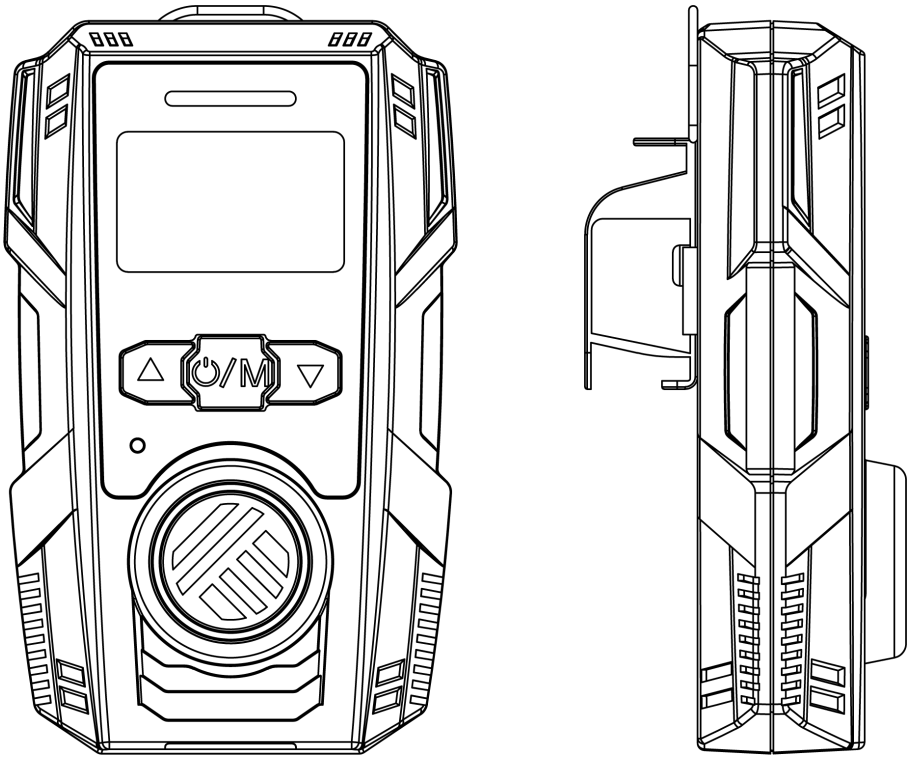
PRODUCT MANUAL

Portable Gas Detectors

ES20D



NOTICE TO USERS

Respected User:

Thank you for purchasing a gas detector from Eyeless Technologies!

Please read this instruction manual carefully before using this product.

Please keep it properly after reading so that you can refer to it anytime when needed.

It is our great honor to have you as our user. In order to help you master the use of our gas detector as soon as possible, we have specially compiled this manual for you. We strive to make the product manual comprehensive and concise. From it, you can get some knowledge about the operation method, installation steps and common troubleshooting of this gas detector. We strongly recommend that you read it carefully before using this product, which will help you use this product better. If you fail to operate the detector according to the requirements of this manual and any losses caused thereby, our company will not be responsible.

We have tried our best to avoid human errors and ensure that the information provided in this manual is correct and reliable, but we cannot fully guarantee that there will be no errors that have not been discovered or checked before printing, and no omissions in the printing, binding, distribution and other links that we cannot control. Please understand!

Sometimes, in order to improve the performance and reliability of components and the entire machine, we may make some small adjustments to the hardware or software configuration of the product, which may cause some inconsistencies between the actual situation of the machine and the instructions, but this will not substantially affect your use of the machine. Please note.

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

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STATEMENT

The company does not make any form of warranty, including (but not limited to) the implied warranty of merchantability and fitness for a particular purpose. The company is not responsible for the errors contained in this information (installation errors, operating errors), or the incidental or indirect damages caused by the provision, actual performance and use of this manual.

The contents of this manual are proprietary information 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 our company.

As our company will continue to improve and upgrade its products and equipment, the configuration and performance of subsequent models will change without further notice.

MANUFACTURER'S RESPONSIBILITIES

The Company shall only be responsible for the safety, reliability and performance of the equipment in the following cases, namely:

- Assembly operations, commissioning, performance improvement and maintenance are all performed by personnel approved by the company;
- The relevant electrical equipment complies with national standards;
- Use the device according to the operating instructions.

NOTICE

1. All operators who operate and test our factory instruments must read the instruction manual carefully before operation. Our instruments can only work properly when operated in accordance with our instructions.

2. The instrument must be used in accordance with the procedures specified in the manual. The instrument maintenance and component replacement must be performed by accessories provided by our company and professionally trained personnel.

3. If the user disassembles the instrument to repair or replace parts without following the above instructions, the operator will be responsible for the reliability of the instrument and the company will no longer be responsible for the warranty.

4. The explosion-proof plate or waterproof breathable membrane of the instrument sensor should be cleaned or replaced regularly, otherwise it will be blocked by dust and impurities and affect the sensitivity of the detection.

5. The use of our company's instruments must also comply with the laws and regulations of relevant domestic departments and factory instrument management.

6. The instrument needs to be calibrated at least once every six months. Due to the different characteristics and usage environments of some sensors, it is recommended to calibrate the instrument every three months (using standard gas approved by the measurement unit).

7. The sensor is a sensitive device. If there is a lot of oil smoke, water vapor, dust and other substances in the target environment, it is necessary to do corresponding pretreatment and then connect to the instrument for detection. Otherwise, it is easy to reduce the life of the sensor or even damage it.

8. Do not expose instruments using electrochemical or catalytic combustion sensors to high-concentration target gas environments (except oxygen) for a long time, otherwise it may easily cause sensor poisoning or shorten its life.

9. When calibrating a pump-suction instrument, it is recommended to control the flow rate between 600-800ml/min, otherwise the data test will be inaccurate.

10. Do not use organic solvents or corrosive liquids (such as alcohol, thinner, etc.) to clean the parts. The sensitivity of the combustible gas sensor will be reduced when it is affected by toxic gas or other inhibitors (such as silicone, sulfur, lead or halogenated hydrocarbons, etc.).

TABLE OF CONTENTS

1. BASIC PRINCIPLES AND USES

First of all, thank you for purchasing our company's portable gas detector (hereinafter referred to as the detector); this detector can be widely used in metallurgy, petroleum, chemical industry, mining, coking, municipal administration, environmental protection, pharmaceuticals, electricity, shipping, sewage treatment and other places where toxic and harmful gases need to be monitored.

This detector adopts explosion-proof design, uses imported high-performance sensors, and combines multi-point temperature compensation algorithm. It has high sensitivity, strong anti-interference ability, and stable and reliable performance.

Safety Instructions

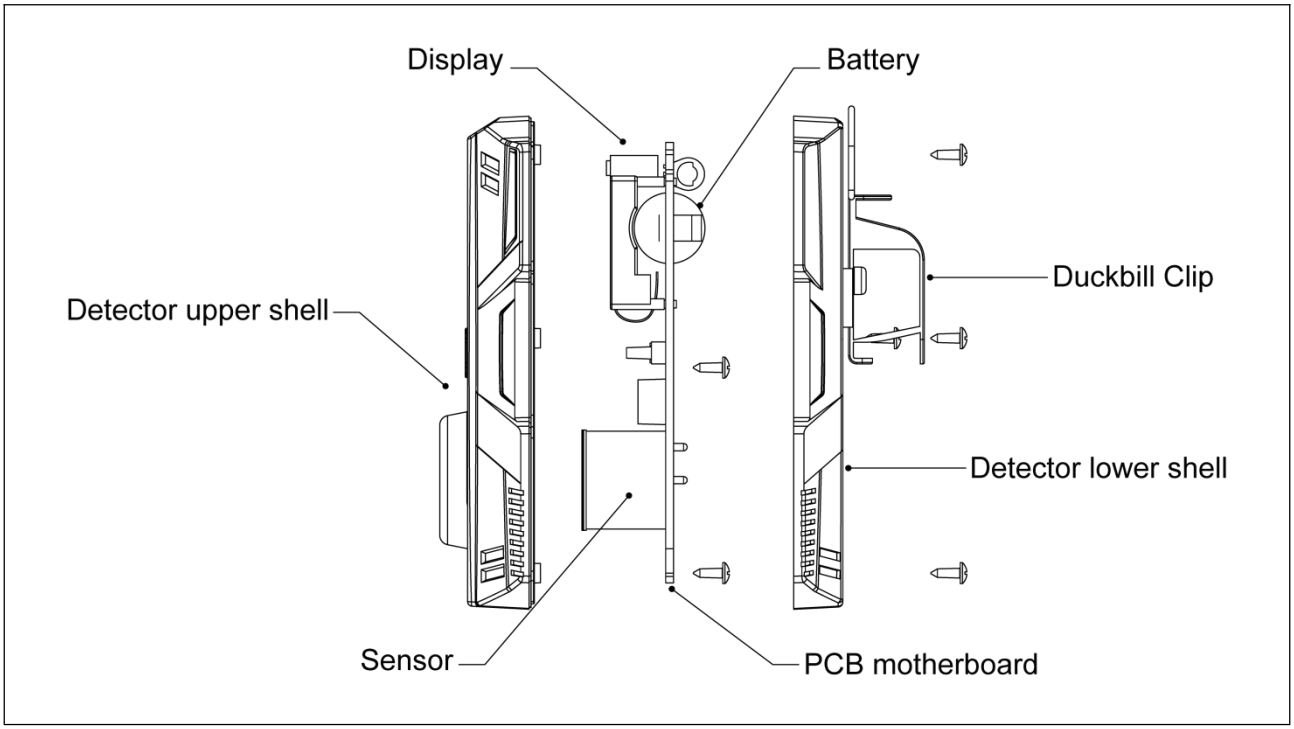
- Sudden changes in atmospheric pressure may affect the oxygen sensor readings.
- During use, please keep the air inlet of the sensor clean. Blockage of the air inlet may cause the detector to read too low.
- To ensure the safe and reliable use of this detector, please do not disassemble it by yourself.
- Do not store the detector in a high temperature, humid or strong static environment.
- Do not use any corrosive liquids to clean the machine parts.
- Users are not allowed to replace parts of this product by themselves.
- The installation, use and maintenance of the product should comply with the product manual and relevant national implementation standards.
- The installation, use and maintenance of the product should comply with the relevant provisions of the product manual, GB/T 3836.13-2021 "Electrical Apparatus for Explosive Gas Atmospheres Part 13: Repair of Electrical Apparatus for Explosive Gas Atmospheres", GB/T 3836.15-2021 "Electrical Apparatus for Explosive Gas Atmospheres Part 15: Electrical Installation in Hazardous Locations (Except Coal Mines)", GB/T 3836.16-2022 "Electrical Apparatus for Explosive Gas Atmospheres Part 16: Inspection and Maintenance of Electrical Installations (Except Coal Mines)" and GB 50257-2014 "Electrical Equipment Installation Engineering - Construction and Acceptance Specification for Electrical Installations in Explosion and Fire Hazardous Atmospheres".

Features

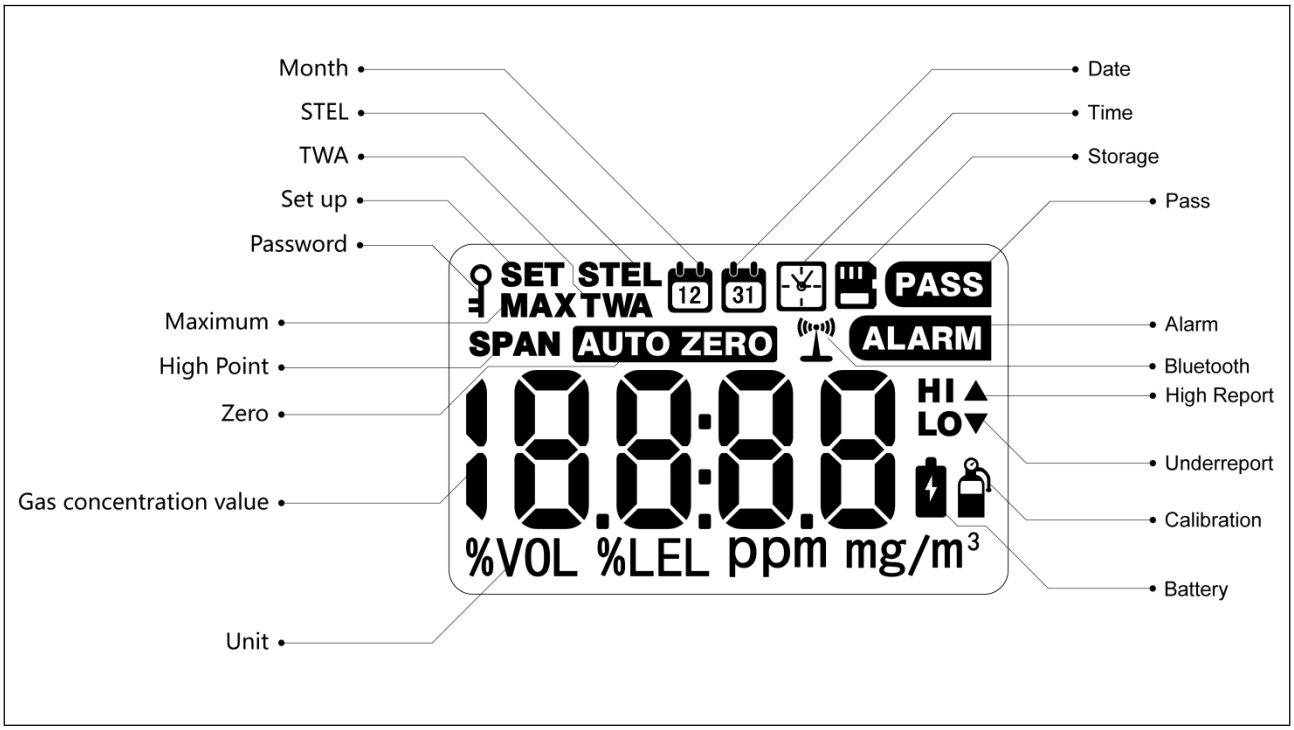
- 32-bit core processor based on ARM architecture;
- Can continuously record 500 alarm events;
- Support Bluetooth function (optional);
- Standard lithium thionyl chloride battery, voltage DC3.6V;
- The battery life can reach more than 2 years (calculated based on 8 hours of normal work per day);
- Automatic zero point calibration at startup;
- Multi-point temperature compensation algorithm;
- Sensor life monitoring alarm prompt;
- Full-function self-check at startup: sensor, battery level, vibration, sound and light alarm;
- Regular accuracy calibration reminders;
- Sound alarm, vibration alarm, light alarm;
- Small size, light weight, with stainless steel back buckle, easy to carry;
- Protection grade is IP54;

2. MAIN PARAMETERS

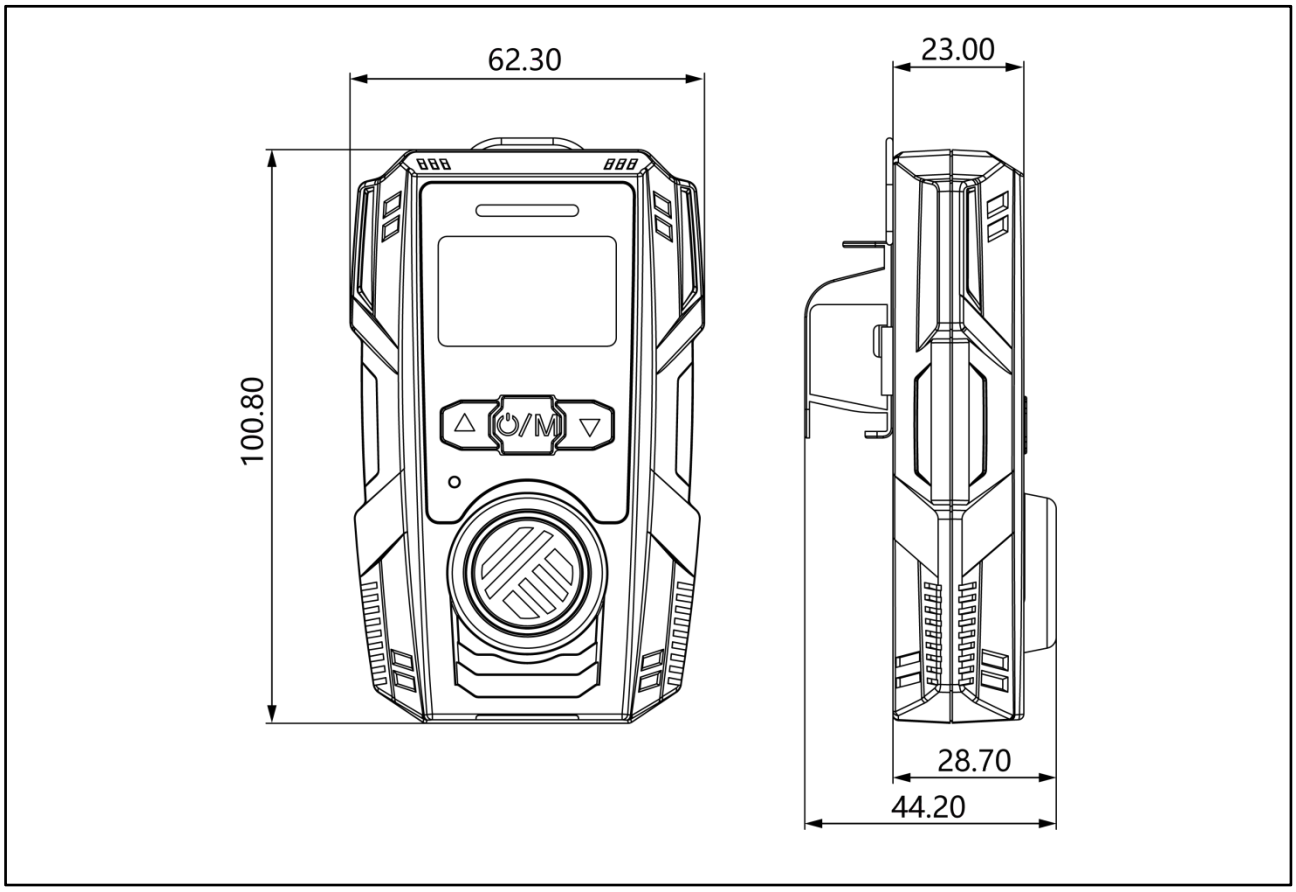
2.1 Structural Composition



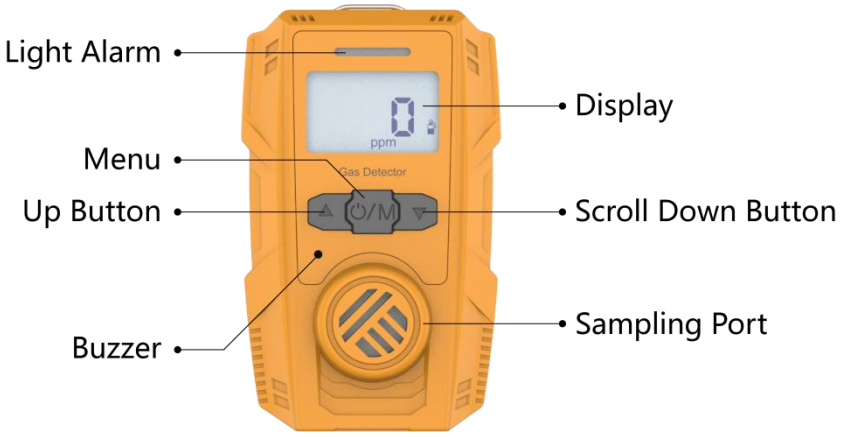
2.2 Display Interface



2.3 Structural Dimensions



2.4 Definition Of Buttons



1. 【Menu】

(1) Press and hold for 5 seconds to turn on the device;
(2) Long press for 5 seconds to shut down;
(3) Short press for 3 seconds to enter the menu;
(4) Short press for 3 seconds to return to the main interface;
(5) Short press once to confirm;

2. 【Up Button】

(1) The menu is flipped up;
(2) Set shift;
(3) Cancel save;

3. 【Light Alarm】

(1) Normal operation, the green light flashes once every 30 seconds;
(2) Fault alarm, yellow light flashes;
(3) Gas concentration alarm, red light flashes;

4. 【Down Button】

(1) Scroll down the menu;
(2) Set the value;

3. INSTRUMENT OPERATION INSTRUCTIONS

3.1 Power On/Off And Normal Operation

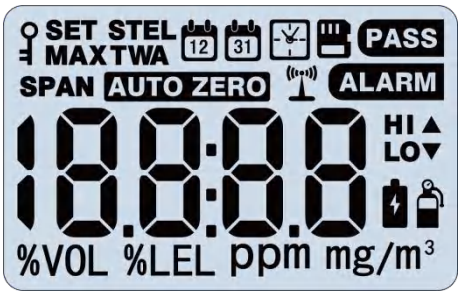
Working process: Press and hold the MENU button for 3 seconds, the device will turn on and enter the self-test state. The screen backlight will remain on during the self-test process, and the preheating interface will be entered after the self-test is completed.

Note: The equipment must be operated in clean air when it is turned on. The self-calibration function of the equipment will be automatically turned on during the preheating process.

will enter normal monitoring mode after 30 seconds of inactivity ;

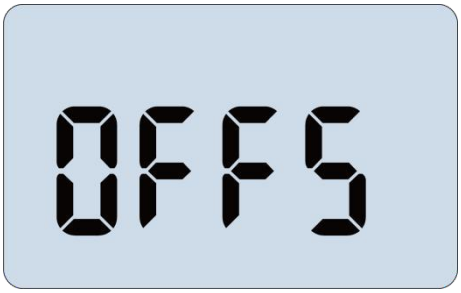
After the device enters the normal monitoring state, you need to short press the MENU button to wake it up and enter the operating state to perform corresponding operations;

3.1.1 Power - On Self-Test



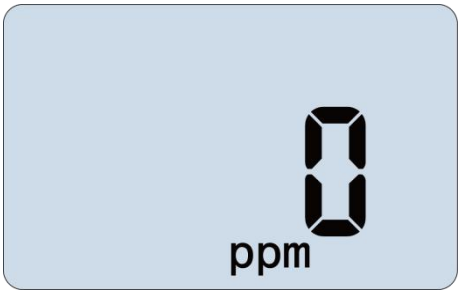
Press and hold the MENU button for more than 3 seconds to enter the power-on countdown interface, screen full-screen light self-test, buzzer self-test, vibration motor self-test, and gas type display for 5 seconds . After completion, the device turns on.

3.1.2 Shutdown



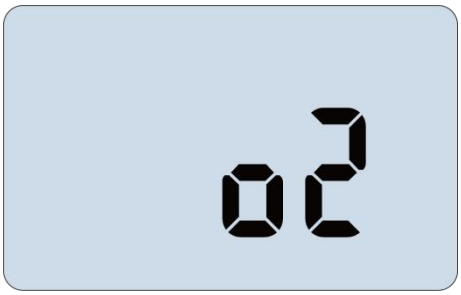
Shutdown interface, countdown 5 seconds, light flashing.

3.1.3 Normal Work



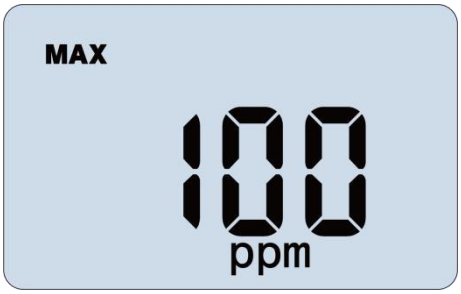
Normal measurement interface, the unit changes according to the set parameters, no sound or light, white backlight, no action for about 1 minute to enter low power mode, press MENU backlight on, the device wakes up in normal power mode.

3.1.4 Gas Type



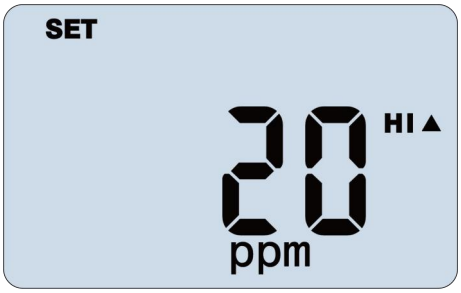
In the normal monitoring working interface, short press the MENU button to wake up the device, and short press the ▲ button to display the gas type.

3.1.5 Maximum



In the normal monitoring working interface, short press the MENU button to wake up the device, and short press the ▲ button twice to display the maximum value of the device.

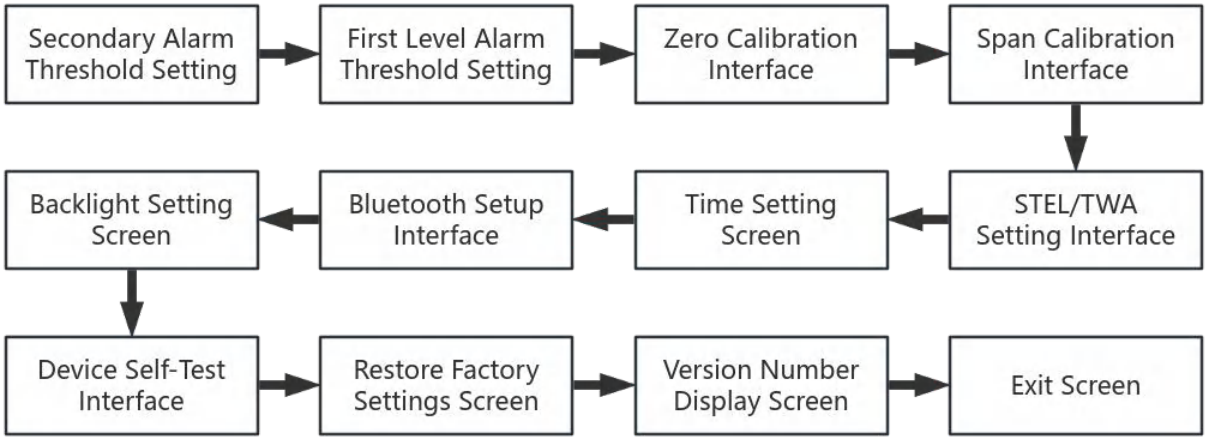
3.1.6 Range



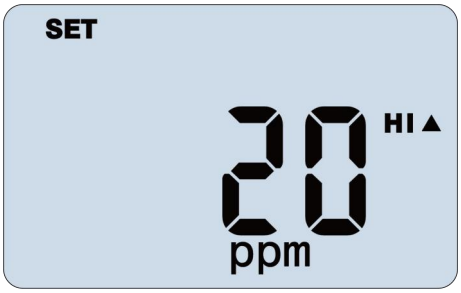
In the normal monitoring working interface, short press the MENU button to wake up the device, and short press the ▲ button 3 times to display the device range.

3.2 User Settings

Setting order:

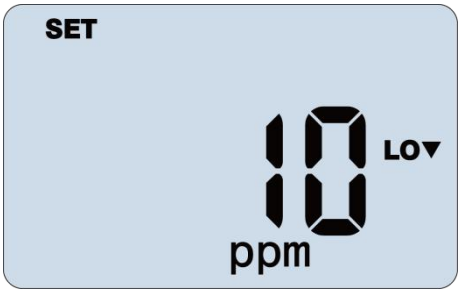


3.2.1 Second Level Alarm Threshold Setting



- Long press the MENU button to enter the secondary alarm value setting interface;
- Short press the MENU button, and the setting digit starts flashing;
- Short press the ▲ key to cycle through the digits to be set;
- Short press the ▼ key to change the value of a digit, the value range is 0~9. To save the set value, press the MENU key;
- Without any action, it will automatically return to the normal measurement interface in about 1 minute.

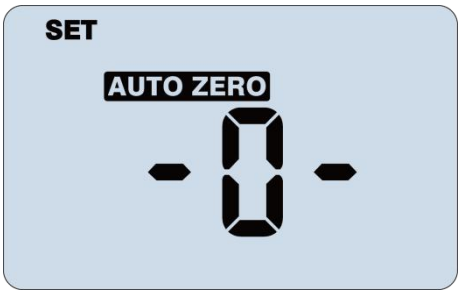
3.2.2 Level 1 Alarm Threshold Setting



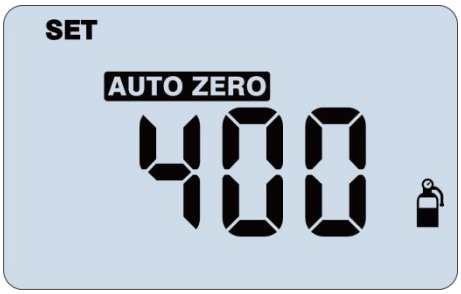
- Long press the MENU button to enter the first-level alarm value setting interface;
- Short press the MENU button, and the set digit starts flashing;
- Press the ▲ key to cycle through the digits to be set;
- Press the ▼ key to change the value of the digit. The value range is 0 to 9. To save the set value, press the MENU key.
- Without any action, it will automatically return to the normal measurement interface in about 1 minute.

3.2.3 Zero Point Calibration Interface

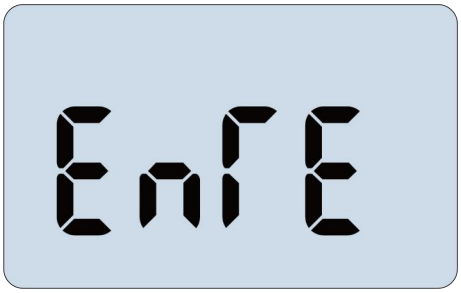
Short press the MENU button to enter the zero calibration interface .



(1) The AUTO ZERO character flashes and the standard gas cylinder icon is displayed;
(2) The AD value is displayed. After the value stabilizes, press the MENU key to complete the zero point calibration.

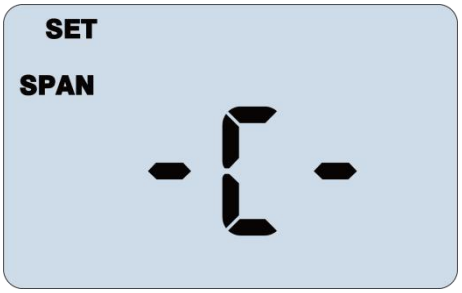


ENTE indicates whether to save the calibration value. To confirm saving, short press MENU. To cancel saving, short press ▲.
If the calibration is successful, -OK- will be displayed; if the calibration fails, -ERR- will be displayed.
Note: In the calibration state (flashing characters), the interface will not automatically return to the normal measurement interface.
Long press the MENU button to return to the normal measurement interface.

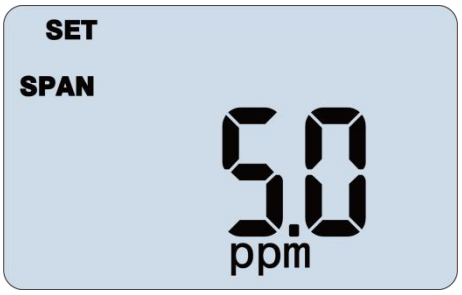


3.2.4 Span Calibration Interface

Short press the MENU key to enter the span calibration interface .

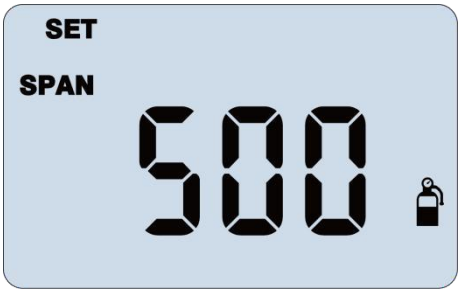


This interface displays and sets the concentration of the currently used standard gas. After the concentration is set, short press the MENU key .

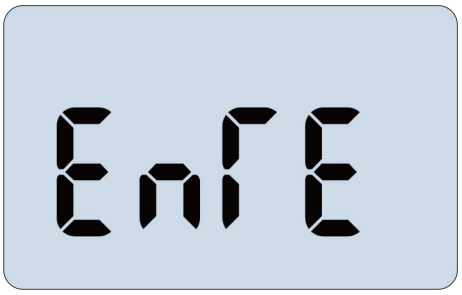


ENTE indicates whether to save the calibration value. To confirm saving, short press MENU. To cancel saving, short press ▲. After confirming saving, enter the span AD value display interface.

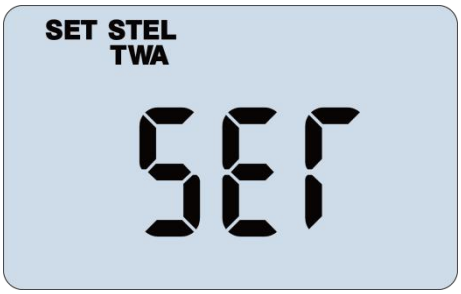
(1) Correctly install the calibration cover;
(2) The standard gas is introduced at a flow rate of about 500 mL/min;
(3) After the AD value is stable, press the MENU key to enter the save selection interface;



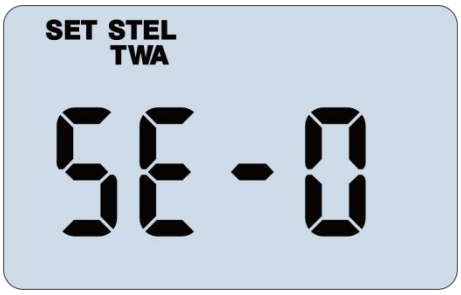
Calibration completed ENTE indicates whether to save the calibration value. To confirm saving, short press MENU. To cancel saving, short press ▲ key.
If the calibration is successful, -OK- will be displayed; if the calibration fails, -ERR- will be displayed.
Note: In the calibration state (flashing characters), it will not automatically return to the normal measurement interface ;
Long press the MENU button to return to the normal measurement interface.
To calibrate multiple span points, repeat the above steps.



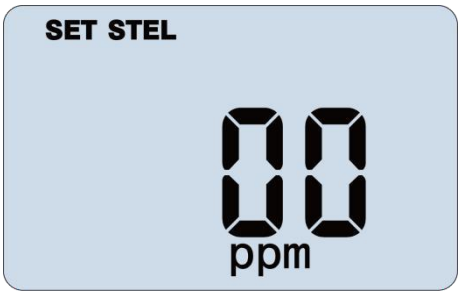
3.2.5 STEL / TWA Setting Interface



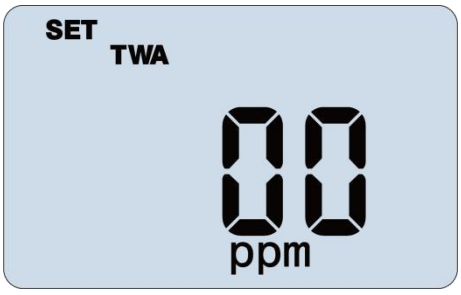
Short press the MENU button to enter the settings interface;



SE-0/SE-1 can set STEL/SWA alarm on/off;



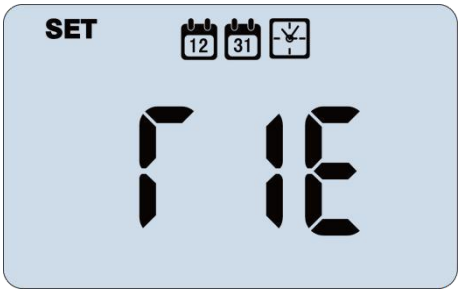
In the STEL alarm threshold setting interface, press the page down button to set the value, and press MENU to confirm after setting.



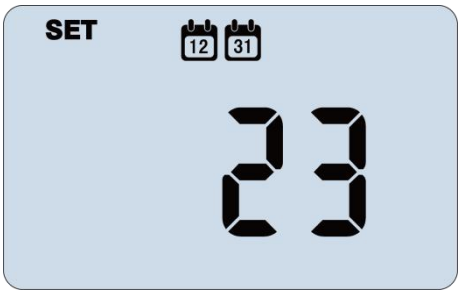
In the TWA alarm threshold setting interface, press the page down button to set the value. After setting, press MENU to confirm.

3.2.6 Time setting Interface

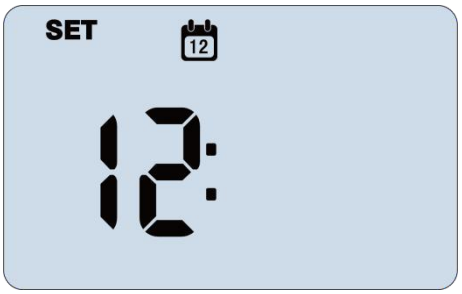
Short press MENU to enter the setting interface .



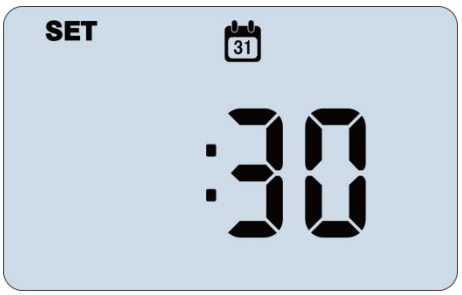
In the year setting interface, short press MENU to enter the setting, short press ▼ key to poll the setting;



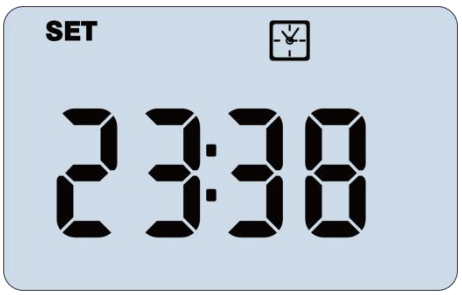
On the month setting interface, short press MENU to enter the setting, and short press ▼ to cycle through the settings;



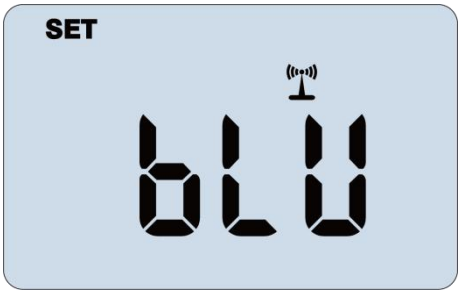
On the day setting interface, short press MENU to enter the setting, short press ▼ to cycle through the settings;



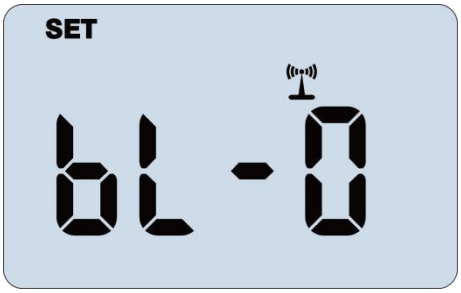
In the time setting interface, short press MENU to enter the setting, and short press ▼ to cycle through the settings;



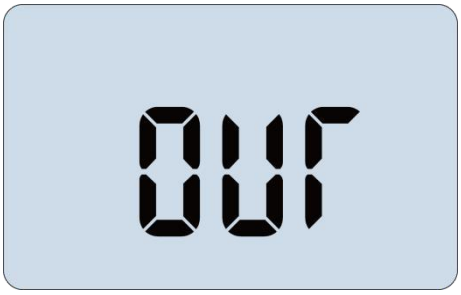
3.2.7 Bluetooth settings interface



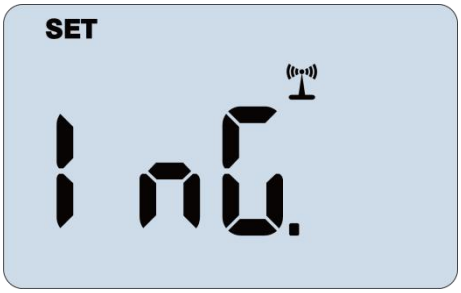
In the Bluetooth settings interface, short press MENU to enter settings;



Open: BL-1; Close: BL-0;



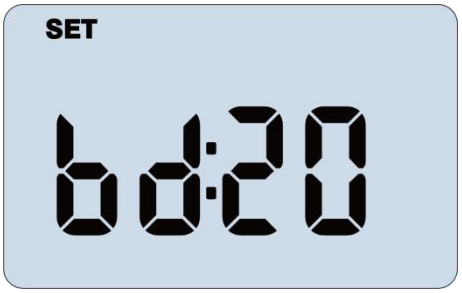
After turning on Bluetooth, short press the MENU button to jump to the export interface, and short press the MENU button to export the alarm data.



Data is being exported;

3.2.8 Backlight setting interface

Press MENU to enter the settings, OF to turn it off, 05, 10, 20, 30 to set the backlight duration, the unit is second (S) .



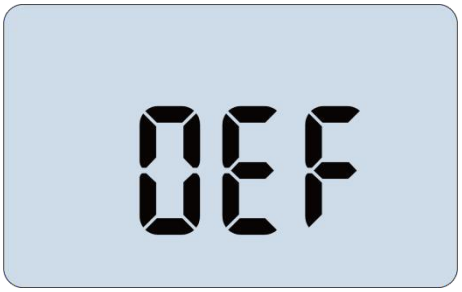
3.2.9 Equipment self - test interface

(1) Press M to confirm the self-test, and the display will show LO, HI;

(2) Sound and light self-test.

3.2.10 Restore factory settings interface

Short press the MENU button to enter the password interface; press the ▲ or ▼ button to set the password to: 0123; after entering the password, short press the MENU button again to confirm.



3.2.11 Version number display interface

As shown in the interface, the software version is V1.0.1 .

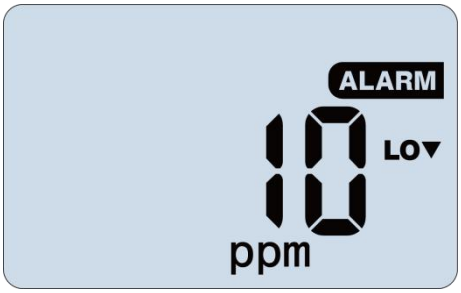
3.2.12 Exit interface

Press the MENU button to confirm and exit to return to the main interface .

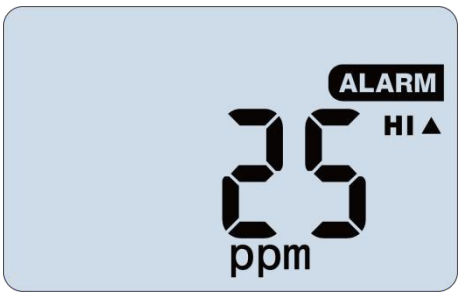
4. ALARM EVENTS

4.1 Concentration alarm

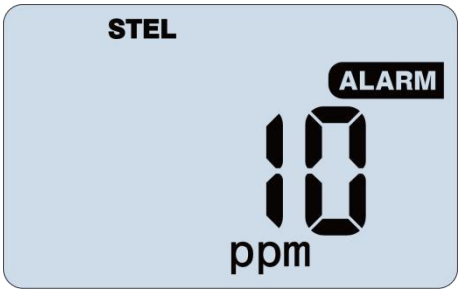
4.1.1 Level 1 alarm display



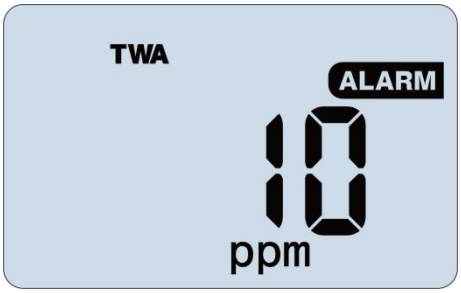
4.1.2 Second level alarm display



4.1.3 STEL alarm display

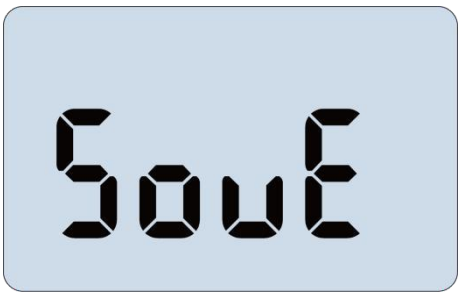


4.1.4 TWA alarm display



4.2 Fault Alarm

4.2.1 Sensor life reminder

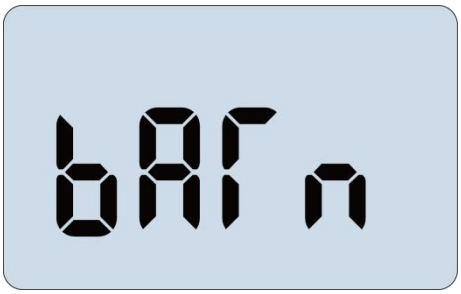


The sensor life is less than 30 days, the display will be turned on, and short press the MENU button to enter the normal monitoring interface.

4.2.2 Sensor life expires

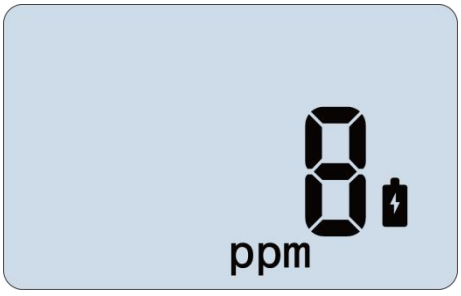
After the sensor life expires, normal monitoring cannot be performed. You can enter the parameter setting interface

4.2.3 Low battery shutdown



When the battery is lower than 2.9V, this page will be displayed, and the device will shut down after a 5s countdown. n is the countdown time.

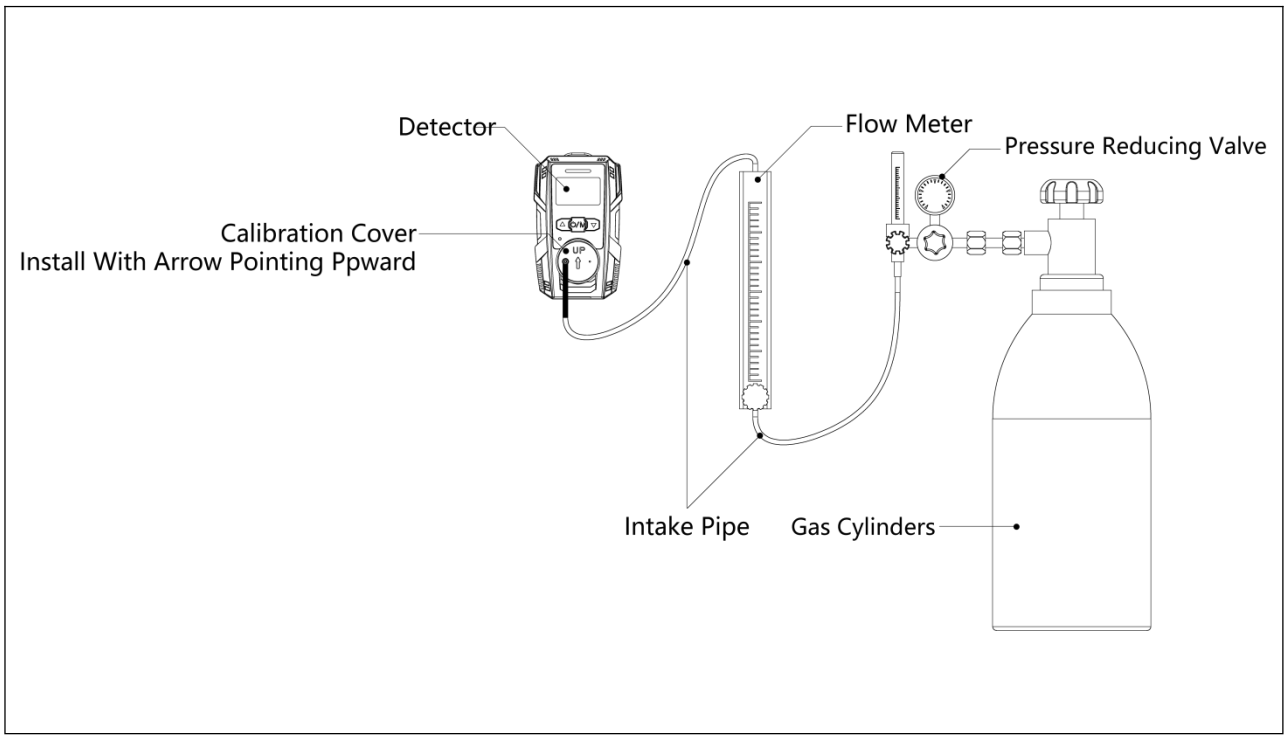
4.2.4 Low battery



When the battery power is lower than 3.1V, the screen will display the low battery icon and the device will alarm once when it is turned on.

5. PRODUCT MAINTENANCE

5.1 Calibration



(1) Please use standard gas to calibrate the instrument;

(2) Pay attention to the installation direction of the calibration cover, press it down, and fasten it tightly with the upper shell of the detector;

(3) The above picture shows the calibration gas circuit. Please connect the gas pipe according to the picture.

(4) The standard gas flow rate is set to about 500mL/min;

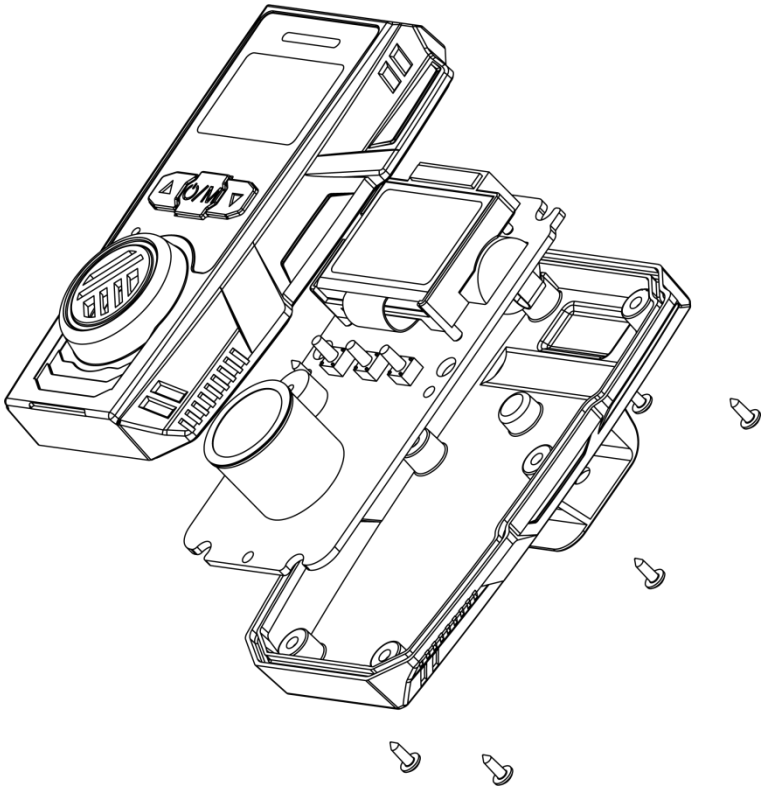
(5) For calibration operations, please refer to 3.2.3 and 3.2.4 to calibrate the zero point and span;

5.2 Cleaning

Clean the outside of the instrument regularly with a soft cloth. Do not use chemical cleaning agents or liquids containing chemical substances for cleaning. It is recommended to use clean water for cleaning.

Please ensure that the sensor filter is clean to prevent dust and dirt from covering the sensor's breathable membrane and affecting the instrument's monitoring accuracy.

5.3 Battery Replacement



Remove the screws on the back cover, disassemble the back cover, and replace the battery. However, it can only be repaired by professional maintenance personnel or maintenance personnel trained by our company, otherwise the maintenance may fail and cause equipment failure.

Note: After replacing the battery, the device system time needs to be modified synchronously;

6. SENSOR SELECTION TABLE

Gas Type	Chemical Formula	Range	Resolution	Operating Temperature
Hydrogen sulfide	H2S	0~100ppm	1ppm	-30℃~50℃
Carbon Monoxide	CO	0~1000ppm	1ppm	-30℃~50℃
oxygen	O_2	0~30%VOL	0.2%VOL	-30℃~50℃
Chlorine	CL_2	0~50ppm	0.1ppm	-30℃~50℃
hydrogen	H2	0~1000ppm	1ppm	-30℃~50℃
Ammonia	NH3	0~1000ppm	1ppm	-30℃~50℃
Nitric oxide	NO	0~20ppm	1ppm	-30℃~50℃
Nitrogen dioxide	NO_2	0~100ppm	0.1ppm	-30℃~50℃
ozone	O_3	0~10ppm	0.02ppm	-30℃~50℃
carbon dioxide	CLO_2	0~1ppm	0.01ppm	-30℃~50℃
Ethylene oxide	ETO	0~100ppm	0.1ppm	-30℃~50℃
Hydrogen cyanide	HCN	0~100ppm	0.1ppm	-30℃~50℃
Phosphine	PH_3	0~20ppm	0.1ppm	-30℃~50℃
Methyl mercaptan	CH3SH	0~10ppm	0.1ppm	-30℃~50℃

Note: If you need to monitor other gas types or gas parameters, please communicate with the manufacturer;

7. TROUBLESHOOTING

Fault Phenomenon	Possible Causes	Approach
The instrument cannot be turned on normally	No battery installed	Installing the battery
	Low or dead battery	Replace the battery with a new one
	Battery installed backwards	Install the battery correctly according to the markings
	The instrument was seriously damaged	Contact the manufacturer for after-sales maintenance
The instrument displays an alarm failure when it is turned on	SOVE	The sensor life is less than 30 days, please replace the sensor as soon as possible
	LOSE	The sensor is expired, please replace the sensor
	BATN	The battery is exhausted, please replace the battery
After the instrument is turned on, the concentration is high and cannot be monitored normally.	Ambient gas exists in the startup environment	Please start the machine in clean air
	The instrument needs to be calibrated	Recalibrate the instrument
	Sensor damage	Replace the sensor

8. AFTER-SALES SERVICE INFORMATION

8.1 Warranty

Before the products leave the factory, our company has calibrated and strictly inspected the products as required. We promise that the products comply with relevant national and industry standards and regulations.

Before using this product, please carefully check whether the accessories, product certificate and user warranty card are complete according to the product factory list. If you find that they are incomplete, please contact the seller or manufacturer immediately.

All customers who purchase our instruments enjoy a 12-month warranty period. Users should follow the instructions during use. Instrument damage caused by improper use or poor working environment is not covered by the warranty. If the instrument cannot work properly due to quality problems, our company will repair or replace it for free, and the cost of production will be charged after one year.

The user should keep the factory certificate properly. The warranty period is based on the date on the certificate. Please attach the factory certificate when returning the product for repair.

After product maintenance or repair, please present this manual and the maintenance personnel will fill in and sign the attached "Maintenance Record". You are also requested to sign on it to confirm the maintenance content and provide valuable suggestions. If you are a corporate user, please affix your official seal.

If you have any questions or dissatisfaction with the products and services we provide, including product technology, quality, installation and maintenance, service attitude, charging standards, etc., please contact us in time and we will handle your opinions appropriately.

APPENDIX I PRODUCT SPECIFICATIONS

item Order	Specifications
model	ES20D
Display method	LCD
button	3 buttons
Detection principle	Electrochemistry
Power supply	Disposable lithium thionyl chloride battery DC3.6V
Working current	＜200uA
Continuous working time	≥2 years (calculated based on normal working hours of 8 hours per day);
communication method	Bluetooth communication (optional)
Accuracy	＜3%FS
Response time (T90)	30 seconds
Repeatability	<2%
Alarm method	Sound, light and vibration alarm
weight	About 100g
Protection level	IP54
Explosion-proof grade	Ex ib IIC T4 Gb
Operating temperature	-30℃～50℃
Working humidity	10%RH～95%RH (no condensation)
Atmospheric pressure	86Kpa～106Kpa
Implementation Standards	GB3836.1-2021, GB3836.4-2021, GB15322.3-2019

APPENDIX II MAINTENANCE RECORDS

Time	Maintenance Content	Maintenance Staff	Principal	Remark