



# P-512 Dissolved Oxygen Meter

## User Manual



PEAK INSTRUMENTS INC  
Version 1801

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## I. General Information

Thanks for using P-512 DO meter. In order to help you operate and maintain the instrument properly, please read the user manual before using it. We reserve the rights to update the manual and its parts subject to the purpose of improving the instrument's performance.

This instrument combines the technologies of advanced electronics, sensors and software design, which can be used to test the dissolved oxygen, temperature and other parameters of water solutions. This DO meter is very suitable for industrial and mining enterprises, power plant, environment protection, etc. Especially suitable for outdoor purpose.

This pH meter has built-in microprocessor chip with beautiful design, variable functions and the following features:

1. Built-in microprocessor chip, with automatic calibration, automatic or manual temperature compensation, data storage, function settings, automatic shutdown and low voltage alarm and other intelligent functions. Easy to use.
2. Digital filtering and slip techniques are used to improve meter's response speed and data accuracy. The symbol of “☺” is displayed when the measured value is stable.
3. Equipped with new type of dissolved oxygen electrode and temperature probe with automatic temperature compensation, manual salinity compensation and air pressure compensation, which make the measurement more accurate and operation easier.
4. Polarographic electrode only needs 3-5 mins to be polarized and adopts combined diaphragm cap design and with three additional caps, which make the cap change much easier.
5. The circuit board adopts Surface Mounted Technology to improve the reliability of product processing.
6. White backlit LCD screen.
7. IP57 waterproof and dustproof.

## II. Specifications

### Dissolved oxygen

Measuring range	(0~20.00)mg/L(ppm), (0~200.0)%
Resolution	0.1/0.01 mg/L(ppm), 1/0.1%
Accuracy	Electrode:±0.10 mg/L Instrument: ±0.40mg/L
Response time	≤30s (25°C,90% response)
Residual current	≤0.1 mg/L
Temperature compensation	(0~99)°C(Auto/Manual)
Salinity compensation	(0~45)ppt(Manual)
Air pressure compensation	(0~200) kPa(Manual)
Automatic calibration	Air saturated with water, water saturated with air
Electrode type	Polarographic

### Other Parameters

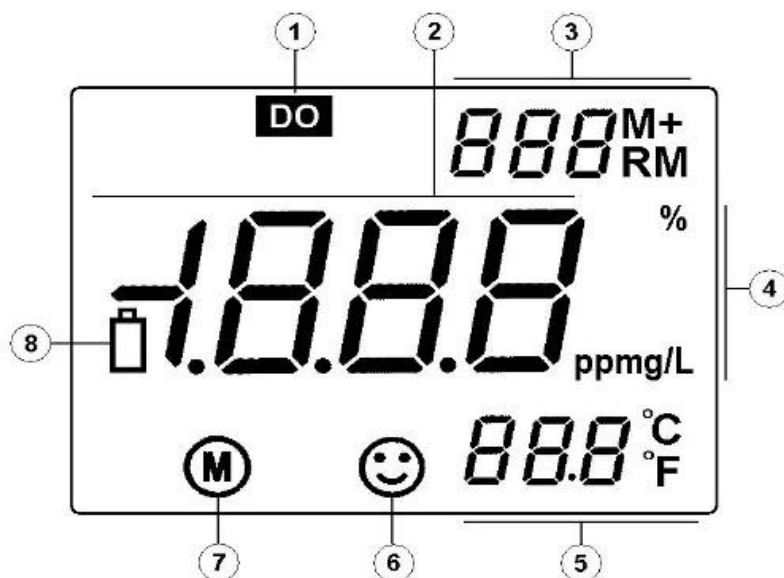
Data Storage	150 sets
Storage Contents	Series number, measuring value, unit, temperature and time
Power	Two pieces of AA battery
Size & Weight	165×90×32 mm/310g
Certificates	ISO9001:2000, CE

### Working Conditions

Ambient Temperature	5~35°C
Humidity	≤85%
IP Rating	IP57

### III. Device Instructions


#### 1. Display indicators



- ① Parameter mode tag
- ② Measurement value
- ③ Data storage and replay number and symbol. Indicator of special status. M+ is symbol for data storage. RM is data replay icon.
- ④ Measurement unit
- ⑤ Temperature and unit
- ⑥ Stability symbol
- ⑦ Calibration indicators
- ⑧ Low voltage symbol, when the voltage is lower than 2.6V, the symbol will be shown to remind customer for battery change.

#### 2. Operation Keys


There are seven operating buttons

2.1.  On/off button, it is used to switch on/off the device in measuring mode. This key is not working in other modes.

2.2.  Calibration key.

2.2.1. Press this button to enter calibration mode in measuring mode.

2.2.2. Press this key to back in other modes.



2.3.  Function key. In measuring mode, short press (less than 1.5 seconds) this key to change measuring unit mg/L → ppm → %.



2.4.  Backlight and delete key.

2.4.1. In measuring mode, short press (less than 1.5 seconds) this key to turn on or off backlit.

2.4.2. When viewing saved data, long press (more than 5 seconds) this key to delete saved data.

2.5.  Increase and data view key.  Decrease and data saving key.

2.5.1. In measuring mode, short press (less than 1.5 seconds)  to save records, short press (less than 1.5 seconds)  to view saved records.



2.5.2.  and  are used to change parameters under setting mode.

2.6.  Set and Confirm/return key


2.6.1. In measuring status, long press (more than 2 seconds) to enter parameter settings.

2.6.2. Short press (less than 1.5 seconds) to confirm current selection in other status.

### 3. Save, view and delete data.

3.1. Data save. In measuring status, when the reading is stable and shows symbol , short press (less than 1.5 seconds)  to save records, the screen will show "M+" and storage number. The device can save 150 sets of records totally.


3.2. Data view.

3.2.1. In measuring status, short press (less than 1.5 seconds)  to view the newest saved record of the current unit, and right upper corner will show symbol "RM".

Continue press  or  to replay all saved records.

3.2.2. In view status, press  to return to measuring mode.

3.3. Delete data



In data viewing mode, long press (more than 5 seconds)  and screen displays

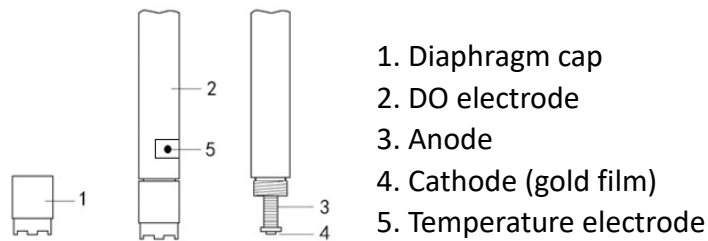
Address: 16223 Park Row, Houston, TX-77084, USA. Website: [www.peakii.com](http://www.peakii.com). Tel: +1 2819353455

**CLR** for two seconds, which means all saved data is deleted already and back to measuring mode.

## IV. DO Measurement

### 1. Preparations







- 1.1. Press  to switch on device, then press  to choose proper unit.
- 1.2. Check the DO electrode (see following fig.). There should not be bubbles inside the electrode diaphragm cap (tiny bubble is OK). Otherwise, rotate off the cap and refill it with electrolyte and install the cap back, connected to instrument and be polarized for 15 minutes.



1. Diaphragm cap
2. DO electrode
3. Anode
4. Cathode (gold film)
5. Temperature electrode

- 1.3. Connect the DO electrode and temperature electrode to the interfaces at the back of instrument.

### 2. Calibration

- 2.1. Press  to enter calibration mode, the screen will show "CAL" at top right corner to indicate entering calibration mode. Put DO electrode in the air vertically for 3-5 minutes until tested value stable and display symbol , then press key  and shows 100%. If the reading is not stable, please wait for a few minutes and press  enter calibration mode until reading is table.
- 2.2. After the calibration, the screen will show "" which means 0% oxygen calibration is done or "" means 100% oxygen calibration is finished.

### 3. Liquid sample measurement

3.1. Measuring flow liquid solution (flowing speed  $>5\text{cm/s}$ ). Dip the electrode into the liquid with the temperature probe under water surface. Tilt the electrode  $45^\circ \sim 75^\circ$  with the flow direction, shake it slightly and last 3-5 minutes until the reading is stable.

3.2. Measuring static liquid solution. Dip the electrode into the liquid with the temperature probe under water surface. Tilt the electrode  $45^\circ \sim 75^\circ$  with the water surface, move it with speed more than  $5\text{cm/s}$  and last 3-5 minutes until the reading is stable.

3.3. Measuring low flowing speed liquid. Please refer to 3.1 and move the electrode faster.

### 4. Notices

4.1. The difference between air temperature and tested solution temperature should be less than  $10^\circ\text{C}$ , if the difference is too big, the electrode should be immersed in the solution to be tested for 10 minutes. Then calibrate it according the steps mentioned above.

4.2. Don't turn off the instrument during use because the electrode should be polarized and calibrated when it is turned on.

4.3. Temperature has strong impact on DO value. Because the temperature electrode is installed in the shell and contact directly with water instead of being installed in electrolyte inside the electrode, which will cause different ability to induce the liquid's temperature and need 3-5 minutes to reach a balance. So the reading time should be more than 3 minutes, otherwise, there will be a bigger error. Especially in case of big temperature difference between electrode and tested liquid, the reading time should be longer.

4.4. Air pressure has great influence on DO test (see appendix II and III). This DO meter has manual pressure compensation function, which can amend the tested value and make sure its accuracy.

4.6. There should not be bubbles on the sensitive membrane of DO electrode, otherwise it will impact its accuracy.

4.7. There should be not bubble (tiny bubbles are OK) in the electrolyte inside the electrode, if yes, it will influence its response speed and test accuracy. If there are big



bubbles, please remove the cap and refill electrolyte.

4.8. The membrane surface should be humid to avoid the electrolyte around cathode becoming dry, which will influence electrode performance greatly.

4.9. Make sure the temperature probe in the electrode shell under water, or inaccurate temperature will result in big errors to the test value.

4.10. When the instrument is abnormal, please restore it to default settings(in P8 and make it on) and make measurement after calibrations.

## 5. Parameter settings

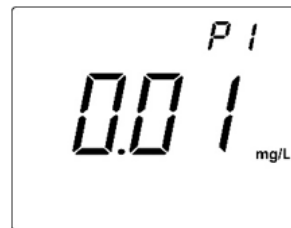
### 5.1. Table of parameter setup




Indicator	Description	Remarks
P1	Resolution setting	0.1mg/L, 0.01mg/L
P2	Manual temperature compensation	(0-99.9)°C
P3	Salinity compensation setup	(0 - 45)ppt
P4	Air pressure compensation setup	(0.0-199.9)kPa
P5	Temperature unit setup	°C °F
P6	Backlight time closing setting	0-20min or 0 stands for this function is not working
P7	Automatic shutdown time setting	0-20min or 0 stands for this function is not working
P8	System restore setup	OFF or ON



#### 5.2.1. Resolution setting(P1)

5.2.1. Long press  to enter set mode


Then press  to enter P1.



5.2.2. Press  or  to select resolution 0.1 or 0.01. Press  to confirm the change and back.




5.2.3. Press  to enter next parameter setting or press  to back to measuring mode.



### 5.3. Manual temperature compensation(P2).

5.3.1. Press  to choose P2 in mode P1,


Then press  to enter P2.



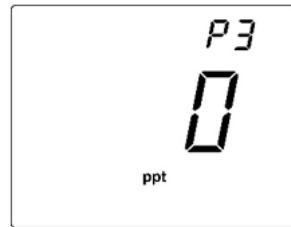
5.3.2. Press  or  to change the temperature. Long press these keys to change the figures continuously. Press  to confirm the change and back.




5.3.3. Press  to enter next parameter setting or press  to back to measuring mode.



### 5.4. Salinity compensation(P3)

5.4.1. Press  to choose P3 in mode P2,


Then press  to enter P3.



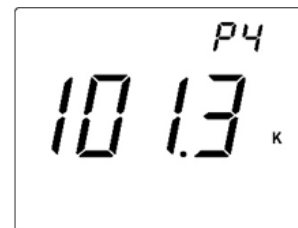
5.4.2. Press  or  to change salinity. Long press these keys to change the figures continuously. Press  to confirm the change and back.




5.4.3. Press  to enter next parameter setting or press  to back to measuring mode.



### 5.5. Air pressure setting(P4)

5.5.1. Press  to choose P4 in mode P3,


Then press  to enter P4.



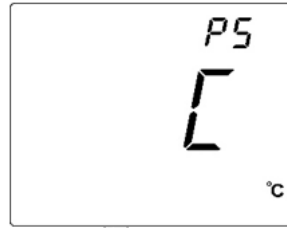
5.5.2. Press  or  to change the pressure value according to the standard air pressure. Long press these keys to change the figures continuously. Press  to confirm the change and back.




5.5.3. Press  to enter next parameter setting or press  to back to measuring mode.



## 5.6. Temperature unit setting(P5)

5.6.1. Press  to choose P5 in mode P4,


Then press  to enter P5.



5.6.2. Press  or  to select temperature unit °C/°F. Press  to confirm the change and back.




5.6.3. Press  to enter next parameter setting or press  to back to measuring mode.



## 5.7. Auto shutdown timer of backlight(P6)

5.7.1. Press  to choose P6 in mode P5,


Then press  to enter P6.



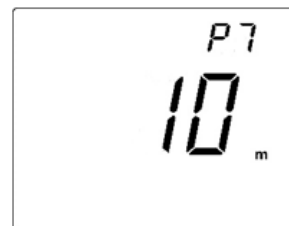
5.7.2. Press  or  to choose auto shutdown time of backlight. Press  to confirm the change and back.



5.7.3. Press  to enter next parameter setting or press  to back to measuring mode.


## 5.8. Auto shutdown timer of the device(P7)



5.8.1. Press  to choose P7 in mode P6,

Then press  to enter P7.




5.8.2. Press  or  to set the automatic shutdown time of the device.

Press  to confirm the change and back. "0" means disabling this function.




5.8.3. Press  to enter next parameter setting or press  to back to measuring mode.


## 5.9. Restore default settings(P8)

5.9.1. Press  to choose P8 in mode P7,

Then press  to enter P8.



5.9.2. Press  or  to choose "On" and confirm by pressing  and "888"

blinks on the screen, which means it is restored to default settings. Press  to back to measuring mode.

5.9.3. Be careful to use this function, because all saved data will be removed once restored to default settings.

## 6. Change diaphragm cap

The diaphragm cap should be changed as bellow steps if following situations happen: long response time, obvious errors to test value, something wrong with sensitive membrane of DO electrode like wrinkles, cracks and damages.

6.1. Rotate off the cap

6.2. Wash the electrode without cap with pure water and wave it dry.

6.3. Wipe the cathode(gold film) surface dry carefully with a piece of flannel or facial tissue.

6.4. Take a new cap and add electrolyte slowly and carefully to make sure there are no bubbles. If bubbles appear, the remove them.

6.5. Put the cap on the horizontal table, and put electrode inside the cap vertically and rotate it clockwise carefully until it is tight.

6.6. Make sure there are no bubbles in the electrolyte. Otherwise to reassemble it.

6.7. Don't touch sensitive membrane when using it or changing the cap. Because the sweat or fat on the hand will influence its performance.

## 7. Zero oxygen calibration

Zero oxygen calibration is only required when changing new electrode, diaphragm cap or long time no use. After the zero oxygen calibration, do the full oxygen calibration.

Usually zero oxygen calibration is not necessary. Please do as the following steps if needed.

7.1. Make 250ml anaerobic water. Add 500mg sodium sulfite ( $\text{Na}_2\text{SO}_3$ ) and 250ml pure water into a flask with 250ml volume. Mix them completely (tiny divalent cobalt salt could be added as catalyst). It is effective in 24 hours.

7.2. Connect DO electrode to instrument and be polarized for 15 minutes.

7.3. Dip DO electrode into anaerobic water, press **CAL** to enter calibration mode, the screen will show "CAL" at top right corner and wait 3-5 minutes until symbol "😊" appears and press **OK** and shows 0%. Wash the electrode clean with pure water and put it in the air vertically for 3-5 minutes until tested value stable and display symbol "😊", then press **OK** and shows 100%, meanwhile "CAL" disappears, calibration is over and enter measuring mode. Then the screen will show "Ⓛ Ⓜ" which means respectively 0% oxygen and 100% oxygen calibration is finished.

7.4. If instrument shows  $\leq 0.02\text{mg/L}$  in five minutes, which means its response speed and residual current are very good, zero oxygen calibration is not necessary to be done.

7.5. If instrument shows  $\geq 0.15\text{mg/L}$  five minutes later, that means its response speed is slow and residual current is high. You can change the diaphragm cap or remove the cap and wipe carefully the cathode gold film surface with polishing paper, then clean its surface with a piece of lint or facial tissue, wash it with pure water and wave it dry, add some electrolyte into the cap and put it back to electrode tightly. And repeat the zero/full oxygen calibration.

## 8. Salinity setting

The instrument has manual salinity compensation function. Before setting salinity compensation, please measure its salinity value of the solutions to be tested with a salinity meter and enter the measured result into the instrument, please refer to P3.

## 9. Air pressure setting

The instrument has manual pressure compensation function. In order to guarantee pressure compensation accuracy, it is suggested to be set according to different place's pressure or altitude listed in appendix II&III. Please refer to P4 for details.

## VI. Packing List

Description	Number
P-512 DO meter	1 unit
DO electrode	1 piece
Diaphragm cap	2 pieces
Polarographic DO refill	1 bottle
AA Battery	2 piece
User manual	1 copy

### Appendix I Saturated content of oxygen in water with different temperature

Temperature (°C)	DO (mg/L)	Temperature (°C)	DO (mg/L)	Temperature (°C)	DO (mg/L)
0	14.64	16	9.86	32	7.30
1	14.22	17	9.66	33	7.18
2	13.82	18	9.46	34	7.07
3	13.44	19	9.27	35	6.95
4	13.09	20	9.08	36	6.84
5	12.74	21	8.90	37	6.73
6	12.42	22	8.73	38	6.63
7	12.11	23	8.57	39	6.53
8	11.81	24	8.41	40	6.43
9	11.53	25	8.25	41	6.34
10	11.26	26	8.11	42	6.25
11	11.01	27	7.96	43	6.17
12	10.77	28	7.82	44	6.09
13	10.53	29	7.69	45	6.01
14	10.30	30	7.56		
15	10.08	31	7.43		

## Appendix II Saturated content of oxygen in water with different air pressure

Air Pressure		Dissolved Oxygen(mg/L)		
mmHg	kPa	15°C	15°C	15°C
750	100.00	9.94	8.14	6.85
751	100.13	9.96	8.15	6.86
752	100.26	9.97	8.16	6.87
753	100.40	9.98	8.17	6.88
754	100.53	9.99	8.18	6.89
755	100.66	10.00	8.20	6.90
756	100.80	10.01	8.21	6.91
757	100.93	10.03	8.22	6.92
758	101.06	10.04	8.23	6.93
759	101.20	10.07	8.24	6.94
760	101.33	10.08	8.25	6.95
761	101.46	10.09	8.26	6.96
762	101.60	10.11	8.27	6.97
763	101.73	10.12	8.28	6.98
764	101.86	10.14	8.30	6.99
765	102.00	10.15	8.31	7.00
766	102.13	10.16	8.32	7.01
767	102.26	10.18	8.33	7.02
768	102.40	10.19	8.34	7.02
769	102.53	10.21	8.35	7.03
770	102.66	10.22	8.36	7.04
771	102.80	10.23	8.37	7.05
772	102.93	10.25	8.39	7.06
773	103.06	10.26	8.40	7.07
774	103.19	10.28	8.41	7.08
775	103.33	10.29	8.42	7.09

### Appendix III Saturated content of oxygen in water with different altitude

Altitude		Air Pressure		DO	Altitude		Air Pressure		DO
feet	meter	kPa	mmHg	mg/l	feet	meter	kPa	mmHg	mg/l
0	0	101.3	760	8.25	7500	2287	77.1	579	6.28
500	152	99.34	746	8.09	8000	2439	75.63	568	6.16
1000	305	97.6	733	7.95	8500	2591	74.44	559	6.06
1500	457	95.87	720	7.81	9000	2744	72.97	548	5.94
2000	610	94.28	708	7.68	9500	2896	71.64	538	5.83
2500	762	92.54	695	7.54	10000	3049	70.17	527	5.71
3000	915	90.95	683	7.41	10500	3201	68.84	517	5.61
3500	1067	89.35	671	7.28	11000	3354	67.38	506	5.49
4000	1220	87.75	659	7.15	12000	3659	66.58	500	5.42
4500	1372	86.15	647	7.02	13000	3963	65.78	494	5.36
5000	1524	84.56	635	6.89	14000	4268	64.98	488	5.29
5500	1677	83.09	624	6.77	15000	4573	64.18	482	5.23
6000	1829	81.63	613	6.65	16000	4878	63.38	476	5.16
6500	1982	80.03	601	6.52	17000	5183	62.58	470	5.10
7000	2134	78.56	590	6.40	18000	5488	61.79	464	5.03

#### Remarks:

Conversion between mmHg and kPa:  $\text{mmHg} \times 0.13333 = \text{kPa}$

$\text{DO}_{\text{pt}} = P \times \text{DO}_t \div 760$

$\text{DO}_{\text{pt}}$ : DO concentration at temperature t and air pressure P(mg/L)

P: Air pressure(mmHg)

$\text{DO}_t$ : DO concentration at temperature t and air pressure 760mmHg(mg/L)

760: Air pressure(mmHg)

PEAK INSTRUMENTS INC

Address: 16223 Park Row, Houston, TX 77084, USA.

Tel/Fax: +1 2819353455/2815780806.

Website: [www.peakii.com](http://www.peakii.com)

Email: [info@peakii.com](mailto:info@peakii.com)