Water Quality Meter

850081

Water Quality Meter Kit

850086

Instruction Manual

SPER
SCIENTIFIC

Environmental Measurement Instruments

Water Quality Meter - 850081
Water Quality Meter Kit - 850086

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INTRODUCTION

This Sper Scientific Water Quality Meter (Model 850081) uses optional, interchangeable probes to read pH, millivolt (mV)/ oxygen reduction potential (ORP), conductivity, total dissolved solids (TDS), salinity, dissolved oxygen (DO) and temperature with optional probes. Order only the probes required for your current parameters and add additional probes in the future.

All probes are optional and not included with the meter.

The meter automatically recognizes pH buffers 4, 7 and 10 for simple calibration. Other features include readings in °C or °F, automatic temperature compensation (ATC) and salinity and altitude compensation for DO measurements.

Additional features include automatic shutoff, minimum and maximum values, a fold-out easel back and a tripod mounting screw.

FEATURES

• Reads pH, mV/ORP, conductivity, TDS, salinity, DO and temperature with optional probes

• Automatic temperature compensation

• Automatic calibration recognition of pH buffers

• Salinity and altitude compensation for DO measurements

• Maximum and minimum values

• Hold function

• Temperature units in °C or °F

• Battery or optional DC 9V power adapter

• Tripod mounting screw

• Automatic shutoff

• Backlight

MATERIALS SUPPLIED

• Water Quality Meter

• Instruction Manual

• DC 9V Battery

• Hard Carrying Case

FRONT PANEL DESCRIPTION
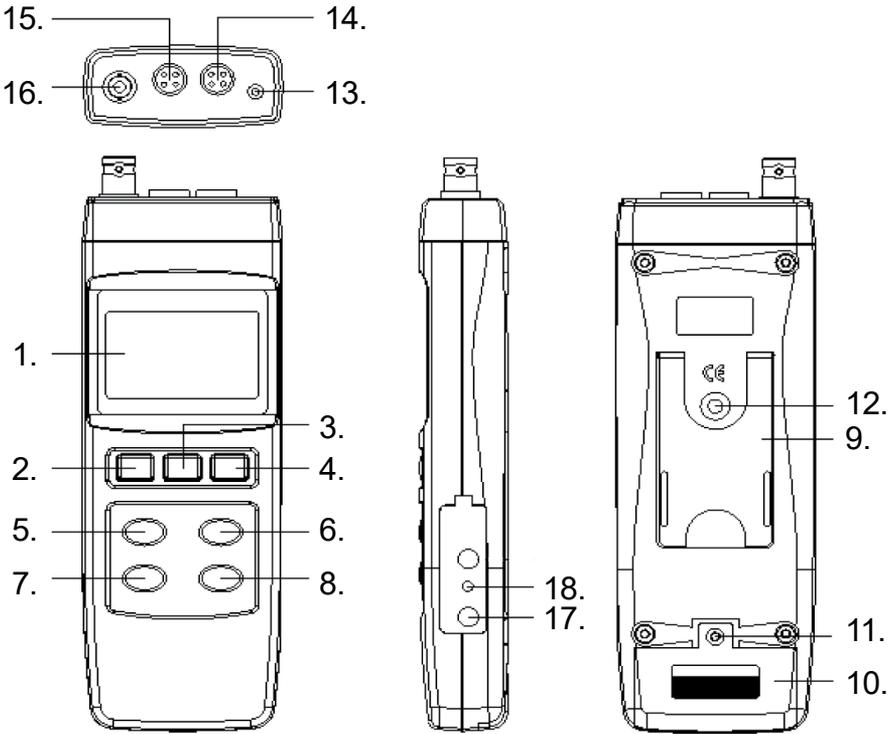
1. LCD Display

2. Power/Backlight Button

3. Hold/Escape Button

4. Record Button

5. ▲/Range Button

6. ▼/Function Button

7. Set Button

8. Enter Button

9. Easel Stand

10. Battery Compartment Cover

11. Battery Compartment Cover Screw

12. Tripod Mounting Screw

13. Temperature Probe Socket

14. Dissolved Oxygen Probe Socket

15. Conductivity Probe Socket

16. pH Probe/BNC Socket

17. DC 9V Power Adapter Socket

18. Reset Button

SETUP

Meter On and Off

1. Press **POWER** to turn the meter **on**.
2. Press and hold **POWER** for 3 seconds and release to turn the meter **off**.

Backlight

The backlight will illuminate automatically when the meter is turned **on**.

1. Press the backlight button to turn the backlight **off**.
2. Press the backlight button again to turn the backlight **on**.

Entering Setup Mode

1. Press **POWER** to turn the meter **on**.
2. Press **SET** for two seconds to enter Setup Mode.
3. Press **SET** to cycle through the options until the desired parameter is displayed.
4. Press **ESC** at any time to exit Setup Mode.

Automatic Shutoff

1. In Setup Mode, press **SET** until "PoFF" is displayed.
2. Press ▲ or ▼ to toggle between "Yes" (automatic shutoff is **on**) or "No" (disable automatic shutoff).
3. Press **ENTER** to save the selection.
4. Press **SET** to continue to the next setup parameter, or press **ESC** to exit Setup Mode.

Beeper

1. In Setup Mode, press **SET** until "bEEP" is displayed.
2. Press ▲ or ▼ to toggle between "Yes" (beeper is **on**) or "No" (disable beeper).
3. Press **ENTER** to save the selection.
4. Press **SET** to continue to the next setup parameter, or press **ESC** to exit Setup Mode.

Select Temperature Units

1. In Setup Mode, press **SET** until "t-CF" is displayed.
2. Press ▲ or ▼ to toggle between °C or °F.
3. Press **ENTER** to save the selection.
4. Press **SET** to continue to the next setup parameter, or press **ESC** to exit Setup Mode.

Select DO Salinity Compensation

This feature is active in DO Mode only.

1. In Setup Mode, press **SET** until "SALt" is displayed.
2. The default value is 0%. Press ▲ or ▼ to adjust the upper salinity compensation value.
3. Press **ENTER** to save the selection.
4. Press **SET** to continue to the next setup parameter, or press **ESC** to exit Setup Mode.

Select DO Altitude Compensation in Meters

This feature is active in DO Mode only.

1. In Setup Mode, press **SET** until "HIGh" is displayed.
2. The default value is 0 meters. Press ▲ or ▼ to adjust the upper altitude compensation value in increments of 100 meters.
3. Press **ENTER** to save the selection.
4. Press **SET** to continue to the next setup parameter, or press **ESC** to exit Setup Mode.

Select DO Altitude Compensation in Feet

This feature is active in DO Mode only.

1. In Setup Mode, press **SET** until "HIGhF" is displayed.
2. The default value is 0 feet. Press ▲ or ▼ to adjust the upper altitude compensation value in increments of 100 feet.
3. Press **ENTER** to save the selection.
4. Press **SET** to continue to the next setup parameter, or press **ESC** to exit Setup Mode.

Select Conductivity Temperature Compensation Value

This feature is active in Conductivity Mode only.

1. In Setup Mode, press **SET** until "PEr C" is displayed.
2. The default value is 2% per ° C. Press ▲ or ▼ to adjust the upper temperature compensation value.
3. Press **ENTER** to save the selection.
4. Press **ESC** to exit Setup Mode.

Select pH Manual Temperature Compensation Value

This feature is active in pH Mode only.

1. In Setup Mode, press **SET** until "t-SEt" is displayed.
2. The default value is 25° C / 77° F. Press ▲ or ▼ to adjust temperature compensation value.
3. Press **ENTER** to save the selection.
4. Press **ESC** to exit Setup Mode.

System Reset

If the meter appears unresponsive or pressing the keys produces no result, reset the system:

1. With the meter **on**, open the cover on the side of the meter.
2. Use a pin or the end of a paperclip to press **RESET**.

MEASUREMENT FUNCTIONS

Select Function (Mode)

1. Press **POWER** to turn the meter **on**.
2. Press **FUNCTION** to cycle through the available modes until the desired function is displayed:

• PH

• OrP – oxidation-reduction potential

• do – dissolved oxygen

• O2 - oxygen

• Cd - conductivity

• tdS – total dissolved solids

• SALt – salinity

3. Follow the specific measurement procedures for the parameter in use.

Parameter	Page
pH	12
mV (ORP)	15
DO	15
O2	17
Conductivity	17
TDS	19
Salinity	20

Data Hold Function

1. During measurement, press **HOLD** to freeze the reading on the display. "Hold" appears on the LCD.
2. Press **HOLD** to return to Normal Mode.

Minimum and Maximum Values

1. During measurement, press **REC** to begin recording the readings. "REC" displays on the LCD.

2. Press **REC** to display the maximum value. "REC MAX" will display.

3. Press **REC** to display the minimum value. "REC MIN" will display.

4. Press **REC** for 2 seconds to clear MIN/MAX and return to Normal Mode.

pH MEASUREMENT Calibration

The pH probe should be calibrated before first use. Recalibrate regularly to ensure highly accurate measurement.

Note…

Calibration should begin with pH 7.00 and then be followed by either pH 4.00 or pH 10.00. Be sure to rinse the electrode in distilled water between calibration points.

The entire two-point calibration procedure should be repeated at least twice.

pH Probe Calibration with Automatic Temperature Compensation

1. Plug and secure the pH probe into the pH socket on top of the meter.

2. Plug the temperature probe into the **TEMP** socket on top of the meter.

3. Press **POWER** to turn the meter on.

4. Press **FUNCTION** to cycle through the available functions until "pH" is displayed.

5. Immerse the pH probe and the temperature probe into the standard buffer solution.

6. Gently shake the pH electrode.

7. The pH value and the temperature of the solution are displayed.

8. Press and hold ▲ and ▼ until "pH" and "CAL" are displayed.

9. Press ▲ or ▼ to select 4.00, 7.00, or 10.00 calibration to correspond with the buffer solution.

10. Press **ENTER** to save the calibration data and return to Normal Mode.

11. To clear the existing calibration data, select "CLr" from the calibration options.

12. Press **ENTER** to confirm the selection and return to Normal Mode.

pH Probe Calibration with Manual Temperature Compensation

1. Use trusted thermometer to measure temperature of the calibration solutions being used for calibrations.

2. Plug and secure the pH probe into the pH socket (BNS connector) on the top of the meter.

3. Press **POWER** to turn the meter ON.

4. Press **FUNCTION** to cycle through the available functions until pH is displayed.

5. Press **SET** > 2 Sec to enter SETUP mode

6. Press and release **SET** 3 times, Temp. value (upper LCD) and t -SET °C (lower LCD) are displayed.

7. Use ▲ or ▼ to adjust the temp. value to the value measured in step 1.

8. Press **ENTER** to save

9. Press **ESC** to return to the measuring mode.

10. Immerse the pH probe into the standard buffer solution

11. Gently shake the pH electrode

12. Press and hold both ▲ ▼ to enter calibration mode (pH and CAL on LCD)

13. Press ▲ or ▼to select appropriate calibration buffer.

14. Press **ENTER** to save and return to measuring mode.

pH Measurement with Automatic Temperature Compensation

1. Plug and secure the pH probe into the pH socket on top of the meter.
2. Plug the temperature probe into the **TEMP** socket on top of the meter.
3. Press **POWER** to turn the meter **on**.
4. Press **FUNCTION** to cycle through the available functions until "pH" is displayed.
5. Immerse the temperature probe into the solution to be measured.
6. Hold the pH electrode handle and immerse the sensing head completely into the solution.
7. Gently shake the electrode.
8. The pH value and the temperature of the solution are displayed.

pH Measurement with Manual Temperature Compensation

1. Plug and secure the pH probe into the pH socket on top of the meter.
2. Press **POWER** to turn the meter **on**.
3. Press **FUNCTION** to cycle through the available functions until "pH" is displayed.
4. Hold the electrode handle and immerse the sensing head completely into the solution to be measured.
5. Gently shake the electrode.
6. The pH value and the manual temperature setting are displayed.

mV (ORP) Measurement

1. Plug and secure the pH/ORP probe into the pH socket on top of the meter.
2. Press **POWER** to turn the meter **on**.
3. Press **FUNCTION** to cycle through the available functions until "OrP" is displayed.
4. Hold the electrode handle and immerse the sensing head completely into the solution to be measured.
5. Gently shake the electrode.
6. The mV value is displayed.

Note…
During pH measurement, simply press **FUNCTION** to switch to ORP measurement.

DO MEASUREMENT

DO Probe Calibration

The DO probe should be calibrated before first use. For the highest level of accuracy, recalibrate before each use.

Air calibration (20.9%) is recommended for simple and precise calibration. Calibration should be performed in a well-ventilated environment.

1. Plug the DO probe into the DO socket on top of the meter.
2. Press **POWER** to turn the meter **on**.
3. Press **FUNCTION** to cycle through the available functions until "O2" is displayed.
4. Wait 5 minutes until the readings stabilize.
5. Press and hold ▲ and ▼ until "CAL" and "20.9" are displayed.
6. Press **ENTER**. The display will count down from 30 to 0 as calibration occurs.
7. The meter returns to Normal Mode.

Do Measurement

1. Plug the DO probe into the DO socket on top of the meter.
2. Press **POWER** to turn the meter **on**.
3. Press **FUNCTION** to cycle through the available functions until "do" is displayed.
4. Hold the electrode handle and immerse the sensing head at least 10 cm into the solution to be measured.
5. Wait several minutes for the probe and solution to reach thermal equilibrium.
6. With the probe tip immersed in the solution, shake the probe or make sure that the liquid has a velocity of at least 0.2 – 0.3 m/s. (A magnetic agitator is recommended to reduce errors due to the diffusion of the oxygen present in the air into the solution.)
7. The DO values in mg/L and the temperature of the solution are displayed.
8. Rinse the probe with tap water after each series of measurements.

Oxygen in the Air

1. Plug the DO probe into the DO socket on top of the meter.
2. Press **POWER** to turn the meter **on**.
3. Press **FUNCTION** to cycle through the available functions until "O2" is displayed.
4. The percentage of oxygen in the air is displayed.

CONDUCTIVITY MEASUREMENT

Conductivity Probe Calibration

The conductivity probe should be calibrated before first use. Recalibrate the probe periodically to ensure accuracy.

Note…
One-point calibration should be executed at 1.413 mS. For multi-point calibration, execute 1.413 first and then proceed to other ranges.

1. Plug the conductivity probe into the CD socket on top of the meter.
2. Press **POWER** to turn the meter **on**.
3. Press **FUNCTION** to cycle through the available functions until "Cd" is displayed.
4. Hold the electrode handle and immerse the sensing head completely into the standard buffer solution.
5. Gently shake the electrode.
6. The conductivity value and the temperature of the solution are displayed.
7. Press and hold ▲ and ▼ until "Cd" and "CAL" are displayed.
8. Press **ENTER** to display the values.
9. Press ▲ or ▼ to adjust the conductivity value to correspond with the standard buffer.
10. Press **ENTER** to save the calibration data and return to Normal Mode.

Conductivity Measurement

1. Plug the conductivity probe into the CD socket on top of the meter.
2. Press **POWER** to turn the meter **on**.
3. Press **FUNCTION** to cycle through the available functions until "Cd" is displayed.
4. Hold the electrode handle and immerse the sensing head completely into the solution to be measured.
5. Gently shake the electrode.
6. The conductivity value and the temperature of the solution are displayed.

Manual Range Selection

The meter defaults to automatic range setting. To manually set the range, press **RANGE** to cycle through the selections until the desired range is displayed:

• 200.0 uS
• 2.000 mS
• 20.00 mS
• 200.0 mS
• Auto

Zero Adjustment

"0" should appear on the display when the range is 200 uS and the probe is not immersed in a solution. If the display shows a value of < 2.0 uS, adjust the value to zero by pressing **RANGE** for 10 seconds until zero is displayed.

TDS Measurement

1. Plug the conductivity probe into the CD socket on top of the meter.
2. Press **POWER** to turn the meter **on**.
3. Press **FUNCTION** to cycle through the available functions until "tdS" is displayed.
4. Hold the electrode handle and immerse the sensing head completely into the solution to be measured.
5. Gently shake the electrode.
6. The TDS value and the temperature of the solution are displayed.

Note…
During conductivity measurement, simply press **FUNCTION** to switch to TDS measurement.

Salinity Measurement

1. Plug the conductivity probe into the CD socket on top of the meter.
2. Press **POWER** to turn the meter **on**.
3. Press **FUNCTION** to cycle through the available functions until "SALt" is displayed.
4. Hold the electrode handle and immerse the sensing head completely into the solution to be measured.
5. Gently shake the electrode.
6. The salinity value as a percentage of weight is displayed.

Note…
During TDS measurement, simply press **FUNCTION** to switch to salinity measurement.

POWER SUPPLY

Battery Power

This meter uses one DC 9 V (006 P) heavy-duty alkaline battery. To install the battery before first use:

1. Unscrew and remove the screw on the back battery cover.
2. Slide off the battery cover in the direction of the arrows.
3. Insert a new 9 V battery by snapping the terminals into the connectors.
4. Replace the battery cover and reinstall the screw.

Replace the battery when the low-battery icon shows on the LCD. However, accurate measurements may still be made for several hours after the low-battery icon appears.

Note…
Before replacing the batteries, turn the meter **off** and disconnect the probe. This is necessary for most meters, but I did not see this instruction in the manufacturer info. Please remove if it is not necessary.

DC Adapter

Note…
When the optional DC power adapter is connected, the meter will supply power from the adapter rather than the batteries. The meter will remain on while the adapter is connected and the power button will be disabled.

To connect the DC adapter, open the cover on the side of the meter and insert the adapter plug into the DC 9V adapter socket.

SPECIFICATIONS

General Specifications

Circuit	Custom one-chip microprocessor LSI circuit
Display	52 x 38 mm LCD
Sample Rate	~ 1 second
Operating RH%	< 85% RH
Operating Temperature	0 - 50 °C 32 - 122 °F
Power Consumption	~ DC 14 mA with backlight **off** ~ DC 26 mA with backlight **on**
Power Supply	One DC 9V (006 P) heavy-duty alkaline battery Optional: DC 9V adapter input
Dimensions	7.0" x 2.7" x 1.9" 177 x 68 x 45 mm
Weight	489 g / 1.08 lb

Electrical Specifications (23 ± 5 °C)

pH / mV			
Measurement	**Range**	**Resolution**	**Accuracy (for calibrated meter)**
pH	0 to 14 pH	0.01 pH	± (0.02 + 2 d)
mV	-1999 to 1999 mV	1 mV	± (0.5% + 2 d)
Input Impedance	10^{12} ohm		
pH Temperature Compensation	Manual: 0 – 100 °C		
	Automatic (ATC): 0 – 65 °C with optional temperature probe		
pH Calibration	pH 4, pH 7, pH 10 (3-point calibration)		

General Conductivity	
Temperature Compensation	Automatic (ATC) from 0 to 60 °C (32 to 140 °F) with temperature compensation factor variable between 0 to 5.0% per °C.
Probe Operating Temperature	0 to 60 °C

Conductivity			
Measurement	**Range**	**Res**	**Accuracy**
0 - 200.00 uS	200 uS	0.1 uS	± (2% full scale + 1 d) for measurement values ≤ 100 mS
0.20 - 2.00 mS	2 mS	0.001 mS	
2.00 - 20.00 mS	20 mS	0.01 mS	
20.00 - 200.00 mS	200 mS	0.1 mS	

Total Dissolved Solids			
Measurement	**Range**	**Res**	**Accuracy**
0 - 132 ppm	200 ppm	0.1 ppm	± (2% full scale + 1 d) for measurement values ≤ 66,000 ppm
132 - 1,320 ppm	2,000 ppm	1 ppm	
1,320 - 13,200 ppm	20,000 ppm	10 ppm	
13,200 - 132,000 ppm	200,000 ppm	100 ppm	

Temperature

Measurement Units	Range	Resolution	Accuracy
°C	0 - 60 °C	0.1 °C	± 0.8 °C
°F	32 - 140 °F	0.1 °F	± 1.5 °F

Salinity		
Range	Resolution	Accuracy
0 -12% salt by weight	0.01% salt	0.5% salt value full scale

Dissolved Oxygen			
Temperature Compensation	Automatic (ATC) from 0 - 50 °C		
Salinity Compensation	0 - 50% salt		
Altitude Compensation (M.T.)	0 - 8900 meters		
Measurement	**Range**	**Res**	**Accuracy**
Dissolved Oxygen	0 - 20.0 mg/L	0.1 mg/L	± 0.4 mg/L
Oxygen in Air	0 - 100.0%	0.1% O2	± 0.7% O2
Temperature	0 - 50 °C	0.1 °C	± 0.8% °C / 1.5 °F

Note…

The above dissolved oxygen specifications apply only to environments with RF Field Strength of less than3 V/M and frequencies of less than 30 MHz.

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, battery leakage, or damage resulting from accident, tampering, misuse, or abuse of the product. Opening the meter to expose its electronics will break the waterproof seal and void the warranty.

To obtain warranty service, ship the unit postage prepaid to:

SPER SCIENTIFIC LTD.
8281 East Evans Road, Suite #103
Scottsdale, AZ 85260

The defective unit must be accompanied by a description of the problem and your return address. Register your product online at www.sperwarranty.com within 10 days of purchase.