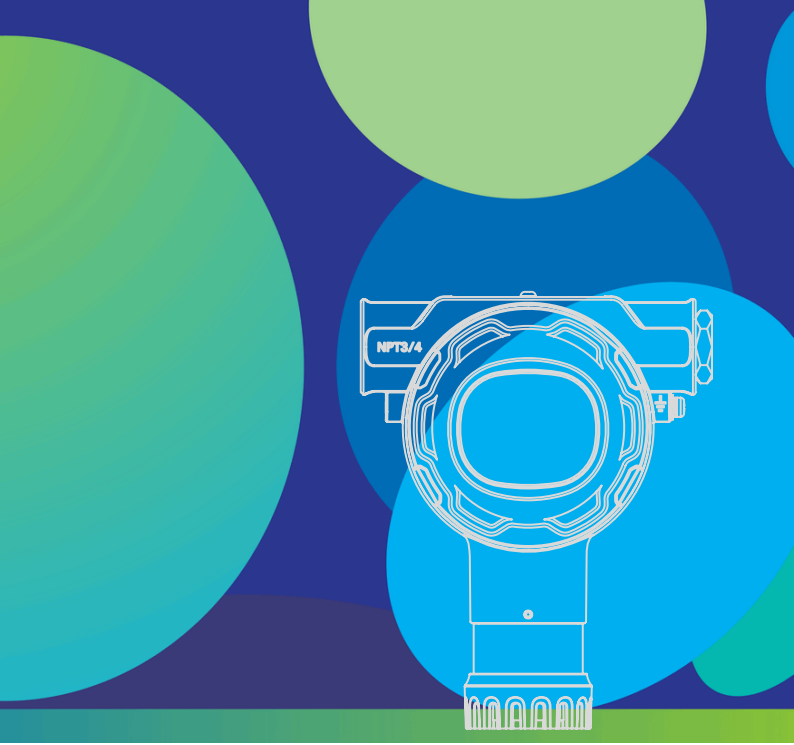


SG100

Fixed gas detector
user manual

V1.2

Shenzhen YuanTe Technology Co.,Ltd

Contents

1. Read before operation

1. All operators who operate and test our instruments must carefully read the user manual before operation. Our instruments can only function properly when operated according to our company's instructions.

2. The use of our company's instruments must be carried out in accordance with the procedures determined in the manual.

3. The maintenance of instruments and the replacement of components are handled by our company or local maintenance stations.

4. If the user does not follow above instructions to start, repair or replace components without authorization, the reliability of the instrument is the responsibility of the operator, and our company is no longer responsible for warranty.

5. The instrument should be calibrated at least once a year (it is recommended to calibrate it every 3-6 months if possible); The explosion-proof plate of the instrument sensor should be regularly cleaned (blown with low-pressure compressed air) according to the applicable scenario, otherwise dust and impurities blocking the protective hole will affect the sensitivity of the detection.

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

2. Warranty Description

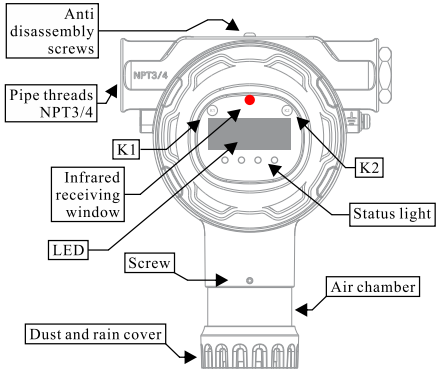
The instruments produced by our company have a 12 month warranty period with lifelong maintenance, which starts from the date of delivery.

Users should follow the instructions during use. Damage to the instrument caused by improper use or harsh working environment is not covered by the warranty. Users should properly keep the factory certificate of conformity, and the warranty period shall be based on the date on the certificate. Please pay attention to attaching the factory certificate when repairing.

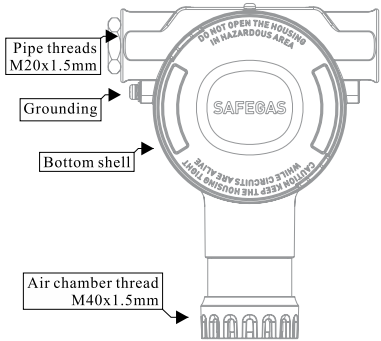
3. Product appearance and size

3.1. Appearance

■ **Front view**



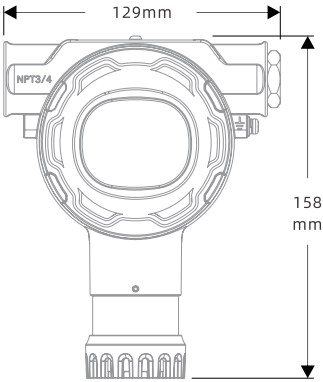
■ **Back view**

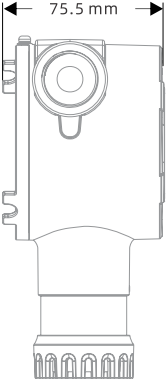


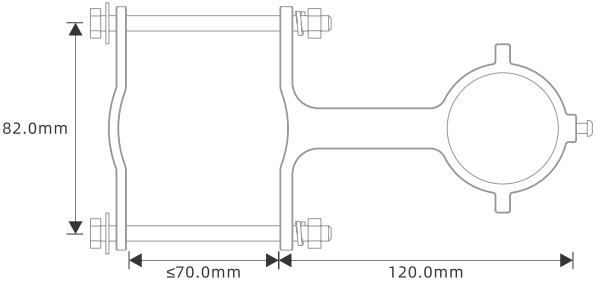
3.2. SG100 size

The size is for reference only, please refer to the actual product.

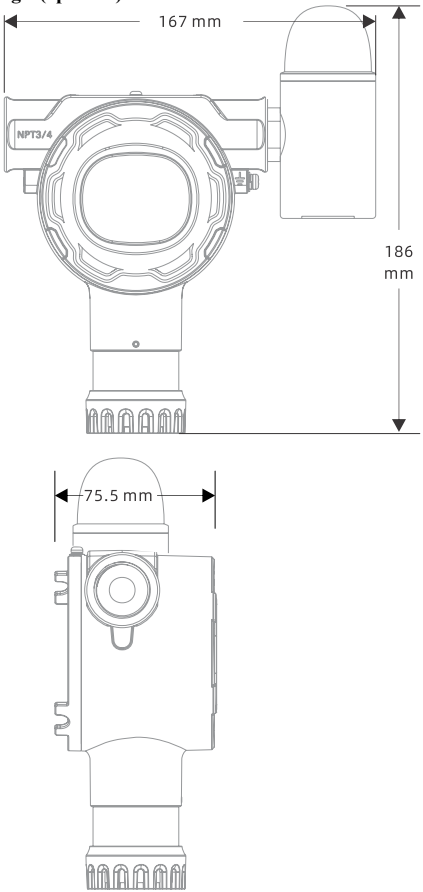
■ **Gas detector size**







■ **With alarm light(optional)**



4. Installation method

4.1. Select installation location

The installation position of gas detector is crucial for achieving the best detection effect. When determining the location, it is necessary to comprehensively consider the following factors: such as the density of the gas leakage point, the specific gravity of the measured gas, the influence of surrounding buildings, the degree of old and new production equipment, wind direction, and perennial meteorological conditions. In addition, the position of doors and windows should also be considered indoors.

The following suggestions are for users' reference:

A. The instrument should maintain an appropriate distance from the potential leakage point of the measured gas. If it is too close, the reaction speed will be fast, but if the leakage is frequent, it will lead to too many alarms or long-term alarm status, which will numb people; Too far away, the reaction speed is too slow, and there is even no response.

B. The instrument should be installed downwind of the leakage point.

C. When installing indoors, if the leakage source is outdoors, the instrument should be installed at the air inlet.

D. The installation height should be determined based on the specific gravity of the measured gas and air.

E. The number of instruments should be selected based on the possible leakage points of the tested gas, the frequency and residence time of personnel, in order to achieve the best detection effect.

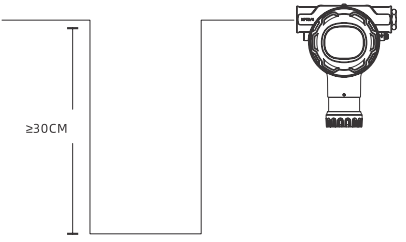
F. If the equipment is outdated, additional test points can be considered.

G. Instruments should be protected from radiation from high-temperature heat sources, as high or low temperatures can affect the effectiveness and lifespan of sensors.

H. The instrument should be protected from moisture and rainwater backflow, which can affect the internal circuit board of the instrument.

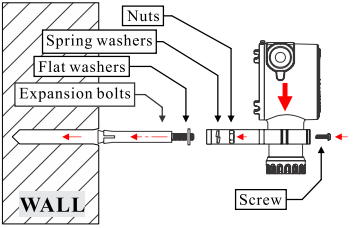
The wiring suggestions are shown in the following figure.

Note: When selecting the NPT3/4 threaded pipeline, a certified lead-in device with an explosion-proof grade of Ex db IIC T6 Gb or above must be selected.



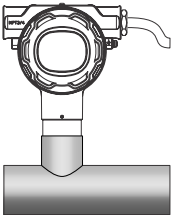
4.2. Select the Installation Type

Wall mounted: This installation method is often chosen for normal indoor testing. According to the size of the installation bracket screw hole, drill holes and embed expansion bolts. Fix the bracket with washers (flat washers and spring washers) and nuts, and lock the detector as shown in the following figure(Before placing the tester, please remove the dust cover. After placing it, please tighten the locking screws and reinstall the dust cover).



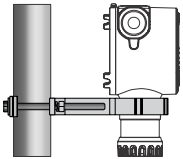
Note: The installation location must be well grounded or insulated. The grounding screw on the right side of the instrument needs to connect the cable to the ground wire. Otherwise, the leakage may cause the detector to be abnormal.

Pipe mounted 1: When using this installation method for pipeline environments, our company's pipeline instrument installation thread size is M40x1.5. During the installation process, hold the detector tightly with both hands, align the sensor parallel to the installation thread, and rotate the detector clockwise after aligning it with the screw opening to install the detector at the target location. To prevent air leakage at the threaded interface, appropriate raw tape can be wrapped around the threads on the detector before installation.



Attention: The pipe installation requires that the pipeline be at room temperature and normal pressure (temperature -20~50 ℃, pressure 0.1MPa) and humidity ≤ 95% RH. If the above conditions are not met and this installation method is required, please contact the manufacturer.

Pipe mounted 2: When installing the standpipe, adjust the mounting bracket and fix the detector to the standpipe with a diameter of 10~70mm, as shown in the figure.



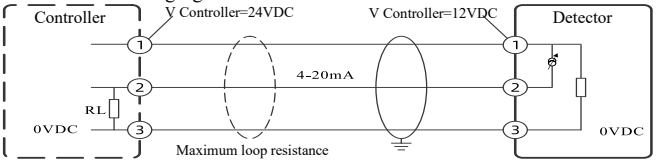
5. Wiring Instructions

5.1. Cable requirements:

Shielded cables are required for power and 4-20mA signal cables, and twisted pair cables are recommended for RS485 cables. Using RS485 communicate with controller, when connected, the RS485 signal transmission distance of our detector can reach over 1000 meters under normal conditions. When in environments with significant signal interference or long-distance transmission, it is recommended to add an RS485 relay, or a 120 Ω/0.5W matching resistor can be connected in parallel between the farthest detector A and B lines to improve communication stability.

The power supply voltage of this series of detectors is 12-24VDC. Due to the impedance of the cable itself causing voltage drop, it should be ensured that the minimum power supply voltage for all detectors is 12VDC.

When the detector is powered by a controller, the power supply voltage of our company's controller is 24VDC. To ensure that the minimum input voltage of the detector is 12VDC, the circuit voltage drop must be less than or equal to 12VDC, as shown in the following figure.



Maximum Loop Impedance:**Rloop=(VController–VDetector(min))/IDetector**

Calculated according to the above formula.

The maximum current of combustible gas detector is 250mA, and the maximum loop resistance is 48Ω;

The maximum current of the toxic gas detector is 100mA, and the maximum loop resistance is 120Ω.

The cable cross-sectional area and the farthest transmission distance are shown in the table below (when connected to our controller). Make sure that the actual installed cable length is shorter than the calculated maximum cable transmission distance.

Cross-sectional area of cable core (mm²)		0.75	1.00	1.50	2.50
Resistance (Ω/km, copper wire)		24.7	18.5	12.3	7.4
The longest cable distance (m) (loop length /2)	Flammable gas	1000	1250	2000	3200
	Toxic gas	2400	3200	5000	8000

Note: The above transmission distance is calculated based on the cable core with a resistivity of $1.85\times10^{-2}\Omega\cdot mm^2$. If a cable of the same wire diameter with a smaller resistivity than this is used, the transmission distance can be longer; if a cable of the same wire diameter with a higher resistivity than this is used, the transmission distance will be shortened. The loop length indicates the total length of the positive

and negative wires of the power supply, and the actual length of the cable is equal to half of the loop length.

Refer to the following formula for the maximum number of detectors allowed on a single cable:

N=Im/Ic=((U-12)/R)/Ic=((U-12)/(ρ×L/S))/Ic

N: Maximum number of detectors

Im: the maximum current passing through the wire(A)

Ic: the average current of a single detector at the lowest starting voltage(A)

U: controller output voltage (our controller is 24V)

R: internal resistance on the cable(Ω)

ρ: core resistivity (copper: 1.85×10^{-2} Ω·mm²)

L: cable length (the total length of the positive and negative lines of the power supply, if the length of a single line is 100m, the total length of the two lines is 200m)

S: core cross-sectional area(mm²)

When the detector uses our controller to supply power, taking the material as copper (the resistivity is 1.85×10^{-2} Ω·mm²) as an example, the maximum number of detectors allowed for a single cable can refer to the following table:

Cable distance (m)		100	200	500	100
The maximum allowable number of detectors when using 0.75mm² wire diameter	Toxic gas(100mA@12V)	24	12	4	2
	Combustible gas(250mA@12V)	10	5	2	1
The maximum allowable number of detectors when using 1.0mm² wire diameter	Toxic gas(100mA@12V)	32	16	6	3
	Combustible gas(250mA@12V)	12	6	2	1
The maximum allowable number of detectors when using 1.5mm² wire diameter	Toxic gas(100mA@12V)	48	24	8	4
	Combustible gas(250mA@12V)	20	10	4	2
The maximum allowable number of detectors when using 2.5mm² wire diameter	Toxic gas(100mA@12V)	80	40	15	7
	Combustible gas(250mA@12V)	30	15	6	3

When the detector is not powered by the controller (that is, powered by an independent power supply), the 4-20mA transmission distance is determined by the load resistance, which includes the output resistance of the control system (controller, DCS or PLC) and the internal resistance of the cable.

The maximum transmission distance refers to the following formula:

L=(R-Rc)/(ρ/S)

L: Maximum transmission distance(m)

R: Maximum load resistance(Ω) (500Ω when powered by 24V, including control system input

resistance and cable internal resistance)

Rc: input resistance of the control system (the input resistance of our controller is 50Ω)

ρ: core resistivity (copper: 1.85×10^{-2} Ω·mm²)

S: core cross-sectional area(mm²)

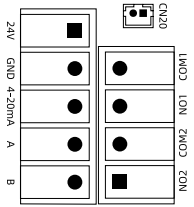
5.2. Wiring port

Attention: Do not connect live wires at any time.

For instruments without an outgoing line, users need to open the instrument casing and connect the wiring to the internal terminals of the instrument. The following figure shows the instructions for each terminal:

Warning: Wiring work must be carried out by professionals, otherwise it may cause electric shock or damage to the instrument.

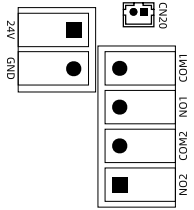
■ **Gas detector wiring diagram (Standard configuration wiring port)**



CN20：Alarm interface
+24V：Power supply positive
GND：Power supply negative
4-20mA：analog signal
COM：Relay common terminal
NO：Relay Normally Open
A：RS485A terminal
B：RS485B terminal

COM1，Low alarm relay
COM2，High alarm relay

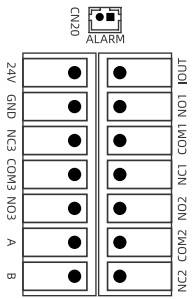
■ **Gas detector wiring diagram (Optional LoRa wireless communication wiring port)**



CN20：Alarm interface
+24V：Power supply positive
GND：Power supply negative
COM：Relay common terminal
NO：Relay Normally Open

COM1，Low alarm relay
COM2，High alarm relay

■ **Gas detector wiring diagram (Optional wiring port for 3 relays)**



CN20：Alarm interface
24V：Power supply positive
GND：Power supply negative
IOUT：analog signal
COM：Relay common terminal
NO：Relay Normally Open
NC：Relay Normally Close
A：RS485A terminal
B：RS485B terminal

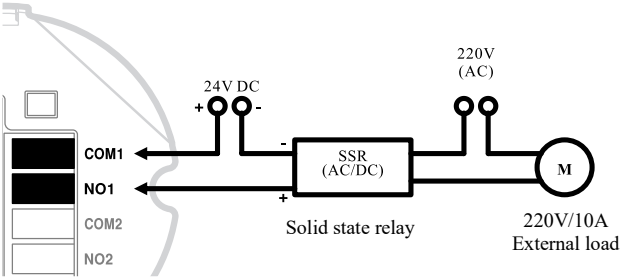
COM1，High alarm relay
COM2，Low alarm relay
COM3，Fault relay

*After J1 is connected to the sound and light alarm, it drives the alarm to work in the alarm state.

*Different alarm states will trigger relays.

External load application

(Standard configuration，low alarm as reference)



Note: Do not connect wires with power on at any time.

*Relay contact load 2A/30VDC, outdoor connection to high-power AC load requires additional solid-state relay for isolation control!

6. Operation and Status

This device supports two operating modes: infrared remote controller operation and magnetic wand operation.

In the parameter setting state, if there is no operation for 10 consecutive seconds, the detector will automatically return to the gas detection interface. The parameters being modified (without pressing the "OK" key or confirming the operation with a short touch of K1 on the magnetic wand) will not be saved. Confirm parameter modification or function execution, display PASS. After confirming the calibration (zero calibration and span calibration) operation and displaying PASS, it will return to the detection interface.

6.1. Infrared remote controller operation

Attention: The remote control must be used in non explosion-proof areas. When operating, please aim the remote control's emission light at the infrared receiving window.

Button	Function
MENU	Enter parameter setting status from the detection interface
RESET	Cancel/activate sound and light alarm
+	Display parameters plus 1
-	Displayed parameters minus 1
OK	Confirm operation
BACK	Cancel Operation/Return

*The RESET key operation is only effective when selecting an external sound and light alarm, and does not affect the status of the instrument indicator light!

6.2. Magnetic wand operation

Operation	Short touch		Long Touch (3 seconds)	
Interface	Detection interface	Function list/ parameter settings	Detection interface	Function list/ parameter settings
K1	-	Confirm/Save	Enter function list	Return to superior
K2	-	Switching functions or adding value	-	Quick switching or value-added

The thin end of the magnetic wand is the operating end, which can be triggered close to the K1-K2 position on the screen.

Note that during short contact, the distance between the magnetic wand and the triggering range should be greater than 3 centimeters to avoid misoperation.

Example: In the detection interface, long touch K1 to enter the function list and display the F-01 address settings; Short touch K1 to enter the settings and display the value 1 (default address is 1); Short touch K2 to increase the value; Long touch K2,

the value increases rapidly; After confirming the value, briefly touch K1 to display PASS, and then return to the address display. Long touch K1 to return to the function list; Long touch K1 again to return to the detection interface (or short touch K2 to switch to F-02 low alarm setting).

6.3. Function list

Function list	Function	Description
F-01	Address setting	1-250
F-02	Low alarm setting	Smaller than high alarm value
F-03	High alarm setting	Bigger than low alarm value
F-04	Zero calibration	Perform after stable reading in a clean environment
F-05	Current correction	C-04, 4mA correction; C-08, 8mA inspection; C-12, 12mA check; C-16, 16mA check; C-20, 20mA correction
F-06	Real time ADC	View ADC values
F-07	Span calibration point	Span calibration value setting
F-08	Span calibration setting	Switch to 1 and start after confirmation
F-09	Manufacture date	View production date (year, month)
F-10	Communication protocol	RS485 protocol: 0-new; 1- old; 2- cloud
F-11	Relay cycle	0- None; 1-60 (minutes)
F-12	Relay opening duration	0- None; 1-60 (seconds)
F-13	Update sensor head	Switch to 1 and start after confirmation
F-14	Restore factory calibration	Switch to 1 and start after confirmation
F-15	VOC coefficient	When setting the CF calibration coefficient for VOC or TVOC
F-16	alarm mode	0- Normal control; 1- Backlash control
F-17	Serial number	

Under normal circumstances, there is no need to operate from F-01 to F-08, and only professional personnel can operate it when needed. For other functions, please consult the manufacturer.

6.4. Working status

Power supply (green light): Normally on, indicating normal status

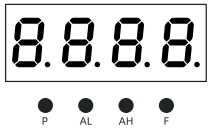
Low alarm (red light): flashing, indicating a low alarm status(Display reading flashing)

High alarm (red light): flashing, indicating a high alarm status(Display reading flashing)

Fault (yellow light): Flashing, displaying E-01 at the same time, indicating that the instrument has not detected the probe. Please reinsert or unplug the probe cable or contact us. Constant light indicates that the calibration has expired or the sensor life has expired. Please recalibrate or contact us.

7. Power on

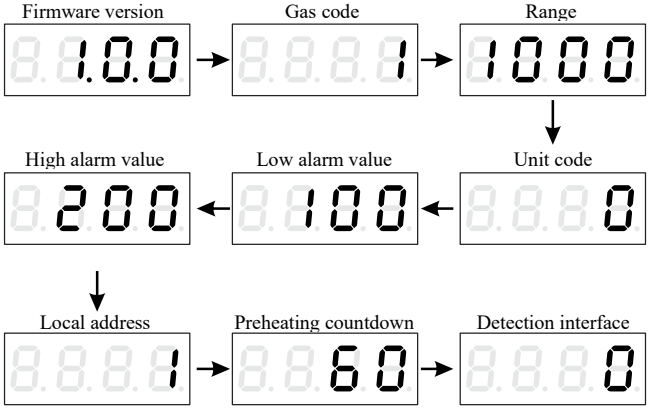
After the detector is powered on normally, it enters a self check state: the screen content is fully displayed, and the indicator lights are all on (if an audible and visual alarm is connected, there is an audible and visual self check response)



After the self check is completed, the screen displays the following content in sequence:

Firmware version → gas code → range → unit code → low alarm value → high alarm value → local address → preheating countdown

as shown in the following figure (taking CO as an example):



8. Calibration method

In order to ensure the measurement accuracy of the detector, the instrument should be regularly calibrated and strictly recorded during use.

Calibration equipment:

One bottle of target sample gas with known concentration (note: the instrument defaults to full range, and in principle, the selected standard gas concentration should be greater than 50% of the range and less than the range);

Pressure relief valve; Flowmeter 0-1000ml/min; Polytetrafluoroethylene trachea; Flow hood, etc.

Note: When the instrument leaves the factory, both the detector and host alarm settings are set to the factory default values. Users can adjust them through the remote control according to the situation.

8.1. Zero calibration

Ensure that instrument is in clean air environment (do not perform this operation in non clean air environments).

Note: After zero calibration, the instrument reading will automatically return to zero (oxygen 20.93% VOL, nitrogen 78.1% VOL, carbon dioxide 450ppm).

Power on when ready. The example is based on remote controller.

Note: In each step of the subsequent operation, the remote control operation or the magnetic wand operation have the same operation effect. Please select one type of operation.

The zero calibration steps are as follows:

1. Enter the function menu

Remote controller: Press the "MENU" button on the , and the instrument will display F-01.

Magnetic wand: Long touch "K1" to display F-01.

2. Go to the [Zero calibration] menu

Remote controller: Press the "+" or "-" buttons to adjust to F-04.

Magnetic wand: Short touch "K2" three times to display F-04

3. Operational calibration

Remote controller: Press the "OK" key to display the current gas concentration reading. After waiting for the value of the tester to stabilize, press the "OK" button

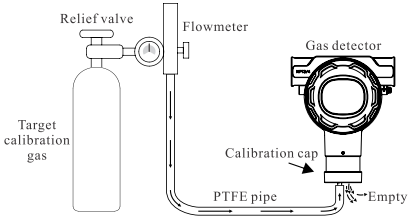
again, and the tester reading will display "PASS", indicating successful calibration.

Magnetic wand: Short touch "K1" to display the current detection concentration reading. Wait for the value of the detector to stabilize, then short touch "K1" to display "PASS", and the calibration is successful.

If the zero calibration is successful, it will automatically return to the detection interface

8.2. Span calibration

Connect the target gas cylinder with a known concentration to calibration cap (Optional) through a polytetrafluoroethylene tube (as shown in the following figure). This operation is mainly divided into two steps: [Set calibration point] and [Do span calibration].



Please note: After the calibration operation is completed, please remove the calibration cap. Do not install the calibration cap on the detector during normal gas detection.

8.2.1. Set calibration point

After checking the connection of the detector, power it on for a period of time until the output of the detector stabilizes.

Note: In each step of the subsequent operation, the remote control operation or the magnetic wand operation have the same operation effect. Please select one type of operation.

1. Enter the function menu

Remote controller: Press the "MENU" button, and the instrument will display F-01.

Magnetic wand: Long touch "K1" to display F-01.

2. Enter the [Span calibration point] function

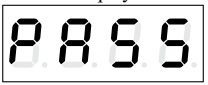
Remote controller: Press the "+" or "-" buttons to adjust to F-07.

Magnetic wand: Short touch "K2" 6 times to display F-07.

3. Set the value of calibration point

Remote controller: Press the "OK" button to enter the gas concentration value display interface. The value can be modified using the "+" and "-" keys to make it consistent with the concentration value of the standard gas to be calibrated. Press the "OK" key to briefly display "PASS".

Magnetic wand: Short touch "K1" to enter the gas concentration value display interface. Short or long touch "K2" to make it consistent with the concentration value of the standard gas to be calibrated. Short touch "K1" to display "PASS".

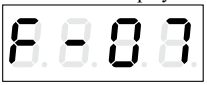


8.2.2. Do span calibration

1. Return to Function Menu

Remote controller: Press the "BACK" key to exit, and the detector will display as F-07.

Magnetic wand: Long touch "K1" to display F-07.



2. go to [Span calibration setting]

Remote controller: Press the "+" button to display F-08.

Magnetic wand: Short touch "K2" to display F-08.

3. Enable selection

Remote controller: Press the "OK" button again to enter the function interface, adjust the "0" displayed on the interface to 1 through the "+" button, and then press the "OK" button to display the current detection reading.

Magnetic wand: Short touch "K1" to display "0"; Short touch "K2" to adjust the display to "1"; Short touch "K1" to display the current detection reading.

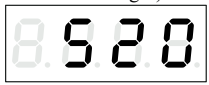

4. Determine calibration operation

At this point, inject 300 ± 20ml/min of calibration gas, and when the instrument's numerical display stabilizes.

Remote controller: Press the "OK" button. The instrument will automatically calibrate, briefly display "PASS" and return to the detection interface.

Magnetic wand: Short touch "K1" to display "PASS" and return to the detection interface.

At this time, the measured concentration value is consistent with the value set in "F-07" (concentration value of calibration gas).



Note: Connect the standard gas to the detector, and after the output is stable, adjust the display value of the calibration detector to be the same as the calibration gas value, and then cut off the gas. Observe whether it can return to zero (in a pure air environment) or the starting point, and then repeat it again, if the difference between the two values is very small, the calibration can be completed within the basic error range. If the difference is significant, the above method calibration needs to be repeated until it meets the calibration specifications (in a pure air environment, oxygen usually displays "20.93%VOL" and nitrogen usually displays "78.10%VOL").

9. Common faults and maintenance

Fault phenomenon	Reason	Solution
Without output	Wrong wiring	Connect in right way again
	Circuit fault	Return to our company for repair
Reading is low	Calibration expired	Calibration again
	Host range set too high	Set host range again
	sensor failure	Replace sensor
Reading is high	Calibration expired	Calibration again
	Host range set too low	Set host range again
	sensor failure	Replace sensor
Reading is not stable	Insufficient preheating stabilization time	Power on and waiting
	sensor failure	Replace sensor
	Circuit fault	Return to our company for repair
Display “E-01”	Sensor detachment	Insert the sensor signal wire or sensor tightly
Fault light always on	Calibration expired, Sensor Life Expiration	Calibration again or contact us

10. Instrument configuration

Standard:

1. Gas detector, 1 set
2. Magnetic wand, 1 set
3. User manual, 1 piece
4. Conformity Certificate/warranty card, 1 piece
5. Installation bracket, 1 set
6. Infrared Ray Controller, 1 piece

Optional: Calibration cap, power adapter, external pump, explosion-proof gland, adapter NPT3/4, adapter M20 * 1.5, sound and light alarm, etc. Please contact us for details.

11. The product design meets the following relevant standards

Domestic explosion-proof standards:

GB-T 3836.1-2021 explosive atmospheres part 1: general requirements for equipment

GB-T 3836.2-2021 explosive atmospheres part 2: equipment protected by flameproof enclosures d

GB-T 3836.4-2021 explosive atmospheres part 4: equipment protected by intrinsically safe type i

National gas calibration standards (taking conventional four gases as an example):

JJF 1421-2013 carbon monoxide alarm type evaluation outline

JJF 1363-2019 outline for type evaluation of hydrogen sulfide gas detection instruments

JJG 365-2008 electrochemical oxygen analyzer

JJG 693-2011 verification regulation for combustible gas detection and alarm

IECEX explosion-proof standard:

IEC 60079-0-2017 explosive atmospheres - Part 0: General requirements for equipment

IEC 60079-1-2014 explosive atmospheres - Part 1: Equipment protected by explosion-proof enclosures “d”

IEC 60079-11-2011 explosive atmospheres - Part 11: Protection of intrinsically safe “i” type equipment

ATEX Explosion-proof standard:

EN IEC 60079-0:2018; EN 60079-1:2014; EN 60079-11-2012

Enterprise standards:

Q-WX001-2022 verification standard for general gas detection and alarm instruments

Other standards:

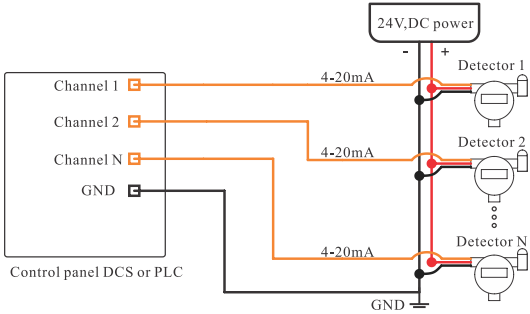
GB 12358-2006 general technology requirements for ambient gas detection alarms in workplace

GB 15322.1-2019 combustible gas detectors - part 1: industrial and commercial point type combustible gas detectors

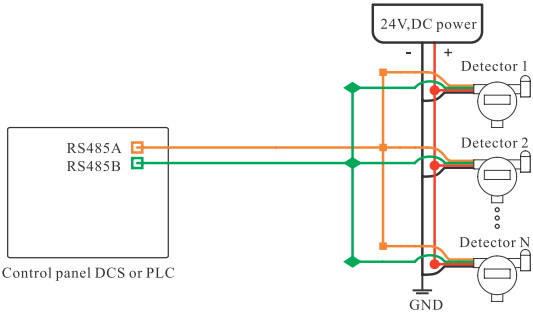
12. Appendix: Schematic diagram of multiple instrument connections

According to the signal category implemented by the user on site, the 4-20mA current signal output method and RS485 digital signal output method can be selected respectively. These two signal output methods also differ during wiring;

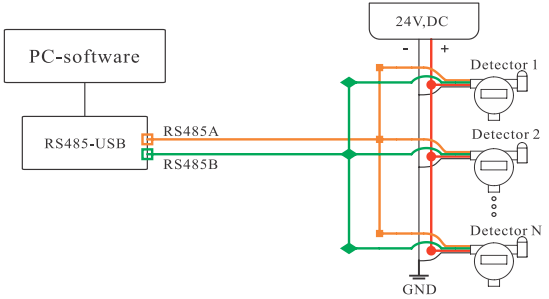
A. 4-20mA current signal output connection method



B. RS485 digital signal output connection method 1.



C. RS485 digital signal output connection method 2



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