麦芽传感
MaiYaSensorTech

MST101

Portable single gas Detector & alarm

(Ver.1.0)

The manual is subject to change without prior notice

User's Manual

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I.Overview of product

MST 101 single gas detector is a high-quility detector which with fall alarm, OLED display, wide range of working temp. Screen is visible in sunlight. The shell is covered with anti-static rubber, so it has good sealing, waterproof and dustproof. can meet the explosion-proof use requirements. By assembling different sensors, the detector can detect a variety of dangerous gases.

II. Characteristics

1. OLED display can continuously show gas concentration in real time
2. English menu operation mode
3. Automatic zeroing calibration when starting up (It can be set to on/off)

4. It offers a variety of concentration units that can be switched
5. Fall alarm function (It can be set to on/off)
6. The display can be invert
7. Compact, light weight, easy to carry
8. With sound, light, vibration of three alarm modes
9. With alarm types of low limit, high limit, STEL, TWA
10. It supports changing alarm points
11. The sensor has temperature compensation
12. Detecting and displaying temperature
13. Reminder of calibration's overdue
14. Starting up self-test, including sensor, circuit board, light and alarm test.
15. Rechargeable lithium-ion polymer battery
16. Anti-fall, anti-static shell

III. Specifications

1. Gases/range, It can be customized

No.	Product Model	Gas Type	Range
1	MST101-CO	carbon monoxide(CO)	（0～1000）ppm
2	MST101-H2S	Hydrogen sulfide(H2S)	（0～100）ppm
3	MST101-O2	oxygen(O2)	（0～30.0）%
4	MST101-H2	hydrogen(H2)	（0～1000）ppm
5	MST101-NH3	ammonia(NH3)	（0～100 ）ppm
6	MST101-CL2	chlorine(CL2)	（0～10.0 ）ppm
7	MST101-HCN	hydrocyanic acid(HCN)	（0～30.0 ）ppm
8	MST101-NO2	nitrogen dioxide(NO2)	（0～100.0）ppm
9	MST101-PH3	phosphine hydrogen(PH3)	（0～10.0）ppm
10	MST101-HCL	hydrogen chloride(HCL)	（0～20.0）ppm

11	MST101-Ex	flammable gas(Ex)	（0～100）%LEL
12	MST101-HF	hydrogen fluoride(HF)	（0～10.0）ppm

2. Battery parameters: rated voltage 3.7V, capacity 500mAh
3. Working current:

   Normal current: ≤0.1mA (when the screen is off)

   Alarm current: ≤100mA
4. Explosion-Proof:

   Ex ib IIC T4 Gb (CLEx)

   II 1G Ex ia IIC T4 Ga (ATEX)
5. Sensor type:

   Oxygen: The Kavani battery

   CO,H2S,NH3,CL2,HCN,PH3 and etc.toxic gas：Electrochemistry

Combustible gas: Infrared sensor

6. Detection method: Diffused

Response time:

Oxygen: T90<30s

For ammonia, hydrocyanic acid, ozone: ≤ 60s.

Phosphine: ≤100s. For other toxic gases: ≤ 30s.

7. Accuracy:

Carbon monoxide: ±10%

Hydrogen sulfide: ±10%

Oxygen: ± 2.0%FS

8. Working environment:

Temperature: -20℃ ~ 55℃

Relative humidity: 0% ~ 95%, no condensation

9. Storage environment:

   Temp.: -40℃～55℃

   Humidity: ≤90%RH, no condensation

10. Charging temperature range: 0℃ ~ 40℃
11. Implementation standards:

    GB12358-2006, GB3836.1-2010, GB3836.4-2010

12. Shell material: ABS, PC, antistatic TPE
13. Overall size: 93mm×52mm×30mm (without back clip)
14. Weight: about 98 g

IV. System structure and working principle

1 . Appearance structure drawing

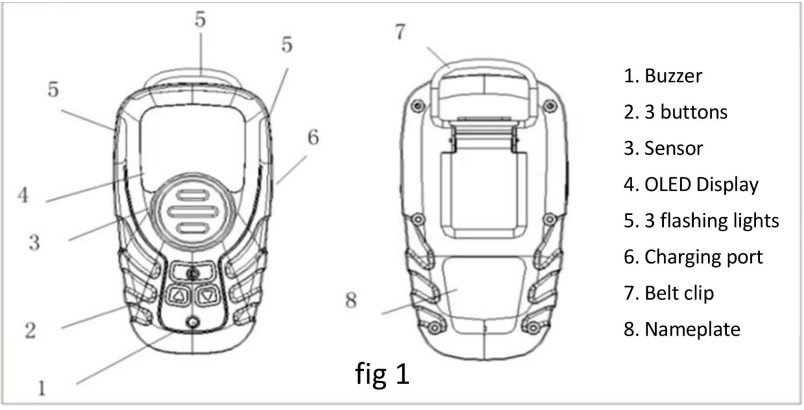


fig 1

2. Description of main display interface

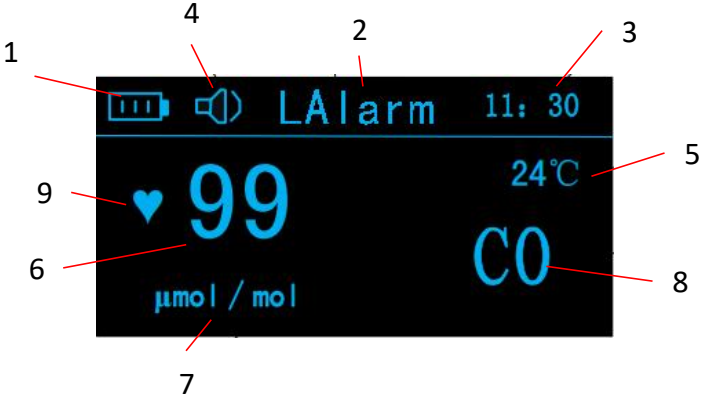


fig 2

2.1. Battery power icon: It displays the remaining battery level.

2.2. Working status show: It display detector's working status. When it is normal, the system displays the picture as shown in fig 3. When it is alarmed, the display shows as picture in fig 2 :

fig 3

2.3. It displays the current time. It can be adjusted in "Setting".

2.4. Sound icon: When there is a alarm or fault, press key to switch the mute/stop mute state, and the prompt icon will change accordingly. means the sound is off. means the sound is on.

2.5. It displays the current temperature.

2.6. Concentration value: It display the realtime value of the measured gas.

2.7. Concentration unit: It displays the current gas concentration unit, which can be changed in "Setting"

2.8. Target gas: It display the name of measured gas.

2.9. Alarm icon: When alarm, the heart icon will flash.

3. The meanings of the indicators

3.1. Green light: It flashes once / 5sec, the detector is working normally.

3.2. Yellow light: It flashes once / 6sec, it indicates that the detector is faulty.

3.3. Red light: It flashes once / 2 sec, the detector is in alarm.

4. Details of Buttons

The detector has 3 keys, namely the On/Off key , the up key , and the down key .

4.1. The function of the On/off key ⏻ :

4.1.1. When detector is at off, long press it for 3 seconds to turn on the detector.

4.1.2. On non-setting interface, long press it for 8 seconds to power off.

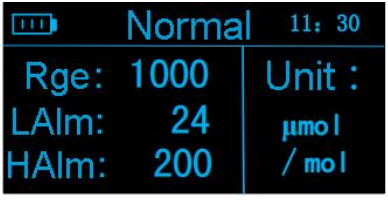
4.1.3. On the setting interface, click it to perform the confirmation.

4.1.4. When detector is alarming, click it to turn on or off the sound.

4.1.5. Wake up the power-saving-mode.

4.2. Up key △ and down key ▽ functions:

4.2.1. In the main interface, click it to Switch screen to view the real time value, Unit, STEL/TWA/PEAK, Range, Alarm point. As shown in fig 4 and fig 5.



f ig 4 fig 5

4.2.2. In setting interface, click to turn the page up or down, and increase or decrease the value.

4.2.3. Wake up the power-saving-mode.

4.3. In the main interface, press the On/Off key and the down key at the same time for 3 sec, it leads to the system Settings. (In this case it need to enter the password)

4.4. In the main interface, press the up key and down key at the same time to return.

5. Working principle

The sensor will convert the collected gas concentration signal into a voltage signal, which will be amplified and then displayed by the MCU after sampling and intelligent calculation. If the measured concentration exceeds the alarm point value, alarm signals such as sound, light and vibration will be sent out.

V. Operation instructions

1. Startup and self-test

1.1. Start up: Press and hold the On/Off key for more than 3 seconds when the device is powered off, then the device will start up.

1.2. Self-test:

After the detector is started, it displays the name and model of the company, then the sound, light, vibration and internal circuit will be tested successively, as shown in Figure 6:

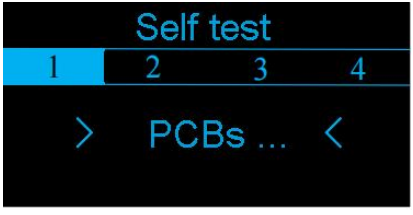


fig 6

After the self-test, if there is not faulty, it leads to display of info that includes measured gas, range, low indicator, high indicator, time from next calibration, software version, etc., as shown in fig 7. Then if the “Auto Cal” is enabled, the zero calibration procedure is executed. If the “Auto Cal” is not enabled, it’ll leads to the main interface, as shown in fig 3.

fig 7

2. Power off

Press and hold the On/Off key for more than 3 seconds in the main interface, countdown appears on the interface for power off, the detector will be displayed as shown in Figure 8. Keep holding the key down untill it appears 0. If user release the On/Off key during the countdown, the detector will return to the main interface.

fig 8

3. Working state

3.1. Normal working

If detector is in the normal detection state, The main screen displays "Normal". The green light blinks once every 5 seconds. If the detector does not detect the alarm and fault information, and there is no any keys operation, in about 18 seconds, it will go into power-saving mode, the screen will be off, but the green light still kept blink every 5 seconds.

3.2. Alarm

a) The red light will flash once every 2 seconds when the detector is in the state of low alarm, STEL alarm or TWA alarm. If the sound is not silenced, detector will intermittently chirp, and keep vibrating.

b) The red light will flash once every 2 seconds when the detector is in the state of high alarm, over range alarm or fall alarm. If the sound is not silenced,

detector will intermittently chirp, and keep vibrating.

3.3. Fault state:

If detector in the fault state, the buzzer sounds every 6 seconds, yellow light shining once per 6 seconds, At the same time, working state area shows "Error". Value display area shows that the fault types, and the icon ♥ blinks. As shown in Figure 9:

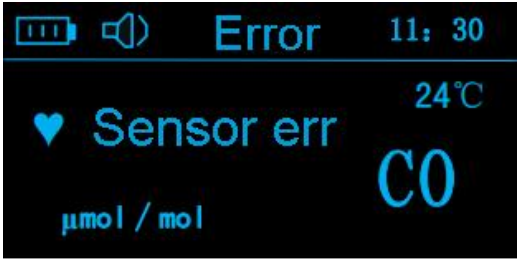


fig 9

3.3. Noise suppression:

When the detector is in alarm, click the on/off key, the sound icon from to , then the sound alarm stop. On the contrary, if you press the On/Off key in the silent state, the detector will turn on the sound alarm and the icon will change accordingly.

4. Password

Press the On/Off key and the Down key for the same time in the main interface, now the red light is on. keeping long press for 3 seconds, then it will enter the password interface. The default password is 2008. as shown in Figure 10.

fig 10

The password consists of 4 digits. Press the up key △ or the down key ▽ to increase or decrease the value. Press the On/Off key ⏻ to confirm the value and The cursor moves to the next digit. Bit by bit as so until the password is complete. If enter the correct password, detector into the Setting menu. If password incorrectly, you will be asked to re-enter the password.

5.Setting:

On the Settings screen, press the Up key or Down key to switch to the options as following fig 11, fig 12, fig 13.

fig 11

fig 12

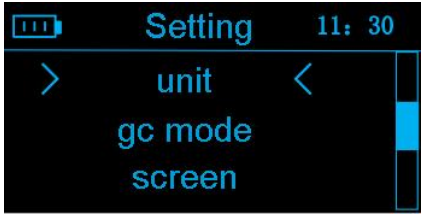


fig 13

Press the On/Off key ⏻ to enter the items:

1) Zeroing

You can proceed zero calibration in this item. When enter this item, the screen will appear the following prompt screen:

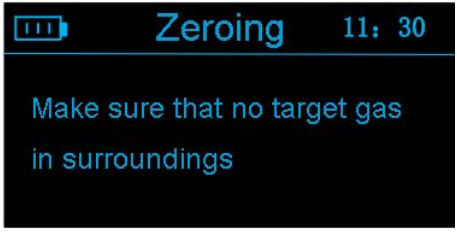


fig 14

Then press the key ⏻, the screen will display the following countdown interface as fig 15. Waiting the countdown reaches “0 s”. Then according to the calibration situation of the system, detector shows ok or failed, as fig 16 and fig 17.

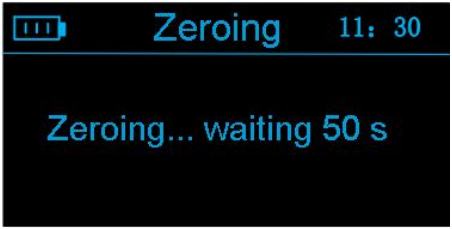


fig 15

fig 16

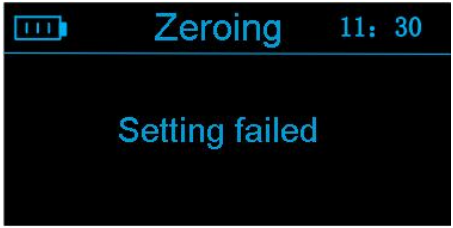


fig 17

2) Span Cal

In this item, you can proceed the span calibration. The method is as follows:

Press the key "Ⓘ" to enter the item, it display the following screen as fig 18:

fig 18

Input the span gas value. Then press the key "Ⓘ" , then display the following screen as fig 19:

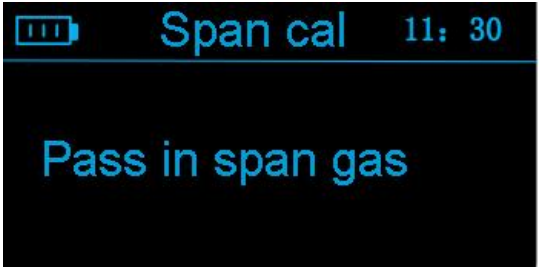


fig 19

At this time, please install the calibration-cover in front of the detector gas inlet, and plug the gas-outlet tube into the calibration cover reliably. Through a steady flow of the standard-gas for at least 30 s, then press the "⏻" key. Then the span calibration is starting, the screen display the calibration progress, as shown in the fig 20 below:

fig 20

The screen will display the countdown value until it is reduced to 0 s. If the calibration is successful, the detector will display "pass". Or the detector will display "failed".

3) Alm set

3.1. Into the item, the screen as shown in fig 21. The cursor will stay on the first digit of the first setting parameter, press the △ or ▽ key to increase or decrease the value of the current position of the cursor, press the key ⏻ to confirm the current value, and the cursor will move to the next position. Do it

until the last position value is confirm. The system displays "pass!".

fig 21

3.2. Default alarm point are as follows:

NO.	Gases	Low Alarm	High Alarm	STEL	TWA
1	CO	24μmol/mol	200 μmol/mol	200 μmol/mol	35 μmol/mol
2	H_2S	10μmol/mol	15μmol/mo	15 μmol/mol	10 μmol/mol
3	O_2	19.5%	23.5%	---	---

4	NH_3	25μmol/mol	50μmol/mol	30 μmol/mol	25 μmol/mol
5	CL_2	0.5μmol/mol	1μmol/mol	1 μmol/mol	0.5μmol/mol
6	HCN	4.7μmol/mol	10.0μmol/mol	10.0μmol/mol	4.7μmol/mol
7	NO_2	2.0μmol/mol	5.0μmol/mol	2.0 μmol/mol	5.0μmol/mol
8	PH_3	1.0μmol/mol	2.0μmol/mol	2.0 μmol/mol	1.0μmol/mol
9	H_2	25μmol/mol	50μmol/mol	30 μmol/mol	25 μmol/mol
10	HCL	25μmol/mol	50μmol/mol	50 μmol/mol	25 μmol/mol
11	Combustible	25%LEL	50%LEL	---	---
12	HF	2.0μmol/mol	4.0μmol/mol	2.0 μmol/mol	4.0μmol/mol

4) Change the time

Into this item, the screen will display as shown in Figure 22. Move the cursor left and right to display "Year, Month,Day..." in turn :

Fig 22

Press △and ▽to increase or decrease the value of the current position of the cursor. Press ⓘ to confirm the current value, and the cursor moves to the next position,Do it until the last position value is confirm. The system displays "Pass !".

5) Cal due

Into this item, the screen will display the remaining days before the next calibration, as shown in Figure 23. If the calibration period has been exceeded, the "Cal expired" information will be displayed, as shown in Figure 24. At the

same time, in the main interface, "Cal overdue" will be displayed. Calibration expired can only be eliminated by span calibration. If the span calibration is successful, the cal due restores to 365 days.

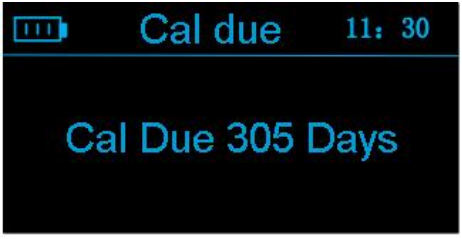


Fig 23

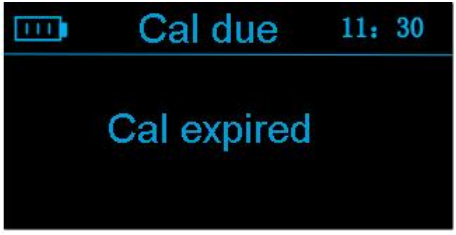


fig 24

6) Auto Cal

You can enable or disable the function of startup zero point calibration here, as shown in the figure below:

Fig 25

At this point, the current status of the cursor is displayed. Press △ or ▽ to switch between "ON" and "OFF". Press ⓘ to confirm then displays "Pass !".

If it is enabled, the device will perform calibration zero during every startup process, and screen shows in Figure 26. User press any key to skip execution of the program. Otherwise, it will perform calibration zero after 5 seconds.

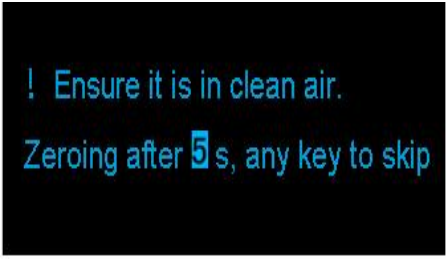


Fig 26

7) Unit

The display unit of measurement results can be switched between "PPM", "µmol/mol" and "mg/m3" here. Press △ and ▽ key to switch units, press the key to confirm and return, as shown below:

Fig 27

8) gc mode

Here you can set to rotate the screen and to enable the fall alarm option. After pressing ⓘ to into this item, the screen will display as shown in Figure 28:

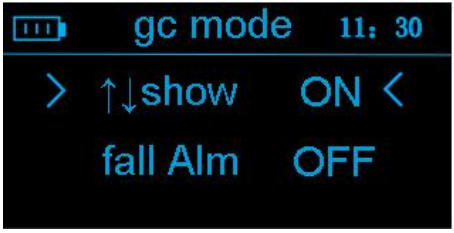


Fig 28

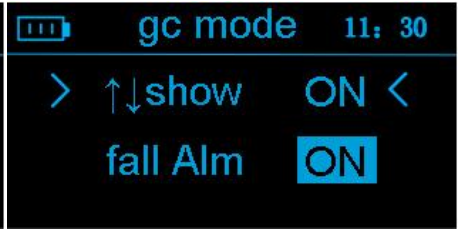


fig 29

Under the screen in fig. 28, press △ and ▽ to switch the item "↑↓show" and "fall Alm". Press ⓘ to confirm the current item then text becomes highlighted, as shown in Figure 29. Press △ and ▽ to change the state of ON or OFF, and press ⓘ to save the settings.

8.1. ↑↓show:

When the detector is inverted, the screen will also be inverted. See Figure 30. This makes it easier for users to see the readings.

Fig 30

8.2. Fall alarm

This function can alert both the detector and a companion that the user may have fallen and be in danger.

When it’s "ON",if detector is stationary within 25 seconds, the warning as shown in Figure 31 will appear. If there is still no operation within next 5 seconds, or the detector cannot detect movement, it will audible and visual alarm and display as Figure 32. The alarm can be eliminated by pressing a button or moving the detector.

Fig 31

fig 32

9) Screen

You can set power saving mode and brightness here. The setting screen is shown in Figure 33.

If power saving mode is ON, The detector turns off the screen when it's idle. It can greatly extend the standby time of the device.

The brightness of the screen can be adjusted as needed in item "brigh".

Fig 33

6. Battery power indicator and charging

6.1. Battery power indicator:

The detector will display the battery level when it is turned on. When the bar is full in the battery icon, it indicates that the battery level is sufficient. When the battery icon is only showing the outer frame and blinking continuously, the detector will sound an alarm. At this time, the device should be charged in time, otherwise it will shut down at any time.

6.2. Charging

The detector can be charged inside the machine. You only need to plug the charger into the 100-220V AC power and insert the micro USB plug of the charger into the USB port on the right side of the detector to charge it.

(a) If the detector is turned on, the battery icon in the upper left corner of the screen will display the animation of charging state. After charging is completed, the battery icon will change to full charge state and no animation will be displayed.

(b) If you are charging while off, press any key, the screen will light up for about 18 seconds, and the following screen will be displayed:

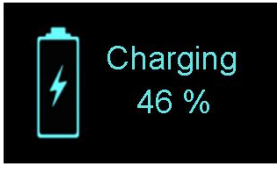


Fig 34

With the progress of charging, the completion ratio value changes with it until it is full, and the prompt message "Charging End" is displayed.

VI. Precautions for Alarm maintenance

1. In order to maintain the measurement accuracy of the detector, calibrate the device regularly (generally half a year).
2. The impact of high concentration gas on the detector should be avoided.
3. Non-professional personnel should not enter the setting menu to avoid affecting the accuracy of the detector and causing faults.
4. Detector should not be used under hypoxia condition.
5. Do not use organic solvent, soap or silicon solution to clean the detector, lest it damage the sensor.
6. Use a damp cloth when wiping the shell to avoid static electricity.
7. Do not open the outer cover of detector in dangerous places.

8. Precautions for battery use:

- This battery has been treated with explosion-proof, are not allowed to replace with batteries.
- Battery replacement should be carried out by the original factory. The fault is caused by automatic replacement, the manufacturer is not responsible for the warranty.
- Don't charging in dangerous places.

VII. Common fault and eliminating

Table 3, Common fault diagnosis, analysis, troubleshooting methods

NO.	common faults	analysis	solution
1	alarm signal system failure	detector damaged	return to factory for repair
2	Error of memory	Memory is corrupted or contents are overwritten	contact manufacturer
3	Sensor fault	The sensor is damaged or loose	contact manufacturer
4	Sensor calibration is overdue	Calibration overdue	recalibrate
5	No sound,light,vibration alarm	Circuit failure	return to depot

VIII. List of accessories

1. One manual
2. One power adapter
3. One BDZ-03 standard gas hood
4. One certificate

IX. Warranty

9.1. Warranty:

The company promises to provide free repair service for faults and defects of portable gas detectors and accessories within one year from the date of product sale.

9.2. Limited Scope:

- For shipping damage, accidents, in the process of change, modify, unauthorized repair, misuse, abuse, use incompatible parts or accessories, do not follow the alarming device of the operating instructions, maintenance or modification, all these cases lead to the fault, the warranty does not apply it.
- In any case, the company's liability under this guarantee, will not exceed the real price of products that customer paid.

Ningxia MaiYa Sensor Technology Development Co., LTD