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SIL Compliance Approved IEC 61508
No. 1N190320. QAEU085

Point-type combustible/toxic wireless gas detector

GT-FGA1000W　　FGA1000W-SO2　　FGA1000W-H2S

User manual

QINGDAO ALLRED ELECTRONICS CO.,LTD.

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Precautions

Any person who may use or maintain the detector, before using and installing the detector, please read the instruction manual carefully and check whether the nameplate, specification parameters, explosion-proof type meets the requirements.

1. Non-professionals are not allowed to install or dismantle the detector.

2. After opening the box, please check the detector and the package, if you find the detector damaged or lack of accessories, please contact our company immediately.

3. Be sure to take personal protection when using products in toxic gas environments.

4. It is strictly prohibited to connect the wires under power, and make sure that the wiring is correct before energizing.

5. It is strictly prohibited to open the cover with electricity, check the creepage distance after installation, whether the electrical clearance meets the requirements.

6. Seals, fasteners, if damaged, should be replaced in a timely manner.

7. After replacing the internal components, restore the sealing ring to the original position and tighten the cover.

8. Avoid the detector from electric shock or violent, continuous mechanical impact.

9. The detector is equipped with internal and external grounding terminals, and needs to be reliably grounded during installation to prevent static electricity accumulation and electromagnetic radiation.

10. Ambient temperature: point-type combustible gas detector (-40 ℃ ~ 70 ℃).

11. Replacement of batteries must use special batteries, in a

well-ventilated, no gas leakage.

12. It is strictly prohibited to disassemble, charge and replace batteries in dangerous places.

13. Qualified by the inspection of the product, do not allow arbitrary replacement of components or change the structure, so as not to affect the explosion-proof and product performance.

14. Maintenance, pay attention to the protection of the explosion-proof surface, all the explosion-proof surface shall not be damaged or corrosion.

15. The installation of this product should be carried out in accordance with the relevant requirements of GB/T3836.15-2017 "Explosive Environment Part 15: Design, Selection and Installation of Electrical Installations".

16. The explosion-proof mark of the equipment is Ex d ia IIC T6 Gb, applicable to Zone 0, Zone 1, Zone 2, containing IIA ~ IIC class, T1 ~ T6 explosive gas mixture places; by the National Quality Inspection Center for Explosion-proof Electrical Products, qualified, and obtain the certificate of conformity for explosion-proof.

Preface

This manual introduces the working principle, technical parameters, installation, application, maintenance and other notes of GT-FGA1000W series point-type combustible gas detector for industrial and commercial use. The detector should be used together with ACR2000 and ACR4000 gas alarm controllers produced by our company. For detailed information of the products, please refer to the relevant chapters of this manual.

Safety

The detector is an intrinsically safe device, explosion-proof marking: Ex d ia IIC T6 Gb, it is suitable for Zone 0, Zone 1, Zone 2, containing IIA ~ IIC class, T1 ~ T6 explosive gas mixtures. If the detector is

installed in the petrochemical industry, oil field, oil depot, liquefied gas station, environmental protection, and other places where flammable/toxic gases may exist, workers for detector installation, operation and maintenance should have a basic knowledge of safety technology and its associated equipment use knowledge.

Implementing Standards

GB15322.1-2019 Combustible gas detector Part 1: Point-type combustible gas detector for industrial and commercial use

GB12358-2006 General Technical Requirements for Gas Detection and Alarm Apparatus for Workplace Environment

GB3836.1-2010 Explosive environment Part 1: General requirements for equipment

GB3836.2-2010 Explosive atmospheres Part 2: Equipment protected by explosion-proof enclosure "d".

GB3836.4-2010 Explosive atmospheres Part 4: Equipment protected by intrinsically safe "i".

GB/T4208-2017 Protection level of enclosure (IP code)

JJG693-2011 Certification Regulations for Combustible Gas Detection Alarms

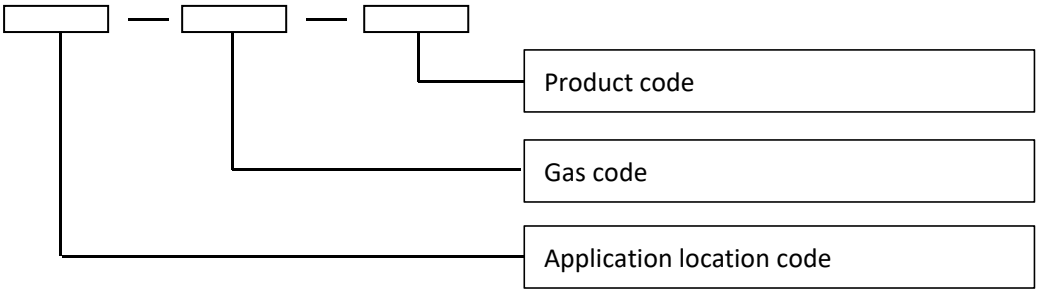
GB/T50493-2019 Design Standards for Petrochemical Combustible and Toxic Gas Detection and Alarms

Other Information

 For the latest information about the products related to this manual, please visit the company's website www.allredgd.com or call (0532-86766369) to contact us.

1.Product overview

1.1 Product introduction



GT-FGA1000W

G Application location code, indicating industrial and commercial use;

T Detection gas code, indicating methane;

FGA1000W Company product code, indicates FGA1000W series detector.

GT-FGA1000W is a point-type combustible gas detector (hereinafter referred to as the detector) for industrial and commercial use.It is an intrinsically safe gas detector for explosion-proof places with a low-power infrared sensor, battery power supply, wireless communication and continuous monitoring.

1.2. Scope of use

This detector is used to measure combustible gases in industrial and commercial environments. When the gas concentration reaches or exceeds the alarm setting value, it will emit sound and light alarm signals to remind the staff present to deal with the leakage in time or avoid the risk. The detector is widely used in petrochemical industry, oil field, oil depot, liquefied gas station, environmental protection, fire-fighting and other occasions where combustible gas exists.

1.3. Working Principle

Adopting non-dispersive infrared principle, the principle is to

utilize the absorption effect of combustible gases on infrared light of specific wavelengths to measure the concentration of combustible gases. The specific calculation follows the Lambert-Beer law and detects the specific wavelength of infrared light on a fixed long path, through the amount of change of infrared light intensity, you can calculate the concentration of combustible gases on the fixed long path.

2.Technical Parameters

Performance Parameters

Detection method: natural diffusion Detection gas: HC combustible gas

Calibration gas: methane, isobutane Detection range: 3～100%LEL

Display value error: ≤±3%FS Resolution: 1%LEL

Repeatability: 2% Response time: ≤30S (T90)

Detection principle: non-dispersive infrared absorption

Alarm Setting Value: 25% LEL for 1-stage alarm; 50% LEL for 2-stage alarm (default value)

Electrical parameters

Working voltage: 24V DC Average power consumption: 1ma

Main power capacity: 12Ah; Backup power capacity: 180mAh

Endurance: >6 months (LORA signal).

Communication mode: wireless transmission, 433M/NB-LOT/4G etc. optional

Use environment

Operating temperature:-40℃～70℃ Operating humidity:15%RH～95%RH(no condensation)

Explosion-proof grade: Ex d ia IIC T6 Gb Protection grade: IP66

Pressure range: (86～106) kPa

Execution standard

GB15322.1-2019;GB/T50493-2019;JJG693-2011

GB3836.1-2010;GB3836.4-2010;GB/T4208-2017;GB3836.2-2010

Structural parameters

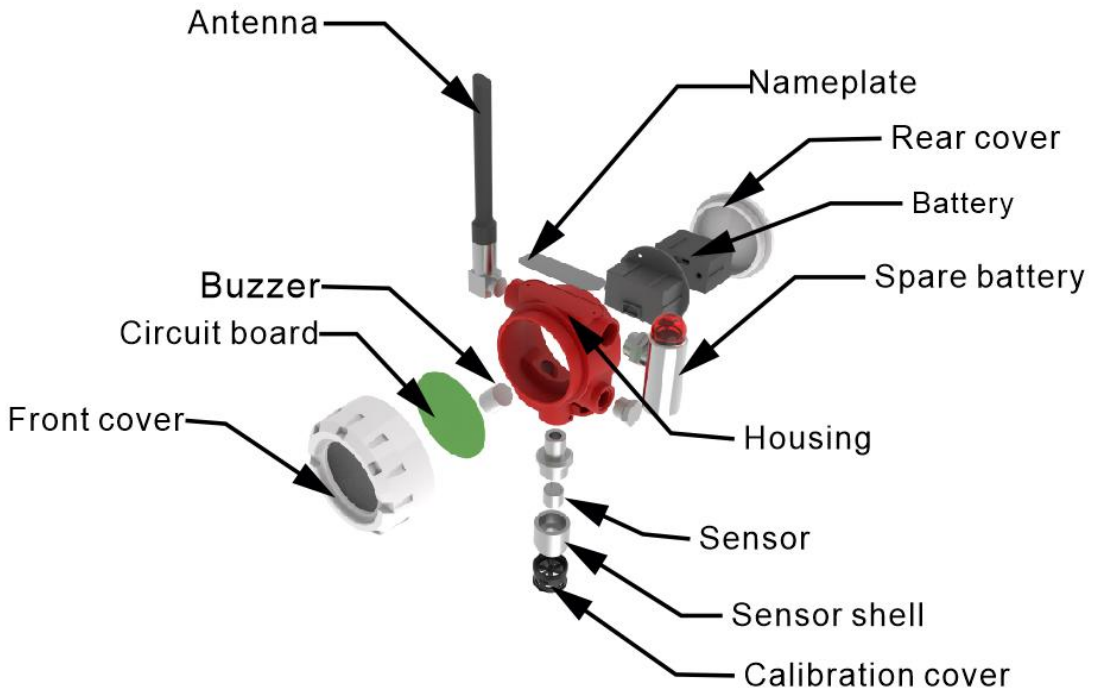
Main body material: aluminum alloy

Sound and light alarm: integrated sound and light alarms

Connection thread: G1/2, G3/4, M20*1.5, 1/2NPT, etc.

Weight: 2.2kg

3.Product structure



4.Installation

4.1 Installation position and requirements

According to the requirements of GB/T50493-2019 "Petrochemical Combustible and Toxic Gas Detection and Alarm Design Standards", the combustible/toxic gas detector should meet the following requirements when installed:

4.1.1 The detector should be installed in a place with no shock, no vibration, no strong electromagnetic field interference and easy maintenance, and the clearance between the detector installation location and the surrounding piping or equipment should not be less than 0.5m.

4.1.2 When detecting combustible or toxic gases heavier than air, the installation height of the detector should be 0.3m～0.6m from the floor (or floor of the building); when detecting combustible or toxic gases lighter than air, the installation height of the detector should be 2.0m

above the source of release. When detecting combustible gas or toxic gas slightly heavier than air, the installation height of the detector should be 0.5m～1.0m below the release source; when detecting combustible gas or toxic gas slightly lighter than air, the installation height of the detector should be 0.5m～1.0m above the release source.

4.1.3 The installation height of the ambient oxygen detector should be 1.5m～2.0m from the floor or the floor of the building.

4.2 Precautions

A. The detector should check the power and address before installation, if the power is insufficient, the main power should be replaced as soon as possible;

B. The detector installation location should be as far away as possible from high-power equipment;

C. The detector installation location should avoid the antenna being blocked as much as possible to prevent signal transmission from being restricted;

D. In order to ensure that the detector is normal use, any operation of the detector must be performed by professionally trained personnel, and arbitrary operation of the equipment is strictly prohibited;

E. It is strictly prohibited to open the cover with electricity in dangerous places.

4.3 Battery replacement

4.3.1 Replacing the secondary battery

a. Remove the protection shell

b. Replace the battery

c. Install the protection shell

4.3.2 Replacing the main battery

a. Remove the back cover

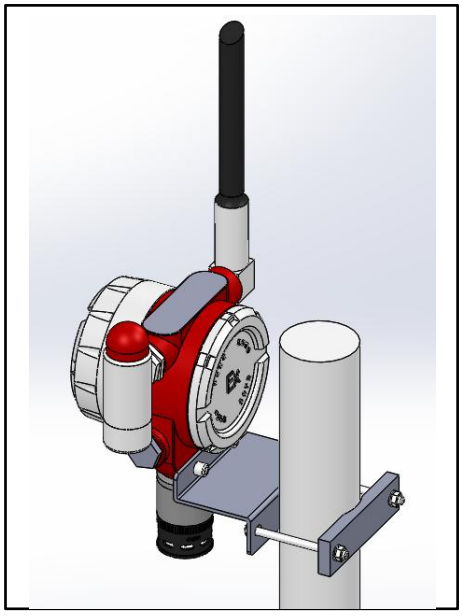
b. Replace the main power supply

c. Tighten the back cover

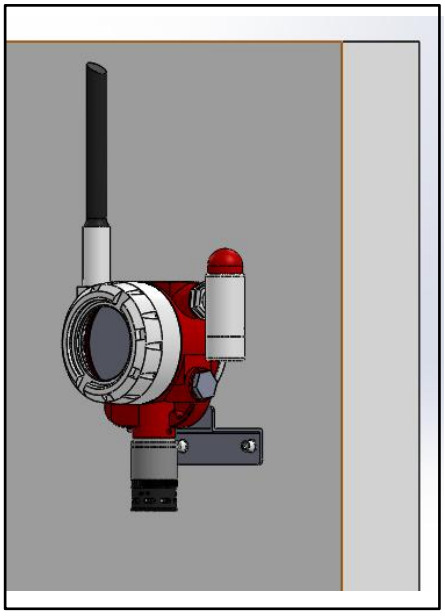
4.4 Instrument Installation

4.4.1 Installation of fixed base plate

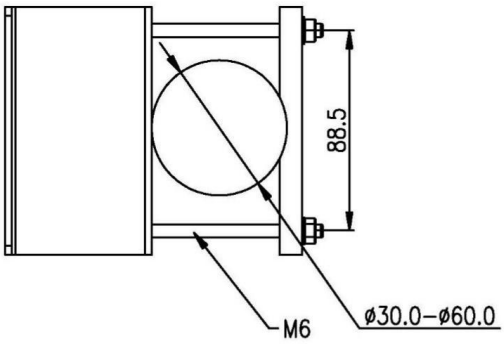
4.4.2 Pipe holding

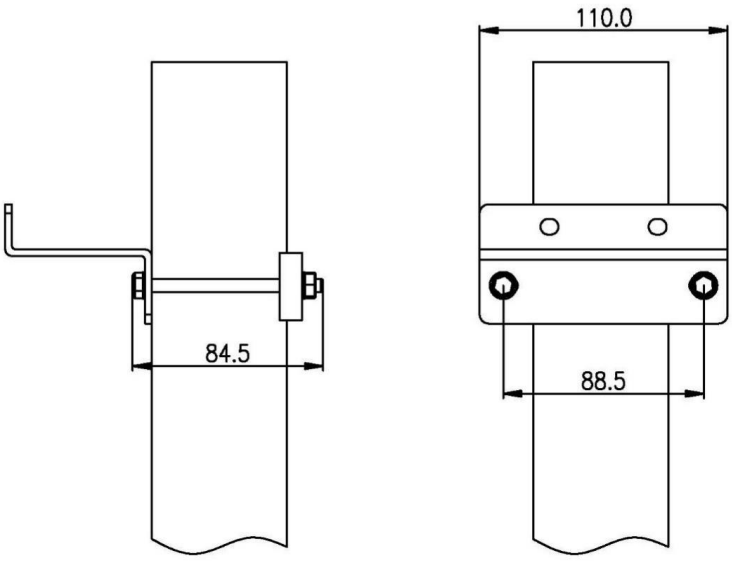


4.4.3 Wall mounting



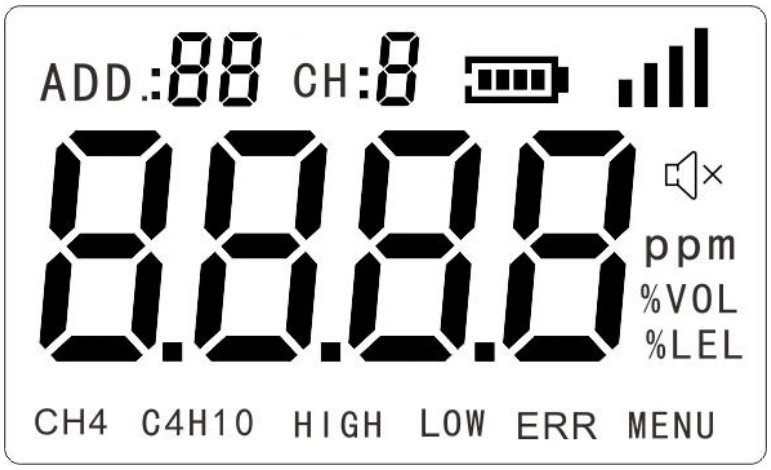
4.5 Mounting Fitting Dimensions





5.Instructions for use

5.1 Main Display Page



ADD: detector address, can be set 1-99;

CH: wireless communication channel, can be set 0-5, a total of 6 channels

Power: battery power

Gas concentration: combustible gas 0-100% LEL;

Gas unit: %LEL, PPM, %VOL can be set, default %LEL;

Gas type: methane, isobutane;

Status: Low alarm, detector low alarm status; High alarm, detector high alarm status; Fault, detector fault status; Low battery, battery power is low;

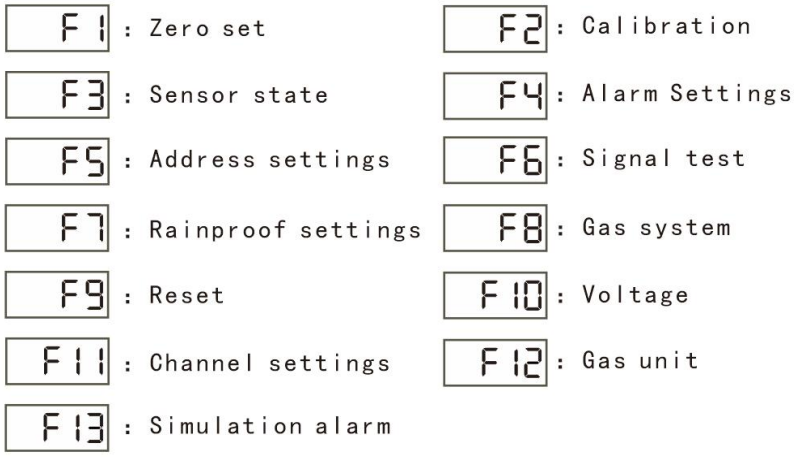
5.2 Status indicators

"Green" Normal light: detector normal status;

"Yellow" Fault light: detector fault status;

"Red" Alarm light: detector alarm status;

5.3 Menu Functions



First magnetic stick tap the wake-up button at the bottom of the screen to enter the operation: then use the remote control to enter the menu, refer to chapter 6 for details;

5.4 Remote control instructions

"Confirm" key: used to enter each level of menu and make sure of the setting value.

"Exit" key: used to exit all levels of menus.

"Forward" key: used to advance the sub-menu; move the cursor left and right;

"Back" key: used for submenu backward; move the cursor left and right;

" + " key: used to increase the value at the cursor location;

" - " key: used to decrease the value at the cursor location;

★ Before remote control operation, a magnetic stick must be used to wake it up and make it in the operating state.

6. Operation method

All the functions of this instrument are set through the magnetic bar and the remote control as follows:

a. Press the "Wake Up" key with the magnetic bar, the display will enter the password input interface, showing 4 flashing "0000".

b. Press "Forward" button 4 times with the remote control, enter the password, the display will enter the menu interface, the default display is "F1";

c. Continue to press the "forward" key with the remote control to find the function menu to be set;

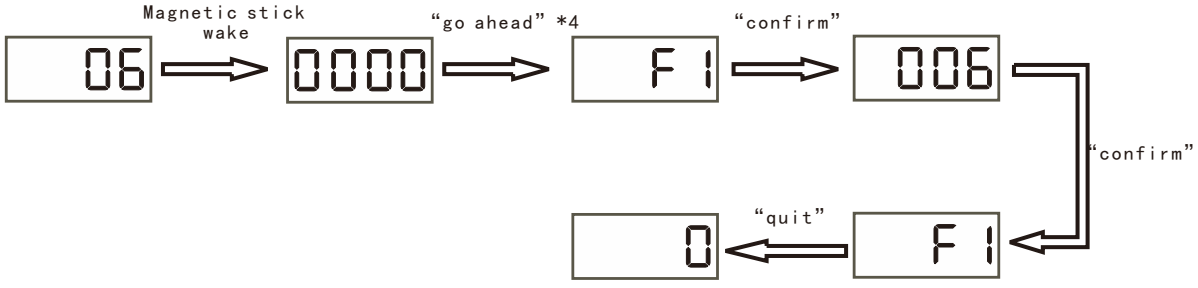
d. Use the remote control to press the "Confirm" key to enter the corresponding function interface, use the "Forward" key and "Back" key to move the cursor left and right, use the "+" key and "-" key to adjust the value, and then press the "Confirm" key to save the settings;

e. Finally, press "Exit" key with remote control to return to the main interface of the instrument and complete the corresponding function setting.

The specific operation methods are as follows;

6.1 Zeroing

Zeroing function is realized through the menu "F1", which is used to correct the zero drift of the detector. Before zero adjustment, the instrument should work normally and stably for more than half an hour, the specific operation method is as follows:



a. When there is no combustible/toxic gas on site, the instrument will drift and need to be "zeroed";

b. Press the "Wake Up" button with a magnetic bar through the explosion-proof glass (without opening the cover), the display will enter the password input interface, showing 4 flashing "0000".

c. Press the "Forward" key 4 times with the remote control, input the password and the display will enter the menu interface, and the default display will be "F1";

d. Press the "Confirm" key with the remote control, the display enters the interface of zero adjustment, showing the current drift value;

e. Continue to use the remote control to press the "Confirm" key to zero, after zeroing, display "F1".

f. Finally, press the "Exit" key with the remote control, the display will return to the main interface and show "0" to complete the zero setting.

Attention:

A. Before zeroing operation, it is recommended to pass in pure air for 3-5 minutes or make sure there is no combustible/toxic gas in the surrounding environment before proceeding;

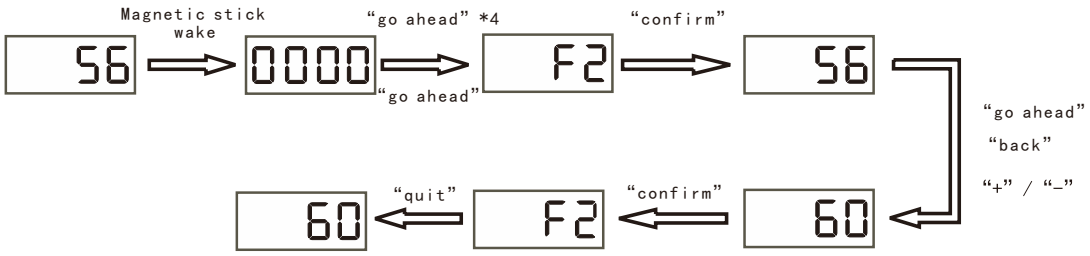
B. Zeroing should be done during installation, regular maintenance and calibration, and should be done after the instrument has been working normally and stably for more than half an hour, otherwise the accuracy of the instrument will be affected;

C. It is recommended that the periodic maintenance of the instrument should be carried out once every half a year, and the maximum period should not exceed one year.

6.2 Calibration

The calibration function is realized through the menu "F2", which is used to calibrate the instrument by calibrating the range of the detector

on site. Calibration of the instrument needs to be carried out in the presence of a standard gas, the specific operation method is as follows:



a. Before calibration, first carry out "zero setting", the specific method refers to "6.1 Zeroing";

b. After the zero setting is completed, open the standard gas valve, adjust the float flowmeter, set the flow rate to 0.5L/min, connect the float flowmeter and the instrument calibration gas cover with PTFE tube, and let the standard gas pass into the instrument;

c. The standard gas is continuously passed into the instrument, wait for the instrument display value to stabilize (about 60 seconds), if there is a difference between the displayed concentration value of the instrument and the standard gas concentration value, adjust the displayed concentration value to the standard gas concentration value;

d. Press the "Wake Up" button with a magnetic bar through the explosion-proof glass (without opening the cover), the display will enter the password input interface and display 4 blinking "0000";

e. Remote control to press the "forward" key 4 times, enter the password, the display enters the menu interface, the default display "F1;

f. Continue to press the "forward" key with the remote control to find the menu "F2";

g. Press "Confirm" key with remote control, the display will enter the calibration interface and show the current concentration value.

h. Press the "back" key and "forward" key with the remote control to adjust the cursor position, and use the "+" key and "-" key to adjust the value to match the standard

value.

i. Press the "Confirm" key with the remote control to carry out the calibration, return to the menu interface and display "F2".

j. Finally, press "Exit" again with the remote control, the display will return to the main interface and show the adjusted concentration value (the same as that of the standard gas, if it is different, repeat the steps d to j above), withdraw the standard gas and complete the instrument calibration.

Attention:

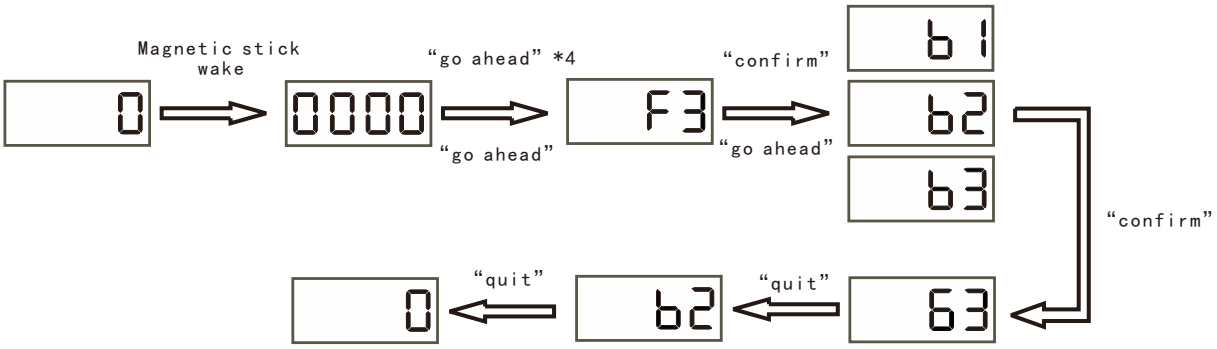
A. Each set of instrument has been debugged before leaving the factory, please do not modify it privately, otherwise the accuracy of the instrument will be affected;

B. When the instrument is calibrated, the accuracy of the standard gas used must be ensured, otherwise the accuracy of the instrument cannot be guaranteed;

C. The instrument must be "zeroed" and "calibrated" before calibration.

6.3 Other Function Settings

6.3.1 Sensor status



b1: Sensor Status, 00, Normal; 01, Warm-up; 04, Signal Abnormal; 08, Drift; 16, Temperature Abnormal;

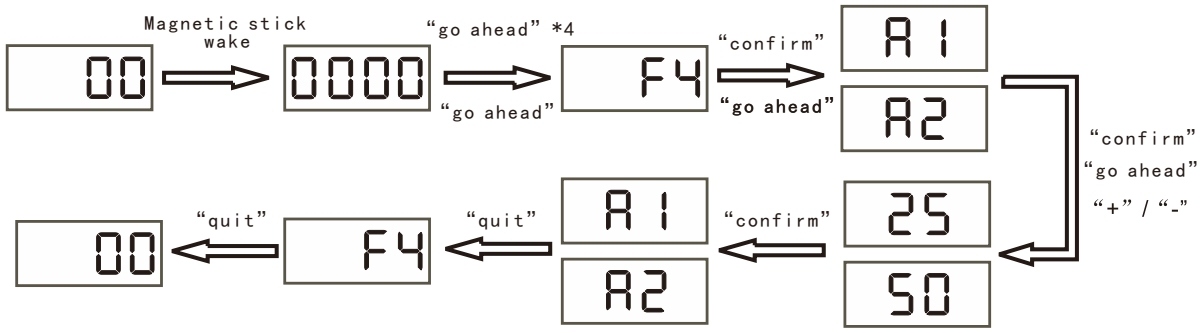
b2: Sensor Humidity; b3: Sensor Concentration;

64, Temperature Overrun;

6.3.2 Alarm setting

The "Alarm Setting" function is used to set the alarm value of the detector, usually including the first stage alarm (i.e., low alarm), and the second stage alarm (i.e., high alarm), and the factory default alarm value is:

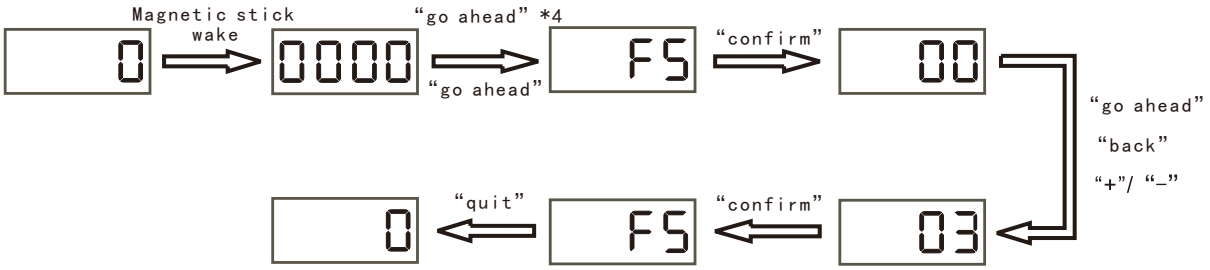
first stage alarm, 25% LEL; second stage alarm, 50% LEL, the specific operation method is as follows:



Note: A1: 1-stage alarm; A2: 2-stage alarm

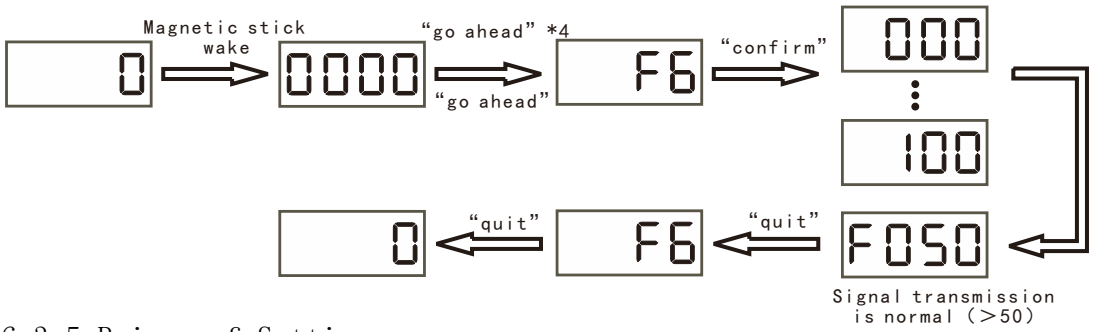
6.3.3 Address Setting

Set the detector address; detectors with the same channel cannot have the same address, as follows:



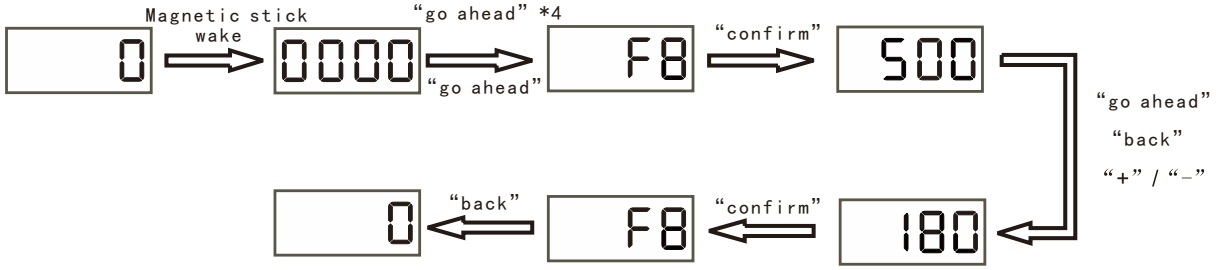
6.3.4 Signal test

The "Signal Test" function is used to test the communication strength between the detector at the current position and the controller. Make sure the wireless controller is in normal working condition before testing. After entering the test mode, the detector sends data to the controller 100 times from 1-100, and finally displays FXXX to indicate the success rate. The specific operation method is as follows:



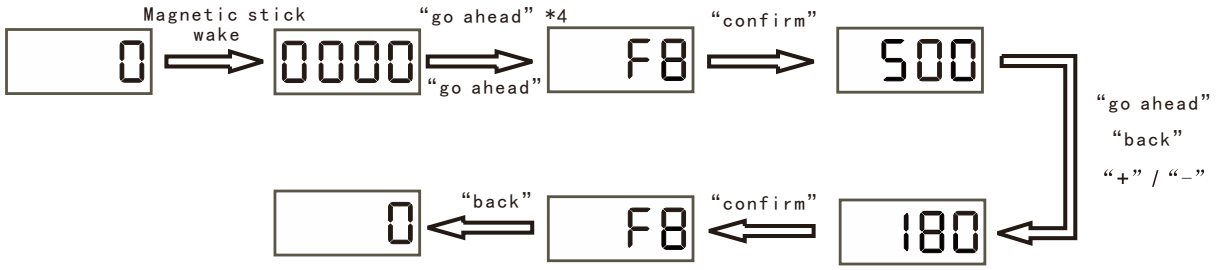
6.3.5 Rainproof Setting

The function of "Rainproof Setting" is used to avoid the sensor abnormality in high humidity environment such as rain, the range is 80-99, please set it under the guidance of the manufacturer, the default is 90.



6.3.6 Gas coefficients

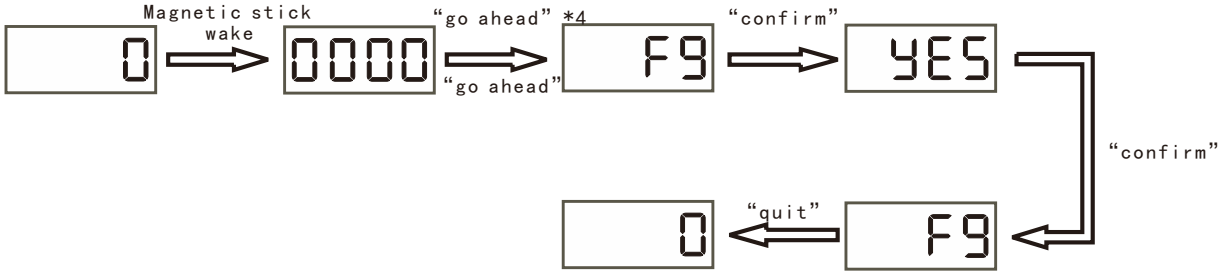
The "gas coefficient" function is used to set the conversion coefficients corresponding to different calibration gases, including methane 500, isobutane 180, propane 200; the specific operation method is as follows:



6.3.7 Restore Defaults

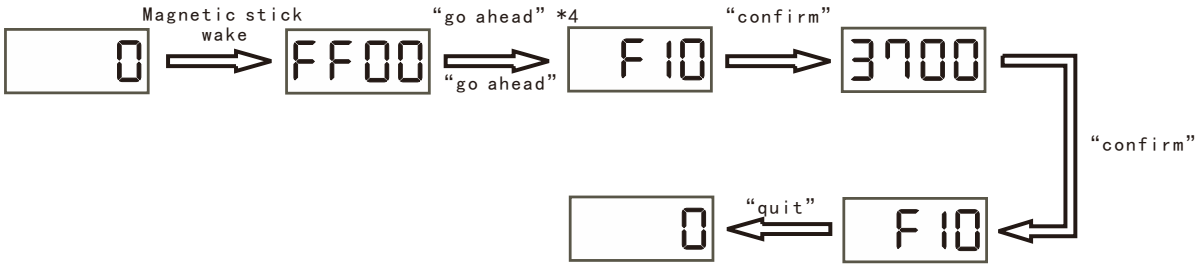
The "Restore Defaults" function is used to restore the default settings of the sensor; use F9 to operate the sensor when it is zeroed, calibrated,

or in other abnormal sensor states under error conditions. The specific operation method is as follows:



6.3.8 Supply Voltage

The "Supply Voltage" function is used to view the detector battery voltage.

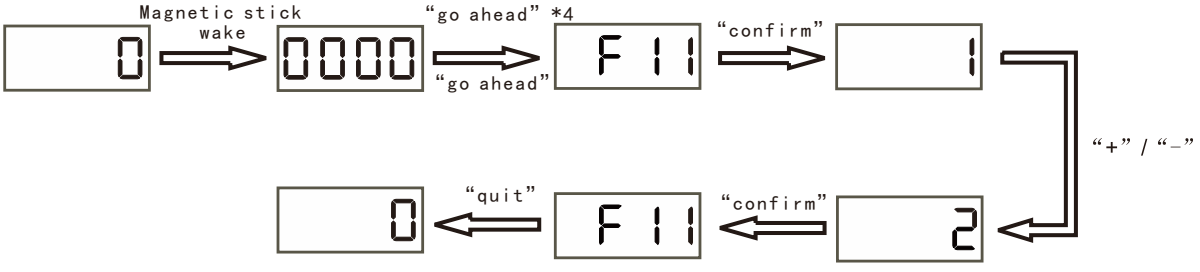


6.3.9 Channel setting

The function of "channel setting" is used to set the communication channel between the detector and the controller, at present, it supports 6 channels, range 0-5, please communicate with the manufacturer for other channels; the specific operation methods are as follows:

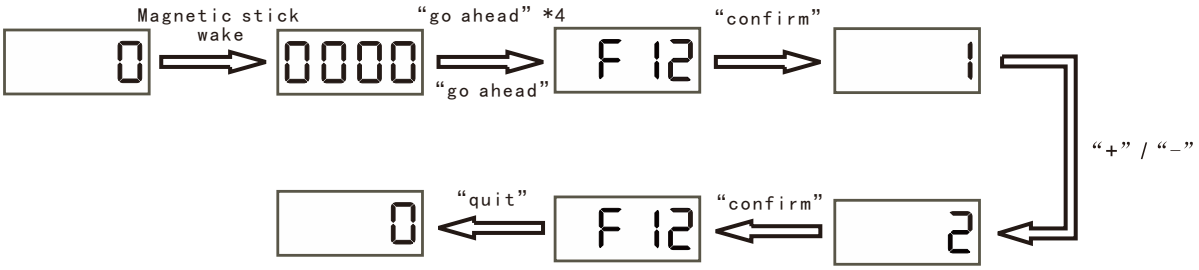
Channel 0: 436M; Channel 1: 433M; Channel 2: 430M;

Channel 3: 426M; Channel 4: 423M; Channel 5: 413M;



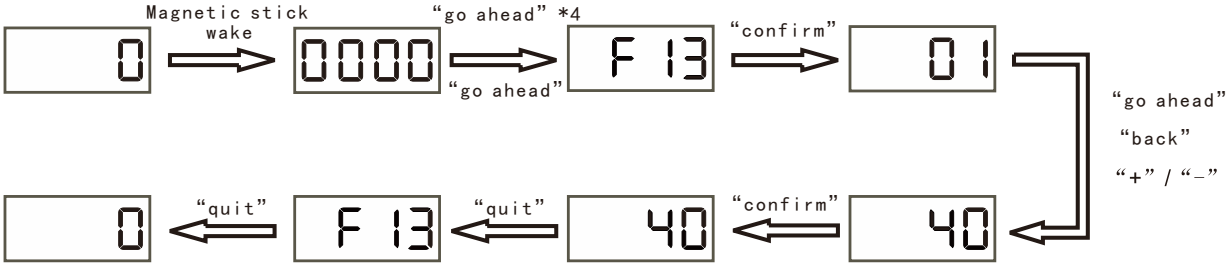
6.3.10 Gas unit

The "Unit Setting" function is used to set the unit of the detector, there are 4 display modes; Mode 0: no display; Mode 1: %LEL; Mode 2: %VOL; Mode 3: ppm; the specific operation methods are as follows:



6.3.11 Simulating alarms

The "Simulate Alarm" function is used to simulate the detector concentration alarm, test the communication, linkage and other functions; The specific operation method is as follows:



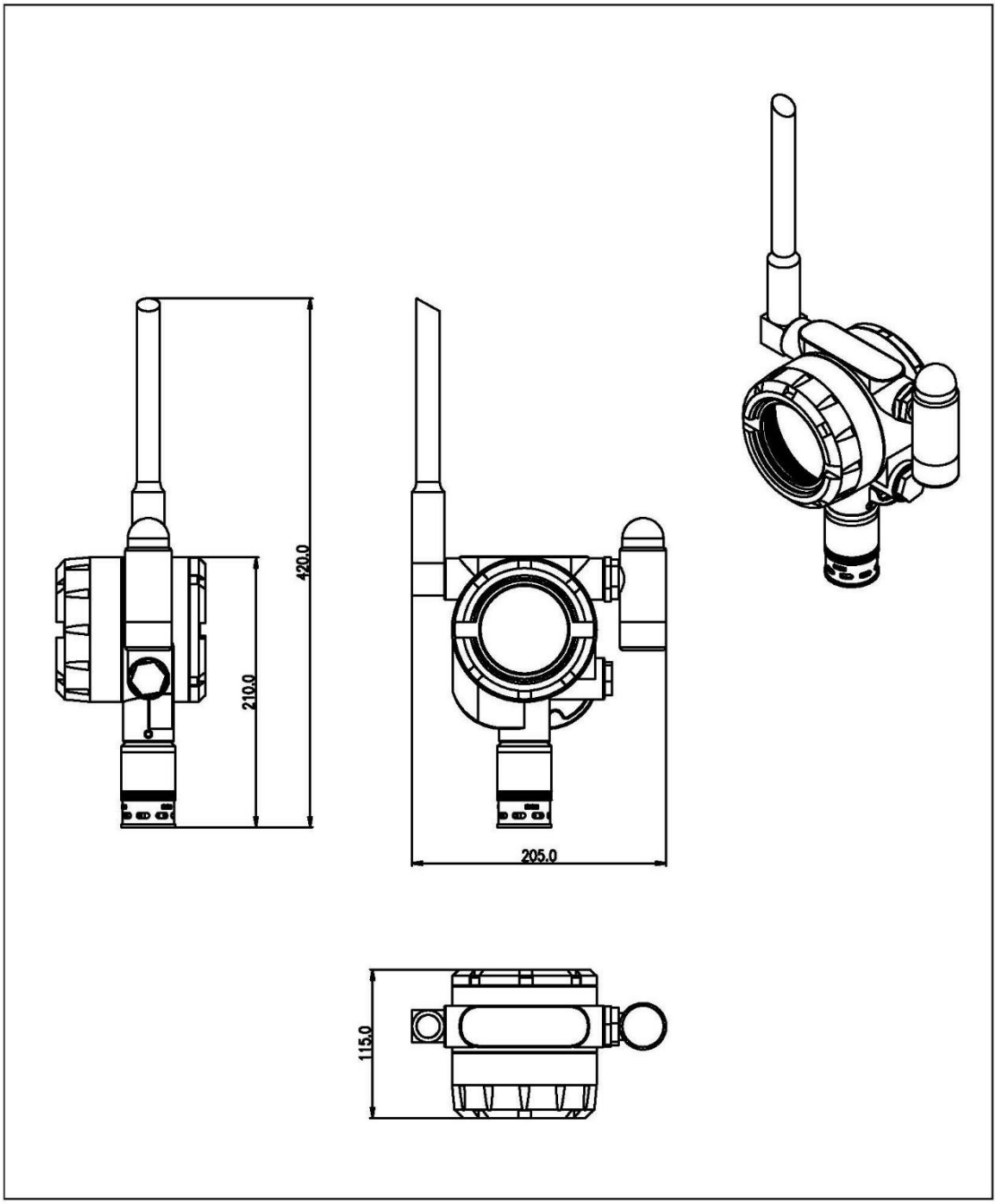
★When the test is completed, you must press the "Exit" button to exit;

7. Common Problems and Handling Methods

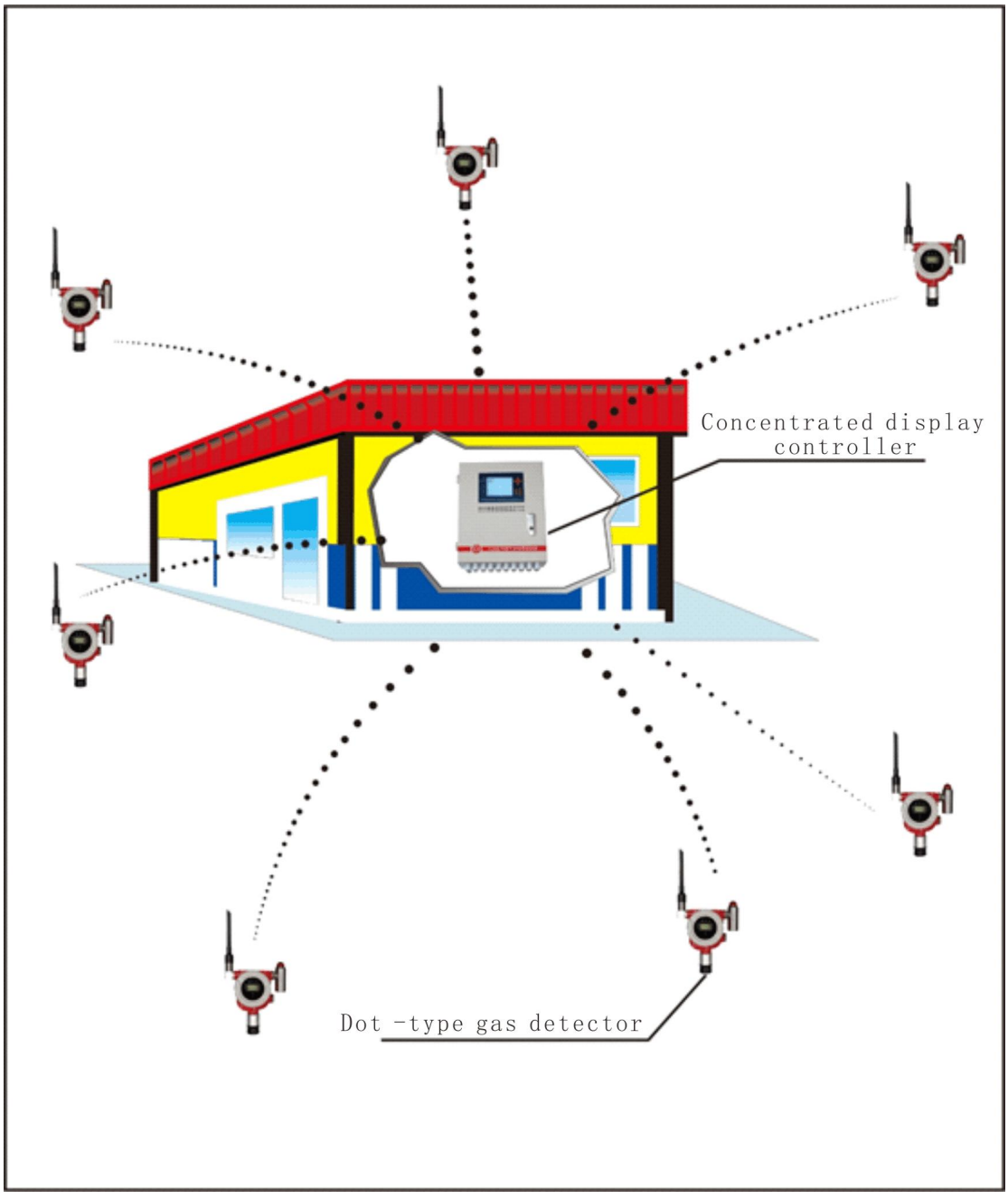
Problem Phenomenon	Cause	Treatment
"Low battery" is displayed	Battery is low	Replace the battery
"Fault" is displayed	Loose or damaged sensor	Contact factory for repair
No leakage, concentration value displayed	Drift	F1 zeroing
Detector and controller concentration display is not consistent, there is a large deviation	Wireless transmission communication failure	F6 Test signal strength, check wireless transmission communication path.
Controller displays "Connection line failure".	a. Wireless transmission communication failure; b. Detector signal abnormality; c. Controller wireless receiver module failure	a. Check the wireless transmission communication path; b. Check if the detector is normal; c. Contact the manufacturer and replace the module.
Ventilation calibration no response	a. Zero point setting deviation is too large; b. Range calibration	a. F1 reset the zero point; b. Use standard gas F2

	deviation is too large. c. Calibration gas and detector calibration gas is not consistent	to re-calibrate. c. Replace the consistent standard gas
Detector and controller false alarm	a.Zero point drift; b.Calibration settings are set incorrectly; c.Controller alarm setting value error	a. F1 reset zero point and reset controller; b. Recalibrate using standard gas F2 and reset controller; c. Reset the controller alarm value and reset the controller.

Appendix I Detector External Dimensions



Appendix II Schematic diagram of the field system



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