

# TC100N

## Fixed Gas Detector Operation Manual

## 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). Otherwise, it will shorten the sensor life.
- Please don't paint the gas sensor or detector.
- Only special designed gas sensor is allowed to be used on the device.
- Calibrate the gas sensor once 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. Before opening the cover, please make sure there is no mixture gas of combustible gas and air in the environment, so as to avoid any possible explosion.
- Please avoid water or dust to come into the cover through the wire connection holes. Otherwise, it will easily damage the device.
- Please avoid the device from electric shock and continuous serious mechanical striking.

- Installation must abide by the local electric equipment installation regulations.
- It's forbidden for the user to disassembly, adjust and repair the device or to replace the internal spare parts.
- All operation inside the device must be carried by professional personnel. Before operation, please carefully read and understand the operation manual.

### **Precautions:**

To avoid personal safety injury, Instrument damage and potential dangerous accident; do not install the gas detector before reading this manual

### **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 three wire 4~20mA electric current signal 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. Specifications

Gas	Range	Resolution	Low alarm	High alarm
LEL	(0~100)%LEL	1%LEL	20%LEL	50%LEL
HC vapour	(0~100)%LEL	1%LEL	20%LEL	50%LEL
O <sub>2</sub>	(0~30)%vol	0.1%vol	19.5%vol	23.5%vol
CO	(0~1000)ppm	1ppm	35ppm	200ppm
H <sub>2</sub> S	(0~100)ppm	1ppm	10ppm	15ppm
CL <sub>2</sub>	(0~20)ppm	0.1ppm	5ppm	10ppm
SO <sub>2</sub>	(0~500)ppm	1ppm	10ppm	50ppm
NH <sub>3</sub>	(0~100)ppm	1ppm	25ppm	50ppm

Sensor type: Catalytic or electrochemical gas sensor

Sampling: Natural diffusion

Working type: Continuously working

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

Response time (T90):  $\leq 30$ s (LEL) /  $\leq 60$ s (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 IIC T6

Protection grade: IP55

Working voltage: DC24V $\pm 25\%$

Working pressure: 86kPa $\sim$ 106kPa

Signal output: 4-20mA 3-line

Consumption: 2W/channel

Life: Catalytic sensor 3 years; electrochemical sensor: 2 years

Connection screw size: G1/2"

Cable required: 3-line cable,  $\geq 3 \text{ mm}^2$

Transforming distance:  $\leq 1000$ m

Dimension and weight: l**×**b**×**h mm 196**×**186**×**68.5 App. 1200g

### 3. Structural Drawing

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:

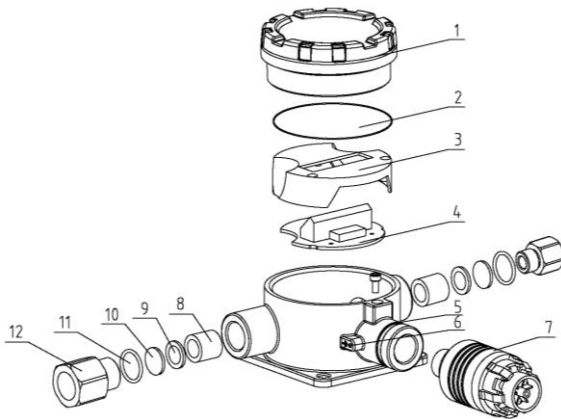


Fig. 1 Structural drawing

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 Position

4.1.1 For petrol gas, oil gas and alcohol gas etc. which is heavier than the air, the position is 0.3m-0.6m higher than the ground.

4.1.2 For natural gas, CH<sub>4</sub> etc which is lighter than the air, the position is 0.5m-2m higher than the gas source.

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

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

4.1.3 The position should be far away from shocking, shattering, strong electromagnetic interference. Around the position, there should be at least 0.3m empty place.

4.1.4 The 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 nearer to the above places, but avoid influencing the working of the other equipments. 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.

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

## 4.2 Dimensions

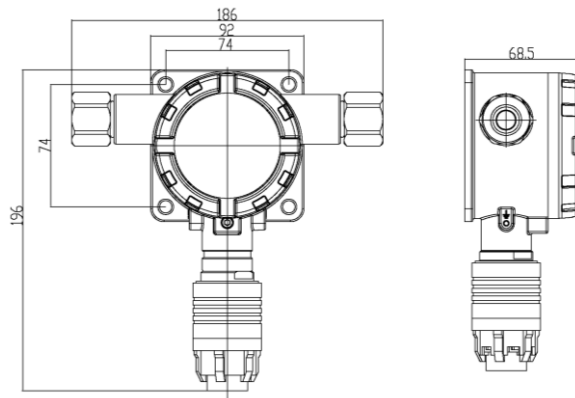


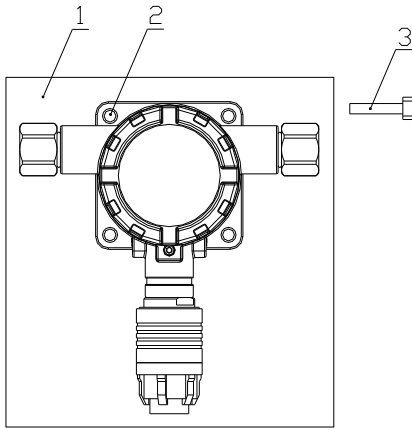
Fig. 2 Dimension

## 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. Details as follows:

**Method 1 Wall mounted:** According to the device dimension, choose a

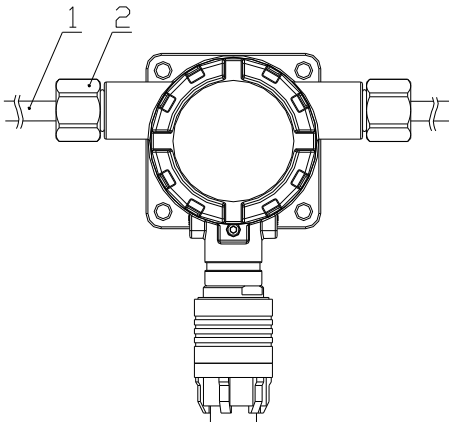
suitable wall. First fix devices on the wall by 4pcs of M6×60 bolts.



1	Wall
2	Fixing holes
3	Bolts

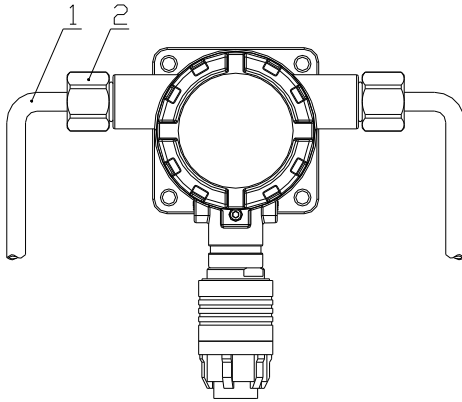
Fig. 3 Wall Mounted

**Method 2 Screw Buttjoint 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	Pipe with screw
2	Connector

Fig.4 Screw Buttjoint Connection-1

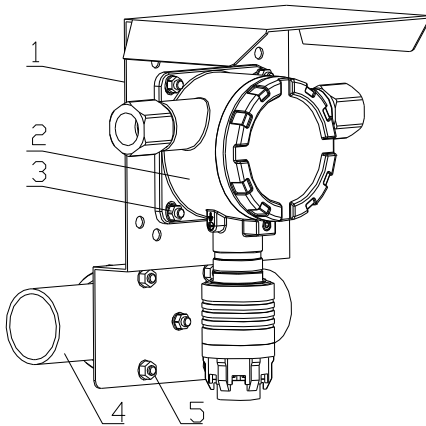


1	Pipe with screw
2	Connector

Fig. 5 Screw Buttjoint Connection-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 can first fix the detector onto the plate and then fix the plate on the pipe.



1	Installation plate
2	Detector
3	Fixing bolts
4	Pipes
5	U-type bolts

Fig. 6 Pipe Installation



## 5. Wire connection

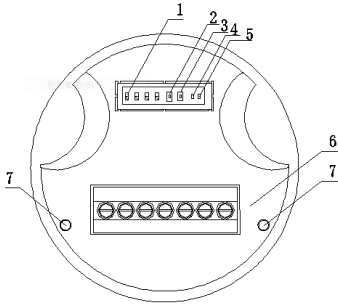


Fig. 7 Inside the device

No.	Name
1	DIP switch
2	+ button
3	- button
4	Calibration LED
5	Power LED
6	Terminals
7	Fixing holes/Ground

**Warning:** All the wire connection must be carried when the power is cut off.

Procedure:

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

5.2 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.

No.	Icon	Name	Specification
1、2	NC	Low alarm	---
3、4	NC	High alarm	---
5	lout	4-20mA output	4~20mA
6	—	Cathode of power	DC24V±25%
7	24V	Anode of	DC24V±25%

5.3 All the wires must be



connected to the terminals as shown on the following drawing.

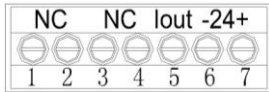


Fig. 8 Terminals

5.4 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:** The size of the wire between the controller and detector should be not less than 6mm, and the distance should be note more than 1000m.

5.5 After checking all the connection well, install the display PCB and the front cover. Make sure O-type circle is put on and connected with the cover tightly.

## 6. Debugging

Before adjusting, please be noted of the following information:

### Warning!

- Make sure wire connection is good and then connect it to the power.
- 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 personnels.

**Procedures:**

6.1 Connect the wire correctly according to installation position and wire connection instruction. Then connect the device to the power. Green power LED is flickering and the detector enters into warm up status.

6.2 After 3 minutes of warm up, green power LED is on continuously and the detector enters into normal working status.

## **7. 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 single point calibration. Calibration instruction is as follows:

7.1 Electrify the detector so as to ensure it can work normally.

### **7.2 Zero Calibration**

7.2.1 Put the device into the clean air and keep it working for at least 10 minutes. Then hold both S2 and S3 buttons continuously for 1-2 seconds, the green power LED starts to flicker, which indicates the device enters into calibration status. Adjust the first digit of DIP switch to "ON". Red LED starts to flicker and green LED is continuously on. The controller displays 0. After several seconds, resume the first digit of DIP switch to the original position, and the detector remembers the present level as zero. Red LED flickers several times and then is off. Zero calibration is completed.

7.2.2 If zero calibration cannot be carried out in the clean air, then please follow the above instruction to enter into the calibration status. When the first digit of DIP switch is to "ON" and red LED starts to flicker, inhale N<sub>2</sub> gas or synthetical air onto the sensor continuously for more than 10 minutes. Then resume the first digit of DIP switch to the original position, and the detector remembers the present level as zero. Red LED flickers several times and then is off. Zero calibration is completed.

### **7.3 Single Point Calibration**

7.3.1 Equipment







1 bottle of standard gas: normally the concentration is 40%F.S.

1000ml/min gas flow meter

### 7.3.2 Procedure:

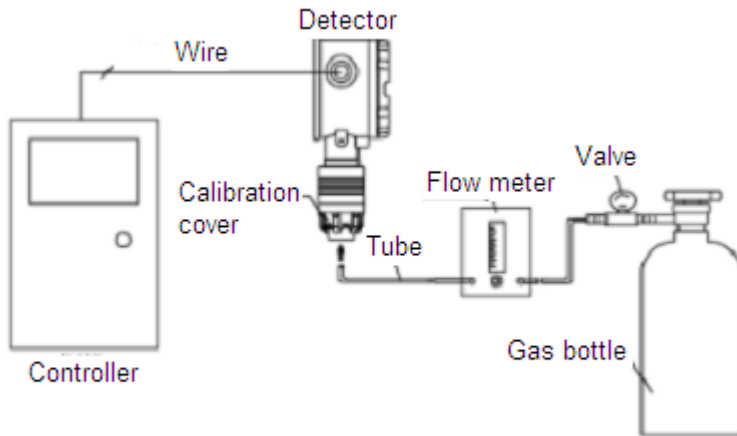
7.3.2.1 Hold both S2 and S3 buttons continuously for 1-2 seconds, the green power LED starts to flicker, which indicates the device enters into calibration status. Adjust the second digit of DIP switch to "ON" (which is 40%F.S calibration point. For details of calibration points, please refer to the following table.) Red LED starts to flicker.

**Note:** Without permission, nobody is allowed to adjust the DIP switch.

DIP switch	Calibration	DIP switch	Calibration
	Zero calibration		10%F.S calibration point
	40%F.S calibration point		20%F.S calibration point
	50%F.S calibration point		60%F.S calibration point

**Note:** Black part is position of the DIP switch.

7.3.2.2 Connect gas bottle and gas flow meter correctly. Open the gas bottle and adjust the flow meter according to the above table. Connect the tube to the calibration cap of the detector. After 2 minutes of inputing gas, when the controller displaying value will be the same with the standard gas concentration, resume the DIP switch to the original position and the detector will remember this value. Red LED flickers several times and then is off. Then close the gas bottle and take off the tube. The calibration is completed.



Calibration

## 7.4 Calibration of Oxygen Detector

### 7.4.1 Zero calibration

Disconnect the sensor module from the detector. At the same time, hold both S2 and S3 buttons continuously for 1-2 seconds, the green power LED starts to flicker, which indicates the device enters into calibration status. Adjust the first digit of DIP switch to "ON". Red LED starts to flicker and green LED is continuously on. After several minutes, resume the first digit of DIP switch to the original position, and the detector remembers this value as zero. Red LED flickers several times and then is off. Zero calibration is completed.

### 7.4.2 Single Point Calibration (20.9%VOL)

After zero calibration, connect the sensor module to the detector correctly and electrify the detector. After working for 10 minutes, follow the above instruction to enter into calibration status. Adjust the second digit of DIP switch to "ON" (which is 20.9%VOL. Red LED starts to flicker. After several seconds, resume the DIP switch to the original position and the detector will remember this value. Red LED flickers several times and then is off. The calibration is completed.

## 8. Sensor replacement

In normal working environment, the catalytic sensor life is 3 years and

electrochemical sensor is 2 years. When the sensor life is overdue or the sensor is damaged, please follow the following instruction to replace the sensor.

Before replacing sensor, please first cut off power supply. The user doesn't need to open the detector cover, but only need to open the cover the sensor module.

8.1 Take off the calibration cover in counter-clockwise.

8.2 Pull out the decoration part downwards.

8.3 Screw off the jbscrew from the sensor protection cover.

8.4 Take off the protection cover in counter-clockwise.

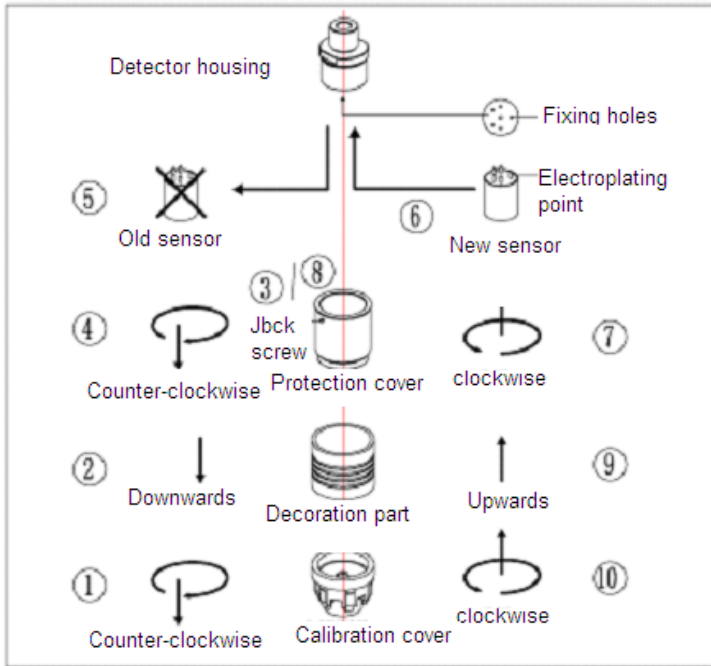
8.5 Take out the old sensor.

8.6 Put the new sensor into the sensor cover.

**Note:** Please put the new sensor into the correct fixing holes. It's forbidden to rotate the sensor.

8.7 Then install in turns protection cover, jbscrew, decoration part and calibration cap. The replacement is completed.

8.8 Electrify the detector and calibrate the detector.



## 9. Normal fault and solution

Fault description	Reason	Solution
No response for detection gas	time-lapse doesn't end	Wait till it ends
	Sensor broken	Change sensor
	Circuit fault	Factory maintain
Abnormal connection with Controller	Wire connection Fault	Check the wire connection
	Open circuit of signal output	Inspect the open circuit
	Circuit Fault	Factory maintain