User Manual

Online wireless gas detectors

To our users

Dear User:

Thank you for purchasing our gas detectors! Please read this instruction manual carefully before using this product. After reading it, please keep it in a safe place so that you can consult it whenever you need it.

It is a great honor for us to have you as our customer. In order to enable you to get to grips with the use of our wireless gas detectors as quickly as possible, we have prepared this manual, especially for you. We have tried to make the manual as comprehensive and simple as possible. In it, you will learn about the detector's operation, installation procedures, and common troubleshooting. We strongly recommend that you read it carefully before using the product, as this will help you to use it better. We cannot be held responsible for any damage caused if you do not operate the detector in accordance with these instructions. We have made every effort to avoid human error to ensure that the information provided in this manual is correct and reliable, but we cannot guarantee that there will be errors that were not detected or checked before printing, or omissions in printing, binding, distribution, etc. that are beyond our control. Occasionally, we may make minor adjustments to the hardware or software configuration of the product in order to improve the performance and reliability of the components and the machine, which may result in some inconsistencies between the actual condition of the machine and the manual, but this will not materially affect your use of the machine and is hereby stated.

In order to ensure that you can enjoy the full range of after-sales services provided by our company in a timely manner, please register your product information in a timely manner.

Copyrights

Declaration

The Company disclaims all warranties of any kind, including (but not limited to) implied warranties of merchantability and fitness for a particular purpose. The Company shall not be liable for errors (installation errors, operating errors) contained in this material, or for incidental or consequential damages resulting from the provision, actual performance, and use of this manual. The contents contained in this manual are proprietary material protected by copyright law. All rights reserved. No part of this manual may be reproduced, photographed, copied, or translated into other languages in any form or by any means without the prior written consent of the Company. In view of the continuous improvement and upgrading of our production equipment, the equipment and performance of subsequent models will be subject to change without notice.

Responsibility of the manufacturer

The Company shall only consider itself responsible for the safety, reliability, and performance of the equipment under the following situation:

1. the assembly operation, commissioning, performance improvement, and maintenance are carried out by personnel approved by the Company.
2. the electrical equipment in question complies with national standards
3. the equipment is used in accordance with operating instructions.

Notice：

1. All operators who operate and test our factory instruments must read the operating instructions carefully before operating them. Our instruments will only work properly if they are operated in accordance with the requirements of our operating instructions.

2. The use of our instruments must be in accordance with the procedures defined in the instructions. Repairs and replacement of parts must be carried out with parts supplied by the Company and by trained personnel.

3. If the user does not follow the above instructions and dismantles the instrument for repair or replacement, the operator is responsible for the reliability of the instrument. At the same time, the company is no longer responsible for the warranty.

4. The sensor of the instrument should be cleaned or replaced regularly, otherwise, the dust and impurities blocking the protection holes will affect the sensitivity of the detection.

5. The use of our instruments should also abide by the laws and regulations of relevant Chinese departments and factories on instrument management.

6. The instrument should be calibrated at least once every six months; however, due to the characteristics of some sensors, it is recommended that the instrument be calibrated every three months.

7. The sensor is a sensitive component, so if there is a large amount of oil, smoke, water, dust, and other substances in the target environment for measurement, please do the corresponding filtering pre-treatment before accessing the instrument for detection, otherwise, the sensor will be easily damaged.

8. Instruments with electrochemical sensors should not be exposed to high concentrations of the target gas for extended periods of time (except oxygen) as this may cause sensor poisoning or reduce the life of the sensor.

9. When calibrating and performing gas testing with in-line instruments, please control the flow rate between 160 to 250 ml/min, otherwise, the values will be unstable or inaccurate.

CATALOG

One Basic Principle and Use：

First of all, thank you for purchasing our online wireless gas detector (hereinafter referred to as the detector), which collects the corresponding gas concentration through the sensor, converts the target gas concentration into a corresponding current or voltage signal, transmits it to the signal acquisition and processing circuit for filtering and amplification, then carries out AD-analogue-to-digital conversion, and finally sends it to the CPU unit for various calculations, and finally comes up with the gas concentration to be measured, and displays the calculation results and controls the corresponding unit module to achieve various signal outputs and controls.

The detector adopts a dashboard display interface and a three-color backlight design scheme; the readings, faults, and alarms are intuitive; the circuit board is wired in four layers, with a simple process and an explosion-proof design; the output signals are optional: wireless, 4-20 mA, 0-5V, 0-10V, 200-1000Hz, two sets of relay outputs; the data can be uploaded to our environmental monitoring cloud platform to form a safety and protection system. Protection system; high detection sensitivity, fast response time, strong anti-interference ability, stable and reliable performance, excellent signal processing algorithm, the product is at the leading level at home and abroad.

It can be widely used in metallurgy, petroleum, chemical industry, mining, coking, municipalities, environmental protection, pharmaceuticals, electric power, ships, sewage treatment, laboratories, scientific research institutes and other places that need continuous detection of flammable and explosive, toxic and harmful gases.

1.1 Safety instructions

- High or low levels of oxygen in the atmosphere may affect the readings of the combustible gas sensor.
- Sudden changes in atmospheric pressure may affect the reading of the oxygen

sensor.

- Vapors from silicone compounds can cause damage to catalytic combustion sensors, please ensure that such substances are not present in the environment in which they are used.
- Please take care to keep the sensor inlet clean during use. Blockages in the air inlet may cause low readings from the detector.
- To ensure the safe and reliable use of this detector, please do not disassemble it yourself.
- Do not store the detector in a hot, humid or electrostatically charged environment
- Do not use any corrosive liquids to clean the parts of the machine
- The shell should be grounded in a reliable method.
- The user shall not replace the parts of the product by himself, but shall work together with the manufacturer to solve the faults that occur during operation in order to prevent damage.
- The installation, use and maintenance of the products should also comply with the user manual, GB3836.13-1997 "Electrical equipment for explosive atmospheres Part XIII: Maintenance of electrical equipment for explosive atmospheres", GB3836.15-2000 "Electrical equipment for use in explosive atmospheres Part XV: Electrical installation in hazardous places (except coal mines)", GB3836.16-2006 "Electrical equipment for use in explosive atmospheres Part XVI: Inspection and maintenance of electrical installations (except coal mines) " and GB50257:1996 "Code of practice for the construction and acceptance of electrical installations in explosive and fire-hazardous environments for the installation of electrical equipment"

Two Installation method

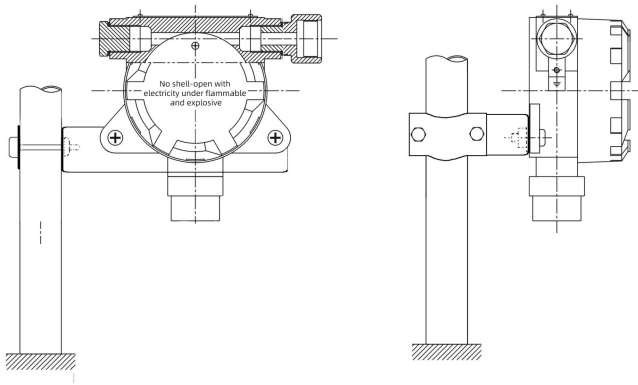

Fig. 2.0 Site installation diagram

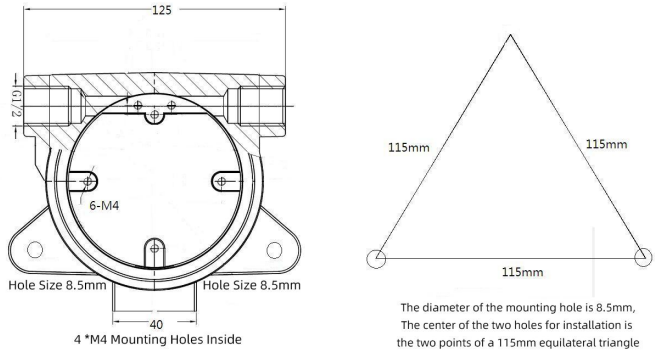

Fig. 2.1 Installation and dimensional drawings

2.1 Select installation location

The location of this detector is essential to achieve the best detection results. The following factors need to be taken into account when determining the location: the density of the gas leak, the specific gravity of the gas to be measured, the surrounding buildings, the wind direction and the year-round weather, etc. In indoor areas, the location of doors and windows should also be taken into account.

The following suggestions are for users to consider：

- The installation height should be determined according to the specific gravity of the gas to be measured and the air. The installation height should be 0.3~0.6m above the ground for heavier than air, 0.5~2m above the release source for lighter than air, and 1.5m for those with a similar specific gravity to air under normal circumstances (refer to the height of an adult's nose breathing).
- The instrument and the measured gas leak point should be kept at an appropriate distance, too close to react too fast, if the leak is frequent, it will lead to too much alarm information, or a long time in the alarm state to make people paralyzed; too far away to react too slowly, or even no response.
- The instrument is to be installed upwind of the leak point.
- For indoor installations, if the leak source is outside, the instrument is to be installed at the air inlet.
- The height of the installation is to be determined by the specific gravity of the gas to be measured in relation to the air.
- The number of instruments should be selected to achieve the best results, depending on the possible leak points of the gas to be measured, the frequency of personnel presence and the duration of their stay.
- The instrument should be protected from radiation from high temperature heat sources, too high or too low temperatures can affect the effectiveness and life of the sensor.

For more specific instructions, please refer to: Design Specification for Detection and Alarm of Combustible and Toxic Gases in Petrochemical Enterprises SH3063-1999

2.2 Select installation type

- Wall-mounted: This is the normal mounting method for indoor detection, with the mounting bracket bolted to the detector.
- Tube-mounted: this is the installation of choice for piped environments.
- Flow-through: This type of installation is used in special environments (e.g. flue, negative pressure ducts, etc.).

2.3 Wiring instructions

All wiring complies with relevant Chinese standards and industry standards and regulations. The DC signal line and the AC power line must not be in the same shielded cable. The detector is reliably connected to ground via conduit, brackets and using an ground cable.

Wiring methods：

- Open the upper cover of the detector shell by turning the upper cover counterclockwise.
- Unplug the top circuit module upwards, the top layer is connected to the bottom module by a 10pin cable.
- Expose the bottom control board, whose interface is shown in Figure 2.2 Internal wiring block diagram.
- Thread the power and signal cables into the shell from the plug on the left side of the lower cover.
- Depending on the design or actual need, plug the power and signal cables into the corresponding terminals and secure them.

Notice：

1. In explosive hazardous places, the user must cooperate with the cable introduction device in accordance with national regulations, to ensure the safe use of the detector, please ensure that the detector shell is reliably connected to ground;
2. Install on-line wireless gas detectors as far away as possible from high-powered equipment such as motors, radio frequency equipment, etc.
3. The power supply of the on-line wireless gas detector should not be arranged in the same line slot as the high voltage line (e.g. 220VAC), if this cannot be avoided on site, the shielded armoured wire must be selected separately, but this still has the possibility of causing the on-line wireless gas detector to work abnormally.

Three Introduction of function：

3.1 Normal working mode

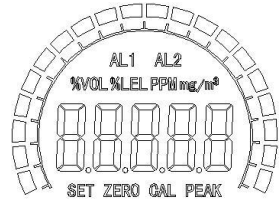

Fig. 3.1 Boot up full display screen

After powering up, the machine is first switched on with full display and then enters the self-test procedure, which proceeds as follows.

1. LCD displays all fields and white backlight is illuminated；
2. LCD The full scale value is displayed and the white backlight is illuminated；
3. LCD The low alarm limit is displayed and the orange alarm light illuminates；
4. LCD High alarm limits are displayed and the red alarm light illuminates；
5. Enter the preheat screen and countdown to show the preheat time；
6. After the countdown, the instrument enters normal operation and the LCD displays the measured gas concentration.

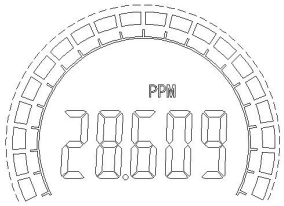

Fig. 3.2 Standard measuring interface

When the measured concentration exceeds the set alarm limit, the corresponding AL1 and AL2 fields are displayed, indicating whether there is a primary or secondary alarm, and a red backlight indicates that an alarm has occurred. When the machine is faulty, ERR.01 is displayed, while the yellow backlight is lit, indicating that the machine is faulty and should be serviced in time.

Note：

If you want to skip the Pre-heating process before entering the standard measurement screen, you can press the OK button during the Pre-heating process (but this is not recommended), skipping the Pre-heating time may result in unstable values

3.2 System setup interface

The system setting interface includes: primary alarm setting interface→ secondary alarm setting interface→ device address setting interface→ restore factory setting interface→ zero calibration interface →gas concentration value setting interface→ span calibration interface.

If you need to enter the system setting interface, press and hold the M (MENU) key, the system will first enter the primary alarm setting interface ; if you want to enter other interfaces directly in this interface, press the ▼ key to switch to other interfaces in turn; if you want to set the corresponding value or function, press the M key briefly, the setting character will flash, in the case of the character flashing, the setting function of the corresponding interface will take effect; after changing the setting, press the After changing the settings, press the OK key to save the settings, or press the M key again to cancel; to exit the system setting interface and return to normal working mode, press and hold the M key.

3.2.1 Primary alarm setting interface：

The first interface of the setting interface is entered by default, and the user can set the value of the primary alarm on this interface. When the measured value exceeds the set value, the red backlight will be lit, and the K1 relay will act at the same time.

After switching to this interface, press the M key, and AL1 will flash for a while, and the set digit will also flash accordingly. Press the ▲ key to switch to the desired digit, and press the ▼ key to change the value of the flashing digit. Values change cyclically from 0 to 9, after modifying the alarm limit, if you want to save the modification, press the OK key to confirm, if you cancel the modification, press the M key, and the field stops flashing.

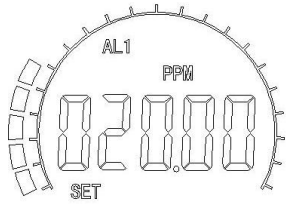

Fig. 3.3 primary alarm setting interface

3.2.2 Secondary alarm setting interface：

The user can set the value for the secondary alarm in this interface. When the measured value exceeds this setting, the red backlight will be illuminated and the K2 relay will be activated.

After switching to the secondary alarm setting interface, if you want to set the secondary alarm point, press the M key, at some point, AL2 will flash and the set digit will flash accordingly, press the ▲ key to switch to the digit to be set, press the ▼ key to change the value of the corresponding digit, the value will be cyclically changed from 0 to 9, after modifying the alarm limit, press the OK key to confirm if you want to save the modification if you want to cancel the modification, press the M key and the field will stop flashing.

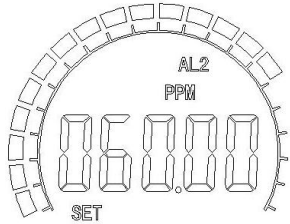

Fig. 3.4 secondary alarm in this interface

3.2.3 Device address setting interface：

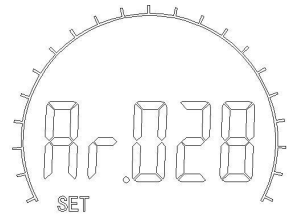

Fig. 3.5 device address setting interface

In this setting interface, press the M key to set, then the SET character flashes, press the ▲ key to switch to the digit to be set, press the ▼ key to change the value of the corresponding digit, and the value changes from 0 to 9 cyclically, after the setting is completed Press the OK key to save and cancel or press the M key.

In this interface, the user can set the address of the device, the address range is 1~247; the address of each device in the same RS-485 bus system is unique, and there can be no conflict.

Note: This function is only valid for models with RS-485 function output.

3.2.4 Restore factory setting interface：

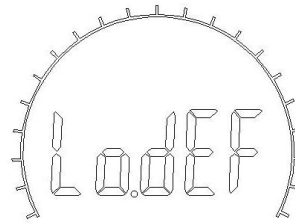

Fig. 3.6 restore factory setting interface

If you want to restore to the factory settings parameters, then press the M key in this interface, at this time the half-arc bar flashes, cancellation can be done by pressing the M key again, confirm the restoration of factory settings then press the OK key to restore to the factory parameters settings; if the restoration settings are OK, then automatically return to the standard interface, not OK then stay in the original interface.

3.2.5 Zero calibration interface：

In the system setting interface, press the ▼ key to switch to the zero calibration interface. If zero calibration is required, press the M key in the zero calibration interface.

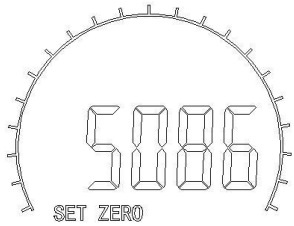

Fig. 3.7 zero calibration interface

At this time, the SET ZERO field flashes, and the screen displays the corresponding value at the same time. After the value is stable, press the OK key to complete the zero calibration (the zero calibration should ensure that the environment where the sensor is located has no target detection gas).

3.2.6 Gas concentration value setting interface ：

After entering the setting interface, press the ▼ arrow key to switch to this interface, press the M key, the field SET CAL and the corresponding setting digit will start flashing, at this time you can enter the calibrated gas concentration value, the ▲ key is reused to move the setting digit function, press the ▲ key to switch to the digit to be set while the digit is flashing, press the ▼ key to change the value of the corresponding digit, the value will change in a cycle from 0 to 9, press the OK key after setting The setting of the calibration gas concentration can be completed, and the interface of the standard gas concentration is as follows.

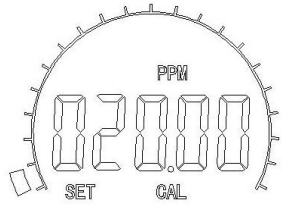

Fig. 3.8 gas concentration value setting interface

3.2.7 Span Calibration :

Span calibration is a process whereby the user uses a standard concentration of gas to calibrate the instrument. After entering the span calibration interface, if you want to calibrate the span, press the M key, the field SET PEAK will start flashing, pass in the standard gas (airflow control at 200ml/min), wait for the value to stabilise, then press the OK key to complete the span calibration.

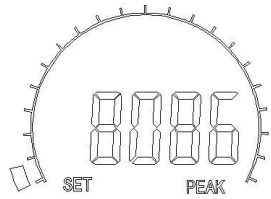

Fig. 3.9 Span Calibration Interface

Four Basic calibration methods

The products are calibrated as required before leaving the factory. If the user has the conditions for calibration, the product can be calibrated regularly in use according to the instructions; if not, the product can be calibrated at the relevant metrology department or by post to our company for a fee.

To ensure the measurement accuracy of the detector, the normal calibration interval for the instrument is 3-6 months. If higher concentrations of the measured gas are often present in the operating environment, the calibration interval can be shortened. To ensure the measurement accuracy of the detector, calibration should be carried out regularly during use and recorded accordingly.

4.1 Zero calibration

Pass the detector into a standard gas with a concentration of 0ppm, usually with clean air (no target gas) as the zero point, some gases (e.g. oxygen, carbon dioxide, etc.) with pure nitrogen as the zero point; then select the menu to enter the zero calibration interface, press the M key briefly to make the SET ZERO character flash and display the zero value at the same time, wait for the value to stabilise and press the OK key to complete the zero calibration.

4.2 Span Calibration

First pass the standard gas under pressure through the flow meter, with the flow rate controlled at 160-300 ml/min, then connect it to the gas chamber of the detector through the conduit (refer to Figure 4.0 for the calibration schematic); select the menu to enter the calibration gas concentration setting interface, set the calibration gas concentration, set the value to match the concentration value indicated by the standard gas bottle; then enter the span calibration interface again, short press the M key to make SET PEAK flash, after the value has stabilized (no more rising or falling trend), press the OK key.an Calibration

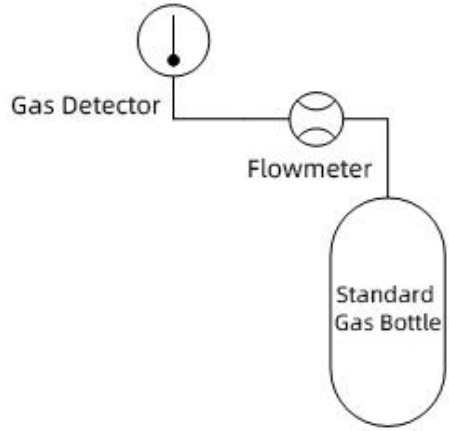

Fig. 4.0 Calibration diagrams

Five Network parameter configuration

5.1 Password entry screen

Press and hold the "OK" and "M" keys at the same time in the standard screen to enter the password screen, enter 123：

5. 2 Target address setting screen

The target address of the device, i.e. the address of the module corresponding to the host Lora radio configuration.

Enter the password 123 in the "Enter password screen" and press the OK key to enter the target address setting screen by default.

Press the M button to enter the setting mode.

Press UP to switch to the next digit；

Press DOWN to increase the number, the recommended value range is 200~247；

After modifying the parameters, press the OK button to save the settings , exit the setup mode；

Press DOWN to switch to the channel setting screen；

Press and hold the M key to exit.

5.3 C**hannel setting screen** ：

Switch to this screen by pressing DOWN in the target address setting screen；

Set the channel in the same way as above, with a recommended value range of 18 to 28；

After modifying the parameters press the OK button to save the settings and exit the setup mode；

Press DOWN to switch to the local address setting screen；

Press and hold the M key to exit.

5.4 **Network ID setting interface：**

Switch to this screen by pressing DOWN in the channel settings screen；

Set the channel as above, the value range is 1~255；

After modifying the parameters press the OK button to save the settings and exit the setup mode；

Press DOWN to switch to the target address setting interface; long press M to exit.

SIX Remote control usage

Fig. 5.0 Remote control appearance

The use of remote control is only for the ES10B series with display models, remote control operation is mainly for the display detector installed in flammable and explosive, fumes and dust and other harsh environments or some inconvenient places to open the cover operation, so that without removing the upper cover of the shell can be operated by remote control, the detector parameters to view the operation, to avoid the risk of fire caused by removing the upper cover of the shell or lead to dust and impurities inside the instrument. Press the "MENU" key on the remote control enters the parameter setting interface, the "<" and ">" keys switch to the previous and next parameter setting interface, the "SET" key enters the parameter setting state and the corresponding character flashes.The "∧" and "∨" keys add one and subtract one to the value of the digit to be modified, the "OK" key saves the setting without saving and presses the "MENU" key, "ESC" exits directly to the normal working mode.

The remote control "big white key" (the top big white key) to enter the password interface, enter the number of password interface, enter 0123 to enter the network parameters configuration interface, it should be noted that the network configuration parameters need to be configured under the guidance of technical personnel, unprofessional configuration is likely to lead to equipment disconnection. The remote control uses two replaceable AAA batteries, due to transportation reasons, the factory default does not come with batteries.

SEVEN Notes on the use and maintenance of sensors

The gas sensor is a device that converts gas concentration information into a weak electrical signal, and is the core of the gas detector, while the sensor is very sensitive and fragile and needs careful use and protection or it will cause performance degradation or damage, so the sensor is a wear and tear product to pay attention to the following matters:

1. Most electrochemical sensors can be used at temperatures from -20°C to +50°C, infrared sensors at temperatures from -40°C to +70°C and operating humidity from 15 to 95% RH (non-condensing). Special sensors are available for use in specific environments depending on the model.
2. Ensure that the gas flowing into the sensor chamber does not contain impurities or stains such as moisture and oil that can easily adhere to the sensor surface and cause the sensor to fail or be damaged.
3. The sensor is recommended to be calibrated once every 3 months, depending on the site environment, e.g. whether large or small quantities of the target gas are regularly present.
4. The service life of electrochemical sensors is about 2 years, the service life of infrared sensors is about 3 years, special sensors depend on the specific model and the use of the site environment, such as whether the site ambient temperature is too high or low.
5. Do not unplug the sensor with electricity, do not drop it on impact; its warranty terms are subject to the standards of the sensor manufacturer, no warranty will be made for man-made damage or improper use.

Note：

The replacement of sensors should be purchased from our company. Purchasing and replacing sensors that are not approved by us may cause the performance of the instrument to fail to meet the design requirements, or may even cause damage to the sensor or the machine, for which we are not responsible.

EIGHT After Sales Service Information

8.1 Warranty Notes：

Before leaving the factory, our products have been calibrated and strictly inspected as required, and we promise that they comply with the relevant national and industry standards and regulations.Customers who purchase our instruments are covered by a 12-month warranty. The user should observe the instructions in use. Damage to the instrument caused by improper use by the user, or by the harsh working environment, is not covered by the warranty. If it does not work properly due to quality problems, our company will repair or replace it for the user at no cost. After 1 year, repairs will be charged. The user should keep the factory certificate of conformity in a safe place and the warranty period is subject to the date on the certificate of conformity. Please note that the factory certificate of conformity is attached when returning the product for repair.

ANNEX I Product Specifications

Name	Description
Product name:	Online wireless gas detectors
Detection principle:	Electrochemical, catalytic combustion, NDIR, PID
Display method	LCD screen display
Display units:	%VOL,%LEL,ppm Depending on the type of gas
Alarm methods	Audible and visual alarms, relay output alarms
Accuracy:	±3%F.S
Preheating time:	90S
Output signal:	LORA
Relays:	One set of relays (passive): 2A@24VDC; 2A@250AC
Main material	Aluminium
Installation method:	Wall mounted, piped, all-in-one
Operating temperature:	Electrochemistry: -20℃～+50℃
	Catalytic combustion: -40℃～+70℃
Operating humidity:	10%～95%RH(No condensation)
Pressure range:	86~106KPa
Operating voltage:	24±6VDC
Power consumption :	<2.5W
Cable Specification:	RVV4X0.5MM²
Size :	160mm*140mm*92mm
Weight :	About 1.6KG
Explosion-proof sign:	Exd IIC T6 Gb
Protection grade:	IP66
Environmental	Empty space
Standard:	GB15322.1-2019,GB3836.1-2010,GB3836.2-2010,GB3836.4-2010,GB12358-2006