environmental express®

100 Series Portable pH/Cond. Meter

Instruction Manual

pH 100 portable pH Meter ☐

EC 100 portable conductivity Meter ☐

PC 100 portable pH/Cond. Meter ☐

CE RoHS compliant IP57 WATERPROOF ISO9001:2015

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1 BRIEF INTRODUCTION

Thank you for purchasing Environmental Express 100 series Portable pH/Cond. Meter (hereafter referred to as the instrument). The instrument is an outstanding combination of the most advanced electronic technology and software design.

Before using the product, please read this manual carefully to help you properly use and maintain the product. Environmental Express reserves the right to update the content of this manual without giving prior notices.

1.1 Measuring Parameters

Measuring Parameters	pH100	EC100	PC100
pH	√		√
mV/ ORP	√		√
Cond./TDS/Salinity		√	√
Temperature	√	√	√

1.2 Features and Functions

- The built-in microprocessor chip enables advanced functions such as auto calibration, auto temperature compensation, parameter setting, self-diagnosis, auto power-off, low-battery reminder, etc. PC100 meter can measure pH & conductivity at the same time. See diagram on the right, pH electrode, conductivity electrode and the temperature probe can be installed on the clip for simultaneous measurements.
- The meter adopts advanced digital processing technology, intelligently improves the response time and accuracy of the measurements. Stable reading and auto lock display mode are available for choice.
- Meets IP57 waterproof and dust resistant rating, ideal for use under harsh environment.

1.3 Features of Measuring Parameters

Measuring Parameter	Features	Applicable Model
pH	● 1~3 points auto calibration with calibration guide & self-diagnosis function. ● Automatic recognition of pH calibration solutions: USA, NIST & CUS (user-defined).	pH100 PC100
mV	With temperature measurement and display function.	pH100 PC100
ORP	With ORP calibration function	pH100 PC100
Cond.	● 1~ 4 points auto calibration with calibration guide and auto-check function. ● Automatic recognition of conductivity calibration solutions: Standard & CUS (User-defined). ● Single-tap switch among conductivity, TDS and Salinity.	EC100 PC100

2 TECHNICAL SPECIFICATIONS

2.1 Parameter Specifications

	Technical Parameters		Applicable Models
pH	Range	0.00 ~ 14.00pH	pH100 PC100
	Resolution	0.01/0.1 pH	
	Accuracy	±0.01 pH	
	Temperature compensation range	0 ~ 100°C (Auto or manual)	
	Calibration	1~3 points auto calibration	
	Buffer solutions	USA, NIST	
mV	Measuring Range	±1000mV	pH 100

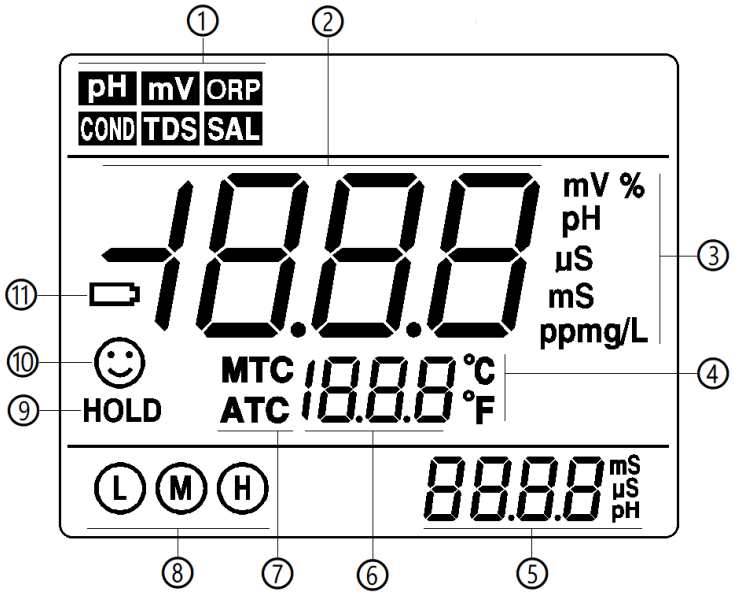
	Resolution	-200 ~ 200mV: ±0.1mV Other range: ±1mV	PC 100
	Accuracy	±0.2% F.S.	
ORP	Range	±1000mV	pH 100 PC 100
	Resolution	1mV	
	Accuracy	±0.2% F.S.	
	Calibration Range	±50mV of reading	
Conductivity	Measuring Range	0~200 mS/cm, including 5 ranges: 0.00~19.99µS/cm, 20.0~199.9µS/cm, 200~1999µS/cm, 2.00~19.99mS/cm, 20.0~199.9mS/cm	EC 100 PC 100
	Resolution	0.01/0.1/1µS/cm, 0.01/0.1 mS/cm	
	Accuracy	±1.0% F.S.	
	Temperature compensation range	0 ~ 60°C (Auto or manual)	
	Electrode Constant	0.1 / 1 / 10 cm^{-1}	
	Temperature coefficient	0~9.99%/°C	
	Reference temperature	15~30°C	
	Calibration	1~4 points automatic	
	Calibration solutions	84µS/cm, 1413µS/cm, 12.88mS/cm, 111.8mS/cm	
TDS	Range	0~100g/L	EC 100 PC 100
	Accuracy	±1.0% F.S.	
Salinity	Range	0~100ppt	EC 100 PC 100
	Accuracy	±1.0% F.S.	
Temperature	Range	0~100°C	pH 100 EC 100
	Resolution	0.1°C	
	Accuracy	±0.5°C ±1digit	

2.2 Other specifications

Power	AA batteries x 3 (1.5V×3)
IP rating	IP57 waterproof and dust resistant
Dimension & Weight	Meter: 91×190×33mm, (3.58”x7.48”x1.29”) / 342 gm
	Carrying case: 330×270×82mm, (12.99”x10.63”x3.22”) / 0.59 kg
	Paper box: 255×200×45mm, (10.04”x7.87”x1.77”) /1.28 kg

3 INSTRUMENT DESCRIPTION

3.1 LCD display



①	Measuring mode icon	⑦	ATC—Automatic temperature compensation MTC—Manual temperature compensation
②	Measurement reading	⑧	Calibration indicator icon
③	Units of measurement	⑨	Auto. Hold icon of reading
④	Temperature units	⑩	Stability icon of reading
⑤	Indicator icon	⑪	Low battery icon
⑥	Temperature value and indicator icon		

3.2 Keypad functions

Diagram - 1

Short press ----- <2 seconds; **Long press** ----- >2 seconds.

Table - 1 Keypad operations and descriptions

Keypad	Operations	Descriptions
	Short press	● Press to turn on or turn off the meter.
	Short press Long press	● Press to select parameter or unit: pH100 pH meter: pH → mV → ORP EC100 conductivity meter: COND → TDS → SAL PC100 pH/cond. meter: pH → mV → ORP → COND → TDS → SAL ● Long press to enter the menu of parameter setup

CAL/MEAS	Long press Short press	● In measurement mode, long press to enter calibration mode. ● Press to cancel operation, the meter returns to measurement mode or the previous interface. ● When the measure value is locked-up, short press release lock-up.
ENTER ☼	Short press	● In measurement mode: press to turn on/off the backlight. ● In calibration mode: press to calibrate. ● In the parameter setup mode: press to enter and open the sub-menu, confirm parameter.
▲ ▼	Short press Long press	● Under MTC (see Section 3.4.4), short press to change temperature, long press for quick changing of the value. ● In parameter setup mode: press to select parameter.

3.3 Meter sockets

The meter sockets are protected by silicon caps, waterproof and dustproof, open the silicon caps and connect the meter with the electrode.

Table - 2 Meter sockets

Model	Remarks
pH100	BNC socket (left) —connect pH electrode or ORP electrode Φ2.5 socket (middle)—connect temperature probe
EC100	BNC socket (right)—connect conductivity electrode Φ2.5 socket (middle)—connect temperature probe
PC100	BNC socket (left)—connect pH electrode or ORP electrode Φ2.5 socket (middle)—connect temperature probe BNC socket (right)—connect conductivity electrode

3.4 Display mode and other functions

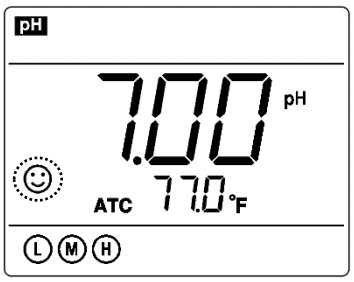


Diagram - 2

3.4.1 Stable Reading Mode

When the measurement value is almost stable, smiley icon ☺ appears on LCD, see Diagram - 2. If the smiley icon ☺ does not appear or flash, please do not get the reading value or conduct

calibration until the measuring value is stable.

3.4.2 Automatic Lock-up Display Mode

Select on from parameter P6.2 to turn on automatic lock-up display function. When the reading value stabilizes more than 10 seconds, the meter locks the reading value automatically and Displays **HOLD** icon, see Diagram - 3. In **HOLD** mode, press CAL/MEAS to release lock-up.

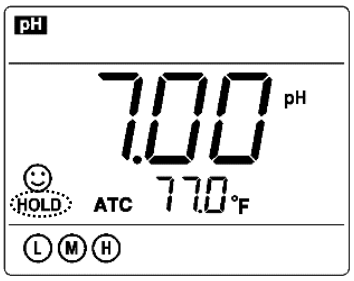


Diagram - 3

3.5 Other functions

3.5.1 Manual Temperature Compensation

When temperature probe is not connected, press ▲ or ▼ to change the temperature value, long press for quick changing of the temperature value.

3.5.2 Automatic Power-off

The meter is with automatic power-off function. Select from parameter P6.4 to select automatic power-off time: 10-20-30-off, i.e. user can select automatic power-off time to be 10 minutes, 20 minutes or 30 minutes (starting from the last operation). When Off is selected, the meter will not turn off automatically.

3.5.3 Back-light

The meter is with white backlight, suitable for application even in dark environments. However, when backlight is on, the consumption of the power will increase. Press ENTER/☼ to turn on/off the backlight in measurement mode. Select from P6.3 to select lasting time for backlight: 1-2-3-Off, i.e. select backlight lasting time to be 1 minute, 2 minutes or 3 minutes. When Off is selected, the backlight will be turned on all the time.

3.5.4 Battery

The meter adopts 3xAA batteries. Please use LR6 alkaline battery to ensure the battery quality. Battery life > 200 hours (without backlight). When LCD displays ▭ icon, please replace with new batteries, see Diagram - 4.

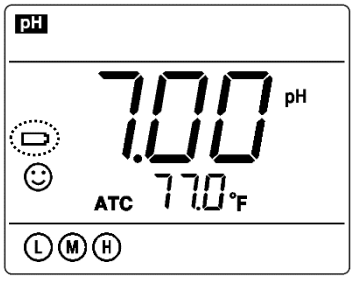


Diagram - 4

4 PH MEASUREMENT

4.1 pH electrode information

4.1.1 The meter connects to 201-C plastic combination pH electrode, with BNC connector. Configured with MP500-2.5 temperature probe (built in 30kΩ thermistor), Phono plug. The meter can use other pH combination electrodes with the BNC connector.

4.1.2 When both the pH electrode and the temperature probe are connected to the meter, it directly goes to automatic temperature compensation mode. When the meter is connected to the pH electrode only, it will enter manual temperature compensation mode. Press  or  to input the temperature into the meter.

4.1.3 Gently stir the pH electrode for a few seconds after it's dipped into the test solution to eliminate air bubbles for the stable measurement in a short period of time.

4.2 Calibration solution and calibration mode

4.2.1 Calibration solution

The meter is capable of calibrating up to 5 pH values using USA or NIST buffer series, corresponding to calibration indicator icons, see Table - 3.

Table - 3 pH buffer solution series

Calibration icon		pH buffer solution series	
		USA	NIST
3 points calibration	(L)	1.68 or 4.00 pH	1.68 or 4.01 pH
	(M)	7.00 pH	6.86 pH
	(H)	10.01 or 12.45pH	9.18 or 12.45 pH

4.2.2 Calibration mode

The meter can adopt 1 to 3 points of calibration. The 1st point must be using 7.00 pH (or 6.86 pH) buffer solution, and then choose other buffers to do 2nd point and 3rd point. Please refer to Table-4 for details.

Table - 4 Calibration mode

	USA	NIST	Calibration icon	When to adopt

1-Point Calibration	7.00 pH	6.86 pH	(M)	Accuracy: ±0.1pH
2-Point Calibration	7.00 pH→4.00 or 1.68pH	6.86 pH→4.01 or 1.68pH	(L)(M)	Measuring range: 0 to 7.00 pH
	7.00 pH→10.01 or 12.45pH	6.86 pH→9.18 or 12.45pH	(M)(H)	Measuring range: >7.00 pH
3-Point Calibration	7.00pH→4.00 or 1.68pH→10.01 or 12.45pH	6.86pH→4.01 or 1.68pH→ 9.18 or 12.45pH	(L)(M)(H)	Wide measuring range

4.3 pH Measurement

4.3.1 The 1st point calibration

Rinse the pH electrode and the temperature probe in distilled or deionized water and allow it to dry, long press CAL MEAS to the enter calibration mode. CAL1 icon will flash in the bottom right corner of the LCD, reminding you to use pH7.00 buffer to conduct the 1st point of calibration. Dip the pH electrode and the temperature probe into pH7.00 buffer solution, stir gently and let it stand still and wait for the reading to be stable. When the stable icon ☺ displays on LCD, press ENTER to finish 1st point calibration, meter goes to measurement mode, the bottom left of LCD indicating (M).

4.3.2 The 2nd point calibration

Rinse the pH electrode and the temperature probe in distilled or deionized water, allow it to dry. Long press CAL MEAS to enter calibration mode. CAL2 icon flashes at the bottom right corner of the LCD, reminding you to make the 2nd point of calibration. Submerge the electrodes into pH4.00 buffer solution, stir the solution gently and allow it to stay in the buffer solution until a stable reading is reached. The meter's display will show scanning and locking process of calibration buffer solution at the bottom right of LCD. When the meter locks 4.00pH, stable icon ☺ displays and stays on LCD. Press ENTER to calibrate the meter. Electrode slope displays after calibration is done, the 2nd point calibration finished, the meter goes to measurement mode, and the bottom left of LCD indicates (L) (M).

4.3.3 The 3rd point calibration

Repeat the steps as per Section 4.3.2, use pH10.01 buffer solution, and complete the 3rd point calibration. The bottom left of LCD indicates (L)(M)(H) .

4.4 pH test

Rinse pH electrode in distilled or deionized water, allow it to dry, and submerge it in the sample solution. Stir the solution briefly and allow it to stay in the sample until the value becomes stable and ☺ icon appears on LCD, get the reading which is the pH value of the sample solution.

4.5 Information regarding pH calibration and measurement

4.5.1 During the process of calibration and measurement, submerge both the pH electrode and the temperature probe into the solution to ensure automatic temperature compensation.

4.5.2 In calibration mode, press CAL/MEAS to exit.

4.5.3 The meter can conduct 1~3 points of calibration according to measurement requirements. Refer to Table - 4 to check when to adopt.

4.5.4 During the process of calibration and measurement, the meter has self-diagnosis functions, indicating information Er1~Er4, please refer to Table - 5 for relevant solutions.

4.5.5 The calibration frequency depends on the sample, electrode performance and accuracy requirement. For high accuracy measurements (≤±0.03pH), the meter should be calibrated before test every time. For ordinary accuracy measurements (≥±0.1pH), once calibrated, the meter can be used for about a week or even longer.

In the following cases, the meter must be re-calibrated:

a) The electrode hasn't been used for a long time or the electrode is brand new.

b) After measuring strong acid (pH<2) or strong base (pH>12) solutions.

c) After measuring fluoride-containing solution and strong organic solution.

d) There is a big difference between the temperature of the test sample and the temperature of the buffer solution that is used in the last calibration.

4.5.6 pH temperature principle

Please note that the closer the temperature of the sample is to the calibration solution, the more accurate will be the readings.

4.5.7 Factory default setting

The meter has a function to return to factory default setting, which can be set up in P1.3. All calibration data will be deleted, and the meter will restore to the theory value (zero electrical potential of pH is 7.00, the slope is 100%). Some functions restore to the default value (refer to Appendix - 1). When calibration or measurement fails, please restore the meter to factory default setting and then perform re-calibration or measurement. Please note once set the factory default, all the data deleted will be irretrievable.

4.6 Customized calibration (take 1.60pH & 6.50pH as example)

4.6.1 Choose CUS (customized calibration) in parameter setting P1.1, the meter enters customize calibration mode.

4.6.2 Rinse the electrode with distilled or deionized water, allow it to dry. Long press CAL/MEAS to enter calibration mode, dip it into 1.60pH calibration solution, stir gently and let it stand still and wait for the reading to become stable. When the smiley icon ☺ displays on LCD, press ▲ to adjust the value to 1.60, then press ENTER to confirm the calibration. The meter goes back to measurement mode, and the 1st point calibration is completed.

4.6.3 Dip the electrode into 6.50pH buffer solution, follow the steps as per Section 4.6.2 to finish the 2nd point of calibration. The meter can conduct 1~2 points of customized calibration.

4.7 Notes regarding customized calibration

4.7.1 Calibration indicator will NOT appear at the bottom left of the LCD for a customized calibration.

4.7.2 The pH of "customized calibration" is the measurement under certain temperature. The meter must calibrate and measure in the same temperature, otherwise it will be inaccurate. The meter does not recognize customize calibration solutions.

4.8 Self-diagnosis information

Among the calibration and measurement procedure, the meter has self-diagnosis function, indicating relevant information, see Table - 5.

Table - 5 Self-diagnosis information in pH measurement mode

Display Icon	Contents	Checking
Er 1	Press ENTER before measuring value becomes stable.	Press ENTER when ☺ icon appears and stays.
Er2	Wrong pH buffer solution or the buffer solution out of range.	1. Check whether pH buffer solution is correct. 2. Check whether the meter connects the electrode properly. 3. Check whether the electrode is damaged.
Er3	During calibration, the measuring value being unstable (≥3min).	1. Check whether there are air bubbles in glass bulb. 2. Replace with a new pH electrode.
	pH electrode zero electric potential	1. Check whether there are air bubbles in glass

Er4	out of range (<-60mV or >60mV) Electrode slope<75%	bulb. 2. Check whether pH buffer solution is correct. 3. Replace with a new pH electrode.

4.9 Maintenance of the pH Electrode

4.9.1 Daily maintenance

The soaking solution contained in the supplied protective bottle is used to maintain hydration of the glass bulb and liquid junction. Loose the cap, take out the electrode and rinse in distilled or deionized water before taking a measurement. Insert the electrode and tighten the cap after measurements to prevent the solution from leaking. If the storage solution is cloudy or moldy, rinse the bottle and replace the soaking solution (The method to prepare, dissolve 26g KCl into 100ml distilled water). Make sure the meter is dry and clean all the time, especially the sockets and connectors, or else it may lead to measurement inaccuracy or invalid readings. Once contaminated, use medical cotton and water free alcohol to wipe clean and allow it to dry.

*The electrode should **NOT** be soaked and stored in **purified or distilled** water, protein solution, acid fluoride solution or organic lipids.

4.9.2 Calibration buffer solution

For calibration accuracy, the pH of the standard buffer solution must be reliable. The buffer solution should be refreshed often, especially after heavy use.

4.9.3 Protect glass bulb

The sensitive glass bulb at the front of the combination electrode should not come in contact with hard surfaces. Scratches or cracks on the electrode will cause inaccurate readings. Before and after each measurement, the electrode should be rinsed with distilled or deionized water. Do not wipe the glass bulb with tissue paper as it may lead to unstable electric potential of the electrode and the slow response. If a sample sticks to the electrode or it's contaminated, the electrode should be thoroughly cleaned with soap water and then rinsed with distilled water.

4.9.4 Renew glass bulb

Electrodes that have been used for a long period of time will become aged. Submerge the electrode in 0.1mol/L hydrochloric acid for 24 hours, then rinse the electrode in distilled water, then submerge it in the soaking solution for 24 hours. For serious passivation, submerge the bulb in the pH soaking solution (sold separately) to renew it.

4.9.5 Clean contaminated glass bulb and junction (see Table - 6)

Table - 6 Clean contaminated pH glass bulb and junction

Contamination	Cleaning Solutions
Inorganic metal oxide	Dilute acid less than 1mol/L
Organic Lipid	Dilute detergent (weak alkaline)
Resin macromolecule	Dilute alcohol and ether
Protein hematocyte sediment	Acidic enzymatic solution (saccharated yeast tablets)
Paints	Dilute bleacher, peroxide

The electrode housing is polycarbonate. Please avoid using detergents including perchloromethane, trichloroethylene, diethylene oxide and acetone, as these solutions will dissolve the shaft material and lead to passivation or failure of the pH electrode.

5 MV AND ORP MEASUREMENT

Press MODE SETUP and switch the meter to mV and ORP mode. mV mode is to measure the electric potential of the pH electrode or other ISE, with temperature measurement function; ORP mode is to measure the potential of the ORP electrode, without temperature measurement function but with calibration function. See below table for the difference of the 2 modes.

Table - 7 mV and ORP measurement mode

	mV	ORP
Range	±1000mV	±1000mV
Resolution	±200mV: ±0.1 mV Other: ±1 mV	±1 mV
Temperature	0~100.0℃	N/A
Accuracy	±0.2% F.S.	±0.2% F.S.
Application	Electric potential of the pH electrode and other ISE	Electric potential of the ORP electrode
Calibration	N/A	±50mV of the measuring value

5.1 mV measurement

Connect the pH combination electrode (or other ion combination electrodes) and the temperature probe, submerge into the solution, stir gently and let it stand still, wait for the reading to be stable and LCD displays ☺ and then get the reading.

5.2 ORP measurement

5.2.1 ORP means Oxidation Reduction Potential. It is an important measurement indicator of the oxidation and reduction potential of water solutions. The unit is mV.

5.2.2 ORP measurement does not require calibration. This is because ORP is a qualitative measurement of the redox ability of a solution, it is a relative index, not a quantitative calculation. Connect to the ORP combination electrode (sold separately), immerse into the sample solution, gently stir and let it stand still. Wait for the reading to be stable and LCD displays ☺, and then get the reading.

5.2.3 In order to make the ORP reading more comparable with the reference values, user can calibrate using ORP standard solutions. Rinse the ORP electrode in distilled or deionized water and allow it to dry. Long press CAL/MEAS to enter calibration mode, dip the electrode into the ORP standard solution with known value. Gently stir and let it stand still, wait for the reading to be stable and LCD displays ☺, and then get the reading. Press ▲ or ▼ adjust it to the required value. The range that can be adjusted is ±50mV, then press to calibrate. The meter returns to measurement mode.

5.2.4 ORP standard solution:

There are different ORP standard solutions on the market, for example: 222mV or 468mV ORP standard solution, which are all applicable of the meter. ORP standard solutions can not only used for the calibration of ORP meters, but also used to check whether the ORP meter works properly. If the ORP meter has been calibrated, please restore the ORP calibration mode to factory default setting before using ORP standard solution to check if the meter works fine. Select Yes in parameter setting P2.1, and then test the ORP standard solution.

5.2.5 Clean and activate the ORP electrode

After the electrode has been used over a long period of time, the platinum surface will get polluted which causes inaccurate measurement and slow response. Please refer to the following methods to clean and activate ORP electrode:

(a) For inorganic pollutant, submerge the electrode in 0.1mol/L dilute hydrochloric acid for 30 minutes, then wash it in distilled water, then submerge it in the electrode storage solution for 6 hours.

(b) For organic or lipid pollutant, clean the platinum surface with detergent, then wash it in distilled water, then submerge it in the electrode storage solution for 6 hours.

(c) For heavily polluted platinum surface on which there is oxidation film, polish the platinum surface with toothpaste, then wash it in distilled water, then submerge it in the electrode storage solution for 6 hours.

6 CONDUCTIVITY MEASUREMENT

6.1 Conductivity electrode information

6.1.1 The meter comes with conductivity electrode with BNC connector and temperature probe (built-in 30kΩ thermistor) with 2.5 mm Phono plug.

6.1.2 When both the conductivity electrode and the temperature probe are connected to the meter, it directly enters automatic temperature compensation mode. When the meter is connected to the conductivity electrode only, it will enter manual temperature compensation mode. Press  or  to input the temperature into the meter.

6.1.3 Gently stir the conductivity electrode for a few seconds after it has dipped into the test solution to eliminate air bubbles for the stable measurement in a short period of time.

6.1.4 Conductivity electrode constant

The meter matches conductivity electrodes of three constants: K=0.1, K=1.0 and K=10.0. Please refer to Table - 8 for measuring range. Set constant in parameter setting P3.2, refer to Section 7.4.

Table - 8 measuring ranges of cell constants

Range	< 20 µS/cm	0.5 µS/cm~100 mS/cm			> 100mS/cm
Conductivity electrode constant	K=0.1 cm^{-1}	K=1.0 cm^{-1}			K=10 cm^{-1}
Standard solution	84µS/cm	84 µS/cm	1413 µS/cm	12.88 mS/cm	111.9 mS/cm

6.2 Information about conductivity calibration

6.2.1 Conductivity calibration solutions

The meter uses conductivity standard solution of 84 µS/cm, 1413 µS/cm, 12.88 mS/cm and 111.9 mS/cm. The meter can recognize the standard solution automatically, can perform 1~4 points calibration. The calibration indication icons correspond to the four standard values (Ⓗ icon corresponds to two standards). See Table - 9.

Table - 9 Conductivity standard solution series

Indication Icon	Calibration Solution	Indication Icon	Calibration Solution	Indication Icon	Calibration Solution
Ⓛ	84 µS/cm	Ⓜ	1413 µS/cm	Ⓗ	12.88 mS/cm or 111.8 mS/cm

6.2.2 Calibration intervals

(a) The meter is calibrated before leaving the factory and can generally be used right out of the package.

(b) Normally perform calibration per month.

(c) For high accuracy measurements or large temperature deviation from the reference temperature (25°C), perform calibration per week.

(d) Use conductivity standard solution to check whether there is error. Perform calibration for large error.

(e) For new electrode or factory default setting, perform 3-point or 4-point calibration. Choose closer standard solution to the sample solution to perform 1-point or 2-point calibration.

6.2.3 Reference temperature

Reference temperature of factory default is 25°C. Other reference temperature can also be set for range 15°C ~ 30°C. Select in parameter setting P3.3 and refer to Section 7.4.

6.2.4 Temperature coefficient

The temperature compensation coefficient of the meter setting is 2.0%/°C. However, the conductivity temperature coefficient is different from solutions and concentration. Please refer to Table - 10 and the data collected during testing. Set per parameter setting P3.4. and refer to Section 7.4.

Note: When the coefficient for the temperature compensation is set to 0.00 (no compensation), the measurement value will be based on the current temperature.

Table - 10 Temperature compensation coefficient of special solutions

Solution	Temperature compensation coefficient
NaCl solution	2.12%/°C
5% NaOH solution	1.72%/°C
Dilute ammonia solution	1.88%/°C
10% hydrochloric acid solution	1.32%/°C
5% sulfuric acid solution	0.96%/°C

6.2.5 Avoid contamination of standard solution

Conductivity standard solution has no buffer. Please avoid being contaminated during usage. Before submerging the electrode in standard solution, please wash the electrode and allow it dry. Please do not use the same cup of conductivity standard solution repeatedly, especially for standard solution of low concentration (84 µS/cm). The contaminated standard solution will affect accuracy.

6.3 Conductivity calibration (take 1413 µS/cm as an example)

6.3.1 Rinse the electrode in distilled or deionized water, allow it to dry, long press CAL MEAS to enter calibration mode, submerge it in 1413 µS/cm standard solution. Gently stir and let it stand still until a stable reading is reached. The meter's display will show scanning and locking process of calibration buffer solution at the bottom right of LCD. When the meter locks 1413 µS, stable icon ☺ displays and stays on LCD. Press ENTER to finish calibration. The meter returns to measurement mode and the bottom left of LCD indicates Ⓜ

6.3.2 For multi-point calibration, please repeat the steps indicated in Section 6.3.1 until all the calibrations are done. The meter can repeat calibration in the same calibration solution to ensure better accuracy and repeatability of the reading.

6.3.3 Notes

(a) Er1 (see Table - 12) appears if press ENTER key before the stable icon ☺ displays on LCD.

(b) If return from calibration mode, press CAL/MEAS to exit.

6.4 Relation between TDS and conductivity

6.4.1 TDS and conductivity are linear related. The conversion factor is 0.40-1.00. Adjust per parameter setting P3.5. The factory default setting is 0.71, see Section 7.4. The meter can only be calibrated in conductivity mode and not TDS mode. After calibration of conductivity, the meter can switch from conductivity to TDS or salinity.

6.4.2 User can adjust TDS conversion factor per parameter P3.5 according to data collected during testing. See Table - 11 for some commonly used TDS conversion factors.

Table - 11 Commonly used TDS conversion factors

Conductivity of solution	TDS conversion factor
0-100 µS/cm	0.60
100-1,000 µS/cm	0.71
1-10 mS/cm	0.81
10-100 mS/cm	0.94

6.5 Sample test

6.5.1 Rinse conductivity electrode in distilled or deionized water, allow it to dry, and submerge it in the sample solution. Stir the solution briefly and allow it to stay in the sample solution until a stable reading is reached and ☺ icon appears on LCD, then get the reading value which is the conductivity value of the solution.

6.5.2 Press MODE/SETUP to switch between TDS and salinity.

6.5.3 During the process of calibration and measurement, the meter has self-diagnosis functions, indicating the relative information as below, Table - 12.

Table – 12 Self-diagnosis information of conductivity measurement mode

Display Icons	Contents	Checking
Er 1	Press ENTER when measuring value is not stable during calibration.	Press ENTER after ☺ icon displays and stays on screen
Er2	Wrong conductivity calibration solution or the recognition range of calibration solution	1. Check whether conductivity calibration solution is correct. 2. Check whether the meter connects the electrode well. 3. Check whether the electrode is damaged.
Er3	During calibration, the measuring value is not stable for ≥3min.	1. Shake the electrode to eliminate bubbles in electrode head. 2. Replace with a new conductivity electrode.

6.5.4 Factory default setting

For factory default setting, please refer to parameter P3.8 (Section 7.4). All calibration data is deleted and the meter restores to the theory value. Some functions restore to the original value (refer to appendix -1). When calibration or measurement fails, please restore the meter to factory default setting and then perform re-calibration or measurement. Please note once factory default setting is set, all the data deleted will not irretrievable.

6.6 Conductivity electrode maintenance

6.6.1 Always keep the conductivity electrode clean. Before taking a measurement, rinse the electrode in distilled or deionized water and then rinse it in the sample solution. When submerging the electrode in solution, stir the solution briefly to eliminate air bubbles and allow it to stay until a stable reading is reached. For conductivity electrode which keeps dry, soak the electrode in distilled or deionized water for 5-10 minutes. Rinse the electrode in distilled or deionized water after measurement.

6.6.2 The interaction pole of conductivity electrode is coated with platinum black to minimize electrode polarization and expand measuring range. The platinum black coating applied by a special processing technology, which improves the electrode performance.

7 ARAMETER SETTING

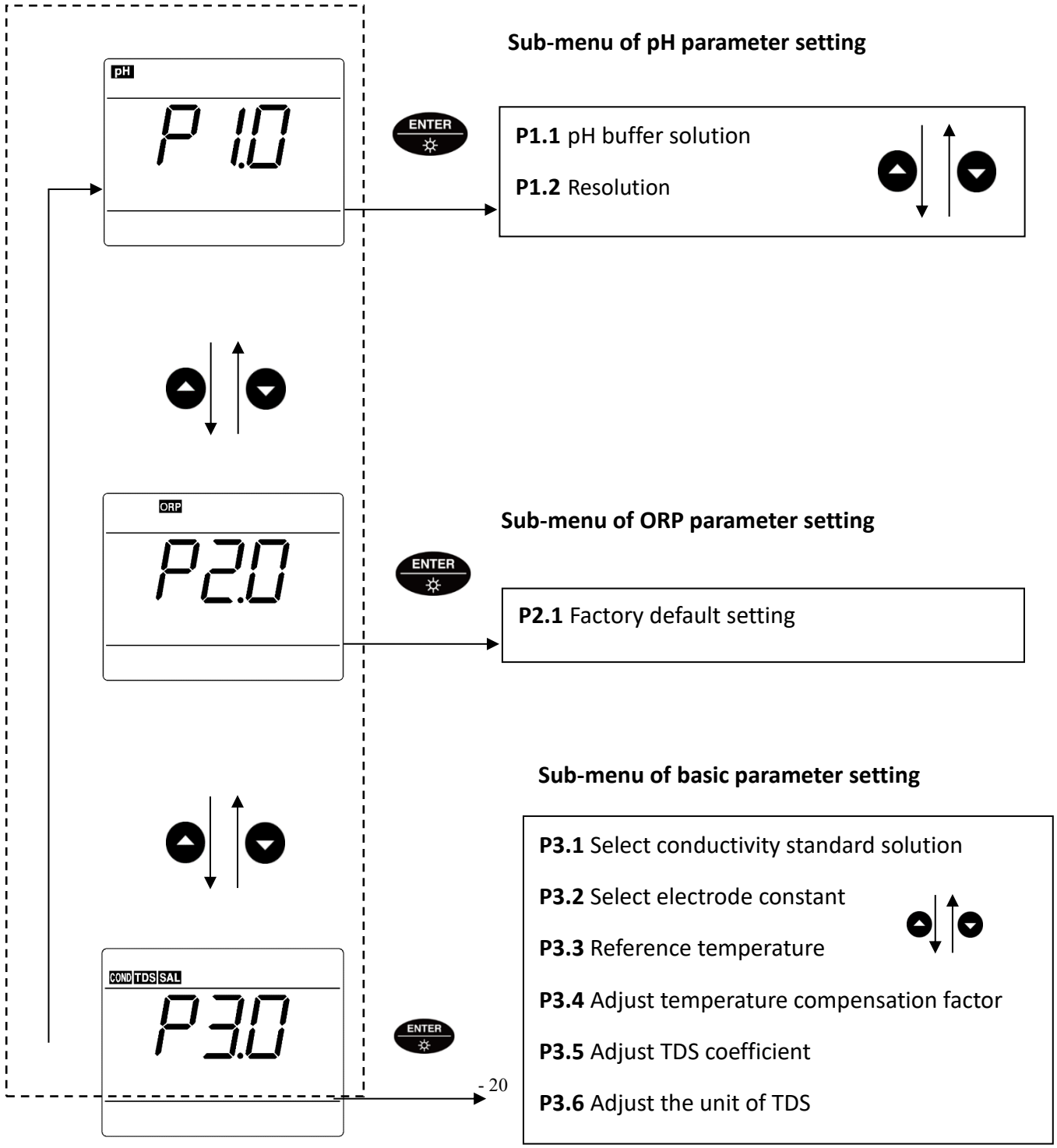
7.1 Main menu of parameter setting

In the measurement mode, Long press MODE SETUP to enter in P1.0, then press ▲ or ▼ to switch to main menu: P1.0→P2.0→P3.0→P6.0. Please refer to Diagram – 5.

P1.0: pH parameter setting; P2.0: ORP parameter setting.

P3.0: Conductivity parameter setting; P6.0: Basic parameter setting.

Main menu of parameter setting



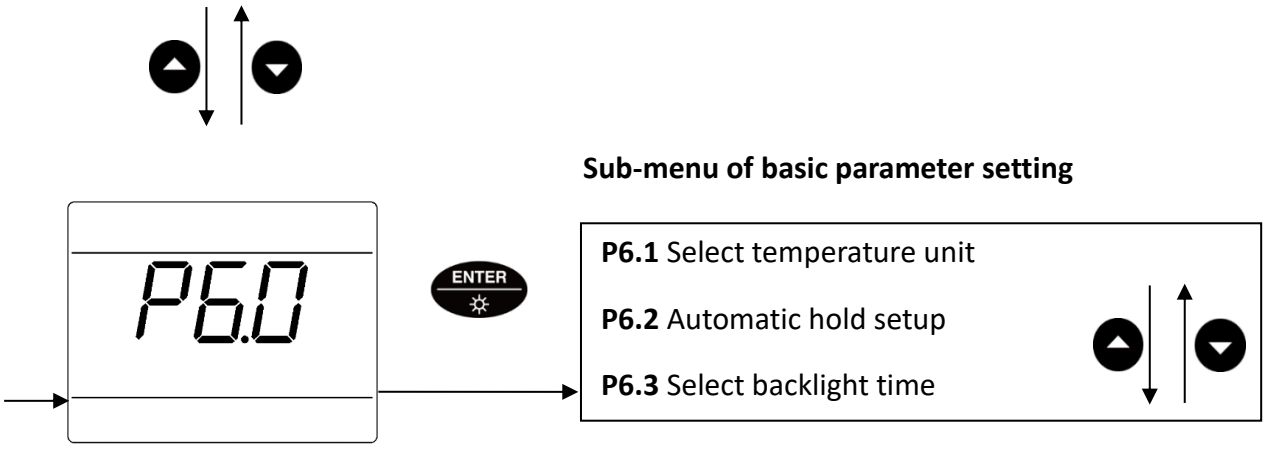
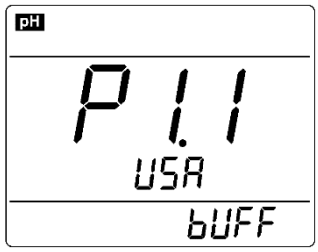
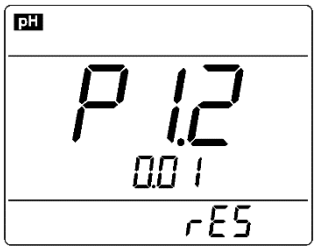
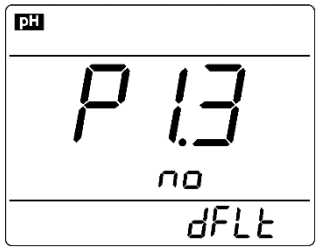


Diagram - 5

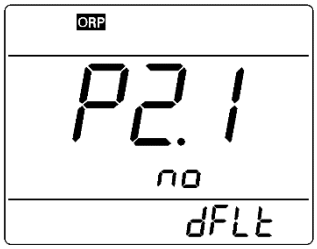
7.2 Sub-menu of pH parameter setting

Press ENTER in P1.0, enter P1.1 sub-menu of pH parameter setting, and then press ▲ or ▼ to switch among P1.1→P1.2→P1.3.

	**P1.1 — Select pH buffer series** (USA—NIST—CUS) 1. Press ENTER **USA** icon flashes, press ▲ to select USA→nIS→CUS, press ENTER to confirm. USA—USAseries; nIS—NIST series; CUS—Customized calibration. 2. Press ▲ to enter P1.2 or press CAL/MEAS to return.
	**P1.2 — Resolution** (0.01—0.1) 1. Press ENTER and **0.01** flashes, Press ▲ to select between 0 .01→0.1, Press ENTER to confirm. 2. Press ▲ to enter P1.3 or press CAL/MEAS to return.
	**P1.3 — Factory default setting** (No—Yes) Press ENTER, **no** flashes, press ▲ to select YES, press ENTER to confirm, the meter returns to measurement mode. No— Don't restore to factory default; Yes—Restore to factory default.

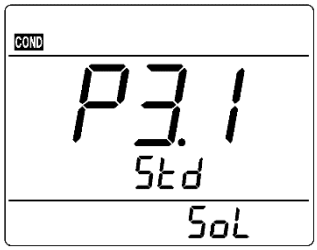
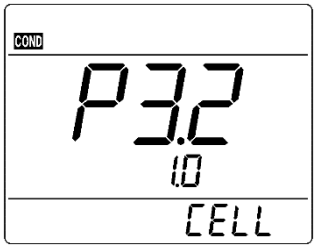
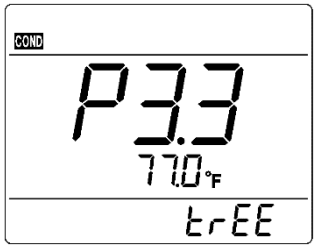
7.3 Sub-menu of ORP parameter setting

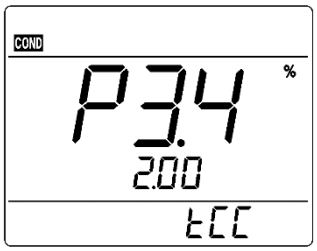
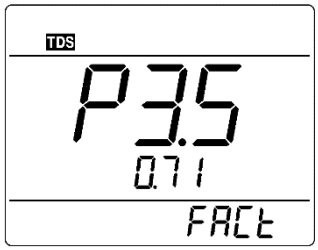
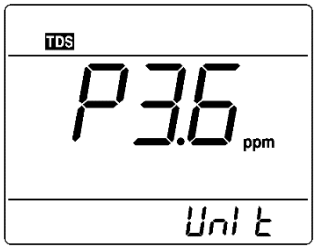
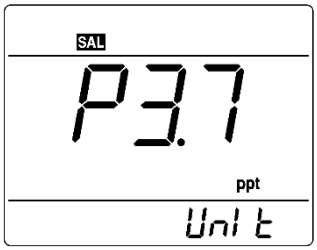
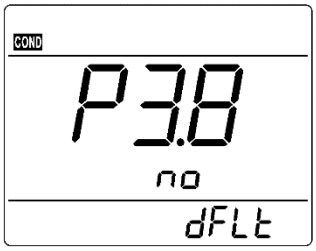
Press ENTER in P2.0, enter P2.1 sub-menu of ion parameter setting.

	P2.1 — **Restore to factory default setting** (No—Yes) Press ENTER **no** flashes, press ▲ to select YES, press ENTER to confirm, the meter returns to measurement mode. No— Don't restore to factory default; Yes—Restore to factory default.

7.4 Sub-menu of conductivity parameter setting

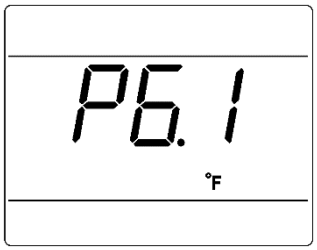
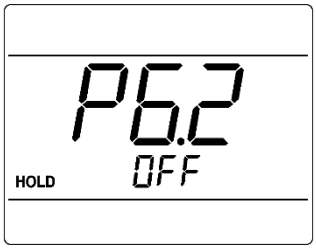
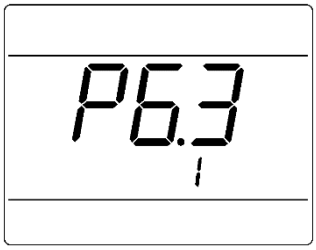
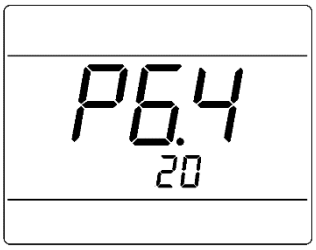
Press ENTER in P3.0, enter P3.1 sub-menu of pH parameter setting, and then press ▲ or ▼ to switch among P3.1→P3.2→...→P3.8.

	P3.1—**Select conductivity standard solution (**Std—CUS) 1. Press ENTER **Std** flashes, then press ▲ to select Std→CUS, press ENTER to confirm. Std—Standard series; CUS—customer defined. Factory default setting: Standard 2. Press ▲ to enter P3.2 mode or press CAL MEAS to return.
	P3.2—**Select electrode constant** (1.0—10.0—0.1) 1. Press ENTER **1.0** flashes, then press ▲ to select 1.0→10.0→0.1, Press ENTER to confirm. 2. Press ▲ to enter P3.3 or press CAL MEAS to return.
	P3.3—**Reference temperature** (15.0°C~30.0°C/59.0°F~95.0°F) 1. Press ENTER **25.0°C** flashes, press ▲ to adjust temperature value: 15.0~30.0°C, press ENTER to confirm. Factory default setting: 25.0°C. 2. Press ▲ to enter P3.4 mode or press CAL MEAS to return.

	P3.4—**Adjust temperature compensation factor** (0.00~9.99%) 1. Press ENTER **2.00** flashes, press ▲ to adjust temperature compensation factor 0.00~9.99, press ENTER to confirm. Factory default setting: 2.00. 2. Press ▲ to enter P3.5 or press CAL MEAS to return to measurement mode.
	P3.5—**Adjust TDS coefficient** (0.40~1.00) 1. Press ENTER **0.71** flashes, press ▲ to adjust TDS coefficient 0.40~1.00, press ENTER to confirm. Factory default setting: 0.71. 2. Press ▲ to enter P3.6 mode or press CAL MEAS to return.
	P3.6 — **Adjust the unit of TDS** 1. Press ENTER **mg/L** flashes, press ▲ to select ppm→mg/L, press ENTER to confirm. 2. Press ▲ to enter P3.6 mode or press CAL MEAS to return.
	P3.7 — **Adjust the unit of salinity** 1. Press ENTER **ppt** flashes, press ▲ to select ppt→%, press ENTER to confirm. 2. Press ▲ to enter P3.8 mode or press CAL MEAS to return.
	P3.8 — **Restore to factory default setting** (No—Yes) Press ENTER **no** flashes, press ▲ to select YES, press ENTER to confirm, the meter returns to measurement mode. No— Don't restore to factory default; Yes—Restore to factory default.

7.5 Sub-menu of basic parameter setting

Press ENTER in P6.0, enter P6.1 sub-menu of pH parameter setting, and then press ▲ or ▼ to switch among P6.1→P6.2→P6.3→P6.4.

	**P6.1 — Temperature unit** (℃—℉) 1. Press ENTER ℃ flashes, press ▲ to select between ℃→℉, press ENTER to confirm. 2. Press ▲ to enter P6.2 or press CAL MEAS to return.
	**P6.2 — Automatic lock-up** (Off→On) 1. Press ENTER **OFF** flashes, press ▲ to select between OFF→On, press ENTER to confirm. Off—Unlock-up**;** On—lock-up （Stable reading > 10 seconds and the reading will be automatically locked up). 2. Press ▲ to enter P6.3 or press CAL MEAS to return.
	**P6.3 — Select backlight timing** (1→2→3→Off) 1. Press ENTER **1** flashes, press ▲ to select among 1→2→3→OFF, press ENTER to confirm. Select Off to turn on the backlight, the time unit is minute. 2. Press CAL MEAS to return to measurement mode.
	**P6.4 — Automatic power-off setup** (10→20→30→Off) 1. Press ENTER **20** flashes, press ▲ to select among 10→20→30→Off, press ENTER to confirm. Select off to turn off automatic power-off, the time unit is minute.

8 WHAT'S IN THE KIT?

	Content	Quantity	35613-27	35613-25	35613-28	35604-15	35604-10	35613-46	35613-45
1	pH100 portable pH meter	1	√	√	√				
2	EC100 portable Cond. meter	1				√	√		
3	PC100 portable pH/Cond. meter	1						√	√
4	Plastic pH combination electrode	1	√	√			√	√	√
5	Plastic conductivity electrode	1				√	√	√	√
6	Temperature probe		√	√	√	√	√	√	√
7	pH buffer solutions (4.00pH/7.00pH/ 10.01pH/50mL)	1 btl each	√					√	
8	Conductivity calibration solution (84µS /1413µS /12.85mS/ 50mL)	1 btl each				√		√	
9	Combined electrode clip							√	√
10	Instruction manual	1	√	√	√	√	√	√	√
11	Carrying case	1	√			√		√	
12	Paper box	1		√	√		√		√

9 WARRANTY

We warrant this instrument to be free from defects in material and workmanship and agree to repair or replace free of charge, at option of Environmental Express, any malfunctioned or damaged product attributable to responsibility of Environmental Express, for a period of THREE YEARS (SIX MONTHS for the probe) from the delivery.

This limited warranty does not cover any damages due to:

Transportation, storage, improper use, failure to follow the product instructions or to perform any preventive maintenance, modifications, combination or use with any products, materials, processes, systems or other matter not provided or authorized in writing by us, unauthorized repair, normal wear and tear, or external causes such as accidents, abuse, or other actions or events beyond our reasonable control.

Appendix - 1 Table of Parameter Setting

Mode	Prompts	Parameter setting items	Abbreviation	Description	Restore to factory default setting
P1.0 pH	P1.1	Select pH buffer series	bUFF	USA - NIST - CUS	USA
	P1.2	Select resolution	rES	0.01 - 0.1	0.01
	P1.3	Restore to factory default setting	dFLt	No - Yes	No
P2.0	P2.1	Restore to factory default setting	dFLt	No - Yes	No
P3.0 Cond.	P3.1	Select conductivity standard solution	SoL	Std - CUS	Std
	P3.2	Select electrode constant	CELL	1.0 - 10.0 - 0.1	1.0
	P3.3	Select reference temperature	trEF	(15~30)°C	25°C
	P3.4	Adjust temperature compensation coefficient	tCC	0.00~9.99	0.20
	P3.5	Adjust TDS factor	FACt	0.40~1.00	0.71
	P3.6	Select the unit of TDS	Unit	ppm - mg/L	ppm
	P3.7	Select the unit of salinity	Unit	ppt - %	ppt
	P3.8	Restore to factory default setting	dFLt	No - Yes	No
P6.0 Basic parameter	P6.1	Select temperature unit	/	°C - ℉	/
	P6.2	Automatic lock-up	/	Off - On	/
	P6.3	Select backlight timing	/	1 - 2 - 3 - Off	/
	P6.4	Automatic power-off setup	/	10 - 20 - 30 - Off	/

Appendix - 2 Icons and Abbreviation

Mode	Prompts	Abbreviation	Stand for	Explanation
P1.0 pH	P1.1	bUFF	Standard buffers	pH standard buffers
	P1.2	rES	resolution	Resolution
	P1.3	dFLt	Factory default setting	Factory default setting
P2.0 ORP	P2.1	dFLt	Factory default setting	Factory default setting
P3.0 Cond.	P3.1	SoL	Solution	Conductivity standard solutions
	P3.2	CELL	Cell	Electrode constant
	P3.3	trEF	Reference temperature	Reference temperature
	P3.4	tCC	Temperature compensation coefficient	Temperature compensation coefficient
	P3.5	FACt	Total Dissolved Solid	TDS factor
	P3.6	Unit	Unit	TDS unit
	P3.7	Unit	Unit	Salinity unit
	P3.8	dFLt	Factory default setting	Factory default setting
P6.0 Basic parameter	P6.1	/	/	/
	P6.2	/	/	/
	P6.3	/	/	/
	P6.4	/	/	/

Appendix - 3 Table of Self-diagnosis Symbol

Icon	Self-diagnosis Information	pH	Cond.
Er 1	Press ENTER when measuring value is not stable during calibration.	√	√
Er2	Wrong calibration solution or the buffer solution out of range.	√	√
Er3	During calibration, the measuring value being unstable (⩾3min).	√	√
Er4	pH electrode performance error, zero electric potential<-60mV or >60mV; Electrode slope<75%	√	

Replacement Sensors & Solutions

	Description	Oakton Part Number	
1	pH100 pH meter, temp probe only	35613-28	
2	pH100 pH meter, pH, temp probes	35613-25	
3	pH Electrode “All in One” Single Junction	35811-71	Includes temp
4	pH Electrode “All in One” Double Junction	35811-72	Includes temp
5	pH Electrode Replacement Single Junction	59001-65	
6	Replacement temperature ATC probe	35613-13	
7	pH buffer solution, 4.01, 500 mL bottle	00654-00	
8	pH buffer solution, 7.00, 500 mL bottle	00654-04	
9	pH buffer solution 10.01, 500 mL bottle	00654-08	
10	PC100 portable pH/Cond. meter/probes	35613-45	
11	EC100 Conductivity meter with probes	35604-10	
12	Replacement conductivity electrode K= 0.1	35606-53	Includes temp
13	Replacement conductivity electrode K=1.0	35606-55	Includes temp
14	Replacement conductivity electrode K=10.0	35606-57	Includes temp
15	Conductivity calibration solution 84 µS, 500 mL bottle	00653-16	
16	Conductivity calibration solution 1413 µS, 500 mL bottle	00653-18	
17	Conductivity calibration solution 12.85 mS 500mL bottle	00606-10	