

DO Meter Kit

850048

Instruction Manual

SPER
SCIENTIFIC

Environmental Measurement Instruments



www.eastern-energy.net

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DO Meter Kit 850048

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FIRST TIME USE or USE AFTER BEING UNPLUGGED FOR MORE THAN ONE HOUR.

This instrument requires calibration prior to operating. After attaching the probe for the first time, please allow the probe to warm up for **30 MINUTES** before beginning calibration. Please see calibration instructions on page 9.

When using the meter, press the buttons firmly for one full second to ensure proper operation.

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INTRODUCTION

This meter reads dissolved oxygen (DO) for measuring water quality in labs, industrial and municipal waste water, aquariums, fish hatcheries and environmental testing.

Features include automatic temperature compensation (ATC) and manual altitude and salinity compensation. The meter also provides readings in either °C or °F, multiple calibration points (for optional pH and conductivity probes), 99 memory points, a large backlit LCD screen, a low battery icon and one-hour automatic shut off. A Set Up Mode allows you to customize the meter's defaults and parameters.

The meter comes complete with DO probe, replacement electrolyte fluid, 2 replacement membrane sets, carrying case, batteries, and instruction manual.

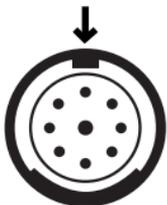
Optional Accessories:

- Replacement DO Probe - 850048DO
(includes 2 probe heads & electrolyte)
- Conductivity/Salinity Probe - 850048C/S
- pH Probe - 850048PH

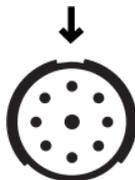
ATTACHING AND DETACHING THE PROBE

Always turn the power **OFF** before attaching and detaching the probe, and use caution. Please use alignment guide markings on probe and meter for proper connection (see image below).

Marker on
Meter Connection



Marker on
Probe Connection



To attach the probe to the meter:

1. Plug the probe into the connector port on top of the meter.
2. Screw down the attached probe guard until it is moderately tight.

To detach the probe from the meter:

1. Unscrew the probe guard (the piece that is directly on top of the meter that connects the probe to the meter).
2. Holding the plug, pull the probe away from the meter. **DO NOT** hold the cable and pull the probe and meter apart as this may damage the probe connection.

FRONT PANEL DESCRIPTION



POWER/SET - Press to turn the meter on and off. In Normal Mode, press for >2 seconds to enter Function (Set) Mode.

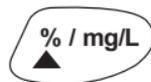


CAL/ESC - Press to switch between Normal and Calibration Modes. Press to return to Normal Mode from Function or Recall Modes.



EC/SALT - If using with the optional conductivity probe, press to switch between CON (μ s) or Salt (ppt) units.

RECALL - Press for >2 seconds to read the memory value.



% / mg/L - Press to switch between DO in % and mg/l.

▲ - Press to increase the displayed value in Function or Calibration Modes.



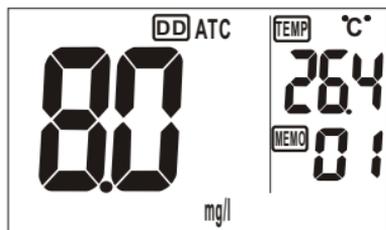
MEM - Press to save the current reading.

▼ - Press to decrease the displayed value in Function or Calibration Modes.



ENTER - Press to confirm the calibration or parameter setting.

LCD DISPLAY DESCRIPTION



- The DO value is displayed on the left side of the LCD.
- The temperature value is displayed on the upper right side of the LCD.
- The total number of records saved is displayed on the lower right side of the LCD.

DO PROBE *(please inspect upon receiving)*

Clean the electrode (see pg. 19) if there is too much white residue attached to it. It is normal to see the cloudy/milky electrolyte and there is no need to replace it for this reason. The best condition of the electrode is a clean surface. However, some white residue attached on electrode is also fine.



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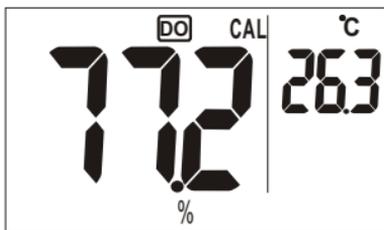
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DISSOLVED OXYGEN % SATURATION CALIBRATION

After attaching the probe, please allow the probe to warm up for 30 minutes before beginning calibration.

Calibrate the meter before each use.

1. Remove the protective cap from the DO probe.
2. Press the power button to turn the meter **ON**.
See p.16 to adjust salt & altitude value if necessary.
3. Hold the probe in a well ventilated area for several minutes (it may take 5-10 minutes) until the LCD reading has stabilized. This is particularly important if you have just refilled the electrolyte solution or replaced either the batteries or the membrane set.
4. Press **CAL/ESC** for 2 seconds to calibrate for 100% saturation. The CAL icon will flash on the LCD.



5. Press **ENTER** to finish the calibration.
6. If "ERR" appears during calibration, there is an error due to low electrolytes or a defective probe.

Note...

To exit Calibration Mode without saving the new value, press **CAL/ESC**. The meter will retain the previously saved calibration data for the current range.

MEASUREMENT PROCEDURES

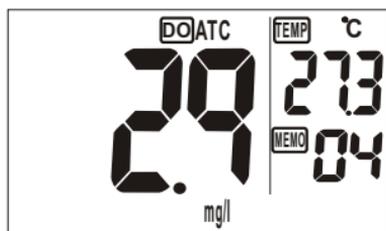
1. Remove the protective cap from the DO probe.
2. Insert the DO probe into the meter.
3. Press the power button to turn the meter **ON**.
4. Hold the probe in the air until the LCD reading has stabilized. This may take several minutes.
5. The DO reading will be displayed on the LCD. You may change the display from % to mg/L as desired by pressing % / **mg/L**.
6. Place the probe into the sample solution, making sure that the electrode is completely immersed in the sample.
7. Stir the probe gently to create a homogenous sample.
8. Wait until the reading has stabilized.

Storing DO Readings in Memory

1. To store the reading in memory, the value must be displayed in mg/l. Press % / **mg/L** if needed to change from % to mg/L.
2. Press the **MEM** button to save the value.
3. The memory number will be displayed on the LCD. If the memory is full, "FUL" will be displayed. See Memory Clear Function on p.12.

Recall Readings

1. Press and hold **RECALL** for 2 seconds to enter Recall Mode.
2. Press ▲ or ▼ to scroll through the data in memory.
3. Press **CAL/ESC** for 2 seconds to return to Normal Mode.



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FUNCTION SETTINGS

Entering Function Mode

1. Press and hold **SET** for >2 seconds to enter Function Mode.
2. Press **▲** or **▼** to scroll through the programmable functions. The meter will display functions for the probe currently in use. The left side of the LCD shows the function name and the right side shows the function number.
3. Press **CAL/ESC** to exit Function Mode.

The table below shows the programmable functions of the DO probe as well as the optional pH and Conductivity probes.

Parameter	DO	COND	PH
P 10 Memory Clear-Clr adjustable	x	x	x
P 20 PH Electrode Slope Review			x
P 30 Cond. Calibration Review		x	
P 40 Cond. Cell Constant Review		x	
P 60 DO Review & Set parameters adj.	x		
P 70 Temperature unit setting adjustable	x	x	x
P 90 Reset to Default Setting adjustable	x	x	x

Memory Clear Function (P10)

Note...

This function will clear all 99 records in the memory. Once cleared, the data cannot be recovered.

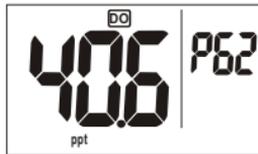
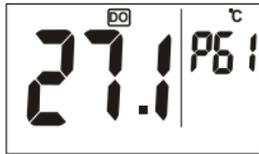
Clearing the memory will delete the records for the current probe type only. For example, if you are using the optional conductivity probe and you clear the memory with that probe inserted, you will not affect any records stored with the DO probe.

1. Enter Function Mode. “Clr P10” will be displayed on the LCD screen.
2. Press **ENTER**. The default “no” icon will flash and “P11” will be displayed.
3. Press **▲** or **▼** to change the status from “no” to “yes”.
4. Press **ENTER** to confirm. The memory records will be cleared and “Clr P1” will display. To exit without clearing the memory, press **CAL/ESC**.
5. Press **▲** or **▼** to continue to the next function or press **CAL/ESC** to exit Function Mode.



DO Review and Set Parameters Function (P60)

1. Enter Function Mode. Press ▲ or ▼ until “COE P60” is displayed.
2. Press **ENTER** to view the previous DO calibration temperature information. “P61” will be displayed.
3. Press **ENTER** again. The salinity compensation value will flash and “P62” will be displayed.



Note...

To exit at any point without making any changes, press **CAL/ESC**.

4. Press or hold down ▲ or ▼ to adjust the salinity compensation value. The salinity value can be adjusted from 0.0 to 42.0 ppt.
5. Press **ENTER** to confirm.
6. The compensation value for height above sea level will flash and “P63” will be displayed. Press or hold down ▲ or ▼ to adjust the value. The height level can be adjusted from 0 to 3500 m in 100 m increments.

7. Press **ENTER** to confirm.
8. Press **▲** or **▼** to continue to the next function or press **CAL/ESC** to exit Function Mode.

Select Temperature Units Function (P70)

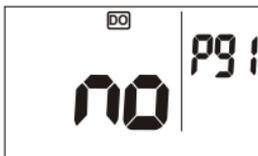
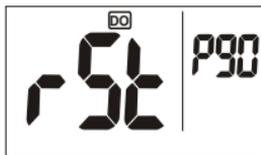
Temperature data can be displayed in either °C or °F.

1. Enter Function Mode. Press **▲** or **▼** until “unt P70” is displayed.
2. Press **ENTER**. “C” or “F” will flash and “P71” will be displayed.
3. Press **▲** or **▼** to change the temperature units.
4. Press **ENTER** to confirm.
5. Press **▲** or **▼** to continue to the next function or press **CAL/ESC** to exit Function Mode.



Restore Default Settings (P90)

1. Enter Function Mode. Press ▲ or ▼ until “rSt P90” is displayed.
2. Press **ENTER**. “No” will flash and “P91” will be displayed.



3. Press ▲ or ▼ to change the status from “no” to “yes”.
4. Press **ENTER** to confirm. The meter will revert to the factory default settings. To exit without restoring the default settings, press **CAL/ESC**.
5. Press ▲ or ▼ to continue to the next function or press **CAL/ESC** to exit Function Mode.



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pH Electrode Slope (View Only) Function (P20)

For use with optional pH probe.

To view the pH electrode data (slope value):

1. Enter Function Mode. Press ▲ or ▼ until “ELE P20” is displayed.
2. Press **ENTER** to view P22. The slope value will be displayed.



Note...

The meter allows a maximum of 3 pH calibration points, so you can review 2 slope values. If the displayed value is <75% or >115%, we recommend that you change the electrode immediately.

3. Press **CAL/ESC** to return to the “ELE P20” display.
4. Press ▲ or ▼ to continue to the next function or press **CAL/ESC** to exit Function Mode.

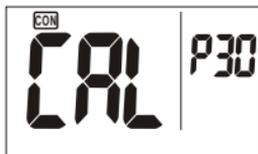


Conductivity Calibration (View Only) Function (P30)

For use with optional conductivity probe.

This function allows you to view previously stored conductivity calibration values.

1. Enter Function Mode. Press **▲** or **▼** until “CAL P30” is displayed.



2. Press **ENTER** to view the calibration information for Range 1. “P32” will be displayed.



3. Press **ENTER** to continue scrolling through the calibration information for Range 2 (P33), Range 3 (P34) and Range 4 (P35).
4. Press **ENTER** to return to the “CAL P30” display.
5. Press **▲** or **▼** to continue to the next function or press **CAL/ESC** to exit Function Mode.

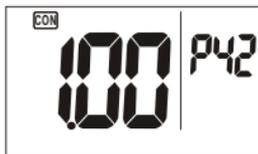
Conductivity Cell Constant (View Only) Function (P40)

For use with optional conductivity probe.

1. Function Mode. Press the ▲ or ▼ buttons until “CEL P40” is displayed.



2. Press **ENTER** to view the cell constant information screen. “P42” will be displayed.



3. Press **ENTER** to continue scrolling through the cell constant information for P43, P44 and P45.
4. Press **ENTER** to return to the “CEL P40” display.
5. Press ▲ or ▼ to continue to the next function or press **CAL/ESC** to exit Function Mode.

Parameters	Default Setting Value
P 10 Memory Clear-CLr adjustable	No
P 20 pH Electrode Slope Review	100%
P 30 Cond. Calibration Review	146.6 μ S, 1413 μ S, 12.88 mS, 51.5 mS
P 40 Cond. Cell Constant Review	1.00
P 60 DO Review and Set parameters adjustable	25°C, 0 ppm, 0 Meter
P 70 Temperature unit setting adj.	Degree °C
P 90 Reset to Default setting adj.	No

DO Probe Maintenance



- Protect the probe in the storage cap when it is not in use.
- Make sure the electrode is clean. Rinse it carefully in deionized water before using.
- Please store at 0 ~ 50°C after each use.

Cleaning the Electrode

Disassemble the electrolyte from probe and use soft/long fiber cloth to clean the electrode surface where the white residue is attached. After cleaning the electrode, assemble the membrane kit properly.

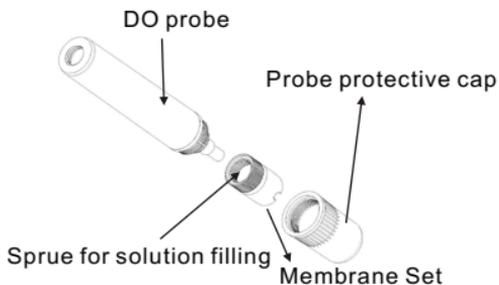
Refilling the Membrane Set & Electrolyte Solution

Replace the membrane set when the membrane is dirty or damaged or when calibration cannot be performed.

1. Remove the protective cap from the DO probe.
2. Unscrew the old membrane set from the probe.
3. Hold the new membrane set vertically on a flat surface and add the fresh fluid.
4. Install the new membrane set by screwing it onto the probe.
5. Replace the protective cap on the probe and tighten it until it is secure.

Refill the electrolyte solution when:

- The solution has evaporated.
- You are changing the membrane set.
- There are bubbles in the probe.
- The meter appears to be less sensitive.
- An error message indicates that measurements are inaccurate.



BATTERY INSTALLATION AND REPLACEMENT

The battery compartment is located on the back of the meter. When you are using the meter for the first time or when the low battery icon appears, install/replace all 4 batteries with new AAA heavy-duty alkaline batteries. Be sure to match the polarity (-/+) when you insert the batteries.

TROUBLESHOOTING

Meter is on, but there is no display

Check and/or replace the batteries. Be sure there is good contact and that the polarity is correct.

Meter is not reading correctly or reading is unstable

1. Clear and re-calibrate the probe.
2. Make sure that the sample solution covers the entire sensor.
3. Replace the probe if it is damaged.

Meter is slow to respond

1. Rinse the electrode in tap water for 10-15 minutes.
2. Replace electrolyte and probe head.

ERROR CODES

ERROR CODE	CAUSE	ACTION
E02	The value is under the lower limit.	The concentration of the testing solution is out of range or the probe may need replacement.
E03	The value is over the upper limit.	The concentration of the testing solution is out of range or the probe may need replacement.
E04	There is a mistake in the original data.	Check the mV or temperature reading.
E13	There is a mistake in the pH calibration (pH probe only)	Recalibrate or replace the probe.
E16	The cell constant is out of range (COND probe only).	Recalibrate or replace the probe.
E21	Temperature difference between measuring target and temperature condition of calibration is more than 10°C.	Recalibrate the unit with a similar temperature condition as the testing sample.
E31	Measuring circuit failure.	Contact Sper Scientific, Ltd
E32	Memory IC failure/ reading failure.	Contact Sper Scientific, Ltd.

SPECIFICATIONS

Parameter	Range	Accuracy	Resolution
pH	2.00 ~ 12.00	± 0.1	0.01
Conductivity	0 ~ 199.9 0 ~ 1999 µS/cm 0 ~ 19.99 0 ~ 69.99 mS/cm	± -1% F.S. ± 1 digit	0.1 µS/cm 1 µS/cm 0.01 mS/cm 0.1 mS/cm
Salinity	0 ~ 10 ppt 0 ~ 42 ppt (sea water)	± 1% F.S. ± 1 digit	0.01 ppt 0.1 ppt
DO	0 ~ 199.9% (0 ~ 30 mg/L)	± 3% F.S. ± 1 digit	0.1
Temp	0 ~ 60.0°C	± 0.5°C	0.1

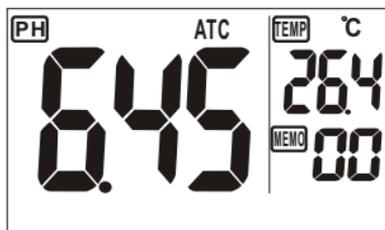
Operating Temp & RH%	0 ~ 50°C Humidity <80%
Storage Temp & RH %	-20 ~ 60°C Humidity <90%
Dimensions (mm)	169 (L) x 78.3 (W) x 43.4 (H)
Weight	200 g
Power	4 AAA Batteries

Appendix A

850048PH

pH Probe

LCD DISPLAY DESCRIPTION



- The pH value is displayed on the left side of the LCD.
- The temperature value is displayed on the upper right side of the LCD.
- The total number of records saved is displayed on the lower right side of the LCD.

pH PROBE CALIBRATION

The probe should be calibrated before first use.

Note...

Do NOT wipe the pH probe dry. Wiping the probe may cause static and instability in calibration and measurement.

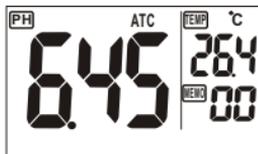
1. Remove the electrode soaker cap from the pH probe.
2. Rinse the electrode in de-ionized or distilled water. If the probe is dehydrated, soak it for 30 minutes in a KCl solution.
3. Insert the pH probe into the meter.
4. Press the power button to turn the meter **ON**.

5. Pour the pH buffer into a clean container and place the electrode into the buffer. We recommend starting with a middle range buffer such as pH 7.01. Make sure the pH electrode is completely immersed in the buffer.
6. Press and hold **CAL/ESC** for 2 seconds to enter Calibration Mode.
7. When the probe automatically recognizes the pH buffer, “CAL” and “7.01” will flash.
8. If the displayed value is different from the standard buffer that you are using, press ▲ or ▼ to adjust the value.
9. Press **ENTER** to save the calibration value. “SA” will be displayed to indicate that the calibration has been saved. If you do not press **ENTER**, the meter will save the value automatically after 30 seconds.
10. Repeat the steps to calibrate the meter using 4.01 & 10.01 buffers.



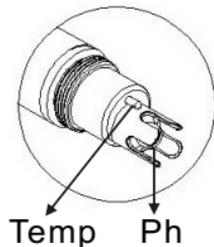
pH MEASUREMENT

1. Remove the electrode soaker cap from the pH probe.
2. Rinse the electrode in de-ionized or distilled water.
If the probe is dehydrated, soak it for 30 minutes in a KCl Solution.
3. Insert the pH probe into the meter.
4. Press the power button to turn the meter **ON**.
5. Place the electrode into the sample solution, making sure that the electrode is completely immersed in the sample.
6. Stir the probe gently to create a homogenous sample and shorten the stabilizing time.
7. Wait until the reading has stabilized. The pH value will be displayed on the left side of the LCD.



pH PROBE MAINTENANCE

- Do NOT touch, wipe or rub the glass bulb.
- The pH glass bulb must always be kept moist. Place it in the protective storage cap whenever it is not in use.



Appendix B

850048CS

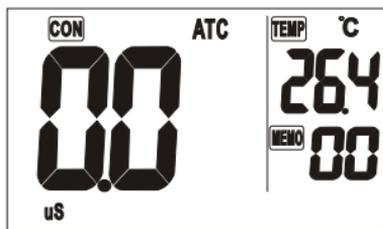
Conductivity/Salinity Probe



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LCD DISPLAY DESCRIPTION



- The conductivity value is displayed on the left side of the LCD.
- The temperature value is displayed on the upper right side of the LCD.
- The total number of records saved is displayed on the lower right side of the LCD.

CONDUCTIVITY PROBE CALIBRATION

The probe should be calibrated before first use.

- Always use a fresh calibration solution because contaminants in the solution will affect accuracy.
- Calibrate at 2/3 full range under most conditions. For example, if the measuring range is 0~1999 mS, use 1413 μ S solution to calibrate.
- You will only need to do single-point calibration.

Calibration Procedure

1. Remove the protective cap from the conductivity probe.
2. Rinse the probe by inserting it into de-mineralized or distilled water for 30 minutes.

3. Insert the conductivity probe into the meter.
4. Press the power button to turn the meter **ON**.
5. Select a standard buffer close to your measuring range or refer to the table below.

	Cond. Measuring Range	Suggested Buffer Range
1	0 ~ 199.9 μ S	60.0 ~ 170.0 μ S
2	0 ~ 1999 μ S	600 ~ 1700 μ S
3	0 ~ 19.99 mS	6.00 ~ 17.00 mS
4	0 ~ 199.9 mS	60.0 ~ 170.0 mS

6. Pour the solution into a clean container and place the probe in the solution. The sensing area of the probe should be completely immersed in the liquid.
7. Gently tap the probe on the bottom of the container to remove any air bubbles from the sensing area.
8. Press and hold **CAL/ESC** for 2 seconds to enter Calibration Mode. The probe will detect the conductivity solution value and the number will flash on the LCD.
9. If the displayed value is different from the standard buffer that you are using, press **▲** or **▼** to adjust the value on the LCD to match the standard calibration value.



10. Press ENTER when the conductivity solution value is correct. "SA" will be displayed to indicate that the value has been saved. The meter will return to Normal Mode.



11. Repeat the steps if needed to calibrate for other ranges.
12. If the probe has degraded over time or through use, "E16" will display after calibration. Please replace the probe immediately.

Note...

To exit Calibration Mode without saving the new value, press CAL/ESC. The meter will retain the previously saved calibration data for the current range.



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Recalibration Guidelines

The meter should be periodically recalibrated to maintain accuracy. Each recalibration will replace the previously saved data for that range.

- Recalibrate the meter at least once a week if the conductivity of the solutions being tested is $<100 \mu\text{S}$.
- Recalibrate the meter at least once a month if the meter is being used to test solutions in the midranges.
- Recalibrate the meter at least once a week if measurement is taking place at extreme temperatures.

CONDUCTIVITY MEASUREMENT

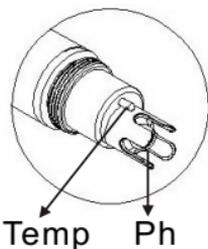
1. Remove the protective cap from the conductivity probe.
2. Rinse the probe by inserting it into de-mineralized or distilled water for 30 minutes to remove any impurities.
3. Insert the probe into the meter.
4. Press the power button to turn the meter **ON**.
5. Place the probe into the sample solution, making sure that the electrode is completely immersed in the sample.
6. Gently stir the probe to make sure that there are no air bubbles trapped in the slot.
7. Wait until the reading has stabilized.

SALINITY MEASUREMENT

1. Remove the protective cap from the conductivity probe.
2. Rinse the probe in de-ionized or distilled water for 30 minutes to remove any impurities.
3. Insert the probe into the meter.
4. Press the power button to turn the meter **ON**.
5. Press **EC/SALT**.
6. Place the probe into the sample solution, making sure that the electrode is completely immersed in the sample.
7. Gently stir the probe to make sure that there are no air bubbles trapped in the slot.
8. Wait until the reading has stabilized.

CONDUCTIVITY PROBE MAINTENANCE

- Do NOT rub or wipe the surface of the electrode. This might change the original constants and affect the testing range.
- Protect the probe in the storage cap whenever it is not in use. The probe should be dry for storage.
- If the surface of the electrode is contaminated, place the probe in a solution of either detergent or acid for 15 minutes. Rinse the probe with distilled water.



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



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