

Point-type multi-gas detector

(Applicable model: DTS-A002)

Thank you for purchasing our electronic products. When you are ready to use this product, please read the instructions carefully, so that you can fully enjoy the services provided by our company and avoid damage to the machine or other accidents caused by misoperation. If the equipment is damaged due to human reasons, the warranty terms will be invalid.

Since there are many factors that affect the detector to alarm normally, the use of this product can play a preventive role, but it does not necessarily guarantee that accidents will not occur.

During the warranty period, the Company is only responsible for the direct liability caused by this product and the amount of compensation shall not exceed the price of the product. If you install and use this product, it is deemed that you fully understand the meaning of this clause and agree to it.

If the user installs, uses, repairs, damages or replaces any part without following the instructions in this manual, the user shall be responsible for all liabilities arising therefrom.

The final interpretation of this manual belongs to our company. We will not give further notice if the details are changed due to product upgrade or appearance change.

Please keep this instruction manual properly, so that you can check it and get help in time when you need it in the future.

Symbol Definition

Before starting to use, please familiarize yourself with the symbols that may appear in this instruction:



Caution-may hurt yourself or others.



Caution-May damage the detector or other equipment.



Notes-comments, usage tips, or additional information.

[] Indicates the menu item of a point gas detector (hereinafter referred to as "detector").

This form is used to identify the buttons on a handheld remote control.

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User service Guidelines

- 1 After purchasing the product, please check carefully according to the packing list whether the accessories, certificate of conformity and product warranty card are complete. If not, contact the seller or manufacturer immediately.
- 2 Within 12 months from the date of sale, if the product quality is lower than the technical indicators under the condition that users comply with the storage, transportation and use requirements, free maintenance can be enjoyed by using the product warranty card.

- 3 If you have any questions or dissatisfaction with the products and services we provide, including product technology, quality, installation and maintenance, service attitude, charging standards and other issues, please contact us in time, we will deal with your opinions in a timely and proper manner.

Safety Matters

Before using this product, please be sure to read the following safety matters and strictly comply with the relevant operation requirements.

- 1 Before use, please check whether the detector shell has cracks or missing parts. If the detector is damaged or missing parts, contact the dealer or manufacturer.
- 2 In order to better ensure the detection accuracy and reliability of the detector, it is recommended to make a new calibration in the field environment when using for the first time.
- 3 In order to ensure the safety of your use and the normal operation of the gas detector, please often use the known concentration of gas for impact test (place the detector in the target gas with a concentration higher than the high limit alarm value) to confirm the working status of the detector. If the detector shows a value beyond the specified range, please calibrate according to the calibration requirements in this manual.
- 4 If the detector is exposed to a high concentration of mixed gas or high humidity and high temperature for a long time, it may cause the sensor component pollution or reduced sensitivity. Therefore, the detector needs to be calibrated frequently to ensure reliable operation of the equipment.
- 5 The power must be turned off before opening the detector housing. Do not open the housing or replace the sensing component in the presence of hazardous gases.
- 6 The installation of this machine must be strictly in accordance with the contents of the instructions and comply with the national electrical and local electrical installation regulations, otherwise it may lead to unpredictable serious consequences!
- 7 The sensor may contain corrosive electrolyte. If leakage occurs, it must be transferred immediately and treated properly. Note that the electrolyte should not touch skin, clothing or other instrument circuits to avoid personal injury or equipment damage.
- 8 The detector must be safely grounded to protect against radio frequency interference.
- 9 Do not block or cover the detection part during the use of the detector, otherwise the detector will fail.
- 10 The sensitivity of a combustible gas sensor is reduced when it is affected by toxic gas or other inhibitors (such as silicone resin, sulfur, lead or halogenated hydrocarbons, etc.).
- 11 During maintenance, it is strongly recommended to use original parts to avoid damage to the equipment or reduce the performance of the equipment. Private replacement of parts may damage the internal safety of the detector.
- 12 Do not place the sensor in an organic solvent or flammable solution.
- 13 Avoid frequent contact between the instrument and high concentration gas samples whose concentration exceeds the detection range, otherwise the sensor life will be shortened.
- 14 Do not disassemble, adjust or repair this gas detector privately. Any operation inside the detector should be carried out by professionals.
- 15 Avoid electric shocks or violent, continuous mechanical impacts to the detector.

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Summary

The A002 series point-type gas detector (hereinafter referred to as the detector) is a new type of gas detection instrument produced by our company. This device adopts high-performance gas-sensitive components and microcontroller technology, combined with excellent SMD manufacturing process. It has good repeatability, temperature and humidity characteristics, long service life, easy operation and other advantages. It is suitable for gas concentration detection in industrial environment.

The detector has the characteristics of stable and reliable operation, high protection level, long signal transmission distance and good anti-interference performance.

This detector is widely used in petroleum, petrochemical industry, refinery, chemical plant, metallurgy industry, electric power industry and other places that may produce harmful gases to human body gas detection.

1.1 The design, manufacture and verification of this product shall comply with the following national standards:

GB3836.1-2021 Explosive Atmospheres Part 1: General Requirements for Equipment

GB3836.2-2021 Explosive Atmospheres Part 2: Equipment protected by flameproof enclosure "d"

GB15322.1-2019 "Flammable Gas Detector Part 1: Point type Flammable gas detector with a measuring range of 0~100%LEL"

JJG693-2011 "Verification Regulations for Flammable Gas Detection and Alarms"

GB4208-2008 "Enclosure Protection Class (IP Code)"

GB T13384-92 Technical Conditions for Application of Packaging of Mechanical and Electrical Products

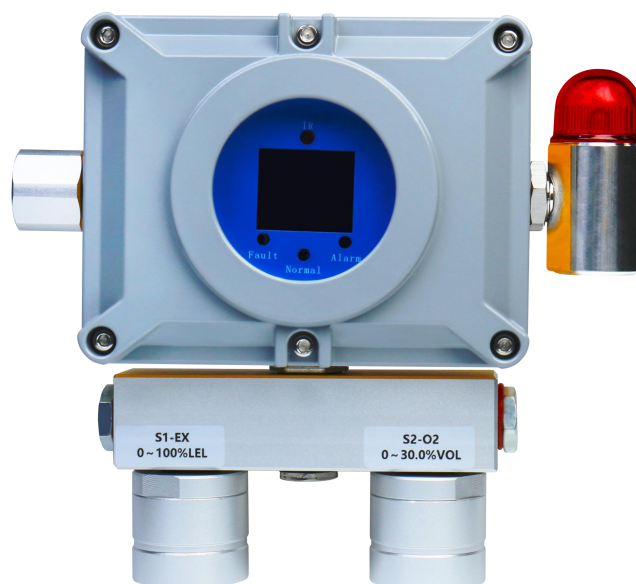
1 The key technical indexes

tracer gas	molecular formula	Standard range	resolution ratio	Gas flow rate
carbon monoxide	CO	0 ~ 1000umol/mol	1umol/mol	200ml/min
combustible gas	/	0 ~ 100%LEL	1%LEL	500ml/min
hydrogen	H ₂	0 ~ 1000umol/mol	1umol/mol	500ml/min
VOC	VOC	0 ~ 100umol/mol	1umol/mol	500ml/min
hepatic gas	H ₂ S	0 ~ 100umol/mol	1umol/mol	500ml/min
oxygen	O ₂	0 ~ 25.0%VOL	0.1%VOL	500ml/min

Note: This equipment supports up to 4 gases, including but not limited to the above gas combinations.

Sampling method: natural diffusion;
Working voltage: DC 24V±6V;
Power consumption: ≤3W;
Working mode: continuous detection;
Status indication: yellow indicates fault, red indicates concentration alarm, green indicates normal work;
Operation mode: infrared remote control;
Response time (t90): less than or equal to 30s (combustible gas); less than or equal to 60s (toxic gas);
Working temperature: -40°C~+70°C (flammable); -10°C~+50°C (toxic gas);
Working humidity: ≤95%RH (non-condensation);
Explosion-proof mode: explosion-proof;
Explosion-proof rating: Ex d ii C T6 Gb;
Protection class: IP65;
Environmental pressure: 86kPa~106kPa;
Output signal: 4~20mA (single gas) / RS485 / relay switch signal / wireless NB / 4G (optional);
Explosion-proof connection thread: G1/2 (inner pipe thread);
Use of cable: ≥1.5 mm²×3 shielded cable, the outer diameter of the cable is required to be between 6mm~9mm (4~20mA)/ 1.5 mm²×4 (RS485);
Maximum distance between detector and host: ≤1000m;
Service life of sensor: three years (combustion catalytic combustion sensor, optical principle five years, toxic gas electrochemistry two years);
Product size: 160mm × 145 mm × 97 mm;
Weight: about 2.5kg.

2 Overall Appearance of Detector



3 Installation of Detector

3.1 Installation Position

- 1、 For detectors measuring heavier-than-air gases such as liquefied petroleum gas (LPG), oil-derived gas, and alcohol, the installation height should be 0.3m~0.6m above the floor (or building floor). However, to prevent damage from rainwater splashing on sensors, it is recommended to install them as close as possible to 0.6m. Note: A gas is considered heavier than air if its density exceeds 0.97kg/m³ (standard conditions), and lighter if below 0.97kg/m³ (standard conditions). For detectors measuring lighter-than-air gases like natural gas or methane, the installation height should be 0.5m to 2m above the emission source.
- 2、 The installation position of the detector should be determined based on the speed and direction of air flow, the relative position to the potential source of leakage, and the ventilation conditions, and should be convenient for maintenance and calibration.
- 3、 The detector shall be installed in a place without impact, vibration and strong electromagnetic interference, and the surrounding clearance shall not be less than 0.5m.
- 4、 For equipment located in open-air or open factory areas, the distance between combustible gas detection points and emission sources should not exceed 15 meters when the monitoring point is situated upwind of the annual minimum frequency wind direction. When the monitoring point is located downwind of the annual minimum frequency wind direction, this distance limit should be reduced to no more than 5 meters.
- 5、 If the combustible gas release source is located in a closed or semi-open plant with poor local ventilation, one detector can be set up every 15m, and the distance between the detector and any release source within its coverage should not be greater than 7.5m.
- 6、 If the source of flammable gas release is located in a closed or semi-open plant with poor local ventilation, detectors should be installed not only above the source, but also at the highest point where gas is easy to accumulate in the plant.
- 7、 The detector should avoid direct blow of fast flowing gas, otherwise the test results will be affected.

3.2 Installation Method

During installation, the gas sensor is down to avoid dust and rain to enter the sensor and affect its performance, but also better detect the measured gas. The specific installation method is as follows:

According to the actual situation of the detection site, the detector is fixed to the wall, horizontal pipe or vertical pipe as follows.

◆ Method 1 (wall-mounted installation method):

- 1) According to the size of the detector installation and fixing hole, determine the hole position, and drill screw holes in the wall.
- 2) Attach the detector to the fixed hole position, and then fix the detector to the wall with bolts.

◆ Method 2 (top drop installation method):

- 1) According to the installation bracket attached to the detector, determine the hole position on

the roof or ceiling, and drill screw holes on the ceiling or roof.

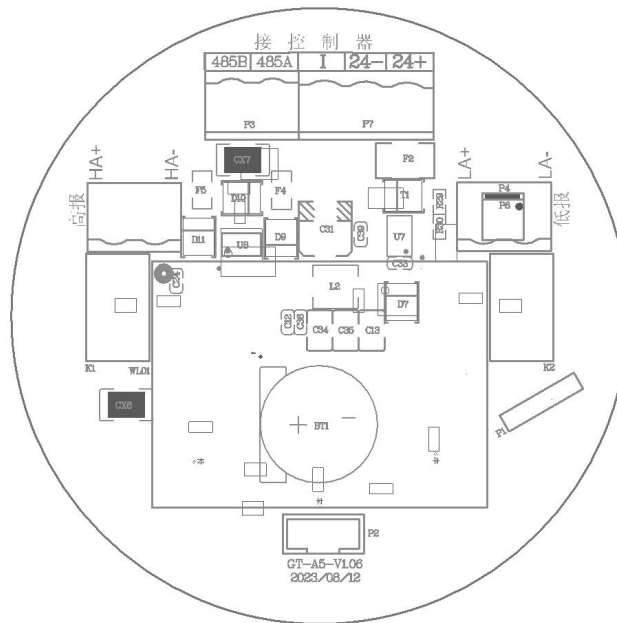
- 2) Connect the detector, so that the detector is fixed in the hole position, and then fix the detector to the ceiling with bolts.

3.3 Connector Wiring

The A002 bus-type detector should be connected using our company's compatible controller products, or alternatively with other RS485 bus-supported devices. However, ensure proper communication protocol compatibility. RS485 signal transmission distance should not exceed 1200 meters. The number of point-type gas detectors that can be connected per RS485 bus depends on the controller model used. It is recommended to thoroughly review the technical specifications of the controller before installation.

The A002 split-line detector can be connected to any split-line controller/PLC/DCS and other equipment, but the parameters such as gas detection range and alarm value should be set.

4 Wiring Instructions



The wiring of A002 multi-gas detector is as follows:

order number	characteristic	function
1	24V+	Positive pole of detector power supply interface
2	24V-	The negative pole of the probe power supply interface
3	I	4~20mA current output
4	485A	RS485A signal line terminal
5	485B	RS485B signal line terminal
6	LA+	Low alarm relay output contact A

7	LA-	Low alarm relay output contact B
8	HA+	High alarm relay output contact A
9	HA-	High alarm relay output contact A

Note: The relay contact capacity is 3A@30VDC, do not overload.



pay attention to:

- 1. Before connecting the detector, the power supply of the detector must be disconnected!**
- 2. The internal or external grounding end of the detector must be reliably grounded.**



take care:

- 1. The seal at the connector must be properly installed to prevent water or dust from entering the detector chamber through the pipe or connector and damaging the detector.**
- 2. When the cable is introduced into the detector housing, it shall be in accordance with the relevant technical requirements in GB3836.1-2021.**

- 1) Rotate counterclockwise to remove the top cover. The components inside the housing can be seen at this point.
- 2) Rotate counterclockwise to remove the pipe fitting and the rubber stopper. Insert the shielded cable through the wiring hole into the housing, sequentially over the pipe fitting and sealing plug. For explosion-proof compliance, retain the explosion-proof plugs in unused wiring holes. All components on the detector housing and internal circuit board must not be discarded carelessly.
- 3) All wiring is connected through terminals within the detector housing. Definitions and electrical specifications of the terminals are detailed in Section 4. Connect wires to corresponding terminals inside the housing according to markings, ensuring correct polarity for power input terminals. The cable's shielding layer should be connected to either the internal grounding terminal or a reliable external ground point.
- 4) After checking that the wiring is correct, if there are excess cables in the housing, they must be wrapped with insulated electrical tape or pulled out. Finally, tighten the pipe joint, press the rubber seal, and wrap the cables. When using explosion-proof hose, it can also be directly connected to this detector.
- 5) After checking that all links are correct, tighten the top cover again.



remarks:

1. The controller and the detector are connected by a four-core shielded cable with an outer diameter of no less than 6mm (the maximum distance between the detector and the host is $\leq 1200\text{m}$).
2. According to the conditions of the detection site, the detector can be installed first and then wired, or the wiring can be connected first and then installed.

5 Start the Machine

After powering on, the detector first performs self-checks: The display screen lights up to verify normal operation, while red, green, and yellow status indicators illuminate to confirm operational parameters. All characters are displayed to test screen functionality. Subsequently, the detector displays its software version (e.g., 1.01) and system settings before entering a countdown preheating phase for sensors. The duration varies by sensor type but typically lasts 120 seconds. During this period, the green status indicator remains active until the countdown reaches zero, after which the detector enters normal operating mode.

5.1 Preheating

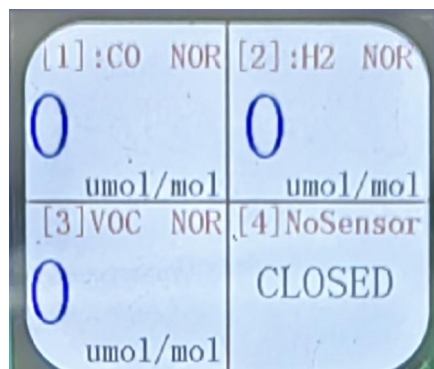
- 1) The detector is powered on and all status indicators are lit for about 1 second to test whether the working status indicators are normal.
- 2) Then the display shows the status information of the machine, and after the information is displayed, the preheating countdown is entered.
- 3) After preheating, the display screen shows the gas concentration and detector status of the surrounding environment, and the corresponding output signal can be transmitted to the controller.

5.2 Detector Working Status

The various states of the detector during operation are as follows:

Running state	Status indicator	LCD display status information	Relay is in the engaged state
Preheat	The green light stays on	Preheat	Low and high relays are disconnected
Normal	The green light flashes once every 1 second	Normal	Low and high relays are disconnected
Low atings ①	The red light is on	Low reporting	Low relay is energized
High alert ②	The red light is on	High reporting	High and low level relay is engaged
Hitch	The lights are on	Hitch	

5.3 The monitoring interface of the detection display screen is as follows:



The following takes the first channel as an example:

1. [1]: The channel number of the sensor to be connected;
2. CO: Name of gas (carbon monoxide);
3. NOR: The status of the sensor for channel modification; PRE is preheating; NOR is normal; FAU is fault; LAR is low alarm; HAR is high alarm
4. umol/mol: the gas unit of the sensor, that is, ppm;%LEL is the percentage of the lower explosive limit of the flammable gas;%VOL is the volume ratio;

6 Menu Operations

6.1 Handheld Remote Control

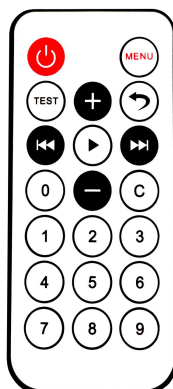


pay attention to :

Do not replace the battery of the remote control or open the instrument in the dangerous area!

The remote control is operated within 1 meter of the detector, and the operating Angle is $\pm 15^\circ$ (based on the center line of the display screen).

If not used for a long time, remove the battery from the remote control.



Key	Function
Set the key	Switch the interface and shift the selection
Return key	Return to the previous step/previous interface
Identify the key	Confirm the current operation
+/- key	Increment 1/ decrement 1
Help key 1	Enter the advanced Settings screen
+/- key	Increment 1/ decrement 1
+10/-10 keys	Add 10/ subtract 10
+100/-100 keys	Add 100/ subtract 100
+1000/-1000 key	Increase by 1000/ decrease by 1000

6.2

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peration

The probe has five user menu options, which are operated by a handheld remote control. The table below lists all menu options and their corresponding functions and descriptions.

Menu	Function	Description
1、	CH1 Settings	Set the sensor module parameters for channel 1
2、	CH2 Settings	Set the sensor module parameters for channel 1
3、	CH3 Settings	Set the sensor module parameters for system channel 1
4、	CH4 Settings	Set the sensor module parameters for channel 1
5、	System Settings	Set the overall general parameters of the equipment

6.3 Low Reporting Settings

Low report setting steps (using channel 1 as an example):

- 1) Under normal detection state, press the setting key of the remote control once, and the detector displays the following interface:



The selected setting items by pressing the "+" and "-" keys are displayed in reverse order (taking the

sensor of setting channel 1 as an example).

2) Press the confirmation key to enter the channel to be set. The display interface of the detector is as follows:

CH1 Settings
1、 Underreporting setting
2、 High reporting settings
3、 Zero-point shift
4、 Span calibration
5、 System Settings

Return Next page

The selected setting items by the "+" and "-" keys are displayed in reverse order as the selected setting items (taking the low report setting as an example),

3) Press the confirm key to enter the item to be set, and the detector display interface is as follows:

CH1 Settings
Underreporting setting
35umol/mol
Return Next page

Adjust the value to be set by pressing the "+" and "-" keys. After adjusting the value, press the "Confirm" key to save it and press the "Return" key to exit.

6.4 Overreporting Settings

The steps for setting up a high report are the same as those for setting up a low report.

6.5 Zero Point Translation



take care:

The zero point shift of the gas detector without the target gas to be measured must be carried out in clean air. For the gas detector containing the target gas to be measured (such as oxygen) in the air, consult the manufacturer or relevant technical personnel before the zero point shift.

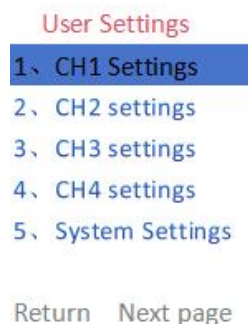
When the detector is used for a period of time or applied to a new environment, its indication in clean air sometimes does not show zero phenomenon, which is called zero drift. Zero drift is generally caused by large changes in environmental temperature and humidity, which can be corrected by zero shift.

Zero-point shift can provide basic calibration for detectors, ensuring their accurate and reliable operation. However, unlike calibration, it cannot correct sensitivity deviations caused by prolonged use. Therefore, this feature should only be used when calibration is impractical. Even after applying zero-point shift, we strongly recommend conducting calibration every six months.

Zero point translation method (taking zero point translation of channel 1 as an example):

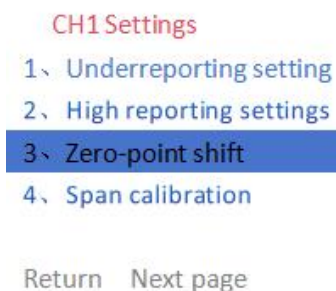
1) After the detector works stably for 10 minutes, put it in a clean air environment. Under normal

detection conditions, press the setting key of the remote control once, and the detector displays the following interface:



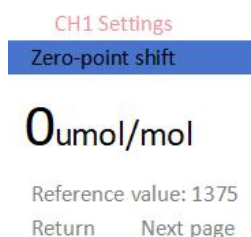
The selected setting items by pressing the "+" and "-" keys are displayed in reverse order (taking the sensor of setting channel 1 as an example).

2) Press the confirmation key to enter the channel to be set, and the detector display interface is as follows:



The selected setting items by the "+" and "-" keys are displayed in reverse order (taking the zero point translation setting of channel 1 as an example).

3) Press the "Confirm" button to enter the zero point translation. The interface is as follows:



The zero point shift must be performed in clean air without the target gas to be measured. The operation must be performed after the sensor aging is completed. The default value is 0 and cannot be adjusted. After the reference value is stable, press the "Confirm" key to save and press the "Return" key to exit.

6.6 Span Calibration (SPAN calibration)

The following is an example of channel 1 span calibration.

1) After the detector works stably for 10 minutes, it is placed in a clean air environment. Under normal detection state, press the setting key of the remote control once, and the detector displays the following interface:

User Settings

- 1、CH1 Settings
- 2、CH2 settings
- 3、CH3 settings
- 4、CH4 settings
- 5、System Settings

Return Next page

The selected setting items by pressing the "+" and "-" keys are displayed in reverse order (taking the sensor of setting channel 1 as an example).

2) Press the confirm key to enter the menu options to be set, and the display interface of the detector is as follows:

CH1 Settings

- 1、Underreporting setting
- 2、High reporting settings
- 3、Zero-point shift
- 4、Span calibration

Return Next page

3) Press the "Confirm" button to enter the span calibration. The interface is as follows:

CH1 Settings

Span calibration

0 umol/mol

Reference value: 1375

Return Next page

Adjust the value to be set by pressing the "+" and "-" keys, then input the standard gas. After the reference value reaction is stable, press the "Confirm" key to save and press the "Return" key to exit.

6.7 System Settings

1) Under normal detection state, press the setting button of the remote control once, and the detector displays the following interface:

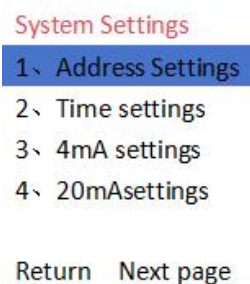
User Settings

- 1、CH1 Settings
- 2、CH2 settings
- 3、CH3 settings
- 4、CH4 settings
- 5、System Settings

Return Next page

The selected setting items by the "+" and "-" keys are displayed in reverse order (taking the user system Settings as an example).

2) After adjusting the reverse display item to the system setting option, press the "Setting" key to enter the user system setting interface, as shown below:



This setting item is only valid for RS485 communication. The gray items are not set items. Press the "Confirm" key to enter the address setting interface as follows:



After adjusting the value to be set by the "+" and "-" keys, press the "Confirm" key to save, and press the "Return" key to exit.

6.8 Detector Gas Calibration

This function is a professional operation item, please consult the distributor for details.



remarks :

If more accurate measurement of gas concentration on site is required, the detector can also be calibrated in factory mode. Please contact your local distributor or manufacturer for specific calibration methods.

7. Replacement of Sensors



pay attention to:

Before replacing the sensor, cut off the power supply of the detector!

When the service life of the sensor expires or the sensor is damaged and cannot be detected normally, please replace the new sensor. When replacing the sensor, you need to cut off the power supply first, but do not open the main shell of the detector, just open the sensor assembly at the bottom of the detector. The replacement steps are as follows:

Sensor replacement steps:

- 1) Rotate counterclockwise to remove the sensor cover;
- 2) Remove the failed sensor;
- 3) Install new sensors.
- 4) Rotate clockwise to install the sensor cover, and the replacement of the sensor is completed.
- 5) After the detector is powered on for 20 minutes, it needs to be calibrated or calibrated according to the instructions.

There are different sensor modules for different gases. When users need to detect other gases, please contact the local distributor to buy the corresponding gas sensor module, and then replace it according to the above method.

8 Troubleshooting Guide



pay attention to :

When the service life of the sensor expires, it should be safely disposed of in accordance with local waste management and environmental regulations from an environmental protection perspective.

Fault Phenomenon	Failure Cause	Process Mode
The detector status is shown as faulty	Wire connection error, broken wire or sensor damage	Redress the wiring or replace the sensor
The indication is not accurate	Sensor drift	Perform a zero-point translation
	The sensor has not been calibrated for a long time	Calibrate the sensor
	The sensor reaches the end of its life	Replace the new sensor
The value in clean air is not zero	Sensor zero drift	Perform zero point translation
No reaction to the gas being tested	The sensor is damaged	Replace the new sensor
	fault	Contact the dealer or manufacturer for repair
Abnormal connection with the controller	Cabling fault	Check the wiring
	fault	Contact the dealer or manufacturer for repair

9 Maintenance Records

Order Number	Failure Cause	Date	Remarks
1			
2			
3			
4			
5			
6			