# BST-MG01 Single Gas Detecting Alarm Manual Instruction

# Notice:

BST-MG01 single gas detecting alarm is applied to operation of portable gas detectors like Oxygen($O_2$), Hydrogen Sulphid($H_2S$), Carbon Monoxide(CO), Nitrogen Monoxide(NO), Nitrogen Dioxide($NO_2$), Hydrogen($H_2$), Sulphur Dioxide($SO_2$), Chlorine($CL_2$), Ammonia($NH_3$), thylene Oxide(ETO), Carbon Dioxide ($CO_2$), etc.

This manual will take Oxygen($O_2$) gas detector for example to demonstrate, gas detector for other gases have similar specification, please refer to appendix for detailed parameters.

## 1.Application

BST-MG01O2 portable $O_2$ gas detecting alarm is applied to the underground coal mine, petrochemical industry, municipal, environmental protection and other spaces where it need to detect the $O_2$ gas concentration in the environment and provide a alarm function. When the $O_2$ gas concentration in the environment is higher or lower than that of preset alarm point, this device will send out sound and light alarm to warn the user who wears it to take protective actions. This device is portable and can be also used as a fixed device. This device is intrinsically safe and explosion-proof under mine, the explosion-proof sign is Exib I.

## 2.Working principle

The sensor of this device adopts electrochemical principle. The electrode inside the $O_2$ sensor will react with $O_2$ gas in the role of catalyst to achieve the directional movement of electron between electrodes, and make the electrical signal amplified and displayed by amplifyingcircuit technology and other existing technologies so that to achieve the detection of concentration.IR $CO_2$ sensor adopts infrared principle.

## 3.Charging this device

Notice:  To charge the battery, ensure you are in a safe, non-hazardous area.

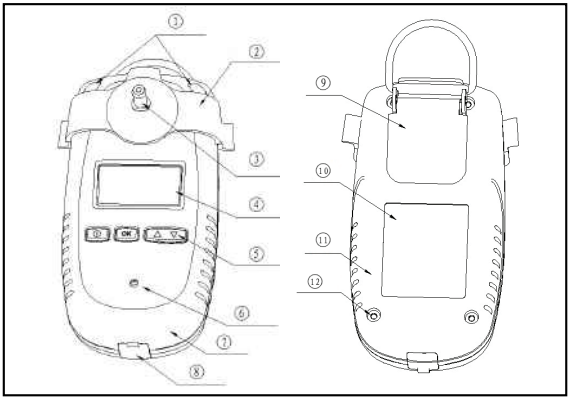
① Input voltage: 110-240V, 50-60Hz  Output voltage: 5V, 500mA.

② It can be charged from 5V USB socket through connecting USB cord with this device. USB socket could from computer, phone adapter, power station, etc.

③ After connecting USB cord with this device, green LED flashing indicates regularly charging.

④ When green LED stops flashing and remains light, it indicates charging is basically completed, to enlarge battery life, please don't unplug charging device right away, instead remain it on charge for another hour.

## 4.Drawing sketch and components list




| Item | Description |
|---|---|
| 1 | Alarm light |
| 2 | Calibration mask fixator |
| 3 | Calibration mask |
| 4 | Display screen |
| 5 | button |
| 6 | Buzzer |
| 7 | Front cover |
| 8 | USB plug |
| 9 | Clip |
| 10 | Label |
| 11 | Back cover |
| 12 | Mounting screw |

## 5.Technical specification

| Technical indicator | Parameter |
|---|---|
| Measuring range | (0.0-30.0)% vol |
| Measurement error | ( 0.0-5.0)% vol：±5%vol ( >5.0~30.0)%vol：±0.9%vol |
| Resolution ratio | 0.1%vol |
| Display | Liquid crystal display（LCD）display |
| Response time | ≤35s (T90) |
| Alarm sound intensity | ≥75dB |
| Alarm light | ≥20m visible |
| High alarm point | 25.0%vol (can be adjusted in whole range) |
| Low Alarm point | 18.0%vol (can be adjusted in whole range) |
| Alarm way | Sound, light |
| Continuous working time | ＞300 hours |

| Technical indicator | Parameter |
|---|---|
| Sensor lifetime | ≥2 year (≥5 years for IR sensor) |
| Working current | 5mA |
| Battery model | 3.7V/1500mA |
| Battery short circuit current | 2A |
| Charging time | 4-5 hours |
| Protection degree | IP65 |
| Working temperature | -25℃~55℃; short time for -40℃~55℃ |
| Size | 105×54×32（mm） |

## 6.Operation instruction

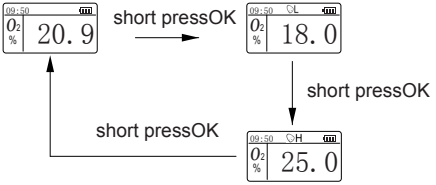
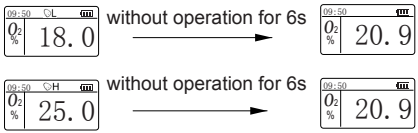
① Instruction of buttons

| Button | Description |
|---|---|
| ⏻ | ● On/ off button start this device or shut it down, please long press ⏻ |
| OK | ● yes button press OK (change between detecting interface and function interface) |
| △ | ● up button set the data value |
| ▽ | ● down button set the data value |

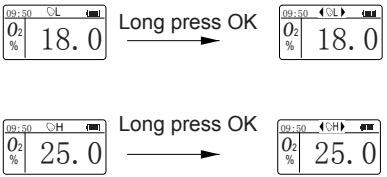
② On/ off operation

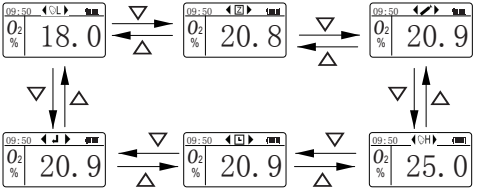
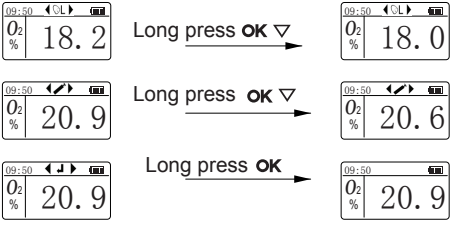
| Step | display |
|---|---|
| Long press on/off button to activate this device, display our company logo "BESANTEK", then go into normal detecting interface. |   |

## ③ Interface switch operation

| Step | display |
|---|---|
| Short press OK button, switch between detection interface, high alarm point and low alarm point, etc. |   |
| Without operation for 6s, automatically returns detecting interface. |   |

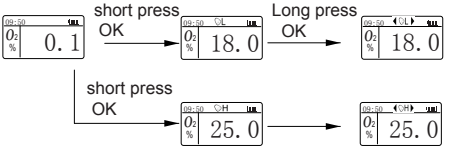
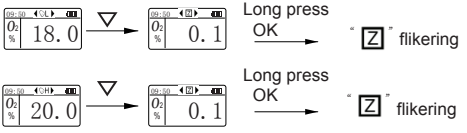
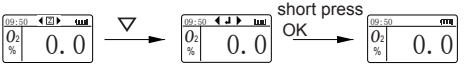
## ④ Setting interface operation

| Step | display |
|---|---|
| Long press OK button to enter the setting interface from high or low alarm point interface, and remain the alarm point setting option with the tip ◖♡L◗ (low alarm point setting) or ◖♡H◗(high alarm setting) |   |

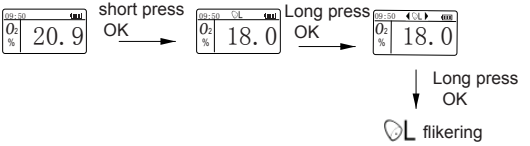
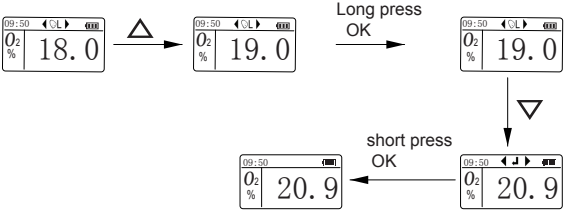
| Step | display |
| --- | --- |
| Press“ △▽ ”,to choose different setting option, eg.: zero setting option ◀ Z ▶, calibration option ◀ ✎ ▶ , time setting option ◀ □ ▶, exit option ◀ ↵ ▶ |  |
| Enter into each option by long pressing OK button, and exit it by short pressing OK button under exit option ◀ ↵ ▶ to return the detecting interface.<br><br>Without operation for 6s, automatically returns detecting interface. |  |

## ⑤ Zero setting

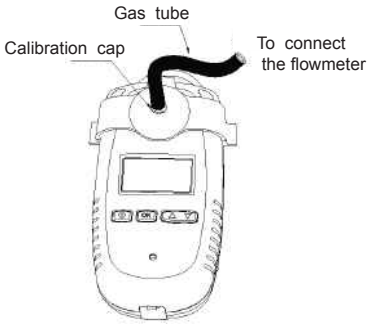
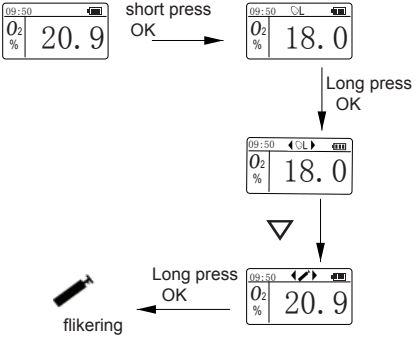
**Tip: When this device occurs drift of small value in clean air, user needs to do zero setting operation. Use 100%vol nitrogen gas to zero O2 and CO2 sensors. For other gases, it should be carried out in clean air.**

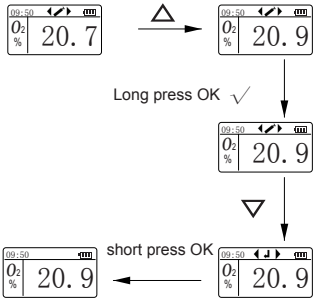
| Step | display |
| --- | --- |
| If the display value is not 0 of a clean device under 200ml/min nitrogen gas flow,short press OK button and enter into the alarm point interface, then long press OK button to enter the setting option interface ♡L low alarm point or ♡H high alarm point and remain in i nterface of alarm point option ◖♡L◗ low alarm point or ◖♡H◗ high alarm point. |  |
| Press up/down button to choose the zero setting option, ◖Z◗ then long press OK button, Z blinking, now carry out the zero setting. |  |
| When the value is stable, long press OK button to finish the setting successfully and return the zero setting option Z , display value is 0. |  |
| Wait for 6s or press up/down button to exit options ◖ ⏎ ◗,then short press OK button to return the detecting interface. |  |

## ⑥ Alarm point setting

| Step | display |
|---|---|
| Short press OK button under detecting interface to enter alarm point interface ◡L or ◡H,then long press OK button to enter setting option interface and remain alarm point option ◖◡L◗or◖◡H◗ , then long press OK button to enter the alarm point setting interface, at this time, ◡Lor◡H is blinking. |  |
| Press up/down button to set the alarm point value. Long press OK button to finish it and return back alarm point option ◖◡L◗ or ◖◡H◗ , the display value will be same with the setting alarm point value. Wait for 6s or press up/down button to exit this option ◖◢◗ ,then short press OK button to return the detecting interface. |  |

# ⑦ Calibration

| Step | display |
|---|---|
| Notice: Always carry on zero setting firstly before calibration<br>$O_2$ sensor can be calibrated in clean air, it also can be calibrated under 20.9%vol oxygen gas, let's take calibration under oxygen gas for example to demonstrate.<br>① Connect the specialized calibration cap to the standard gas tube, and adjust the gas flow to 300ml/min (make sure the flow is stable), exhaust the gas for 30s to empty air in the gas tube. |  |
| ② Short press OK button under detecting interface to enter the alarm point interface ♡L or ♡H, then long press OK button to enter setting option interface and remain in the alarm point option interface ◀♡L▶ or ◀♡H▶, then press up/down button to choose the calibration option ◀🔧▶, long press ok button, and then the ◀🔧▶ under 🔧 blinks, then user can carry out the calibration. |  |

| Step | display |
| --- | --- |
| ③ When the value is stable, press up/down button to adjust the display value and make it same with calibration gas concentration. Long press ok button to finish calibration and return calibration option ◀ ✎ ▶ , wait for 6s or press up/down button to exit the option ◀ ↵ ▶ , then short press OK button to return detecting Interface. |  |

**Notice:**

**A Please don't carry out calibration when the device is alarming for low power**

**B Before calibration, open this device for at least 5 minutes, then carry on zero setting.**

**C Standard gas cylinder could not be shut off during the process of calibration.**

**D Suggest to use 20.9%vol oxygen gas to do the calibration**

**E Calibration cycle is 3-6 months.**

## 7.Attentions of using this device

① Battery of this device shouldn't be removed in underground places, and DO NOT use different batteries from standard one.

② Charge this device in ground and safe places.

③ The replaceable sensor must be provided by BESANTEK Corporation.

## 8.Storage and maintenance

**Notice: When maintain this device, please don't change any component's parameter, specification and model name**

① This device should be kept by special person, and build a registration system.
② This device should be stored in dry and well ventilated places if it's not used for a long time.
③ DO NOT disassemble this device at will, it must be repaired by specialists.

## 9.Trouble shooting

① If this device couldn't be turned on, maybe it has no power, please charge it firstly.
② If the value of this device is not zero in clean air, please carry on zero setting firstly. （except Oxygen ）
③ If this device couldn't test accurately, please carry on calibration firstly.
④ If this device becomes expired, please purchase a new one.

# Appendix

**Parameter** (Zero setting for all these gas sensors except oxygen sensor must be carried out in clean air)

| Gas | Detecting range | Resolution | Respond time | Zero setting gas & concentration | Calibration gas &concentration | Gas flow(ml/min) |
|---|---|---|---|---|---|---|
| $O_2$ | (0~30)%vol | 0.1%vol | ≤35s(T90) | $N_2$ 100%vol | $O_2$ 20.9% / Clean air | 300 |
| CO | (0~1000)ppm | 1ppm | ≤45s(T90) | Clean air | CO 500ppm | 300 |
| $SO_2$ | (0~20)ppm | 1ppm | ≤45s(T90) | Clean air | $SO_2$ 10ppm | 300 |
| NO | (0~250)ppm | 1ppm | ≤45s(T90) | Clean air | NO 100ppm | 300 |
| $H_2S$ | (0~100)ppm | 1ppm | ≤45s(T90) | Clean air | $H_2S$ 50ppm | 300 |
| $H_2$ | (0~1000)ppm | 1ppm | ≤45s(T90) | Clean air | $H_2$ 500ppm | 300 |
| $NO_2$ | (0~20)ppm | 1ppm | ≤45s(T90) | Clean air | $NO_2$ 10ppm | 300 |
| $NH_3$ | (0~100)ppm | 1ppm | ≤45s(T90) | Clean air | $NH_3$ 50ppm | 300 |
| $CL_2$ | (0~10)ppm | 1ppm | ≤45s(T90) | Clean air | $CL_2$ 5ppm | 500 |
| ETO | (0~20)ppm | 1ppm | ≤140s(T90) | Clean air | $C_2H_4O$ 10ppm | 300 |
| $IRCO_2$ | (0.00~5.00)%vol | 0.01%vol | ≤45s(T90) | $N_2$ 100%vol | $CO_2$ 2.50%vol | 250 |
| $IRCH_4$ | (0.00~5.00)%vol | 0.01%vol | ≤45s(T90) | Clean air | $CH_4$ 2.50%vol | 250 |

| Sensor name | Error /Deviation |
|---|---|
| CO | (0-20)ppm: ≤± 2ppm |
| | (20-100)ppm: ≤ ±4ppm |
| | (100-500)ppm: ≤± 5% of testing gas |
| | (500-1000)ppm: ≤ ± 6% of testing gas |
| $H_2S$ | (0-49)ppm: ≤± 3ppm |
| | (50-100)ppm: ≤ ±10% of testing gas |
| $O_2$ | (0.0-5.0)%vol: ≤± 5%vol |
| | (5.0-30.0)%vol: ≤ ± 0.9 % |
| $SO_2$ | (0-20)ppm : ≤ ± 5%FS or ± 1ppm |
| NO | (0-250)ppm : ≤ ±5%FS |
| $NO_2$ | (0-20)ppm: ≤± 5%FS or ±1ppm |
| $H_2$ | (0-1000)ppm : ≤± 5% of testing gas |
| $NH_3$ | (0-100)ppm: ≤± 5%FS |
| $CL_2$ | (0-10)ppm: ≤± 5%FS or ± 1ppm |
| ETO | (0-20)ppm: ≤±10%FS |
| IR $CH_4$ | (0.00-1.00)%vol: ≤± 0.06%vol |
| | (1-100)%vol: ≤± 7% of displayed value |
| IR $CO_2$ | (0-0.5)%vol: ≤± 0.10%vol |
| | (0.5-5.0)%vol: ≤± (0.1%vol + 5% of testing gas) |