BS03

Fixed gas detector

Operation manual

Ver:HWWM160617CG

Read this manual carefully before using the device

Safety information

1. Before using the device, please first carefully read and follow the following information to operate the device:
2. Please don't use the defective detector. Before using, please check if there is crack or spare part missing. If yes, please contact the seller.
3. In order to keep the accuracy, please calibrate it once before the first time using.
4. Working voltage of the detector is DC18V to DC30V and recommended voltage is DC24V. The voltage exceeding DC30V will damage the detector.
5. Before using, please make sure the housing is fixed.
6. There should be no speedy gas flow on the installation place. Otherwise, it will influence the detection result.
7. Please don't expose the device to the gas which concentration is exceeding the range. Otherwise, it will influence the accuracy and shorten the sensor life.
8. Please don't paint the sensor parts or detector.
9. Only sensor spare parts which are specified for BS03 are allowed to be used.
10. It's suggested calibrate the sensor once every 6 months.
11. In order to avoid damage human beings, please operate it when power off. Before opening the cover, make sure there is no mixture gas of combustible gas and air. Otherwise, it will possibly cause fire or explosion.
12. Please avoid water or dust to come into the housing.
13. Please don't expose the device to the environment which has electric shock, strong magnetic field or serious continuous mechanic shocking.
14. When no using, please take out the battery from the remote controller.
15. Installation must abide by the national and local regulations.
16. It's forbidden to disassembly, adjust or repair the device without permission.
17. All the operation inside the device must be carried by professional persons.

Table of content

1. Brief introduction

BS03 fixed gas detector, adopting high-quality catalytic gas sensor and SMD arts and crafts, has advantages of good reproducibility, disturbing-proof against temperature and humidity, long life-span and easy operation.

The signal output of BS03 is standard 4-20mA. It is widely used in refineries, chemical plant, LPG station, gas boiler, and Spray-Paints etc where gas leakage easily.

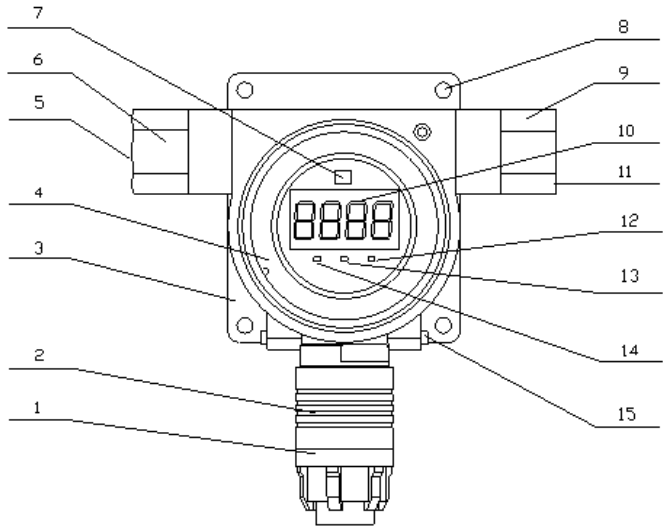
2. Main technical specification

Gas	Range	Resolution	Calibrating gas flow
LEL	0-100%LEL	1%LEL	500±50ml/min
CH4, C3H8	0-100%LEL	1%LEL	500±50ml/min
CH4	0-5%VOL	0.1%VOL	500±50ml/min
CO	0-1000PPM	1PPM	200ml/min
H_2S	0-100PPM	1PPM	200ml/min
NH_3	0-100PPM	1PPM	500±50ml/min
CL_2	0-20PPM	0.1PPM	1000±50ml/min
H_2	0-100%LEL	1%LEL	500±50ml/min
O_2	0-30%VOL	0.1%VOL	300±50ml/min
H_2	0-1000PPM	1PPM	200ml/min
SO_2	0-50PPM 0-20PPM	1PPM	600±50ml/min
CO2	0-6000PPM 0-5000PPM	1PPM	500±50ml/min
NO	0-1000PPM	1PPM	200ml/min
NO2	0-20PPM 0-50PPM	0.1PPM	1000±50ml/min
HCN	0-100PPM	1PPM	200ml/min

Sensor type: Catalytic, electrochemical or NDIR gas sensor
Gas sampling: Natural diffusion
Power supply: DC24V±25%
Power consumption: ≤3W

Working method: Continuous monitoring
Accuracy: ≤±5%F.S.
Indication method: 4-digit LED light
Condition display: 3 LED lights indicate fault alarm, L-alarm and H-alarm
Operation: Infrared remote control
Response time: ≤30s (LEL) / ≤60s (toxic gas)
Working temperature: -40℃～70℃ (LEL) / -20℃～50℃ (toxic)
Working humidity: ＜95%RH
Explosion-proof: Ex d ⅡCT6
Protection: IP65
Pressure Limit: 86-106kPa
Signal output: 4～20mA or RS485, 2 relay output
Install screw thread: G3/4"
Cable dimension: ≥1.5mm^2×3
Transmission distance: ≤1000m
Dimensions: l×b×h, 210×200×105mm
Weight: about 2100g

3. Structure



BS03 fixed gas detector

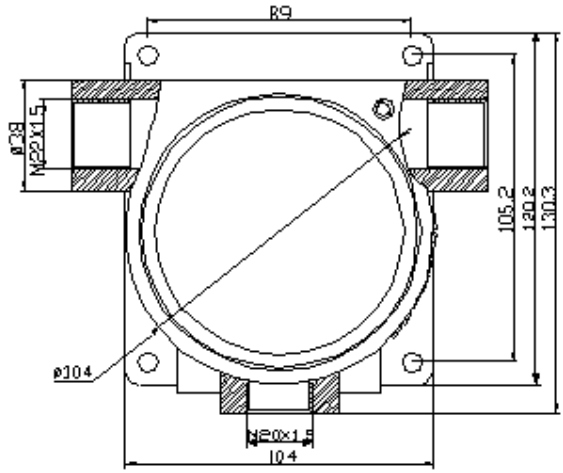
No.	Name	No.	Name
1	Protection cover	9	Pipe connector
2	Decoration	10	Display screen
3	Lower shell	11	Wire connection hole
4	Upper shell	12	H-alarm LED
5	Wire connection hole	13	L-alarm LED
6	Pipe joint	14	Fault / Power LED
7	Remote control receiving window	15	Ground nut
8	Fixing hole		

4. Installation

4.1 Installation position

1) For petrol gas, oil gas and alcohol gas etc. which is heavier than the air, the position is 0.3m-0.6m higher than the ground.
2) For natural gas, CH4 etc which is lighter than the air, the position is 0.5m-2m higher than the gas source. Gas density more than 0.97kg/CBM, then it's heavier. Gas density less than 0.97kg/CBM, then it's lighter.
3) The position should be far away from shocking, shattering, strong electromagnetic interference. Around the position, there should be at least 0.3m empty place.
4) The position should be within 1m around the possible gas leakage area, such as valve, pipe connection point, gas outlet place. Please try to install it nearer to the above places, but avoid influencing the working of the other equipment. Please avoid the environment of high temperature and humidity. Also please keep it from water swashing, oil and mechanical damage. Please also consider the convenience of maintenance and calibration.
5) For large scale detection, we suggest install 1pc every 10-12 square meters, so as to get the best detection result.

4.2 Dimensions

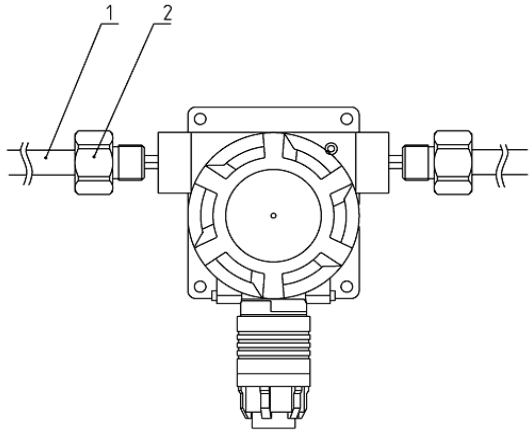


4.3 Installation methods

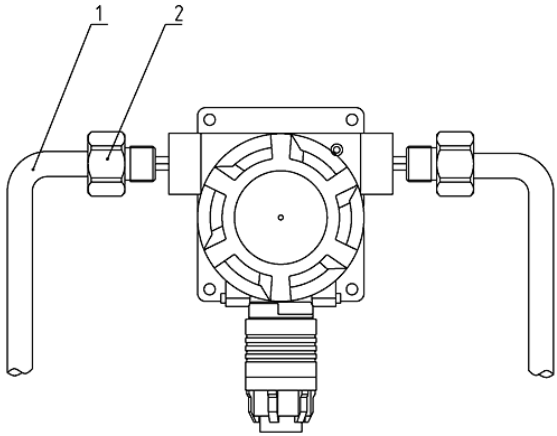
Note: Fix the detector with sensor head **downwards**!

According to the installation place, you can fix the detector onto the wall or to the gas pipes. Please follow the details as below:

- **Method 1(thread butted type fixing method):** If there are transverse or vertical siphon with G3/4 Screw thread in installed places, please connect the two terminals of the detector to the gas pipes. Then connect and screw down the pipe screw thread nut and fix it tightly.

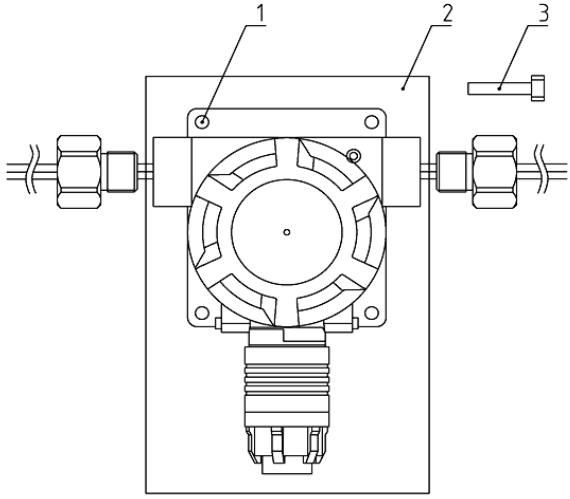


Thread butted type fixing method 1



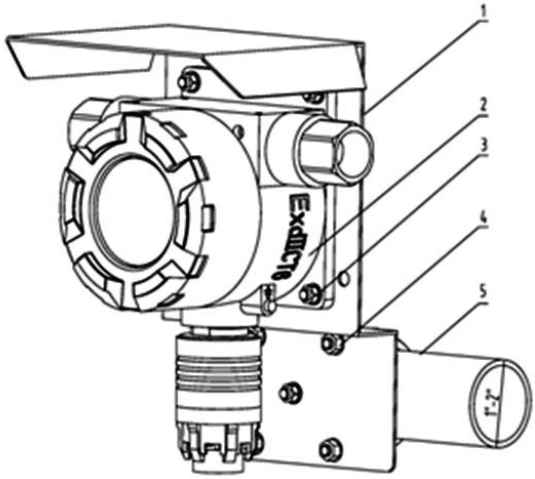
Thread butted type fixing method 2

- **Method 2:** If the user needs to install the detector onto the wall, please choose an appropriate place on the wall according to the detector dimensions. Then fix the detector by using 3 pieces of M6×70 bulge bolts in the corresponding installed holes.



Wall mounting type fixing method

- **Method 3:** If there is 1" to 2″ (diameter) pipe, the user can use 2 U-type bolts to fix the hanging plate on the pipe, and then fix the detector onto the plate. Or, the user can first fix the detector onto the plate and then fix the plate on the pipe.

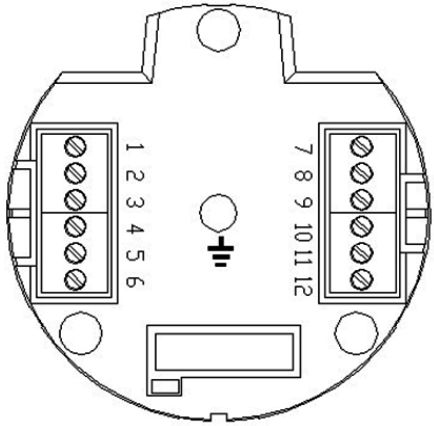


1. Anti-sunshine installation plate 2. Detector
3. Fixing bolt 4. U-type bolt 5. Gas pipeline

5. Wire connection

Note: Electricity power must be cut off before wire connection.
Wire connecting steps:

1) Screw down the cover in counter-clockwise way. Then use a cross-type screw to screw down the 3 bolts and take off the display PCB.
2) Screw down the pipe connector in counter-clockwise way. Take out the explosion-proof pad. In turns, put 3-line wire to the internal of the enclosure through the pipe connector, compaction circle, air-proof closing plug and the wire connection hole. According to the explosion-proof requirement, please don't take out the explosion-proof closing plug from the unused wire connection holes. Please don't throw away any part inside the enclosure or the PCB.
3) All the wires should be connected to the terminals. The terminal instruction is as follows:



wiring terminal diagram

A. If the output signal is 4-20mA signal, then the terminal definitions are as below:

NO.	mark	function	spec
1	L-Alarm	Low alarm output	Switching value
2	L-Alarm	Low alarm output	
3	24V	Power input	DC24V ±25%
4	GND	Power input	
5	Iout	Current ouput	4～20mA
6	NC	—	—
7	H-Alarm	High alarm output	Switching value
8	H-Alarm	High alarm output	
9	24V	Power input	DC24V ±25%
10	GND	Power input	
11	Iout	Current output	4～20mA
12	NC	—	—

B. If the output signal is RS485 signal, then the terminal definitions are as below:

NO.	mark	function	spec
1	L-Alarm	Low alarm output	Switching value
2	L-Alarm	Low alarm output	
3	24V	Power input	DC24V ±25%
4	GND	Power input	
5	A	Data communication	RS485A
6	B	Data communication	RS485B
7	H-Alarm	High alarm output	Switching value
8	H-Alarm	High alarm output	
9	24V	Power input	DC24V ±25%
10	GND	Power input	
11	A	Data communication	RS485A
12	B	Data communication	RS485B

4) After the correct wire connection, take out the useless wire from the enclosure. Then tighten the compaction circle, rubber air-proof circle and wire. Explosion-proof soft tube can also be connected with the device directly.
Note: The size of the connection wire between the controller and detector should not be less than 6mm, and the distance should be note more than 1000m.
5) After checking all the connection well, install the display PCB and the front cover. Make sure O-type circle is put on and connected with the cover tightly.

6. Operation

On the remote controller, there are totally five buttons as follows: “Setup”, “Confirm”, “Cancel”, “+” and “-”.
Warning: It's forbidden to replace the batteries for the remote control in working area.
Note: “Setup”, “Confirm” and “Cancel” are single-spring buttons. These buttons can only be triggered once even if you press them continuously, and the interval between two springs should not be less than 1 second. “+” and “-” are continuous-spring buttons and can be triggered by continuous pressing. Setting can only be affected after pressing “Confirm”. After setting, press “Cancel” to return to the normal mode. Effective setting can be kept till the next setup, even if without power.

Display in different status:

1) Normal status: Display the detecting result of the gas concentration
2) Sensor fault status: Screen display “E-02”; yellow LED is on.
3) High concentration protection status(only available for LEL type): Screen display “100”, 3 LED lights are all on, electrical current output 21.3mA.
4) Low alarm status: red L-ALARM LED light is on
5) High alarm: red L-ALARM LED light and red H-ALARM LED lights are on.
6) Low alarm setting: “F--1”
7) High alarm setting: “F--2”
8) Zero calibration: “F--3”
9) Single point calibration: “F--4”
10) Factory setting: “F--5”(Unavailable to the customers).

6.1 Low alarm setting

In normal status, press “Setup” once and it displays “F-1”. Press “Confirm”, it displays the default low alarm. This figure can be adjusted by pressing “+” or “-”. After setting completed, press “Confirm” to save the setting. The setting will be effective immediately after exit. The screen will display “F-1”. You can press “setup” to make the other settings or press “Cancel” to exit to return to the normal status.

6.2 High alarm setting

In normal status, press “Setup” twice and it displays “F-2”. Then press “Confirm”, it displays the default high alarm. This figure can be adjusted by pressing “+” or “-”. After setting completed, press “Confirm” to save the setting. The setting will be effective immediately after exit. Then the screen will display “F-2”. User can press “setup” to make the other settings or press “Cancel” to return to the normal status.

6.3 Zero translation

After the detector have been used for a long time, or the detector was put in a new type environment, it may not display “0” in clean air, this phenomenon is called “zero drift”, zero drift is normally caused by big change of temperature or humidity, and this phenomenon can be corrected by zero translation.

Zero translation can do simple correction for gas detector, but comparing with calibration, it cannot correct the sensitivity deviation after long time use. So in principle, please do zero translation for correction only when calibration is not convenient to do, and proceed zero calibration every half year even zero translation have been made.

Zero translation method: after the detector works more than 20 minutes,

put it into clean air (zero translation can not be done when there is other gas in the environment, if the detecting gas is O2 or CO2, zero translation must be done in pure N2 gas environment), in normal working status, press "Setup" three times, screen will display "F-3", then press "Confirm", it displays "XXXX" (The A/D value of the present zero point). After this figure on the screen is steady, press "Confirm" to remember this figure to complete zero translation. The translation will be effective immediately after exit. Then the screen displays "F-3". The user can press "setup" to make other setting or press "Cancel" to return to the normal status.

6.4 Single point calibration

Detector's calibration must be operated by professional engineers and using standard gas, it is forbidden to calibrate the detector privately. In order to keep the detector's accuracy, we suggest calibrate the detector at least once every half year.

Calibration method: After the detector has been working for more than 20 minutes, input standard gas (gas concentration is half of the detector's detecting range) into the detector. Then press "Setup" four times in normal working status, the screen will show "F-4", then press "Confirm" and it will display the default calibration point. Press "+" or "-" to change the calibration point to be same with the input gas concentration level, then press "Confirm" to remember this figure, it will display "XXXX" (The A/D value of the present gas environment). After the A/D value on the screen is steady, press "Confirm" to remember this figure for calibration. The calibration operation will go into effect immediately after exit. After then the screen will display "F-4". The user can press "setup" to make other settings or press "Cancel" to return to the normal status.

Note: Please don't carry the above calibration when the detector is working or there is no standard calibration gas.

6.5 Address code setting

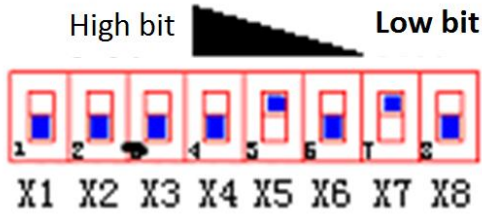
If the detector's output signal is RS485 signal, the detector's address code can be set as the following:

Address code switching locate inside the detector, you must cut off the power and open the cover only then you set the switching.

The address code is set by the dial switch from second switch to the eighth switch, and they are calculated by binary method, right side are low bit, left side are high bit. Switch at up position "ON" means 1, at low position "OFF" means 0. From right to left, every switch means in turn 1、2、4、8、16、32、64. Calculating formula: ADD= X2×64+X3×32+X4×16+X5×8+X6×4+X7×2+X8×1. (X2 to X8 only can be

"0" or "1").

For example: from low bit to high bit, second switch and fourth are at up position "ON", then X7=X5=1, other bits are all 0, so the address code shall be calculated as: ADD=0×64+0×32+0×16+1×8+0×4+1×2+0×1=10



You can find the address code settings at the last pages of this manual.

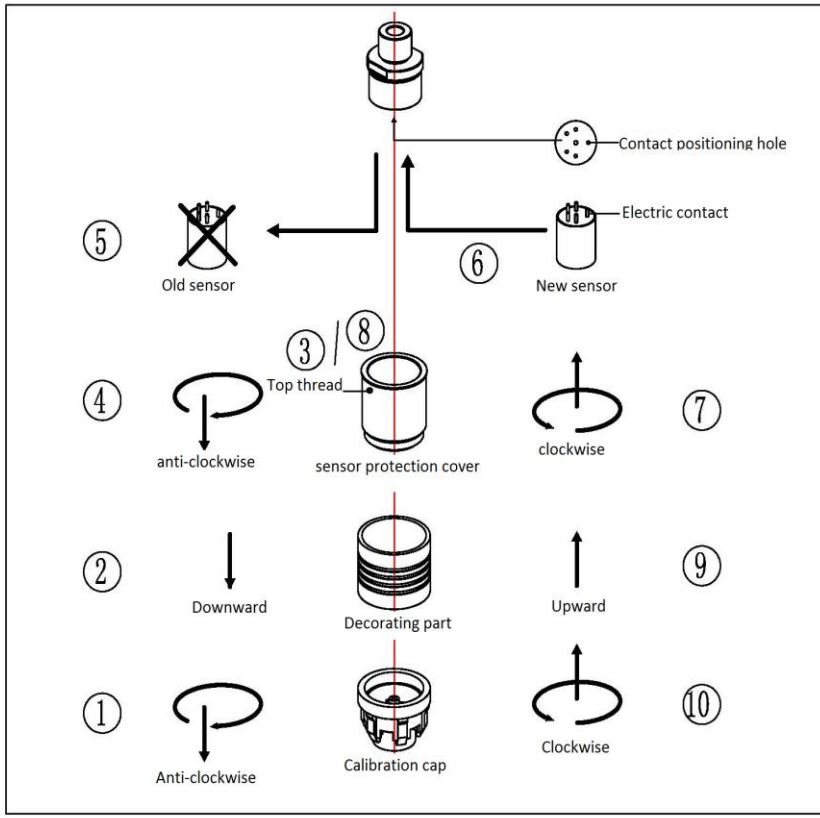
The first code switch only can be used during maintenance operation, but it must be at "ON" position normally. To same one controller, there cannot be more than one detectors which are set at same address code.

7. Sensor replacement

In normal working environment, catalytic sensor's using life is 3 years, electrochemical sensor's using life is 2 years. When the sensor life is overdue, the detection result may be not accurate.

To replace the sensor, please first cut off the power but it won't be necessary to open the detector's housing, only need to open the sensor assembly.

1. Take off the calibration cover in anti-clockwise.
2. Pull out the decoration part downwards.
3. Screw off the top thread from the sensor protection cover.
4. Take off the protection cover in counter-clockwise.
5. Take out the old sensor.
6. Install new sensor, make sure the electric contact match to each contact positioning hole.
7. Then install in turns protection cover, top thread, decoration part and calibration cap.
8. Power on the detector and calibrate the detector.

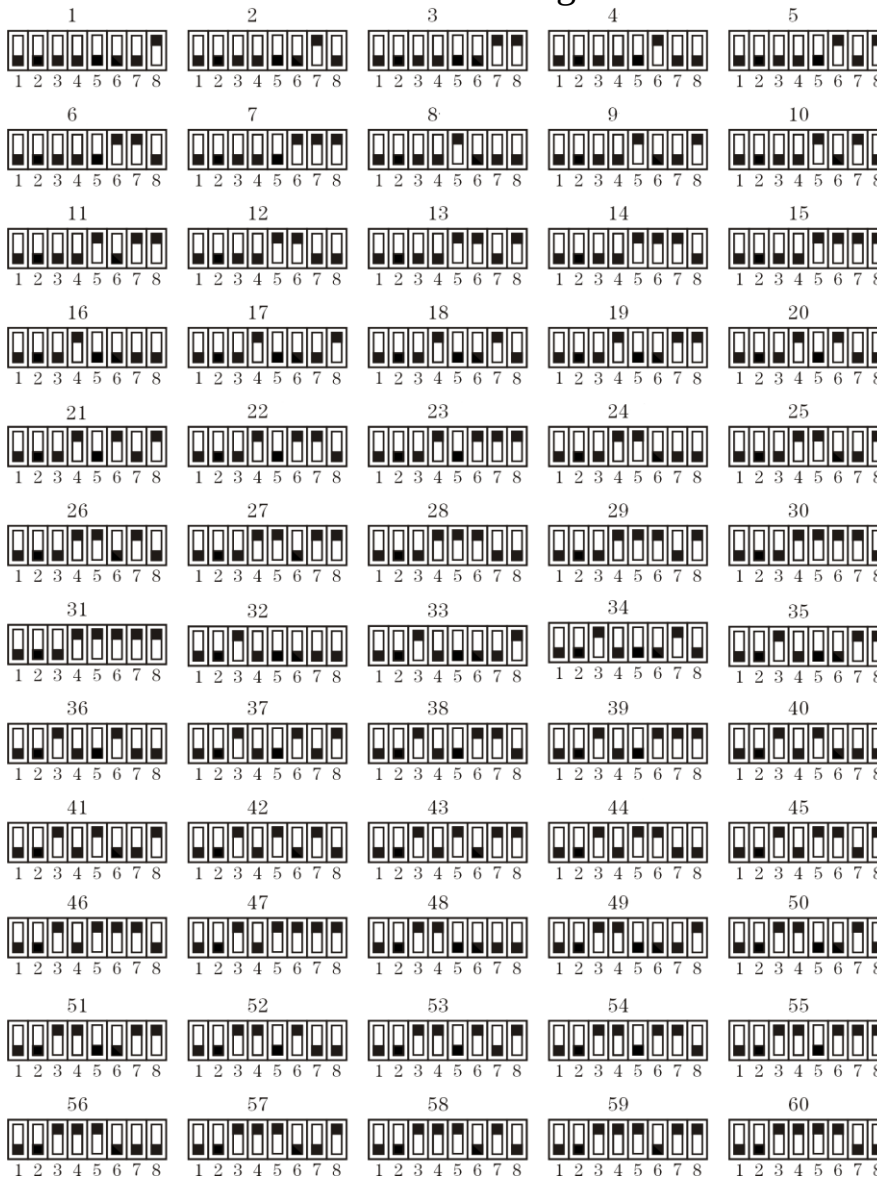

Contact positioning hole
Electric contact
5
Old sensor
6
New sensor
3
8
Top thread
4
anti-clockwise
sensor protection cover
clockwise
7
2
Downward
Decorating part
Upward
9
1
Anti-clockwise
Calibration cap
Clockwise
10

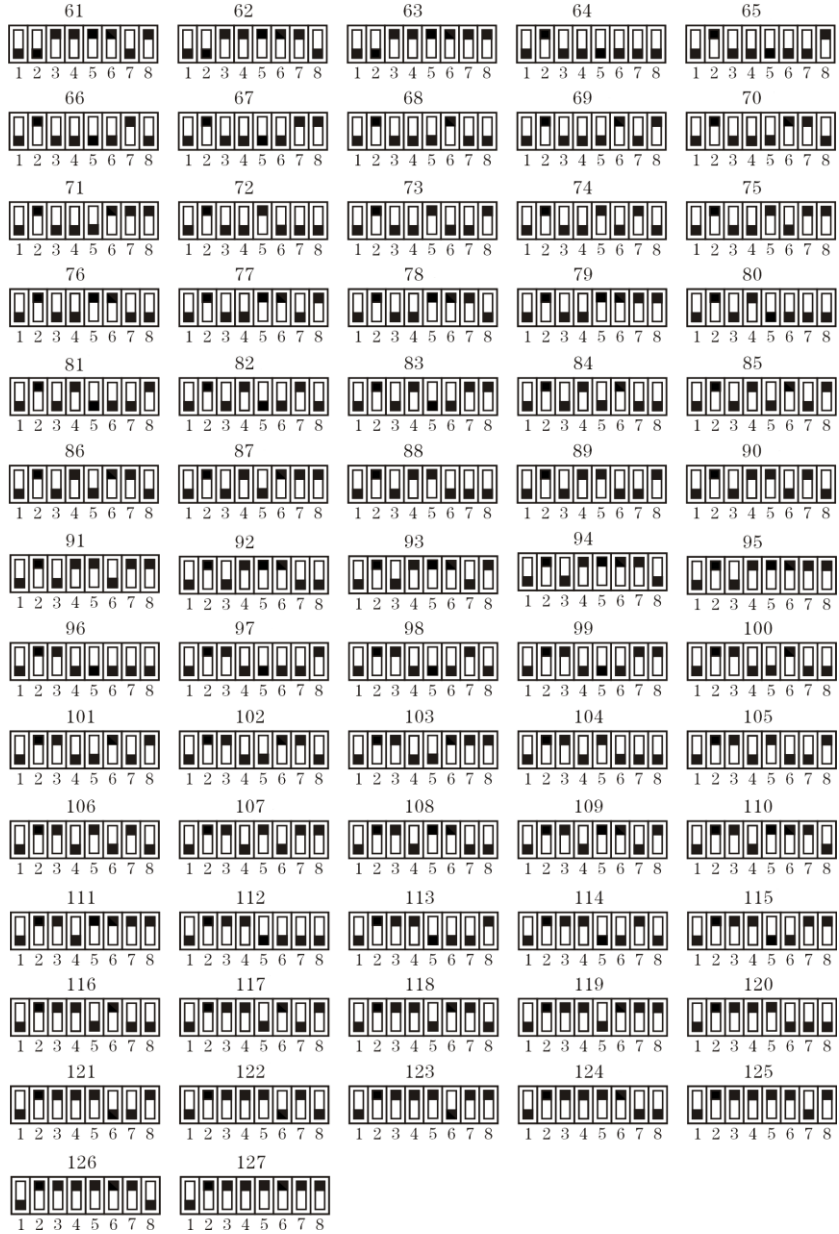
8. Trouble shooting guidance

Problems	Possible reason	solution
NO response to gas	Sensor damage	Replace sensor
	Electrical fault	Contact with seller
Abnormal connection with controller	Wiring fault	Check the wiring
	Electrical fault	Contact with seller
E-01	Calibration fault	recalibrating
E-02	Wiring fault, connection fault or sensor fault	Reconnect the wire or replace sensor
E-04	Sensor drift	Replace sensor
E-06	System’s parameter fault	Reload system parameter

Attachment 1

Address code settings





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