
TC100N

Fixed gas detector

Operation manual

Ver: HWWM161229CG

Safety Information

Before using this device, please carefully read the following safety information:

- After opening the packing box, please check if there is any crack on the device or spare part missing. If the device found damaged, please don't use it. Please contact the seller.
- Before using, please make sure the covers are fixed tightly.
- In order to assure the sensitivity and accuracy, please calibrate zero point before the first time of using.
- Working voltage of the device is 18VDC-30VDC and suggested voltage is 24VDC. Any voltage beyond 30VDC will damage the device.
- Please don't install the device on the place where there is fast flow passing. Otherwise, it will influence the result.
- Please don't expose the device always to high concentration gas (higher than the detecting range). It will shorten the sensor life.
- Only special designed gas sensor is allowed to be used on the device.
- Calibrate the gas sensor at least every 180 days. We suggest the user inspect or test device regularly, so as to avoid the problems of falling dust on the sensor head or unexpected painting.
- Wire connection must be carried when the power is cut off.
- Please protect the detector from water or dust in case they come into the cover through the wire connection holes. Otherwise, it will easily damage the device.
- Please prevent the device from electric shock and continuous serious mechanical striking.
- It's forbidden for the user to disassemble, adjust and repair the device or to replace the internal spare parts privately.
- All operation inside the device must be carried by professional personnel.

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1. Brief Introduction

TC100N fixed gas detector adopts advanced catalytic gas sensor or electrochemical sensor, which can translate the gas concentration in the air to the digital signal output. TC100N adopts four wire RS485 signal output to connect to the gas monitor panel.

The detector working with gas controller can be used to detect gas in refinery, chemical plant, LPG station, boiler room, painting plant and other places with gas exists.

2. Main technical specification

Target Gas	Range	Resolution	Calibrating gas flow
LEL(CH ₄ , C ₃ H ₈ , etc.)	0~100%LEL	1%LEL	500ml/min
O ₂	0~30% vol	0.1% vol	300ml/min
CO	0~1000ppm	1ppm	200ml/min
H ₂ S	0~100ppm	1ppm	200ml/min
H ₂	0~100%LEL	1%LEL	500 ml/min
NH ₃	0~100ppm 0~1000ppm	1ppm	400 ml/min

Sensor type: Catalytic or electrochemical gas sensor

Sampling: Natural diffusion

Accuracy: $\leq \pm 5\%$ F.S.

Response time (T90): $\leq 30s$ (LEL) / $\leq 60s$ (toxic gas)

Working condition:

Temperature: $-40 \sim 70^{\circ}\text{C}$ (LEL) / $-20 \sim 50^{\circ}\text{C}$ (toxic gas)

Humidity: $\leq 95\%$ RH (no condensation)

Explosion-proof grade: Exd II CT6

Protection grade: IP65

Working voltage: DC24V $\pm 25\%$

Working pressure: 86kPa \sim 106kPa

Signal output: RS485 4-line

Consumption: 2W

Cable required: 4-line cable, $\geq 2.5\text{mm}^2$

Transmission distance: $\leq 1000\text{m}$

Dimension: l**×**b**×**h mm 196**×**186**×**68.5

Weight: about 1200g

3. Structure

The device consists of the housing, sensor part and PCB. The housing consists of upper cover, lower cover, O-type circle and cable input hole part. The housing function is to protect the inside part. The sensor part consists of gas sensor, sensor protection cover, decoration part and calibration cap. The sensor and housing is connected by potting epoxy resin. The following is the structural drawing:

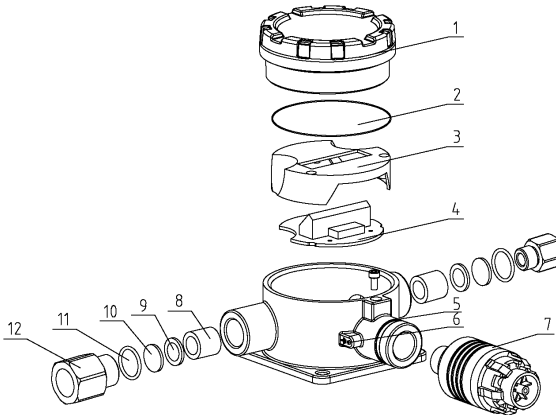


Fig. 1 Structural drawing

No.	Name	No.	Name	No.	Name
1	Upper cover	5	Lower cover	9	Fixing circle
2	O-type circle	6	Ground nut	10	Pad
3	Protection part	7	Sensor module	11	Seal ring
4	PCB	8	Closing plug	12	Connector

4. Installation

4.1. Installation Position

1. For petrol gas, oil gas and alcohol gas etc. which is heavier than the air, the installation position should be 0.3m-0.6m high above the ground.
2. For natural gas, CH₄ etc which is lighter than the air, the installation position is 0.5m-2m high above the gas source.

Note: Gas density more than 0.97kg/CBM, it's heavier than air.

Gas density less than 0.97kg/CBM, it's lighter than air.

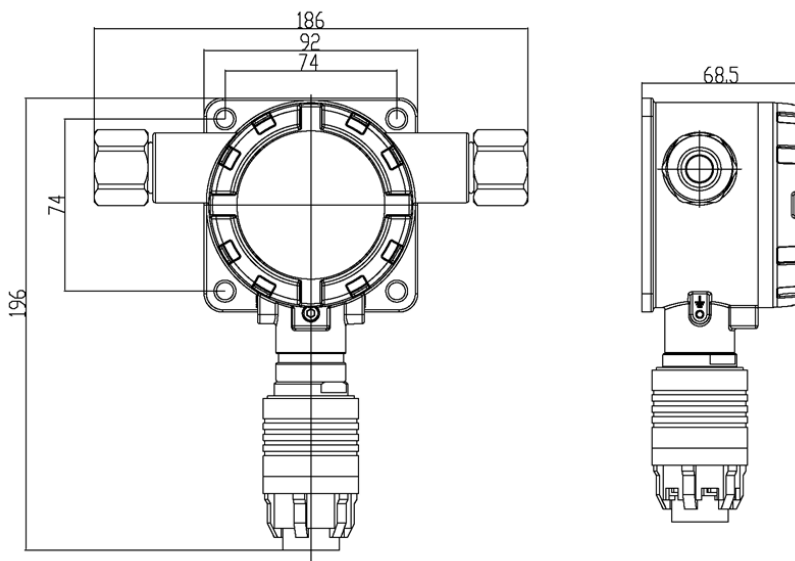
3. The position should be far away from shocking, shattering, strong electromagnetic interference. Around the position, there should be at least

0.3m empty place.

4. The installation position should be within 1m around the possible gas leakage area, such as valve, pipe connection point, gas outlet place. Please try to install it near to the above places, but avoid influencing the working of the other equipment. Please avoid the environment of high temperature and humidity. Also please keep it from water swashing, oil and mechanical damage. Please also consider the convenience of maintenance and calibration.

5. For large area detection, we suggest install 1pc every 10-12 square meters, so as to get the best detection result.

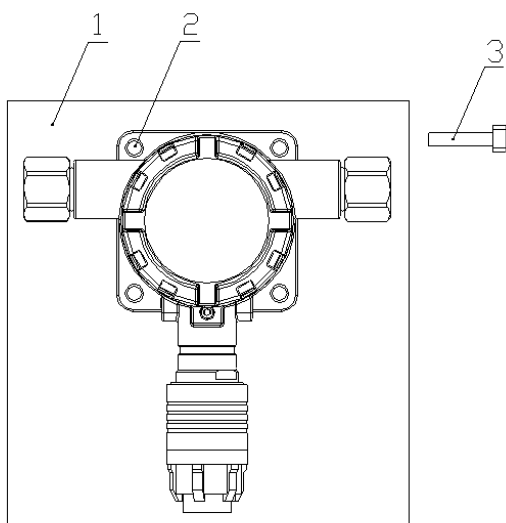
4.2. Dimensions



4.3. Installation methods

Note: Fix the detector with sensor head downwards. According to the installation place, fix the detector onto the wall or gas pipes.

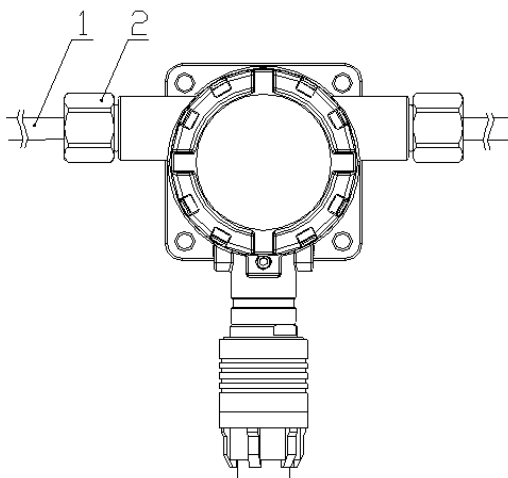
- ◆ **Method 1. Wall mounted:** According to the device dimension, choose a suitable wall. First fix devices on the wall by 4pcs of M6 ×60 bolts.



1	wall
2	Installing holes
3	Expansion bolt

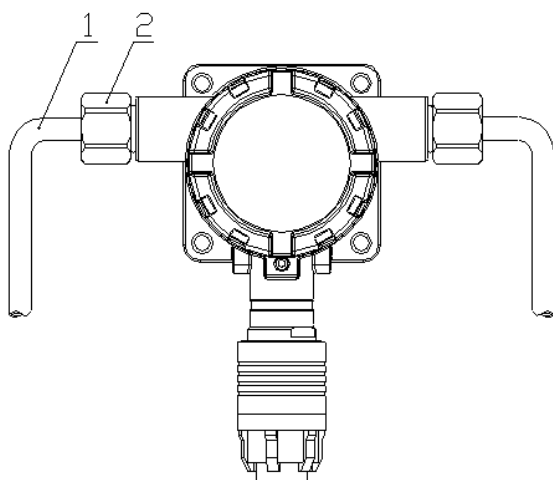
Wall mounting type

- ◆ **Method 2 Screw Butt joint Connection:** If there is pipe screw of G1/2 on the spot, the user can butt joint the device to the pipe screws and then screw tightly the device.



1	Install solenoid
2	Pipe joint

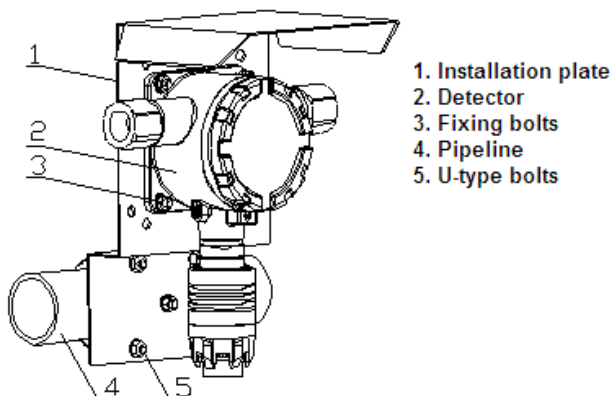
Connection for screw butt type



1	Install solenoid
2	Pipe joint

Connection for screw butt type.2

- ◆ **Method 3 Pipe Installation:** If there is 1" to 2" (diameter) pipe, the user can use 2 U-type bolts to fix the hanging plate on the pipe, then fix the detector onto the plate. Or, the user first fix the detector onto the plate and then fix the plate on the pipe.



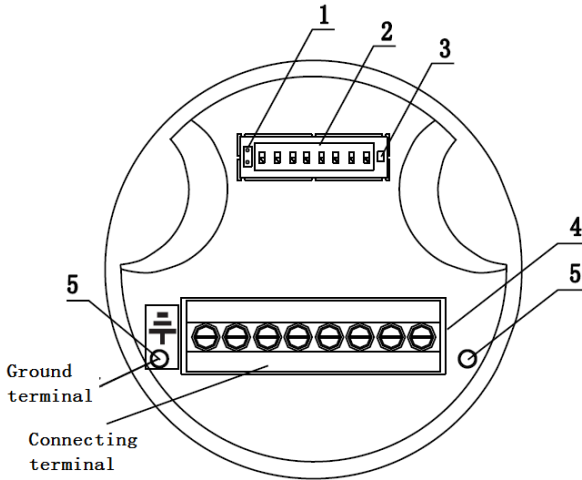
Pipe installation drawing

5. Wire connection

Warning: Wire connection must be carried when the power is cut off.

Procedure:

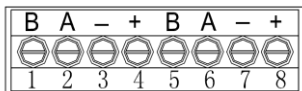
1. Take off the up cover from the device and the inside can be seen.



NO.	Part name
1	Switch
2	+ button
3	- Button
4	Red LED light
5	Green LED light
6	Wire terminals
7	Fasten screw/GND

2. Screw down the pipe connector in counter-clockwise way. Take out the explosion-proof pad. In turns, put 3-line wire to the internal of the enclosure through the pipe connector, compaction circle, air-proof closing plug and the wire connection hole. According to the explosion-proof requirement, please don't take out the explosion-proof closing plug from the unused wire connection holes. Please don't throw away any part inside the enclosure or the PCB.

3. All the wires must be connected to the terminals as shown on the following drawing.



No.	Icon	Name	Spec.
1、5	B	RS485	Bus signal
2、6	A	RS485	Bus signal
3、7	-24	Cathode of power	DC24V±25%
4、8	24+	Anode of power	DC24V±25%

4. After the correct wire connection, take out the useless wire from the enclosure. Then screw on the connector, tighten the compaction circle, rubber air-proof circle and wire. Explosion-proof soft tube can also be connected with the device directly.

Note: Connection between the controller and detector should be by four core shielded cable whose external diameter is more than 6mm (the distance between detector and control panel can not be more than 1000m), meantime, bridge 120Ω resistor over at the end of the signal line (the signal terminal inside the last detector).

5. After checking all the connection well, set every detectors' address code according to "address code settings" at the end of this manual (so as to set the numbers of each detector), after that, put on the front cover, make sure O-type circle is put inside and connected with the cover tightly.

Note: You may install the detector first before wire connection or connect the wire first before installation, choose the favorable method as for your convenience. Wire connection should bus method.(please refer to appendix 1)

6. Address code settings

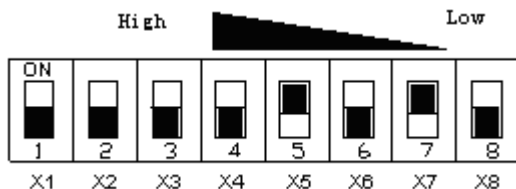
The address codes are set by the coding switch from the 2nd to the 8th switch. They are calculated by binary system. The 8th is low bit and the 2nd is high bit. It means 1 when the switch is on and it means 0 when the switch is off. From low to high, each switch will means 1, 2, 4, 8, 16, 32 and 64 in turn (namely right).The calculation formula is:

$$ADD = X2 \times 64 + X3 \times 32 + X4 \times 16 + X5 \times 8 + X6 \times 4 + X7 \times 2 + X8 \times 1$$

In the formula: X2 to X8 can only be 1 or 0.

For example: from low bit to high bit, if the 2nd and the 4th switch are on, then $X7=X5=1$, and the rest are 0.The calculation address is as follows:

$$ADD = 0 \times 64 + 0 \times 32 + 0 \times 16 + 1 \times 8 + 0 \times 4 + 1 \times 2 + 0 \times 1 = 10$$



Note: address code settings please refer to appendix 2.

7. Debug

Before debug, please read the below information carefully.

Warning!

Make sure of good wire connection. Then connect it to the power. green power LED will keep flickering and the detector enters into warm up status.
Make sure there is no combustible gas leakage on the spot.
Don't use pure gas or light to test it. Otherwise, it will damage the sensor or lower the sensitivity.

Note: Adjusting must be carried out by professional technicians.

Procedures:

1. Connect the wire correctly according to installation position and wire connection instruction. Then connect the device to the power. green power LED will keep flickering and the detector enters into warm up status.
2. Open and enter into the control panel system, search the detectors.
3. After several minutes of warm up, the indicate light will be off, it will flicker when data's been communicated. Use certain target gases and test the detectors to see if the detector works well.
4. Refer to trouble shooting guidance if there is abnormal situation.

8. Calibration

Calibration is to adjust the value of the detector in the specific gas environment so as to assure the detecting accuracy and reliability. Normally, it includes zero calibration and span calibration. **Make sure the detector have been connected with gas control panel correctly**, switch on the power source on the control panel so as to start on the gas detectors, then follow the calibration instruction as below:

8.1 Zero point calibration

Wait about 10 minutes and the detector enters into working status. Put the first DIP switch to “ON” position. Then you can follow the control panel’s manual to execute zero calibration in the clean air.

(After zero calibration has been finished, If you don’t need to do span calibration, please put the first DIP switch to non “ON” position.)

8.2. Span Calibration

8.2.1 Preparation

Before executing span calibration, you will need to prepare below equipment and devices.

- ◆ 1 bottle of standard gas: normally the gas concentration supposed to be 50% of the detector’s detecting range. (For example, standard methane calibration gas is recommended to be 50%LEL).
- ◆ 1 gas flow meter (the meter’s range should be over the required gas flow rate of the standard calibration gas).

8.2.2 Calibration

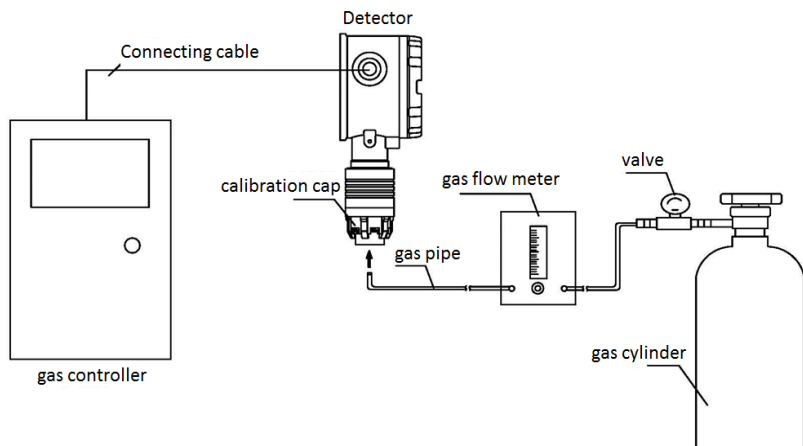
Connect the standard gas and gas flow meter with gas tube. Open the gas bottle and adjust the gas flow meter to make the output gas flow rate to be the required calibration gas flow rate (refer to the table in term 2 of this manual).

After the standard have be output for 2 minutes, connect the gas tube from the gas flow meter to the calibration cap of the detector to let the gas reaches the sensor.

After 1 minute, enter the control panel’s operation menu, follow the panel’s calibration manual and complete the calibration.

After calibration is finished, turn off the switch valves on the gas bottle and disconnect the gas tubes.

At the end, remember to put the first DIP switch to non “ON” position.



9. Zero translation

After the detector have been used for a long time or when it is put in a new environment, it may not indicate “0” even in clean air, this is called “zero drift”. Zero drift is caused normally by great change of the environment temperature or the change of environment humidity. This situation can be corrected by zero translation.

Zero translation can be simple correction for detector, to make detector for better performing, but compared with calibration, it cannot revise sensitivity deviation which is caused after long time using, so in principle, zero translation is only used for correction when calibration operation is not convenient to execute. It is highly suggested that do calibration every half year even after zero translation have been done.

To do zero translation for TC100N detector, you will need to connect it with the control panel, and then do the operation through the control panel.

Zero Translation method:

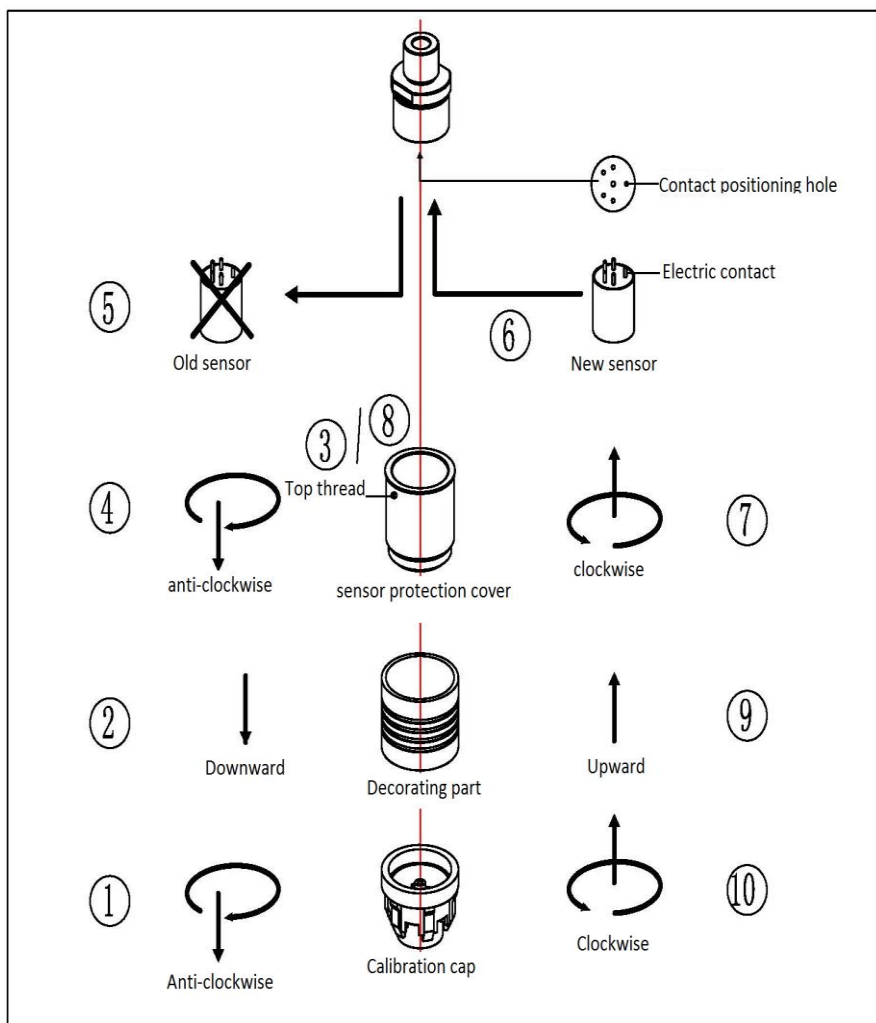
1. Turn on the control panel.
2. Wait for 20 minutes, after the detector enter a stable working state, set the first DIP switch to “ON” position, then follow the operation manual of the control panel and operate to do zero translation in the environment of clean air.(If the target gas is Oxygen gas, then zero translation must be executed in pure nitrogen environment).
3. After zero translation is finished, set the first DIP switch to non “ON” position.

10. Sensor replacement

In normal working environment, the catalytic sensor's life is 3 years and electrochemical type sensor's life is 2 years. When the sensor life is overdue or the sensor is damaged, the detector will not work well, please follow the below instruction to replace the sensor.

Before replacing sensor, please first cut off power supply. It doesn't need to open the main casing of the detector, but only need to open the sensor module which is under the detector.

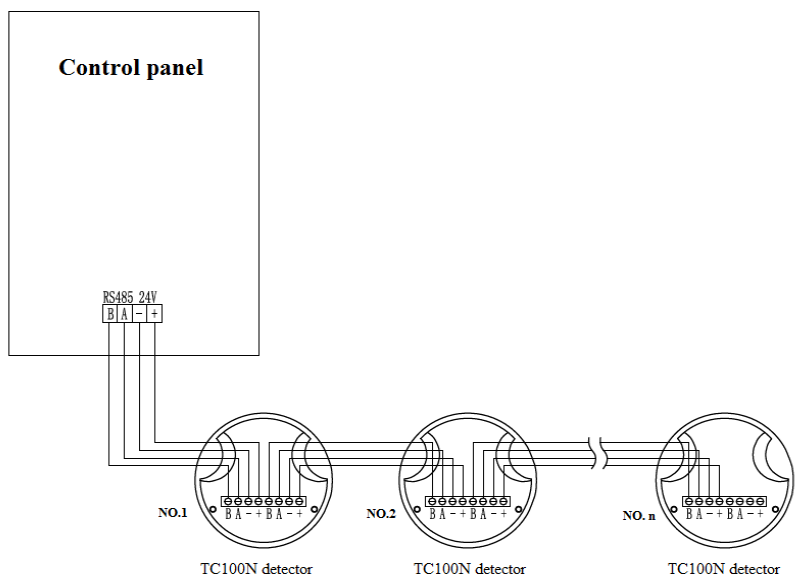
1. Take off the calibration cover by counterclockwise rotation.
2. Pull out the decoration part downwards.
3. Twist off the top thread from the sensor protection cover.
4. Take off the protection cover in counter-clockwise.
5. Take out the old sensor.
6. Install new sensor, make sure the electric contact match to each contact positioning hole.
7. Then install in turns the protection cover, top thread, decoration part and calibration cap.
8. Power on the detector and calibrate the detector before use.



11. Trouble shooting guidance

Troubles	Possible reason	Solution
No response to target gas	Sensor warm up incomplete.	Wait till warm up finish
	Sensor damage	Replace the sensor
	Circuit fault	Contact to the seller
None communication with Control panel	No power, no indication light.	Check the power wire connection
	Incorrect connection with Signal wire “A” and ”B”	Connect the signal wire correctly.
	Signal wire break circuit	Check the break point
	Short circuit between signal wire “A” and ”B”	Check the short circuit point
	Circuit Fault	Contact to the seller
Cannot be calibrated.	Calibration switch is off	Set the first DIP switch to be “ON” position.

Appendix 1. System wiring diagram.



Appendix 2. Address code setting.

