

# CDB800-6BG

## OPERATION MANUAL

BIOGAS PRETREATMENT EQUIPMENT

Product Model: 1000028234

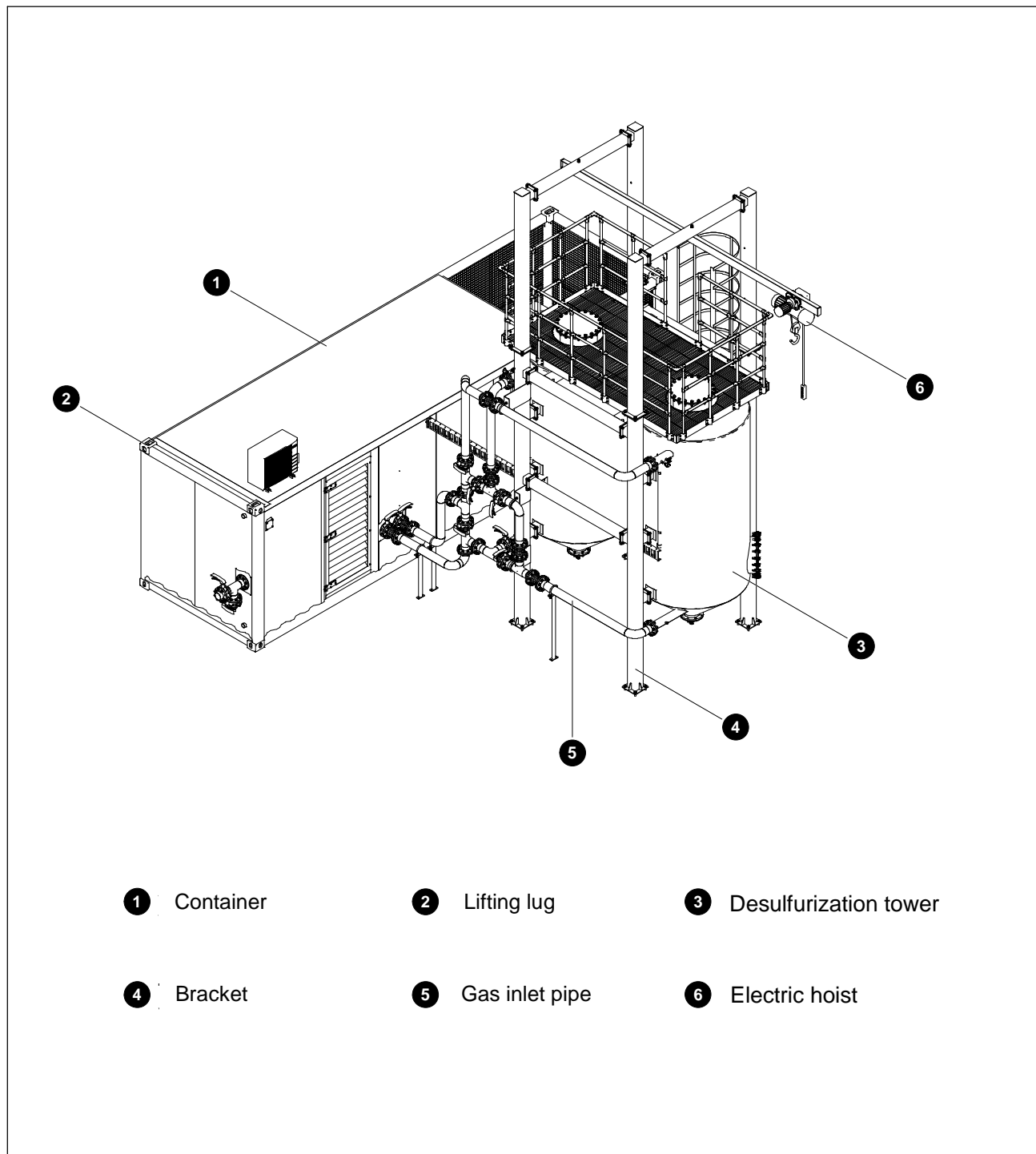
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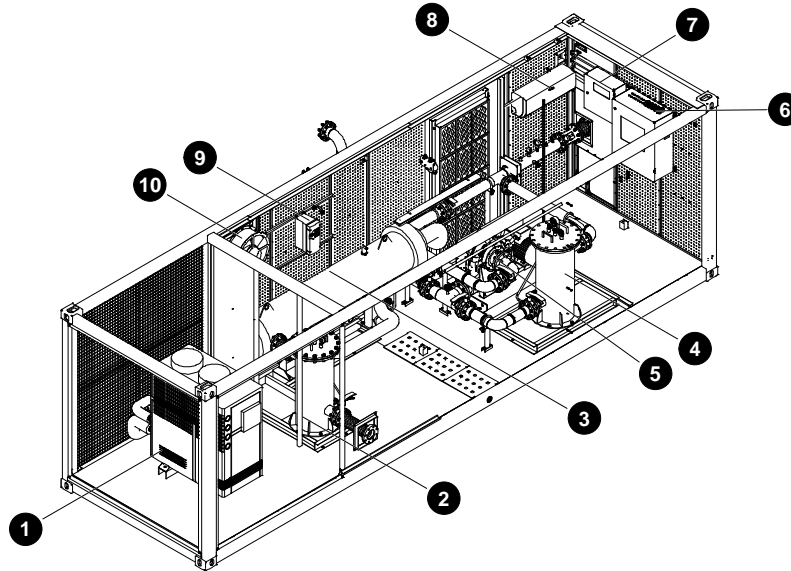
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# 1. Pretreatment system

## 1.1 Structure instruction

CDB800-6BG is a biogas pretreatment equipment, mainly including container, desulfurization tower, gas filter, air cooled dryer, special gas concentration detector, booster fan and control cabinet.





- |    |   |   |                  |   |                     |
|----|---|---|------------------|---|---------------------|
| 1  | Air cooler dryer                          | 2 | Defoaming filter | 3 | Heat exchanger      |
| 4  | Precise filter                            | 5 | Booster fan      | 6 | Control cabinet     |
| 7  | Special gas composition monitoring system | 8 | Air conditioner  | 9 | Frequency converter |
| 10 | Axial flow fan                            |   |                  |   |                     |



## 1.2 Moving and lifting requirements

Before moving and lifting the equipment, it is necessary to make preparations. The following provisions shall be strictly followed:

- 1) Disconnect external cables and pipes connected with the equipment, including the external valves and other components;
- 2) Close all valves of the equipment, and drain or close water pipeline valves to ensure no leakage;
- 3) Special lifting operation position shall be used for the equipment. It is forbidden to move and lift the equipment at other positions.

## 1.3 Installation requirements

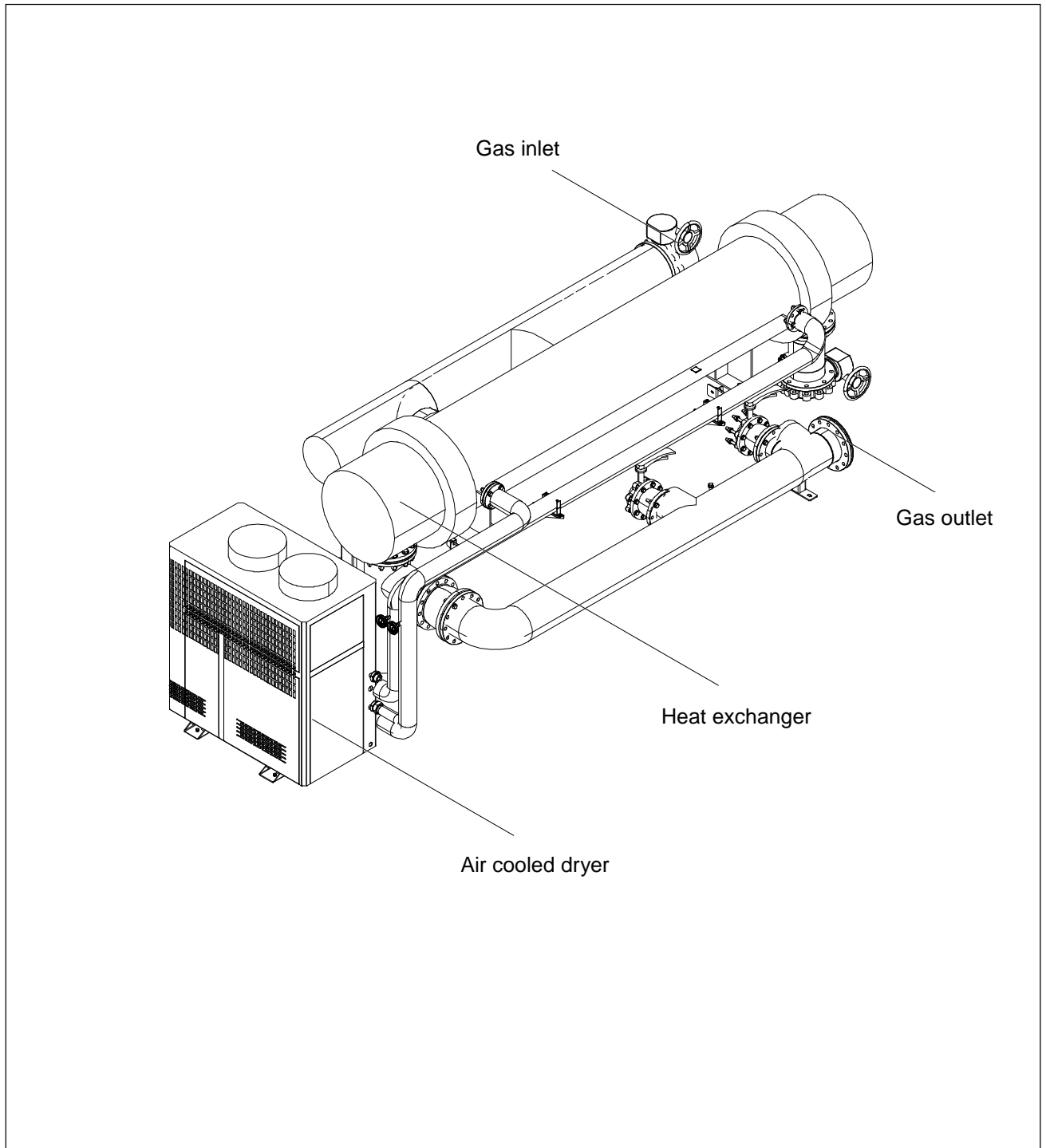
- 1) It should be installed on flat, smooth and non combustible horizontal base, such as concrete base;
- 2) It should be installed in a stable and vibration free environment without corrosive gas (liquid), dust, metal debris;
- 3) Enough space must be reserved during installation to ensure its maintenance;
- 4) The installation site shall be equipped with drainage system to facilitate water discharge;
- 5) Before installation, it is necessary to clean the inside of all pipes, especially the welded pipes, such as gas pipes, water pipes, etc;
- 6) The standard flange is used for connection. In order to facilitate the maintenance of the equipment, valves should be installed at the biogas inlet and outlet;
- 7) The installation site shall avoid the accumulation of leaves, weeds, soil, floating sand and falling snow. If such problems are found, the equipment should be protected by erecting shed or fence;
- 8) The geological safety bearing capacity of the installation ground should be fully considered before installation.



## 2. Air cooled dryer system

### 2.1 Structure instruction

The air-cooled dryer is the gas cooling and drying equipment of the pretreatment system, mainly including water cooler, heat exchanger.



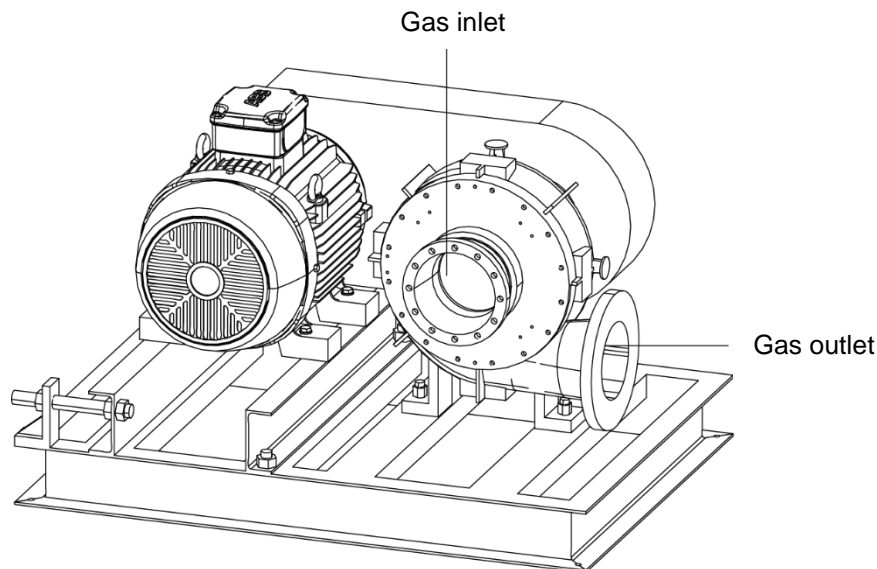
## 2.2 Precautions of using

- 1) The water inlet pipe of the air cooled dryer is equipped with a water filter of more than 50 meshes, so it needs to be cleaned regularly to prevent blocking the heat exchanger and damaging the equipment.
- 2) After biogas is connected, check the pressure gauge, gas inlet and outlet, water inlet and outlet, etc. to see if there is any leakage. Once leakage is found, stop gas and water supply for repairing.
- 3) There shall be no strong heat source and exhaust port of other equipment and no strong hot steam around the equipment.
- 4) Choose a place with good ventilation, and the exhaust air would not affect other users around.



### 3. Booster fan system

#### 3.1 Structure instruction



#### 3.2 Application environment of booster fan

Biogas temperature:

1) Maximum allowable temperature: + 40 °C, standard: + 15 °C;

Ambient temperature:

1) Maximum allowable temperature: + 40 °C

2) Minimum allowable temperature: - 30 °C

3) The ambient temperature difference of 25-40 °C has an effect on the allowable overall pressure. Coil damage may occur at higher temperatures and the grease change period may be shortened.





### 3.3 Precautions of using

- 1) If the pipeline operates in closed condition, considering that the temperature of the fan may rise sharply, which may cause damage to the fan, long-term continuous operation shall be avoided.
- 2) Clean the dust inside and outside the fan regularly. If a large amount of dust is accumulated, the heat dissipation effect will be poor, which may cause the temperature of the fan to rise, the air volume to decrease, and the vibration to increase, resulting in failure.
- 3) Bearings, oil seals and filter elements are consumables with a certain service life and need to be replaced regularly.

### 3.4 Troubleshooting

Fault	Cause	Remedy	Need
Motor cannot work, and no sound.	At least two power lines are open circuit	For the open circuit caused by the safety device, remove the terminal line	Electrician
Motor fails to work, and has noisy sound.	One of the power lines is open	Use fuse, terminal and lead to remove the fault	Electrician
	The impeller is stuck	Open the cover of fan pump, remove sundries and clean	After-sales
	Impeller defect	Replace impeller	After-sales
	The rolling bearing on the motor side or fan side is damaged.	Replace the bearing	After-sales
The motor protection switch is triggered; the power consumption is too high	The coil is short circuited	Check the coil electrician	Electrician
	Motor overload. Current does not conform to the rated data	Reduce throttling	After-sales
		Clean the filter and pipes if necessary.	After-sales
Abnormal fluid noise	too fast fluid speed, clean up the pipeline.	Clean the pipeline. Use the pipeline with larger cross section if necessary	Operator
	Muffler contamination	Clean parts of muffler, replace if necessary	After-sales
Abnormal running sound	roller bearing is under lubricated or damaged	Lubricate or replace roller bearing	After-sales
Leakage of compressed gas	seal on muffler damaged	Check seal on muffler, replace if necessary	After-sales

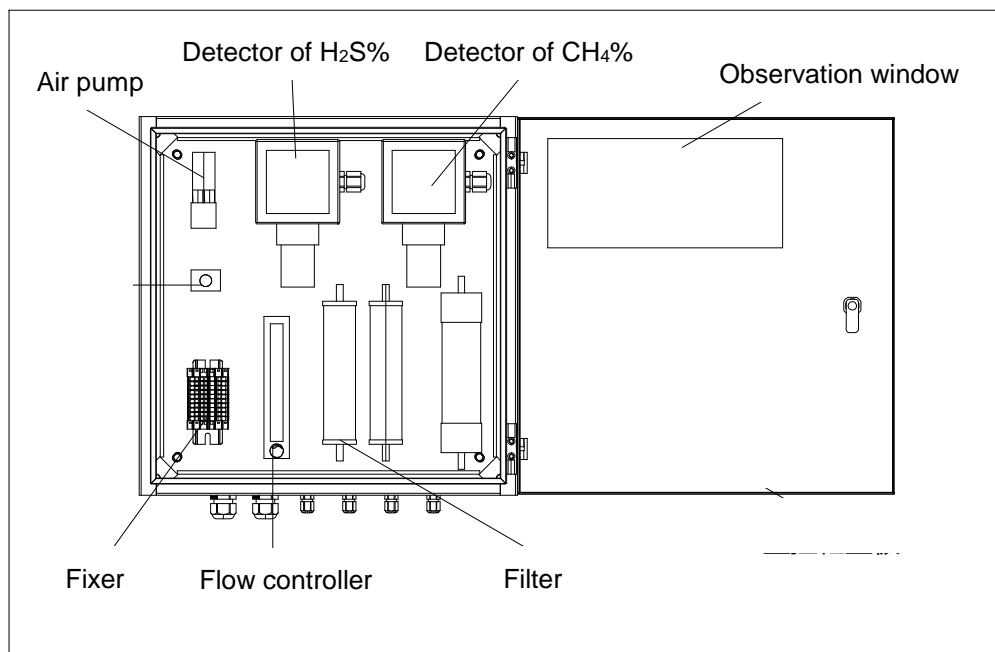


Fault	Cause	Remedy	Need
	The seal in the motor is damaged	Check the seal in the motor and replace if necessary	After-sales
Gas has no pressure or has a low differential pressure	There is leakage in the system	Seal the leaking part	Operator
	Wrong rotate direction	Change the rotate direction by exchanging two connecting wires	Electrician
	Wrong frequency (with frequency converter)	Correction frequency	Electrician
	Shaft seal damaged	Replace shaft seal	After-sales
	There is a deviation in the gas density	Reconvert the pressure value if necessary	After-sales
	Change of blade profile due to contamination	clean impeller, check for wear and replace if necessary	After-sales



## 4. Special gas composition monitoring system

### 4.1 Structure instruction



### 4.2 Precautions of detector operating

The user should avoid using the gas impact sensor which is beyond the range of the instrument. This operation will affect the service life and detection accuracy of the detector, and even will directly damage the sensor of the detector.

When the user accidentally operates the detector beyond the range, the instrument shall be quickly removed from the test site, placed in clean air for more than half an hour, and observe whether the concentration value of the instrument drops. If it drops to the normal value, it can continue to be used; if the concentration value remains high for a long time, it should be overhauled and ready to replace the sensor.

**Warning:** The damage caused by over range operation is not covered by the warranty.

### 4.3 About tester calibration

All the detectors of our company will be calibrated by the standard gas of relevant specific concentration. If there is no special condition after the user purchases our products, it is not necessary to calibrate the target point of the detector, and this operation must be conducted under the guidance of professional technicians.



#### 4.4 Quick operation instructions of gas detector

Mute: when the detector is in the alarm state, press the "back" button to mute.

Function main menu entry: when the tester is in the normal detection interface, long press the "up" key and "down" key for 5 seconds to enter the menu.

#### 4.5 Functional features of Instruments

- ◆ Using the latest semiconductor nano technology ultra-low power 32-bit microprocessor, 24 bit ADC data acquisition chip.
- ◆ Adopt 2.4-inch industrial HD large screen with resolution of 320x240.
- ◆ PPM, %vol and mg/m<sup>3</sup> concentration units can be switched.
- ◆ Minimum detection limit of the instrument: 0.001ppm, maximum detection limit: 99.999% vol, depending on the specific sensor.
- ◆ Multiple signals can be output at the same time:  
Standard 4-20mA signal: standard 16 bit precision 4-20mA output chip, transmission distance 1km.  
Standard RS485 signal: adopt standard Modbus RTU protocol, with transmission distance of 2km.  
Two sets of relay outputs are provided as standard: the alarm concentration value is adjustable, and the high and low alarm modes are adjustable.  
Optional 0-5V, 0-10V output.
- ◆ Multiple signal transmission modes are optional: 3-4-core cable, optical fiber, network cable, 3G transmission, wireless transmission, video transmission.
- ◆ With life detection function, it can detect the working status of sensors, main chips and components in real time and automatically.
- ◆ It has the functions of over-voltage protection, lightning protection, short circuit protection, reverse connection protection, anti-static interference, anti-magnetic field interference, etc. Moreover, it has the function of automatic recovery to prevent the instrument from being damaged due to any external, human or natural disasters.
- ◆ Software automatic calibration, sensor up to 6 levels of target point calibration function, to ensure the accuracy and linearity of measurement.



- ◆ Chinese and English operation display, simple and practical, with standard four buttons for field operation.
- ◆ The instrument can also be equipped with temperature and humidity sensors and on-site audible and visual alarm.

#### 4.6 Technical parameters

Detection gas	Single gas (see sensor selection table)		
Sensors	Support electrochemical, catalytic combustion, semiconductor, PID photoion, infrared gas sensors		
Detection method	Diffusion type, pipeline type (thread size: M40x1.5mm), flow type and pump suction type are optional, online detection		
Measuring range	Depend on different sensors. Please refer to the simultaneous interpreting sensor selection table.		
Resolution ratio	Depend on different sensors. Please refer to the simultaneous interpreting sensor selection table.		
Detection accuracy	≤±3%F.S	Linear error	≤±1%F.S
Response time	≤20 秒 (T90)	Zero drift	≤±1% (F.S/年)
Recovery time	≤20s	Repeatability	≤±1%F.S
Relay	Two sets of relay output, contact capacity: 24VDC 3A/220VAC 3A		
Explosion proof sign	ExdII CT6, explosion proof Certificate No.: CNEx10.1807		
Protection grade	IP65		
Shell material	die cast aluminum, explosion-proof and corrosion-proof	Connection mode	3/4"NPT、1/2"NPT internal thread
Instrument size	200x160x80mm (LxWxH)	instrument weight	1.5 Kg (net weight)
Working temperature	-30 ~ 60°C	Working humidity	≤95%RH, no condensation
Working pressure	0 ~ 200Kpa		



### 4.7 Test instructions

When the power is off, connect 24V DC power supply to the power terminals V +, V - of the tester, the LCD backlight of the tester will be on, and the tester will start automatically. After starting up, the screen displayed is sensor information interface, sensor preheating interface and normal detection Interface in turn, as shown in Figure 1-2. After entering the normal detection interface, the detector will automatically detect the concentration of relevant gas on the site, and visually display the concentration value and alarm condition on the display screen. Disconnect the 24V DC power connected to the detector, the LCD backlight of the instrument will turn dark and enter the shutdown state.

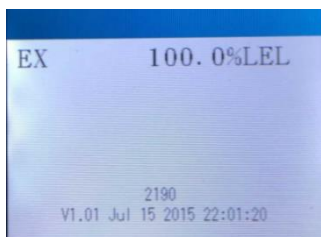


Figure 1

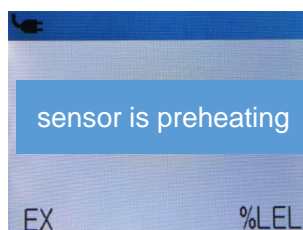


Figure 2

### 4.8 Instrument operation interface

#### 4.8.1 Display description of instrument test interface

As shown in Figure 3, the normal detection interface of the combustible gas ex detector. The upper left corner is the power connection icon, the lower left corner is the chemical formula of the detected gas, the lower right corner is the concentration unit of the detected gas, and the middle value is the real-time concentration of the detected gas.

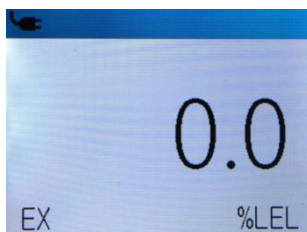


Figure 3



#### 4.8.2 Function menu description of instrument system

Loosen the round cover of the instrument and press "up" and "down" for 5 seconds. The instrument will enter the system function menu interface, as shown in Figure 4. The system function menu includes six function submenus, including basic parameter setting, zero point calibration, target point calibration, alarm point setting, communication parameter setting and factory setting. In the system function menu interface, the cursor can be moved to different submenu through the "up" and "down" buttons. At this time, short press the "OK" key to enter the corresponding submenu options, and short press the "return key" to return to the normal detection interface.

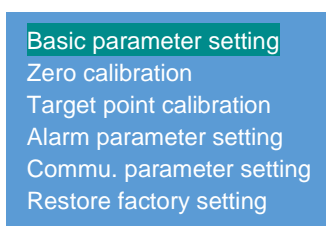


Figure 4

##### 4.8.2.1 Basic parameter setting

After entering the sub menu option of basic parameter setting, the parameters as shown in Figure 5 can be seen. Different parameter options can be entered through the up and down keys and OK keys. The user can view and modify the detection concentration range of the detector through the "range setting" option in Figure 5 and Figure 6.

Through the "unit setting" option, the detector can be selected to display volume concentration (PPM, LEL%, vol%) or mass concentration (mg/m<sup>3</sup>, mg/m<sup>3</sup>), as shown in Figure 6.

Through "temperature correction" and "humidity correction", the temperature and humidity display of the instrument can be adjusted manually, as shown in Figure 7.

All Chinese or English display can be set through the "language setting" option, as shown in Figure 8.

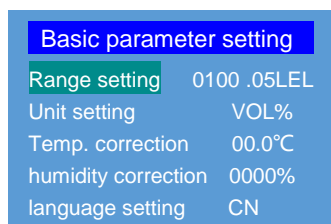


Figure 5

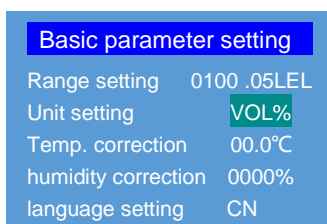


Figure 6

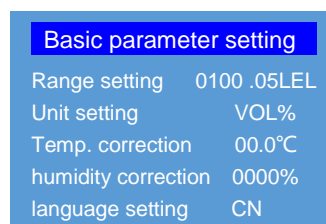


Figure 7

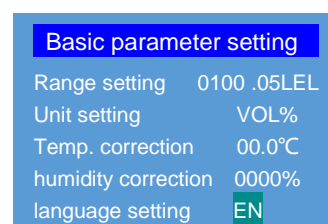


Figure 8



#### 4.8.2.2 Zero calibration

If the zero drift of the sensor is too large, the user can perform the zero calibration operation. After the zero calibration, the concentration value of the target gas will default to 0, as shown in Figure 9.

Operation instruction: the user enters the system function menu, selects the "zero point calibration" submenu, and briefly presses the OK key to enter. At this time, the cursor stays on the "calibration", and then presses the OK key again to open the interface as shown in Figure 9. Then press the "up key" or "down key" to move the cursor to the "confirm". Press the OK key to complete the zero calibration operation. After the operation, the current value displayed by the instrument should be 0. Press the return key to return to the previous menu.

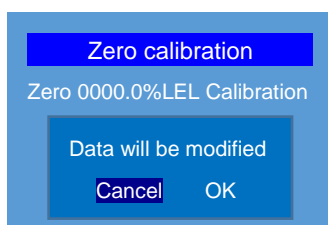


Figure 9

Note:

The zero point calibration must be carried out in the environment without target detection gas, generally clean air environment or high-purity inert gas environment (such as N<sub>2</sub> of 99.999% vol).

#### 4.8.2.3 Target point calibration (this operation is forbidden by non professional technicians)

Gas detector can calibrate six level target point concentration of the configured gas as shown in Figure 10. This operation must be carried out when there are standard concentration gas, pressure reducing valve, flowmeter, calibration cover and gas path are well connected, otherwise it is forbidden to use.

Operation instruction: First fully connect the gas path, then enter the calibration interface of the target gas, slowly open the standard gas and control the flow to 500ml/min, observe the real-time concentration value of the instrument (at this time, the concentration value should be rising), and wait for the real-time concentration value to rise to the peak value. When it is basically stationary, the user can choose an uncalibrated option (√ indicates that the level has been calibrated, × indicates that it has not been calibrated): input the concentration value of the standard gas first, and then complete it through the "calibration" operation. After the calibration operation of the target point is completed, the concentration





indication of the target gas of the instrument will automatically change to the concentration value of the standard gas.

Note: Some electrochemical sensors can work normally only in aerobic environment. It is recommended that the user select the standard gas with oxygen or air as the base gas for calibration.

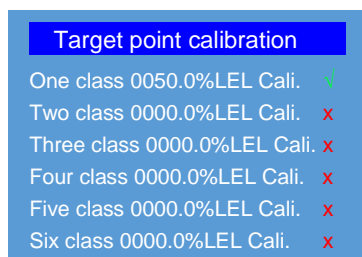


Figure 10

#### 4.8.2.4 Alarm parameter setting

The user can set the warning value and alarm mode of the detected gas through this option. As shown in Figure 11, the gas detector is equipped with two alarm point settings, in which the alarm mode can be set as low alarm or high alarm. When the user sets it as low alarm and the detection concentration is lower than the set concentration value, the instrument is in alarm state; when the user sets high alarm, the instrument is in alarm state when the detection concentration is higher than the set concentration value.

Operation instruction: After entering the alarm parameter setting submenu, the user moves the cursor to "level 1 alarm" or "level 2 alarm", short press the OK key to move the cursor, short press the "up" and "down" keys to switch the high and low alarm modes, and then press the "OK" key to save.

The user moves the cursor to the "alarm point" and presses the OK key to move the cursor to the alarm value. At this time, short press the "up" and "down" keys to move the cursor left and right to the value bit to be modified, then press the OK key to confirm the modification of the value, and then use the "up" and "down" keys to increase and decrease the number value. After changing the value, you need to press OK to save it.

Note:

The first level alarm is for the first group of relay outputs (COM1, No1, NC1) of the main board;

The second level alarm is for the second group of relay outputs (xom2, NO2, NC2) of the main board.



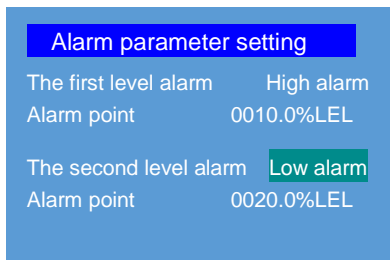


Figure 11

#### 4.8.2.5 Communication parameter setting

This menu is used for RS485 communication with controller, upper computer software, PLC, DCS and other terminal equipment. If there is no communication requirement, the users do not need to set this menu option. As shown in Figure 12, the range of equipment address can be set as 001-255 (default factory address is 255), and the baud rate can be 9600, 4800, 2400 (default factory 9600), and the validation mode can be no validation, odd validation and even validation (default factory is no validation).

Note:

RS485 communication mode of gas detector is RTU;

When the gas detector communicates with the terminal equipment in RS485, the address, baud rate and validation mode of the detector and the terminal equipment shall be consistent. When multiple detectors communicate with one terminal equipment, the address of each detector shall be unique.

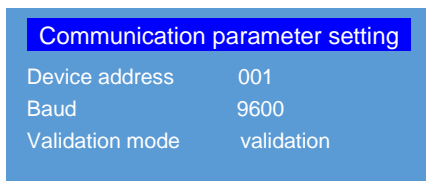


Figure 12

#### 4.8.2.6 Restore factory settings

This menu can be operated when the user accidentally misoperates or wants to restore the parameters of the instrument to the factory configuration. As shown in Figure 13.



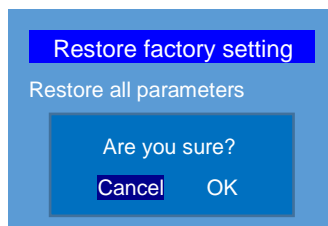


Figure 13

#### 4.9 Other precautions

- ◆ It is forbidden to start the machine for maintenance or replacement of parts without permission.
- ◆ Installation, debugging, setting and other operations must be carried out by professionals.
- ◆ The calibration inspection shall be carried out regularly, and the sensor beyond the effective service life and with fault shall be replaced in time.
- ◆ It is forbidden to use gas impact sensor higher than the measuring range.
- ◆ Prevent the instrument from falling from height or being impacted by violent vibration.
- ◆ It is strictly prohibited to use it in high temperature, high pressure and high humidity environment.  
If the humidity is high, filter dehumidification device shall be added.
- ◆ Artificial damage is not covered by the warranty.

#### 4.10 Common faults and troubleshooting

##### 1) The concentration value of the instrument in the clean air is unstable, high and low, with a small amount of numerical display.

Cause of failure:

Some electrochemical gas sensors are easy to be interfered by other gases, which may be colorless and tasteless.

##### Troubleshooting:

Place the instrument in a clean place without interfering gas, the value of the instrument will drop to the normal value;

If it is confirmed that it is a clean place and the value cannot be reduced, zero point calibration can be carried out once.



**2) When the instrument is connected with gas for test, the value has no response or the response is very weak.**

Cause of failure:

The oxygen content of the gas may be too low: < 5% vol;

It may be that the pressure of the gas is too high for the air pump to pump;

It may be that the service life of the sensor is over, or the detector is faulty.

**Troubleshooting:**

If it is an electrochemical, catalytic combustion, semiconductor gas sensor, oxygen is required to work properly to ensure the incoming

The oxygen content of the gas is more than 5% vol, and the gas pressure is: - 30KPa ~ 100KPA. If the user has standard gas, gas test can be introduced and target point calibration can be carried out. If oxygen and pressure meet normal conditions, it may be that the sensor is out of order and needs to be returned to the factory for repair.

**3) After the gas is injected, the value of the instrument will not be stable for a long time, or it will be high or low.**

Cause of failure:

Generally, it is caused by the low oxygen content of the introduced gas; it may also be caused by the change of the gas concentration itself.

**Troubleshooting:**

Increase the oxygen content of the gas and stabilize the flow rate; or replace the standard gas test with high oxygen content.

**4) The 4-20mA output is abnormal, and the output is < 4mA or > 20mA.**

Cause of failure:

It is possible that the multimeter and ammeter used for testing have quality problems, or the relevant chip of the detector has faults.

**Troubleshooting:**

If there are still problems, return to the factory for maintenance.



**5) The tester cannot be connected to the upper computer software and controller when they are communicating with RS485.**

Cause of failure:

It is possible that the parameters of the upper computer software are not set correctly, the address of the detector is not the same as that of the upper computer software or the controller

Detector RS485 positive and negative connection is reversed, multiple detectors have address repetition, line fault and detector RS485 output failure when communicating.

**Troubleshooting:**

Confirm that the detector address, upper computer software and controller parameters are set correctly, If the communication is still not available when the line is OK, it needs to be returned to the factory for maintenance.

**6) The instrument cannot be turned on.**

Cause of failure:

Generally, the power line is connected reversely, or the voltage is too low, or the power line is in poor contact.

**Troubleshooting:**

Test the terminals V + and V - of the tester with a multimeter to ensure that there is 24V DC power input;

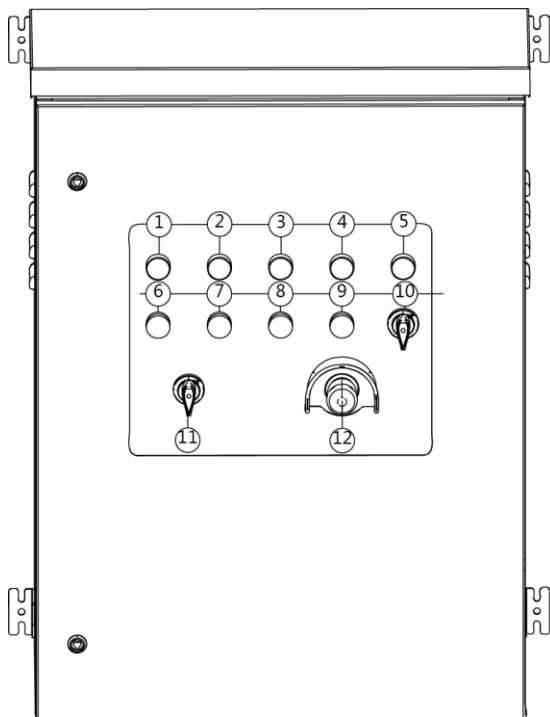
If there is no power supply coming, please check whether the circuit or power adapter is normal and whether the terminal is in good contact;

If the machine still cannot be started, it needs to be returned to the factory for inspection.



## 5. Control cabinet

### 5.1 Control panel instruction



- |   |   |
|---|---|
| ① Running indicator of booster fan                  | ② Stop indicator of booster fan           |
| ③ Open indicator of check valve                     | ④ Close indicator of check valve          |
| ⑤ Mains indicator                                   | ⑥ Start button of booster fan             |
| ⑦ Stop button of booster fan                        | ⑧ Open button of check valve              |
| ⑨ Close button of check valve                       | ⑩ Remote start switch of air cooler dryer |
| ⑪ Selector switch of control mode (local or remote) |   |
| ⑫ Emergency stop button                             |   |

### 5.2 Operation instruction

- 1) Check before start-up: whether all pipes are sealed well; whether the equipment wiring is normal (please strictly follow the attached circuit diagram for wiring).
- 2) Connect the mains power, and the mains indicator light will be on at this time.
- 3) Press the booster fan start button, the fan operation indicator will be on, and press the air cooled dryer start button at the same time, otherwise the air cooled dryer would not work.
- 4) When the booster fan and air cooled dryer are turned off manually, the pretreatment equipment stops working. After the pretreatment equipment is started, if the booster fan and air cooled dryer are not shut down manually, the pretreatment equipment would stop automatically when the generator set is shut down, and would start automatically when the generator set is started

