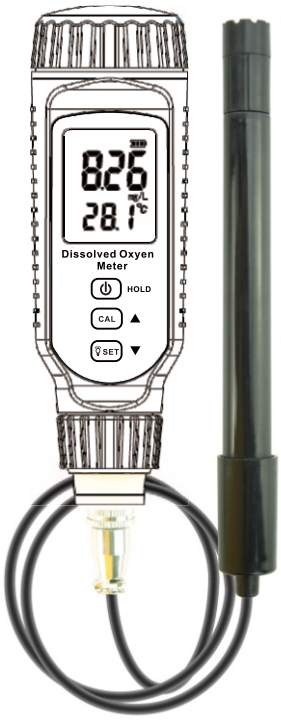
SMART SENSOR

PEN TYPE DISSOLVED OXYGEN METER INSTRUCTION MANUAL

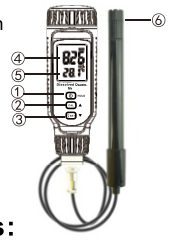


Introduction

This device is an intellectual precise measurement apparatus. It designed and made with imported components and sensor, It have high sensitive and accuracy, stable to work with different temperature, small size for easy storage and hand carry. It can measure the dissolved oxygen value and measure solvent's temperature under test. Dissolved oxygen meter widely applied in industrial, electrical and agriculture, medicine, food industrial, quality of drinking water etc. It is very important that you read through this instruction before using this device to get the correct reading.

1. Explanation of the appearance

1) Power ON/OFF / Data Hold button
2) Calibrate / increase button
3) Back light / reduce button
4) Dissolved oxygen value reading area
5) Temperature reading area
6) Dissolved oxygen electrode probe



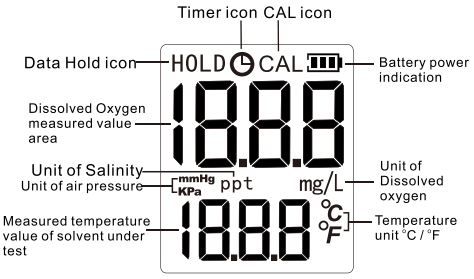
2. Technical parameters:

Technical parameters	
Dissolved Oxygen measuring range	0.00~20.00 mg/L
Basic measurement error	+/-0.4 mg/L
Measurement response time	< 30 seconds
Solvent temperature compensation range	0~40 °C
Temperature measuring range	0°C ~40 °C
Power Supply	3.7V Li-polymer rechargeable battery
Display	Large segment type LCD display
Working temperature range	0~40 °C
Working humidity range	< 85%RH (non-condensing)

3. Accessories for instrument

1) Main unit: X 1pc, USB cable X 1pc;
2) A type reagent X 10 bag;
3) One bottle of electrolyte to fill the probe
4) Spare parts of protection cover 3 pcs.
5) Instruction Manual and Warranty Card: one set each

4. LCD display screen



5. Instrument operation

Calibrating the oxygen probe

The oxygen probe **must be calibrated** before you use it for the first time, and again before each use after a long period (weeks or months) of sitting idle. We also recommended calibration the probe before making any measurements that must be extremely precise.

Before calibrating the probe, make sure it is dry. Before use please fill in fresh electrolyte:

1) Get out the new probe head reservoir, fill in 3/4 fresh electrolyte, make sure there are no bubble inside the water, if bubble found, please hold the probe head and tapped by finger, then the bubble will be move out from the electrolyte.

2) Then screw the probe head reservoir back to the probe handle tightly until membrane touch with the Gold cathode. Try your best to keep the probe head reservoir without bubble.
Remarks: If electrolyte too much and overflow, please clean it with soft paper.

3) Then plug the probe connector to the main body, turn on the unit and warn up at least 30 minutes before use
If the value change is very small when probe immersed to Hydrogen peroxide water or Saturated dissolved oxygen water, then you must be change a new probe head reservoir and refill with fresh electrolyte

4) CALIBRATION.
This instrument use two point calibration method, please prepare one cup of Hydrogen peroxide liquid and one cup of Saturated dissolved oxygen liquid for calibration. (Please refer to appendix 1 of how to prepare the Hydrogen peroxide liquid and Saturated dissolved oxygen liquid. If the liquid under test have presence of salt in the liquid, please set the instrument up with saltine water setting. (Saltine value must be measured by Saltine meter), then you can use it to measure the value of dissolved oxygen of water, the setup range of saltine is (0,0~45%). The default value of the saltine is zero. If your instrument is not in same sea level, please set it up with correct altitude value. (Altitude value must be measured by Altitude meter). The default value of this instrument is sea level altitude (The setup range of altitude is (101.3~79.9KPa or 760~600mmHg).

5) Before calibration please put the probe into the Hydrogen peroxide liquid, and read the value if it is "zero" go to next step, if not calibrate the zero point as below calibration method. Then put the probe into the Saturated dissolved oxygen liquid, to take the reading and compare it with same temperature of the appendix 1, if it have too much difference, perform the calibration as below method:
At normal measure mode, depress " CAL/▲ " key more then 3 seconds go to calibration mode,

a) LCD screen shown **CAL 0** and flashing (**0** means zero point calibration), put probe into Hydrogen peroxide liquid, wait for two to three minutes, if you see the reading of the value stable, depress " CAL/▲ " key until LCD screen shown "PAS" then go to next calibration step, LCD screen show **CAL 1** and flashing, put probe into Saturated dissolved oxygen liquid, wait for two to three minutes, if you see the reading of the value stable , depress " CAL/▲" key until LCD screen shown "PAS", instrument will store the setting value and go back to normal measurement mode. Under the above calibration step, if the LCD screen shown **"Err",** it means the calibration failed, may be the value is not at the calibration range or the probe was damage.

b) After calibration, if the sample liquid under test is saltine liquid, and the test place is not at same sea level, please perform the below compensation methods:
At normal measure mode, long depress "SET/▼" key go to compensation setup mode, LCD screen shown "TDS" and "Saltine value "flashing , depress " CAL/▲ " key to increase the value (long press increase value fast), reduce the value by depress " SET/▼" key ((long press to reduce value fast), after completed this step, depress " HOLD " key to save the setting and go to Altitude compensation mode (**AP**), LCD screen shown **AP** and AP value flashing, depress "CAL/▲ " key to increase the value (long press increase value fast), reduce the value by depress "SET key ((long press to reduce value fast), at this stage you can select the altitude unit by depress " CAL/▲ " key and " SET/▼ " key at the same time, switch Altitude unit in **mmHg** and **KPa** unit sequentially. After completed the AP value setting, depress " HOLD " key to store the setup value and go back to normal measurement mode.

6) If you find the power indication of the LCD display screen become empty [ ], please replace the batteries jmmediately, replace with alkaline battery is highly recommended. If instrument will not be used for a long period, please take out the batteries from the battery compartment.

7) HOLD key: short depress it to turn unit on, after unit turn on, depress it can hold the measured value. Long depress it to turn off the unit.

8) CAL/▲key:

a) At normal measurement mode, depress it more than 3 seconds go to Calibration mode.

b) At compensation mode, depress it to increase value, long depress it increase value in fast way

9) SET/▼ key:

a) Depress it to turn back light on or off in sequential.

b) At compensation mode, depress it to reduce the value, long depress it to reduce the value in fast **way.**

10) Auto Power off setup:
Before turn on the unit, depress "HOLD" key and " CAL/▲" key at the same time go to auto power on/off set up mode, LCD display screen shown **APO ON** or **APO OFF** wording, depress "HOLD " key can select APO ON or APO OFF, after selection, long depress "HOLD " key to save the selection and return to normal measurement mode.

a) APO ON mode: This is auto power off mode, if no any key input, unit will turn off after 5 minutes.

b) APO OFF mode: No auto power off function, user must turn the unit off by depress the " HOLD" key more than 3 seconds..

11) Temperature unit selection: before power on the unit, depress " HOLD " key and "SET/▼" key at the same time, go to temperature selection mode, LCD screen will shown °C or °F, you can select the unit by depress "HOLD " key sequentially, after selected what unit you want, long depress "HOLD " key to save the selection and back to normal measurement mode.

6. Maintenance of probe and electrode

Highly recommended maintenance probe and electrode every three month, Keep the probe clean and its head inside the protection cover when not in use, periodically clean the electrode and refill the electrolyte with fresh electrolyte.

a} take out he probe from the instrument.

b) Unscrew the old diaphragm set from the probe head, clean the metal electrode and old diaphragm by distilled water,

c) If found the golden cathode electrode become dark, please use polish paper to polish the surface of the golden electrode, drop dot of deionized water to the polish paper, then polish the golden electrode 5-6 turns on this paper,. Then clean the golden cathode with deionized water, after than dry the golden cathode with clean paper. Be sure the surface of the golden cathode become bright again

d) Clean silver anode electrode as followings: The surface of silver anode electrode should be silver grey color, if it becomes dark grey, please use polish paper to polish the surface to let it becomes bright.

7) Storage of electrode:

a) Short period storage: overnight or In the interval between measurement, please keep electrode in the instrument., then place it into clean water.

b) If the electrode not to be used for a long period of time, it should be store in dry area after it clean with a boiled distilled water and after it cool down. Please note at the cleaning period, don't turn on the unit, also instrument should be store in an environment of humidity less than 85% RH and temperature not higher than 40 °C.

Appendix:

1. Configuration of Hydrogen peroxide liquid
Get 350mL distilled water, added in A type reagent, shake evenly about 10 minutes, then you can use it to calibration the probe.

NOTICE : Hydrogen peroxide water is toxic, don't drink it

2. Configuration of Saturated dissolved oxygen liquid
Fill in 8L distilled water into constant temperature water bath, adjust the temperature of the bath to your desired temperature, turn on the mixer to stir the water, at the same time use a Bubbler (air pump) add air into the water at least 60 minutes.

3. The saturated value of dissolved oxygen liquid with different temperature , please refer to below table for your reference.

Temperature (°C)	dissolved oxygen(mg/L)	Temperature (°C)	dissolved oxygen(mg/L)
0	14.64	18	9.46
1	14.22	19	9.27
2	13.82	20	9.08
3	13.44	21	8.90
4	13.09	22	8.73
5	12.74	23	8.57
6	12.42	24	8.41
7	12.11	25	8.25
8	11.81	26	8.11
9	11.53	27	7.96
10	11.26	28	7.82
11	11.01	29	7.69
12	10.77	30	7.56
13	10.53	31	7.43
14	10.30	32	7.30
15	10.08	33	7.18
16	9.86	34	7.07
17	9.66	35	6.95

Warranty period

1) The warranty period of the composite electrode is one year of storage.

2) In this warranty period, if found malfunction of the instrument or electrode, factory have the reliability to repair or replaced with a good one.

Special Announcement

Our company reserved the right to change the design and the user manual without prior notice to the end user.

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