Point-type Combustible Gas Detector

GTYQ-FGA1000P

User Manual

QINGDAO ALLRED ELECTRONICS CO., LTD.

CONTENT

Precautions

Anyone who may use or maintain the detector should read the instruction manual carefully and check whether the nameplate, specifications, and explosion-proof type meet the requirements before using and installing the detector.

1. Non-professionals are not allowed to install or disassemble at will.

2. After unpacking, please check whether the detector is damaged or missing accessories. If you find that the detector is damaged or missing accessories, please contact our company immediately.

3. Be sure to take personal protection when using the product in a toxic gas environment.

4. Avoid electric shock or severe and continuous mechanical impact to the detector.

5. Ambient temperature: combustible gas detector (-40℃~70℃),

6. Battery replacement must be done with a special battery and under conditions with good ventilation and no gas leakage.

7. It is strictly prohibited to disassemble, charge, replace batteries, etc. in dangerous places.

8. Products that have passed the inspection are not allowed to replace components or change the structure at will, so as not to affect explosion protection and product performance.

9. The installation of this product must be carried out in accordance with the relevant requirements of Explosive atmospheres-Part 15: Electrical installations design, selection and erection.

10. The explosion-proof mark of the equipment is Ex ia IIC T6 Ga/Ex ia IIIC $T_{200}80℃$ Da, which is suitable for Zone 1 and Zone 2, and places containing explosive gas mixtures of categories IIA to IIC, T1 to T6; it has passed the inspection by the China National Quality Supervision and Test Centre for Explosion Protected Electrical Products and obtained the

explosion-proof certificate

Foreword

This manual introduces the working principle, technical parameters, installation, application, maintenance and other precautions of the GTYQ-FGA1000P series point type combustible gas detectors for industrial and commercial purposes. The detector should be used in conjunction with the ACR3000 combustible gas alarm controller produced by our company. For detailed product information, please refer to the relevant chapters of this manual.

Safety Tips

This detector is explosion-proof equipment, and the explosion-proof mark is: Ex ia IIC T6 Ga/Ex ia IIIC $T_{200}80℃$ Da. It is suitable for Zone 1 and Zone 2, and places containing Class IIA~IIC, T1~T6 explosive gas mixtures. If the detector is installed in petrochemical industry, oil fields, oil depots, liquefied gas stations, environmental protection, firefighting and other places where flammable/toxic gases are present, the installer, operator and maintainer of the detector should have basic safety technical knowledge and related equipment. Use knowledge.

Executive Standard

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

GB12358-2006 *Gas monitors and alarms for workplace General technical requirements*

GB3836.1-2021 *Explosive atmospheres-Part 1：Equipment-General requirements*

GB3836.4-2021 *Explosive atmospheres-Part 4：Equipment protection by intrinsic safety "i"*

GB/T4208-2017 *Degrees of protection provide by enclosure (IP code)*

JJG693-2011 *Calibration regulations for combustible gas detection alarms*

GB/T50493-2019 *Standard for design of combustible gas and toxic gas detection and alarm for petrochemical industry*

Other Information

The content of this manual is the copyright of Qingdao Allred Electronics Co., Ltd. For the latest information on products related to this manual, please log on to the company's website www.allredgd.com or contact Qingdao Allred Electronics Co., Ltd. (+86 0532-86766369).

1. Introduction

1.1 Function

GTYQ-FGA1000P is a point-type combustible gas detector (hereinafter referred to as the detector) for industrial and commercial purposes. It uses a low-power infrared sensor, battery power supply, wireless communication, continuous monitoring, and simple installation. It is an intrinsically safe detector suitable for explosion-proof places.

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 set value, it will send out an audible and visual alarm signal to remind the staff on site to handle the leakage or avoid risks in a timely manner. Detectors are widely used in petrochemical industry, oil fields, oil depots, liquefied gas stations, gas stations and other places where flammable gases may exist.

1.3 Principle

Infrared sensors use the infrared light absorption effect of combustible gases on specific wavelengths to measure the concentration of combustible gases. The specific calculation follows the Lambert-Beer law and detects infrared light of a specific wavelength on a fixed long path. Through the change in infrared light intensity, the concentration of combustible gas on the fixed long path can be calculated.

1.4. Technical Parameters

Performance parameters

Detection method: diffusion type	Gas type: HC combustible gas
Calibration gas: methane, isobutane	Detection range: 0~100%LEL
Indication error: $\leqslant\pm3\%FS$	Resolution: 1%LEL
Repeatability: 2%	Response time: $\leqslant30S$ (T90)

Alarm value: 1 stage alarm 25% LEL; 2 stage alarm 50% LEL (default value)

Electrical parameters

Operating voltage: 3.6V	Average power consumption: 1mA
Main battery capacity: 57Ah	Backup battery capacity: 2200mAh

Maximum power: 0.5W

Battery life: 5 years (LORA signal)

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

Usage environment

Operating temperature: -40℃～70℃   Working humidity: 0%RH～95%RH (non-condensing)

Explosion Proof Classification: Ex ia IIC T6 Ga/Ex ia IIIC $T_{200}80$℃ Da

Ingress protection: IP66

Pressure range: (86~106) kPa

Structural parameters

Sound and light alarm: integrated sound and light alarm

1.5. Product Appearance

2. Installation

2.1 Installation Position and Requirement

According to the requirements of GB/T50493-2019 "Design Standard for Detection and Alarm of Combustible and Toxic Gases in Petrochemical Industry", the installation of flammable/toxic gas detectors should meet the following requirements:

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

When detecting flammable gases or toxic gases that are heavier than air, the detector should be installed at a height of 0.3m to 0.6m from the floor (or floor); when detecting flammable gases or toxic gases that are lighter than air, the detector should be installed at The installation height should be within 2.0m above the release source. When detecting flammable gases or toxic gases that are slightly heavier than air, the detector should be installed 0.5m to 1.0m below the release source; when detecting flammable gases or toxic gases that are slightly lighter than air, the detector should be installed higher than Release source 0.5m~1.0m.

2.2 Precautions:

a. The power and address of the detector should be checked before installation;

b. The detector should be installed as far away from high-power equipment as possible;

c. Try to avoid installing the detector in a location that is completely covered by metal to prevent signal transmission from being restricted;

d. In order to ensure the normal use of the detector, any operation on the detector must be performed by professionally trained personnel, and random

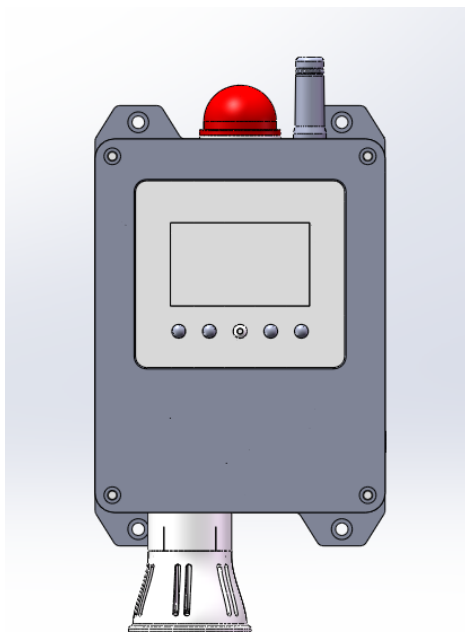operation of the equipment is strictly prohibited;

e. Disassembly is strictly prohibited.

2.3 Installation of rain cover

2.3.1 Install the rain cover under the sensor
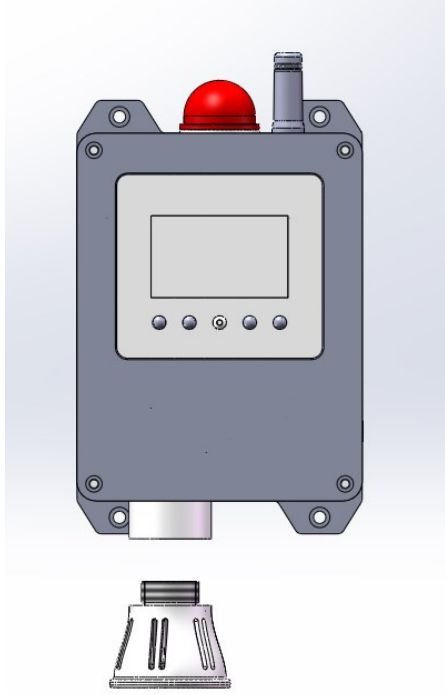
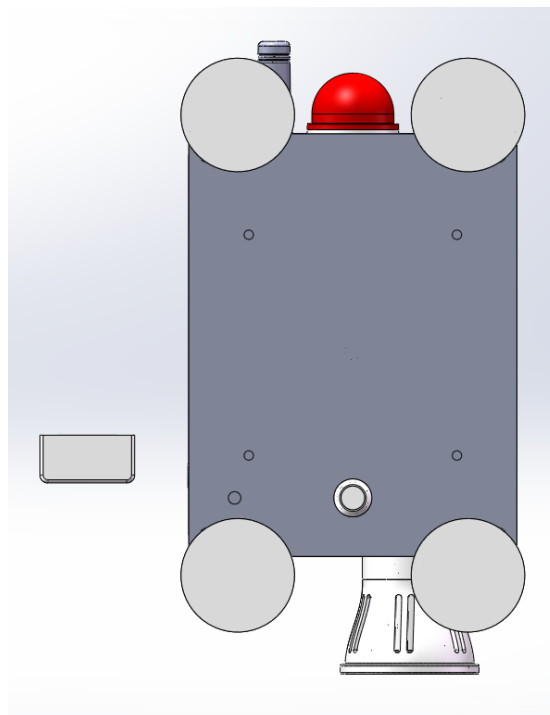### 2.3.2 Effect after installation

2.4 Instrument Installation

The installation method supports magnetic installation, and wall-mounted installation;

2.4.1 Magnetic Installation

Use the magnetic backing plate to attach the detector to the iron surface, as shown below;

（1）The left side is the anti-theft clasp and the right side is the detector;
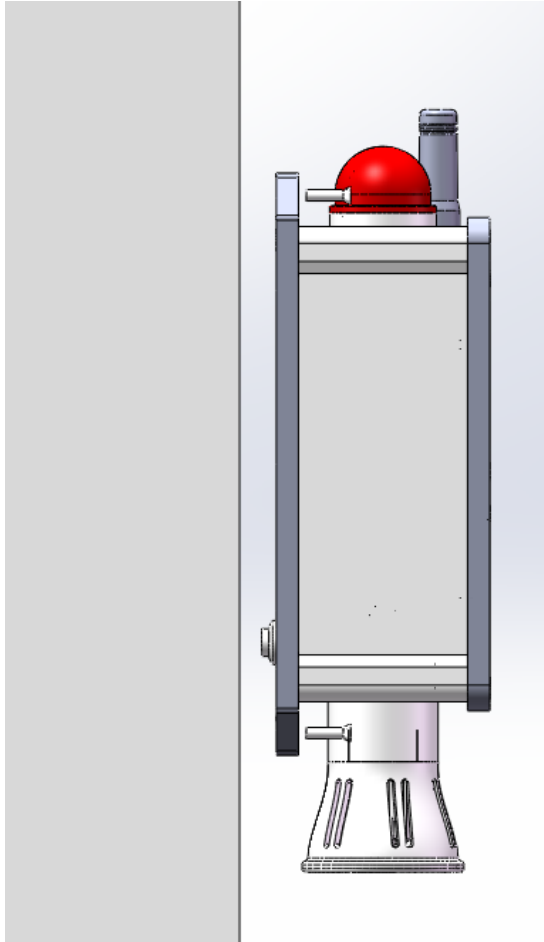
(2) Use glue to fix the anti-theft clasp on the installation surface;

Align the anti-theft switch on the back of the device with the anti-theft clasp;

use the magnetic plate to attach the device to the installation surface.
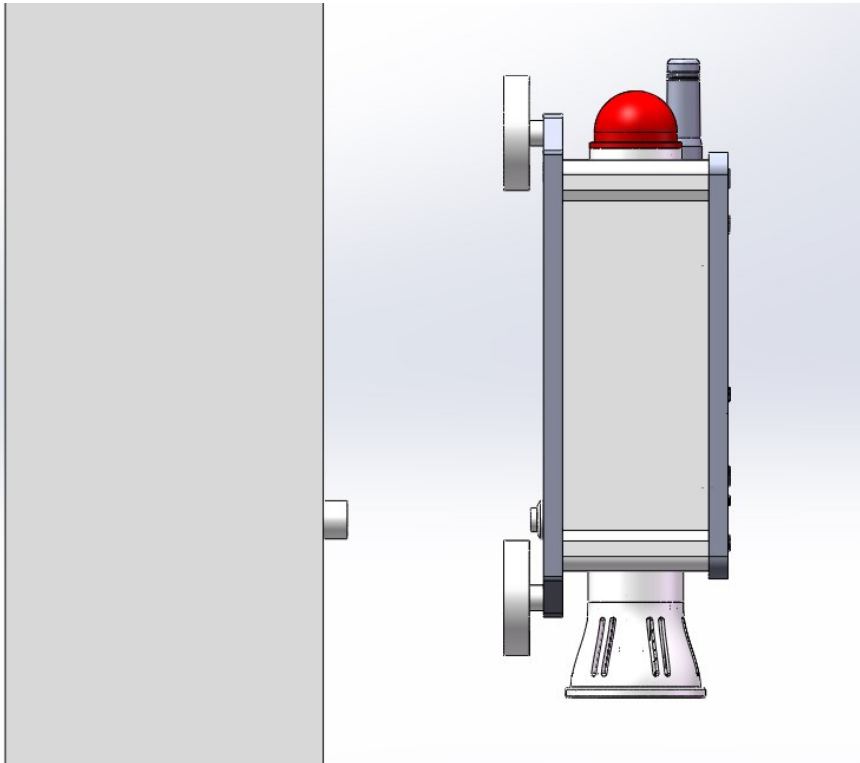
2.4.2 Wall-mounted Installation

Use self-tapping screw to install the detector, as shown

2.5 Commissioning

a. Check whether the detector number is consistent with the detection number bound to the controller; if not, adjust the controller binding number;

b. Check whether the detector number and detector address are consistent; if they are inconsistent, refer to Chapter 4.3.3 to set the detector address.

c. The anti-theft alarm is turned off by default. If it is installed magnetically, the anti-theft alarm can be turned on. For the setting method, please refer to Chapter 4.3.12;

d. Observe whether the controller displays the detector concentration and power; if not, wait for 10 minutes; for other questions, please refer to Chapter 5;

3. Operation

3.1 Main Display Page
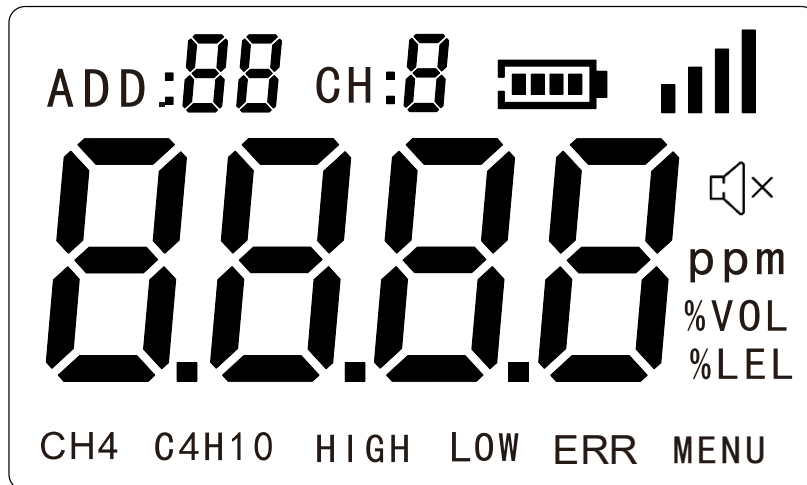
"ADD.": Detector address, showing the tens and ones digits of the detector number, which can display 0-99;

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

Power: Battery power

Gas concentration: flammable gas 0-100% LEL;

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

"CH4 C4H10":　 Gas type,methane, isobutane;

"LOW": low alarm, the detector is in low alarm status;

"HIGH": high alarm, the detector is in high alarm status;

"ERR": fault, the detector is in fault status;

3.2 Indicator Light

Normal light: green, the detector is in normal state;

Fault light: yellow, detector fault status;

Alarm light: red, detector alarm status;

Anti-theft alarm light: red, anti-theft alarm status;

3.3 Turn On and Off

The right side of the device is the "power switch". Press and hold to turn on and off the device, and press it briefly to turn on the remote control function;

The detector is on. Press and hold the "power switch" for 5 seconds to turn off the detector;

The detector is turned off. Press and hold the "power switch" for 5 seconds to turn on the detector;

Short press the "power switch" to turn on the remote control function.

3.4 Remote Control

Introduction to detector remote control, the specific button functions are as follows:

"Confirm" key: used to enter various levels of menus and confirm setting values

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

"Forward" key: used to advance the submenu; move the cursor position;

"Back" key: used to go back in the submenu; move the cursor position;

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

"-" key: used to reduce the value at the cursor position;

★Before remote control operation, you must press the "power switch" to turn on the remote control operation function of the detector;

3.5 Shortcut Button

Press the "power switch" once and press the "confirm key" on the remote control. After "0000" is displayed, enter the password "+" 4 times to turn on the anti-theft function;

Press the "power switch" once and press the "confirm key" on the remote control. After "0000" is displayed, enter the password "-" 4 times to turn off the anti-theft function;

Press the "power switch" once and press the "confirm key" on the remote

control. After "0000" is displayed, enter the password 4 times and "back" to send the data to the controller;

3.6 Anti-theft Alarm

After turning on the anti-theft alarm:

If the equipment moves abnormally and is not restored to its original state, the detector will continue to alarm against theft. Please handle it as soon as possible and restore it to its original state;

If the equipment moves abnormally and returns to its original state, the detector will sound an anti-theft alarm. It will return to normal after 30 seconds. Please check the cause of the alarm;

4. Menu

F 1	:Zero Set	F 2	:Calibration
F 4	:Alarm Setting	F 3	:Gas Type
F 5	:Address Setting	F 6	:Signal Test
F 7	:Rainproof Setting	F 8	:gas coefficient
F 9	:Restore Default	F 10	:Power Voltage
F 11	:Channel Setting	F 12	:gas unit
F 13	:simulation alarm	F 14	:anti-theft setting

First, press the "power switch" briefly, and then use the remote control to operate. The specific operation method is as follows;

4.1 Zero Set

The zero adjustment function is realized through the menu "F1" and is used to correct the zero point drift of the on-site detector. Before zero adjustment, the instrument needs to work normally and stably for more than half an hour. The specific operation method is as follows:
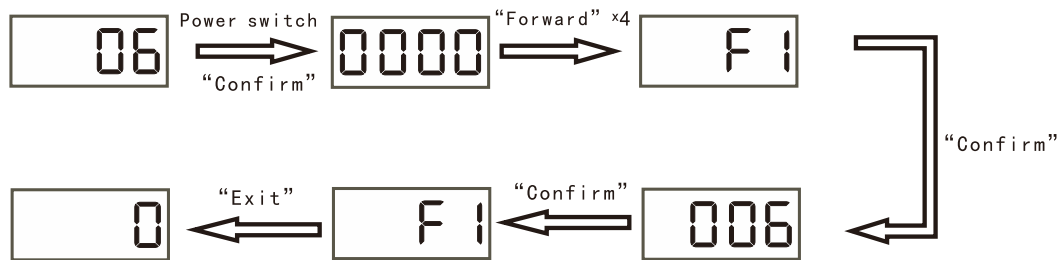
a. When the instrument is free of flammable/toxic gases at the site, the instrument will drift in value and the instrument needs to be set to "zero";

b. Short press the "power switch" once, press the "confirm key" and the display will enter the password input interface, showing 4 flashing "0000";

c. Press the "Forward" key 4 times, enter the password and the display will enter the menu interface. "F1" will be displayed by default;

d. Press the "Confirm" button, the display will enter the zero adjustment interface and display the current drift value;

e. Continue to press the "Confirm" key, and the display will re-enter the menu interface and display "F1";

f. Finally, press the "Exit" key again. The display will return to the main interface and display "0" to complete the zero adjustment setting.

Notice:

A. Before performing the zero adjustment operation, it is recommended to vent pure air for 3-5 minutes or ensure that the surrounding environment is free of flammable/toxic gases before proceeding;

B. Zero adjustment must be carried out during instrument installation, regular maintenance and calibration, and must 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 time of the instrument is once every six months, and the maximum period should not exceed one year.

4.2 Calibration

The calibration function is realized through menu "F2" and is used for on-site detector range calibration and instrument calibration. Calibrating the instrument needs to be done with standard gas. The specific operation method is as follows:
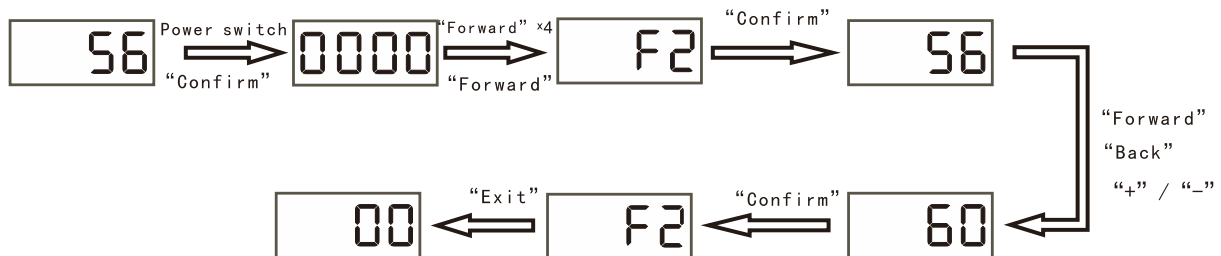
a. Before performing calibration settings, perform "zero setting" first. For specific methods, refer to "4.1 Zero Setting";

b. After the zero adjustment is completed, open the standard gas valve, adjust the float flowmeter, set the flow rate to 0.5L/min, and use a polytetrafluoroethylene tube to connect the float flowmeter and the instrument calibration gas cover to allow the standard gas to flow into the instrument;

c. Continuously flow the standard gas into the instrument, and wait until the instrument's indication value stabilizes (flammable for about 30 seconds, toxic for about 1 minute). If there is a difference between the concentration value displayed by the instrument and the standard gas concentration value, adjust the displayed concentration value to the standard gas concentration value. ;

d. Press the "power switch" once and press the "confirm key". The display will enter the password input interface, showing 4 flashing "0000";

e. Press the "Forward" key 4 times, enter the password, and the display will enter the menu interface, with "F1" displayed by default; continue to press the

"Forward" key once to go to the menu "F2";

f. Press the "Confirm" key and the display will enter the calibration interface;

g. Press the "forward" key, "backward" key, "+" key and "-" key to adjust to the current standard gas concentration value;

h. Press the "Confirm" key to calibrate, the display will return to the menu interface and display "F2";

i. Finally, press the "Exit" key, and the display will return to the main interface, showing the adjusted concentration value (same as the standard gas, if different, repeat steps d~j above), remove the standard gas, and complete the instrument calibration.

Notice:

A. Each set of instruments has been debugged before leaving the factory. Please do not modify it without permission, otherwise it will affect the accuracy of the instrument;

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

C. Before the instrument is calibrated, it must be "zeroed" and "calibrated".

4.3 Other Function Settings

4.3.1 Gas Type
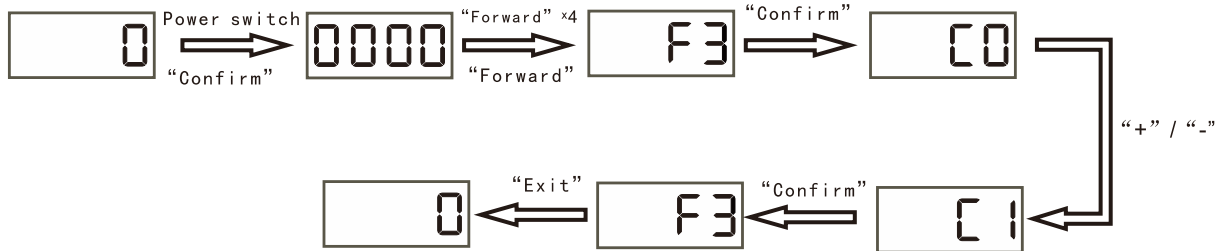
Gas type setting.C1, methane; C4, isobutane; C0, other gases, not displayed;

4.3.2 Alarm Setting

"The "alarm setting" function is used to set the alarm action value of the detector, which usually includes first-stage alarm (i.e. low alarm) and second-stage alarm (i.e. high alarm). The factory default alarm value is: first-stage alarm, 25 %LEL; second-stage alarm, 50%LEL, the specific operation method is as follows:
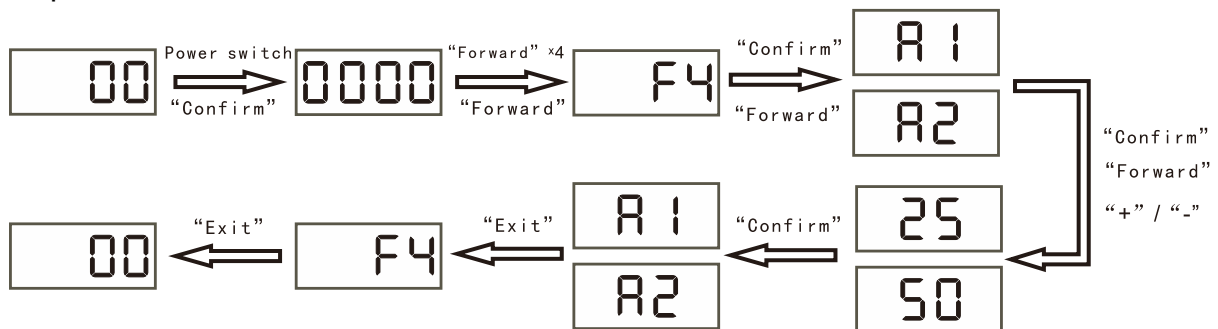
Note：A1：first-stage alarm；A2: second-stage alarm

4.3.3 Address Setting

The "Address Setting" function is used to set the detector address, which should be the same as the detector number; detectors on the same channel cannot have the same address. The specific operation method is as follows:
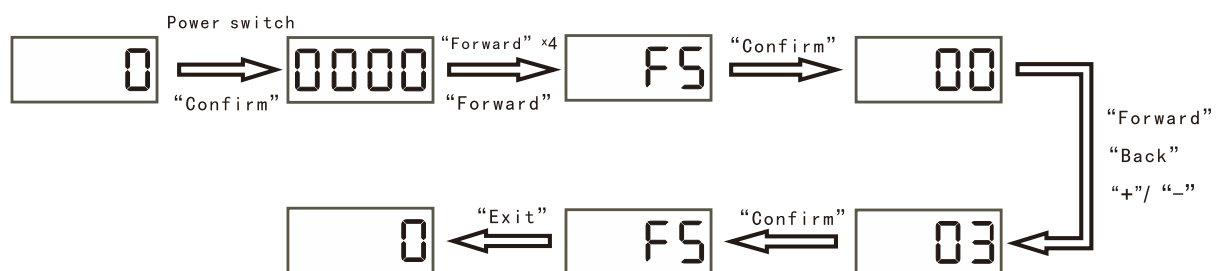
4.3.4 Signal Test

The "Signal Test" function is used to test the communication strength between the detector and the controller at the current location. Before testing, confirm that the wireless controller is in normal working condition. After entering the test mode, the detector sends data from 1-10 to the controller 10 times, and finally displays FXXX to indicate the success rate. The specific operation method is as follows:
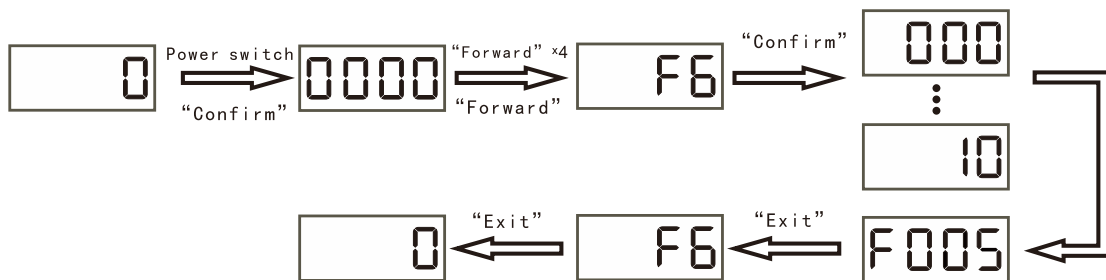
4.3.5 Rainproof Setting

The "Rainproof Setting" function is used to avoid sensor abnormalities in high humidity conditions such as rain. The default is 90 and the range is 80-99. Please modify it under the guidance of the manufacturer.
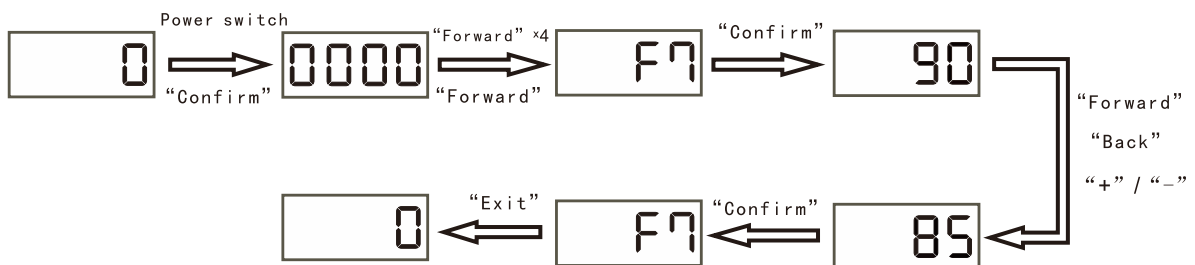
4.3.6 Gas Coefficient

The "gas coefficient" function is used to set the conversion coefficient corresponding to different calibration gases. When the calibration gas type needs to be changed, first change the gas coefficient through F8; gas coefficient: methane 500, isobutane 180, propane 200; specific operation method as follows:

0 →(Power switch / "Confirm")→ 0000 →("Forward" ×4 / "Forward")→ F8 →("Confirm")→ 500 →("Forward" / "Back" / "+" / "–")→ 180 →("Confirm")→ F8 →("Exit")→ 0
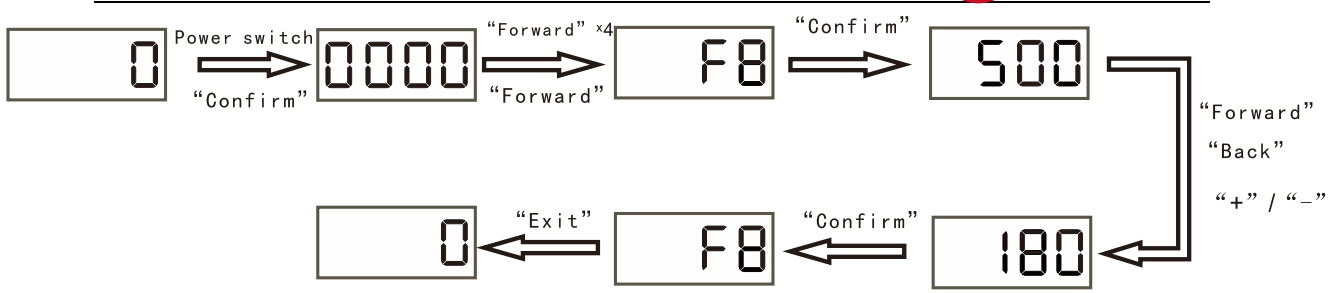
4.3.7 Restore Default

The "Restore Default" function is used to restore the default settings of the sensor without modifying other settings. When the sensor has error conditions, zero adjustment, calibration and other abnormal sensor conditions, use F9 to operate. The specific operation method is as follows:

0 →(Power switch / "Confirm")→ 0000 →("Forward" ×4 / "Forward")→ F9 →("Confirm")→ YES →("Confirm")→ F9 →("Exit")→ 0
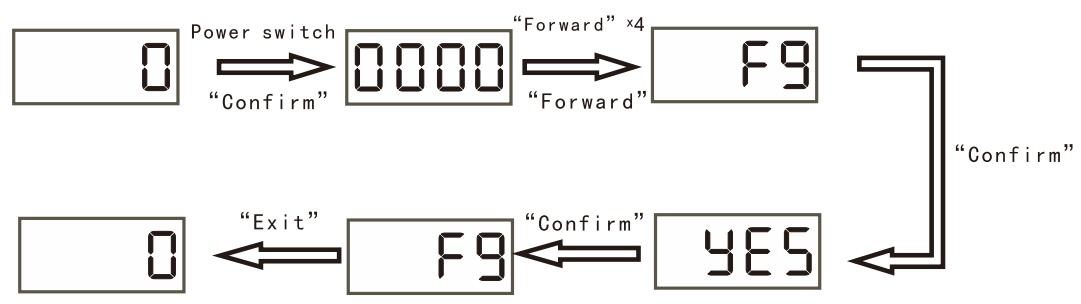
4.3.8 Power Voltage

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

0 →(Power switch / "Confirm")→ FF00 →("Forward" ×4 / "Forward")→ F10 →("Confirm")→ 3700 →("Exit")→ F10 →("Exit")→ 0
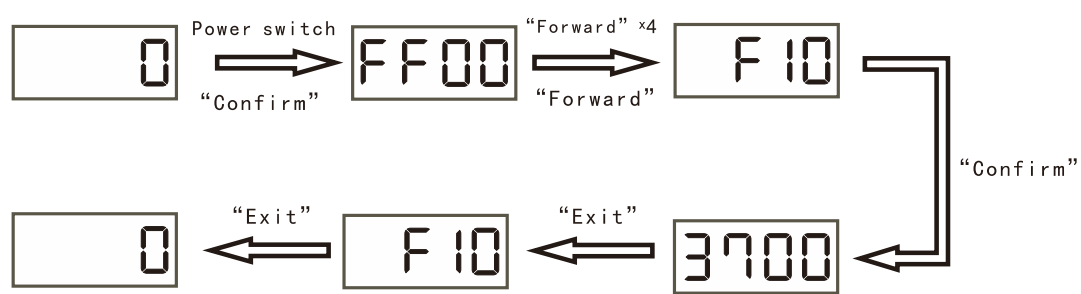
4.3.9 Channel Setting

The "Channel Setting" function is used to set the communication channel between the detector and the controller. Currently, it supports 6 channels, ranging from 0-5. For other channels, please contact the manufacturer; the specific operation method is as follows:

```
  0    Power switch   0000   "Forward" ×4   F 11    "Confirm"      1
       =====>         =====>              =====>
       "Confirm"             "Forward"
                                                                          "+" / "−"
  0    "Exit"   F 11    "Confirm"    3
  <=====        <=====
```
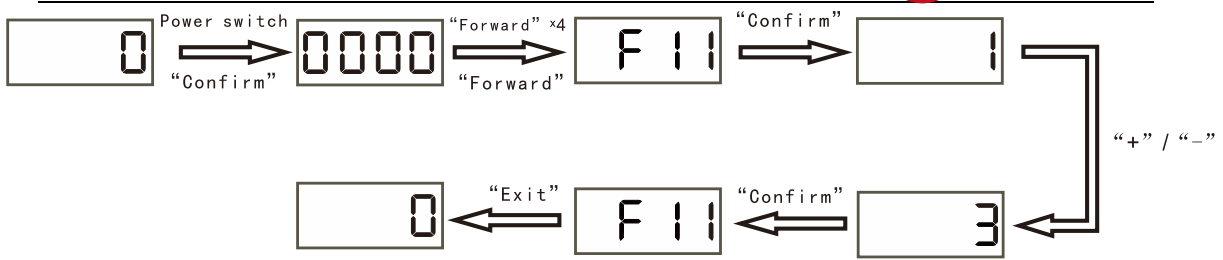
4.3.10 Gas Unit

The "gas unit" function is used to set the unit displayed by the detector, with a total of 4 display modes;The specific operation method is as follows:

```
  0    Power switch   0000   "Forward" ×4   F 12    "Confirm"      1
       =====>         =====>              =====>
       "Confirm"             "Forward"
                                                                          "+" / "−"
  0    "Exit"   F 12    "Confirm"    2
  <=====        <=====
```

Code 0: Not displayed; Code 1: %LEL; Code 2: %VOL; Code 3: ppm;

4.3.11 Simulation Alarm

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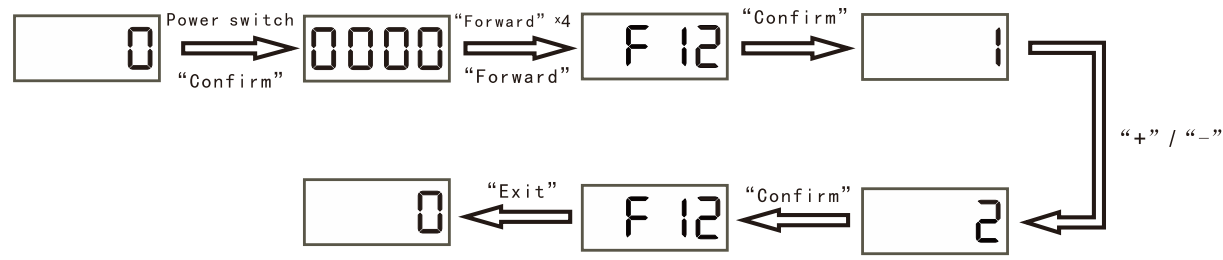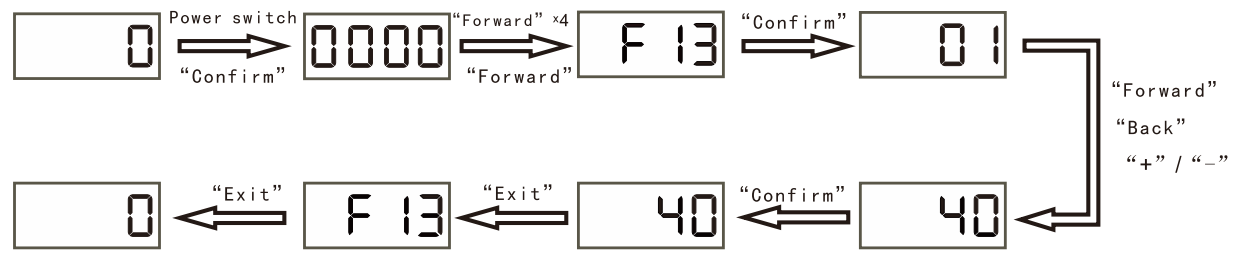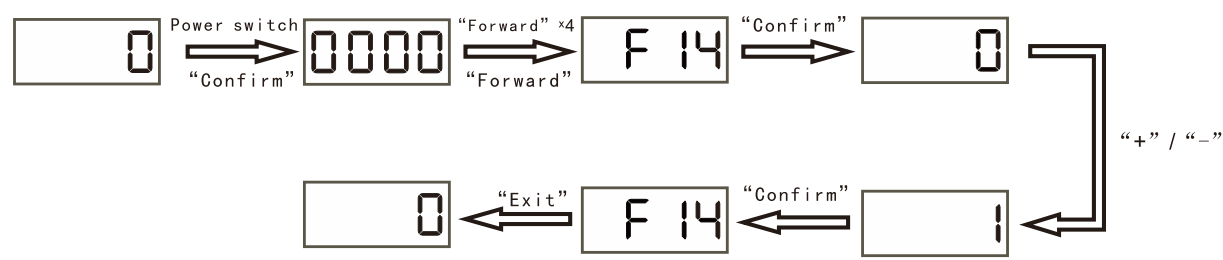The specific operation method is as follows:

```
  0    Power switch   0000   "Forward" ×4   F 13    "Confirm"    01
       =====>         =====>              =====>
       "Confirm"             "Forward"
                                                              "Forward"
                                                              "Back"
                                                              "+" / "−"
  0    "Exit"   F 13    "Exit"   40    "Confirm"   40
  <=====        <=====        <=====
```

After the test is completed, you must press the "Exit" key to exit;

4.3.12 Anti-theft Setting

The "anti-theft setting" function is used to set whether to turn on the anti-theft alarm. Setting it to 0 turns off the anti-theft alarm. Setting it to 1 turns on the anti-theft alarm. The specific operation method is as follows:

```
  0    Power switch   0000   "Forward" ×4   F 14    "Confirm"      0
       =====>         =====>              =====>
       "Confirm"             "Forward"
                                                                          "+" / "−"
  0    "Exit"   F 14    "Confirm"    1
  <=====        <=====
```

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5. Common Problems and Solutions

Problem	Reason	Solution
"Low battery" is displayed	Battery is low	Replacement battery
Show "fault"	Sensor is loose or damaged	Contact the manufacturer for repair
No leakage status, display concentration value	Shift	F1 zero adjustment
Concentration 0, detector sounds and lights alarm	Anti-theft alarm triggered	Install the detector in the correct position and wait 30 seconds
The concentration display of the detector and controller is inconsistent and there is a large deviation.	Wireless transmission communication failure	Test the signal strength and check the wireless transmission communication path.
Controller says "Offline"	a.Wireless transmission communication failure; b. Abnormal detector signal; c. Controller wireless receiving module failure	a. Check the wireless transmission communication path; b. Check whether the probe and controller antenna are normal; c. Contact the manufacturer.

No response from ventilation calibration	a. The zero point setting deviation is too large; b. Range calibration deviation is too large	a. F1 resets the zero point; b. Recalibrate using standard gas F2.
Detector and controller false alarms	a. Zero point drift; b. Calibration settings are set incorrectly; c. Controller alarm setting value error	a. F1 resets the zero point and resets the controller; b. Use standard gas F2 to recalibrate and reset the controller; c. Reset the controller alarm value and reset the controller.

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