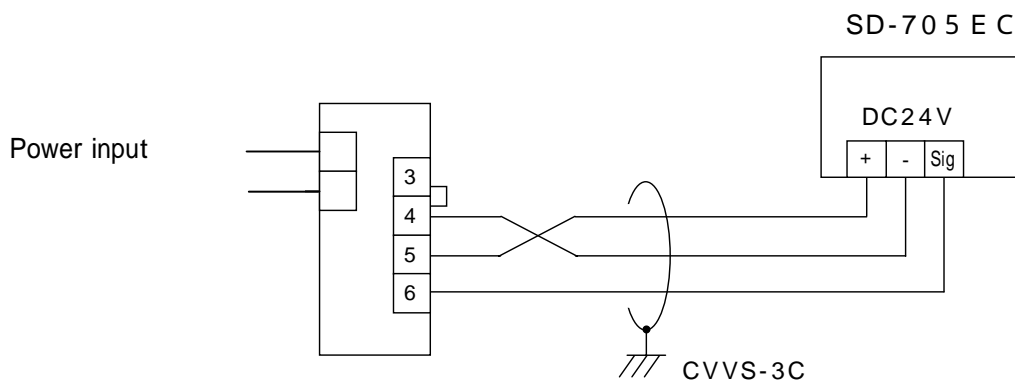
Do not enter metals or other substances inside detector when opening the detector lid.

Remove them inside detector to avoid the detector trouble or loss of ability for explosion proof.

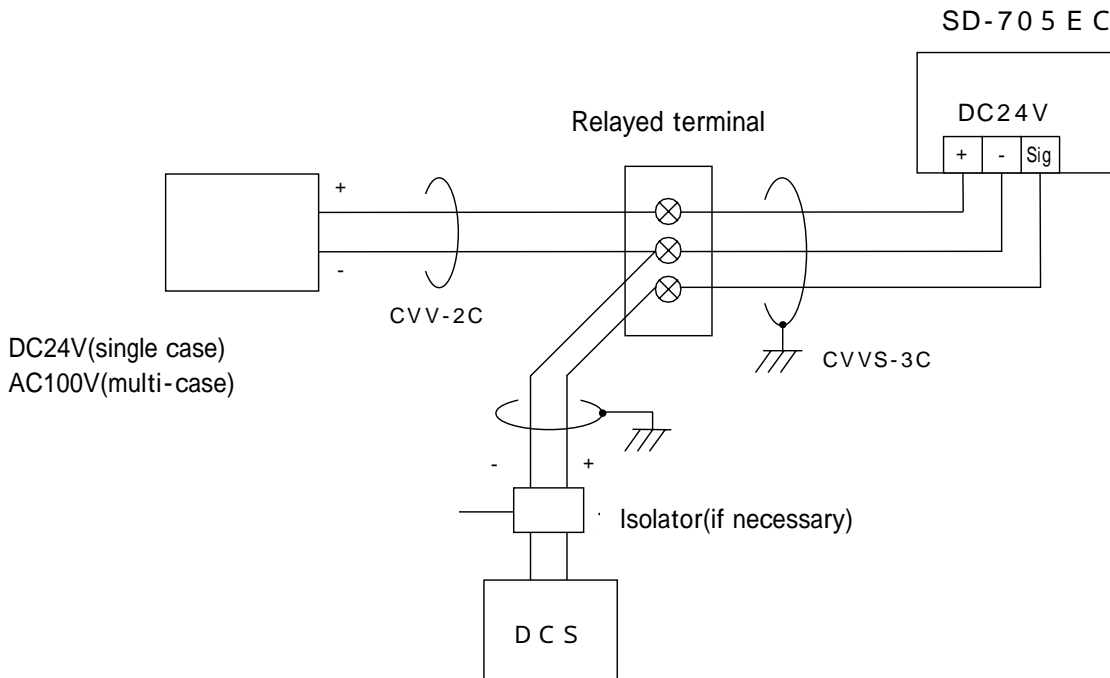
2 - 6 *Wiring Method*

- (1) After installation of detector, confirm that there is no error in installation, and carry out connection between equipment as follows.

Connection of the SD - 705 EC to the indicating alarm section(E C - 583 etc.)



Connection of 4 ~ 20mA of the SD - 705 EC to the DCS, etc.(Example)

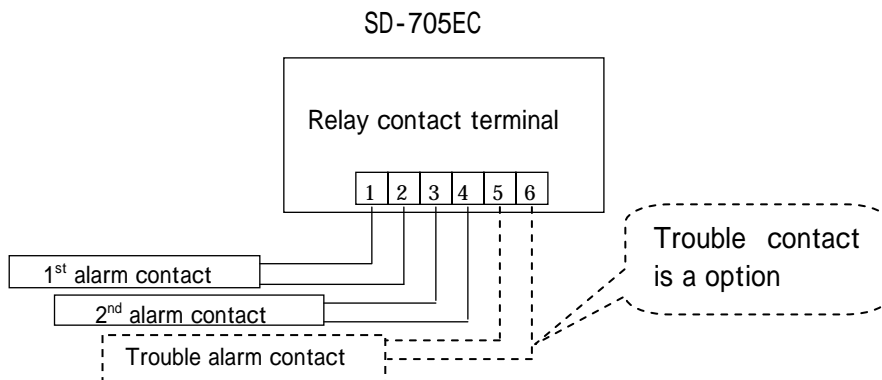


- (2) For safety and to protect an instrument from external noise, be sure to make ground before power on. Use cable as thick and short as possible in order to suppress resistance. Use internal of instrument or "E" bolt (Refer to Page 5) on the bottom of instrument for ground.

**WARNING**

- Be sure to make ground as the instrument is flame proof design.
- Make ground with ground resistance is below 100
- Be sure not to connect ground cable to gas pipes.

(3) Connect alarm relay contacts as following.



- 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 surge absorbing parts(Spark Killer, Diode, etc) suited for the rating of relay coil directly to relay.
- Add surge absorbing parts to the load side of relay on the request.

The spec for alarm contact 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.
- As it is big noise, the trouble action may be taken by the reckless drive of CPU.

**CAUTION**

- The inductive load shall not be used in principle.
- 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 and it is protected by an appropriate surge killer.

* As the inductive load, there are following samples.

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

**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.

**CAUTION**

Trouble alarm contact is an option. Please contact with our nearest agent or RIKEN KEIKI if it is intended to use.

(4) 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.

(5) Make grounding with E bolt located at the bottom of detector(this detector is a flame-proof structure. It is required to make grounding).

3 . Operation

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.

Tighten these bolts firmly and supply power to the unit.

- (3) With power ON to the unit, the "PW/TR" LED light goes ON and the LCD in the indication window shows "....." for about 25 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 25 seconds, the LCD show the gas concentration value ("0"), etc). When any abnormality is detected in the course of self-diagnosis, "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 the "3-2 Warm-up" and then, make zero and span adjustments.



CAUTION

The detector will be ready for measurement for about 25 seconds after power ON. During this period, alarm may be activated if the sensor output is not stable. Make necessary treatment at upper system or at load side not to be a problem if alarm is given at powered ON.

* NOTE

Zero and span adjustments shall be done at start-up adjustment and sensor replacement. Need special tools for these adjustment. It is recommendable to ask our agent or RIKEN KEIKI.

3 - 2 Warm-up

Make warm-up operation for 2 ~ 3 hours when making the start-up adjustment or replacing the sensor.

3 - 3 Detection method

After completion of "3-1 Startup Method," continuous detection will be started.

3 - 4 Gas Alarm Function

When gas concentration exceeds preset alarm level (alarm point), alarm relay contact and alarm light activates. Gas alarm has 1st alarm and 2nd alarm. And each alarm performs individually.

When gas concentration exceeds 1st alarm point, 1st alarm relay contact activates and AL1 light is lighting. When gas concentration decrease below 1st alarm point, 1st alarm relay contact is reset, and AL1 light is off (Self reset)

Performance of 2nd alarm is same as 1st alarm.

The action at gas alarm shall follow to the client rule and immediate refuge shall be required.

Generally, the following action is taken.

Confirmation of reading at this detector.

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

When gas concentration display show, close the gas value and confirm that gas concentration 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.

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

★ REMARK

- 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 - 5 Trouble Alarm Function

When the abnormality is detected in the instrument, trouble alarm light activates.

When the abnormality is detected in the instrument, PW/TR light 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 - 6 Confirmation of Alarm Level

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

4 . Maintenance and Inspection

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 in Japan sets forth the obligation of periodical inspection of the gas detection alarm.

-Maintenance Contract-

To maintain the safety operation of detector, 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 nearest agent.

4 - 1 Inspection Frequency and Items

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 lights, 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.

Inspection Point/item	Contents of inspection		Judgment
	Daily inspection	Monthly inspection	
Status light check	Check if the "PW/TR" LED light(power light) is ON.	Brightness of "PW/TR" LED light is good.	The "PW/TR" LED light must be ON. If flickering, take an appropriate measure according to 5-2. Troubleshooting guide.
Gas consent. indication check	Check if the gas consent. indication of the indicator is zero.	Same as daily inspection	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	Check if there is any obstruction for detection of the gas concerned.	Same as daily inspection	No obstruction for gas detection. If any, remove such obstruction or move the unit to another place.
Sensor check	Check if the gas inlet is covered with dust or water or if it is discolored.	Same as daily inspection	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. If cannot be adjusted, consult with RIKEN KEIKI.

Inspection point/item	Contents of inspection		Judgment
	Inspection by every 6 months	Yearly inspection	
Sensor sensitivity	Calibration with gas	Sensor replacement and calibration with gas	Adjust zero and span according to Gas Sensitivity Calibration Method

6 months inspection and yearly inspection include daily and monthly inspection respectively.

Following items are performed in periodical inspection.

Daily check	Cleaning of device	Calibration
Function check	Parts replacement	etc.

To keep the safety performance of the instrument, recommend to make maintenance contract concerning to regular inspection, adjustments, repairing, etc. including gas calibration.



WARNING

- This is a safety instrument and the inspection every 6 months or more is mandatory to ensure the safety. If 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 gas in the neighborhood. If zero adjustment is made in an atmosphere containing 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 Maintenance Mode

Adjustment is performed by control key in maintenance mode without opening the lid. Following is a menu of maintenance mode and common operation method. In maintenance mode, 4-20mA output becomes 2.5mA and SKIP light is flickering. All operation performed by control key.

LCD indication	Menu
0.5.0	Displays set potential
1.2 E+	Zero adjustment mode
2.5 P n	Span adjustment mode
3.0 u t	4mA adjustment mode
4.0 L	Alarm point set mode
5. t t	Alarm test mode
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 light is flickering. Release control key after entered.

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 >

Display goes to MENU when press MAINTENANCE switch during each mode.

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 >

Display goes to MENU when press MAINTENANCE switch during each mode.

To recover measuring mode, press MAINTENANCE switch for 3 seconds during MENU

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

4 - 3 Gas Sensitivity Calibration Method

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

- Gas sampling bag
- Calibration adaptor
- Calibration gas
- Control key

(1) Zero adjustment method

Confirm with a portable gas detector that the atmosphere around the detector and measuring gas inlet is clean and does not contain any gas.

If any gas exists around the detector and measuring gas inlet, fill high-purity air or external fresh air into the gas sampling bag (separately available).

Attach the calibration adaptor and sampling bag filled with high-purity air to the sensor and allow for about 2 minutes.

Then, proceed to zero adjustment.

To make zero adjustment and span adjustment, enter the maintenance mode.

Press SET switch in LCD display 0.5.0 and confirm the sensor set potential.

Press SET switch in MEMU i.7 E t

Zero adjustment mode enters and ZERO light 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.

Confirm that fresh air is introduced and press SET switch . ZERO light is changed from flickering to lighting). And indicating that zero point is adjusted. (ZERO adjustment is completed).

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 our nearest agent.

(2) Span adjustment

★ REMARKS

Be sure to adjust span after completion of zero adjustment.
Recommend to contact with our authorized agent for span adjustment, as it requires exclusive jigs.

Prepare about 5L of calibration gas whose concentration has been confirmed beforehand (the appropriate concentration is around 1.6 times of preset alarm level).

Make cover the sensor with calibration adaptor and fix it with knurling screw.

Connect gas sampling bag prepared in step to IN side of calibration adaptor, flowmeter with flow control valve and pump exhaust bag to OUT side respectively as shown in next figure.

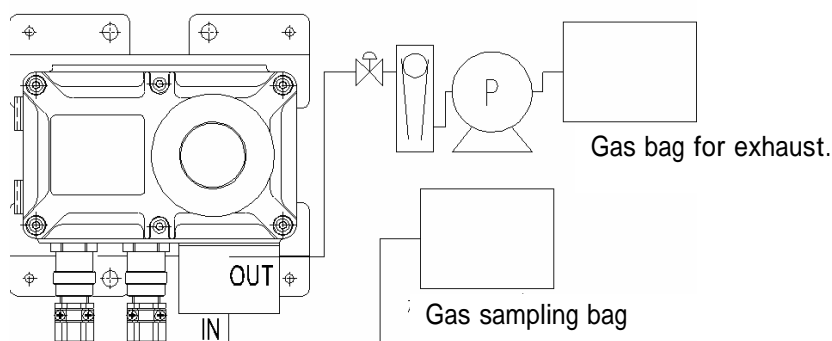
Press SET switch in MENU display 2.5Pn.

When span adjustment mode is entered, SPAN light and indication value on LCD are flickering.

Operate the pump and adjust flowmeter at 1.5l/min.

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 adjustment, press SET switch to decide.

SPAN light 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 adaptor and press the control key to MAINTENANCE switch . Then, proceed to the zero adjustment again.

If the reading cannot be adjusted to the calibration gas concentration, sensor life will be over. Put off the power switch and contact with our authorized agent. (It is recommendable to replace the sensor every one year). For sensor replacement, refer to “4-8 Sensor Replacement Method.”



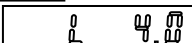
CAUTION

Confirm that the replacement sensor is the same type as described in the sensor type seal stucked on the detector.

Make zero and span adjustments again after sensor replacement.

4 - 4 4 mA Signal Output Adjustment Method

Press SET switch in MENU display 

When signal output adjustment mode is entered  is displayed on LCD, and signal output becomes 4mA (value : zero).


Adjust indication value to 4mA(zero) on indication part* of DSC and etc which is connected separately by pressing UP switch and DOWN switch .

After adjustment, press SET switch to decide. When it is decided, SPAN light is lighting.

* : If indication value cannot be confirmed on indication part, signal output can be confirmed by connecting a tester (Ammeter) to check pins between TP1(+) and TP1(-).

4 - 5 Alarm Point Change Method

1st alarm and 2nd alarm can be alternated individually.

Pres SET switch in menu display 

When alarm set mode is entered, AL light is on and current 1st alarm value is displayed on LCD.

When changing alarm point, press SET switch .

Then, AL1 light is changed from lighting into flickering, and alarm point on LCD is changing as same. Press UP switch and DOWN switch to adjust.

After adjustment, press SET switch and return to

Then, press UP switch .

Current 2nd alarm point is displayed on LCD. And AL2 light is lighting.

2nd alarm point can be changed as same as 1st alarm point.

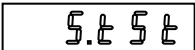
4 - 6 Alarm (Transmission) Test Method

Alarm functions can be confirmed.

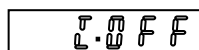


CAUTION

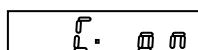
When make alarm test (transmission test), announce it to respective department beforehand. Carry it out after making proper treatment.

Press SET switch in menu display  .

Press UP switch or DOWN switch to select whether alarm contact is activated or not.



(No operation)



(Operation)

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 light and SPAN light are flickering simultaneously.

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).

Test level exceeds 1st alarm point, 1st alarm is activated.

(After alarm delay time passed, AL1 light is lighting, and 1st alarm contact is activated if "ON" is chosen).

Test level exceeds 2nd alarm point, 2nd alarm is activated.

(After alarm delay time passed, AL2 light is lighting, and 2nd alarm contact is activated if "ON" is chosen).

4 - 7 Point Skip Set Method

Maintenance mode can be set compulsorily

4 ~ 20mA : 2.5 mA(Fix)

Alarm contact : OFF

Press SET switch in menu display 6.P5.

When point skip set mode is entered, current set condition is displayed on LCD.

To set point skip condition, press UP switch or DOWN switch to change as

0.FF

0.n

and to cancel point skip condition, change as

0.n

0.FF

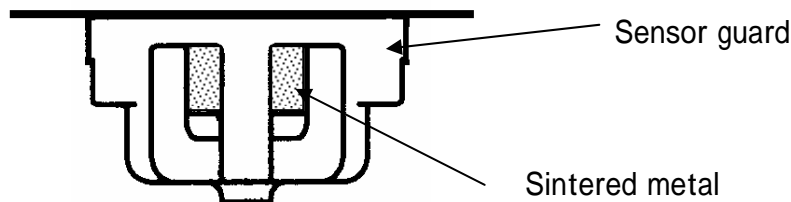
. Then, press SET switch to decide.

After decision, SPAN light is lighting.

4 - 8 Sensor Replacement Method

Replace the gas sensor with following procedures.

- (1) Turn OFF power supply to this unit.
- (2) Remove the hexagonal socket head bolts of the sensor guard and remove the sensor guard.



- (3) Remove the sintered metal and remove the sensor form connector.
- (4) Insert the new sensor to the connector softly and rotate it until it stops once.
Push and rotate the sensor further until it is stopped.
- (5) Mount the sintered metal.
- (6) Make cover the sensor guard onto the sensor and rotate the guard clockwise to fasten.
Tighten it with hexagonal socket headed bolt.
- (7) After completion of the sensor replacement, put on the power. Check with the portable gas detector that there is no gas around the detector. Then remove hexagonal socket headed bolts(6 pcs.) and the lid.

*** CAUTION**

- When open the lid, wait for more than 30 seconds after put off the power supply. If not, explosion proof performance can not be guaranteed.
- It becomes measuring mode for about 25 seconds after powered ON. The detector may give an alarm if the sensor is not stabled enough. Please make necessary treatment not to make trouble outside even if an alarm is activated.

(8) Connect voltmeter to TP0(+) and TP3(-) on the printed circuit board inside detector and confirm the sensor set potential.

Adjust the set potential to designated value with potentiometer VSET VR.

(9) Fasten the lid with hexagonal socket headed bolts tightly.

Make warm up according to "3-2 Warm up Operation". Then make zero and span adjustment respectively according to "4-3 Gas sensitivity Calibration method."

*** NOTE**

After sensor replacement, be sure to carry out zero and span adjustments. Accordingly, it is recommendable to contact with our local agent for sensor replacement.

4 - 9 Fuse Change Method



CAUTION

When open the lid, wait for more than 30 seconds after put off the power supply. If not, explosion proof performance can not be guaranteed.

- (1) Turn OFF power supply to the unit.
- (2) Remove 6 hexagonal socket headed screw and lid in the front, and remove the fuse on the internal board. (For the fuse position, refer to Page 5. Internal View).
- (3) Install the attached fuse (0.5A), install the lid and 6 hexagonal socket headed screws, and tighten these screws.
- (4) Turn ON power supply to this unit. Confirm that the operation is normal. If not, refer to 5. 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.

The warm up time will be longer if the power is not supplied to the sensor for a long time.

If the sensor is kept for more than one month without power supply, gas calibration may be required. So, it is recommendable to supply the power always.

- (2) Storage conditions

Temperature : -10 ~ +40

Humidity : 30 ~ 80%RH 以下

Environmental conditions: Place without organic solvent and gas generation.

4 - 11 Recommendable Spare Parts List

No.	Description	Checking interval	Replacement interval	Q'ty/Detector
1	Sealing packing	1 year	5 ~ 6 years	1 pce
2	Packing	1 year	5 ~ 6 years	1 pce
3	Sensor	6 months	1 year	1 pce
4	Printer circuit board(Display)	-	5 ~ 6 years	1 set
5	Printed circuit board(Main)	-	7 ~ 8 years	1 set
6	Fuse	-	8 years	1 pce

* 1 : The above replacement interval may vary depending on the conditions of actual use. It does not mean the warranty period.

The replacement interval also may vary by the result of regular inspection.

* 2 : The main reason of the printed circuit board is the deterioration of capacitors.

5 - 1 Trouble Indication and Countermeasure

This section describes a procedure to determine the fault location when any trouble is found as a result of 4. Maintenance and inspection

Indication : E - 0 0

Indicated when trouble occurs inside detector.

Countermeasure : Put ON the power again. If not recovered, replace the PCB.

Indication : E - 0 4

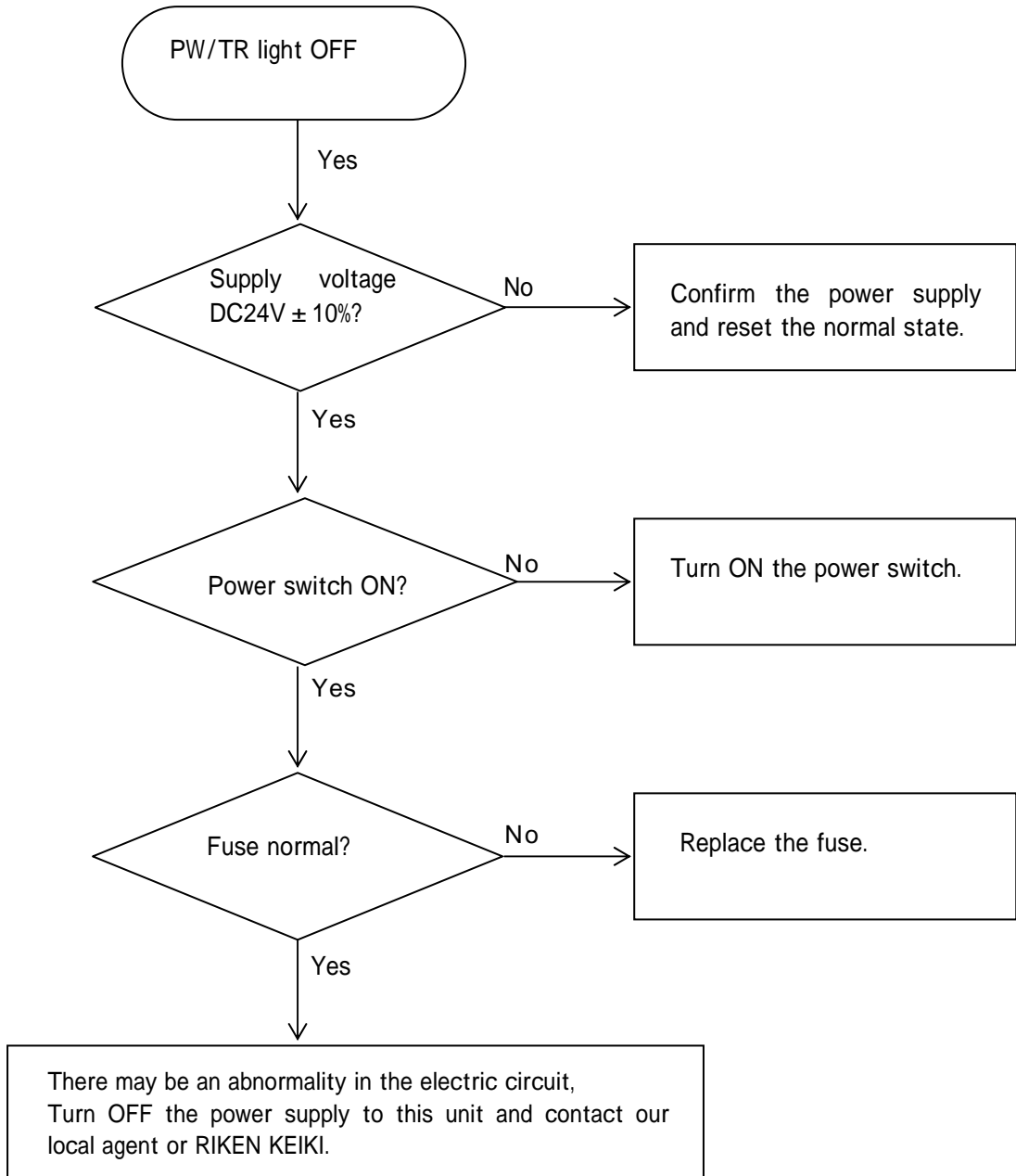
Trouble of zero correction function. Indicated when zero fluctuation beyond its tolerance due to long use or the influence against environmental conditions.

Countermeasure : Check with the portable gas detector that there is no gas around gas detector. When no gas is confirmed, it may be caused by either wrong zero adjustment to be done before or the defective of sensor.

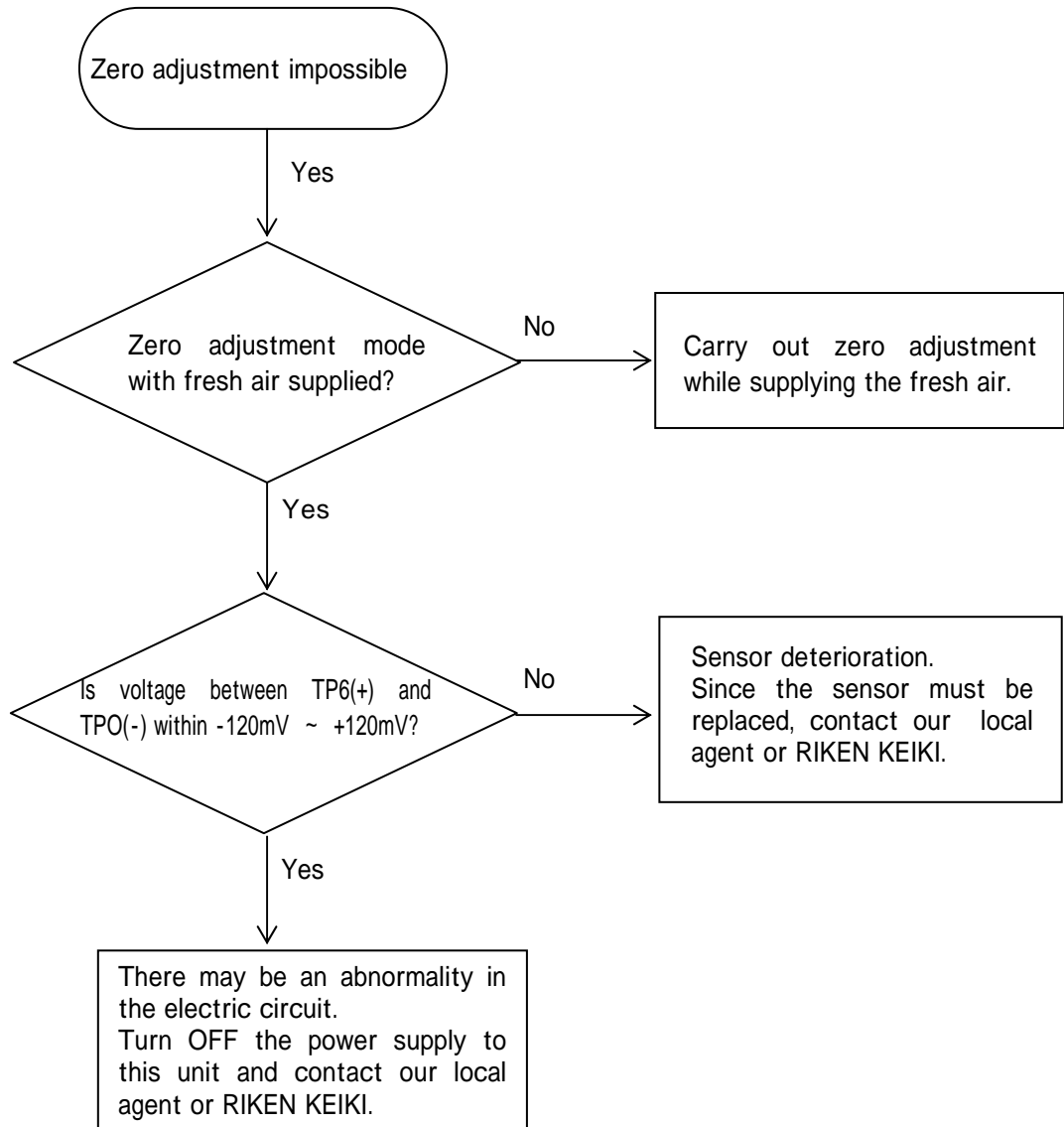
Make zero adjustment. If it can not be recovered or same trouble will be happen later, consult with RIKEN KEIKI or our local agent.

5 - 2 Troubleshooting

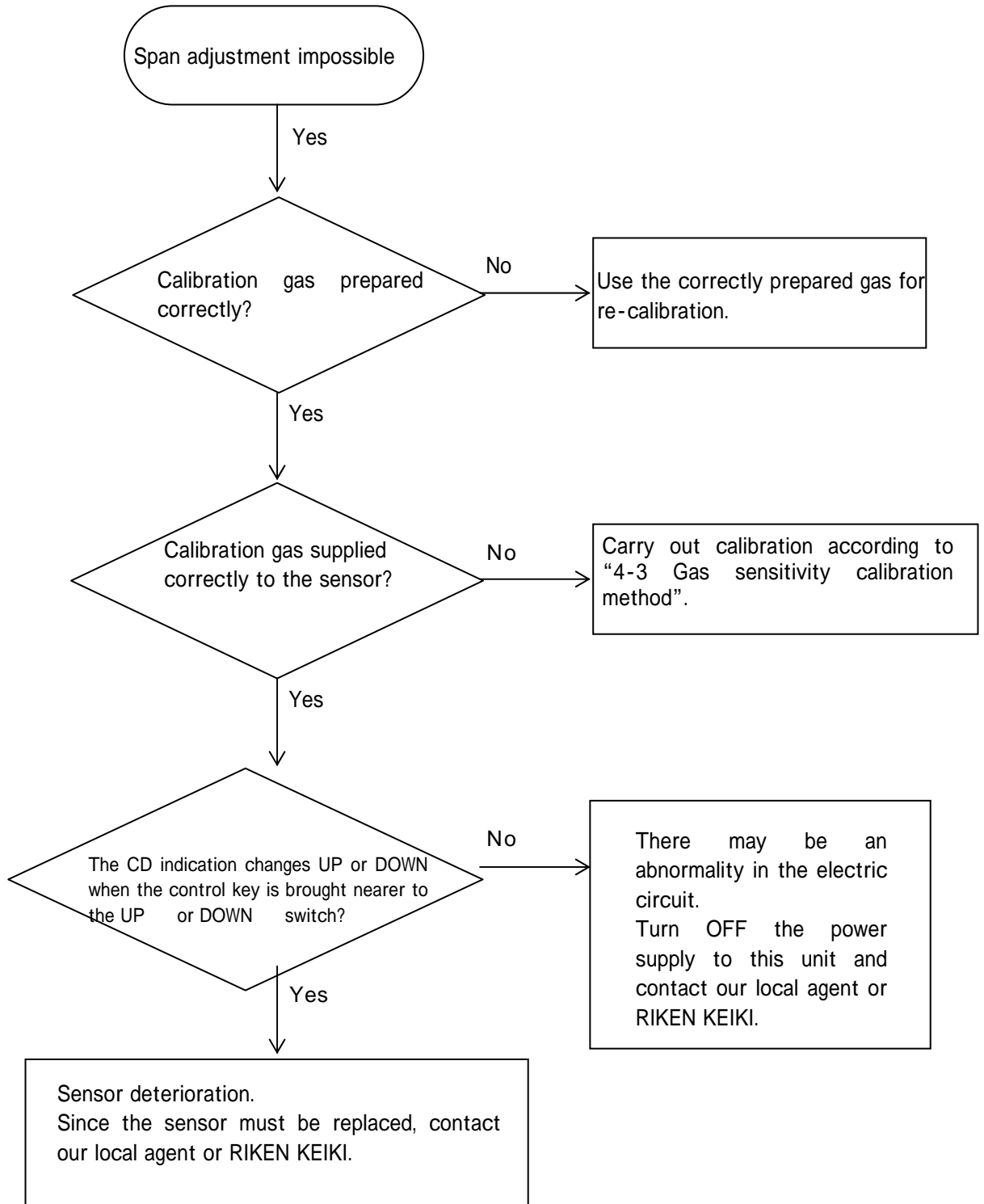
PW/TR light is not ON



Zero adjustment impossible



Span adjustment impossible



6. Definition

Electrochemical method

This is a principle for the sensor integrated into this detector.
For the details, refer to 8-2 Detection Principle.

Initial

The output from the detector fluctuates for a while after power application.

The function is to suppress alarm during this period.

F u l l s c a l e

The maximum value of the detection range.

p p m

The unit of gas concentration in Parts Per Million.

Calibration

Matching the equipment indication to the calibration gas concentration value by the calibration gas.

7 . Scrap of Sensor

Scrap of products

- For used up sensors, be sure to return them to the manufacturer.
The return is requested via our nearest agent or RIKEN KEIKI..
- Should any leak sensors be found, do not touch the leak liquid for sure and put it in vinyl bag so that the liquid can not be leaked outside.
Then should any leak be found from the sensor to detector, make power off the detector and contact our nearest agent or RIKEN KEIKI.
- Regarding detector complete, treat it in the same as industrial scrap (Non-flammable goods).



WARNING

As there is the electrolyte in the sensor, do not disassemble absolutely. When touch the electrolyte of it, the skin may be damaged and if goes into eyes, there will be possibility of losing sight. Then, if it sticks to clothes, the color of it may be changed or make a hole. If should touch it, clean the wet part enough with water.

8 . Specifications

8 - 1 Specifications

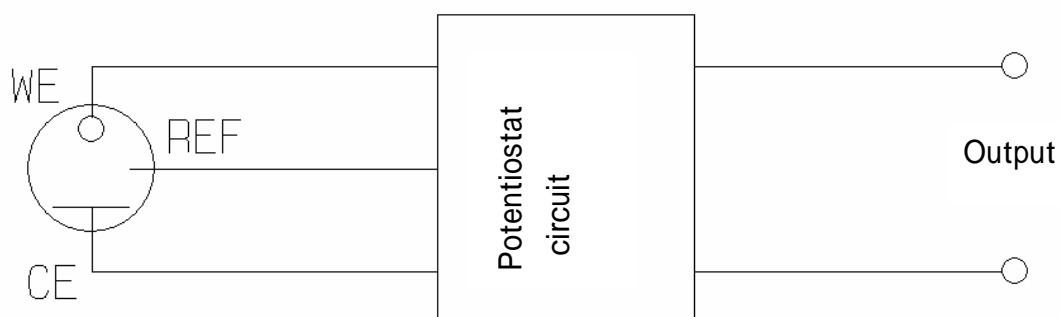
Type	:	SD - 705EC
Detection principle	:	Electrochemical Cell method
Gas to be detected	:	Toxic gas
Detection method	:	Diffusion type
Detection range	:	Depends on gas
Response time	:	T60... 60 sec or less
Transmission method	:	3-wire type analog transmission(power, signal, common)
Transmission distance	:	1.25 km or less with CVVS(1.25 sq.) cable 2km or less with CVVS (2.0 sq.)cable
Alarm output	:	2 level alarm output ·Contact output:1a or 1b ·Contact rating:DC30V 1A
Preset alarm point	:	Depend on gas and range
External output	:	4-20mA(current discharge type), Resistive load : max 300 0.5mA at fault 2.5mA in the maintenance mode and during initial operation 4-20mA Gas concentration output Note : Linear up to 22mA.
Indication function	:	Concentration indication : LCD 4digits, 7-segment, 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 2nd alarm indication(Red/flickering or lighting) SKIP Maintenance mode indication(Green/flickering or 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),ets.(off)
Self-diagnosis function	:	Abnormality of zero correction. Indication : PW/TR(Green/flickering).LCD message "E-XX". Output : 4-20mA output 0.5mA output(fix)
Initial clear	:	25 seconds after power ON (LCD indication " - - - - ")

Power supply	:	Supply voltage : DC24V \pm 10% Power consumption : Max 2.5W
Operating temperature/humidity	:	-10 ~ +40 30 ~ 80%RH(no-condensing)
Setting & adjustment	:	ZERO/SPAN adjustment(non-contact)with the control key
Over all dimensions	:	Approx. 205(W) \times 134(H) \times 92 (D) mm
Weight	:	Approx 4 . 3 kg
Explosion proof	:	Flame-proof construction (Explosion-proof class : ExdIIBT4X)

8 - 2 Detection Principle

The detection principle of this gas detector is electrochemical method. The sample gas is electrolyzed by the electrochemical cell added with bias voltage and detected from the electrolyzed current generated at that time.

The electrochemical sensor is designed to keep the interface between electrode and electrolyte at a constant potential(Bias voltage) and is the method to electrolyze gas directly. Then as the gas has the bias voltage generating its own electrolyzation(oxidation-reduction potential)the bias voltage of sensor is determines by the oxidation-reduction potential.



WE: Working electrode
CE : Counter-electrode
RE : Reference electrode

9. Warranty

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 WARRANTY IS EXPRESSLY IN LIEU OF ANY AND ALL OTHER WARRANTIES AND REPRESENTATIONS, EXPRESSED OR IMPLIED, AND ALL OTHER OBLIGATIONS OR LIABILITIES ON THE PART OF RIKEN KEIKI CO., LTD. INCLUDING BUT NOT LIMITED TO, THE WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL RIKEN KEIKI CO., LTD. BE LIABLE FOR INDIRECT, INCIDENTAL OR CONSEQUENTIAL LOSS OR DAMAGE OF ANY KIND CONNECTED WITH THE USE OF ITS PRODUCTS OR FAILURE OF ITS PRODUCT TO FUNCTION OR OPERATE PROPERLY.

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

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