

Point Type Combustible Gas Detector

GTYQ-FGA1000L

User Manual

Precautions

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

1. Unprofessional person shall not install and disassemble at will.

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

3. In order to better ensure the detection accuracy and reliability of the detector, it is recommended to carry out a zero adjustment operation before the first use (see "5.3.2.1 One-key zero adjustment" or "5.3.2.3 zero point setting" for details).

4. Personal protection must be done when using products in a toxic gas environment.

5. It is strictly forbidden to wire under the condition of power-on, and make sure that the wiring is correct before it can be energized.

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

7. If the sealing ring and fastener are damaged, they should be replaced in time.

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

9. The outer diameter of the introduced rubber cable must be consistent with the inner diameter of the rubber sealing ring at the inlet port in order to reliably press and seal.

10. Avoid electric shock or violent, continuous mechanical impact of the detector.

11. Equipped with internal and external grounding terminals, reliable grounding during installation to prevent static electricity accumulation and electromagnetic radiation.

12. When wiring, the multi-stranded wire must be safely pressed in the bow washer, and there shall be no loose wire head outside, so as to avoid the formation of discharge.

13. Storage temperature: 0~+40°C, working temperature: -40°C~+70°C, not stored or used in an environment of too high or too low temperature.

14. Instrument components shall not be disassembled or replaced in an explosive gas environment, and shall be replaced in a safe place.

15. During maintenance, pay attention to protect the flameproof surface, and all flameproof surfaces shall not be damaged or corroded.

16. Installation should strictly comply with the relevant requirements of GB/T3836.15-2017 "Explosive atmospheres Part 15: Design, selection and installation of electrical installations"

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Preface

This manual introduces the working principle, technical parameters, installation, application, maintenance and other precautions of GTYQ-FGA1000L Point Type Combustible Gas Detector For Industrial And Commercial Use.

The GTYQ-FGA1000L Point Type Combustible Gas Detector For Industrial And Commercial Use introduced in this manual should be used with the combustible gas alarm controller produced by our company, please refer to the relevant chapter of this manual for details.

Safety

This instrument is flameproof type, explosion-proof mark is: ExdbIICT6 Gb, it is suitable for zone 1, zone 2, containing IIA ~ IIC class, T1 ~ T6 explosive gas mixture place. If the instrument is installed in petrochemical, oilfield, oil depot, liquefied gas station, environmental protection, fire station and other occasions where toxic gases are present, the installer, operator and maintainer of this instrument shall have basic safety technical knowledge and the use knowledge of its related equipment. This instrument has been inspected by the China National Quality Supervision and Test Centre for Explosion Protected Electrical Products (CQST) and meets the following criterias:

GB3836.1-2021 Explosive atmospheres Part 1: General requirements for equipment

GB3836.2-2021 Explosive atmospheres Part 2: Equipment protected by flameproof housing "d"

GB/T 4208-2017 Enclosure protection class (IP code)

Others

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Allred is a wholly-owned subsidiary of Qingdao ALPTEC Safety Equipment Co., Ltd. Allred is committed to the design and development of infrared principle combustible gas detection products, on the basis of the company's years of accumulated technical advantages and industry experience, through breakthrough innovation, master the core technology, launched GT-FGA1000L Point Type Combustible Gas Detector For Industrial And Commercial Use and its supporting products with independent intellectual property rights. For the latest information on products related to this manual, please visit the company's website www.qdallred.com or contact Qingdao Allred Electronics Co., Ltd.

1. Introduction

1.1 Scope of Use

GTYQ-FGA1000L Point Type Combustible Gas Detector For Industrial And Commercial Use uses the principle of non-dispersive infrared to detect the measured gas in the air, which has good selectivity, and has a wide measurement range, no oxygen dependence, stable performance and long life, which can replace the catalytic combustion detector and is widely used in petrochemical, oil field, oil depot, liquefied gas station, environmental protection, fire station and other occasions where combustible gas exists.

1.2 Working Principle

GTYQ-FGA1000L Point Type Combustible Gas Detector For Industrial And Commercial Use adopts the non-dispersive infrared principle, which uses the infrared light absorption effect of combustible gas on a specific wavelength to measure the concentration of combustible gas. In the specific calculation, follow the Lambert-Beer law, detect a specific wavelength of infrared light on a fixed channel path, through the change of infrared light intensity, the concentration of combustible gas on the fixed channel path can be calculated. Convert the concentration of the gas to be measured into an electrical signal, display it on the display screen after single-chip microcomputer processing, and convert it into a 4-20mA signal or RS485 signal for secondary instrumentation.

1.3 Features

1. Choose advanced infrared absorption sensor, long life (8-10 years), non-poisoning, good selectivity (no dependence on oxygen, high concentration will not fail, etc.);
2. With self-test function, the sensor automatically alarms to ensure the safety of use;
3. The remote control is used to operate, which is convenient for the user to adjust the instrument without opening the cover;
4. LED digital display interface, which is intuitive and clear;
5. The signal output can be connected with DCS, PLC and other industrial automation systems.

2. Technical parameters

Detection principle	Non-dispersive infrared (NDIR)
Detection method	Diffusion
Detecting gases	Hydrocarbon gas
Detection range	(3~100)%LEL
Indication error	±3%LEL
Resolution	1%LEL
Alarm value	Low alarm 25%LEL;High alarm 50%LEL; It can be set manually according to the requirements of the site
Response time	<30S (T90)
Operating temperature	-40℃~70℃
Operating humidity	10%RH~95%RH non-condensing
Operating voltage	24VDC
Maximum power	1.5W
Enforce standards	GB 15322.1-2019
Verification procedures	JJG 693-2011
Explosion-proof sign	Ex db IIC T6 Gb/Ex tb IIIC T80℃ Db
Protection level	IP66
Product size	191mm*180mm*117mm(L*W*H)
Weight	2.22KG

3. Structure

3.1 Structure

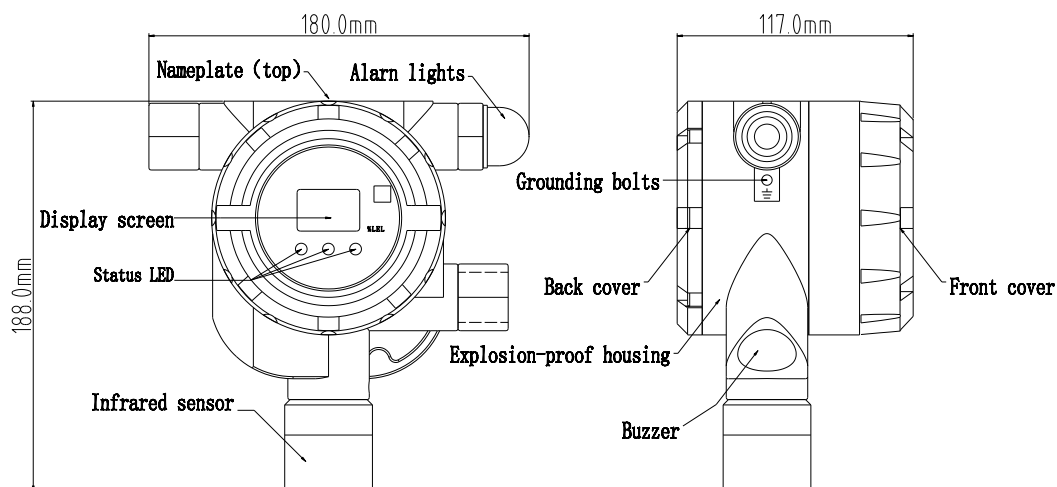


FIG 3.1

3.2 Composition

GTYQ-FGA1000L Point Type Combustible Gas Detector For Industrial And Commercial Use consists of three parts: explosion-proof housing, circuit board assembly and sensor part.

a. Explosion-proof shell: front cover, middle shaft, back cover, shell grounding identification (double-sided), inner grounding bolt, G3/4 electrical interface (double-sided), sound and light alarm light, buzzer, installation interface and nameplate.

b. Board components: main control board, display board and panel.

c. Sensor part: sensor, insert plate base, cover, flameproof cup, fixing sleeve, hydrophobic film and sensor nameplate.

Note:

1. It is strictly forbidden to disassemble the instrument without the permission of Qingdao Allred Electronics Co., Ltd.;

2. The sensor part cannot be decomposed, and it is strictly forbidden to immerse the sensor in water and oil.。

4. Installation

4.1 Installation location and requirements

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

1 The detector should be installed in a place without shock, vibration, strong electromagnetic field interference, and easy to maintain, and the clearance between the detector installation site and the surrounding process pipeline or equipment should not be less than 0.5m.

2 When detecting combustible gas or toxic gas heavier than air, the installation height of the detector should be 0.3m~0.6m from the floor; when detecting combustible gas or toxic gas lighter than air, the installation height of the detector should be within 2.0m above the release source. 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 higher than the release source.

3 The installation height of the ambient oxygen detector should be 1.5m~2.0m away from the floor

4 Linear combustible gas detectors should be installed in large open environments, and the length of their detection area should not be greater than 100m

4.2 Installation method

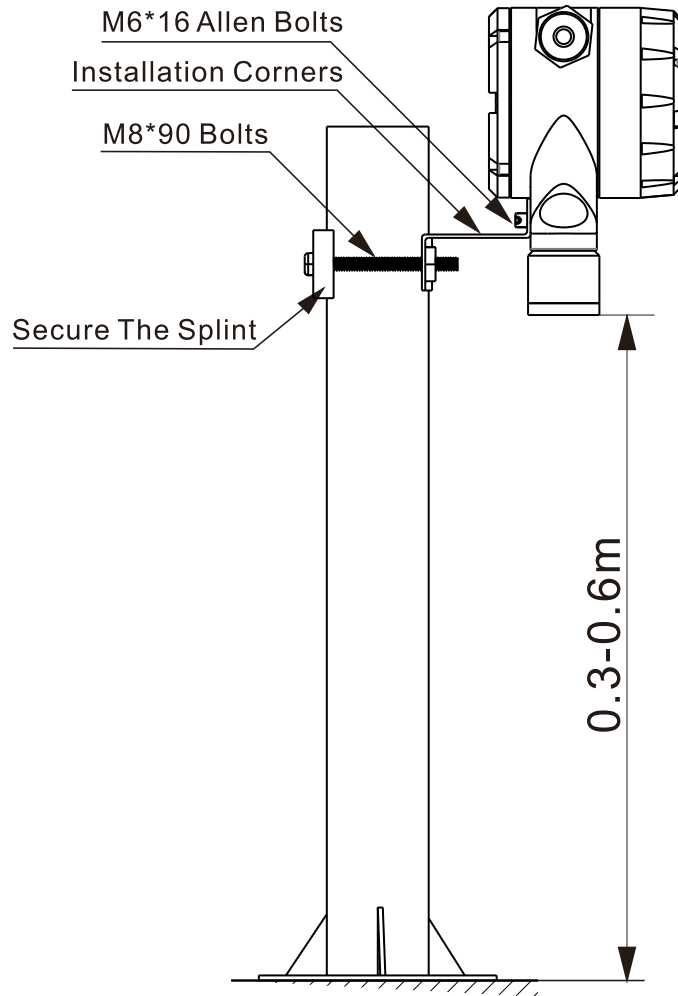


FIG4.1

Note: When the instrument is installed, the air inlet should be fixed downward.

1. According to the site situation, select a suitable position, fix the bracket, and confirm that it is firm;
2. Use the matching fixed splint and installation angle to fix the instrument on the bracket, and the air intake of the instrument is 0.3-0.6 meters from the ground, as shown in Figure 4.1 .

4.3 Wiring method

4.3.1 Cable Selection

The instrument wiring cable is recommended to use RVVP (or KVVP) PVC insulated, PVC sheathed shielded control cable or RVV (or KVV) PVC insulated, PVC sheathed control cable and other shielded cables. When RVV cable is used, the metal tube should be threaded and connected to the controller housing and reliably grounded.

The shield can be attached to the grounding bolt of the detector housing body at the detector end, so it is important to note the single-ended grounding of the detector and

controller.

The maximum transmission distance of the detector and controller is related to how the instrument is connected and depends on the wire diameter of the connecting cable. It is recommended to choose a cable with a wire diameter of 1.5mm^2 or more to ensure the minimum operating voltage of the farthest detector

4.3.2 Breakout system (4-20mA) wiring method

- a. Remove the back cover of the detector and insert the three-core cable from the detector inlet;
- b. Connect the three wires of the three-core cable to the corresponding positions of the detector terminal block, as shown in Figure 4.2 below:
- c. Tighten the back cover, squeeze the cable entry hole, and the grounding bolts of the shell and bracket for safe grounding.

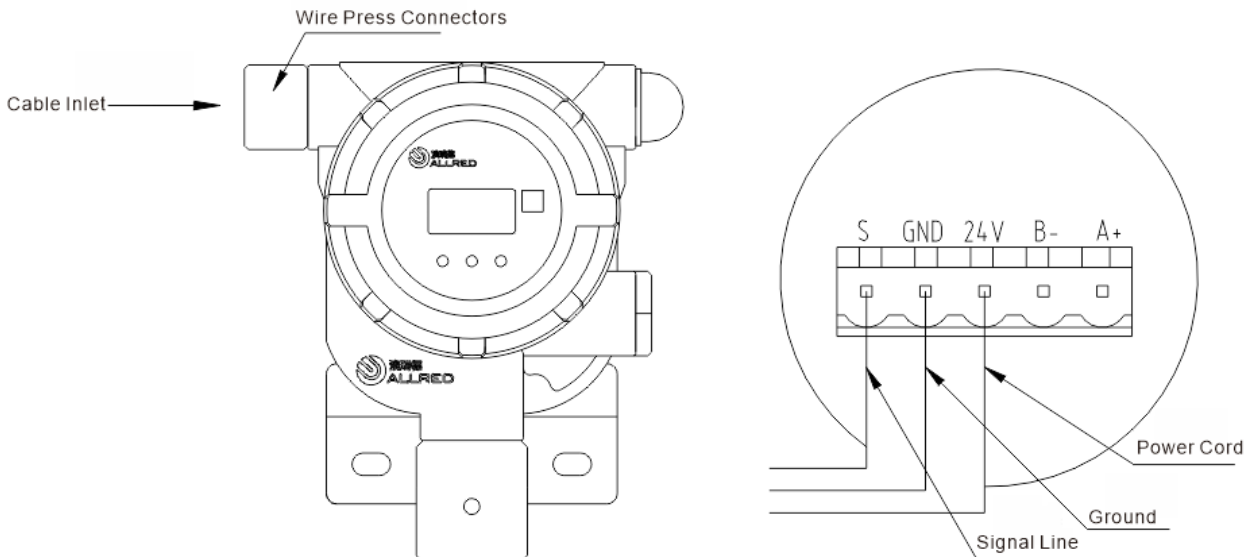


FIG 4.2

4.3.3 Bus system (RS485) wiring method

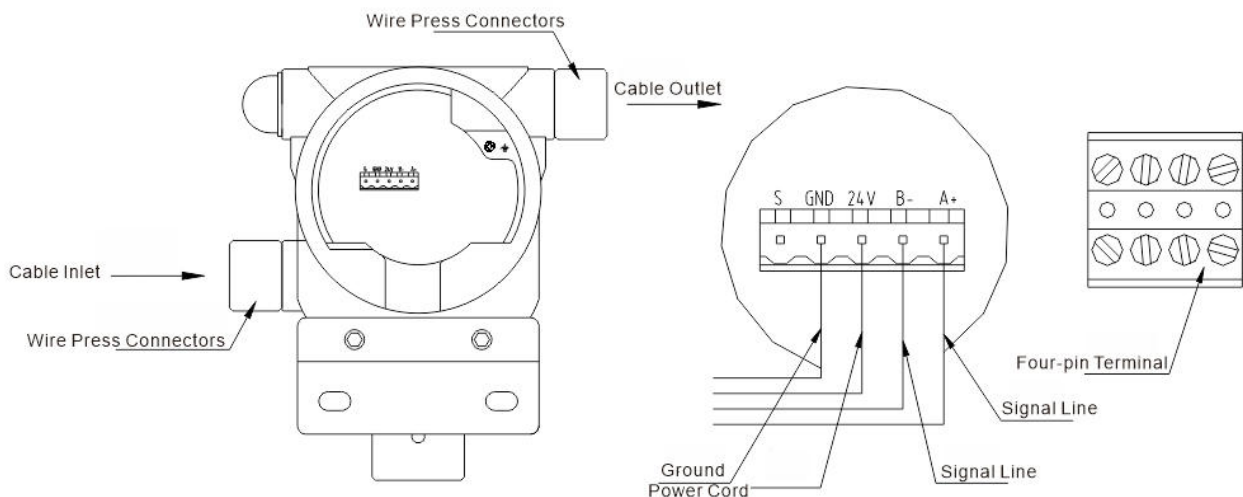


FIG 4.3

- a. Remove the back cover of the detector and insert the four-core cable from the inlet and outlet of the detector respectively;
- b. Connect the four wires of the four-core cable to the corresponding positions of the detector terminal block, as shown in Figure 4.3 below:
- c. Tighten the back cover, squeeze the cable entry hole, and the grounding bolts of the shell and bracket for safe grounding.

5. Product functions and operating instructions

5.1 Remote control operating instructions

Various function settings of the detector can be made through the infrared remote control, and the panel is shown in Figure 5 on the right:

- “OK” : Enter the menus at all levels and determine the set Value;
- “↶” : Exit the menus at all levels;
- “↓” : Move the cursor forward, select sub-menus of different functions and select different digits of the value in the sub-menu;
- “↑” : Move the cursor back, select sub-menus of different functions and select different digits of the value in the sub-menu;
- “+” : Increase the value of the cursor position;
- “-” : Decrease the value of the cursor position.

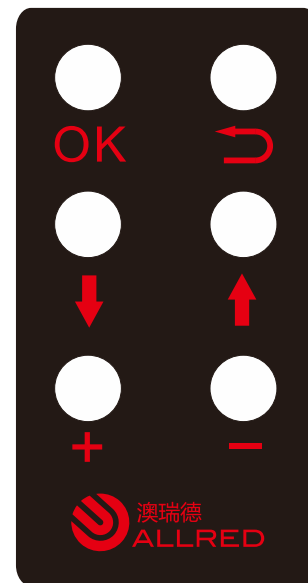


Fig 5.1

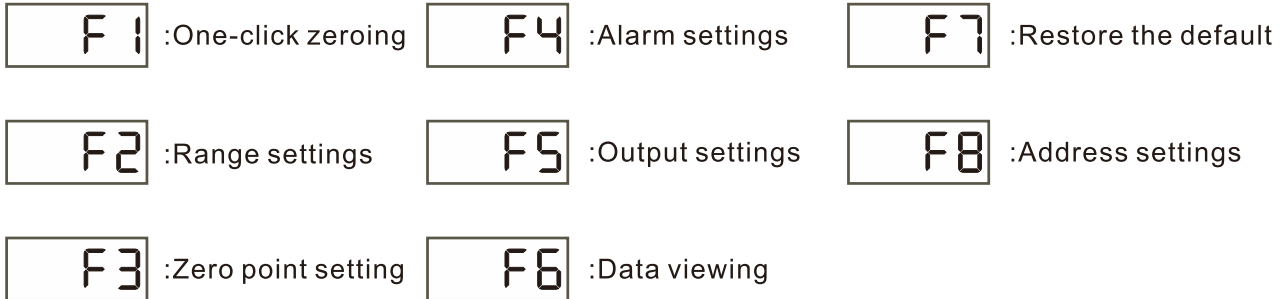
5.2 Power on

When the instrument is installed correctly according to the installation requirements, the power is turned on, the instrument is turned on, and the instrument enters the self-test state, the screen displays a 30-second countdown, and the status indicator is fully on. After the countdown is over, the instrument enters the normal monitoring state, the screen displays the gas concentration value, and the status indicator - normal light (green light) is always on.

5.3 Menu

5.3.1 Main Menu

Under the main interface, press the Confirm key “OK” to enter the main menu, which consists of eight parts, namely: F1, F2, F3, F4, F5, F6, F7, F8. As shown below:



5.3.2 Submenus

5.3.2.1 One-click zeroing

The "one-key zero" function is used for on-site calibration, and it needs to work normally and stably for more than half an hour before zeroing. The zeroing operation method is as follows

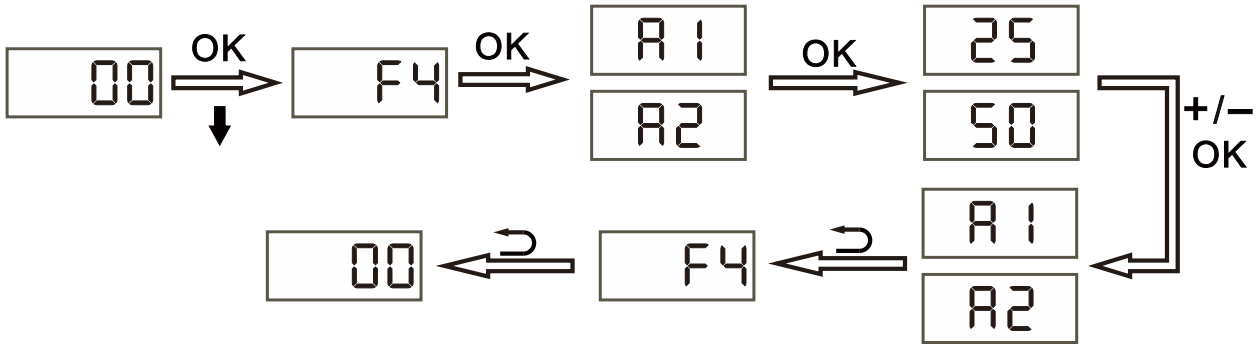


Note:

1. Before entering the menu in the first step, it is recommended to intake pure air for 3~5 minutes or ensure that the surrounding is free of combustible gas;
2. After the installation of the instrument, regular maintenance (it is recommended to be once every six months, the cycle should not exceed one year) and calibration should be set to zero, and it needs to be carried out in the normal and stable work of the instrument for more than half an hour, otherwise the accuracy of the instrument will be affected.

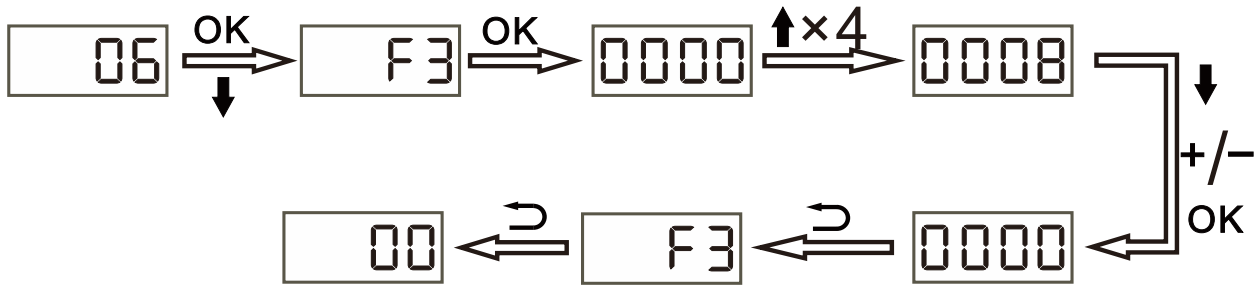
5.3.2.2 Alarm settings

"Alarm setting" function is used to set the alarm concentration value of the detector, usually including the first level alarm (that is, low alarm) and the secondary alarm (that is, high alarm), the default alarm value at the factory is: first level alarm: 25% LEL, second level alarm: 50% LEL, of course, you can also reset the alarm value according to the specific requirements of the site, the specific operation method is as follows:



5.3.2.3 Zero point setting

"Zero point setting" function is a supplement to the "one-key zero" function, when you need to understand the detailed parameters, you can manually zero the instrument through the "zero point setting" function, so that the instrument meets the requirements of use, the specific operation method is as follows:

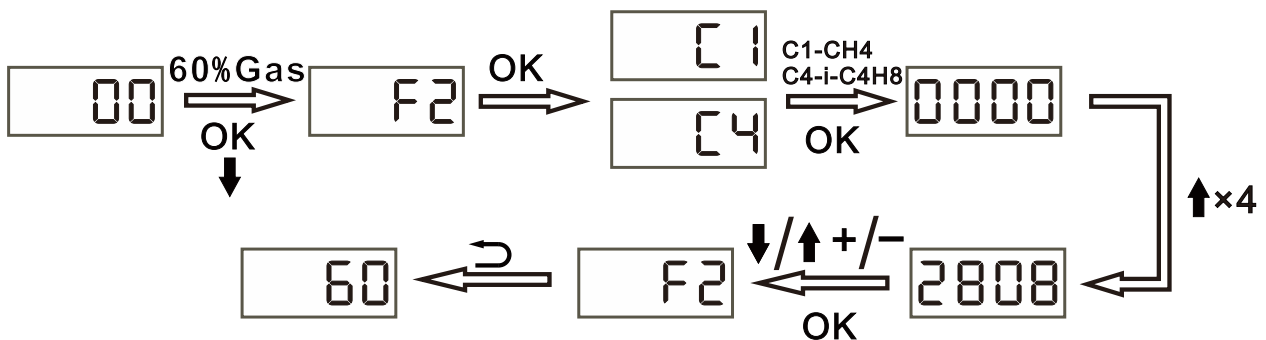


Note:

1. Before entering the menu in the first step, it is recommended to intake pure air for 3~5 minutes or ensure that the surrounding is free of combustible gas;
2. After completing the "one-click zero adjustment", there is no need to set this function. The setting of this function also needs to be carried out after the instrument works normally and stably for more than half an hour and the value of the "current data" is stable (fluctuations within 10 numbers are normal), otherwise the accuracy of the instrument will be affected.

5.3.2.4 Range settings

The "Range Setting" function is used to calibrate the instrument in the presence of standard gas, as follows:

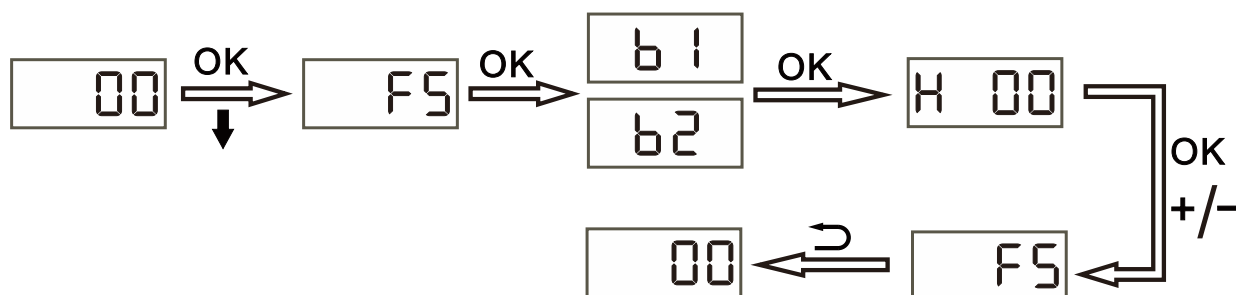


Note:

1. The range of each set of instruments has been debugged before leaving the factory, please do not modify it privately, otherwise it will affect the accuracy of the instrument;
2. When debugging the range, the accuracy of the standard gas used must be ensured, otherwise the accuracy of the instrument cannot be guaranteed;
3. When the instrument is verified, it must first carry out "zero adjustment" and calibration;
4. When setting the range, the instrument may need to repeatedly enter "F2" for numerical modification, and finally adjust the concentration value displayed on the main interface to the standard gas concentration value.
5. Value adjustment law: when the concentration value displayed by the instrument is lower than the standard gas concentration value, reduce the range value, and vice versa, add a large range value.
6. Conventional products store two gas ranges of C1 methane and C4 isobutane. You can click "↓" twice on the main interface to quickly enter the isobutane range, and click "↑" twice to quickly enter the methane range. You can also choose C1 methane or C4 isobutane in "F2".

5.3.2.5 Output Settings

The "output setting" function is to adjust the 4-20mA signal output of the instrument, when the concentration value displayed by the instrument is inconsistent with the concentration value displayed by the combustible gas controller, this function needs to be set, the specific operation method is as follows:

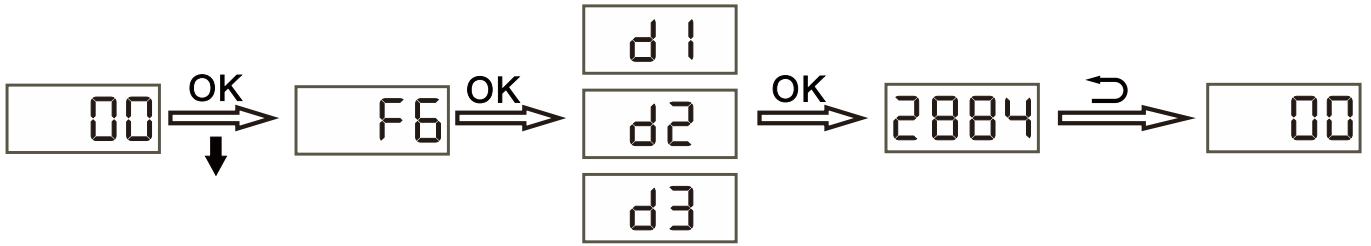


Note:

When the detector value is 0, use "b1" to adjust the output, "+" to increase the output, and "-" to decrease the output. When the detector value is 60, use "b2" to adjust the output, "+" to increase the output, and "-" to decrease the output.

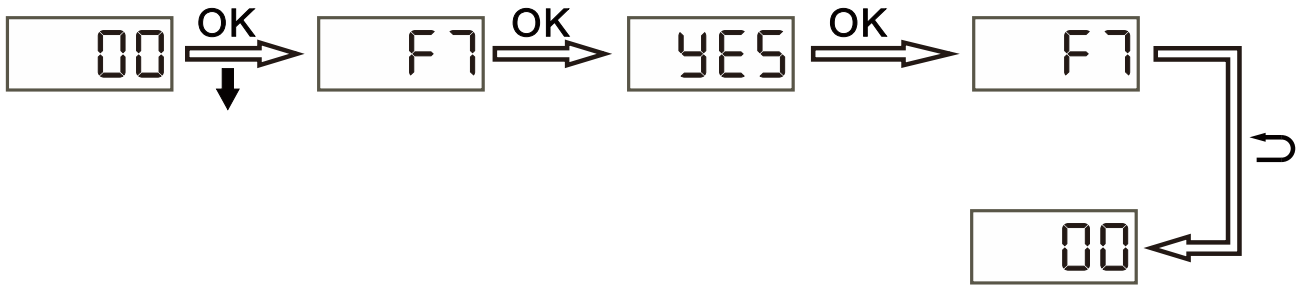
5.3.2.6 Data Review

The "data view" function is the display of the technical parameters of the instrument, which cannot be modified, and is mainly used for the reference of technicians when overhauling, and the viewing method is as follows:



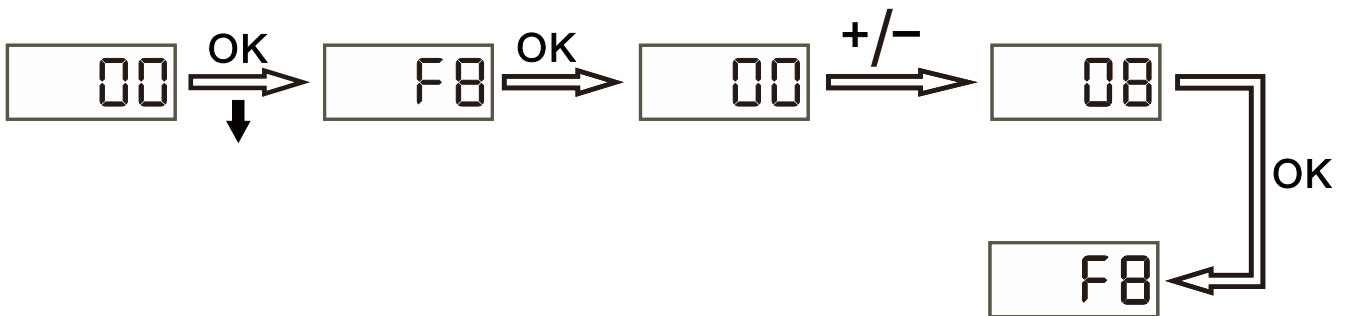
5.3.2.7 Restore defaults

When the sensor fails or misoperates, you can choose to "restore the default" setting, operation as follows:



5.3.2.8 Address Settings

The "Address Setting" function is used to set the sensor address, when the sensor address error occurs, it can be set through this function, without the need to set through the dial switch, the specific operation is as follows:



6 Use and maintenance

6.1 Indication of use and working status

After the instrument is turned on, it performs self-checking, the indicator lights are all on, it enters the preheating state, and the display counts down to preheat. After the countdown ends, the instrument enters the normal monitoring state.

All working states of this instrument are indicated by LED lights. The display status is as follows:



1、 Normal concentration: When the concentration value is less than the first-level alarm value, the instrument works normally, the green light (that is, the normal indicator light) is always on, the red light and yellow light are extinguished, and the sound and light alarm does not act.



2、 Concentration first-level alarm: When the concentration value is greater than or equal to the first-level alarm value is less than the



second-level alarm value, the instrument is in the first-level alarm state, at this time, the red light (that is, the alarm indicator) flashes at low frequency, the green light and yellow light are extinguished, and the sound and light alarm issues a low-frequency alarm.



3、 Concentration secondary alarm: When the concentration value is greater than or equal to the secondary alarm value, the instrument is in the

secondary alarm state, at this time the red light (that is, the alarm indicator) flashes at high frequency, the green light and yellow light are extinguished, and the sound and light alarm sends out a high-frequency alarm.

4、 Sensor failure: If the sensor fault is detected, the instrument enters the sensor fault alarm state, the display screen displays "FF", the yellow light (that is, the fault indicator) flashes rapidly, the green light and red light go out, and there will be a sound and light alarm.

6.2 Maintenance

1. The instrument should be calibrated regularly and the calibration record should be kept. Before calibration, the instrument must be operated for more than 30 minutes, and then calibrated after the operation is stable.

2. Instrument calibration should have a special person responsible, calibration interval according to the product operating environment, generally not more than half a year, it is recommended to calibrate every three months.

3. If the instrument fails or misalarms and other abnormal states, please contact the manufacturer in time to deal with it by professional and technical personnel or under the

guidance of technical personnel to avoid unnecessary losses.

4. Do not install the instrument in places where water vapor is diffused or there is water shower for a long time.

5. The instrument power supply voltage should be stable, to avoid frequent power on/off, if the instrument is sent for inspection, pay attention to the wiring order every time you disassemble the wiring, mark it, and prohibit misconnection and leakage of cables to avoid damage to the instrument.

6. The sensor probe of the instrument should be cleaned regularly, otherwise dust impurities block the ventilation hole to reduce the sensitivity of the sensor, if gasoline, diesel, paint, etc. are accidentally poured on the sensor, resulting in continuous alarm or failure of the instrument, it is forbidden to directly adjust zero, please contact the manufacturer after-sales maintenance, otherwise it will greatly reduce the sensitivity of the instrument or damage.

7. When the instrument is approaching the deadline, do not disassemble it privately, please contact the manufacturer for instrument inspection, and the sensor replacement or instrument replacement will be carried out by professionals.

8. After replacement, the old instrument should not be discarded at will, the instrument is composed of metal shell, PVC circuit board and electronic components, should be disassembled by professionals, sent to a professional recycling site for disposal, otherwise it is easy to cause pollution to the environment.

7 Common faults and approaches

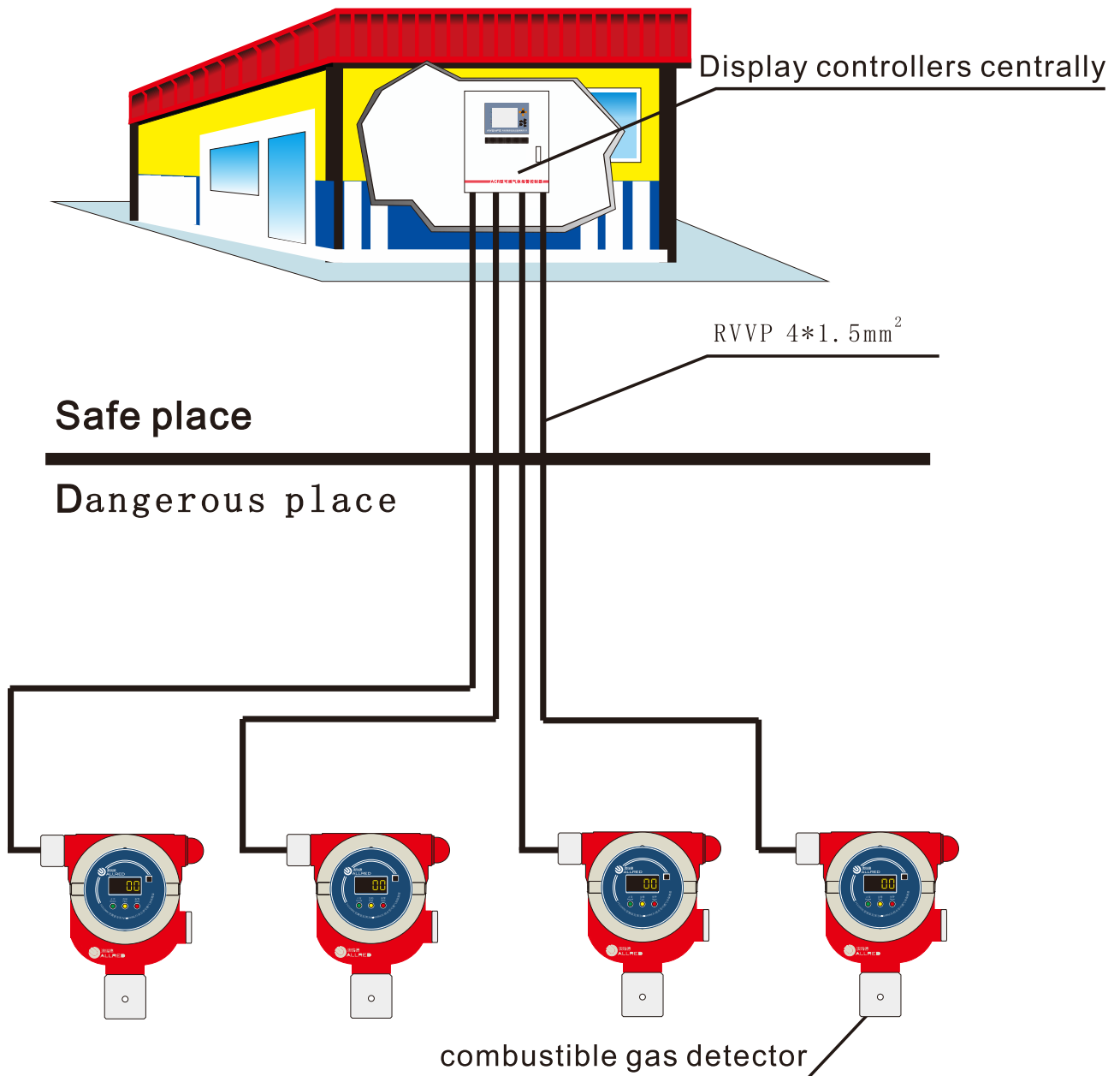
No matter what kind of fault occurs, first check whether the wiring sequence is correct, and the detector and the controller 24V, GND, S must correspond one to one.

Breakout system (4-20mA) common faults		
Symptom	Cause	Processing method
The detector display is inconsistent with the controller display, and the deviation is 2-3 values	a. 4-20mA output accuracy is not enough	a. Using the remote control, adjust the Output Settings (see 5.3.2.5 Output Settings for details)
The detector display is inconsistent with the controller display, and there is a large deviation	a. There is leakage such as damage or short circuit in the line; b. The corresponding channel of the controller is abnormal or damaged; c. The sampling resistance of the detector is damaged;	a. Check the cable to eliminate the problem; b. Change the spare channel or replace the circuit board; c. Replace the instrument motherboard or return to the factory for repair.
Controller shows "Sensor failure"	a. Short circuit or open circuit in the line; b. Abnormal detector signal; c. The corresponding channel of the controller is abnormal or damaged;	a. Check the line and eliminate the problem points; b. Return to factory for maintenance; c. Change the spare channel to use or replace the circuit board
False alarms for detectors and controllers	a. Zero drift or missetting; b. Missetting of range; c. The controller alarm setting value is wrong	a. Use the remote control, reset the zero point, and reset the controller (see ACR2000 Combustible Gas Alarm Controller Manual for details); b. Use the remote control, reset the

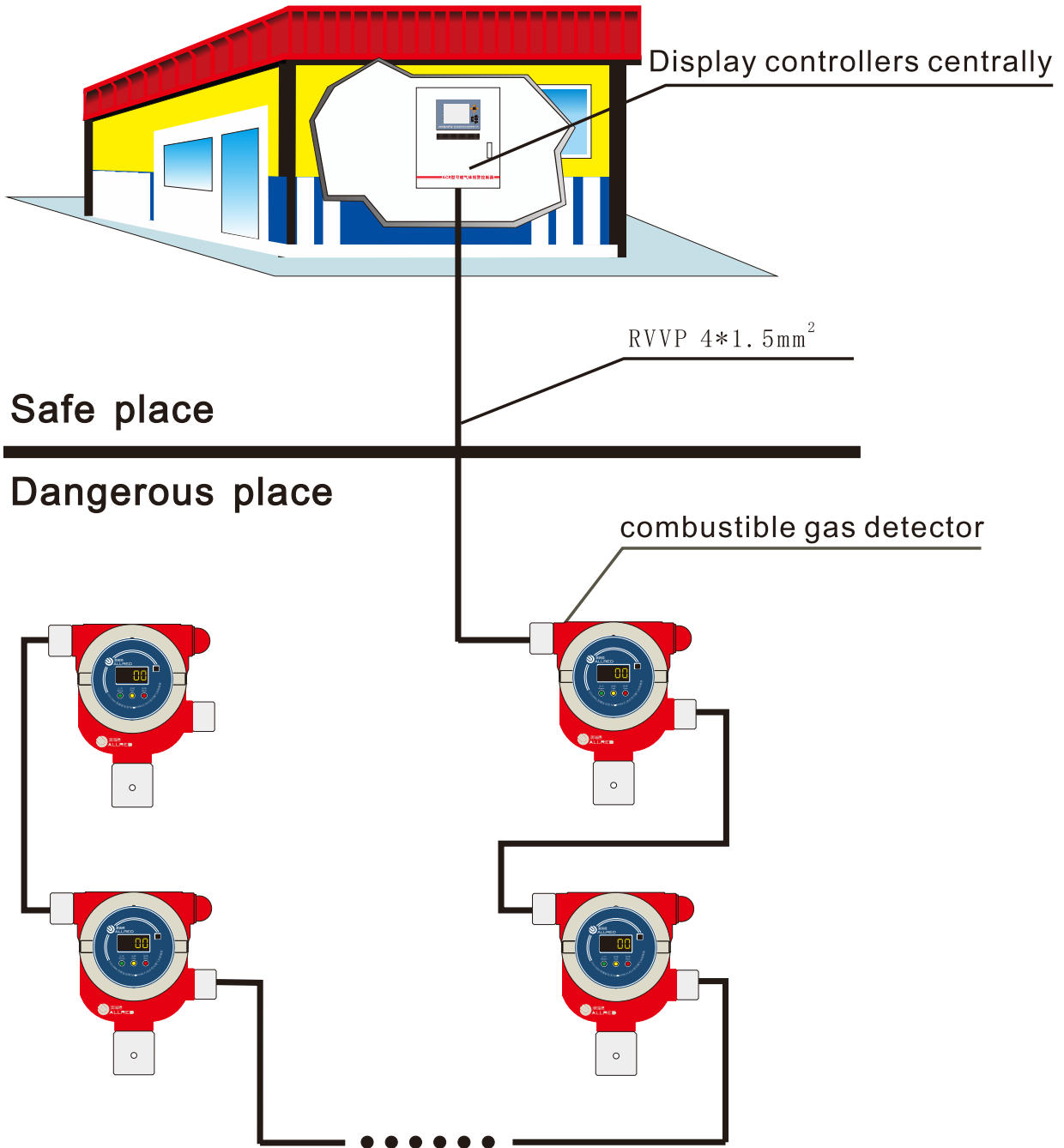
		range (see "5.3.2.4 Range Settings" for details), and reset the controller. c. Reset the alarm value of the controller
Ventilation calibration is unresponsive	a. The deviation of the zero point setting is too large; b. The range is set too large;	a. Use the remote control to reset the zero point (see "5.3.2.3 zero point setting" for details); b. Use the remote control to reset the range (see "5.3.2.4 Range Settings" for details).
Bus system (RS485) common fault		
Symptom	Cause	Processing method
The detector indicator flashes and the screen does not light up	a. The cable resistance is too large and the voltage drop is out of range, resulting in insufficient power to the detector	a. Contact the manufacturer to modify the power supply method
The detector is partially working fine, partially faulty	a. Wiring error; b. The address of the DIP switch overlaps or is not dialed;	a. Start from the first faulty detector and check the lines one by one; b. Check the dial switch address setting.

Appendix I Wiring diagram (4-20mA)

Control



Appendix II Wiring diagram (RS485) Control



Appendix III RS485 Installation Recommendations

Cable specifications: RVVP 4*1.5 shielded twisted pair

1. Combustible gas controller internal 24V power supply, single combustible gas detector number:

Up to 100 meters Can be connected to 8 sets

Up to 200 meters Can be connected to 6 sets

Up to 400 meters Can be connected to 4 sets

Beyond the above distance, on-site power supply is required.

2. Internal 36V power supply of combustible gas controller, number of single combustible gas detectors:

Up to 100 meters Can be connected to 8 sets

Up to 200 meters can be connected to 8 sets

Up to 400 meters Can be connected to 8 sets

Beyond the above distance, on-site power supply is required.

Note:

For wiring lengths of more than 100 meters, it is recommended to add 120Ω resistors at the start and termination 485+ and 485-.

Appendix IV List of spare parts

List of accessories		
Accessory	Quantity	Remark
Point Type Combustible Gas Detector	1	
User Manual	1	
Certificate	1	
Mounting feet	1	
Mounting splint	1	
Bolt M8*90	2	
Bolt M6*16	2	
Nut M8	2	
Gasket M6	2	
Gasket M8	2	
Bounce pads M6	2	
Bounce pads M8	2	
Cable crimping connectors	1	RS485 detector with 2 pcs
Rubber stoppers and gaskets for cables	1	2 for every 8 RS485 detectors
Plug	1	2 for every 8 RS485 detectors
Remote control	1	1 for every 8 units, at least 1
Standard hood	1	1 for every 8 units, at least 1
Rain cover	1	Matching

Ver: 5.1.4



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