

Fixed Gas Detection Alarm

(Wireless Gas Detection Alarm)

TCB2-W series

Operating Instruction



Henan Otywell Electronic Technology Co., Ltd.

ISO9001 Quality Management System Certified Enterprise

Thank you for choosing Henan Otywell Electronic Technology Co., Ltd. products. Before using this device, please read the instructions carefully and follow the provided steps to ensure optimal service experience while preventing accidental damage or other issues.

Please keep this manual safe and accessible for future reference and assistance.

Copyright Statement

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Henan Otywell Electronic Technology Co., Ltd. adheres to the principle of technological advancement, continuously striving to enhance product performance. The company reserves the right to make any product improvements without prior notice.

If the user installs, repairs, or replaces components without following the instructions in this manual, the user shall be held responsible for any resulting liabilities.

User Service Guide

1. Before using this product, please carefully check whether the accessories, product certificate of conformity, and user warranty card are complete according to the factory list. If any items are missing, contact the seller or manufacturer immediately.

2. For twelve months from the date of sale, if the product quality falls below the technical specifications while users comply with storage, transportation, and usage requirements, free repairs will be provided upon presentation of the warranty card.

3. For damages caused by non-compliance with operational regulations, malfunctions not serviced by our designated authorized technical service department, or product quality issues due to force majeure, we will charge for repairs.

4. When servicing your product, please present the warranty card. Failure to do so will result in a paid repair.

5. After product maintenance or repair, please present this manual. The technician will complete and sign the attached "Maintenance and Repair Record." Additionally, please sign the technician's record to confirm the maintenance details and provide feedback. For institutional users, please affix the official seal.

6. Should you have any questions or concerns regarding our products and services—including technical specifications, quality, installation, maintenance, service attitude, or pricing—we kindly ask you to contact us promptly. Your feedback will be addressed with due care.

Safety precautions:

Warning: Do not open the detector cover while powered on at the work site!

Before any operation, comply with local regulations and on-site operating procedures;

Any operation inside the detector must be performed by a professional;

Before powering on the detector, carefully check the wiring connections.

▲ The interval between a detector power failure and subsequent power-on exceeds 5 seconds;

▲ Connect devices and add nodes only after powering off the system.

▲ The detector should have an independent power supply to avoid sharing the same power line with large motor equipment.

▲ The detector's casing must not be damaged, as this would compromise its shielding performance.

▲ If the power supply lacks a ground wire, safely ground the detector using the grounding terminal.

Do not repair or disassemble the detector yourself.

▲ Protective cover must be used when exposed to open areas;

▲ Always disconnect the power supply before connecting or disconnecting the detector terminals and grounding wire.

Avoid installing detectors in the following situations:

1. Environments where temperature and humidity exceed operational parameters;
2. Environments with highly corrosive gases;
3. Environments with high concentrations of dust, salt, and metal powders;
4. Areas where water, oil, or chemical liquids may splash;
5. Situations involving direct vibration or impact;
6. Situations with strong electromagnetic interference.

The product appearance and colors in the product catalog are for reference only. The actual product supplied will be subject to the catalog. Our company reserves the right to modify the technical parameters of the products listed in this catalog without prior notice. For any inquiries, please contact our customer service hotline.

Catalogue

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1. Overview

The TCB2-W wireless gas detector is an advanced instrument developed by our company. Featuring high-performance gas sensors and microcontroller technology, it is manufactured using precision SMD (Surface-Mount Device) technology. This device offers excellent repeatability, reliable temperature and humidity performance, strong anti-interference capability, extended service life, and user-friendly operation.

This product is designed for gas leak concentration detection in industrial and commercial settings. It converts airborne gas concentration signals into electrical signals and supports wireless communication via LoRa/4G/NB technologies. The system can upload gas concentration data and anomaly types to control hosts or cloud platforms through scheduled or event-triggered alerts, featuring long-range transmission and simplified wiring.

This product is designed for gas safety detection, alarm, and control in environments containing flammable gases, including petroleum refining, chemical processing, storage and gas stations, gas pipelines, municipal utility tunnels, fire monitoring systems, and spray painting rooms. It is suitable for hazardous areas with explosive flammable gases classified as Grade II A to II C and temperature ranges from T1 to T6.

1.1 This product's design, manufacturing, and verification comply with the following national standards:

GB/T 3836.1—2021 Explosive Atmosphere Part 1: Equipment General Requirements

GB/T 3836.2—2021 Explosive Atmosphere Part 2: Equipment Protected by Flameproof Enclosure'd'

GB/T 3836.31—2021 Explosive Atmosphere Part 31: Equipment Protected by Dust Inflammable Enclosure 't'

GB 12358—2024 General Technical Requirements for Gas Detection and Alarm Instruments in Workplaces

GB/T 4208—2017 Protective class of enclosure (IP code)

1.2 Gas Units and Conversion Relationships

(1) ppm: A unit of concentration in gas, representing one part per million (e.g., 5ppm means five parts per million).

(2) LEL: The lower explosive limit of flammable gases. A 100% LEL indicates reaching the lower explosive limit (e.g., 10% LEL means 10% of the lower explosive limit concentration).

(3)%VOL: Volume percentage of gas (e.g., 5%VOL means 5% by volume).

(4) $\mu\text{mol/mol}$: micromoles per mole, equivalent to ppm values ($1\text{ppm} = 1\mu\text{mol/mol} = 1 \times 10^{-6}$).

The relative relationship is $\%VOL > ppm = \mu mol/mol$.

For example, the lower explosive limit (LEL) of methane is 5% VOL, therefore:

$$10\%LEL = 0.5\%VOL = 5000ppm = 5000\mu mol/mol = 5000 \times 10^{-6}$$

2. Main Technical Specifications

- Suitable for gases: combustible/toxic/hazardous gases/oxygen, etc.
- Detection principles: catalytic combustion type, electrochemical type, infrared type, etc.
- Detection method: free diffusion
- Detection range: (0 ~ 100%) LEL; 0 ~ 1000 ppm, etc. (customizable)
- Resolution: 1% LEL, 1 ppm/0.1 ppm (depending on gas type)
- Alarm threshold: 20% LEL (flammable)
- Accuracy: $\pm 3\%FS$
- Response time: See Appendix 1
- Ambient temperature: -40°C to +70°C (flammable); -25°C to +55°C (toxic)
- Relative humidity: (20 ~ 93)%(No Condenser)
- Explosion-proof certificate number: CCRI 25.1415X
- Explosion-proof rating: Ex db IIC T6 Gb / Ex tb IIIC T80°C Db
- Protection rating: IP66
- Output signal: LoRa/4G/NB wireless data upload capability (subject to order specifications, see nameplate)
- Operating voltage: DC24V (1 $\pm$ 15%) / AC220V (1 $\pm$ 15%) (specific values subject to order, as indicated on the nameplate)
- Display mode: LCD/Display
- Debugging method: Remote control (display function)
- Power consumption: ≤ 3 W
- Pressure limit: 86 kPa to 106 kPa

3. Product Model Description

The product model meanings are as follows:

Model	Description
TCB2-W	TCB is the product series code; 2 is the product type code; W is the function code, indicating the capability of wireless signal transmission.

4. Product Structure

The product consists of alarm body, sensor unit module, display screen, sound and light alarm device, wireless transmitting antenna, etc.



DC24V digital version



AC220V digital version



DC24V LCD model



AC220V LCD model

Note: Images are for reference only. Actual products are subject to supply availability.

1	Wireless transmission antenna (LoRa/4G/NB antenna)	2	install fixed hole
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3	Built-in junction box	4	Locking head
5	buzzer	6	gas transducer
7	Status indicator (green for normal, yellow for fault, red for alarm)	8	display screen
9	alarm lamp	10	AC220V power cord

5. Installation

5.1 Installation Location

To ensure optimal performance, the alarm should be installed within 1 meter of potential gas leakage points based on gas density and wind direction. This setup guarantees rapid response, preventing situations where combustible gas concentrations at the alarm location remain within limits while local gas levels at the leakage point exceed thresholds, yet the main unit fails to trigger an alarm. The alarm requires network data signals and should be installed away from signal-blocking areas and high-temperature/humidity environments.

The alarm should be installed at a height of more than 30 cm above the ground to prevent water splash. For detecting gases with a density lower than air, such as hydrogen and natural gas, the installation height should be approximately 0.6 m to 1 m above the ceiling. For detecting gases with a density higher than air, such as liquefied petroleum gas (LPG), the installation height should be approximately 0.3 m to 0.6 m above the ground.

Alarm System Configuration: In accordance with petroleum and petrochemical industry standards, combustible gas detectors should have a coverage radius of no more than 10 meters in open outdoor areas, while toxic gas detectors should maintain a coverage radius of no more than 4 meters. For enclosed workshops or semi-open workshops with poor ventilation, combustible gas detectors must cover a radius of up to 5 meters, and toxic gas detectors should limit coverage to 2 meters. All alarm sensor probes must be installed with their tips facing downward. The locking nuts must be fully tightened, and the probe covers must be securely fastened with screws to ensure explosion-proof performance.

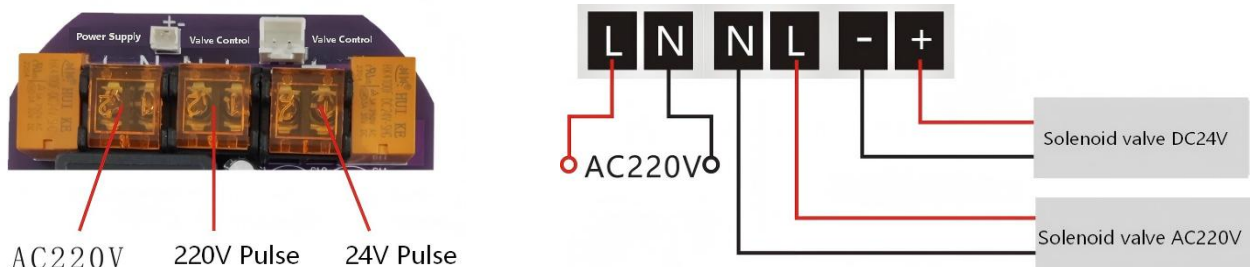
5.2 Installation Method

Select installation locations free from corrosive gases, cooking fumes, and dust at the detection site, and avoid water exposure. Refer to the following for fixing methods:

Install the alarm by aligning it with the mounting holes, securing two M6 expansion bolts on the surface, and tightening the nuts.

5.3 Wiring Considerations

The diagram below shows the terminal connections of the AC220V detector circuit board. The left side contains AC220V power terminals, the middle section has AC220V solenoid valve terminals, and the right side features DC24V solenoid valve terminals.



The AC220V power supply terminal has three terminals: L (live wire), N (neutral wire), and the ground wire is located outside the enclosure.

The AC220V solenoid valve terminal provides an alarm output with active pulse signal.

DC24V solenoid valve terminal: The pulse signal serves as an active alarm output.

The alarm system features two active pulse outputs with 3A load current. When the preset alarm threshold is reached, the relays activate. These outputs can be freely utilized by external control devices.

The alarm has been properly installed with its power output cable. Once securely positioned and fixed as described above, simply plug the power cord into the socket to activate. For connecting an electromagnetic valve, additional wiring is required. To proceed, open the alarm's junction box, run the wiring cable through the adapter's hole into the junction box, then through the housing, and finally connect it to the circuit board. To comply with explosion-proof regulations, do not remove the explosion-proof gasket from unused wiring holes. All components on the alarm housing and internal circuit board must not be discarded indiscriminately.

Connect the wires to the corresponding terminals on the housing according to the markings. After verifying the wiring is correct, remove any excess cable inside the housing. Tighten the compression nut to secure the rubber sealing ring and firmly hold the cable (as required by the explosion-proof design). When using an explosion-proof hose, it can be directly connected to this device via a cable with a cross-sectional area of no less than 1.5mm². Ensure the housing is properly grounded. After confirming all connections are correct, tighten the front cover. Depending on the user's site conditions, the alarm can also be installed after the cable is connected.

6. Operation Instructions

Do not operate the detector while powered on. Power must be applied only after confirming the circuit is fault-free, with a mandatory 180-second countdown period required.

The remote control features five buttons: "Settings", "Confirm", "Exit", "Up", and "Down".

The default login password for the detector is 1111. After the power-on countdown completes, press the "Settings" button, then use the "Up", "Down", and "Confirm" buttons to enter the password. Press "Confirm" to access the main menu interface, where you can select any menu for configuration.

Note: The "Set", "OK", and "Exit" keys are single-tap triggers. Even continuous pressing will only activate once, with a minimum 1-second interval required between presses. The "Up" and "Down" keys are continuous triggers that can be pressed repeatedly. All settings require confirmation by pressing the "OK" key to take effect. To exit the settings, press the "Exit" key (the system will automatically exit if no action is taken within 15 seconds) to return to normal mode. Valid settings will remain preserved after power-off until the next change takes effect.

User access list (password: 1111):

Digital Display Menu List					
FU01	Low alarm Settings	FU11	Relay settings	FU20	Check software version
FU02	High alarm settings	FU12	Mode Settings	FU22	View product serial number (4G/NB model features)
FU05	Zero setting	FU14	Gas name settings	FU23	Check network status (4G and NB features)
FU06	Calibration settings	FU15	Gas unit settings	FU24	Check network strength (4G and NB features)
FU10	Password settings	FU17	Factory reset		

LCD Menu List		
Low alarm settings	Calibration settings	Restart the device
High alarm settings	Wireless information	withdraw from
Zero setting	Restore settings	

Note: This menu list covers all product menus of our company. Some menus are only applicable to certain products. Other unlisted menus are manufacturer-exclusive features. The manufacturer's feature list is for authorized personnel only. Unauthorized users may not operate these functions, and any damage will not be covered.

1. Normal: The gas concentration reads "××××" (where ×××× indicates the normal value), and the detector is in normal monitoring mode.

2. Level 1 Alarm: When the gas concentration reaches "××××" (where the Level 1 threshold

$\leq \times \times \times \times < \text{Level 2 threshold}$), the detector triggers this alert (for oxygen detection, $\times \times \times \times \leq \text{Level 1 threshold}$). The alarm remains active until the concentration drops below the Level 1 threshold and the difference is reduced to below the Level 1 threshold, at which point the alarm is cleared.

3. Level 2 Alarm: When the gas concentration reaches " $\times \times \times \times$ " ($\geq$ the Level 2 threshold), the detector triggers the alarm. To clear the alarm, the concentration must first drop below the Level 2 threshold and then decrease to the baseline value.

For single-gas detectors, the login password can be entered directly to select the menu for configuration. For composite gas detectors, after entering the login password, the user must first select the channel to modify (e.g., Channel 1-methane; Channel 2-oxygen; Channel 3-carbon monoxide; Channel 4-hydrogen sulfide) before selecting the menu to configure that channel.

6.1 FU01 Low Alarm Settings (Take combustible as an example)

The low alarm setting (primary alarm threshold) is configured through the following steps: After logging in with the normal password, navigate to this menu and press "OK" to display "20" (default primary alarm value). To adjust this value, use the "Up" or "Down" keys to increment or decrement the threshold, then press "OK" to save the current setting. The adjustment takes effect immediately after exiting. Press "Settings" to continue other configurations or "Exit" to terminate (automatic exit if no action is performed within 15 seconds), returning to normal mode.

6.2 FU02 High Alarm Settings (For Example: Combustible)

The high alarm setting (secondary alarm threshold) is configured through this menu. After logging in with the normal password, press "OK" to display "50" (default secondary alarm value). To adjust this value, use the "Up" or "Down" keys to increase or decrease the threshold, then press "OK" to save the current setting. The adjustment takes effect immediately after exiting. Press "Settings" to continue other configurations or "Exit" to return to normal mode (automatic exit if no action is taken within 15 seconds).

6.3 FU05 Zero Setting

The sensor will produce drift after a certain period of time, which will lead to the error of measurement results. In order to facilitate the user to correct by himself, the dot-type gas detector has the function of zero point shift.

Method 1: After logging in with the normal password, navigate to this menu and press the "OK" button. Once the data stabilizes, press the "OK" button again to exit the menu and complete

the zero-point translation operation.

Method 2: First, switch the second position of the two-position DIP switch at the bottom of the circuit board up and then down to set a zero point. Wait for the value to stabilize before proceeding to the next step. Then, switch the first position of the DIP switch up and down to complete the zero point adjustment. **(Applicable to certain products)**

Method 3: The circuit board has a zero button. Press the zero button to display a zero value. Wait for the value to stabilize, then press the calibration button to save and complete the zero shift operation. **(Applicable to some products)**

Note: This setting must be performed in a regular air environment and not during normal operation!

6.4 FU06 Calibration Settings (For Combustible Examples)

After logging in with the normal password, navigate to this menu and press the "OK" button to display the standard gas concentration value (select an appropriate standard gas concentration). To adjust this value, press the "Up" or "Down" button to increase or decrease the calibration concentration (within the range of 10% to 90% LEL). Then press "OK" to save the current calibration concentration setting. The screen will display "0" (current A/D value), and the standard gas can be introduced. Using 60% LEL methane standard gas, adjust the calibration concentration to 60% and press "OK". The screen will display "0". Introduce the 60% LEL methane standard gas into the detector's detection port. Once the value stabilizes, press "OK" to save the current value and perform calibration. The changes will take effect immediately after exiting. This completes the calibration. You can press "Settings" to continue other configurations or press "Exit" (the system will automatically exit if no operation is performed within 15 seconds) to return to normal mode.

6.5 Rapid Calibration Method (Applicable to Some Products)

Using methane as an example, contact the manufacturer for detection of other gases. Place the calibrated detector in a clean environment and power it on for 10 minutes. First, toggle the first-position dial switch on the bottom of the circuit board (up/down) to activate calibration mode. The calibration light will remain on, allowing standard gas to be introduced for calibration (or: press the calibration button on the circuit board to initiate the process). Connect the 60% LEL standard gas sample to the flow meter. Adjust the flow rate to 500 mL/min, then place the dedicated detector calibration cover over the sensor detection end. Wait for the readings to stabilize. Next, toggle the second-position dial switch on (up/down) (or: press the zero button to save settings). Calibration is complete. After calibration, remove the standard gas and wait for the readings to drop to 0. Reintroduce the standard gas for testing. Compare the readings with the calibration gas. Consistency confirms successful calibration; otherwise, repeat the calibration process.

6.6 FU10 Password Settings

After logging in with your normal password, go to this menu, press "OK", enter a new password, and press "OK" to save.

6.7 FU11 Relay Settings

After logging in with the normal password, switch to the "FU11" display and press the confirm button to enter the relay configuration interface. The default settings are J1 (24V pulse relay) and J2 (220V pulse relay), both with a 5-second duration. Press the confirm button to adjust the required relay. Use the up/down buttons to adjust the pulse width (0-10 seconds). When the pulse width is set to 0, the output is a switch signal (high level during alarms, low level after alarms). This function is only applicable to 220V settings.

6.8 FU12 Mode Settings

In the mode settings menu, you can configure oxygen and non-oxygen settings. The numbers correspond to the following modes: 1: Oxygen; 2: Nitrogen; 3: Chlorine; 0: Standard.

Factory settings are configured. Customers are prohibited from making changes unless necessary. For modifications, please contact the manufacturer.

6.9 FU14 Gas Name Settings

Factory settings are configured. Customers are prohibited from making changes unless necessary. For modifications, please contact the manufacturer.

6.10 FU15 Gas Unit Settings

In the gas unit menu, the numerical values correspond to the following units: 1: LEL (Lower Explosive Limit); 2: VOL (Volume of Liquid); 3: ppm (parts per million).

Factory settings are configured. Customers are prohibited from making changes unless necessary. For modifications, please contact the manufacturer.

6.11 FU17 Restore factory settings

After logging in with your normal password, go to this menu and press the "OK" button. Follow the prompts to restore factory settings. Proceed with caution!

6.12 FU20 View software version

After logging in with your normal password, go to this menu and click OK to view version information.

6.13 FU22 View product serial number (4G/NB model features)

After logging in with your normal password, go to this menu and press 'OK' to view the product serial number, which is the platform's IMEI number.

6.14 FU23 Check network status (4G and NB models)

After logging in with your normal password, go to this menu and press the "OK" button to check the network status. A "0" indicates normal, while other values indicate abnormal.

6.15 FU24 Check network strength (4G and NB functions)

After logging in with your normal password, go to this menu and press 'OK' to check your network strength. A signal strength above 10 indicates normal connectivity. If it's below 10, the signal is weak. Check if the installation site has signal shielding or lacks 4G coverage.

7. Operation of Zhihui Cloud IoT Platform

This product transmits gas detection data to the cloud IoT platform via NB/4G. Customers may choose either their preferred cloud IoT platform or our company's Zhihui Cloud IoT platform.

The operation instructions for the Zhihui Cloud Platform are as follows:

(1) Three viewing methods are supported: ① Browser access on desktop; ② Mobile app (currently available only for Android); ③ WeChat Mini Program (compatible with both Android and iOS). This guide focuses on desktop operations. The mobile app installation package and WeChat Mini Program QR code are provided on the back cover for scanning and downloading, with identical usage instructions. On desktop, visit <https://www.zhihuiyun-iot.com> to access the login interface.

(2) To log in for the first time, you need to register your account. Click "Account Registration" to go to the registration page and follow the instructions to complete the registration.

(3) After logging into the platform, select "Smart Security" → "Industrial Alarms", then click to access the detector monitoring interface.

(4) Click "Device Management" → "Add Device", fill in the required device information including "Device Model", "Serial Number (SN)", "Notes", and "Installation Location". Click "Next", enter the notification details, then click "Complete".

(5) Added successfully. Click "Data Monitoring" to view real-time and historical device monitoring data.

(6) Click "Alarm Management" to view alarm information, ticket list, and my tickets for a specific time period.

(7) Click "Notification Management" to reconfigure or delete previously added notifications.

(8) Click "Data Report" to view statistics or export reports.

(9) Click "Video Center" to manage and view videos.

8. Common Faults and Solutions

No response to the detected gas: (1) Sensor failure: Replace the sensor; (2) Circuit malfunction: Manufacturer repair.

9. Precautions

(1) This device must be used in a protected environment free from corrosive gases, cooking fumes, dust, and rain, and should be protected from drops from heights or violent vibrations.

(2) The probe area must not be directly exposed to rapidly flowing gas, as this may affect the test results.

(3) Avoid frequent exposure of the device to high-concentration gas samples exceeding the detection range, as this may reduce the sensor's lifespan.

(4) When monitoring mixed flammable gases/liquids/vapors where the sample differs from the calibration gas, the instrument's readings may show discrepancies from actual concentrations.

(5) All devices undergo rigorous inspection and testing prior to shipment. To ensure measurement accuracy, they must be calibrated at least annually, or as required by on-site regulations.

(6) The recommended service life is 5 years for infrared and semiconductor sensors, and 2 years for catalytic combustion and electrochemical sensors.

(7) Products with explosion-proof certification must not have their components or structures that compromise explosion-proof performance replaced or modified without authorization.

(8) It is recommended to connect the detector housing to the ground wire to prevent communication interference.

10. Warranty and Maintenance

(1) This product is covered by a one-year warranty (excluding consumables). In the event of a malfunction under normal usage conditions, free factory repair and maintenance services are provided. Damage caused by human error, natural disasters, or improper use is not covered by the warranty.

(2) If your sensor reaches the end of its service life, please contact our company for a replacement.

(3) If the user cannot resolve the issue, the detector may be returned to our company for repair. We will promptly resolve the problem and return it to the user.

11. STORAGE

The detector shall be stored in a ventilated room with an ambient temperature of 0°C to 55°C and a relative humidity not exceeding 85%, and the air must be free from any harmful gases or impurities that could corrode the detector.

12. Accessories

The supporting products include one detector, one user manual, one product qualification certificate and warranty card, and one factory inspection report.

Appendix Gas Parameter Table

Detected gas	Measuring range	Resolution	Low Alarm	High Alarm	Response time
Combustible (EX)	0-100%LEL	1%LEL	20	50	≤30 s
Combustible (EX)	0-10000ppm	1ppm	500	1500	≤30 s
Oxygen (O2)	0-30%VOL	0.1%VOL	19.5	23.5	≤20 s
Hydrogen sulfide (H2S)	0-100ppm	1ppm	15	35	≤60 s
Carbon monoxide (CO)	0-1000ppm	1ppm	50	150	≤60 s
Nitrogen dioxide (NO2)	0-20ppm	0.1ppm	5	10	≤60 s
Natural gas	0-100%LEL	1%LEL	20	50	≤30 s
Methane (CH4)	0-100%LEL	1%LEL	20	50	≤30 s
Carbon dioxide (CO2)	0-5000ppm	1ppm	1500	2500	≤60 s
Nitric oxide (NO)	0-250ppm	1ppm	50	150	≤60 s
Nitrogen (N2)	0-100%VOL	0.1%VOL	76.5	80.5	≤60 s
Sulfur dioxide (SO2)	0-20ppm	0.1/1ppm	5	10	≤60 s
Chlorine gas(Cl2)	0-20ppm	0.1ppm	5	10	≤60 s
Ammonia (NH3)	0-100ppm	0.1/1ppm	15	35	≤160 s
Hydrogen (H2)	0-1000ppm	1/10ppm	50	150	≤30 s
Phosphine (PH3)	0-20ppm	0.1/1ppm	5	10	≤100 s
Chlorine hydride (HCl)	0-20ppm	0.1/1ppm	5	10	≤160 s

For more product details, please contact our company

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