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User Manual

Fisher Scientific accumet AE150 pH Benchtop Meter

This user manual provides instructions on operating the Fisher Scientific™ accumet™ AE150 pH benchtop meter. Detailed information on meter setup, operation and features is provided in the appropriate sections of this user manual. Please visit www.fishersci.com/accumet for addional information on Fisher Scientific accumet meters and electrodes.

accumet AE150 pH Benchtop Meter
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Table of Contents

Introduction 3
Display 4
Keypad 5
Rear Instrument Panel 6
Meter Start Up 7
Connecting Electrodes and Accessories 7
Connecting the Electrode Holder (Optional) 8
Meter Preparation Prior to Calibration 9
Meter Setup Functions 10
P1.0 Clear Memory Program 10
P2.0 View Electrode Diagnosis Program 11
P3.0 Select pH Buffer Standard Program 12
P4.0 Meter Reset Program 13
Calibration 14
pH Calibration 14
mV Calibration 17
Temperature Calibration 18
Measurements 19
Temperature Compensation 19
pH or mV Measurements 20
HOLD Function 20
Storing and Recalling Data from Memory 21
pH Electrode Maintenance 22
After Use Storage 22
Electrolyte Replacement (for refillable electrodes only) 22
Electrode Cleaning and Rejuvenation 23
Troubleshooting Guide 24
Error Messages 24
General Troubleshooting 24
Additional Information 25
pH and Temperature 25
Use of Standard pH Buffers 25
Standard pH Buffers 25
Meter Specifications 26
Ordering Information 27
Warranty 28

Introduction

Thank you for purchasing the Fisher Scientific accumet AE150 benchtop pH meter. Fisher Scientific accumet essential (AE) meters are designed to provide the key functions needed for routine measurements without complicated features and processes. AE150 pH benchtop meters are designed with convenience in mind, offering user-friendly functionality and storage/recall of up to 100 data sets in the non-volatile memory. As a space saver, a swivel electrode holder can be attached to either side of meter for holding electrodes during operation and storage.

The Fisher Scientific accumet AE150 pH benchtop meters are capable of measuring pH, mV and temperature and are equipped with a LCD (Liquid Crystal Display) with simultaneous display of pH and temperature measured values or mV and temperature measured values for efficient sample reading and recording. These meters are designed for routine pH measurements in laboratory applications.

Meter Features

- One to five point pH calibration with automatic buffer recognition
- Selection of two pH buffer sets
- pH slope and offset display
- One point mV calibration with ±150 mV offset adjustment
- One point ATC temperature probe calibration with ±5 °C offset adjustment
- Automatic or manual temperature compensation
- Measure 0.00 to 14.00 pH with ±0.01 pH relative accuracy
- Measure -1999 to 1999 mV with ±0.2 mV relative accuracy (±199.9 mV)
- Measure 0.0 to 100.0 °C with ±0.3 °C temperature relative accuracy
- Simultaneously display of pH value and temperature or mV value and temperature
- Ready icon indicates measurement stability
- Electrode condition icon indicates electrode status
- 100 point data set storage with non-volatile memory
- Connects to analog device through recorder output

Important Notes and Safety Precautions

Please read this manual thoroughly before using your instrument. Any use outside of these instructions may invalidate the warranty and cause permanent damage to the instrument.

For additional product information, contact your local authorized dealer, local technical sales representative or contact us using the information on the page back of this manual.

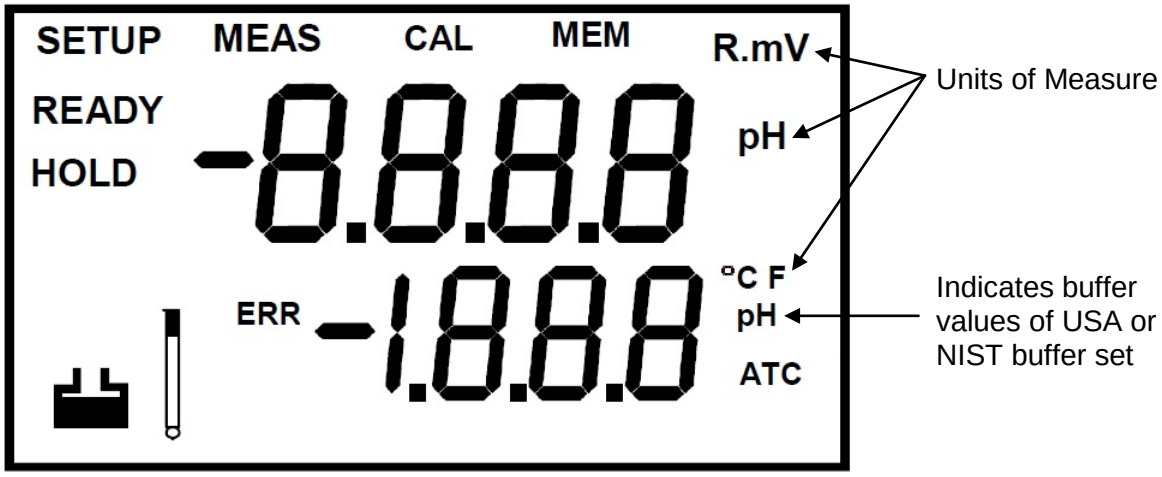
The specifications, descriptions, drawings, ordering information, part numbers and information presented in this manual are subject to change without notice and do not represent a commitment on the part of Fisher Scientific.

Display

The Fisher Scientific accumet AE150 pH benchtop meter display has mode indicators for pH, mV, relative mV (R.mV) and temperature readings.

The primary (upper) display shows the measured values of pH, mV or R.mV and the secondary (lower) display shows the temperature reading in Celsius or Fahrenheit.

Special indicators such as units of measure, error message, icons and modes are arranged around the measurements to give a simplified, uncluttered display.

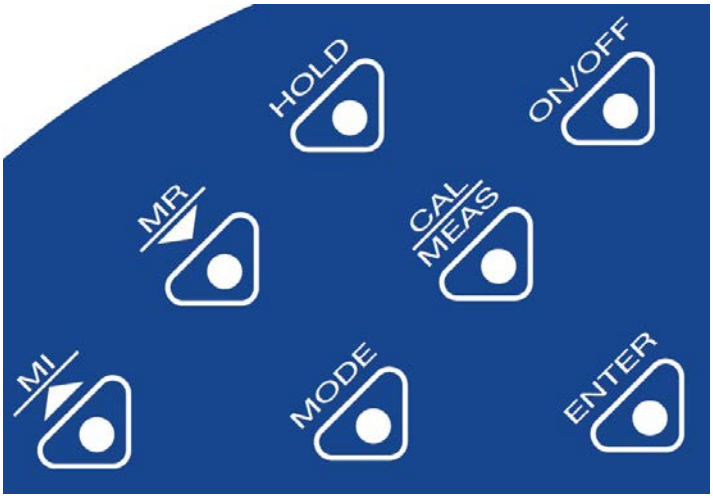


Icon	Description
SETUP	The meter is in the setup mode
MEAS	The meter is in the measure mode
CAL	The meter is in the calibration mode
MEM	Data is stored to the memory
READY	The measured value is stable
HOLD	The displayed value has been frozen
	Prompts user to select buffer during calibration; or indicates buffer error when flashing with ERR icon
	Indicates electrode error when flashing with ERR icon
ERR	An error in operation has occurred
ATC	Indicates Automatic Temperature Compensation is activated; when ATC is not displayed, temperature probe is not connected and manual temperature compensation is activated

Keypad

A splash-resistant membrane keypad with tactile feedback is designed to help make the meter easier to use. Key names and symbols assist with describing the function controls.

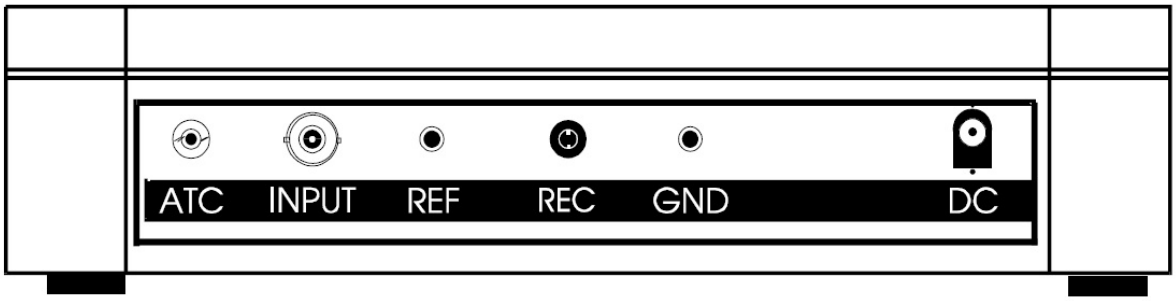
Fisher Scientific accumet AE150 pH Benchtop Meter Keypad



Key	Measure and Setup Modes	Calibration Mode
ON/OFF	Powers the meter on and off. When the meter is switched on, it automatically starts in the last mode of operation.	Powers the meter on and off.
CAL/MEAS	Toggles between the measurement and calibration modes of the meter. In the SETUP mode, pressing the CAL/MEAS key returns to the measurement mode.	---
MODE	Toggles between the different measure modes available: pH, mV and temperature.	Switches from pH to temperature in pH calibration mode.
HOLD	Freezes a measurement on the display. Press HOLD key again to update display with current readings.	---
MR/▼	MR key recalls measurements from memory and scrolls through log values. Down arrow key (▼) scrolls to next program in the SETUP mode.	Down arrow key (▼) scrolls values in mV calibration mode and selects temperature values in calibration mode.
MI/▲	MI key inputs measurements into memory and scrolls through log values. Up arrow key (▲) scrolls to next program in the SETUP mode.	Up arrow key (▲) scrolls values in mV calibration mode and selects temperature values in calibration mode.
ENTER	Enter functions in the memory mode.	Confirms and enters the value selected for calibration.

Rear Instrument Panel

The meter provides a set of connectors for the various accessories. Listed in the table are the details of the available meter connections.



Connection	Function
ATC	2.5 mm phono jack connection for ATC temperature probe
INPUT	For connection to sensors with BNC connectors; the meter accepts pH or ORP electrodes with a BNC connector; always ensure that the connector is clean and dry
REF	For connection to pin type reference half-cell electrode used with half-cell pH electrode
REC	For connection to strip chart recorders; use subminiature plug with positive tip to capture raw mV values
GND	For connection to the ground earth jack (standard tip connectors)
DC	For connection for the AC/DC power adapter

Meter Start Up

Connecting Electrodes and Accessories

Connect the accessory connectors at the rear of the instrument panel. During operation, it is important that water does not get onto the BNC connector. Also avoid touching the connector with soiled or wet hands.

Connecting the Sensor Electrode

Slide the electrode connector over the meter BNC socket marked “INPUT”. The meter can accept a standard pH or ORP electrode with a BNC connector. Align the slot of the electrode connector with the posts of the socket. Rotate the connector clockwise until it locks. For a separate reference half-cell electrode, push the reference electrode pin into the meter jack marked “REF”.

Connecting the ATC Temperature Probe

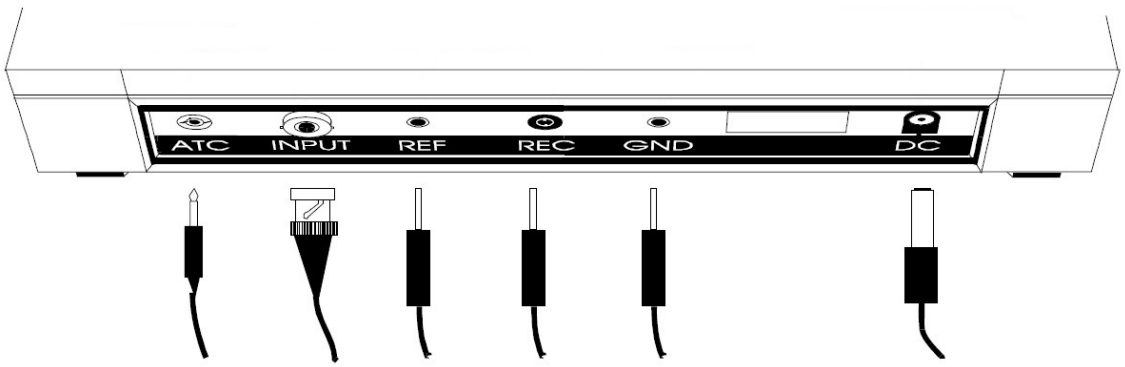
Insert the temperature probe into the connector marked “ATC”.

Connecting the AC Adapter

Slide the jack of the AC adapter into the meter input marked “DC” until it is firmly seated. Ensure the power is switched off before installation and the correct voltage adapter is used.

Connecting a Chart Recorder

Chart recorders or external output devices can be connected to the meter for continuous printout. Plug in the input connector and ground pin of the chart recorder into the ports marked “REC” and “GND” respectively.



Connecting the Electrode Holder (Optional)

The electrode holder is a useful tool for mounting electrodes during measurement or when electrodes are being stored. The meter's base plate (bottom of meter, shown in *Figure 1*) has a side metal bar to which a swivel electrode holder can be attached. The electrode holder can be mounted on either the right or left side of the meter.

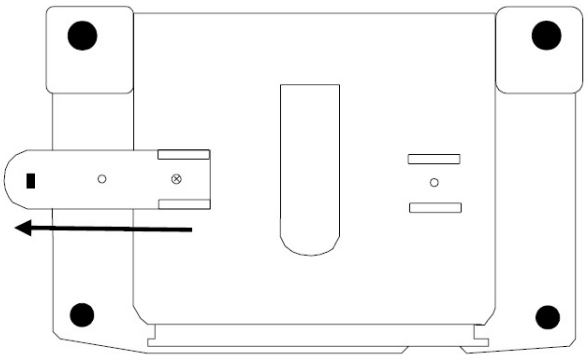


Figure 1:

To position the electrode arm:

Use a Phillips screwdriver to remove the screw holding the electrode holder. Slide the side metal bar until the second screw slot lines up with the original screw hole. Use the screw removed earlier to secure the electrode holder into position.

Note: The side metal bar is reversible. If desired, remove screw holding electrode holder base and slide out of brackets, Slide base into brackets on opposite side and tighten screw.

To install the electrode arm to the meter:

To mount the electrode arm into the metal rod on the side bar, align the slot with the metal rod and base of electrode arm, see *Figure 2*. Push it downwards until it fully sits into position. Avoid using excessive force when fixing or removing. The electrode arm is ready for use.

Note: Move the base of the electrode holder to swing the electrode holder about. To prevent the meter from toppling or causing spills, DO NOT move the body of the electrode holder.

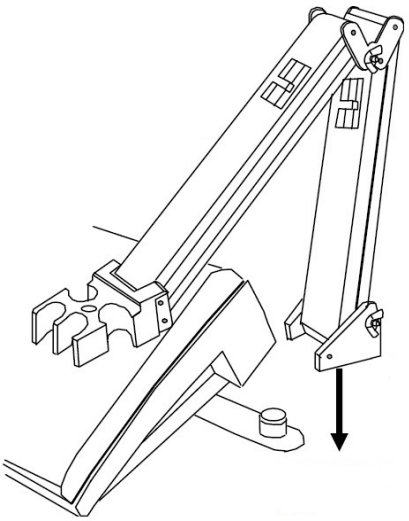


Figure 2:

Meter Preparation Prior to Calibration

Switching the Meter On and Off:

Press the **ON/OFF** key to power the meter on. All the LCD segments will be displayed for a few seconds and then the display switches to the last measurement mode. To power the meter off, press the **ON/OFF** key again.

Selecting the Measure Mode:

The measurement modes available are pH, mV, R.mV (for ORP) and temperature. Select the correct mode of operation by pressing the **MODE** key and each key press toggles to the next measurement mode. When selecting a particular parameter, the respective mode icon is shown at the right hand side of primary display; these include “pH” for pH, “°C” for temperature and “mV” for millivolt.

Meter Reset:

On first use, it is not necessary to reset the meter before calibration. To reset the meter to factory default, refer to the Meter Setup Functions section.

Note: After the meter is reset, a re-calibration is required before measurement. Likewise, to prepare a new set of measurements, all the last calibrated pH values can be reset simultaneously for added convenience.

Caution: All calibration values and memory data will be erased upon meter reset and calibration is required.

Selecting pH Buffer Standard:

The meter is capable of automatically recognizing either USA or NIST pH buffer standards. Refer to Meter Setup Functions for details on how to change the USA buffer standard to the NIST standard on the meter.

- USA Standard Buffer Option: pH 1.68, 4.01, 7.00, 10.01 and 12.45 buffers
- NIST Standard Buffer Option:pH 1.68, 4.01, 6.86, 9.18 and 12.45 buffers

Meter Setup Functions

Use the Setup mode to customize meter preferences and defaults:

- P1.0: Memory Clear (CLr)
- P2.0: View electrode data (ELE)
- P3.0: Select buffer set (bUF)
- P4.0: Reset to factory default settings (rSt)

To Enter the Setup Mode:

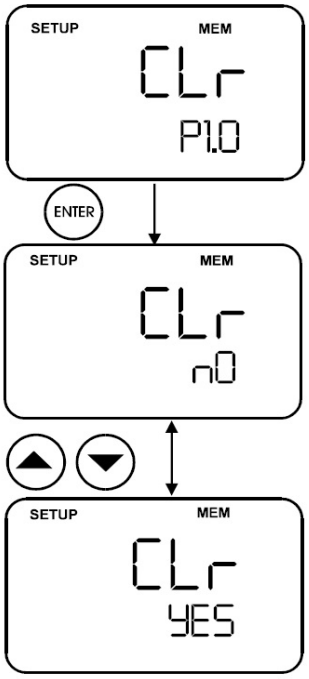
1. Turn the meter off by pressing the **ON/OFF** key.
2. With meter powered off, press and hold the **MODE** key and press and release the **ON/OFF** key. The display will show the "SETUP" indicator.
    a. If the display indicates that the meter is in the measurement mode, turn the meter off and repeat step 2 until the "SETUP" icon is shown.

Note: To exit the Setup mode at anytime without confirming changes, press the **CAL/MEAS** key until the measurement mode appears. You may have to press the **CAL/MEAS** key two times before the meter reverts to the measurement mode.

P1.0 Clear Memory Program

Use this program to clear all memory values when you need to store a new series of values. This avoids confusing the old values with the new ones. NO is the default setting.

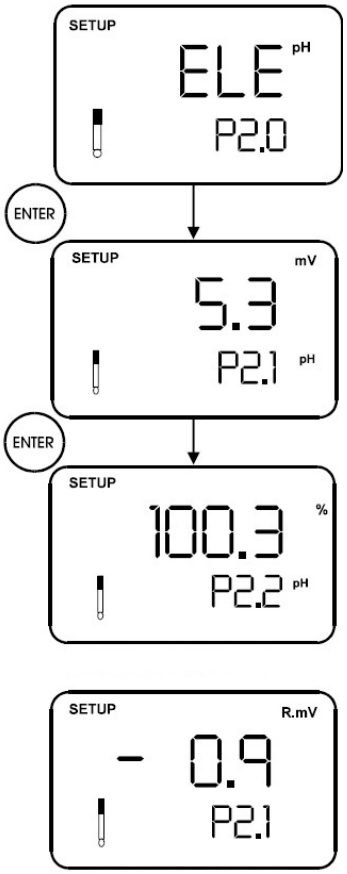
1. With the meter powered off, press and hold the **MODE** key and press and release the **ON/OFF** key. The display will show the "SETUP" indicator.
2. The meter will go to program P1.0. "CLr" is shown in the upper display and "P1.0" is shown in the lower display.
3. Press the **ENTER** key to access the program P1.0. The lower display will show either "nO" or "YES" (depending on last option selected or factory default of nO).
4. Press the ▲ or ▼ arrow key to toggle between the "nO" or "YES" setting. Selecting "YES" will erase all memory values.
5. Press the **ENTER** key to confirm the selection and return to the setup mode.
6. To go to the next program, press the ▲ or ▼ arrow key or to return to the measurement mode press the **CAL/MEAS** key.



P2.0 View Electrode Diagnosis Program

This program allows the electrode parameters to be checked for diagnostic purposes. Depending on the last display mode, the displayed electrode information will vary. If pH was the display mode, the electrode offset value in mV and slope in percent will be shown. If mV was the display mode, the electrode offset value in mV will be shown.

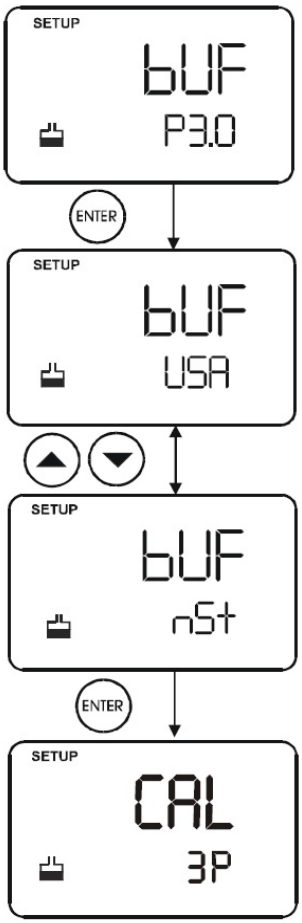
1. With the meter powered off, press and hold the **MODE** key and press and release the **ON/OFF** key. The display will show the “SETUP” indicator.
2. Press the ▲ or ▼ arrow key to scroll through the programs until “ELE” is shown in the upper display and “P2.0” is shown in the lower display. The electrode icon will also appear.
3. Press the **ENTER** key to access the program P2.0. The lower display will show “P2.1”.
4. The information shown in program P2.0 will depend on the mode the meter was in prior to powering the meter off:
    a. In the pH measurement mode:
        i. P2.1 shows the mV offset of the electrode. Press the **ENTER** key to go to P2.2.
        ii. P2.2 shows the slope in % of the electrode.
    b. In the mV measurement mode:
        i. P2.1 shows the mV offset of the electrode.
5. To exit P2.0 program press the **ENTER** key until “ELE” is shown in the upper display and “P2.0” is shown in the lower display.
6. To go to the next program, press the ▲ or ▼ arrow key or to return to the measurement mode press the **CAL/MEAS** key.



P3.0 Select pH Buffer Standard Program

This program allows for the selection from one of two standard calibration buffer sets, depending on your requirements. The available buffer sets are USA and NIST.

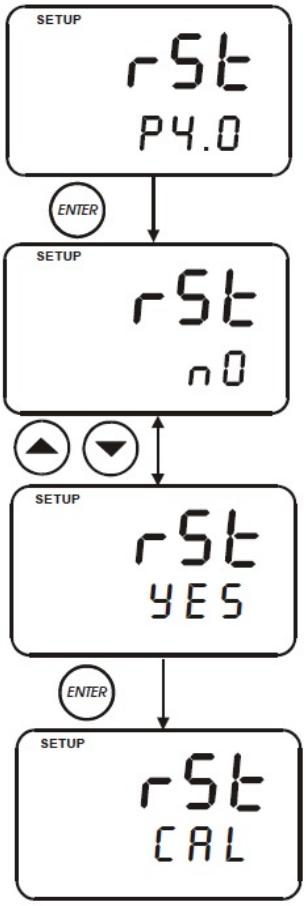
1. With the meter powered off, press and hold the **MODE** key and press and release the **ON/OFF** key. The display will show the “SETUP” indicator.
2. Press the ▲ or ▼ arrow key to scroll through the programs until “bUF” is shown in the upper display and “P3.0” is shown in the lower display. The buffer icon will also appear.
3. Press the **ENTER** key to access the program P3.0. The lower display will show either “USA” or “nSt” (depending on last option selected or factory default of USA).
4. Press the ▲ or ▼ arrow key to select the desired calibration buffer set:
    a. USA buffers: 1.68, 4.01, 7.00, 10.01, 12.45
    b. nSt buffers: 1.68, 4.01, 6.86, 9.18, 12.45
5. To confirm the selected buffer set, press the **ENTER** key. The meter will proceed to the selection mode for the number of calibration points.
6. Press the ▲ or ▼ arrow key to select the number of calibration points from 2 to 5.
7. To confirm the selected number of calibration points, press the **ENTER** key. All the characters on the display will flash briefly and then the display will return to P3.0.
8. To go to the next program, press the ▲ or ▼ arrow key or to return to the measurement mode press the **CAL/MEAS** key.



P4.0 Meter Reset Program

This program gives the option to either reset the calibration data for all parameters (pH and mV modes) or reset the meter back to the factory default conditions except for the temperature calibrated value and buffer set selection (NIST or USA).

1. With the meter powered off, press and hold the **MODE** key and press and release the **ON/OFF** key. The display will show the “SETUP” indicator.
2. Press the ▲ or ▼ arrow key to scroll through the programs until “rSt” is shown in the upper display and “P4.0” is shown in the lower display.
3. Press the **ENTER** key to access the program P4.0. The lower display will show “nO”.
4. Press the ▲ or ▼ arrow key to select “nO” or “YES”.
    a. Selecting “YES” will erase all calibration values for pH and mV modes (CAL) or reset the meter back to the factory default conditions (FCt).
    b. Selecting “nO” will deactivate the reset program.
5. To confirm the reset, make sure “YES” is shown and press the **ENTER** key.
6. Press the ▲ or ▼ arrow key to select “CAL” or “FCt” as the reset function.
    a. Selecting “CAL” will erase all calibration values for all modes (pH and mV).
    b. Selecting “FCt” will reset the meter back to the factory default conditions except for the temperature and buffer set selection (NIST or USA).
7. Press the **ENTER** key to confirm the reset. All the characters on the display will flash briefly and then the meter will return to the measurement mode.



Note: Once the reset is complete, calibrate the meter before taking any new measurements.

Calibration

pH Calibration

The Fisher Scientific accumet AE150 pH benchtop meter is capable of performing a one to five point pH calibration for accuracy across the pH measurement range.

The multi-point calibration offers flexibility of calibrating using either USA or NIST buffer sets with their fixed calibration points:

- USA Standard Buffer Option: pH 1.68, 4.01, 7.00, 10.01 and 12.45 buffers
- NIST Standard Buffer Option:pH 1.68, 4.01, 6.86, 9.18 and 12.45 buffers

For ATC temperature measurements, attach the temperature probe to the meter. The “ATC” icon will be shown on the display. Insert the temperature probe into the solution to be measured so that the sample temperature can be recorded and pH readings automatically temperature compensated. If manual temperature compensation is preferred, do not plug a temperature probe into the meter.

DO NOT REUSE SOLUTIONS AFTER CALIBRATION. Contaminants in the solution can affect the calibration, and eventually the accuracy of the measurements.

A one point calibration (offset calibration) must be performed using pH 7.00 buffer or pH 6.86 buffer; otherwise calibration will not be accepted.

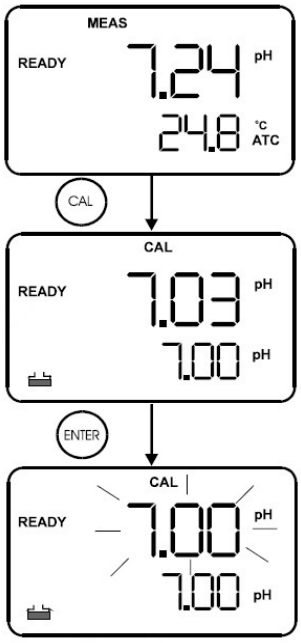
For slope-to-slope calibration (two point calibration), the first calibration point will only be successfully registered in the meter after the second point calibration has been completed.

It is recommended that you perform at least a two point calibration using buffers that bracket the expected sample range (one buffer above the sample pH and one buffer below the sample pH), starting with the pH 7.00 buffer or pH 6.86 buffer first.

All new calibrations will replace the existing stored calibration data.

1. To power the meter on, press the **ON/OFF** key. All the display segments will be displayed briefly and then the pH measurement mode will be displayed.
    a. If necessary press the **MODE** key to select the pH measurement mode.
2. The display will indicate the following:
    a. “MEAS” icon indicates the meter is in the measurement mode
    b. “pH” icon indicates the pH measurement mode is selected
    c. “°C” icon indicates the measured temperature reading
    d. “ATC” icon indicates automatic temperature compensation is active when a temperature probe is connected
3. Rinse the pH electrode with deionized water or rinse solution. If using a separate temperature probe, thoroughly rinse the temperature probe as well.
    a. Do not wipe the pH electrode or temperature probe, as this may cause a build-up of electrostatic charge that may cause measurement instability.

One Point Calibration



4. Select the first pH buffer (pH 7.00 or pH 6.86) and pour the buffer into a clean container.
5. Immerse the pH electrode and temperature probe into the first pH buffer.
    a. The tip of the pH electrode must be completely immersed in the buffer. Stir the electrode gently to create a homogenous solution.
6. Press the **CAL/MEAS** key to enter the calibration mode.
    a. The “CAL” icon will be shown on top of the display to indicate the meter is in pH calibration mode.
    b. The upper display will show the measured reading and lower display will indicate the pH buffer standard value, based on the selected buffer set.
7. Wait for the measured pH value to stabilize and the “READY” icon to be shown on the display.
8. Press the **ENTER** key to confirm the calibration point.
    a. The upper display will flash the calibration value briefly before storing the calibration point in the meter.
    b. The lower display will toggle between the next calibration buffer values, based on the selected buffer set.
9. Save the calibration or proceed to the next calibration point.
    a. If performing a one point calibration, press the **CAL/MEAS** key to return to the measurement mode and start taking pH readings.
    b. If performing a two to five point calibration, continue to step 10 (do not press the **CAL/MEAS** key).

Two to Five Point Calibration

10. Rinse the pH electrode with deionized water or rinse solution. If using a separate temperature probe, thoroughly rinse the temperature probe as well.
11. Select the second pH buffer (i.e. pH 4.01) and pour the buffer into a clean container.
    a. The meter will automatically recognize the buffers in the buffer set selected in the Setup mode, either USA (pH 1.68, 4.01, 7.00, 10.01 and 12.45 buffers) or NIST (pH 1.68, 4.01, 6.86 9.18 and 12.45 buffers).
12. Immerse the pH electrode and temperature probe into the second pH buffer.
    a. The lower display will update to the pH buffer standard value, based on the selected buffer set.
13. Wait for the measured pH value to stabilize and the “READY” icon to be shown on the display.
14. Press the **ENTER** key to confirm the calibration point.

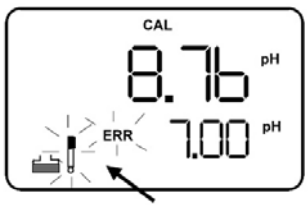
a. The upper display will flash the calibration value briefly before storing the calibration point in the meter.

b. The lower display will switch to the next calibration buffer value, based on the selected buffer set.

15. Save the calibration or proceed to the next calibration point.
    a. If performing a two point calibration, press the **CAL/MEAS** key to return to the measurement mode and start taking pH readings.
    b. If performing a three point calibration, continue to step 16 (do not press the **CAL/MEAS** key).
16. Rinse the pH electrode with deionized water or rinse solution. If using a separate temperature probe, thoroughly rinse the temperature probe as well.
17. Select the third pH buffer (i.e. pH 10.01 or pH 9.18) and pour the buffer into a clean container.
18. Immerse the pH electrode and temperature probe into the third pH buffer.
    a. The lower display will update to the pH buffer standard value, based on the selected buffer set.
19. Wait for the measured pH value to stabilize and the “READY” icon to be shown on the display.
20. Press the **ENTER** key to confirm the calibration.
    a. The upper display will flash the calibration value briefly before storing the calibration point in the meter.
    b. The meter will automatically proceed to the measurement mode after a three point calibration is completed, unless the number of calibration points is set to 4 or 5 using the P3.0 Program in the Setup mode. In this case, repeat steps 15-20 for the four or five point calibration.

Automatic Buffer Recognition Error

During the pH calibration, if the upper measured pH reading is not within the acceptable buffer value range for automatic buffer recognition, the “ERR” error icon and electrode icon will flash when the **ENTER** key is pressed. Press the **CAL/MEAS** key to exit the error calibration condition and return to the measurement mode. Refer to the Troubleshooting Guide section to verify the pH electrode performance and repeat the calibration.



Accepted Buffer Value Ranges

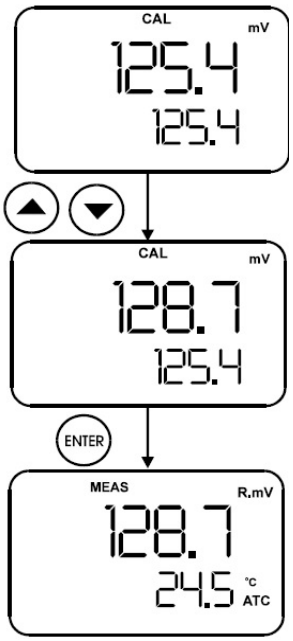
Buffer Set	Buffer Value	Accepted Range
USA	1.68	±1.00
USA	4.01	±1.00
USA	7.00	±1.50
USA	10.01	±1.00
USA	12.45	±1.00

Buffer Set	Buffer Value	Accepted Range
NIST	1.68	±1.00
NIST	4.01	±1.00
NIST	6.86	±1.25
NIST	9.18	±1.00
NIST	12.45	±1.00

mV Calibration

If relative mV has never been calibrated or if the meter has been reset, the value shown in the upper display during the calibration will be the same as the absolute mV value.

The range of adjustment is -1999 mV to +1999 mV with 1 mV resolution or -199.9 mV to +199.9 mV with 0.1 mV resolution.



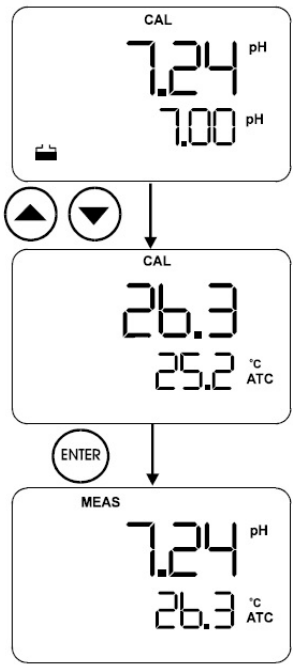
1. To power the meter on, press the **ON/OFF** key. All the display segments will be displayed briefly and then the pH measurement mode will be displayed.
    a. If necessary press the **MODE** key to select the pH measurement mode.
2. Press the **CAL/MEAS** key to enter the calibration mode.
    a. The “CAL” icon will be shown on top of the display to indicate the meter is in R.mV calibration mode.
    b. The upper display will show the relative mV reading and lower display will indicate the absolute mV value.
3. Rinse the electrode with an appropriate rinse solution. If using a separate temperature probe, thoroughly rinse the temperature probe as well.
4. Select a standard and pour the standard into a clean container.
5. Immerse the electrode and temperature probe into the standard.
6. Press the ▲ or ▼ arrow key to set the relative mV value to match the desired standard value.
7. Press the **ENTER** key to confirm the reading and the meter will proceed to the measurement mode. The upper display will show the relative mV reading and the “R.mV” icon will appear in the upper right hand corner.

Note: New mV calibrations will override existing stored mV calibration data. The meter retains stored mV calibrations even when the meter is turned off.

Temperature Calibration

To perform the temperature calibration procedure, the temperature probe must be attached to the meter and “ATC” icon must be shown on the display.

1. Immerse the temperature probe into a solution of known temperature, such as a temperature bath, for a few minutes until the temperature probe stabilizes.
2. To perform temperature calibration, you must be in the pH measurement mode.
    a. If necessary press the **MODE** key to select the pH measurement mode.
3. Press the **CAL/MEAS** key to enter the pH calibration mode.
4. Press the **MODE** key to switch to the temperature calibration mode.
5. Press the ▲ or ▼ arrow key to scroll to the correct temperature value corresponding to the known solution temperature.
    a. The meter allows a limit of ±5 °C variation with 0.1 °C resolution of the input temperature reading.
6. Once the correct temperature is set, press the **ENTER** key to confirm. The meter will automatically proceed to the pH measurement mode.



Measurements

Temperature Compensation

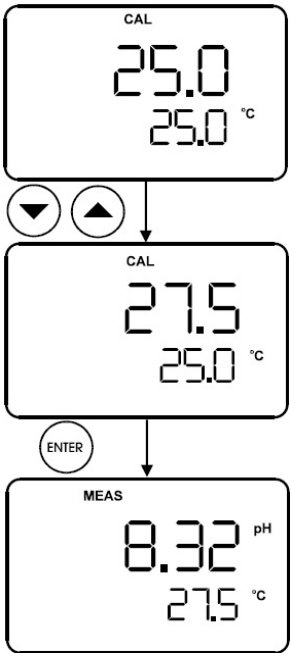
Automatic Temperature Compensation (ATC):

For ATC measurements, simply attach the temperature probe to the meter and the “ATC” icon will be shown on the display.

Note: If using a temperature probe, the probe must be submersed in the liquid being measured so that the sample temperature can be recorded and compensated for (pH measurement mode only) along with the primary measurement.

Manual Temperature Compensation (MTC):

Important: For manual temperature compensation, the temperature probe must be disconnected from the meter.



1. Power the meter on by pressing the **ON/OFF** key.
2. Press the **MODE** key to select the pH measurement mode.
3. Press the **CAL/MEAS** key to enter the pH calibration mode. The “CAL” icon will be shown above the upper display.
4. While in pH calibration mode, press the **MODE** key to enter temperature compensation mode.
    a. The upper display will show the current temperature setting and the lower display shows the default value 25.0 °C (if the meter has never been manually set for temperature) or the last manually set value if the meter has previously set for MTC. If you have not set the current temperature setting the upper display will also show the default value of 25.0 °C.
5. Check the temperature of the sample using an accurate thermometer.
6. Press the ▲ or ▼ arrow key to scroll to the temperature value corresponding to the measured sample temperature.
7. Once the correct temperature is set, press the **ENTER** key to confirm. The meter will automatically proceed to the pH measurement mode. The meter will compensate pH reading for the manually set temperature.

pH or mV Measurements

Note: Remove the protective cap or storage bottle (if any) from the electrode before proceeding with measurement or calibration. Take care not to exert too much force, as this may cause damage to the electrode. Whenever the electrode is not in use, put it into storage bottle or protect the electrode with the cap provided.

1. Rinse the electrode with deionized water or appropriate rinse solution before use to remove any impurities adhering to the electrode body. If the pH electrode was dehydrated, soak it for at least 30 minutes in electrode storage solution.
2. Power the meter on by pressing the **ON/OFF** key.
    a. The “MEAS” icon will be shown on the top of the display.
    b. The “ATC” icon will appear in the lower right corner of the display if a temperature probe is connected.
3. Press the **MODE** key to toggle between the pH or mV measurement mode.
4. Immerse the electrode and temperature probe into the sample.
    a. If using a pH electrode, make sure that the glass bulb of the pH electrode is completely immersed in the sample.
    b. Gently stir the electrode to create a homogeneous sample.
5. Wait for the reading to stabilize. When the reading stabilizes, the “READY” icon will be shown. Record all applicable readings.
    a. The “READY” icon is shown when pH readings are stable within a range of ±0.01 pH.

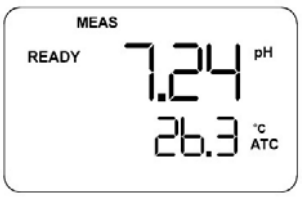
HOLD Function

The hold function allows the value of a measured reading to be frozen on the display. The hold function can be used at any time when in the measurement mode, as indicated by the “MEAS” icon.

To hold (freeze) a measurement, press the **HOLD** key while in measurement mode. The “HOLD” icon will be shown on the display.

The held (frozen) reading can be stored by pressing the **MI** key.

To release (unfreeze) a measurement, press the **HOLD** key a second time. The “HOLD” icon will disappear from the display and the “MEAS” icon will be shown on the display.

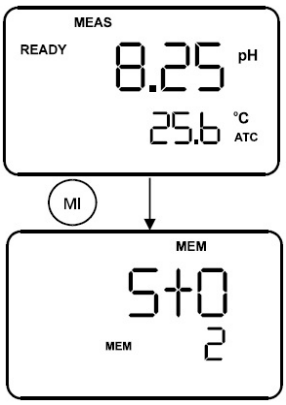


Storing and Recalling Data from Memory

The Fisher Scientific accumet AE150 pH benchtop meter allows up to 100 data sets to be stored and recalled in its non-volatile memory in a Last-In-First-Out (LIFO) sequence. Data sets are stored with a specified location, as indicated on the display. For example, 32 pH and temperature data sets and 18 mV and temperature data sets can be stored.

Memory Input:

The memory input feature allows measurement readings to be stored for later review. This mode can be used at any time during measurement mode or when the reading is frozen ("HOLD" icon is shown on the display by pressing the **HOLD** key).

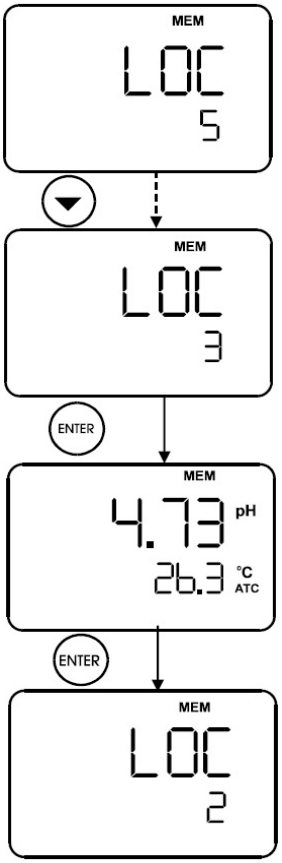


1. To store a reading during any measurement or HOLD function, press the **MI** key to input data into the memory.
2. The "MEM" icon, "StO" and memory number will be shown briefly on the display.
3. The meter will then return to the measurement mode.
4. To store another reading, press the **MI** key again.

Note: When the memory is full, the oldest stored data set will be erased to create space for the new data set.

Memory Recall:

Readings stored in the memory are retained even when the meter is powered off. To erase all readings stored in memory, use the P1.0 program in the setup mode.



1. In the measurement mode, press the **MR** key to retrieve the most recent stored reading.
2. The memory location screen with "MEM" icon, "LOC" and the memory number will be shown on the display.
3. Press the **ENTER** key to recall the reading stored under that memory number.
4. Press the **ENTER** key again to return to the main memory recall mode.
5. To view additional data sets, press the ▲ or ▼ arrow key to scroll to the desired data set location.
    a. For example, to view the third data set, press the ▲ or ▼ arrow key until "LOC 3" is shown and press the **ENTER** key to view the data from this location.
6. To continue reviewing additional stored data, press the **ENTER** key again.
7. To exit the memory recall mode, press the **CAL/MEAS** key to return to the measurement mode.

pH Electrode Maintenance

pH electrodes are susceptible to dirt and contamination and may need to be cleaned regularly, depending on the extent and condition of use.

After Use Storage

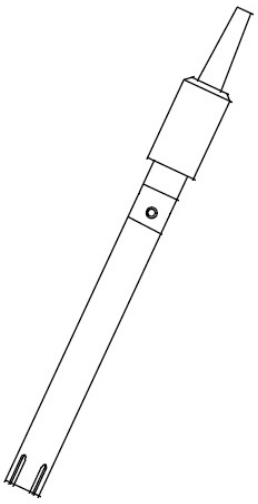
After measurements are done, use the following procedure for proper electrode storage:

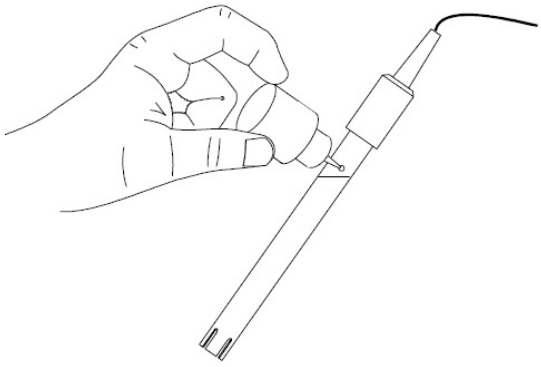
1. Wash the electrode and reference junction in deionized water.
2. If using a refillable electrode, close the fill hole by returning its rubber sleeve or stopper cap into position.
3. Store the electrode bulb in solution, preferably pH electrode storage solution.
    a. Using pH 4 buffer is also acceptable as a storage medium. Do not store electrodes in deionized water.
    b. The protective rubber cap or container filled with storage solution provides ideal electrode storage for long periods.

Electrolyte Replacement (for refillable electrodes only)

Refill the reference electrolyte when the pH electrode has been used for an extended period or if the internal electrolyte dries up. To accomplish this, use the following procedure:

1. Remove the protective rubber cap or sleeve to expose the fill hole of the electrode.
2. Remove the old electrolyte by flushing it out with a flexible syringe or lint-free tissue.
3. Add in fresh electrolyte until it reaches the level of the fill hole. The type of reference electrolyte depends on the specific electrode being used.
4. Rinse the electrode and reference junction with deionized water and gently tap dry.





Note: If replacing the reference electrolyte fails to restore normal electrode response, attempt to clean and rejuvenate the electrode.

Electrode Cleaning and Rejuvenation

pH electrodes that are functioning properly or have not been in use for a period of time may be restored to normal performance by one or a combination of following procedures:

Salt deposits – dissolve the salt deposits by immersing the electrode in a container filled with warm tap water for ten to fifteen minutes and then thoroughly rinse it with deionized water.

Oil/grease films – wash the pH electrode bulb in mild detergent and water and then rinse the electrode tip with deionized water.

Clogged reference junction – heat a dilute 1% KCl solution to 60 °C. Place the sensing portion of the pH electrode into the heated KCl solution for approximately 10 minutes. *Care must be taken when performing this procedure.* Allow electrode to cool while immersing it in an unheated KCl solution.

Protein deposits – use protein cleaning solution to remove any protein that is deposited onto pH electrode. Allow the electrode to stand in the cleaning solution for five to ten minutes.

pH Electrode Rejuvenation

Caution: Proper protective eyewear and precautionary measures must be used when performing the rejuvenation, as it involves the use of concentrated acid and alkaline.

Generally, if the storage and maintenance procedures have been closely followed, the pH electrode can be used immediately. However, should the electrode response become sluggish, it may be possible that the glass bulb has dehydrated. Immersing the electrode in storage solution for 1- 2 hours can rehydrate the glass bulb. If this fails, the electrode may require rejuvenation. At no time should you touch or rub the glass bulb, as this causes the build-up of electrostatic charge. If cleaning procedures do not re-activate the electrode to acceptable status, try rejuvenating the electrode using the following procedure.

1. Dip and stir the electrode in a concentrated acid (i.e. HCl, H_2SO_4) for 5 minutes.
2. Leave the electrode in tap water for 15 minutes.
3. Dip and stir the electrode in a strong base (NaOH) for 5 minutes.
4. Leave the electrode in tap water for 15 minutes.
5. If the electrode is refillable, remove the old electrolyte and add new electrolyte.
6. Test the pH electrode with standard calibration buffer solutions.
7. If needed, repeat the rejuvenation procedure up to 3 times. If the response does not improve, the electrode has completed its useful life. Replace it with a new electrode.

Troubleshooting Guide

Error Messages

The table provides a quick guideline for diagnosis of possible problems indicated by meter generated messages. The table also provides possible solutions to problems encountered.

Error Message	Indicates	Cause	Corrective Action
Err icon	Wrong keypad input	Key does not work in the current operation mode	Release key and select valid keys depending on mode
Err + Electrode icons	Calibration error	Buffer value does not match value displayed or electrode is disconnected or failing	Use fresh buffer solution, check electrode connection or possibly replace electrode
Ur or Or (in upper Display)	Measured value is out of range	• Electrode not connected, • Electrode clogged, dirty or broken • Meter not calibrated • Measurement is under range or over range	• Make sure electrode is connected • Clean or replace electrode Recalibrate the meter • Treat samples to bring within meter measuring range

General Troubleshooting

Problem	Probable Cause	Remedial Action
No display	Main power not switched on	Switch on the power supply
	AC Adapter socket not inserted properly	Re-insert AC Adapter socket
Unstable reading	Insufficient reference electrolyte in electrode	Fill electrode with reference electrolyte
	Broken electrode	Replace electrode
	External noises or induction (i.e. electrical noise caused by a nearby motor)	Remove or switch off interfering device
	Dirty electrode	Clean the electrode, hydrate and then rejuvenate if necessary
Slow response	Dirty electrode	Clean the electrode, hydrate and then rejuvenate if necessary
Meter not responding to key	HOLD mode in operation	Cancel Hold mode by pressing the HOLD key
	Internal program error	Reset all internal programs by removing and reinserting the A/C adapter

Additional Information

pH and Temperature

Automatic Temperature Compensation (ATC) compensates for temperature changes. Some solutions show an increase in pH while others show a decrease in pH with the same temperature change. Always record the solution temperature along with the pH value when taking measurements. Temperature changes also affect the signal the pH electrode sends to the meter and cause a loss of accuracy for the reading if they are not accounted for. To limit the loss of accuracy during calibration, ensure the temperature of the pH buffer solutions and the sample solutions are the same.

Use of Standard pH Buffers

Use standard buffer solutions to calibrate a pH meter before measuring the pH of a sample. They serve as reference standards for basis of comparison between measurements. The most common USA standard buffers are the pH 1.68, 4.01, 7.00, 10.01 and 12.45 buffers and NIST standard buffers are pH 1.68, 4.01, 6.86, 9.18 and 12.45 buffers. For one point calibration, use a standard buffer of pH 7.00 or pH 6.86. Use two point calibration when you know the sample is acidic (low pH) or basic (high pH). For acidic samples, use standard buffers of pH 7.00 and pH 4.01. For basic samples, use standards of pH 7.00 and pH 10.01. Use a three to five point calibration when the sample pH is unknown.

Standard pH Buffers

The following table shows pH buffer values at various temperatures during calibration. The table also illustrates why a calibration value may be different from the buffer value at 25 °C.

	USA pH Buffer				
Temp. (°C)	1.68	4.01	7.00	10.01	12.45
0	1.67	4.01	7.12	10.32	13.43
5	1.67	4.01	7.09	10.25	13.21
10	1.67	4.01	7.06	10.18	13.00
15	1.67	4.00	7.04	10.12	12.81
20	1.68	4.00	7.02	10.06	12.63
25	1.68	4.01	7.00	10.01	12.45
30	1.69	4.01	6.99	9.97	12.29
35	1.69	4.02	6.98	9.93	12.13
40	1.70	4.03	6.97	9.89	11.99
45	1.70	4.04	6.97	9.86	11.84
50	1.71	4.06	6.97	9.83	11.70
55	1.72	4.08	6.97	9.81	11.58
60	1.73	4.10	6.98	9.79	11.45
65	1.73	4.11	6.98	9.77	11.45
70	1.74	4.12	6.99	9.76	11.45
75	1.75	4.14	6.99	9.75	11.45
80	1.77	4.16	7.00	9.74	11.45
85	1.78	4.18	7.01	9.73	11.45
90	1.80	4.23	7.02	9.73	11.45
95	1.81	4.23	7.03	9.74	11.45
100	1.81	4.23	7.03	9.74	11.45

	NIST pH Buffer				
Temp. (°C)	1.68	4.01	6.86	9.18	12.45
0	1.67	4.01	6.98	9.46	13.43
5	1.67	4.01	6.95	9.40	13.21
10	1.67	4.01	6.92	9.33	13.00
15	1.67	4.00	6.90	9.28	12.81
20	1.68	4.00	6.87	9.23	12.63
25	1.68	4.01	6.86	9.18	12.45
30	1.69	4.01	6.85	9.14	12.29
35	1.69	4.02	6.84	9.11	12.13
40	1.70	4.03	6.84	9.07	11.99
45	1.70	4.04	6.83	9.04	11.84
50	1.71	4.06	6.83	9.01	11.70
55	1.72	4.08	6.83	8.99	11.58
60	1.73	4.10	6.84	8.96	11.45
65	1.73	4.11	6.84	8.94	11.45
70	1.74	4.12	6.85	8.92	11.45
75	1.75	4.14	6.85	8.91	11.45
80	1.77	4.16	6.86	8.89	11.45
85	1.78	4.18	6.87	8.87	11.45
90	1.80	4.23	6.88	8.85	11.45
95	1.81	4.23	6.88	8.85	11.45
100	1.81	4.23	6.88	8.85	11.45

Meter Specifications

pH Range	0.00 to 14.00 pH
pH Resolution	0.01 pH
pH Accuracy	± 0.01 pH
mV Range	± 1999 mV
mV Resolution	0.1 mV (± 199.9 mV), 1 mV beyond ± 200 mV
mV Accuracy	± 0.2 mV (± 199.9 mV), ± 2 mV beyond ± 200 mV
mV Offset Adjustment	Up to ±150 mV
Temperature Range	0.0 to 100.0 °C
Temperature Resolution	0.1 °C
Temperature Accuracy	± 0.3 °C
ATC Temperature Calibration	Offset in 0.1 °C increments; Offset range: ± 5 °C
Temperature Compensation	Automatic or manual (0 to 100 °C)
pH Calibration Points	1 to 5 points with automatic buffer recognition (ABR)
pH Buffer Calibration Options	USA : pH 1.68, 4.01, 7.00, 10.01, 12.45 NIST: pH 1.68, 4.01, 6.86, 9.18, 12.45
Memory	100 data sets
Hold Function	Yes
Self-diagnostic Messages	Yes
pH Slope & Offset Display	Yes
Inputs	BNC, 2.5 mm phono plug, reference pin tip, ground
Output	Recorder (+/- 2000 mV)
Power Requirements	AC/DC 9V Adapter (110/220VAC, 50-60Hz)
Display	Dual line LCD with icons
Dimensions	Meter with electrode holder: 18 x 23 x 6 cm (7.1 x 9.1 x 2.4 in)
Weight	Meter with electrode holder: 1.25 kg (2.76 lb)
Warranty	3 years
Operating Ambient Temperature	5 to 45 °C
Operating Relative Humidity	5 to 85%, non-condensing
Storage Temperature	-20 to 60 °C
Storage Relative Humidity	5 to 85%, non-condensing
Pollution	Degree 2
Overvoltage	Category II
Regulatory and Safety	CE

Ordering Information

Catalog Number	Description
13-636-AE150	Fisher Scientific accumet AE150 pH benchtop meter and stand
13-636-AE151	Fisher Scientific accumet AE150 pH benchtop meter education set with 13-620-108B single junction gel pH electrode, 13-620-22 ATC probe and stand
13-636-AE152	Fisher Scientific accumet AE150 pH benchtop meter bio set with 13-620-299B double junction gel pH electrode, 13-620-22 ATC probe and stand
13-636-AE153	Fisher Scientific accumet AE150 pH benchtop meter 3-in-1 set with 13-620-AE6 3-in-1 single junction gel pH/ATC electrode and stand
13-620-AE6	Fisher Scientific accumet AE series 3-in-1 single junction gel pH/ATC electrode
13-620-108B	Fisher Scientific accumet AE series single junction gel pH electrode
13-620-299B	Fisher Scientific accumet AE series double junction gel pH electrode
13-620-21	Fisher Scientific accumet AE series ATC temperature probe (120 mm length)
13-620-22	Fisher Scientific accumet AE series ATC temperature probe (90 mm length)

Warranty

The accumet AE150 pH benchtop meter is supplied with a 3 year warranty from manufacturing defects from the date of purchase.

If repair or adjustment is necessary and has not been the result of abuse or misuse within the designated period, please request to return the meter and correction will be made without charge. Out of warranty products will be repaired on a charged basis.

Exclusions: The warranty on the meter shall not apply to defects resulting from:

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

For technical assistance contact your Fisher Scientific representative or visit www.fishersci.com/accumet or email accumet@fishersci.com

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