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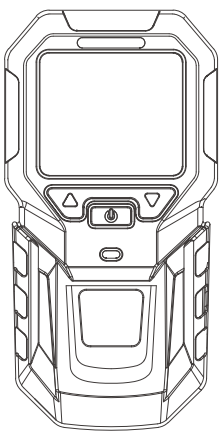
BT-BX102

Portable Single Gas Detector

Operation Manual(V1.0)



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1. Description

The BT-BX102 portable single gas detector (referred to as "the detector") employs a natural diffusion sampling method for gas detection. It utilizes high-quality gas sensors that provide excellent sensitivity and repeatability, making it easy to operate and maintain. This instrument is highly reliable for alerting you to hazardous gas levels, thus protecting your safety and property. The detector's casing is made from high-strength engineering plastics combined with anti-slip rubber, ensuring durability and a comfortable grip. It is also waterproof, dustproof, and explosion-proof. The device can be used widely across various industries, including petroleum, chemical manufacturing, environmental protection, metallurgy, refining, biomedicine, agriculture, scientific research, and educational institutions.

The detector can integrate various detection principles, such as electrochemical, catalytic, semiconductor, thermal conductivity, and optical methods, providing users with reliable, accurate, and safe gas detection solutions.

2. Main Features

★ User-friendly GUI operation interface.

★ Natural diffusion gas sampling method.

★ High-resolution color display, automatic screen rotation.

★ Three-button operation, easy and intuitive operation.

2.2 Product Functions

1. Alarms are indicated by flashing LEDs, audible alarm, flashing alarm icons on display and internal vibrating alarm.

2. Support gas unit switching

3. Support three-point calibration, allowing the detection to be more accurate.

4. Standard magnetic data cable allows the detector to connect to the host computer to transmit data and upgrade the software.

5. Multi-language support in English, Chinese, support customize other languages.

6. The device supports optional 4G data transmission and allows for a configurable data transmission interval. It also supports cloud platform data viewing, device grouping, and the sending of group alarm messages.

7.Dust/Waterproof IP Rating: IP67

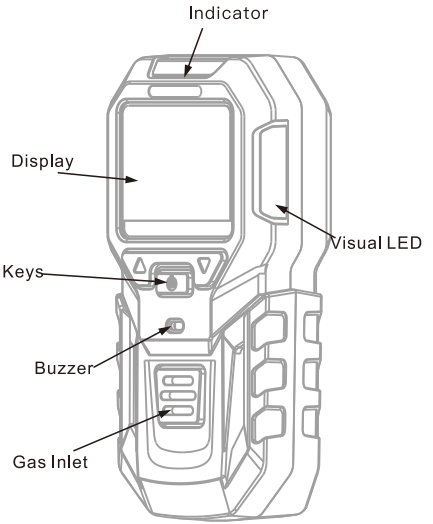
8. Support TWA and STEL alarms.

9. Equipped with Fall alert

10. Numeric display mode and curve display mode

11. Support NFC, APP-Device binding, Bluetooth, Network management and other functions.

3. Components



4. Technical Specification

Measurement Range	Please refer to the Appendix for more information
Resolution	1%LEL、1ppm、0.1ppm、0.1%vol (ppm and mg/m³ units are convertible)
Alarm Thresholds	Different gas types have different alarm thresholds. Taking carbon monoxide as an example: Low alarm at 50 ppm,High alarm at 150 ppm.
Response Time	T90≤60s (The performance can vary depending on the type of gas sensor used.)

Working Environment	Temperature:-10℃~+55℃; Humidity:≤93%RH(no dew)		
Working Voltage	DC3.7V		
Display	2.0inch color display		
Alarm Method	Visual and audible alarms, display icon flashing alarm and vibration alarm; support fall alert, TWA/STEL alarm.		
Sampling Method	Natural Diffusion		
Data Transmission	Connect to the host computer via USB port to view data		
4G(Optional)	Support for 4G enables data viewing through the cloud platform.		
Bluetooth (Optional)	Bluetooth support allows data viewing through an app on a smartphone.		
Language	Multi-language support includes English and Chinese, with options to customize additional languages.		
Charging Adapter	5V/2A standard charger		
Standby time	⩾8h	Charging time	＜7h
Historical Records	6000 historical records: The detector is capable of recording monitoring data for the last 100 hours (peak values captured every minute). This data can be accessed through a host computer or an mobile app via Bluetooth. Additionally, the detector can store up to 1,000 alarm records. These records can be viewed and deleted locally, as well as accessed through the host computer or app via Bluetooth.		

Sensor Lifetime	2 years
Dimensions	L×W×H, mm:124*63.3*34.7
Weight	About 210g

5. Operations

5.1Start-up Tests

Long press the power key for 2 seconds to turn on the detector. The display will light up (see Fig 1), and the detector will perform startup tests, including visual, audible, and vibration alarms. After warming up, the detector will enter the monitoring screen(See Fig 2)

Fig 1

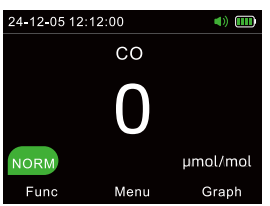


Fig 2

5.2 Display description

5.2.1 Display Elements

25-02-26 08:03:00	Displays the current date and time. If the mobile network function is enabled, the time can be updated automatically once.

	When a person falls, the fall alert icon will be displayed and the buzzer will sound continuously, with the LED indicator light remaining on. To cancel the fall alert, press the left and right buttons simultaneously for 2 seconds while on the monitoring screen.
	4G Status Indicator. Once the mobile network function is enabled, this indicator shows the current network connection status. The icon will flash while connecting to the server and will remain on when the connection is successful.
	Bluetooth Status Indicator. After enabling the Bluetooth function, this indicator displays the current Bluetooth connection status. The icon will flash when connecting to Bluetooth and will be continuously displayed when the connection is successful.
	Alert/Mute Icon. This icon indicates whether the buzzer and vibration are turned on or muted.
	Battery life indicator. The battery icon is divided into four sections, and it changes to  when the power is depleted.

5.2.2 Main Interface Display Instructions

The detector operates in a normal detection state as shown in Figure 2, allowing it to monitor gas concentration in real time.

When the detected gas concentration is below the preset low alarm threshold (when the oxygen concentration is above the low alarm threshold but below the high alarm value), the status bar will display "Normal".

If the gas concentration rises above the preset low alarm threshold (meaning the oxygen concentration is at or below the preset low alarm threshold), the detector enters a low alarm state. The status bar will read "Low Alarm," and the buzzer will emit a sound every 0.5 seconds. Additionally, the LED indicator will flash, the vibrator will activate, and if the screen is off, it will light up simultaneously.

If the detected gas concentration exceeds the preset high alarm threshold, the detector enters a high alarm state. The status bar will read "High Alarm," and the buzzer will emit a sound every 0.25 seconds. Additionally, the LED indicator will flash, the vibrator will activate, and if the screen is off, it will light up simultaneously.

If the gas concentration surpasses the sensor's range, the detector will indicate an over-range state. In this case, "OL" will replace the numeric gas reading, the status bar will display "Over Limit," and the buzzer will sound every 0.25 seconds, with the LED indicator flashing and the vibrator vibrating. The screen will also light up if it is turned off.

When the TWA (Time-Weighted Average) or STEL (Short-Term Exposure Limit) alarm function is enabled, if the gas concentration is at or above the preset alarm threshold, the detector will alert you by displaying "TWA" or "STEL" on the status bar. The buzzer will emit three sounds, while the LED indicator and vibrator will activate three times. The screen will also light up if it is off.

Even with the mute function enabled, if a new alarm occurs, the buzzer and vibrator will reactivate. Once the gas concentration returns to a normal level, the status bar will revert to "Normal," and the alarm will be automatically silenced.

In cases where multiple alarm statuses are detected in the same gas channel, only the highest priority alarm will be triggered. The alarm

priority is as follows:

Normal < TWA < STEL < Low Alarm < High Alarm < Over Limit.

5.3 Mute, Bluetooth, 4G, Fall alert

As shown in Figure 3, press the left button to scroll through options, press the middle button to toggle a function on and off, and press the left button to return to the monitoring mode.

1.When the mute function is activated, the switch status icon changes to ; the alarm status icon changes to . If the detector is in an alarm state and the mute function is enabled, the buzzer and vibrator are deactivated while the LED indicator and alarm indicator continue to flash.

2.When the Bluetooth function is activated, the switch status icon changes to; the indicator icon is displayed and begins to flash. Once a connection with the Bluetooth APP is established, the icon is permanently displayed and the message "BLE Connect" appears. If the device disconnects from the Bluetooth app, the display will show "BLE Disconnect".

Error Prompts:

If "BLE Error: 0" appears, it indicates a circuit fault. Please contact the dealer or manufacturer for repairs.

If "BLE Error: 1" appears, there is a communication issue between the device and the Bluetooth app. Please disconnect and reconnect to the app.

3.When the mobile network function is activated, the switch status icon changes to . The network icon starts to flash. When a connection with the cloud platform is successful, it will be permanently displayed and the message "NET Connect" will appear. After disconnection from the cloud platform, the message "NET Disconnect" will be shown.

Error Prompts:

If "NET Error: 0" appears, there is a problem with the hardware connection; please check the connections.

If "NET Error: 1" appears, the network registration failed—confirm the status and tariff of your SIM card.

If "NET Error: 2" appears, the device failed to register with the server. Please check if the current network signal is strong.

If "NET Error: 3" appears, the device's information sent to the server has timed out. Please verify the current network signal.

4.When the fall alert function is activated, the switch status icon changes to . If a fall is detected, the indicator icon will display, a prompt box will appear (as shown in Figure 4), the buzzer will sound, and the LED indicator will remain on. To cancel the fall alert, press and hold the left and right buttons simultaneously for 2 seconds.

Fig 3

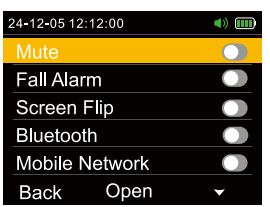


Fig 4

5.4 Menu

To access the menu interface from the main screen, press the middle button. Once in the menu, use the left or right button to navigate through the submenu options. Press the middle button to confirm your selection. The submenu icons and their function descriptions are provided in the table below.

Icon	Name	Description
	Main Menu	Return to the main menu screen. Note: If there is no operation under the menu screen, the system will automatically return to the monitoring mode after 10 seconds.
	Gas Zero	To perform a gas zero calibration
	Gas Calib	To perform a gas calibration
	Gas Setting	To set parameters of the gas channel
	Records	To view alarm records of the gas channel
	Sys Setting	To set system parameters
	Sys Info	To view device information, battery information and calibration information
	Sys Reset	To perform a factory reset
	Sys Update	To upgrade the system
	Power off	To turn off the device

5.5 Detailed Description of Menus

5.5.1 Zero calibration

To perform gas zero calibration, select the gas zero calibration icon from the main menu and press the middle button to enter the zero calibration screen (refer to Figure 5). You can return to the main menu by pressing the left button. To carry out a gas zero calibration, press the right button. If the calibration is successful, a "Calibration Success!" prompt will appear on the display (see Figure 6), and the icon will change to to indicate success. If it fails, a "Calibration Failure!" prompt will be displayed (see Figure 7).

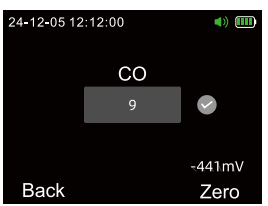


Fig 5

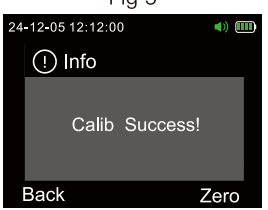


Fig 6

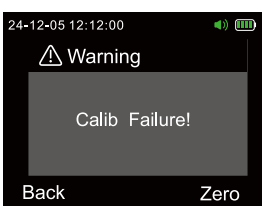


Fig 7

5.5.2 Calibration

To perform gas calibration, select the gas calibration icon from the main menu interface. Press the middle button to enter the password input screen (as shown in Figure 8). Use the right button to edit the selected digit and press the middle button to move the cursor. Enter the password "1111" (as demonstrated in Figure 9), and then press the middle button to access the gas calibration interface (as shown in Figure 10).

In this screen, you can press the left button to return to the main menu. Use the right button to select the calibration point and the middle button to edit the calibration value and perform the calibration. Once editing is complete, press the middle button to confirm and perform the calibration. If you need to cancel the calibration operation, press the left button.

After a successful calibration, a "Calibration Success!" prompt box will appear on the display (see Figure 11), and the icon will change to  accordingly.

If the calibration fails, a "Calibration Failure!" prompt will be shown (see Figure 12), indicating that the calibration threshold limit has not been met.

If you see the "Invalid Calibration!" prompt box (refer to Figure 13) or the "Repeat Calibration" prompt box (see Figure 14), it means that there is a conflict with the current calibration point.

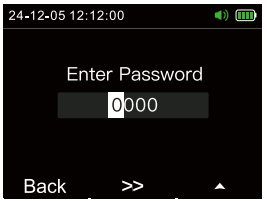


Fig 8

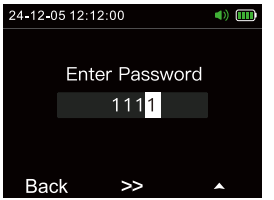


Fig 9

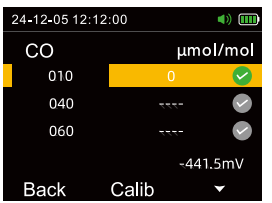


Fig 10

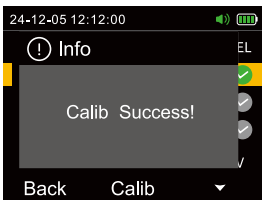


Fig 11

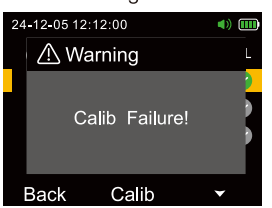


Fig 12

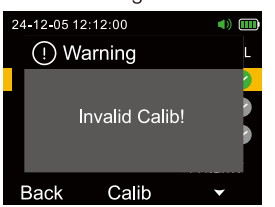


Fig 13

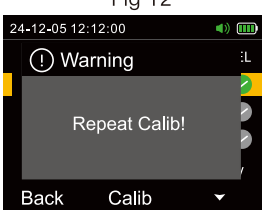


Fig 14

5.5.3 Gas settings

To enter the gas settings screen, select the gas settings icon from the main menu (refer to Figure 15). In this screen, you can switch units and edit the low alarm value, high alarm value, zero-TLV, and calib-TLV. You can also enable the TWA/STEL alarms and modify their values. If the unit switch attempt fails, an "Invalid Operation" dialog box will appear (see Figure 16).

Note:

a.The high alarm value must be less than the range. If the set value is greater than or equal to the range, a corresponding prompt box will appear (see Figure 19).

b.The low alarm value must be greater than 0. If set to 0, a warning dialog box will pop up (see Figure 17).

c.The low alarm value must be smaller than the high alarm value. If the low alarm value exceeds the high alarm value, a warning dialog box will appear (see Figure 18).

d.The TWA and STEL threshold values must be greater than 0. Setting them to 0 will trigger a corresponding warning dialog box (see Figure 17).

e.The Zero-TVL and Calib-TLV are primarily used for gas zero calibration and calibration operations. Since the detector is factory calibrated, users generally should not modify the Zero-TVL and Calib-TLV settings.

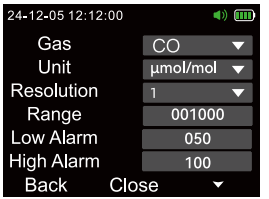


Fig 15

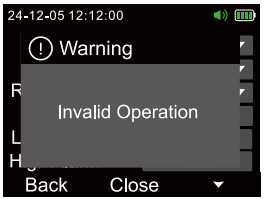


Fig 16

Fig 17

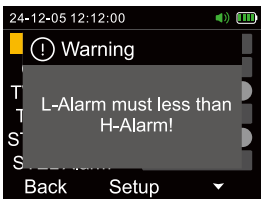


Fig 18

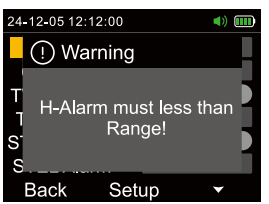


Fig 19

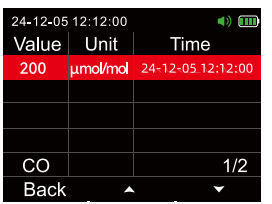


Fig 20

5.5.4 Records

To view alarm records, select the record icon from the main menu and press the middle button to access the alarm records viewing screen (see Figure 20). In this screen, you can view the alarm value, unit, alarm type, and alarm time. Use the middle and right buttons to

navigate through the records, while the left button returns you to the previous screen.

To clear alarm records, long press the middle button to enter password input mode (see Figure 21). Move the cursor with the middle button and edit the password with the right button. Enter the password "1111" (as shown in Figure 22). After entering the password, you will be able to clear the alarm records (see Figure 23). Press the left button to cancel the operation, or press the right button to confirm clearing. Once the clearing is complete, a "Delete Success!" prompt box will appear (see Figure 24).

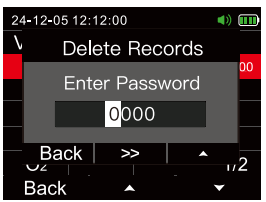


Fig 21

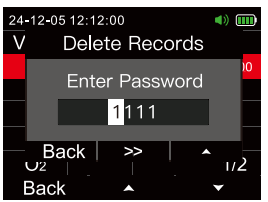


Fig 22

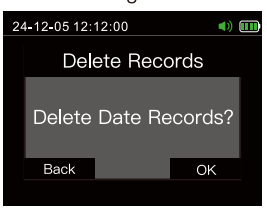


Fig 23

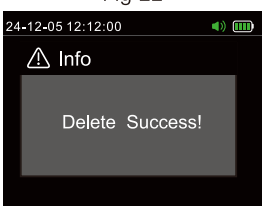


Fig 24

5.5.5 System settings

To access the system settings, select the system settings icon in the main menu and press the middle button to enter the settings screen (as shown in Figure 25).

Press the left button to return to the main menu, Press the right button to switch the menus, press the middle button to confirm an option.

Language: Configure the system language.

Backlight: Set the device's backlight off time to "Keep Bright", "30s", "60s", or "120s". When the screen backlight is off, the green operating indicator at the top of the device flashes twice every 5 seconds.

Bluetooth: After enabling Bluetooth, you can view the device's Bluetooth name and MAC address (as shown in Figure 26).

Mobile Network: Once the mobile network is activated and connected to the platform, you can set and view parameters such as data transmission cycle (range: 30 to 600 seconds), group alarm, network number, IP address, etc. (as shown in Figure 27).

Date and Time: To edit the currently selected date or time, press the right button. Use the middle button to move the cursor (as shown in Figure 28).

Note: For detailed instructions on using Bluetooth and 4G data, please refer to Appendix B.

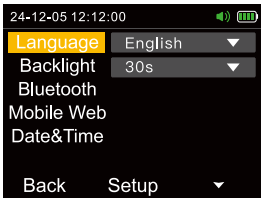


Fig 25

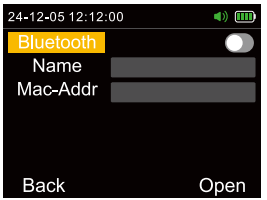


Fig 26

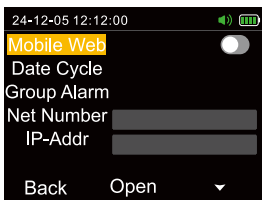


Fig 27

Fig 28

5.5.6 System information

To view system information, select the system information icon in the main menu and press the middle button (as shown in Figure 29). You can switch options by pressing the right button and enter specific information screens by pressing the middle button.

Device Information: Check the software version and device number (as shown in Figure 30).

Battery Information: View current battery voltage and charging status (as shown in Figure 31).

Calibration Information: Check the calibration value and the time of the last calibration for the corresponding gas channel (as shown in Figure 32).

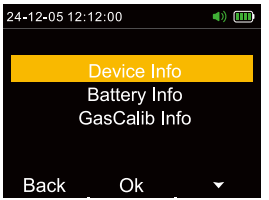


Fig 29

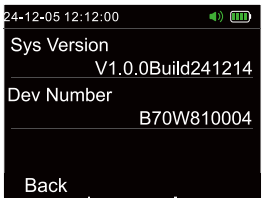


Fig 30

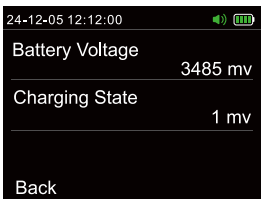


Fig 31

Fig 32

5.5.7 Factory Reset

To perform a factory reset, select the system reset icon in the main menu and press the middle button to enter the password input mode (as shown in Figure 33). The password is "1111." Press the middle button to confirm and access the factory reset screen(as shown in Figure 34). Press the left button to return to the previous menu. Press the right button to perform a factory reset. After a successful reset, a dialog box titled "Settings Success!" will appear (see Figure 35). If the reset fails, a dialog box titled "Reset Failure!" will be displayed.

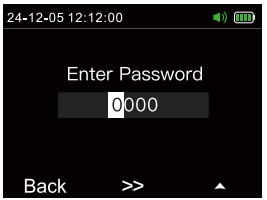


Fig 33

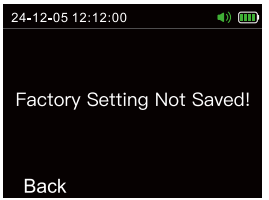


Fig 34

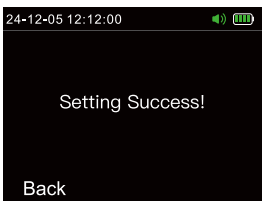


Fig 35

5.5.8 System upgrade

Select the system update icon from the main menu and press the middle button to access the system upgrade screen. If the system does not detect an upgrade package, the screen will display a relevant message (see Figure 36). If an upgrade package is available, it will be indicated on the screen (see Figure 37).

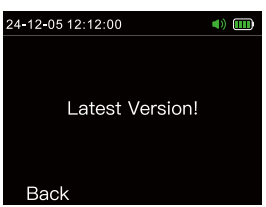


Fig 36

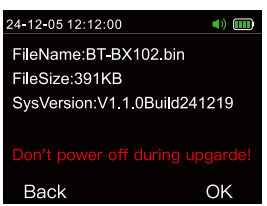


Fig 37

5.5.9 Power off

Select the power off icon on the main menu and press the middle button to enter the power-off screen (see Figure 38). Press the left button to return to the previous menu and the right button to power off the device. The detector will shut down once the progress bar completes.

Note: Long press the middle button on the main interface can directly turn the device off.

5.6 Curve Display

Press the right button on the main screen to access the "Curve" display (see Figure 39).

On this page, you can view the maximum and minimum gas detection values, as well as the trend curve of changes over a specified time range. Detection values can also be checked here if the TWA/STEL function is enabled. Use the left and right buttons to switch between gas types, and press the middle button to return to the main screen.

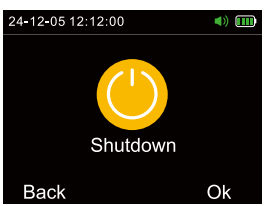


Fig 38

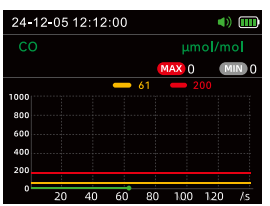


Fig 39

6.Charging

If you see the prompt "Battery Low!" or if the detector cannot be turned on due to low voltage, please charge it immediately. When the detector is off and detects a charging operation, it will automatically turn on and display the charging status (see Figure 40). "Complete" will appear on the screen after charging finishes (see Figure 41).

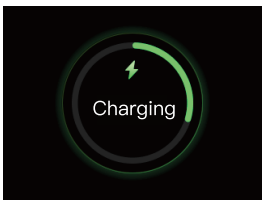


Fig 40

Fig 41

Under-voltage

When the battery is low, the screen will display "Battery Low!" every two minutes (see Figure 42), accompanied by a four-beep warning from the buzzer ("Ding-Ding-Ding-Ding").

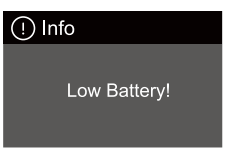


Fig 42

Under-voltage shutdown

If the battery power drops below the normal operating voltage, the device will initiate an automatic shutdown countdown (see Figure 43), and will shut down once the countdown ends.

Fig 43

Important Note: Do not charge the detector while it is powered on to avoid slowing down the charging process, and do not charge the device in hazardous environments to prevent fire or explosion from potential sparks during charging.

7.Warning

1.Prevent the instrument from falling or experiencing severe vibrations.

2.Do not disassemble, modify, or repair the instrument without authorization.

3.Avoid using the device in high concentration gas environments.

4.Follow the instructions and specifications in the manual strictly; failure to do so may lead to inaccurate results or damage to the instrument.

5.Do not store or use this product in environments containing corrosive gases (such as high concentrations of chlorine) or in harsh conditions, including extreme temperatures, high humidity, or strong electromagnetic fields.

6.If the surface of the instrument becomes dirty over time, gently clean it with a soft cloth slightly dampened with water. Avoid using corrosive solvents or abrasive objects to prevent scratches or damage.

7.To ensure the accuracy of the instrument's detection capabilities, regular calibration is required, with a maximum calibration interval of one year.

8.Batteries cannot be removed or replaced, and charging in explosive gas environments is strictly prohibited. Do not connect any non-explosion-proof certified external devices to the instrument, and avoid replacing sensors in explosive gas environments.

8.Storage

The instrument should be stored in a well-ventilated room with an environmental temperature ranging from -20°C to 55°C. The relative humidity must not exceed 85%, and the air should be free of harmful gases or impurities that could corrode the instrument.

9.Troubleshooting

Fault 1

Unable to turn on

Cause

1) Low battery

2) System has frozen

3) Circuit failure

Solution

1) Please charge the device promptly.

2) Please contact the dealer or manufacturer for repair.

3) Please contact the dealer or manufacturer for repair.

Fault 2

No response to gas detection

Possible Cause

1) Circuit failure

Solution

1) Please contact the dealer or manufacturer for repair.

Fault 3

Detection value is inaccurate

Cause

1) Sensor has expired

2) Not calibrated recently

Solution

1) Please contact the dealer or manufacturer to replace the sensor.

2) Not calibrated recentlyPlease calibrate the device promptly.

Fault 4

Time display error

Cause

1) Battery completely depleted

2) Strong electromagnetic interference

Solution

1) Please charge the device and reset the time promptly.

2) Please reset the time.

Fault 5

Zeroing calibration failed

Cause

1) sensor drift

Solution

1) Modify the zero-TLV and calib-TLV in the channel settings.

Fault 6

Display shows full scale in monitoring mode

Cause

1) Sensor failure

Solution

1) Please contact the dealer or manufacturer to replace the sensor.

Fault 7

Bluetooth error "BLE Error: 0"

Cause

1) Circuit failure

Solution

1) Please contact the dealer or manufacturer for repair.

Fault 8

Bluetooth error "BLE Error: 1"

Cause

1) Communication issue with Bluetooth APP .

Solution

1) Please restart the Bluetooth APP.

Fault 9

Mobile network error "NET Error: 0"

Cause

1) Loose wiring or component failure

Solution

1) Please check wiring or contact the dealer or manufacturer for repair.

Fault 10

Mobile network error "NET Error: 1"

Possible Cause

1) Weak network signal or unpaid SIM card

Solution

1) Please check the network signal or billing status.

Fault 11

Mobile network error "NET Error: 2"

Cause

1) Device number error

Solution

1) Check if the device number matches the label in the system information.

Fault 12

Mobile network error "NET Error: 3"

Cause

1) Weak network signal

Solution

1) Please check the network signal.

10.Accessories and Others

Accessories	Quantity
Packaging Box	1
Gas Detector	1
Charging Set	1
USB Data Cable	1
Instruction Manual	1
Warranty Card	1

Appendix A-
Industrial Gas Detection Online Monitoring Platform User Guide

1. Android users: Scan the QR code via the mobile browser to download the app.
iOS users: Search for Cycle Analytics Cloud in the App Store to download the app.
2. A comprehensive user manual, Industrial Gas Detection Online Monitoring Platform User Guide, can be obtained by scanning the provided QR code. Network and Bluetooth-based operation shall be performed in accordance with the steps outlined in the manual.

Android APP

User Guide

Platform service address

https://intlcloud.bosean.com/

Appendix-Gas Type Table

Model	Range	L-alarm	H-alarm
CH4	0-100%LEL	20%LEL	50%LEL
C3H8	0-100%LEL	20%LEL	50%LEL
H2	0-100%LEL	20%LEL	50%LEL
H2	0-1000ppm	35ppm	250 ppm
H2S	0-100ppm	10ppm	15ppm
H2S	0-100ppm	10ppm	20ppm
CO	0-1000ppm	35ppm	200ppm
CO	0-1000ppm	30ppm	60ppm
C2H4O	0-20ppm	10ppm	15ppm
C2H4	0-100%LEL	20%LEL	50%LEL
C2H4	0-20ppm	5ppm	10ppm
O2	0-30%vol	19.5%vol	23.5%vol
C2H5OH	0-100%LEL	20%LEL	50%LEL
NH3	0-100ppm	25ppm	50ppm
CL2	0-20ppm	5ppm	10ppm
O3	0-20ppm	5ppm	10ppm
O3	0-10ppm	2ppm	5ppm
SO2	0-20ppm	2ppm	5ppm
SO2	0-100ppm	2ppm	5ppm
PH3	0-20ppm	0.3ppm	5ppm
PH3	0-5ppm	0.3ppm	2ppm
CO2	0-5000ppm	1000ppm	2000ppm
CO2	0-50000ppm	1000ppm	2000ppm
NO	0-250ppm	20ppm	50ppm
NO2	0-20ppm	5ppm	10ppm
HCN	0-500ppm	10ppm	20ppm
HCN	0-50ppm	10ppm	20ppm
HCL	0-50ppm	10ppm	20ppm
CH2O	0-10ppm	2ppm	5ppm
VOC	0-100ppm	20ppm	50ppm
C6H6	0-100ppm	20ppm	50ppm