Fisher Scientific

Accumet AP Series Handheld pH/mV/Ion Meter

Instruction Manual

Instruction Manual
Accumet® Models AP61, AP62, AP63

CONTENTS

Note: For electrochemistry technical support, call 1-888-358-4706 or e-mail accumet@thermofisher.com

Performance Characteristics

	Accumet® AP61	AP62	AP63
pH MEASUREMENT			
Range, pH	-1.99 to 19.99	-1.99 to 19.99	-1.99 to 19.99
Resolution, pH (selectable)	0.1, 0.01	0.1, 0.01	0.1, 0.01
Accuracy, pH	0.01	0.01	0.01
Buffer Values	2.00 4.00	7.00 10.00	12.00
Automatic Buffer Recognition	yes	yes	yes
Calibration Points	5	5	5
mV MEASUREMENT			
Range	———	-999 to 999	-999 to 999
Resolution		1	.1
Accuracy	———	.1	.1
Ion MEASUREMENT			
Range, ion	———	———	0.001 to 99,900
Resolution, ion			2 or 3 significant figures
Accuracy	———	———	+/- 0.17%
Standard Values	.1 .5 1 2 5 10 50 100 500 1000		
Calibration Points	———	———	5
Temperature MEASUREMENT			
Range, ^{0}C	0 to 100	0 to 100	0 to 100
Resolution, ^{0}C	0.1	0.1	0.1
Accuracy, ^{0}C	0.3	0.3	0.3

Specifications

Input Impedance, ohms	$> 10^{12}$
Battery Life, hours	>200
Operating Temperature, ^{0}C	5 to 40
Storage Temperature, ^{0}C	-10 to 55
Dimensions, inches	1.2 x 2.9 x 6.8
Weight, Ounces	10
Case Material	ABS plastic
Safety Standard	FCC/part 15
Protection (Waterproof*)	IP67
Battery	9V alkaline

* The electronic board and LCD compartment is waterproof only if appropriate connectors and plugs are used. However, the battery compartment is not waterproof. The meter cannot operate under water.

Quick Reference\ AP63 pH\mV\Ion Meter

pH Measurement

1. **Mode** - Press **mode** to select pH.
2. **Setup** - Press **setup** to cycle through the available options and their current state in the meter. The AP61, AP62, and AP63 meter

options displayed include percent slope, the clear existing buffers option, and the number of digits in the measurement (x.xx or x.x).

Press **enter** to accept an option or setting you desire.

3. Standardization

a. From the Measure screen, press **setup** twice and then **enter** to clear the meter of buffers from the previous standardization.

b. Press **std** to access the standardize screen. Immerse the electrode(s) into a buffer from the buffer group displayed (2, 4, 7, 10 ,12).

c. Press **std** again to initiate standardization. When the reading is stable, the meter will return to the Measure screen. The buffer value just accepted is displayed on the screen.

d. Repeat steps b and c for additional buffers. You can use up to a total of five buffers.

4. Measure

a. Immerse the rinsed electrode(s) into the sample solution.

b. If **AUTO** is not displayed on the screen, the auto read function is not active, and the meter will continuously monitor and update the pH value of the sample.

c. If **AUTO** is displayed on the screen, the meter will fix the measured pH value on the screen when it is stable. Press **enter** to obtain a new reading in the same or another sample.

Note: The autoread function is turned on or off by pressing **auto**.

Ion Measurement

1. **Mode** - Press **mode** to select ION.

2. **Setup** - Press **setup** to cycle through the available options and their current state in the meter. The AP63 meter options include electrode slope, the clear standards option, and the number of significant digits used in the measurement (xxx, xx, or x). Press **enter** to accept the option or setting you desire.

3. Standardization

a. From the Measure screen, press **setup** twice and then **enter** to clear the meter of standards from the previous standardization.

b. Press **std** to access the Standardize screen.

c. Press **setup** repeatedly if necessary to choose the standard concentration desired.

d. Immerse the electrode(s) into the standard solution plus an ionic strength adjustor (isa) if required. Provide moderate stirring if possible.

e. Press **std** again to initiate standardization. When the reading is stable, the meter will return to the Measure screen. The standard value is displayed on the screen.

f. Repeat steps b through e with subsequent standards. A minimum of two standards must be used. A maximum of five standards is possible.

Measure Ion Concentration

a. Immerse the rinsed electrode(s) into the sample solution.

b. If **AUTO** is not displayed on the screen, the autoread function is not active, and the meter will continuously monitor and update the Ion value of the sample.

c. If **AUTO** is displayed on the screen, the meter will fix the measured Ion value on the screen when it is stable. Press **enter** to obtain a new reading in the same or another sample.

Note: The auto read function can be turned on or off by pressing **AUTO**.

Accessories

The following list of accessories may be used with the Accumet® AP61, AP62, and AP63 meters. Consult your Fisher sales representative for information on the full line of accessories that are available.

Item	Catalog Number
Fisher Buffer Pac (one 500 mL each, pH 4,7,&10, color coded)	SB105
Automatic Temperature Compensator (ATC)	13-620-AP53
Combination liquid-filled pH/ATC electrode	13-620-AP50
Carrying case	13-620-AP69
AC Adapter	13-636-100
Adapter (U.S. Standard/Pin to BNC)	13-636-498
Adapter (dual pins to BNC)	13-620-488
Adapter (BNC/pin to single BNC)	13-620-489

Features

- **Display Resolution**
  Operator-selectable with Setup button.
- **Auto Mode**
  Display locks on current value when reading is stable.
- **Battery Saver**
  If 30-minute period elapses without pressing any buttons, meter turns itself off to conserve battery life, but retains standardization data in memory.
- **Slope Readout**
  Display of current electrode slope when Setup button is pressed.
- **Buffer Recognition**
  Auto-recognition of five buffers, with temperature correction of buffer value.
- **Standardization**
  Optional 1, 2, 3, 4, or 5 point standardization.
- **Error Indicators**
  Low battery (Lo?) or ELECTRODE ERROR.

The Instrument

Before operating the meter, become familiar with the location and function of its various display elements, keypad, and connectors.

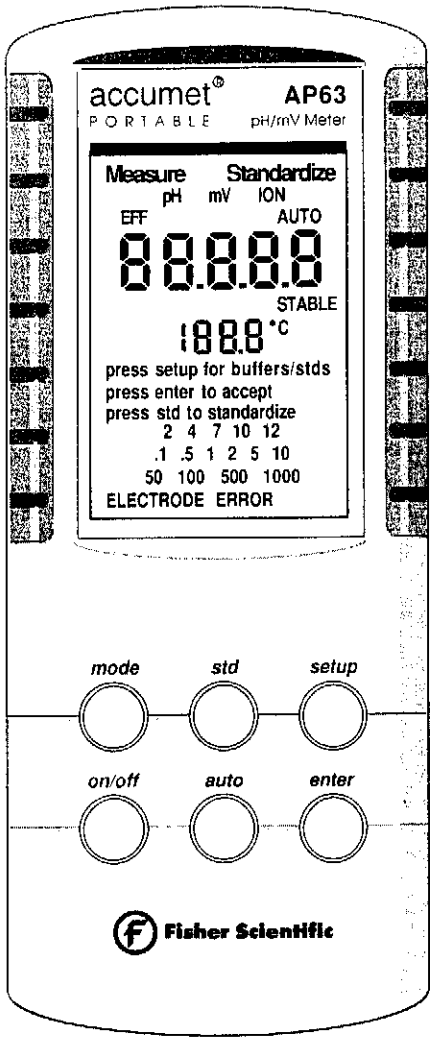

Figure 1

Display

Figure 2 illustrates the liquid crystal display area. Each of the display elements is referenced in the figure and described below.

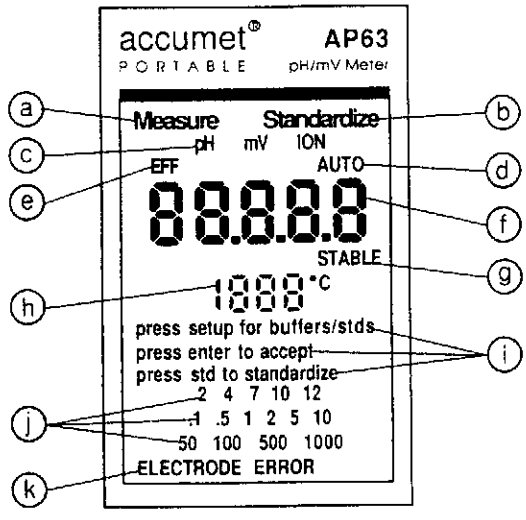

Figure 2

a. Indicates that meter is in the Measure mode.

b. Indicates that meter is in the Standardize mode.

c. Indicates the function mode area of the meter. Up to three modes are possible, pH, mV, and ION, depending on which meter you have.

d. Indicates the auto mode. If the meter displays **AUTO**, the stable reading will be "fixed"on the screen until enter is pressed. **AUTO** will flash until the reading stabilizes.

e. Indicates the efficiency, as percent slope, of the electrode after standardization.

f. Five-digit numeric display area for pH, mV, or ION concentration depending on your meter.

g. Stability indicator. When the measurement meets meter stability criteria, **STABLE** appears.

h. Temperature readout area.

i. Prompt display area. The appropriate prompts are displayed to guide the user through the use of the meter.

j. pH buffer and ION standard display area. Here buffer or ION standards used to standardize the meter are displayed.

k. In pH, ELECTRODE ERROR is used to indicate that the electrode slope is outside the 90 to 102% range. You can press **enter** to accept any slope, and continue to measure.

Keypad

Figure 3 illustrates the keypad area. The function of each key is described below.

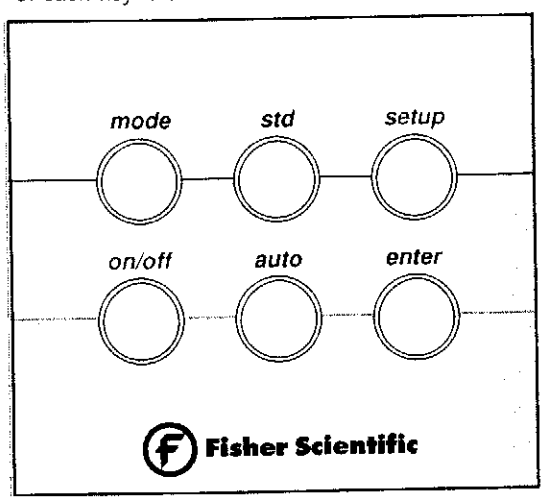

Figure 3

mode — Press this button to set the meter to the desired mode, pH, mV, or ION.

std — Initiates standardization for the current measurement mode. Refer to page 15 for pH standardization, and to page 19 for ion standardization.

setup — Press to scroll through and to view the various features and options available on the meter. Included are slope, clear existing buffers, and measurement resolution.

enter — Press to accept a feature or option displayed in setup or to initiate a new reading if in the auto mode.

auto — Press to place meter into or out of the auto mode. Use of the auto mode eliminates the need for the operator to subjectively judge electrode stability and termi-

nate a measurement. The use of the auto feature locks the measurement onto the screen when stable. You must press enter for a new reading.

on/off Press to turn meter on or off. When turned on the meter resumes operation in the same mode it was in when it was turned off.

Connectors

Note that the meter is waterproof only when the rubber plugs and/ or the appropriate ATC probe are used. If the meter is totally submersed water may enter the BNC connector. Dry the connector (not higher than 130 degrees Fahrenheit) to avoid corrosion.

1. For pH, mV, and ION measurements, attach combination electrodes with BNC connectors directly to the middle BNC jack on the meter. If non-combination electrodes are used, adapters must be used.

2. If automatic temperature compensation is desired, insert the waterproof ATC connector into the ATC tower jack (the tall jack). Insert the attached plug if an ATC probe is not used to maintain a waterproof state.

3. The AC adapter jack lies next to the BNC jack opposite the tall ATC tower jack. Insert the attached plug to maintain the meter in a waterproof state. If an AC adapter is connected, the meter is not waterproof. When the AC adapter is in use, the battery is removed from the circuit, preventing battery drain.

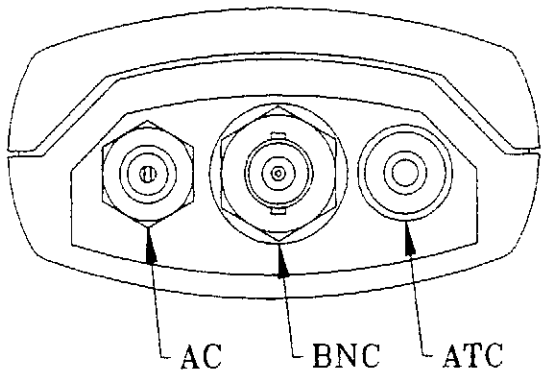

Figure 4

Battery Installation

The battery must be installed or replaced

* prior to initial use
* when the main display area is blank, or
* when the Low Battery (Lo?) indicator is on.

To install or replace the battery, perform the following steps:

1. Remove the battery slip cover from the back of the meter.

2. Disconnect the old battery, and connect a new 9 - Volt battery.

3. Place installed battery in meter battery compartment. Make certain that the battery wires are properly positioned so as not to interfere with closing the battery cover. Otherwise, cover edge may damage wires.

4. Replace the battery slip cover.

If you desire to use line voltage, connect the AC adapter to the top connector AC power jack and to a power source. Note that the meter is not waterproof when the AC adapter is connected.

Electrodes

This meter can be directly fitted with combination electrodes only. If separate pH or ION and reference electrodes are employed, adapters are required (see accessories). The meter also provides a jack for an ATC probe.

1a. Carefully remove the protective cover from the end of the pH electrode. Before using your electrode, or if your electrode is dry, soak it for 2 - 4 hours in electrode storage solution, pH 4 buffer, or KCl solution.

1b. Prepare and condition your ion selective electrode as recommended by the manufacturer.

2. Remove the shorting cap from the BNC connector. Install the electrode by twisting it to lock it in place.

3. Rinse and blot dry (don't wipe) the electrode between each measurement. Use distilled or deionized water, or a portion of the next solution to be measured.

4a. Between measurements, store your pH electrode in electrode storage solution, pH 4 buffer, or KCl solution. If liquid filled, always leave the filling hole open when ever the electrode is immersed in any solution. Refill when the level of fill solution recedes below the manufacturer's recommended level.

4b. Store your ion selective electrode as recommended by the manufacturer.

pH Operation

Using setup in pH mode

From the Measure screen:

The setup button is a scroll button which allows you to view and change several operating parameters. **While in setup you may:**

- Press **mode** to return to the Measure screen without making a change or selection.
- Press **setup** and scroll through the operating parameters in the meter.
- Press **enter** to accept the parameter as displayed or to accept a change made to that parameter.

1. Press **setup** to view the electrode efficiency (as percent slope) stored in the meter. If the meter has not been standardized, a series of dashes will appear on the display rather than a percent slope value.

   Press **enter** to accept the efficiency (as percent slope) and return to the Measure screen or

2. Press **setup** to access the clear buffers option. The buffers used in the previous standardization are displayed on the screen, along with **Clr?** for Clear.

   Press **enter** to clear the existing buffers and return to the Measure screen or

3. Press **setup** again to display the two decimal point resolution selection (x.xx)

Press **enter** to accept this resolution and return to the Measure screen, or

4. Press **setup** again to display the one decimal point resolution selection (x.x).

   Press **enter** to accept this resolution and return to the Measure screen or

   Press **setup** again to return to the Measure screen.

Standardization

Because your electrode(s) may vary in their response, you must standardize the meter to compensate for this variation. Generally, the more frequently you standardize, the better accuracy you will achieve. Standardize daily, or more often, for best results.

1. Press **mode** until the display indicates the pH mode.

2. Immerse the rinsed electrode(s) into a buffer from the group including 2, 4, 7, 10, or 12. Stir moderately if possible.

3. Press **std** to access the Standardize screen. The buffer group used by the meter will briefly be displayed, and the prompt **press std to standardize** will flash.

4. Press **std** again to initiate standardization. The meter will automatically recognize the buffer used, and display the value on the screen. **Standardize** will flash until the buffer is accepted, and the meter returns to the Measure screen. The accepted buffer value remains displayed on the screen.

5. Repeats steps 2 -4 with a second and subsequent buffers. When the meter accepts the second buffer, it will briefly display the efficiency (as percent slope) associated with the electrode's performance prior to returning to the Measure mode. If the percent slope is outside the range of 90 - 102 , the meter will display **ELECTRODE ERROR** and will not return to the Measure screen until you press **enter**. The message ELEC TRODE ERROR will remain until an acceptable slope is attained after stan dardization.

Measurement

1. Immerse the electrode(s) into the sample solution. Stir moderately if possible.
   Note: Make sure the meter is in the pH mode.

2. When the meter senses that the reading is stable, **STABLE** will appear under the measurement reading. The reading may be recorded at this time.

   a. If **AUTO** is not displayed on the screen, the autoread function is not active, and the meter will continuously monitor the pH value of the sample, and change as it changes.

   b. If **AUTO** is displayed on the screen, the meter will fix the measured pH value on the screen when it is stable.
   Press **enter** to obtain a new reading in the same or another sample. **AUTO** will flash on the display until a stable reading is obtained.

mV Operation

Absolute Millivolts

The AP62 and AP63 meters display absolute millivolt values, meaning that all values are referenced to zero millivolts when the BNC input is shorted electrically. You may check the zero value by placing the BNC shorting cap on the meter, and observing the mV reading.

1. Press **mode** until the meter displays the mV mode.

2 Immerse the electrode in sample solution.

3. When the meter senses that the displayed value is stable, **STABLE** will appear under the displayed value. Record the reading at this time.

   Note that the auto button is not functional in the mV mode.

Ion operation

Using setup in the Ion mode

From the Measure screen:

The setup button is a scroll button which allows you to view and change several operating parameters. **While in setup you may:**

- Press **mode** to return to the Measure screen without making a change or selection.
- Press **setup** and scroll through the operating parameters in the meter.
- Press **enter** to accept the parameter as displayed or to accept a change made to that parameter.

1. Press **setup** to view the efficiency (as electrode slope) stored in the meter. If the meter has not been standardized. a series of dashes will appear on the display rather than a slope value.

   Press **enter** to accept the slope and return to the Measure screen or

2. Press **setup** to access the clear standards option. The standards used in the previous standardization are displayed on the screen, along with **Clr?** for Clear.

   Press **enter** to clear the existing standards, and return to the Measure screen or

3. Press **setup** again to display the three significant figure resolution selection (xxx).

   Press **enter** to accept this resolution and return to the Measure screen, or

4. Press **setup** again to display the two significant figure resolution selection (xx).

   Press **enter** to accept this resolution and return to the Measure screen or

5. Press **setup** again to display the one significant figure resolution selection (x).

   Press **enter** to accept this resolution and return to the Measure screen or

   Press **setup** again and return to the Measure screen.

Standardization

Because your electrode(s) may vary in their response, you must standardize the meter to compensate for this variation. Generally, the more frequently you standardize, the better accuracy you will achieve. Standardize daily, or more often, for best results.

1. Press **mode** until the display indicates the Ion mode.
2. Press **std** to access the Standardize screen. The prompt **press std to standardize** will flash.
3. Press setup repeatedly until the standard concentration desired is lit.
4. Immerse the electrode(s) into a standard solution (plus isa) consistent with the value chosen in step 3. Provide moderate stirring if possible.
5. Press **std** again to initiate standardization. The meter will display the value on the screen. **Standardize** will flash until the reading is stable, the standard is accepted, and the meter returns to the Measure screen. The accepted standard value remains displayed on the screen.
6. Repeats steps 2 -5 with a second and subsequent standards. When the meter accepts the second standard, it will briefly display the efficiency (as a millivolt slope) associated with the electrode's performance prior to returning to the Measure mode.

Measurement

1. Immerse the electrode(s) into the sample solution. Stir moderately if possible. Note: Make sure the meter is in the Ion mode.
2. When the meter senses that the reading is stable, **STABLE** will appear under the measurement reading. The reading may be recorded at this time.

   a. If **AUTO** is not displayed on the screen, the autoread function is not active, and the meter will continuously monitor the Ion value of the sample, and change as it changes.

   b. If **AUTO** is displayed on the screen, the meter will fix the measured Ion value on the screen when it is stable. Press **enter** to obtain a new reading in the same or another sample. **AUTO** will flash during a measurement until a stable reading is obtained.

Measuring Temperature

The Accumet AP61, AP62, and AP63 meters all permit monitoring of sample temperature with an accessory temperature probe or ATC probe. The ATC probe may be separate or part of a combination electrode. If an ATC probe is attached, a continuously updated temperature reading will appear on the meter display. If an ATC probe is not used, the meter will display a constant 25 degrees centigrade as a default temperature. The temperature display is provided in all modes, pH, mV, and ION.

The meter is waterproof only when the ATC probe 13-620-AP53 or the combination electrode 13-620-AP50 are used with the meter.