Water Quality Meter

850081

Instruction Manual

SPER
SCIENTIFIC LTD.

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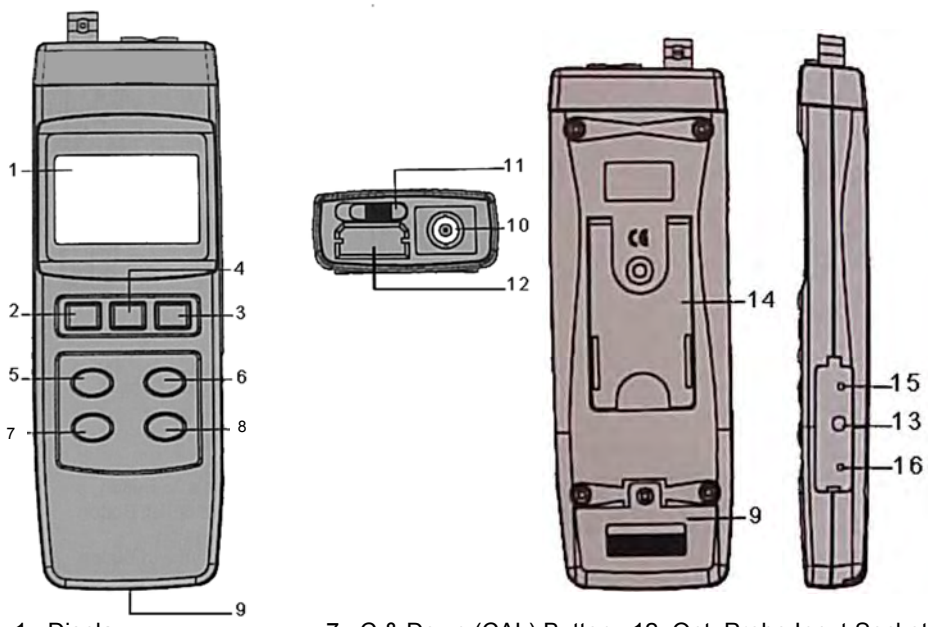
I. INTRODUCTION

Using interchangeable probes this versatile meter reads pH, mV, conductivity, TDS, D.O. temperature and ORP. Order probes for only the parameter you currently require and add additional probes in the future. Intelligent probes electronically retain calibration information. No recalibration is required when changing probes, and pH can be calibrated without buffer solutions when they are not available.

The display simultaneously reads temperature in user-selectable ºC & ºF and all measurements are automatically temperature compensated. The RS-232 port enables communication with a computer. Also features automatic shut off, hold, maximum/minimum, fold out easel back and a tripod screw. Comes with 9V battery and a hard-shell foam-lined carrying case with room for one or two probes.

II. PANEL DESCRIPTION

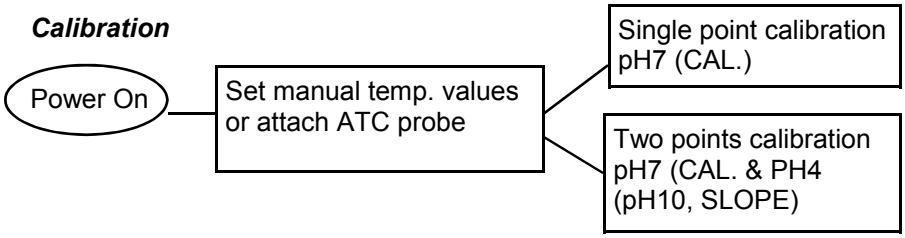
Fig. 1



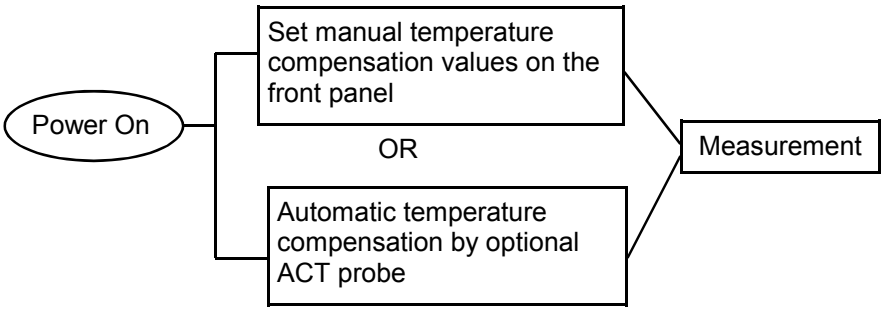
1. Display
2. Power Button
3. REC. Button
4. Hold Button
5. A & UP (°C/°F) Button
6. B & LEFT (PH/mV) Button
7. C & Down (CAL) Button
8. D (TEMP.C) Button
9. Battery Compartment
10. pH BNC Input Socket
11. Probe Lock
12. Opt. Probe Input Socket
13. RS-232 Out Terminal
14. Stand
15. PH7 Cal.
16. PH4/PH10 Cal.

III. Procedures Overview

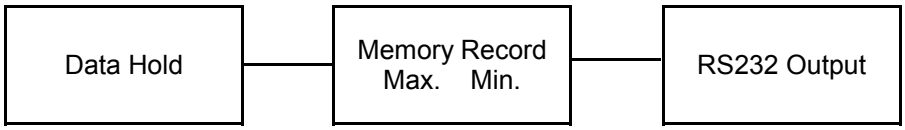
Calibration



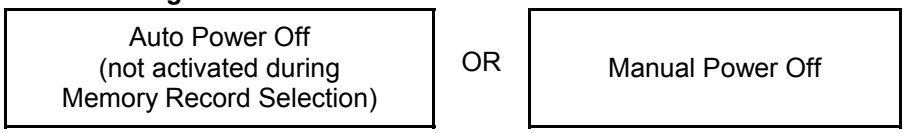
PH Measuring Procedure



Optional Measuring Procedure



Power Management



IV. OPERATING INSTRUCTIONS

A. **TEMPERATURE COMPENSATION** - pH measurement.

Note: The meter is factory set for a solution temperature of 77°F/25°C.

1. Manual Temperature Compensation for pH Measurement

- Slide the **LOCK SWITCH** to the locked position and press the **POWER** button. The LCD flashes momentarily.
- The temperature is shown in the lower display (Fig.2). Press the **°C/°F** button to select the desired unit of measure.
- Press the **TEMP.C** button to adjust the manual temperature compensation by using the **LEFT**, **UP** and **DOWN** buttons.
- Press the **TEMP.C** button 3 times to return to the measuring mode.

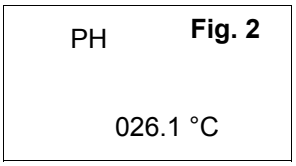


Fig. 2

2. Automatic Temperature Compensation (ATC) for pH Measurement

- Connect the pH electrode to the **BNC SOCKET**. Plug the ATC probe into the **OPTIONAL PROBE INPUT SOCKET**. Slide the **LOCK SWITCH** to the locked position and press the **POWER** button. The LCD flashes momentarily.
- Press the **PH/MV** button and select the pH mode. "PH" is displayed on the LCD.
- Insert both probes into the solution. The pH measurement will be automatically compensated for temperature.

B. PH CALIBRATION PROCEDURES

The meter is factory calibrated to simulate the ideal pH electrode (0 mV at pH 7.00 and 177.4 mV at PH 4, based on an ambient temperature of 77°F/25°C).

1. Electronic Calibration of the Meter Only (without buffers)

- If applicable detach the ATC probe. Slide the **LOCK SWITCH** to the locked position and press the **POWER** button. The LCD flashes momentarily.
- Attach the pH probe to the **BNC SOCKET**and press the **PH/MV** button to select the pH mode ("PH" is displayed on the LCD).
- To adjust the pH 4 default value, press the **TEMP.C** button twice. The upper display will show "4.00" and the lower display will show the pH 4 default calibration value (Fig.3). Use the **UP** and **DOWN** buttons to adjust the value.

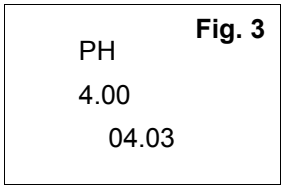


Fig. 3

See Fig.1, Pg.4 for inputs & button locations

- To adjust the pH 7 default value, press the **TEMP.C** button again. The upper display will show "7.00" and the lower display will show the PH 7 default calibration value (Fig.4). Use the **UP** and **DOWN** buttons to adjust the value.

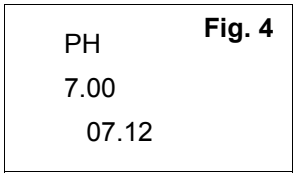


Fig. 4

- To adjust the pH 10 default value, press the **TEMP.C** button again .The upper display will show "10.00" and the lower display will show the pH 10 default calibration value (Fig.5). Use the **UP** and **DOWN** buttons to adjust the value. Press the **TEMP.C** button again to exit.

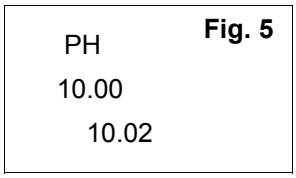


Fig. 5

NOTE: To skip any of the above procedures, press the **Temp.C** button twice. The pH calibration values you set will become the default values. This is convenient when pH 4, pH 7, and pH 10 buffer solutions are not available.

2. Chemical Calibration of the Meter and Electrode (buffers required)

Buffer solutions and a pH electrode are needed to perform the following procedures.

Two Point Calibration

- Connect the PH electrode to the **BNC SOCKET.**
- Ensure that the temperature setting is adjusted to the temperature of the pH buffer solution. See TEMPERATURE COMPENSATION on page 5.
- Press the **PH/MV** button and select the pH mode. "PH" is displayed on the LCD.

PH 7 Calibration

- Rinse the electrode with distilled water and immerse the electrode into the pH7 buffer solution.
- Press the **CAL** button. The upper display flashes "CAL" and the lower display shows the default calibration value (Fig.6).
- After approximately 5 seconds, the meter calibrates itself automatically. The upper display will show the calibrated value, the lower display will show temperature (Fig.7).

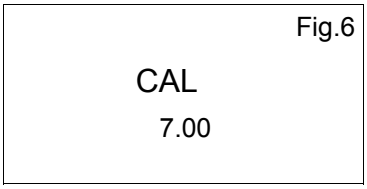


Fig.6

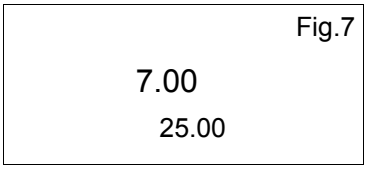


Fig.7

PH 4 or PH 10 Calibration

- Rinse the electrode with distilled water and immerse the electrode in the pH4 or pH10 buffer solution.
- Press the **CAL** Button. The upper display

See Fig.1, Pg.4 for inputs & button locations

shows "CAL" and the lower display shows the default calibration value (Fig.8).

- "CAL" will flash on the LCD for around 5 seconds. After that, the meter calibrates itself automatically. The upper display will show the calibrated value, the lower display will show temperature (Fig.9).
- Rinse the electrode again.
- To ensure the highest degree of accuracy, repeat calibration procedures at least two more times, using fresh solution.

Fig. 8

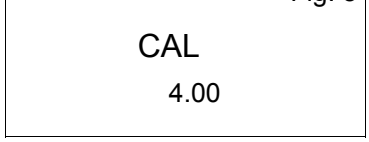
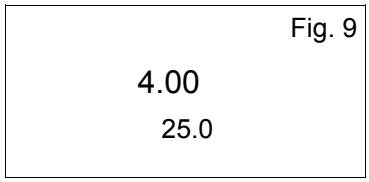


Fig. 9



Single Point Calibration

Single point calibration can be performed using the pH7 calibration instructions. For the most accurate measuring results, two point calibration is recommended.

3. Procedures for meters that are out-of-calibration by more than 1 pH of the Calibration Solution.

1 pH of pH 7, (when the measurement is >pH 8 or <pH 6)
1 pH of pH 4, (when the measurement is >pH 5 or <pH 3)
1 pH of pH 10, (when the measurement is >pH 11 or <pH 9)

- Connect the pH electrode to the **PH BNC INPUT SOCKET**. Slide the **LOCK SWITCH** to the locked position and press the **POWER** button. The LCD flashes momentarily. Press the **PH/MV** button and select the pH mode. "PH" is displayed on the LCD.
- Set the Manual Temperature Compensation value to 77°F/25° (page 5).
- Rinse the electrode with distilled water and place it into a standard solution (pH 7, pH 4 or pH 10). The PH reading is displayed on the LCD.

  For pH7: Adjust the **PH7 CAL.** until the reading is within pH6 ~ pH8,

  pH4: Adjust the **PH4/PH10 CAL.** until the reading is within pH3 ~ pH5,
  pH10: Adjust the **PH4/PH10 CAL.** until the reading is within pH9 ~ pH11.

- Complete the calibration by using the Single or Two Point Calibration procedures on pages 6 and 7.

C. MEASUREMENT PROCEDURES

1. Temperature

- Plug the ATC temperature probe into the **OPTIONAL PROBE INPUT SOCKET**.
- Slide the **LOCK SWITCH** to the locked position and press the **POWER**

See Fig.1, Pg.4 for inputs & button locations

button. The LCD flashes momentarily.

- Press the **°C/°F** button to select the desired unit of measure.
- Place the temperature probe into the solution and the LCD will display the measurement.

2. PH Measurement

Once the unit has been calibrated:

- Connect the pH Electrode to the **PH BNC INPUT SOCKET**.
- Press the **PH/MV** button to select the pH mode. ("PH" appears on the LCD).
- Place the electrode into the solution. The pH measurement is displayed.
- Rinse the electrode with distilled water after each use.

3. mV Measurement

The mV (millivolt) mode, enables the user to make ion-selective, oxidation-reduction potential (ORP), and other precise mV measurements.

- Press the **PH/MV** button and select the mV mode ("mV" appears on the LCD).
- Place the electrode into the solution. The mV measurement is displayed.
- Rinse the electrode with distilled water after each use.

4. Hold

- During the measuring procedure, press the **HOLD** button to freeze the display. The LCD will display the word: "HOLD."
- Press the **HOLD** button again to exit.

5. Maximum / Minimum

To record the maximum and minimum readings:

- Press the **REC** button once. "REC" appears on the LCD.
- Press the **REC** button again. "REC Max" and the maximum measurement appear on the LCD. (To delete the maximum measurement, press the **HOLD** button for at least 2 seconds. When released, the LCD displays only "REC".)
- Press the **REC** button again. "REC Min" and the minimum measurement appear on the LCD. (To delete the minimum measurement, press the **HOLD** button for at least 2 seconds. When released, the LCD displays only "REC".)
- To exit the this function, press and hold the **REC** button for at least 2

See Fig.1, Pg.4 for inputs & button locations

seconds, until the display reverts to the current reading.

D. AUTOMATIC SHUT OFF

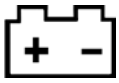
The instrument has an automatic shut off function in order to prolong battery life. After approximately 10 minutes without activity (no buttons pushed), the meter will automatically shut off. To disable this feature, press the **REC** button.

E. OVERLOAD INDICATOR

When the measurement is out of range, "- - - -" appears on the display. Additional information may be contained in the individual probe instruction manual(s).

F. BATTERY REPLACEMENT

- Replace the battery when the low battery icon is displayed in the left corner of LCD. In-spec measurements may be made for several hours after the low battery indicator appears.



- Slide the battery cover away from the instrument, remove the battery and replace with a 9V battery (alkaline or heavy duty type).
- Close the battery cover.

G. RS232 PC SERIAL INTERFACE

The instrument features RS232 output via a 3.5 mm terminal. The signal output is a 16-digit data stream that can be adapted to user-defined applications. A RS232 lead with the following connection is required to link the instrument with the PC serial interface.

Meter (3.5 mm jack plug)	PC (9W 'D" Connector)	
Center Pin	Pin4	Pin 2 ┐ 2.2 K
Ground/shield	Pin 2	Pin 5 ┘ resistor

See Fig.1, Pg.4 for inputs & button locations

The 16 digits data stream will be displayed in the following format:	
D15 D14 D13 D12 D11 D10 D9 D8 D7 D6 D5 D4 D3 D2 D1 D0	
Each digit indicates the following status:	
D0	End Word
D1 & D8	Display reading, Dl = LSD, D8 = MSD E.g: If the display reading is 1234, then 08 to Ohs: 00001234
D9	Decimal Point (DP), position from right to the left 0 = No DP, 1= 1 DP, 2 = 2 DP, 3 = 3 DP
D10	Polarity: 0 = Positive 1 = Negative
D11 & D12	Annunciator for Display °C=O1 °F=02 mV=18 mS=14 0-6F1 = 06 mg/L = 07
D13	The upper display data = 1, The lower display data = 2
D14	4
D15	Start Word
RS232 FORMAT: 9600, N, 8, 1	

V. SPECIFICATIONS

Circuit	Custom one-chip microprocessor LSI circuit.	
Display	51 mm x 32 mm, dual function LCD display, 15mm (0.6") digit size.	
Input Impedance	10^{12} ohm	
Temperature Compensation for pH measurement	Manual	0-100°C, adjusted by the °C/°F button.
	Automatic (ATC)	With optional probe, 1-65°C
Ph Calibration	pH 7, pH 4, & pH 10, 3 points calibration ensures the best linearity and accuracy.	
PH Electrode	Opt., any pH electrode with BNC connector.	
Operating Temperature	0°C to 50°C (32°F to 122°F).	
Operating Humidity	Max. 80% RH.	

Sampling Time	Approximately 0.8 seconds.
Power Supply	006P DC 9V battery (Alkaline or heavy duty).
Power Current	Approximately DC 7 mA.
Weight (meter)	8.8 oz (250 g).
Size (meter)	7 ¾" x 2 ½" x 1" (195 x 68 x 30 mm).
Standard Accessories	Hard-shell foam-lined Case & 9V Battery.

VI. OPTIONAL ACCESSORIES (item number and description)

840090 Water Resistant Instrument Pouch.
840092 Bench-Top Tripod.
840093 Field Tripod.
850080 Software.
840057 RS232 Cable.

PROBES	Unit of Msrmt.	Range	Resolution	Accuracy
pH (Standard BNC connector) 840016	pH	0 ~ 14	0.01	±(0.02PH + 2d)
pH Spear Tip (Standard BNC connector) 840049	pH	0 ~ 14	0.01	±(0.02PH + 2d)
ATC Temp. Probe 850082	°C	0 ~ 65	0.1	± 0.8
	°F	32 ~ 149		± 1.5
Conductivity Probe 850083	mS	0.2 ~ 1.999	0.001	±(3%fs + 1d)
	mS	2 ~ 19.99	0.01	
	ºC	0 ~ 60	0.1	0.8
	ºF	32 ~ 140		1.5
Conductivity/TDS Probe 850084	mS	0.2 ~ 2.000	0.001	±(3%fs + 1d)
	mS	2 ~ 20.00	0.01	
	PPM	132 ~ 1320	1	
	PPM	1320~13,200	10	
	ºC	0 ~ 60	0.1	0.8
	ºF	32 ~ 140		1.5
DO Probe 850085 / 850087	mg/L	0 ~ 20	0.1	±0.4
	ºC	0 ~ 50	0.1	0.8
	ºF	32 ~ 122		1.5
ORP (Standard BNC connector) 850088	mV	0 ~ 1999	1	±(0.5% + 2d)

5 YEAR METER WARRANTY

Sper Scientific warrants this product against defects in materials and workmanship for a period of five (5) years from the date of purchase, and agrees to repair or replace any defective unit without charge. If your model has since been discontinued, an equivalent Sper Scientific product will be substituted if available. This warranty does not cover probes, batteries, or damage resulting from accident, misuse, or abuse of the product. In order to obtain warranty service, simply ship the unit postage prepaid to:

SPER SCIENTIFIC LTD.
7720 East Redfield, Suite 7
Scottsdale, Arizona 85260
(480) 948-4448
www.sperscientific.com

Please Note: The defective unit must be accompanied by a description of the problem and your return address.