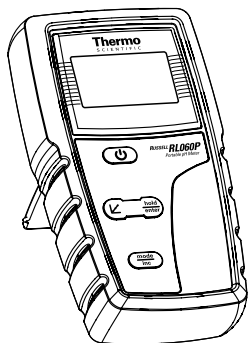


Russell RL060P

User Guide



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ionplus electrodes and Optimum Results solutions are protected by US Patent 5,830,338.

ROSS Ultra electrodes are protected by US patents pending 6,793,787.

Orion ORP Standard is protected by US Patent 6,350,367.

Orion NoCal electrodes have patent pending.

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The specifications, descriptions, drawings, ordering information and part numbers within this document are subject to change without notice.

This publication supersedes all previous publications on this subject.

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Chapter I

Introduction

Thank you for purchasing the RL060P pH meter. This microprocessor-based handheld meter is economical and easy to use. It has a large custom LCD (Liquid Crystal Display) for clear and easy reading.

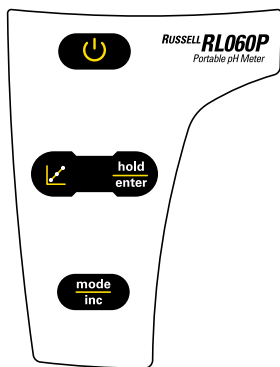
The RL060P pH meter measures pH and temperature (°C).





Included with your meter are 4 alkaline AAA batteries, sensor, user guide and a warranty card. Some models also include a rubber armor. To order other accessories and buffer calibration or standard solutions, please refer to please refer to the **Ordering Information** section for more information.


Chapter II


Getting Started


Description of Keypad Functions





The RL060P pH meter has four keys on its splash-proof keypad with tactile feedback. The common keys include , , , and .

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

: Selects measurement mode for mV, pH and temperature.

: Allows calibration for pH, mV or temperature, and will also abort the calibration without confirming any set value.

 (hold): Freezes the measured reading for easy viewing.

 (enter): Confirms the calibration value.

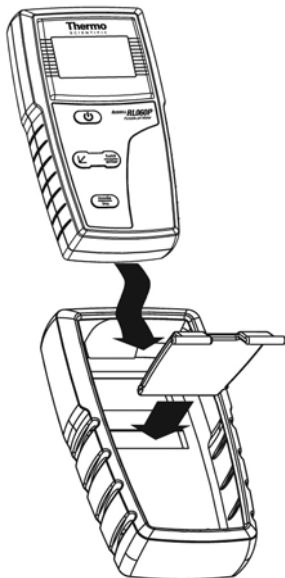
Description of LCD Annunciators



The meter has a large custom LCD that consists of 3 1/2-digit segments and operation annunciators for pH, mV or °C (temperature). Other annunciators include “HO” (when the HOLD function is activated) and “LO” (low battery condition).

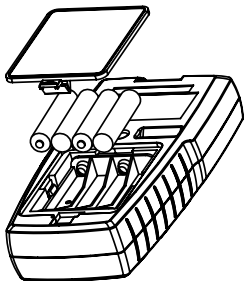
Inserting & Removing the Rubber Armor

Some models also include a rubber armor



1. To remove the meter from the rubber armor, push the bottom edges of meter out until it is completely separated from the armor. Ensure that the cables on the pH electrode or the temperature probe are not connected.
2. To insert the meter into the rubber armor, slide in from the top of meter before pushing the bottom edges down and set it into position. Lift up the stand at the back of the meter for bench top applications if necessary.

Inserting New Batteries



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

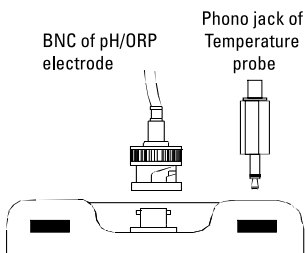
Battery Replacement



A “LO” annunciator in the LCD alerts you when battery power is running low. The replacement batteries are 4 alkaline AAA.

Caution: *Power off the meter when changing batteries.*

Connecting the Electrode and Temperature Sensor



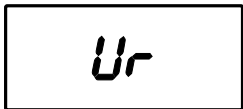
To connect the electrode into meter, align the connector slots with the posts of meter's socket and rotate the connector clockwise until it locks. Do not force when connecting. To remove, simply rotate the connector in anti-clockwise direction until it unlocks, and slide the connector off the socket.



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

Condition the pH Electrode

Condition the pH electrode before use or if it has not been in use for a long time. This can be done by soaking it into a container filled with pH 4 buffer solution for at least 1 hour. Rinse with water before proceeding to calibrate the electrode with the meter.

Switching the Meter On



1. Press  to power up your meter. All LCD segments display momentarily as the meter performs a self-diagnostic test
2. Press  to choose your desired mode of measurement. The corresponding annunciator displays in the LCD.

In temperature mode, the measured reading can be 25.0 °C (factory default). The last calibrated temperature value will appear if there is no temperature probe connected, or current measured value will appear if a temperature probe is connected.

3. The LCD displays "**Or**" if the meter reading exceeds the maximum or "**Ur**" if under minimum measurement range. Refer to **Chapter VII, Specification**.

Chapter III

Calibration


pH Calibration

The meter is capable of calibrating up to three points using USA or NIST (nSt) pH buffer standards or two points with low ionic strength (Pb) pH buffer standard. All new calibration values will automatically override existing data.

USA	pH 4.01, 7.00 and 10.01
NIST	pH 4.01, 6.86 and 9.18
Pb	pH 4.10 and 6.97

It is recommended that you perform at least a two point calibration at room temperature (25 °C) using standard buffers, starting with the first buffer at pH 7.00 (USA), pH 6.86 (NIST) or pH 6.97 (Pb) followed by other buffer values.


A one point calibration should be performed with a pH buffer value closest to the expected sample value being measured. Otherwise calibrating at pH 7.00, pH 6.86 or pH 6.97 is advisable.

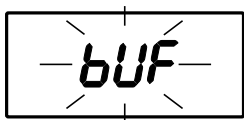
The meter has automatic buffer recognition that identifies the correct pH buffer values during calibration. If non-standard pH buffers other than the above standards are used, or the electrode has worn out, the LCD will flash “**Er1**”. Press the  to abort calibration and resume measurement. In general all pH buffer values have the window of up to ± 1 pH tolerance during calibration.



Ensure that you use new pH buffer solutions or sachets during calibration. Do not reuse buffer solutions as it may be contaminated and affect the calibration and accuracy of measurements. Always store buffer solutions in a dry, cool environment.



Before use, remove the plastic protective cap of pH electrode and condition the glass bulb by soaking it in tap water for 1-2 hours. This hydrates the glass bulb if electrode is too dry or has not been used for a long period of time. Always rinse the probes with tap water or rinse solution before and after each calibration/sample measurement to avoid cross-contamination. For details refer to **Chapter V, Electrode Care and Maintenance**.

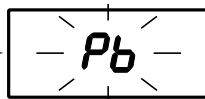
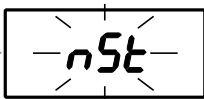
Selection of pH buffer standards


You must set the meter to accept either USA, NIST (nSt) or Low Ionic (Pb) pH buffer standard values before calibration. The factory default is USA standard. If you wish to abort this operation press the  at any sequence and the meter reverts to pH measurement mode.



1. With the meter off, press and hold . Turn on the meter by pressing . The display shows “bUF” blinking.





2. Press  to get into the buffer selection mode. Press  to toggle USA, NIST or Pb standards.





3. Press  to confirm your choice of buffer standard to be used. The display then reverts to the pH measurement mode.

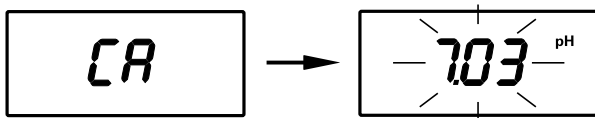
Resetting the User Calibrated Values



If you need to have a new set of ion or pH measurements or mV offset (in pH 6) taken, you may wish to reset the last ion/pH/mV calibrated values. Note only temperature offset (if set) will not be erased.

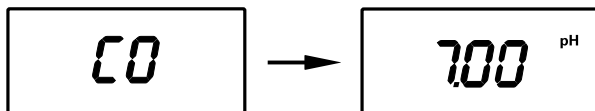
1. With the meter off, press and hold  while turning on the meter by pressing . The LCD shows “rSt” blinking.
2. Press  to abort this operation if you do not wish to reset.
3. Press  to confirm. The meter automatically clears all stored pH calibration or mV offset values and reverts to measurement mode.

pH Calibration using USA standard buffers

1. Pour a known pH buffer standard solution into a clean, dry container, e.g. pH 7.00. Power on the meter and it automatically enters into the measurement mode. Select pH mode by pressing  if necessary.
2. Dip both pH electrode and temperature probe into pH 7.00 buffer solution. Swirl gently and wait for reading to stabilize (about 30 seconds depending on your electrode condition).
3. Press  to enter pH calibration mode. A “**CA**” displays momentarily and the display shows the current uncalibrated reading flashing while in the calibration mode.





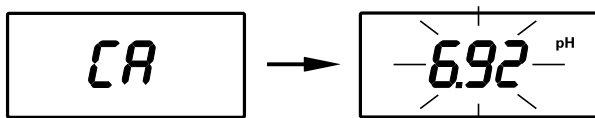
4. To abort or cancel calibration without accepting new value, press . The meter then reverts to pH measurement mode.
5. To proceed with the calibration, allow the reading to stabilize. The meter automatically recognizes pH 4.01, 7.00 or 10.01 buffers. Press  to confirm calibration and the LCD displays “**CO**” momentarily. The meter reverts to the measurement mode.





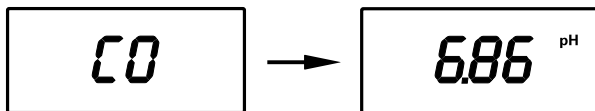
6. For a two or three point calibration, repeat steps 3 through 5 with other pH buffer values of 4.01 and/or 10.01 for higher accuracy.

pH Calibration using NIST standard buffers

1. Pour a known pH buffer standard solution into a clean container, e.g. pH 6.86. Power on meter, and it automatically enters into measurement mode. Select pH mode by pressing  if necessary.
2. Dip both pH electrode and temperature probe into pH 6.86 buffer solution. Swirl gently and wait for reading to stabilize (about 30 seconds depending on your electrode condition).
3. Press  to enter pH calibration mode. A “**CA**” displays momentarily and the display shows the current uncalibrated reading flashing while in the calibration mode.





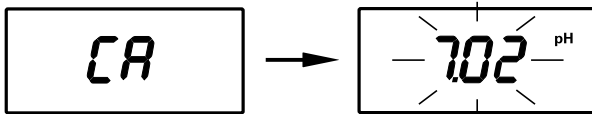
4. To abort or cancel calibration without accepting new value, press . The meter then reverts to pH measurement mode.
5. To proceed with the calibration, allow reading to stabilize. The meter automatically recognizes pH 4.01, 6.86 or 9.18 buffers. Press  to confirm calibration and the LCD displays “**CO**” momentarily. The meter reverts to measurement mode.





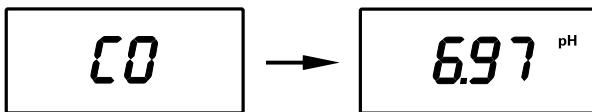
6. For a two or three point calibration, repeat steps 3 through 5 with other pH buffer values of 4.01 and/or 9.18 for higher accuracy.

pH Calibration using Pb standard buffers

1. Pour a known pH buffer standard solution into a clean container, e.g. pH 6.97. Power on the meter, and it automatically enters into measurement mode. Select pH mode by pressing .
2. Dip both pH electrode and temperature probe into pH 6.97 buffer solution. Swirl gently and wait for reading to stabilize (about 30 seconds depending on your electrode condition).
3. Press  to enter pH calibration mode. A “CA” displays momentarily and the display shows the current uncalibrated reading flashing while in the calibration mode.



4. To abort or cancel calibration without accepting new value, press . The meter then reverts to pH measurement mode.
5. To proceed with the calibration, allow reading to stabilize first. The meter automatically recognizes either pH 4.10 or 6.97 buffer. Press  to confirm calibration and the LCD displays “CO” momentarily. The meter reverts to measurement mode.

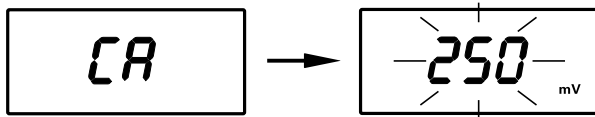


6. For a two point calibration, repeat steps 3 through 5 with pH 4.10 buffer for better accuracy.

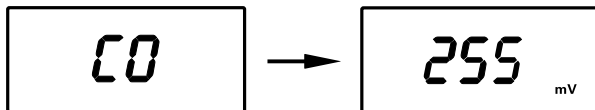
Millivolt (mV) Calibration

mV calibration is performed for ORP or redox measurements, where you can adjust the mV value as a base value for measurements.

1. Press **mode inc** 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 **↙** to enter mV calibration. The LCD shows "**CA**" momentarily followed by displayed reading flashes.




4. To abort calibration press **↙**. Meter reverts to measurement mode.
5. To proceed with the calibration, press **mode inc** to adjust the reading to your desired value. The maximum adjustment you can make is ± 50 mV. Pressing **mode inc** continuously allows you to scroll to the maximum allowable value and then loops back to the minimum allowable value.
6. Press **hold enter** to confirm calibration. The display shows "**CO**" momentarily and meter reverts to measurement mode showing the current set value.




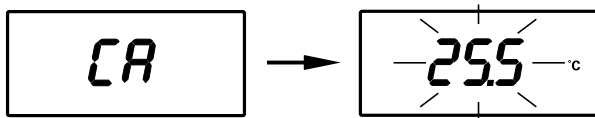
Temperature Calibration




With Temperature probe

The temperature probe 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  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  to enter temperature calibration mode. The LCD shows "CA" momentarily and displayed reading flashes.





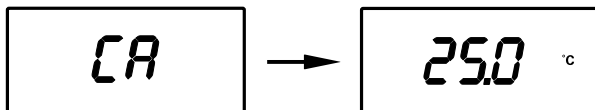
4. Press  until the LCD display shows the desired temperature. The meter allows an adjustable maximum value of ± 5 °C from factory default.
5. To cancel or abort this operation, press . Note no new value will be stored into the meter's non-volatile memory. To confirm calibration, press . The LCD displays "CO" momentarily, and the meter reverts to measurement mode.






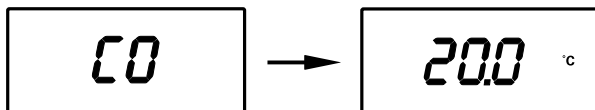
Without Temperature probe (no ATC)

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

1. Press  to enter into temperature mode until "°C" shows in LCD.
2. Compare the displayed value to NIST certified thermometer or a thermometer known to be accurate (dipped into a constant temperature bath).
3. Press  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 the last set temperature value.





4. Press  (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 . Note no new value will be stored into the meter's non-volatile memory. To confirm calibration, press . The LCD displays "CO" momentarily, and the meter reverts to measurement mode.



Chapter IV


Measurement

Taking Measurements


1. Before taking a measurement, rinse the pH/ORP electrode and temperature probe thoroughly with tap or distilled water to remove any impurities stuck onto the bodies of probes.
2. Power on the meter using . Press  to select your desired mode of operation (pH, mV, or temperature).
3. Dip and stir both probes gently into an aqueous test sample, swirl gently and wait for the reading to stabilize. Note the reading. Freeze the display if necessary, for details refer to the **Releasing a Held Reading** section.
4. Rinse the probes with tap water or rinse water thoroughly before taking the next sample measurement or storing them.

Holding a Reading



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

Releasing a Held Reading

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

Chapter V

Electrode Care and Maintenance

For best results, always keep the pH/ORP electrode bulb wet. Store the pH/ORP glass bulb with pH electrode storage solution. Other pH buffers are also suitable. NEVER use deionized water for storage. Wash the probe thoroughly with distilled water after each use. Because your pH electrode is susceptible to contamination or dirt, clean it every 1 to 2 months depending on the extent and condition of use.

Clean the pH/ORP electrode using a mild detergent. Wipe the probe with a soft tissue paper. Avoid touching the glass membrane with your fingers. Wash thoroughly in tap water and then in distilled water. Recalibrate the meter after cleaning the electrode.

Chapter VI

Troubleshooting

Problem	Cause	Solution
No display	Batteries not in place	a. Insert batteries b. Re-insert batteries in correct polarity
“LO” displays in the LCD	Low battery	Replace batteries with fresh ones
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
“Er2” display	Single point calibration	Perform at least 2 point calibration
Not able to calibrate	a. Display freezes b. Faulty electrode	a. Release reading by pressing HOLD key b. Replace electrode

Chapter VII

Specification

Specification	
pH Range	0.00 to 14.00 pH
pH Resolution	0.01 pH
pH Accuracy	± 0.01 pH
pH Slope Range	80 to 120%
Number of Calibration Points	1 to 3 points
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 °C
Temperature Resolution	0.1 °C
Temperature Accuracy	± 0.5 °C
Temperature Compensation	Automatic / Manual (0 to 100 °C)
Millivolt Range	-1000 to +1000 mV
Millivolt Resolution	1 mV
Millivolt Accuracy	± 2 mV
Features	
Auto-Buffer Recognition	YES, see Buffer Options
Hold Function	“HO”
Auto Shut Off	After 17 minutes
Low Battery Indication	“LO”
Display	Single custom LCD
Operating Temperature	0 to 50 °C
Power Requirements	4 x “AAA” alkaline batteries
Battery Life	500 hours
Meter Dim./Weight	14 x 7 x 3.5 cm / 200 g

Chapter VIII

Ordering Information

Meter Kits and Replacement Meter Accessories

Cat. No.	Description
5122001	RL060P portable pH meter with pH electrode (9146BN) and ATC probe (917004) with rubber armor
5122003	RL060P portable pH meter with 3-in-1 pH/ATC electrode (9147BN) with rubber armor
5222004	RL060P portable pH meter with pH electrode (9146BN) and ATC probe (917004) without rubber armor
5222006	RL060P portable pH meter with 3-in-1 pH/ATC electrode (9147BN) without rubber armor
9142BN	Glass-body refillable combination pH electrode, single junction, 12 mm x 120 mm*, 1 meter cable length
9146BN	Epoxy-body gel combination pH electrode, single junction, 12 mm x 120 mm*, 1 meter cable length
9147BN	Epoxy-body gel combination pH/temperature electrode, single junction, 12 mm x 110 mm*, 1 meter cable length
917004	ATC probe compatible with RL060P
910001	pH electrode storage solution, 475 mL
900020	pH electrode cleaning solution kit, includes one bottle each of A, B, C and D cleaner, 15 mL beaker and pipette
900011	Ag/AgCl electrode filling solution, 5 x 60 mL (for 9142BN)

* Dimensions are from bottom of cap.

Replacement Solutions

Cat. No.	Description
910104	pH 4.01 buffer, 475 mL bottle (1 pint)
910460	pH 4.01 buffer, 5 x 60 mL bottles
910410	pH 4.01 buffer pouches, 10 x 15 mL pouches.
910425	pH 4.01 buffer pouches, 25 x 15 mL pouches
700402	pH 4.10 low ionic strength buffer, 4 x 475 mL bottles
910686	pH 6.86 buffer, 475 mL bottle (1 pint)
916860	pH 6.86 buffer, 5 x 60 mL bottles
700702	pH 6.97 low ionic strength buffer, 4 x 475 mL bottles
910107	pH 7.00 buffer, 475 mL bottle (1 pint)
910760	pH 7.00 buffer, 5 x 60 mL bottles
910710	pH 7.00 buffer pouches, 10 x 15 mL pouches.
910725	pH 7.00 buffer pouches, 25 x 15 mL pouches
910918	pH 9.18 buffer, 475 mL bottle (1 pint)
9191860	pH 9.18 buffer, 5 x 60 mL bottles
910110	pH 10.01 buffer, 475 mL bottle (1 pint)
911060	pH 10.01 buffer, 5 x 60 mL bottles
911010	pH 10.01 buffer pouches, 10 x 15 mL pouches.
911025	pH 10.01 buffer pouches, 25 x 15 mL pouches
911110	pH rinse solution pouches, 15 mL x 10 pouches
911125	pH rinse solution pouches, 15 mL x 25 pouches

Chapter IX

Assistance and Warranty

After troubleshooting all components of your measurement system, contact Technical Support. Within the United States call 1.800.225.1480, outside the United States call 978.232.6000 or fax 978.232.6031. In Europe, the Middle East and Africa, contact your local authorized dealer. For the most current contact information, visit www.thermo.com/contactwater.

For the most current warranty information, visit www.thermo.com/water.

Chapter X

Declaration of Conformity

Manufacturer: Thermo Fisher Scientific

Address: 166 Cummings Center
Beverly, MA 01915
USA

The above named Manufacturer hereby declares that the product(s) described below conforms to the Standards and Directives listed below:

pH RL060P portable meter

Directive / Standard


89/336/EEC Electromagnetic Compatibility (EMC) Directive

EMC essential requirements for measurement device:

EN 50081-1 /1992: EN 55011
EN 50082-1 /1997: EN 61000-4-2/-3

These products have been manufactured in compliance with the provisions of the relevant Thermo Fisher Scientific manufacturing and test documents and processes. Further, these documents and processes are recognized as complying with ISO 9001:2000 by QMI, listed as File #001911.

Place and date of issue:
Beverly, MA,
November 10, 2005



Patrick Chiu
Quality Assurance Engineer

Chapter XI

WEEE Compliance



This product is required to comply with the European Union's Waste Electrical & Electronic Equipment (WEEE) Directive 2002/96/EC . It is marked with the following symbol:

Thermo Fisher Scientific has contracted with one or more recycling/disposal companies in each EU Member State and this product should be disposed of or recycled through them. Further information on our compliance with these Directives, the recyclers in your country, and information on Thermo Scientific products which may assist the detection of substances subject to the RoHS Directive are available at www.thermo.com/water.

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Quality System

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