麦芽传感科技
Maiya Sensor Technology

MST F200 online type gas detector

Product manual



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I. online type gas detector

online type gas detector can be used in 24 hours continuous online monitoring of field gas concentration, 1.7-inch high-definition color screen will be used for the display of the field concentration, with field sound & light alarm (optional) when exceeding the standard, and remote signal transmission. The gas sensors of internationally known brands are adopted, and the main detection principles include: the gas sensors under the principle of electrochemical, infrared, catalytic combustion, thermal conductivity, PID photoionization, and so on.
is suitable for detecting the concentrations of gases in the atmosphere environment in the pipeline or confined space; and the purity of the gas leakage and various high concentration **single gases** with the background gas as nitrogen gas or oxygen gas. The types for detection are more than 500 types. Strong, durable and explosion-proof shell is suitable for the use at a variety of hazardous places and harsh industrial environments, is widely used in the industries such as petroleum, chemical, metallurgy, refining, gas transmission and distribution, biochemical and pharmaceutical, and so on.

II. Product characteristics of online type gas detector

★ **Units can be switched freely**

★ **Diversified communication metho**ds
It is possible for the real-time monitoring via the wired or remote wireless transmission, and network transmission; three-wire system 4 ~ 20mA standard signal and standard bus RS485 (modbus-RTU) simultaneous output; it is possible to select frequency output 200-1000Hz, Hart protocol signal, 1 ~ 5V output, two-wire system 4 ~ 20mA, SMS alarm, wireless transmission (2 ~5 km or unlimited distance); it is compatible with secondary instrument, data acquisition module, PLC, DCS system, and it is possible to drive the related equipment.

★ **Infrared remote control**
Standard configuration includes the infrared remote control, it is possible for one-key operation via infrared remote control function key, which can achieve the operation without opening the cover under hazardous situations, such as: the functions like modification of the alarm point, density calibration, zero-point calibration, noise reduction, restoring the factory setting, and so on.

★ **Rich human-machine interface**
1.7-inch high-definition color screen, display the real-time concentration, and alarm state;

★ **High temperature gas detection (optional)**
The optional high-temperature high-humidity pretreatment system will be possible to detect the smoke gas at high temperatures.

- **Data recovery function; in case of mis-operation, it is possible to select partial or full recovery.**
- **It is possible to set whether to display the maximum value, minimum value or not.**
- **Multiple alarm modes, and multi-directional and three-dimensional indication alarm states.**
  It includes: 2 sets of relay switch output, sound & light alarm (optional configuration), and display screen visual alarm.
  Alarm types include: concentration alarm, and failure alarm.
- **Multiple alarm mode settings: low alarm, high alarm, interval alarm, and weighted average alarm.**
- **Mis-operation recognition function: automatic recognition and prevention of the concentration calibration mis-operation, which is possible to avoid the poor performance that may be caused by human factors.**
- **Zero-point automatic tracking; long-term use will not be affected by the zero drift.**
- **Multi-level calibration for target points, can ensure the linearity and accuracy of the measurements.**
- **Chinese or English interfaces can be selected.**
- **Broad operating temperatures: -40～+70℃, and temperature compensation is supported.**
- **Log recording**
  Record the calibration logs, repair logs, failure history, failure countermeasure solutions, sensor service life due reminder, and function of reminder for the time of next concentration calibration.
- **Intrinsically safe circuit design, explosion-proof, with Level II lightning** protection, and anti-static capabilities. Meet the national standard, and it is resistant to the high-intensity pulse surge current. With the function of preventing the reverse connection. It is compliant with EMI, and EMC standards.

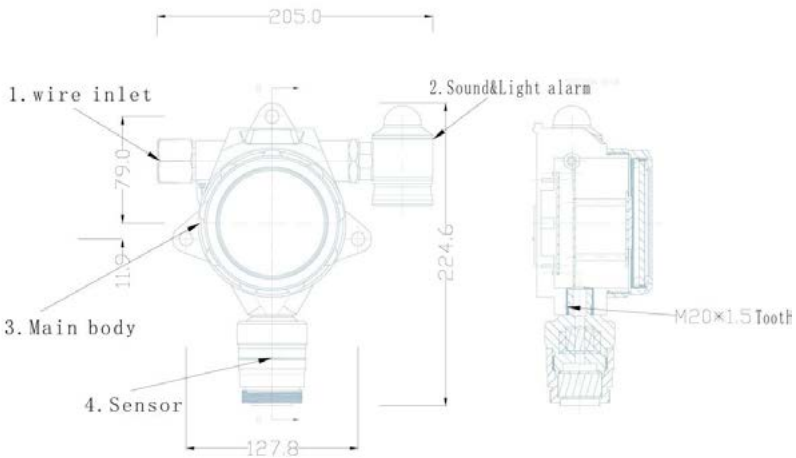
III. Technical parameters of online type gas detector:

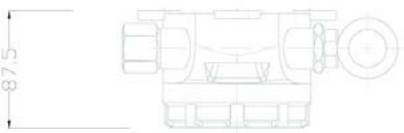
Gases to be detected	Toxic gases, oxygen gas, carbon dioxide, inflammable and explosive gases, TVOC, and so on.				
Application scenarios	All the cases which requires the fixed installation, and online detection of gas concentrations such as petroleum, chemical, pharmaceutical, environmental protection, combustion gas distribution, warehousing, smoke gas analysis, air governance, and so on.				
Detection range	0 ~ 1, 10, 100, 1000, 5000, 50000, 100000ppm, 200 mg/L, 100%LEL, 20%, 50%, 100%Vol, can be selected; and other ranges can be customized.				
Resolution	0.01ppm or 0.001ppm (0 ~ 10 ppm); 0.01ppm (0 ~ 100 ppm), 0.1ppm (0 ~ 1000 ppm), 1ppm (0 ~ 10000 ppm or more),0.01 mg/l (0 ~ 200 mg/l), 0.1% LEL, 0.01%, 0.001% Vol				
Detection principle	Electrochemical, catalytic combustion, infrared, thermal conductivity, PID photoionization, and so on, depending on the type of gas, range, field environment and user demand.				
Sensor service life	Electrochemical principle: 2 ~ 3 years; Oxygen gas: 2 years or 6 years can be selected; infrared principle: 5 ~ 10 years; catalytic combustion: 3 years; thermal conductivity: 5 years.				
Detection accuracy	≤±3%F.S (Higher accuracy level can be customized)				
Linearity	≤±2%	**Repeatability**	≤±2%	**Uncertainty**	≤±2%
Response time	T90≤20 seconds			**Recovery time**	≤30 seconds
Signal output	Bus system RS485 (RTU), three (four) wire system 4 ~ 20mA, optional configuration: 0 ~ 20mA, 1 ~ 5V, 0 ~ 5V, 0 ~ 10V, wireless transmission, network transmission, and SMS alarms.				
Working environment	Temperature: -40 ℃ ~ + 70 ℃ , humidity: ≤10 ~ 95% RH (regular) non-condensing case It should be customized in the case of use in the condensing case, or the use environment should be specified at the time of ordering				
Display method	1.7-inch high-definition color screen for field display, it is possible to select no field display, or the optional configuration of MIC2000 controller for remote display, control, and alarm				
Working voltage	12 ~ 36V DC direct current, the standard power supply for a single equipment is 24V, DC stabilized voltage switching power supply of 1A or greater than 1A				

Power supply reference	The switching power supply of 24V, 2.1A is possible to drive 40 units of toxic gas detector, or 15 units of flammable, infrared gas detector
Working method	Fixed type installation, online detection, diffusion type measurement; and it is possible to select the measurement of pipeline type, flow-through type, and pump-suction type.
Installation method	Pipeline type, and wall mounting type. The working pressure of the pipeline type is ± 30% of atmospheric pressure, and when exceeded this range, it is necessary for the depressurization treatment.
Alarm method	The default option is 1-way, and it is possible to select 2-way passive contact (dry contact) output, level III alarm, and the alarm point can be set. Field sound & light alarm (optional configuration).
Connecting cable	Adopted 4 ~ 20mA three-core shielding cable, adopted four-core for RS485, when the distance exceeded 100 meters, the single wire diameter ≥1.5mm; and the shielding layer will be connected to the earth.
Protection level	IP65
Explosion-proof type	Explosion suppression type
Explosion-proof mark	Ex d IIC T6 Gb
Exterior dimensions	230×152×90mm(L×H×W) 230×210×90mm(L×H×W)include Alarm
Weight	1.8Kg
Standard accessories	Manual, qualification certificate, warranty card, outer packaging box
Optional items	Integrated sound & light alarming device, split-type sound & light alarming device, 24V DC stabilized voltage power supply, **accessory for connection with computer for monitoring**: free upper-level host software, RS485 / RS232 converter, For laptop without RS232 interface, USB / RS232 converting and connecting cable is needed, if the network transmission is needed, TCP / IP converter will be further needed.
Wireless transmission	Optional function is possible to transfer data wirelessly to the cell phone, remote monitoring center, monitoring computers and other monitoring equipment, which will utilize the upper-level host to realize the functions of data analysis, storage, printing or the like on the computer

Pretreatment system	Optional configuration: room temperature and high humidity pre-treatment system, high temperature and high humidity pretreatment system, high temperature and high humidity and high dust pretreatment system
Installation type accessories	Optional configuration: wall mounting bracket, mounting clips for fixation on the pipes (1/2", 3/4" pipe), stainless steel threaded welding seat or flange to be installed on the pipeline (it is necessary to mark the flange or pipe size, such as DN50, DN15 ...), rain cover, 24VDC or 220AC sampling pump (sampling distance is 10 m), vacuum pump (sampling distance is greater than 40 m), 24V switching power supply, pressure reducing valve, flow meters.

IV. Exterior dimensions and installation method





Unit: mm

V. Electrical connection and load characteristics

4-20 mA output: terminal J1 is at the upper left corner of the display screen, marked as “G S V”, V and G are the positive and negative poles of 24V DC power supply, S and G are 4-20 mA output

RS485 output: J8 is RS485 output (terminal J7 can also be used)

Level I alarm output: J4 is marked as “AL Alarm”, NC is normally closed terminal, NO is normally open terminal, COM is the common terminal

Level II alarm output: (optional configuration) J6 is marked as “AH Alarm”

Terminal of sound & light alarming device: if the sound & light alarming device is selected for use, it will be directly inserted into the terminal J5

Connecting terminal of sensor: J2, at the lower left corner of the screen

Remark:

General alarm method: ≥AL alarm &≥AH alarm (default setting, O2 and N2 are excluded)

Interval alarm method: ≤AL alarm &≥AH alarm (default setting of O2 and N2)

Linkage alarm mode: when AH alarms, AL will also have the alarm output (default setting)

Independent alarm mode: when AH alarms, AL will have no alarm output

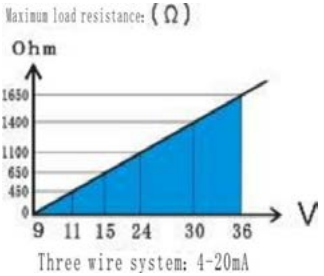
AL alarm output: default terminal J4 (common terminal COM, normally open NO, normally closed NC)

AH alarm output: default terminal J6 (common terminal COM, normally open NO)

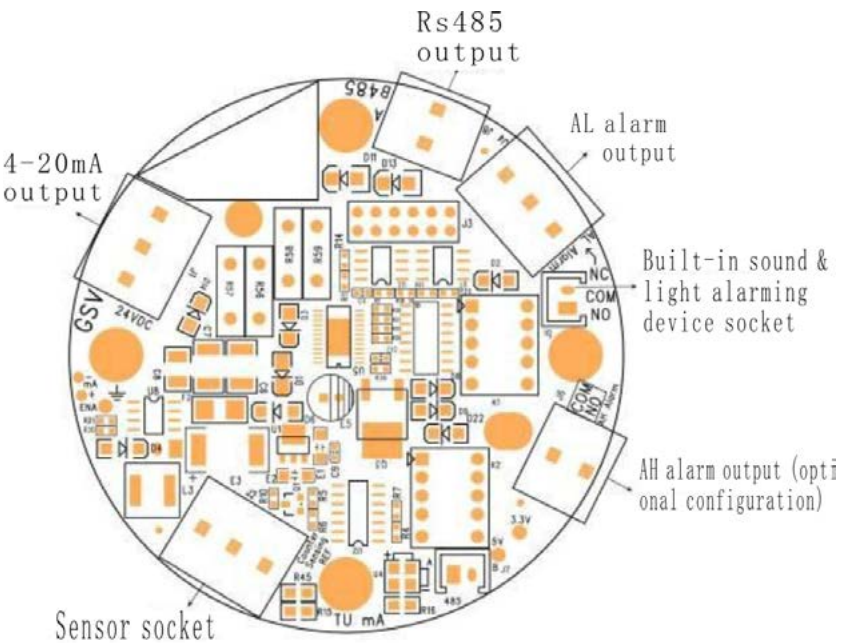
Sound & light alarm output: terminal J5, the default alarm values are same as AL, AH alarm values. (Common terminal COM, normally open NO)

For the specific setting method of alarm values, alarm method, alarm mode, and alarm output, please refer to: alarm setting of the Section 9.5 (page No. 14)

Load capacity: as shown in the right figureBased on the load capacity in the right figure, the impedance of the transmission linewill be calculated, so as to determine the specification of the wire material.General case: based on 1000 m as the transmission distance, for the toxic gases, it will be necessary to use three-core shielding cable with the diameter at 1.0 mm², and for the combustible gases, it will be necessary to use three-core shielding cable with the diameter at 1.5 mm².



VI. Product position reference diagram:



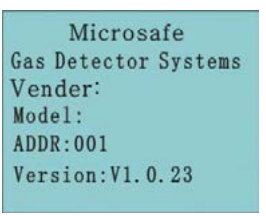
VII. Key definitions and operation instructions

MENU/ESC key: menu key, and return key. Enter and exit the menu; press it for one time at the time of alarm, it will function as muting, after muted, press the (POWER) key for one time to cancel the mute state
OK key: confirmation key
← key: direction key, movement of the cursor to the left will play the role of position shift at the time of modifying the number
→ key: direction key, movement of the cursor to the right will adjust the numerical value at the time of changing the value and turn to the next page

Enter the menu setting: press the “MENU / ESC” key for one time to enter the menu
Exit menu setting: press the “MENU / ESC” key for one time to exit the menu
Quick zero-point calibration: in the test interface, long press ← key for 5 seconds, and “YES” will be displayed at the lower left corner of the “Calibration Successful” screen
Quick target-point calibration: in the test interface, long press → key for 5 seconds, and “YES” will be displayed at the lower left corner of the “Calibration Successful” screen
(What will be calibrated is the level I concentration value, and it is necessary to introduce the gas so that the calibration can be successful)

VIII. Explanation about startup

At the time of startup, the address number and the software
versions of this unit of equipment will be displayed



Display the time which is needed for startup self-check and sensor preheating



After the countdown was finished, enter the test screen



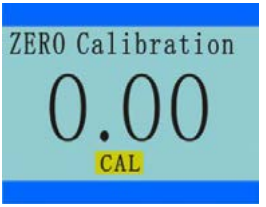
IX. Menu operation instructions

9.1 Operation instructions of zero-point calibration

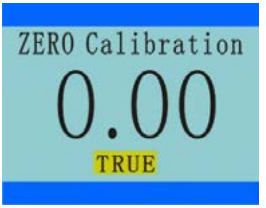
Only when the sensor had relatively large zero-point drift, or it is needed to preciselydetect very low concentrations, the operation of zero-point calibration will be carried out. In the test interface, press "MENU/ESC" key for one time to enter the menu, use"←" key and "→" key to select the menu of "Zero-point calibration", as shown in the figure:



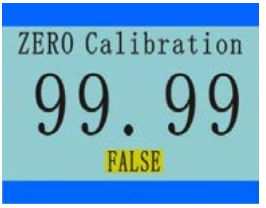
Press "OK" key to enter the interface of zero-point calibration:



Press "OK" key again to carry out zero-point calibration, after the calibration succeeded, it will display: the statement of "Calibration is successful"

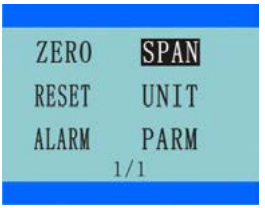


If the calibration did not succeed, it will display: the statement of Calibration failed"

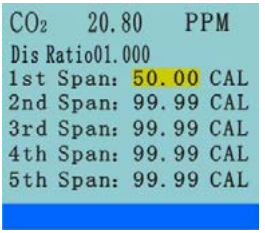


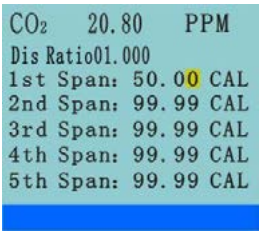
9.2 Operation instructions of concentration calibration

The deviation of the concentration which was detected out by the instrument from the standard gas concentration can be corrected by calibrating the concentration or changing the display coefficients.
In the test interface, press "MENU/ESC" key for one time to enter the menu, use"←" key and "→" key to select the menu of "Concentration Calibration",

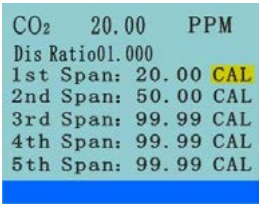


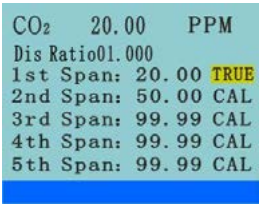
press "OK" key to enter the interface of Concentration Calibration: as shown in the figure:
By default, the cursor will appear at the position of Level I concentration, press "OK" key and then use "←" key and "→" key to modify the concentration values of respective levels, after finished the modification, press "OK" key to save; then, introduce the standard gas or the gas to be measured,





move the cursor to the "calibration" position, and then press "OK" key for calibration, if successful, it will display the statement of "Success", if unsuccessful, it will display the statement of "Failure"
Precautions:
Normally, calibration of Level I concentration will be enough to meet the accuracy requirements. After the concentration value to be calibrated or the concentration value of the standard gas was preset, and then the gas to be detected was introduced at 500 ml / min for 30 seconds,
the calibration will be performed.



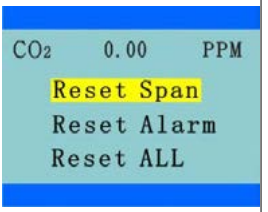


Rules for setting calibration concentration values of three levels:
Level I concentration value < Level II concentration value < Level III concentration value
Concentration calibration sequence for three levels:
Level I concentration calibration →Level II concentration calibration →Level III concentration calibration

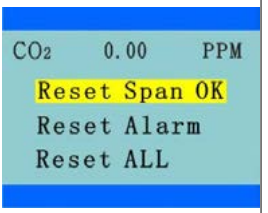
9.3 Operation instructions of Restoring the factory setting

In the test interface, press "MENU/ESC" key for one time to enter the menu, use"←" key and "→" key to select the menu of "Restoring the factory setting", press "OK" key to enter the interface of Restoring the factory setting: as shown in the figure: It is possible to select "Restore the concentration", "Restore the alarm", "Fully restore" and then press "OK" key to restore; if restoring is successful, it will display the statement of "Success"; if unsuccessful, it will display the statement of "Failure"





At the time of setting error or inaccurate detection of the concentration, it is required to carry out the operation of restoring the factory setting; if it is poor performance which was caused by human factors, it will be possible to restore, the parameters which are possible to restore the factory setting include: zero-point calibration, concentration calibration values, alarm values, alarm method, alarm mode, and maximum range.

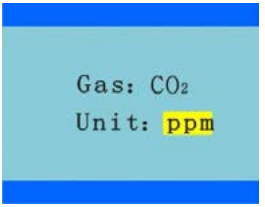


9.4 Operation instructions of unit setting

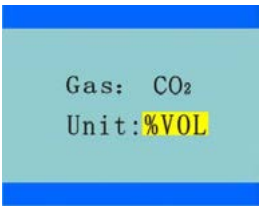
In the test interface, press "MENU/ESC" key for one time to enter the menu, use"←" key and "→" key to select the
menu of "Unit Setting",
press "OK" key to enter the interface of Unit Setting: as shown in the figure:

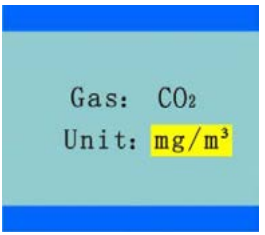


Press "OK" key to switch



Automatic conversion between various units, and the units which may be switched include:
ppm, Vol%, LEL%, ppb, pphm,
mg / m3, mg / L



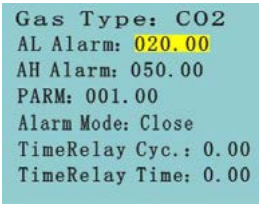


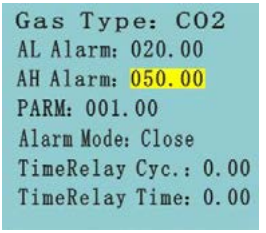
9.5 Operation instructions of alarm setting

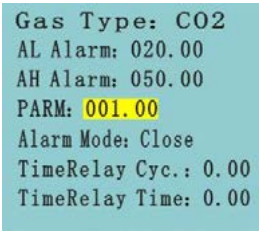
In the test interface, press "MENU/ESC" key for one time to enter the menu, use"←" key and "→" key to select the menu of "Alarm Setting",
press "OK" key to enter the interface of Unit Setting: as shown in the figure:it is possible to use "OK" key and "←" key and "→" key to modify.

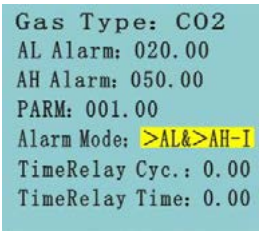


Gas: it will display the name of the gas of the current channelLow alarm limit value: that is the Level I alarm value, and it can be modified;
High alarm limit value: that is the Level II alarm value, and it can be modified; Alarm hysteresis: that is the alarm return difference; if it is set as 0, as long as the value reaches the set value of alarm, the alarm will be activated immediately;
if it is not desired to have frequent occurrence of alarming at the critical point of the set value of alarm, then, the alarm hysteresis should be set to a certain value Alarm mode: the default setting of O2 and N2 is <AL&>
AH alarm; the default setting of other gases is>AL&> AH alarm,and it is possible to modify or set to "Turn off alarm"Alarm method: regular linkage, when value is greaterthan AH alarm value, ALwill also alarm, and link to the relay output (default setting)regular independence, when value is greater than AH, AL will not alarm,there will be no linked relay output, and only AH has linked outputThe default settings of O2 and N2 are interval linkage, and it is possible to set the interval independence







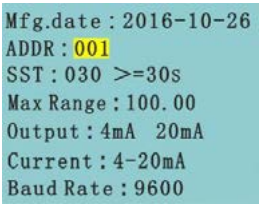


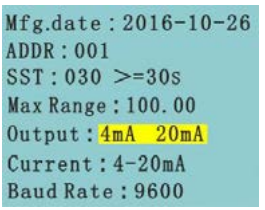
9.6 Operation instructions of system parameters

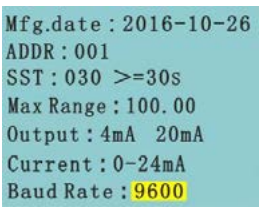
In the test interface, press "MENU/ESC" key for one time to enter menu, use"←" key and "→" key to select the menu of "System Parameters",p



Software version: it displays the current software versionTime when left the factory: it displays the time when this unit of equipment left the factory
Device address: it displays the device address number of this unit of equipment, it is possible to be modified to be 1 ~ 255 according to the need; at the time of erforming RS485 communicationor being connected to the computer for communication, it is necessary to ensure that the address number of each device is not same, and number skip ping communication is supportedPreheating time: the warm-up time which is required by the sensor after startupMaximum range: the maximum range of the gas concentration which can be measured by this unit of equipment,different sensors have different maximum ranges, which had been set up already when the instrument left the factory; no need to set up, and if modification is needed, please contact the manufa cturerElectric current range: the default is 4-20mA as output, andit can beset to 0 ~ 20mA, 0 ~ 24mA, 4 ~ 24mA according to the needBaud rate: the default is 9600, which can be set to4800, 19200, 38400 according to need







X. Common failures and countermeasure solutions

Failure 1: it is not possible to detect when the concentration is low
Countermeasure solutions:

1. In the case of the pump-suction type measurement, first, check whether the pump is working or not; when the pump is working properly, there is slight vibration, and if the finger is used to block the gas inlet for 5 seconds, it is possible to feel the obvious suction force. And then, check whether the gas inlet is clogged or not, or whether the gas leakage and no suction force were caused by the poor sealing of the connection joint or not.
2. **Introduce the nitrogen gas for the zero-point calibration or carry out the zero-point calibration in the clean air, and after the calibration is finished, carry out the detection immediately.**

3. If it was still impossible to detect out the gas to be measured after the zero-point calibration, then it is necessary to conduct the operation of **Restoring the factory setting.**
4. If it is still impossible to detect out after restored the factory setting, then it will be necessary to introduce the nitrogen gas again, or carry out the zero-point calibration in clean air again, after the calibration is finished, carry out the detection immediately.
5. Check whether the connection cable of the sensor has been damaged by human factors or there was poor contact.
6. If it is still not possible to detect out after the above mentioned four steps are done, then, it will be necessary to check whether the gas to be measured exist or not on the spot, or whether the concentration of the detected gas is very low indeed; if it is lower than the minimum detection limit value of the instrument, it will not be possible for the detection.

Failure 2: there is no gas to be detected in the air, but the value fluctuates greatly or bounces wildly

Countermeasure solutions:

1. In general, it belongs to the normal range if the short-term fluctuation range of zero point is less than 1% of the maximum range; under the situation without the presence of the gas to be measured, it belongs to the normal range if the long-term drift is less than 2% of the maximum range; if exceeded this range, it is necessary to check whether the gas to be measured exists or not on the spot, or the great fluctuations of air temperature and humidity resulted in the instability of the numerical values, and in general cases, the great fluctuations in temperature and humidity may cause the great fluctuations of the numerical values of the measurement by the instrument in a short period of time; after the air the temperature and humidity became constant, the numerical values will become relatively stable too.
2. Verify whether the zero-point calibration or target point calibration was carried out for the instrument or not; if the zero-point calibration was carried out in the case when the gas to be measured existed, it might be impossible to detect out the gases at low concentrations; if the target point calibration was carried out in the case when the gas to be measured existed, but the concentration value after calibrated did not match the actual concentration value, it might cause that the fluctuation of the numerical values of the instrument is very great, or the numerical values which are measured is relatively small; for these 2 cases, it is possible to be solved through the operation of **Restoring the factory setting.**
3. If the problem still could not be solved after restored the factory setting, it will be necessary to check whether the power of the detector power supply is enough or not; never use a transformer to supply power to the instrument, and it is the best to use DC stabilized voltage power supply or switching power supply as the power supply,

and the power should be greater than 24V, 1A (power supply to a single equipment), and multiple units of equipment will require greater power; pay attention to that the power wire diameter should not be too small, the wire diameter for the short-range power supply to a single equipment is best to be greater than 0.75 mm^2.

4. Check whether the wiring of the signal transmission line passed the places that may cause the electromagnetic field changes or not, such as powerful fans, motors, inverters, and so on; try best to avoid strong electrical and electromagnetic fields, adopt shielding wire as the signal transmission line; one end of the shielding layer should be connected to the shell of the instrument, and the other end should be connected to the earth, and ensure that the electrical grounding is good.
5. If the problem still could not be solved, it will be necessary to verify whether the gases of high concentrations had been introduced or the gases of high concentrations had impacted the sensor; if the sensor had been impacted, after 24 hours of aging through connecting the power supply to the instrument, the numerical values are till instable, the sensor may be damaged due to the impact.

Failure 3: detection result is inaccurate

Countermeasure solutions:

1. Check whether the gas concentration on the spot is accurate or not; sometimes the difference between the theoretical value and the actual value is great, the best method is to verify the accuracy of the instrument by the introduction of the standard gases, or send to a third party metrology authority for checking.
2. If the use time of the sensor was too long, there might be some errors of the measurement values, and it will be necessary to check with the manufacturer whether it is still possible or not to continue using the sensor; if the sensor itself has almost been close to the service life, even at the moment after the calibration, it can be used normally, soon, it will become not possible to work properly again, so, it is recommended to replace the sensor.

Failure 4: the alarm is activated even when the numerical value was 0 or the alarm value in the air had not been reached

Countermeasure solutions:

1. Check whether the alarm has been modified or not.
2. Check whether the alarm method, alarm mode had been modified or not.
3. Check whether the alarm status is the concentration alarm or the failure alarm, the concentration alarm will display the words of AL or AH, and the red indicator light may flash, the failure alarm will light yellow.
4. If the alarm is caused by the man-made modifications, it can be resolved by restoring to the factory settings; and the failure alarm requires further checking about whether it is caused by the short circuit, open circuit, poor contact, sensor failure, and so on or not, or, deliver it back to the manufacturer for checking.

Failure 5: it is not possible to communicate with the computer

Countermeasure solutions:

1. Check the equipment address, the address which was set in the communication software must be same as the equipment address of the instrument.
2. Check the wiring of RS485 / RS232 converter; in general, TR+ should be connected to terminal A of RS485, TR- should be connected to terminal B of RS485; meanwhile, at computer hardware - Device Manager - Ports, check whether the serial port corresponding to RS485 / RS232 converter is connected or not. For device with USB interface, it is also required to check whether the serial port is connected or not.
3. Check whether there is any duplicate address number for the device address of the upper level computer software or instrument or not, and there should be no duplicate address number.

XI. Equipment maintenance

During the normal use of the detector, the valid service life of the most sensors is 24-36 months. Within the valid service life, one time of periodic sensor calibration should be performed every 6 months or 1 year, so as to ensure the accuracy and effectiveness of the gas detection function. The sensors which exceeded the valid service life and had failures must be replaced.

11.1 Sensor replacement

After the sensor failure appears, please deliver the instrument back to the manufacturer for replacement and recalibration.

11.2 Sensor calibration

Please refer to the detailed description in 9.1 and 9.2 of the Section 9 for details. Never operate when the standard gas is not ready. **At the time of mis-operation, it is necessary to restore the factory setting through the operations of the section 9.3.**

XII. Precautions

- It is prohibited for the live operation with the cover opened in the field.
- It is prohibited for the live replacement of the sensor without disconnecting the power supply.
- The operations such as installation, debugging, setting up and so on must be conducted by professionals.
- The calibration checking of the detector should be carried out regularly.
- The sensors which exceeded the valid service life and had failures must be replaced timely.
- Avoid using the gases higher than the measurement range to impact the sensor.

XIII. Technical performance and parameters

Main technical specifications

Gases to be detected	Range	Allowable error	Minimum reading	Response time T90
Combustible gas (EX)	0-100%LEL	＜±2%(F.S)	0.1%LEL	≤10 seconds
Combustible gas (EX)	0-100%Vol	＜±2%(F.S)	0.1%Vol	≤10 seconds
Methane (CH_4)	0-100%LEL	＜±2%(F.S)	0.1%LEL	≤10 seconds
Methane (CH_4)	0-100%Vol	＜±2%(F.S)	0.1%Vol	≤10 seconds
Oxygen gas (O_2)	0-30%Vol	＜±2%(F.S)	0.01%Vol	≤10 seconds
Oxygen gas (O_2)	0-100%Vol	＜±2%(F.S)	0.01%Vol	≤10 seconds
Oxygen gas (O_2)	0-5000ppm	＜±2%(F.S)	1ppm	≤30 seconds
Nitrogen gas (N_2)	0-100%Vol	＜±2%(F.S)	0.01%Vol	≤10 seconds
Carbon monoxide (CO)	0-100ppm	＜±2%(F.S)	0.1ppm	≤25 seconds
Carbon monoxide (CO)	0-1000ppm	＜±2%(F.S)	0.1ppm	≤25 seconds
Carbon monoxide (CO)	0-2000ppm	＜±2%(F.S)	0.1ppm	≤25 seconds
Carbon monoxide (CO)	0-20000ppm	＜±2%(F.S)	1ppm	≤25 seconds
Carbon monoxide (CO)	0-100000ppm	＜±2%(F.S)	1ppm	≤25 seconds
Carbon dioxide (CO_2)	0-500ppm	＜±2%(F.S)	1ppm	≤20 seconds
Carbon dioxide (CO_2)	0-2000ppm	＜±2%(F.S)	1ppm	≤20 seconds
Carbon dioxide (CO_2)	0-5000ppm	＜±2%(F.S)	1ppm	≤20 seconds

Gases to be detected	Range	Allowable error	Minimum reading	Response time T90
Carbon dioxide (CO_2)	0-50000ppm	＜±2%(F.S)	1ppm	≤30 seconds
Carbon dioxide (CO_2)	0-20%Vol	＜±2%(F.S)	0.01%Vol	≤30 seconds
Carbon dioxide (CO_2)	0-100%Vol	＜±2%(F.S)	0.01%Vol	≤30 seconds
Formaldehyde (CH_2O)	0-10ppm	＜±2%(F.S)	0.001ppm	≤30 seconds
Formaldehyde (CH_2O)	0-10ppm	＜±2%(F.S)	0.01ppm	≤30 seconds
Formaldehyde (CH_2O)	0-100ppm	＜±2%(F.S)	0.01ppm	≤30 seconds
Formaldehyde (CH_2O)	0-5000ppm	＜±2%(F.S)	1ppm	≤50 seconds
Ozone (O_3)	0-1ppm	＜±2%(F.S)	0.001ppm	≤20 seconds
Ozone (O_3)	0-5ppm	＜±2%(F.S)	0.001ppm	≤20 seconds
Ozone (O_3)	0-50ppm	＜±2%(F.S)	0.01ppm	≤20 seconds
Ozone (O_3)	0-100ppm	＜±2%(F.S)	0.01ppm	≤20 seconds
Ozone (O_3)	0-2000ppm	＜±2%(F.S)	0.1ppm	≤30 seconds
Ozone (O_3)	0-30000ppm	＜±2%(F.S)	1ppm	≤30 seconds
Ozone (O_3)	0-20mg/L	＜±2%(F.S)	0.01mg/L	≤30 seconds
Ozone water (O_3)	0-20mg/L	＜±2%(F.S)	0.01mg/L	≤30 seconds
Hydrogen sulfide (H_2S)	0-10ppm	＜±2%(F.S)	0.001ppm	≤30 seconds
Hydrogen sulfide (H_2S)	0-50ppm	＜±2%(F.S)	0.01ppm	≤30 seconds
Hydrogen sulfide (H_2S)	0-100ppm	＜±2%(F.S)	0.01ppm	≤30 seconds
Hydrogen sulfide (H_2S)	0-2000ppm	＜±2%(F.S)	0.1ppm	≤30 seconds
Hydrogen sulfide (H_2S)	0-10000ppm	＜±2%(F.S)	1ppm	≤45 seconds
Sulfur dioxide (SO_2)	0-10ppm	＜±2%(F.S)	0.001ppm	≤30 seconds
Sulfur dioxide (SO_2)	0-20ppm	＜±2%(F.S)	0.01ppm	≤30 seconds
Sulfur dioxide (SO_2)	0-100ppm	＜±2%(F.S)	0.01ppm	≤30 seconds
Sulfur dioxide (SO_2)	0-500ppm	＜±2%(F.S)	0.1ppm	≤30 seconds
Sulfur dioxide (SO_2)	0-2000ppm	＜±2%(F.S)	0.1ppm	≤30 seconds
Sulfur dioxide (SO_2)	0-10000ppm	＜±2%(F.S)	1ppm	≤30 seconds
Nitric oxide (NO)	0-10ppm	＜±2%(F.S)	0.001ppm	≤30 seconds
Nitric oxide (NO)	0-100ppm	＜±2%(F.S)	0.01ppm	≤30 seconds
Nitric oxide (NO)	0-2000ppm	＜±2%(F.S)	0.1ppm	≤30 seconds
Nitric oxide (NO)	0-5000ppm	＜±2%(F.S)	1ppm	≤30 seconds
Nitrogen dioxide (NO_2)	0-10ppm	＜±2%(F.S)	0.001ppm	≤25 seconds

Gases to be detected	Range	Allowable error	Minimum reading	Response time T90
Nitrogen dioxide (NO_2)	0-100ppm	＜±2%(F.S)	0.01ppm	≤25 seconds
Nitrogen dioxide (NO_2)	0-1000ppm	＜±2%(F.S)	0.1ppm	≤30 seconds
Nitrogen dioxide (NO_2)	0-5000ppm	＜±2%(F.S)	1ppm	≤30 seconds
Nitrogen oxide (NO_X)	0-10ppm	＜±2%(F.S)	0.001ppm	≤30 seconds
Nitrogen oxide (NO_X)	0-100ppm	＜±2%(F.S)	0.01ppm	≤30 seconds
Nitrogen oxide (NO_X)	0-2000ppm	＜±2%(F.S)	0.1ppm	≤30 seconds
Nitrogen oxide (NO_X)	0-5000ppm	＜±2%(F.S)	1ppm	≤30 seconds
Chlorine gas (CL_2)	0-10ppm	＜±2%(F.S)	0.001ppm	≤30 seconds
Chlorine gas (CL_2)	0-20ppm	＜±2%(F.S)	0.01ppm	≤30 seconds
Chlorine gas (CL_2)	0-200ppm	＜±2%(F.S)	0.1ppm	≤30 seconds
Chlorine gas (CL_2)	0-2000ppm	＜±2%(F.S)	0.1ppm	≤30 seconds
Ammonia gas (NH_3)	0-50ppm	＜±2%(F.S)	0.01ppm	≤30 seconds
Ammonia gas (NH_3)	0-100ppm	＜±2%(F.S)	0.01ppm	≤30 seconds
Ammonia gas (NH_3)	0-1000ppm	＜±2%(F.S)	0.1ppm	≤30 seconds
Ammonia gas (NH_3)	0-5000ppm	＜±2%(F.S)	1ppm	≤30 seconds
Ammonia gas (NH_3)	0-100%LEL	＜±2%(F.S)	0.1%LEL	≤10 seconds
Hydrogen gas (H_2)	0-100%LEL	＜±2%(F.S)	0.1%LEL	≤10 seconds
Hydrogen gas (H_2)	0-1000ppm	＜±2%(F.S)	0.1ppm	≤30 seconds
Hydrogen gas (H_2)	0-20000ppm	＜±2%(F.S)	1ppm	≤30 seconds
Hydrogen gas (H_2)	0-40000ppm	＜±2%(F.S)	1ppm	≤30 seconds
Hydrogen gas (H_2)	0-100%Vol	＜±2%(F.S)	0.01%Vol	≤20 seconds
Helium gas (He)	0-100%Vol	＜±2%(F.S)	0.01%Vol	≤20 seconds
Argon gas (Ar)	0-100%Vol	＜±2%(F.S)	0.01%Vol	≤20 seconds
Xenon gas (Xe)	0-100%Vol	＜±2%(F.S)	0.01%Vol	≤20 seconds
Hydrogen cyanide (HCN)	0-30ppm	＜±2%(F.S)	0.01ppm	≤30 seconds
Hydrogen cyanide (HCN)	0-100ppm	＜±2%(F.S)	0.01ppm	≤30 seconds
Hydrogen chloride (HCL)	0-20ppm	＜±2%(F.S)	0.01ppm	≤30 seconds
Hydrogen chloride (HCL)	0-200ppm	＜±2%(F.S)	0.1ppm	≤30 seconds
Phosphorus hydride (PH_3)	0-5 ppm	＜±2%(F.S)	0.001ppm	≤30 seconds
Phosphorus hydride (PH_3)	0-25 ppm	＜±2%(F.S)	0.01ppm	≤30 seconds
Phosphorus hydride (PH_3)	0-2000 ppm	＜±2%(F.S)	1ppm	≤30 seconds

Gases to be detected	Range	Allowable error	Minimum reading	Response time T90
Chlorine dioxide ($CL O_2$)	0-1ppm	＜±2%(F.S)	0.001ppm	≤30 seconds
Chlorine dioxide ($CL O_2$)	0-10ppm	＜±2%(F.S)	0.01ppm	≤30 seconds
Chlorine dioxide ($CL O_2$)	0-200ppm	＜±2%(F.S)	0.01ppm	≤30 seconds
Ethylene oxide (ETO)	0-100ppm	＜±2%(F.S)	0.01ppm	≤30 seconds
Ethylene oxide (ETO)	0-1000ppm	＜±2%(F.S)	0.1ppm	≤30 seconds
Ethylene oxide (ETO)	0-100%LEL	＜±2%(F.S)	1%LEL	≤30 seconds
Phosgene ($COCL_2$)	0-1ppm	＜±2%(F.S)	0.001ppm	≤20 seconds
Phosgene ($COCL_2$)	0-50ppm	＜±2%(F.S)	0.01ppm	≤20 seconds
Silane (SiH_4)	0-1ppm	＜±2%(F.S)	0.001ppm	≤30 seconds
Silane (SiH_4)	0-50ppm	＜±2%(F.S)	0.01ppm	≤30 seconds
Fluorine gas (F_2)	0-1ppm	＜±2%(F.S)	0.001ppm	≤30 seconds
Fluorine gas (F_2)	0-10ppm	＜±2%(F.S)	0.01ppm	≤30 seconds
Fluorine gas (F_2)	0-50ppm	＜±2%(F.S)	0.01ppm	≤30 seconds
Hydrogen fluoride (HF)	0-10ppm	＜±2%(F.S)	0.01ppm	≤30 seconds
Hydrogen fluoride (HF)	0-50ppm	＜±2%(F.S)	0.01ppm	≤30 seconds
Hydrogen bromide (HBr)	0-50ppm	＜±2%(F.S)	0.01ppm	≤30 seconds
Diborane (B_2H_6)	0-10ppm	＜±2%(F.S)	0.001ppm	≤30 seconds
Arseniuretted hydrogen (AsH_3)	0-1ppm	＜±2%(F.S)	0.001ppm	≤30 seconds
Arseniuretted hydrogen (AsH_3)	0-10ppm	＜±2%(F.S)	0.01ppm	≤30 seconds
Arseniuretted hydrogen (AsH_3)	0-50ppm	＜±2%(F.S)	0.01ppm	≤30 seconds
Germane (GeH_4)	0-2ppm	＜±2%(F.S)	0.001ppm	≤30 seconds
Germane (GeH_4)	0-20ppm	＜±2%(F.S)	0.01ppm	≤30 seconds
Hydrazine (N_2H_4)	0-1ppm	＜±2%(F.S)	0.001ppm	≤30 seconds
Hydrazine (N_2H_4)	0-300ppm	＜±2%(F.S)	0.1ppm	≤30 seconds
Tetrahydrothiophene (THT)	0-100mg/m3	＜±2%(F.S)	0.01 mg/m3	≤60 seconds
Bromine gas (Br_2)	0-10ppm	＜±2%(F.S)	0.001ppm	≤30 seconds
Bromine gas (Br_2)	0-100ppm	＜±2%(F.S)	0.01ppm	≤30 seconds
Bromine gas (Br_2)	0-2000ppm	＜±2%(F.S)	1ppm	≤30 seconds
Ethyne ($C_2 H_2$)	0-100%LEL	＜±2%(F.S)	0.1%LEL	≤30 seconds

Gases to be detected	Range	Allowable error	Minimum reading	Response time T90
Ethyne (C_2H_2)	0-100ppm	＜±2%(F.S)	0.01ppm	≤30 seconds
Ethyne (C_2H_2)	0-1000ppm	＜±2%(F.S)	0.1ppm	≤30 seconds
Ethylene (C_2H_4)	0-100%LEL	＜±2%(F.S)	0.1%LEL	≤30 seconds
Ethylene (C_2H_4)	0-100ppm	＜±2%(F.S)	0.01ppm	≤30 seconds
Ethylene (C_2H_4)	0-2000ppm	＜±2%(F.S)	0.1ppm	≤30 seconds
Acetaldehyde	0-10ppm	＜±2%(F.S)	0.01ppm	≤30 seconds
Ethanol (C_2H_6O)	0-100ppm	＜±2%(F.S)	0.01ppm	≤30 seconds
Ethanol (C_2H_6O)	0-2000ppm	＜±2%(F.S)	1ppm	≤30 seconds
Methanol (CH_4O)	0-100ppm	＜±2%(F.S)	0.01ppm	≤30 seconds
Methanol (CH_4O)	0-2000ppm	＜±2%(F.S)	1ppm	≤30 seconds
Carbon disulfide (CS_2)	0-50ppm	＜±2%(F.S)	0.01ppm	≤30 seconds
Carbon disulfide (CS_2)	0-5000ppm	＜±2%(F.S)	0.01ppm	≤30 seconds
Acrylonitrile (C_3H_3N)	0-50ppm	＜±2%(F.S)	0.01ppm	≤30 seconds
Acrylonitrile (C_3H_3N)	0-2000ppm	＜±2%(F.S)	1ppm	≤30 seconds
Methylamine (CH_5N)	0-50ppm	＜±2%(F.S)	0.01ppm	≤30 seconds
Iodine gas (I_2)	0-50ppm	＜±2%(F.S)	0.01ppm	≤30 seconds
Styrene (C_8H_8)	0-200ppm	＜±2%(F.S)	0.1ppm	≤30 seconds
Styrene (C_8H_8)	0-5000ppm	＜±2%(F.S)	1ppm	≤30 seconds
Chloroethylene (C_2H_3CL)	0-100ppm	＜±2%(F.S)	0.01ppm	≤30 seconds
Trichloroethylene (C_2HCL_3)	0-100ppm	＜±2%(F.S)	0.01ppm	≤30 seconds
Tetrachlorethylene (C_2CL_4)	0-100ppm	＜±2%(F.S)	0.01ppm	≤30 seconds
Laughing gas (N_2O)	0-100ppm	＜±2%(F.S)	0.01ppm	≤30 seconds
Nitrogen trifluoride (NF_3)	0-100ppm	＜±2%(F.S)	0.01ppm	≤30 seconds
Hydrogen peroxide (H_2O_2)	0-100ppm	＜±2%(F.S)	0.01ppm	≤30 seconds
Methyl bromide (CH_3Br)	0-100ppm	＜±2%(F.S)	0.01ppm	≤30 seconds
Methyl bromide (CH_3Br)	0-30000ppm	＜±2%(F.S)	1ppm	≤30 seconds
Methyl bromide (CH_3Br)	0-200g/m3	＜±2%(F.S)	0.1g/m3	≤30 seconds
Sulfuryl fluoride (SO_2F_2)	0-100ppm	＜±2%(F.S)	0.01ppm	≤30 seconds
Sulfuryl fluoride (SO_2F_2)	0-5000ppm	＜±2%(F.S)	1ppm	≤30 seconds
Sulfuryl fluoride (SO_2F_2)	0-10000ppm	＜±2%(F.S)	1ppm	≤30 seconds

Gases to be detected	Range	Allowable error	Minimum reading	Response time T90
Benzene (C_6H_6)	0-10ppm	＜±2%(F.S)	0.01ppm	≤30 seconds
Benzene (C_6H_6)	0-100ppm	＜±2%(F.S)	0.01ppm	≤30 seconds
Benzene (C_6H_6)	0-2000ppm	＜±2%(F.S)	1ppm	≤30 seconds
Benzene (C_6H_6)	0-20000ppm	＜±2%(F.S)	1ppm	≤30 seconds
Methylbenzene (C_7H_8)	0-10ppm	＜±2%(F.S)	0.01ppm	≤30 seconds
Methylbenzene (C_7H_8)	0-100ppm	＜±2%(F.S)	0.01ppm	≤30 seconds
Methylbenzene (C_7H_8)	0-2000ppm	＜±2%(F.S)	0.1ppm	≤30 seconds
Methylbenzene (C_7H_8)	0-20000ppm	＜±2%(F.S)	1ppm	≤30 seconds
Dimethylbenzene (C_8H_{10})	0-10ppm	＜±2%(F.S)	0.01ppm	≤30 seconds
Dimethylbenzene (C_8H_{10})	0-100ppm	＜±2%(F.S)	0.01ppm	≤30 seconds
Dimethylbenzene (C_8H_{10})	0-2000ppm	＜±2%(F.S)	0.1ppm	≤30 seconds
Dimethylbenzene (C_8H_{10})	0-20000ppm	＜±2%(F.S)	1ppm	≤30 seconds
Total Volatile Organic Compound gases (TVOC)	0-10ppm	＜±2%(F.S)	0.001ppm	≤30 seconds
Total Volatile Organic Compound gases (TVOC)	0-10ppm	＜±2%(F.S)	0.01ppm	≤30 seconds
Total Volatile Organic Compound gases (TVOC)	0-100ppm	＜±2%(F.S)	0.01ppm	≤30 seconds
Total Volatile Organic Compound gases (TVOC)	0-2000ppm	＜±2%(F.S)	0.1ppm	≤30 seconds
Total Volatile Organic Compound gases (TVOC)	0-200000ppm	＜±2%(F.S)	1ppm	≤30 seconds
Volatile gases (PID)	0-10ppm	＜±2%(F.S)	0.001ppm	≤30 seconds
Volatile gases (PID)	0-10ppm	＜±2%(F.S)	0.01ppm	≤30 seconds
Volatile gases (PID)	0-100ppm	＜±2%(F.S)	0.01ppm	≤30 seconds
Volatile gases (PID)	0-2000ppm	＜±2%(F.S)	0.1ppm	≤30 seconds
Volatile gases (PID)	0-200000ppm	＜±2%(F.S)	1ppm	≤30 seconds

Note: please call us to consult about other gases and other detection range which are not listed in the above table.

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