麦芽传感科技
Maiya Sensor Technology

MST F210/F210M
Online Composite Type Toxic And Harmful Gas Detector

Product Manual



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I. Overview of online composite type gas detector

online composite type gas detector can be used in 24 hours continuous online monitoring of concentrations of multiple types of gases in the filed as well as the measurement of temperature and humidity, display of the field concentration, with sound & light alarm (optional) when exceeding the standard, and remote signal transmission. 2.5-inch high-definition color screen was adopted for real-time display, the gas sensors of internationally famous 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; Swiss high-precision capacitive digital temperature and humidity sensors Advanced electric circuit design, mature kernel algorithm processing, unique external appearance design, had achieved a number of patents about the software works, external appearance, 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 and fluorocarbon surface treatment process are suitable for the use at a variety of hazardous places and corrosive environments, it is wear-resistant. It has been 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 composite type gas detector

★ **It is possible to simultaneously detect 1 ~ 6 types of gases, and the units can be switched freely**

★ **Diversified communication methods**

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 0 ~ 20mA, 1 ~ 5V, 0 ~ 5V, 0 ~ 10V output, wireless transmission (2 ~5 km or unlimited distance), SMS alarm, output frequency 200 ~ 1000Hz, Hart protocol signals; it is compatible with secondary instrument, data acquisition module, PLC, DCS system, and it is possible to drive the related equipment. Optional MIC 2000 controller is possible to simultaneously monitor 1,000 units of detectors.

★ **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**

2.5-inch high-definition color screen, display the information such as real-time concentration, alarm, time, temperature, humidity, storage, and so on; the menu interface adopted high definition simulation graphics to display the function name of each menu.

★**Function of large-capacity data storage (capacity can be customized), and multiple storage modes are supported**

Standard configuration is the data storage capacity for 100, 000 entries; SD card storage function is optional configuration, real-time storage and fixed time storage are supported, or only the data of the alarm concentration will be stored; it is supported to use the local host to view, and delete data, and upload the data via RS485 interface to the computer for data analysis or printing.

★ **High temperature gas detection (optional)**

The optional high-temperature high-humidity pretreatment system will be possible to detect the smoke gas at the temperature of 1300 ℃. The detection for the gases at other temperatures can be customized.

★ **It is possible to switch among three display modes**

Simultaneously display the concentrations of multiple types of gases, repeatedly display the concentration of single-channel gases in large font, and display the real-time curve.

★ **Graphical display, and use the form of curve to reflect the trend of gas** concentration changes in a certain period of time.

● **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, average value or not.**

● **High-precision temperature and humidity measurements (optional configuration).**

● **Multiple alarm modes, and multi-directional and three-dimensional indication alarm states.**

It includes: 3 sets of relay switch output (standard configuration is 1 set), 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.**

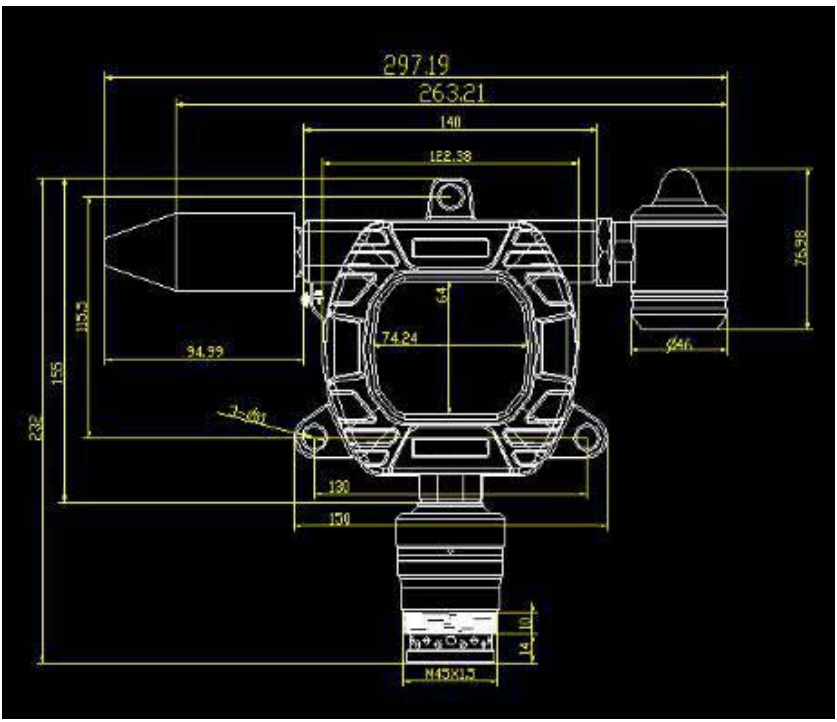
III. Technical parameters of online composite type gas detector:

Gases to be detected	Arbitrary combination of multiple types of gases such as toxic gases, oxygen gas, carbon dioxide, inflammable and explosive gases, TVOC, and so on. Optional configuration: it is possible to simultaneously detect any 1 ~ 6 gases as well as temperature and humidity.
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.				
Allowable error	≤±2%F.S (Other or higher accuracy level can be customized)				
Linearity	≤±1%	**Repeatability**	≤±1%	**Uncertainty**	≤±1%
Response time	T90≤30 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. Range of working pressure: atmospheric pressure ± 30%, some sensors can detect under the pressure of 7 kg				
Display method	2.5-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 consumption	Instantaneous maximum electric current: electrochemical principle: 60 mA, catalytic or infrared principle: 120 mA				
Power supply reference	The switching power supply of 24V, 2.1A is possible to drive 30 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 3-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; both ends of the shielding layer will be connected to the ground, and good grounding should be ensured.				
Protection level	IP66, prevent the water splash and short-period rain				

Explosion-proof type	Explosion suppression type
Explosion-proof mark	Ex d IIC T6 Gb
Exterior dimensions	260×180×90mm(L×H×W)complex gas cell 260×230×90mm(L×H×W) complex gas cell and include Alarm 240×180×90mm(L×H×W)single gas cell 240×230×90mm(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. Larger capacity accessory for the data storage: SD card.
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 pretreatment system, high temperature and high humidity pretreatment system, high temperature and high humidity and high dust pretreatment system
Temperature and humidity measurement	Optional: temperature: -40 ℃ ~ + 120 ℃, accuracy: 0.3 ℃ humidity: 0-100% RH, accuracy: 3% RH
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 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 marked as "G S V" from left to right, 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, the left end is RS485-A, and the right end is RS485-B.

Level I alarm output: J4 is marked as "Alarm 1", three terminals of COM and NO, NC; 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 "Alarm 2", two terminals of COM and NO.

Level III alarm output: (optional configuration) J17 is marked as "Alarm 3", two terminals of COM and NO.

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, J9, J12, J10, J11, J3.

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.

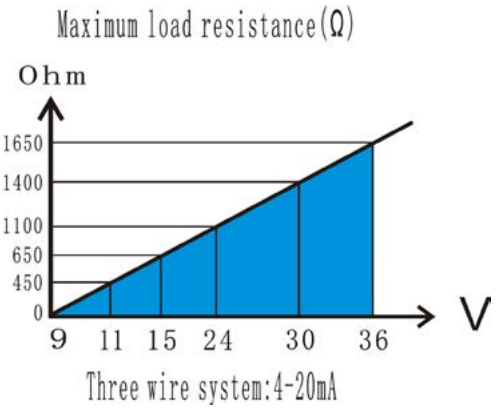
AL alarm output: default terminal J4 (common terminal COM, normally open NO, normally closed NC).

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

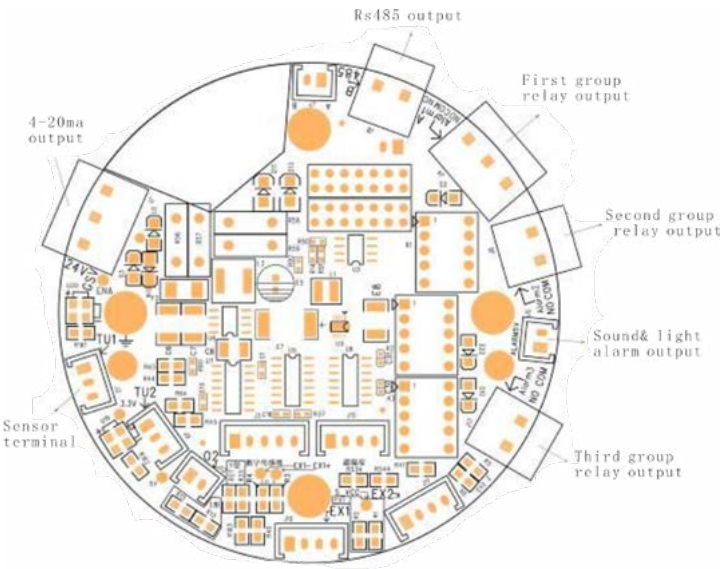
Sound & light alarm output: terminal J5, the default alarm values are same as AL, AH alarm values.(Common terminal COM, normally open NO).

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. 19-21).

Load capacity: as shown in the right figureBased on the load capacity in the right figure, the impedance of the transmission line will 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 key: menu 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 return key for one time to cancel the mute state.

OK key: confirmation key. **key:** return key

◀ **key:** direction key, movement of the cursor to the left will play the role of position shift at the time of modifying the numerical value

▶ **key:** direction key, movement of the cursor to the right will adjust the numerical value at the time of changing the value.

Enter the menu setting: long press the "MENU" key for 3 seconds to enter the menu

Exit menu setting: press the "MENU" key or return key to exit the menu.

VIII. Explanation about startup

At the time of startup, the information about the company, and the countdown time which is required for the startup self-check and sensor preheating will be displayed, as shown in Fig. 1, 2:

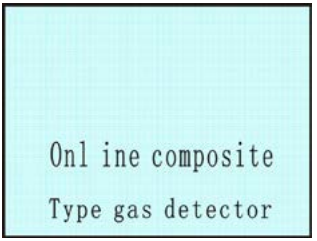


Fig. 1



Fig. 2

At the time of startup, the information about the software version of this unit of equipment, time when left the factory and so on will be displayed, as shown in Fig. 3:

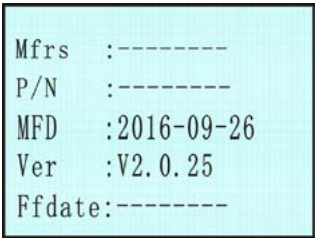


Fig. 3

After the countdown was finished, enter the test screen, as shown in Fig. 4:



Fig. 4

Press “OK key” to switch between different displaying modes, and pres “◀ ▶” keys to switch the channel. As shown in Fig. 5, 6, 7, 8:



Fig. 5



Fig. 6



Fig. 7



Fig. 8

Note: there is figure illustration for each mode (There will be deviation between the figure and the actual product, and the actual product should prevail).

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 precisely detect very low concentrations, the operation of zero-point calibration will be carried out. In the test interface, press “MENU” key for 3 seconds to enter the menu, use “◀” key and “▶” key to select the menu of “Zero-point calibration”, and press “OK” key to enter the interface of zero-point calibration as shown in Fig. 9:



Fig. 9

After entered the interface of zero-point calibration, use “◀” key and “▶” key to select the channel, and then press “OK” key to carry out the zero-point calibration, as shown in Fig. 10:



Fig. 10

after the calibration succeeded, it will display: the statement of “Calibration is successful”; for example, after the calibration of CO2 in the air succeeded, it will display as about 400ppm, as shown in Fig. 11:



Fig. 11

If the calibration did not succeed, it will display: the statement of Calibration failed”; when O2 or N2 is in air, the zero-point calibration will fail, as shown in Fig. 12:



Fig. 12

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” key for 3 seconds to enter the menu, use “◀” key and “▶” key to select the menu of “Concentration Calibration”, and press “OK” key to enter: as shown in Fig. 13:



Fig. 13

Use “◀” key and “▶” key to select the channel, and then press “OK” key to enter the interface of Concentration Calibration, as shown in Fig. 14:



Fig. 14

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”, as shown in Fig. 15, 16, 17, 28:



Fig. 15



Fig. 16



Fig. 17



Fig. 18

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
Note: if the concentration of the introduced gas is too low, the calibration may be unsuccessful; the modified values can become valid only after the successful calibration, otherwise, at the next time of entering the menu, the value will return to the previous concentration value.

9.3 Operation instructions of Restoring the factory setting

In the test interface, press “MENU/ESC” key for 3 seconds 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 Fig. 19:



Fig. 19

Press “OK” key to enter to the interface of “Restoring the factory setting”, use “◀” key and “▶” key to select the channel, as shown in Fig. 20:



Fig. 20

Select the channel to be restored, and then press “OK” key to enter; 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”, as shown in Fig. 21, 22, 23:



Fig. 21



Fig. 22



Fig. 23

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 data recording

In the test interface, press the “MENU” key for 3 seconds to enter the menu, use “◀” key and “▶” key to select the menu of “Data recording”, and press “OK” key to enter the interface of “Data recording”, as shown in Fig. 24:



Fig. 24

Press the “OK” key to select, select the channel for the query of the records, as shown in Fig. 25

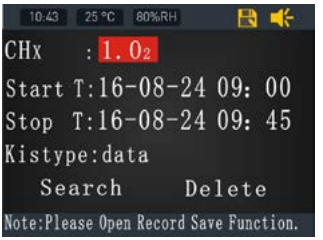


Fig. 26

Use “◀” key and “▶” key to select the “Start Time”, press “OK” key to enter the setting of start time of the query, as shown in Fig. 27:

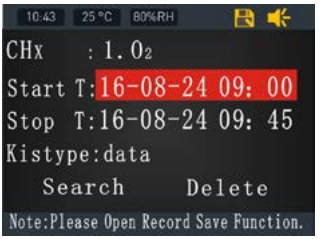


Fig. 27

Use “◀” key and “▶” key to select the “End Time”, press “OK” key to enter the setting of end time of the query, as shown in Fig. 28:

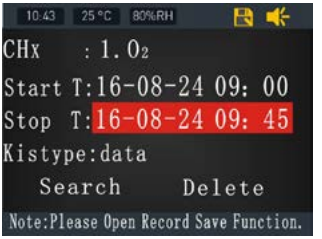


Fig. 28

Select the type of query, press “OK” key to select “All Data” or “Alarm data”, as shown in Fig. 29:

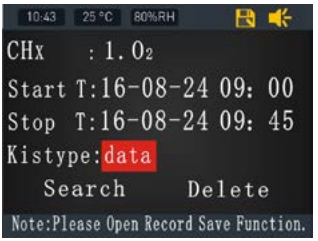


Fig. 29

Select “Start query”, press “OK” key to query, as shown in Fig. 30:

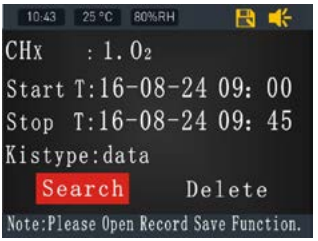


Fig. 30

If there is no result found for the query, it means that the data storage function is not enabled, it is necessary to enable the storage function in “System setting” → “Storage setting”. Select the “timing storage” that is the real time storage function, and set the storage cycle (time interval), as shown in Fig. 31:



Fig. 31

Follow the following steps for startup, as shown in Fig. 32, 33, 34, 35, 36, 37:



Fig. 32



Fig.33



Fig. 34



Fig. 35

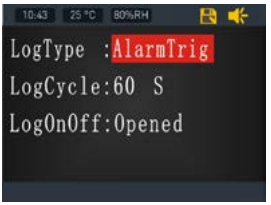


Fig. 36

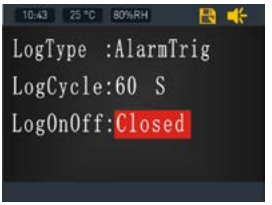


Fig. 37

9.5 Alarm setting operation instructions

In the test interface, press the “MENU” key for 3 seconds to enter the menu, use “◀” key and “▶” key to select the menu of “Alarm setting”, as shown in Fig. 38:



Fig. 38

Press “OK” key to enter the interface of Alarm Setting, as shown in Fig. 39:



Fig. 39

Alarm value setting

It is possible to use “OK” key and “◀” key and “▶” key to modify.

Low 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, as shown in Fig. 40, 41, 42:



Fig. 40



Fig. 41



Fig. 42

Setting of alarm parameters, as shown in Fig. 43:



Fig. 43

Press “OK” key to switch the channel, as shown in Fig. 44:



Fig. 44

Alarm hysteresis: that is the alarm return difference, it is possible to set the alarm return difference for each channel; 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. Time relay: (optional function) it is possible to set the time interval for starting the third group relay, 00.00 indicates inactive; duration: (optional function) it is possible to set the continuous closing time duration after started the third group relay, 00.00 indicates inactive, as shown in Fig. 45, 46, 47:



Fig. 45

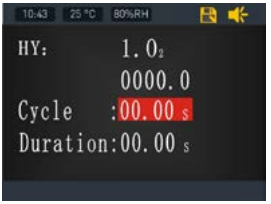


Fig. 46

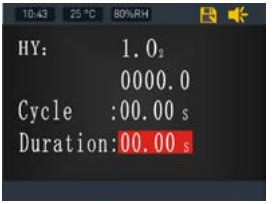


Fig. 47

Alarm mode: generally no setting is needed, because it had been set by default already. 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”, as shown in Fig. 48, 49:



Fig. 48



Fig. 49

Temperature alarm: (optional function) it is possible to select the states of On or Off, and the default state is Off; if it is set to “On”, then, at the time of alarming the gas concentration, there will be no output from the second group relay; only when reached the temperature alarm value which was set, there will be output from the second group relay.

Low temperature alarm: when it is lower than the alarm temperature which was set, the output of second group relay will start, until the temperature is greater than the sum of the alarm temperature value and return difference, then, the output of second group relay will stop, as shown in Fig. 50, 51:



Fig. 50

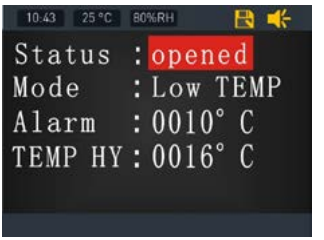


Fig. 51

High temperature alarm: when it is higher than the alarm temperature which was set, the output of second group relay will start, until the temperature is less than the value after subtracted the return difference from the alarm temperature, the output of second group relay will stop, as shown in Fig. 52:

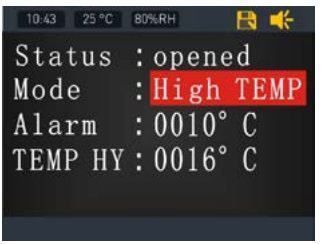


Fig. 52

9.6 System setting operation instructions

In the test interface, press the “MENU” key for 3 seconds to enter the menu, use “◀” key and “▶” key to select the menu of “System setting”, press “OK” key to enter the interface of system setting, as shown in Fig. 53:



Fig. 53

Setting of range: it will display the maximum detection range of each gas, and has been set up before leaving the manufacturer, if modification is needed, please call the manufacturer to confirm whether it is possible or not to modify; when some sensors are measuring under overload conditions, the sensor may be damaged. As shown in Fig. 54, 55:



Fig. 54



Fig. 55

Setting of time: modify date and time, after pressed “OK” key, use “◀” key and “▶” key to select and modify, and then, press “OK” key to save, as shown in Fig. 56, 57:



Fig. 56

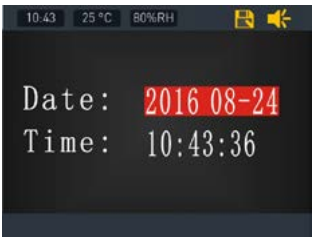


Fig. 57

Setting of background: based on personal preference, it is possible to modify the font color, background color, backlight sleep time, and it is also possible to select “Restore Default” to restore the default settings, use “◀” key and “▶” key to select and modify, then, press “OK” key to save, as shown in Fig. 58, 59, 60:



Fig. 58



Fig. 59



Fig. 60

Setting of storage: move the cursor to “Setting of storage”, press “OK” key to enter the setting interface, as shown in Fig. 61:



Fig. 61

Storage method: it is possible to set two modes which are the timing storage, and alarm trigger; “timing storage” is to store the data for one time during each period of storage cycle. Alarm Trigger storage mode is to store only the data about the alarm; only when the concentration value reaches the alarm setting value the storage will begin; and if there is no alarm, the storage will not begin, as shown in Fig. 62, 63:



Fig. 62



Fig. 63

Storage cycle: the time interval for storing the data, it is possible to set as 1-9999 seconds, and it is valid only at the time of the timing storage
Storage function: select Turn on or Turn off the data storage function, as shown in Fig. 64, 65:



Fig. 64

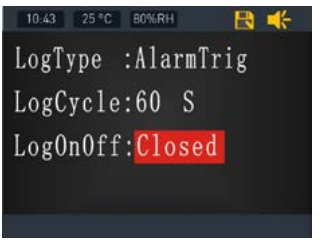


Fig. 65

S**etting of communication:** when there is no connection with the computer or it is RS485 data transmission, there will be no need for this setting, as shown in Fig. 66:



Fig. 66

Equipment address: address number of the local host, and can be set as 1-255
Communication interface: the mode of automatic recognition communication
Baud rate: communication speed, generally select 9600, as shown in Fig. 67:



Fig. 67

9.7 Unit setting operation instructions

In the test interface, press the “MENU” key for 3 seconds to enter the menu, use “◀” key and “▶” key to select the menu of second page of “Unit setting”, press “OK” key to enter the interface of setting; automatic conversion between various units is possible to switch between the following units: ppm, Vol%, LEL%, ppb, pphm, mg/m3, mg/l, g/m3, as shown in Fig. 68, 69, 70:



Fig. 68



Fig. 69



Fig.70

9.8 Other setting operation instructions

In the test interface, press the “MENU” key for 3 seconds to enter the menu, use “◀” key and “▶” key to select the menu of second page of “Other setting”, press “OK” key to enter the interface of setting, as shown in Fig. 71:



Fig. 71

Preheating time: it is the time for preheating and stabilizing which is needed by the sensor, and it is not recommended for modification, as shown in Fig. 72:



Fig. 72

Language options: default is Chinese, English can be selected, as shown in Fig. 73:



Fig. 73

Name of the gas: the molecular formula will be displayed by default, as shown in Fig. 74:



Fig. 74

Display the maximum value: select Open, then the maximum value of the measurement of this time and the maximum value of the last measurement in the single-channel interface will be displayed.

Display the minimum value: select Open, then the minimum value of the measurement of this time and the minimum value of the last measurement in the single-channel interface will be displayed, as shown in Fig. 75:

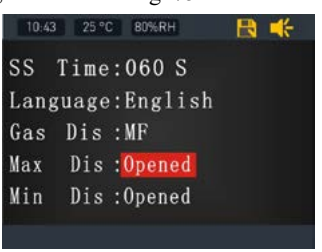


Fig. 75

9.9 Explanation about local host information

In the test interface, long press the “MENU” key for 3 seconds to enter the menu, use “◀” key and “▶” key to select the menu of second page of “Local information”, press “OK” key to enter the interface of view, as shown in Fig. 76:



Fig. 76

Equipment information: it is possible to view the relevant information about this equipment, as shown in Fig. 77, 78:



Fig. 77

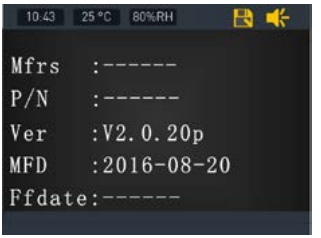


Fig. 78

Sensor information: it is possible to view the service life and the used years of the sensor on this equipment, so as to avoid the extended use which will affect the accuracy and reliability, as shown in Fig. 79, 80:



Fig. 79

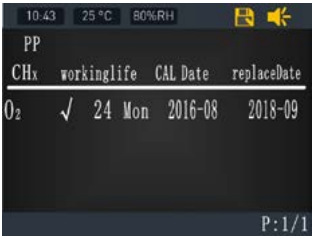


Fig. 80

Repair records: record the repair information of this equipment, as shown in Fig. 81, 82:



Fig. 81



Fig. 82

Guidance about the failures: it will introduce the simple troubleshooting methods for the failures; at present, it could not be viewed temporarily, as shown in Fig. 83:



Fig. 83

X. Operation instructions of remote control IR-01 for the gas detector

1. **Zero-point calibration:** press this key to enter the zero-point calibration interface; on the top left corner of the display screen, it shows “Zero-point calibration”, press “Confirmation” key to operate; if the operation is successful, at bottom of the display screen, the statement of “Calibration is successful” will appear, if unsuccessful, it will display the statement of “Calibration failed”.
2. **Zero-point fine-tuning:** press this key, the upper left corner of the display screen will display “Zero-point fine-tuning”, at this time, by pressing Up key, Down key, it will be possible to raise or lower the zero-point.
3. **Span rough adjustment:** (concentration calibration) press this key to directly enter the interface of Concentration Calibration; for the specific operation methods, please refer to the description in the Section 7.2.
4. **Span fine-tuning:** it will play a role of zooming in or out the numbers on the display screen, the increase or decrease changes of the numerical values are relatively less. At the time of calibration by introducing the gas, when this key is

pressed, the upper left corner of the screen will display “Span fine-tuning”, at this time, by pressing Up key and Down key, it will be possible to zoom in or out the display value, which is equivalent to modifying the “Display coefficient” in the interface of Concentration Calibration.

5. **4mA output:** press this key to directly enter the interface of system parameter setting, no matter what value is displayed currently, the output of the detector will be the electric current signal of 4mA.
6. **20mA output:** press this key to directly enter the interface of system parameter setting, no matter what value is displayed currently, the output of the detector will be the electric current signal of 20mA.
7. **Alarm setting:** press this key or “Low alarm” key to directly enter the alarm interface; for the specific operation methods, please refer to the description in the Section 7.5.
8. **Storage setting:** that is same as “High alarm” key of the older models, press this key to directly enter the storage interface.
9. **Address:** modify the equipment address, press this key to directly enter the interface of system parameter setting, it is possible to quickly modify the address number of this unit of equipment, and press “Confirmation” key to operate.
10. **Mute:** at the time of alarming, press “Mute” key, there will be no alarm output; press “Mute” key again to restore the alarm.
11. **Restore the factory setting:** press this key to enter the interface of “Restore the factory setting”, it is possible to choose to restore the concentration or restore the alarm, and fully restore, press “Confirmation” key to operate.
12. **Menu:** press this key to directly enter the interface of menu setting, use Up and Down keys to select the menu to operate.



XI. 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-sucking 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 2 seconds, it is possible to feel the obvious suction force. And then, check whether the gas inlet of the filter 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. **Carry out the zero-point calibration in the clean air or introduce the nitrogen gas for the zero-point calibration,** 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 carry out the zero-point calibration in clean air again, introduce the nitrogen gas for the zero-point calibration, and 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, 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, and it will be necessary to replace the sensor.

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. At the computer hardware - Equipment Manager - Port, check whether the serial ports corresponding to RS485 / RS232 converter are connected or not. For the equipment of USB interface, it is also necessary to detect whether the serial ports are connected or not, and whether the serial port numbers are correct or not.

XII. 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.

12.1 Sensor replacement

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

12.2 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.**

XIII Precautions

- It is prohibited for the live operation while the cover is left open.
- 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.
- At the time of occurrence of failure, abnormality, and in accurate detection, please conduct the operation of restoring the factory setting, which can usually solve the problem; if the problem could not be solved, please contact the manufacturer.
- At the time of 4 ~ 20mA transmission, three-core shielding cable should be selected; when the distance exceeded 1000 meters, the diameter of single wire will be ≥1.5 mm2; both ends of the shielding layer should be connected to ground and the good grounding should be ensured. At the time of RS485 transmission, four-core shielding cable or power cable should be separated from the signal cable, either on-spot power supply or remote power supply can be selected; at the time of remote power supply, the diameter of the power cable will be decided by the transmission distance, the number and type of the probes; RS485 signal cable adopted 2-core shielding cable or twisted pair cable. For the selection of the specific wire materials, please refer to the wiring method and wire selection in the Section 5.

XIV. Table of technical performance and parameters of other optional sensors

Optional configuration: any combination of 1 ~ 6 types of gases

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
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

Gases to be detected	Range	Allowable error	Minimum reading	Response time T90
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
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

Gases to be detected	Range	Allowable error	Minimum reading	Response time T90
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
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

Gases to be detected	Range	Allowable error	Minimum reading	Response time T90
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_2H_2)	0-100%LEL	＜±2%(F.S)	0.1%LEL	≤30 seconds
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

Gases to be detected	Range	Allowable error	Minimum reading	Response time T90
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
Benzene (C_6H_6)	0-10ppm	＜±2%(F.S)	0.01ppm	≤30 seconds

Gases to be detected	Range	Allowable error	Minimum reading	Response time T90
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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