Instruction Manual

pH 5+ pH/°C
pH 6+ pH/°C/mV
Ion 6+ pH/°C/mV/Ion

OAKTON

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ISO 9001

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Preface

This instruction manual serves to explain the use of the pH 5+, pH 6+ and Ion 6+ meters.

It functions in two ways: first as a step by step guide to help you operate the meter; second, it serves as a handy reference guide.

This manual is written to cover as many anticipated applications of the pH 5+, pH6+ and Ion 6+ meters as possible. If there are doubts in the use of this meter, please do not hesitate to contact the nearest Authorized Distributor.

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1. INTRODUCTION

Thank you for purchasing the pH 5+, pH 6+, or Ion 6+ meter. These microprocessor-based handheld meters are economical and easy to use. It has a large custom LCD (Liquid Crystal Display) for clear and easy reading.

The pH 5+ measures pH and temperature (^{o}C). The pH 6+ and Ion 6+ meters measure pH, mV (ORP) and temperature.

Additionally, the Ion 6+ allows direct ion concentration measurement of various ions (mono and divalent). The mV mode is also useful for diagnosis of ion selective electrodes (ISE).

Meters include 4 alkaline “AAA” batteries, a rubber armor / stand, instruction manual, and warranty card. Please refer to **Section 8 Replacements and Accessories** for information on additional accessories and calibration solutions.

2. GETTING STARTED

2.1 Description of Keypad Functions

The pH 5+ and pH 6+ have four keys while the Ion 6+ meter has six keys on its splash-proof keypad. The common keys are **ON/OFF**, **HOLD/ENTER**, **CAL** and **MODE**. The Ion 6+ meter adds ▲ and ▼ keys.

ON/OFF: Powers meter on and off. Meter starts up in the mode that you last switched off from.

MODE/INC: Selects measurement mode for Ion, mV, pH and Temperature. Increment button for mV calibration (pH 6+ only).

CAL: Allows calibration for Ion, pH, mV or Temperature, or to abort calibration and return to measure without confirming a value.

▲ (Ion 6+ only): Increment values during calibration mode.

▼ (Ion 6+ only): Decrement values during calibration mode.

HOLD: Freezes the measured reading for easy viewing.

ENTER: Confirms calibration value.

pH 5+ and pH 6+

Ion 6+

2.2 Description of LCD Annunciators

The large custom LCD consists of 3½-digit segments which uses annunciators for pH, mV or °C (Temperature). No annunciator is shown in Ion mode. Other annunciators include “HO” (when HOLD function is activated) and “LO” (low battery condition).

2.3 Inserting & Removing the Rubber Armor / Stand

1. To remove meter from rubber armor, push out from the bottom edges of meter until it is completely out of boot. Ensure that cables of ISE/pH electrode or temperature probe are not connected. **Figure A.**

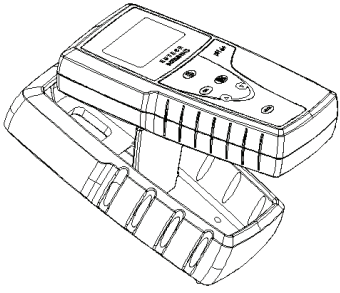


Figure A

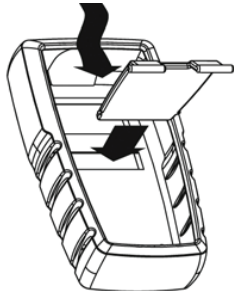
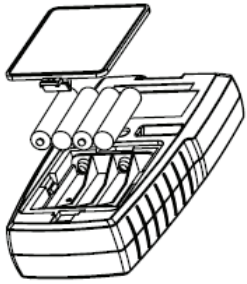


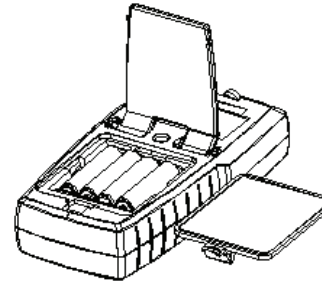
Figure B

2. To insert meter into armor, slide in from the top of meter before pushing the bottom edges of meter down to set it into position. Lift up the stand at the back of meter for bench top applications if necessary. **Figure B.**

2.4 Inserting New Batteries

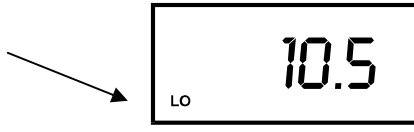
The battery compartment is found at the back of instrument. To open the battery compartment, push in the direction of arrow and lift up the cover. Note the polarity of battery before inserting into position. After replacement, place cover back and press down until it locks.





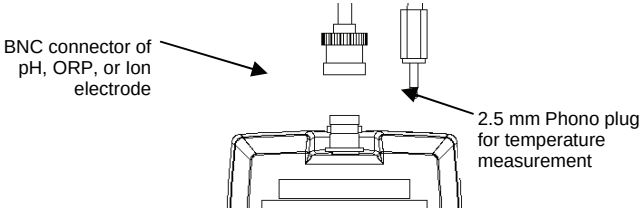
2.5 Battery Replacement

The "**LO**" annunciator of the LCD alerts you when battery power is running low. **Caution:** Power off the meter before changing battery.



2.6 Connecting the Electrode and Temperature Sensor

To connect the electrode into meter, align the BNC connector slots with the posts of meter's socket and rotate connector clockwise until it locks. Do not force when connecting. To remove, simply rotate the connector in counter-clockwise direction until it unlocks, and slide the connector off the socket.



Insert the mini phono jack of temperature sensor into the socket on the meter. Unplug the phono jack when not in use or you measure pH without any temperature compensation.

2.7 Conditioning the pH Electrode

For best results condition the pH electrode before use or if it has not been in use for a long time by soaking it into a container filled with pH 4 buffer solution for at least 1 hour and rinse before use.

2.8 Switching the Meter On

1. Press **ON/OFF** key. All LCD segments will display momentarily as the meter performs a self-diagnostic test. The Ion 6+ will display "**- - -**" if the meter has not been calibrated or if the meter has been reset.

2. Press **MODE** key to choose the desired measurement mode.

   If a temperature probe is not connected, either 25.0^{o}C (factory default) or the last calibrated temperature value is displayed. If a temperature probe is connected, the current measured temperature is displayed.

3. "**Or**" (Over range) indicates the reading exceeds the maximum. "**Ur**" (Under range) indicates the reading is under minimum measurement range (see Section 7 Specifications).

3. CALIBRATION

3.1 pH Calibration

The meter is capable of calibrating up to 3 pH values using USA or NIST (nSt) pH buffer standards or 2 pH values with Low Ionic (Pb) pH buffer standard. All new calibration values will automatically override existing data.

USA group	4.01, 7.00, 10.01
NIST group	4.01, 6.86, 9.18
Pb group	4.10, 6.97

For best results perform at least a 2-point calibration at room temperature (25 ^{o}C) using standard buffers. Begin with pH 7.00 (USA group), pH 6.86 (NIST group) or pH 6.97 (Pb group).

For a 1-point calibration, calibration should be performed with a pH buffer value closest to the expected sample value being measured.

The meter has automatic buffer recognition that identifies the correct pH buffer values during calibration. The meter will accept calibration values that are within +/-1.0 pH units of the expected value, otherwise the LCD will flash "**Er1**" and the value will not be accepted. Press **CAL** to abort calibration and resume measurement.

Always use new pH buffer solutions for calibration. Do not reuse buffer solutions as it may be contaminated and affect the calibration and accuracy of measurements. Promptly seal containers and store solutions in a dark, dry, cool environment.

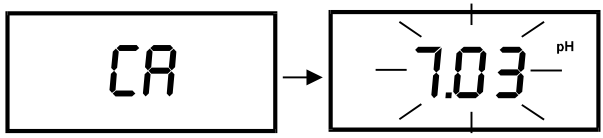
Before use, remove the plastic protective cap of pH electrode and condition the glass bulb by soaking it in tap water or pH buffer (preferably pH 4) for 1-2 hours. This hydrates the glass bulb if the electrode is too dry or has not been used recently. Always rinse the probes with clean water before and after each calibration/sample measurement to avoid cross-contamination. For details refer to section 5 on Electrode care and maintenance.

3.1.1 pH Calibration Procedure

1. Pour known pH buffer calibration standard solution into a clean, dry container, e.g. pH 7.00. Turn on meter and select pH mode by pressing **MODE** key if necessary.

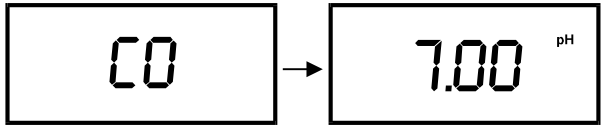
2. Dip the pH electrode and temperature probe into the solution. Swirl gently and wait for reading to stabilise (approx. 30 seconds depending on your electrode condition).

3. Press **CAL** to enter pH calibration mode. "**CA**" displays momentarily before the display flashes the current un-calibrated reading.



4. To abort or cancel calibration without accepting the new value, press **CAL** key. The meter will automatically revert to pH measurement mode.

5. Allow reading to stabilise if necessary. Press **ENTER** key to confirm calibration. "**CO**" displays momentarily before reverting to pH measurement mode.

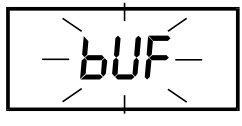


6. For highest accuracy, perform a multiple-point calibration. Repeat step 1 with additional pH buffer calibration standard solutions.

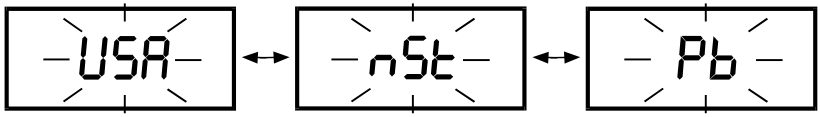
3.1.2 Changing the pH Buffer Group

You can calibrate with pH standards of either USA, NIST (nSt) or Low Ionic (Pb) pH buffer groups. The factory default is USA. To abort buffer group selection press **CAL** to revert to pH measurement mode.

1. Press and hold **MODE** while switching the meter on using the **ON/OFF** key. The display shows "**bUF**" blinking.



2. Press **ENTER** key to begin buffer group selection mode. Use the **MODE** key to toggle between USA, NIST or Pb as shown below.



Press ENTER key to confirm your selection. The meter will automatically revert to pH measurement mode. The meter will save the selected group indefinitely until changed.

3.1.3 Resetting User Calibrated Values

The calibrated pH/mV/Ion values can be reset to factory default using the procedure below. Temperature offset will not be reset using this procedure. To abort press **CAL** to revert to measurement mode.

1. Press and hold **CAL** while switching the meter on using the **ON/OFF** key. The LCD shows "**rSt**" blinking.

2. Press **ENTER** key to confirm. The meter automatically clears all stored pH/Ion calibration or mV offset values and reverts to measurement mode.

3.2 Ion Calibration (Ion 6+)

The Ion 6+ meter is capable of 2 or 3 point ion calibration with standard solutions. The Ion 6+ will display "**- - -**" if the meter has not been calibrated or if the meter has been reset.

To abort ion calibration press **CAL** to revert to measurement mode.

Ion calibration values are not stored into the meter's non-volatile memory. Ion calibration data is lost once the meter is reset and when the batteries are being removed and replaced.

Error message "**Er2**" is displayed after a single point calibration is completed. Recalibrate using minimum of 2 points.

Calibration values are successfully stored if the ISE (Ion Selective Electrode) slope is within the specified tolerance of 15-90mV/decade, otherwise an error message "**Er3**" is displayed.

If any of calibration points are not within 1 decade of each other, an error message "**Er4**" will be shown at the end of calibration process. The ion calibration options

available include 0.1, 1.0, 10.0, 100.0 ppm. Recalibrate and ensure that consecutive calibration points are 1 decade apart from each other.

Ensure that you use new or fresh standard solutions during calibration. Do not reuse ion standard solution as it may be contaminated and affect the calibration and accuracy of measurements. Store standard solutions in a dry, cool environment if possible. Check that ISE's and ion standard solutions are kept in good condition for best results.

Before use, remove any plastic protective cap of ISE (at the tip of sensor) and refer to electrode instruction manual for proper operation. Rinse probes before and after each calibration or sample measurement to avoid cross-contamination.

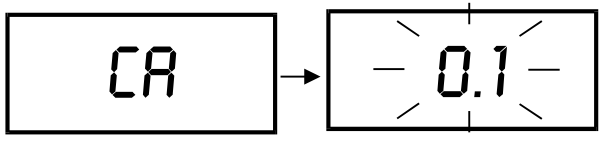
3.2.1 Ion Calibration Procedure

The Ion 6+ can measure various ions. Ion measurement requires ion selective electrodes (ISE)—(sold separately) which measure a specific ion of interest—such as ammonia or fluoride.

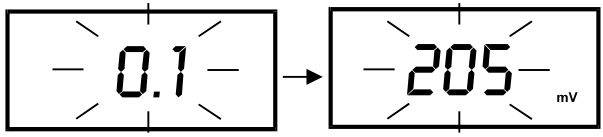
The available ion calibration values for the Ion 6+ are 0.1, 1.0, 10.0, and 100.0 ppm. Pick any 2 or 3 consecutive values to use and prepare the corresponding ion calibration solutions. Turn on the meter and select ion mode by pressing MODE key if necessary. **For best results, always begin with your lowest standard value, followed by the next lowest standard.**

1. Dip the ISE into your standard solution. Add ISA if required. Swirl it gently. Press **CAL** key to begin calibration mode.

2. The display shows "**CA**" (to indicate calibration mode) momentarily followed by "**0.1**" flashing. To select the appropriate standard, use ▲ and ▼ keys.



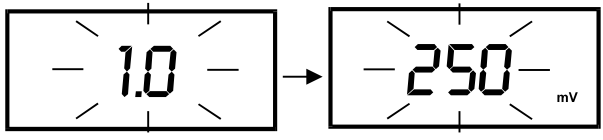
3. Press **ENTER** to confirm that the ppm value is the desired standard. The displayed value now shows the corresponding mV reading for the selected ppm value selected. Allow the reading to stabilise.



4. When the mV reading is stable, press **ENTER** to complete the 1st point calibration. The display will show the next highest calibration standard value. Rinse the electrode with clean water.

5. Dip the electrode into your next highest standard solution. Add ISA if required. Swirl it gently. Press **CAL** key to begin calibration mode.

6. Press **ENTER** to confirm that the ppm value is the desired standard. The displayed value now shows the corresponding mV reading for the selected ppm value selected. Allow the reading to stabilise.



7. When the mV reading is stable, press **ENTER** to complete the 2nd point calibration. The display will show the next highest calibration standard value. Rinse the electrode with clean water.

8. To calibrate a 3rd point, repeat steps 6 & 7. To exit from 2-point calibration, press **CAL** key.

9. The ISE slope in mV value "**PXX mV**" will momentarily display before reverting to ion measurement mode.

If the calibration is not successfully stored into its memory, an error message "**Er3**" will be displayed. This occurs when the slope is lower than 15mV/decade or higher than 90mV/decade.

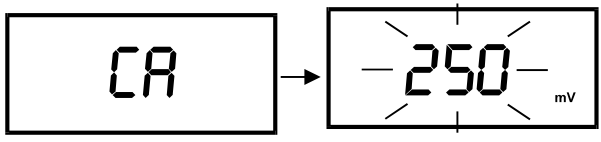
3.3 Millivolt (mV) Calibration (pH 6+ only)

mV calibration is performed for Oxidization Reduction Potential (ORP / Redox) measurements, where you can adjust its mV value as a base value for measurements. To abort press **CAL** to revert to measurement mode.

1. Press **MODE** key to enter mV mode, the LCD displays "**mV**".

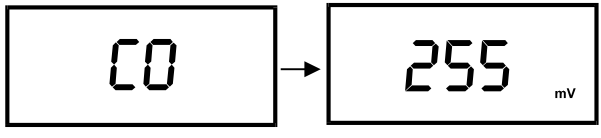
2. Dip the ORP electrode into a known standard solution, (e.g. Quinhydrone 255) and swirl it until the reading stabilizes.

3. Press **CAL** key to enter mV calibration. The LCD shows "**CA**" momentarily before flashing the mV reading.



4. To proceed calibration use **INC** key to adjust the reading to your desired value. The maximum adjustment you can make is ± 50 mV. Pressing **INC** key continuously allows you to scroll to the maximum allowable value and then loops back to the minimum allowable value.

5. Press **ENTER** key to confirm calibration. The display shows "CO" momentarily and meter reverts to measurement mode showing the current set value.



3.4 Temperature Calibration

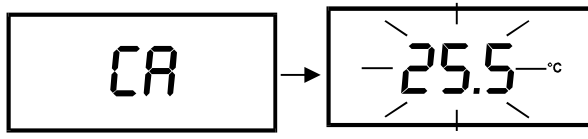
3.4.1 With Temperature Probe

The temperature probe (ECPH5TEM01P) provided with the meter is factory-calibrated. Over time, temperature calibration may drift and require calibration. If there is a need to replace with the new probe you should calibrate the temperature probe prior to pH calibration.

1. Connect your temperature probe to the meter. Press **MODE** key to enter the Temperature mode until "**°C**" annunciator appears in the LCD.

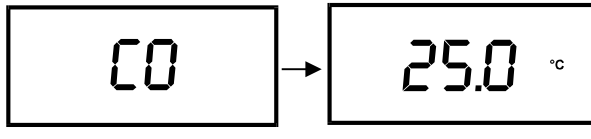
2. Compare the displayed value to a NIST certified thermometer or other thermometer known to be accurate. For best accuracy, place both the probe and thermometer in a constant temperature bath.

3. Press **CAL** key to enter temperature calibration mode. The LCD shows "**CA**" momentarily and displayed reading flashes.



4. Press ▲ and ▼ keys (for Ion 6+) or **INC** key (for pH 5+ / pH 6+) until the LCD display shows the desired temperature. The meter allows an adjustable maximum value of ± 5 °C from factory default.

5. To cancel or abort this operation, press **CAL** key. Note no new value will be stored into its meter's non-volatile memory. To confirm calibration, press **ENTER** key. The LCD displays "**CO**" momentarily, and the meter reverts to measurement mode.



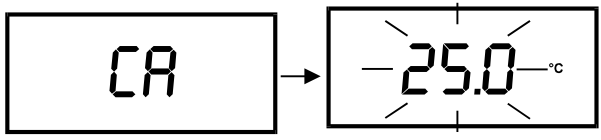
3.4.2 Without Temperature Probe (no ATC)

If no temperature probe is used, the meter compensates for pH response based on a temperature value manually set by you or at 25.0 °C (factory default).

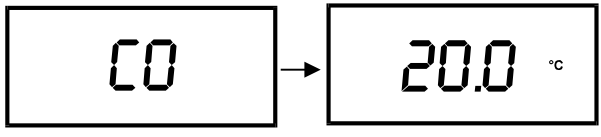
1. Press **MODE** key to enter into Temperature mode until "**°C**" shows in LCD.

2. Compare the displayed value to NIST certified thermometer or thermometer known to be accurate (dipped into a constant temperature bath).

3. Press **CAL** key to enter temperature calibration mode. The LCD shows "**CA**" momentarily and displayed reading flashes. Note that this displayed value should either be 25.0 °C or last set temperature value.



4. Press ▲ and ▼ key (for Ion 6) or **INC** key (for pH 5/6) until the displays shows the desired temperature. You can set any value from 0 to 100 °C.
5. To cancel or abort this operation, press **CAL** key. Note no new value will be stored into its meter's non-volatile memory. To confirm calibration, press **ENTER** key. The LCD displays "**CO**" momentarily, and the meter reverts to measurement mode.



4. MEASUREMENT

4.1 Taking Measurements

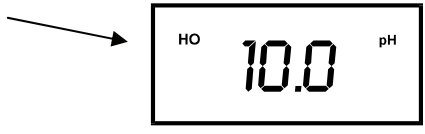
1. Before measurement, rinse pH/ORP electrode or Ion Selective Electrode and temperature probe with clean water to remove any impurities stuck onto the bodies of probes.
2. Power on the meter using **ON/OFF** key. Press **MODE** key to select your desired mode of operation (pH, mV, Ion, or Temperature).
3. Dip and stir both probes gently into an aqueous test sample, swirl gently and wait for the reading to stabilise. Note the reading. Freeze the displayed if desired—for details refer to Section 4.3.
4. Rinse probes with clean water before taking next reading or storage.

4.2 Millivolt (mV) Reference Check (Ion 6+ only)

The mV mode in Ion 6+ can be used for the diagnosis of ISE or pH electrode condition. Press **MODE** to access mV mode, the "**mV**" annunciator in LCD is displayed. The displayed value shows the absolute mV value of ISE or pH electrode being measured.

4.3 Holding a Reading

To freeze or hold your displayed reading momentarily, press **HOLD** key once. The LCD displays "**HO**" annunciator to indicate the HOLD function is activated.



4.4 Releasing a Held Reading

Press **HOLD** key once again to deactivate the HOLD function or to release your frozen reading. The meter reverts to current measurement mode, and the "**HO**" annunciator disappears from the LCD.

5. ELECTRODE CARE AND MAINTENANCE

For best results, keep the ISE capped dry and pH/ORP electrode bulb wet. Store the pH/ORP glass bulb with pH electrode storage solution. **NEVER** use deionised water for storage. Wash electrodes with clean water after each use.

Your ISE or pH electrode is susceptible to contamination or dirt. Clean as needed using mild detergent and warm water. Blot the probe gently with a soft tissue paper. Avoid excessive drying of the glass membrane and avoid touching it with your fingers. Recalibrate after cleaning.

6. TROUBLESHOOTING

Problem	Cause	Solution
No display	Batteries not in place.	a) Insert batteries. b) Re-insert batteries in correct polarity.
"---" on display	Ion 6+ does not have 2 point calibration	Perform 2 or 3 point ion calibration.
"LO" displays in the LCD	Low battery	Replace batteries.
Unstable reading	a) Electrode not deep enough in sample b) Dirty electrode. c) Broken electrode	a) Place electrode deeper in sample. b) Clean electrode and recalibrate. c) Replace electrode.
"Er1" display	Buffer value out of tolerance	Use new pH buffer solution and recalibrate. Ensure correct pH buffer group was selected.
"Er2" display	Single point calibration	Perform at least 2 point calibration. (Ion 6+).
"Er3" display	ISE slope not within the specified tolerance	Check ISE is in good working condition-refer to ISE manual (Ion 6+).
"Er4" display	Any calibration points not within 1 decade	Ensure any calibration points between each other must be within 1 decade. (Ion 6+)
Not able to calibrate	a) Display freezes b) Faulty electrode c) Inaccurate buffer	a) Release reading by pressing HOLD. b) Replace electrode. c) Replace expired buffer solutions.

7. SPECIFICATIONS

Model		pH 5+	pH 6+	Ion 6+
Ion Range	0.01 to 1999 ppm			✓
Resolution	0.01 ppm for 0.01 to 0.99 ppm; 0.1 ppm for 1.0 to 199.9 ppm; 1 ppm for 200 to 1999 ppm			✓
Accuracy	+/- 1% of reading			✓
No. of Calibration Pts	2 to 3 points (minimum 2 pts)			✓
pH Range	0.00 to 14.00 pH	✓	✓	✓
Resolution	0.01 pH	✓	✓	✓
Accuracy	+/- 0.01 pH	✓	✓	✓
pH Slope Range	80 to 120%	✓	✓	✓
No. of Calibration Pts	1 to 3 points (push-button)	✓	✓	✓
Buffer Options	pH 4.01, 7.00, 10.01 (USA) pH 4.01, 6.86, 9.18 (NIST) pH 4.10, 6.97 (Pb)	✓	✓	✓
Temperature Range	0.0 to 100.0 ^{o}C	✓	✓	✓
Resolution	0.1 ^{o}C	✓	✓	✓
Accuracy	+/- 0.5 ^{o}C	✓	✓	✓
Temperature Comp.	Automatic / Manual (0 to 100 ^{o}C)	✓	✓	✓
Millivolt Range	-1000 to +1000 mV		✓	
Resolution	1 mV		✓	
Accuracy	+/- 2 mV		✓	
Millivolt Range	-500 to 500 mV			✓
Resolution	0.1 mV for –200 to 200 mV; 1 mV for 200 to 500 mV			✓
Accuracy	+/- 0.2 and 2 mV resp.			✓

Features	
Auto-Buffer Recognition	Yes
Hold Function	“HO”
Auto Shut Off	After 17 minutes
Low Battery Indication	“LO”
Display	Single Custom LCD
Operating Temperature	0 to 50 ^{o}C
Power Requirements	4 x “AAA” Alkaline Batteries
Battery Life	500 hours
Meter Dim./Weight	15.7 x 8.5 x 4.2 cm / 255 g

8. REPLACEMENTS AND ACCESSORIES

Item Description	Part number Ordering Code	
	Eutech Instruments	Oakton Instruments
pH 5+ with ATC probe	ECPH501PLUS 01X244911	35613-50
pH 5+ with pH and ATC probes	—	35613-52
pH 5+ with pH and ATC probes and solutions in hard carrying case	ECPH502PLUSK 01X244912	—
pH 5+ with pH/ATC probe and solutions in hard carrying case	ECPH503PLUSK 01X244913	35613-54
pH 6+ with ATC probe	ECPH601PLUS 01X245025	35613-20
pH 6+ with pH and ATC probes	—	35613-22
pH 6+ with ATC probe and solutions in hard carrying case	ECPH601PLUSK 01X245028	—
pH 6+ with pH and ATC probes and solutions in hard carrying case	ECPH602PLUSK 01X245026	—
pH 6+ with pH/ATC probe and solutions in hard carrying case	ECPH603PLUSK 01X245027	35613-24
Ion 6+ with ATC probe	ECION601PLUS 01X256409	35613-80
Ion 6+ with pH and ATC probes and solutions in hard carrying case	ECION602PLUSK 01X256410	35613-82
ATC Probe, Stainless Steel, 84 x 3 mm	PH5TEM01P 01X021804	35613-05
pH electrode, plastic, gel-filled, single-junction	ECFC7252101B 01X099412	59001-65
pH electrode, plastic, gel-filled, double-junction	ECFC7252201B 01X099417	35641-51
pH electrode, glass, refillable, double-junction	ECFG7370101B 93X218819	35805-04
pH/ATC electrode, plastic, gel-filled, single-junction	ECFE7352901B 01X218964	35811-71

Item Description	Part number Ordering Code	
	Eutech Instruments	Oakton Instruments
pH/ATC electrode, plastic, gel-filled, double-junction	—	35811-72
ORP electrode, plastic, gel-filled, single-junction	ECFC7960101B 01X256612	59001-75
ORP electrode, plastic, gel-filled, double-junction	ECFC7960201B 01X256613	59001-77
pH 1.68 buffer solution, 480 mL bottle	ECBU1BT	00654-01
pH 4.01 buffer solution, 480 mL bottle (1 pint)	ECBU4BT	00654-00
pH 4.01 buffer sachets, 20 mL x 20 pcs.	ECBU4BS	35653-01
pH 6.86 buffer solution, 480 mL bottle	ECBU686BT	00654-03
pH 7.00 buffer solution, 480 mL bottle (1 pint)	ECBU7BT	00654-04
pH 7.00 buffer sachets, 20 mL x 20 pcs.	ECBU7BS	35653-02
pH 9.18 buffer solution, 480 mL bottle	ECBU918BT	00654-07
pH 10.01 buffer solution, 480 mL bottle (1 pint)	ECBU10BT	00654-08
pH 10.01 buffer sachets, 20 mL x 20 pcs.	ECBU10BS	35653-03
pH 12.45 buffer solution, 480 mL bottle	ECBU12BT	00654-12
pH 4.01, 7.00, & 10.01 buffer pack, 480 mL bottles	—	05942-10
Electrode Storage Solution	ECRE005	00653-04
Electrode Cleaning Solution	ECDPCBT	00653-06

9. WARRANTY

This meter is supplied with a warranty against significant deviations in material and workmanship for a period of **THREE** years from date of purchase whereas probe with a **SIX** month warranty.

If repair or adjustment is necessary and has not been the result of abuse or misuse within the designated period, please return – freight prepaid – and correction will be made without charge. Eutech Instruments will determine if the product problem is due to deviations or customer misuse.

Out of warranty products will be repaired on a charged basis.

Exclusions

The warranty on your instrument shall not apply to defects resulting from:

- Improper or inadequate maintenance by customer
- Unauthorized modification or misuse
- Operation outside of the environment specifications of the products

10. RETURN OF ITEMS

Authorization must be obtained from our Customer Service Department or authorized distributor before returning items for any reason. A “Return Goods Authorization” (RGA) form is available through our authorized distributor. Please include data regarding the reason the items are to be returned. For your protection, items must be carefully packed to prevent damage in shipment and insured against possible damage or loss. Eutech Instruments will not be responsible for damage resulting from careless or insufficient packing. A restocking charge will be made on all unauthorized returns.

NOTE: Eutech Instruments Pte Ltd reserves the right to make improvements in design, construction, and appearance of products without notice.

For more information on our products, please contact our channel partner or visit our websites listed below:

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