SG-1000

Specific Gravity Tester

User Manual

www.eepowersolutions.com

V1.0

Trouble?

If abnormal measurements are experienced, It may be due to low battery power. Replace with new alkaline battery.

CAUTION

- Care should be taken to avoid damage to the prism. Use soft tissue paper when wiping the prism surface to avoid scratching. Never make contact with any metal tools or abrasive materials.
- The instrument is designed to measure the electrolyte solution of lead acid batteries. Do not use the measurement of other electrolyte solutions such as in alkaline batteries.
- The electrolyte contains sulfuric acid and is toxic. Burns may occur if contact is made on the skin or clothes. Blindness may occur if contact is made to the eyes. Always wear protective glasses and rubber gloves. If the electrolyte is splashed onto the skin or clothing, rinse with sufficient amounts of cold water. If it gets into an eye, flush with cold clean water for about 15 minutes and seek immediate medical attention.
- Remove the battery from the Unit for long periods of non-use and storage.

Temperature

Attention to the following points is needed during the measurement when the temperature of the electrolyte varies greatly with the ambient temperature.

The instrument compensates for the temperature of the sample automatically according to the temperature detected on the prism in the Sample Chamber. The instrument always compensates to a temperature of 68°F (20°C). If the temperature of the sample is different from the prism temperature, wait approximately 3 seconds for every 2 degree F (3 seconds for every 1 degree C) of difference between temperatures before pressing the Start Switch. (If any difference between temperatures is suspected, wait some time before pressing the Start Switch.)

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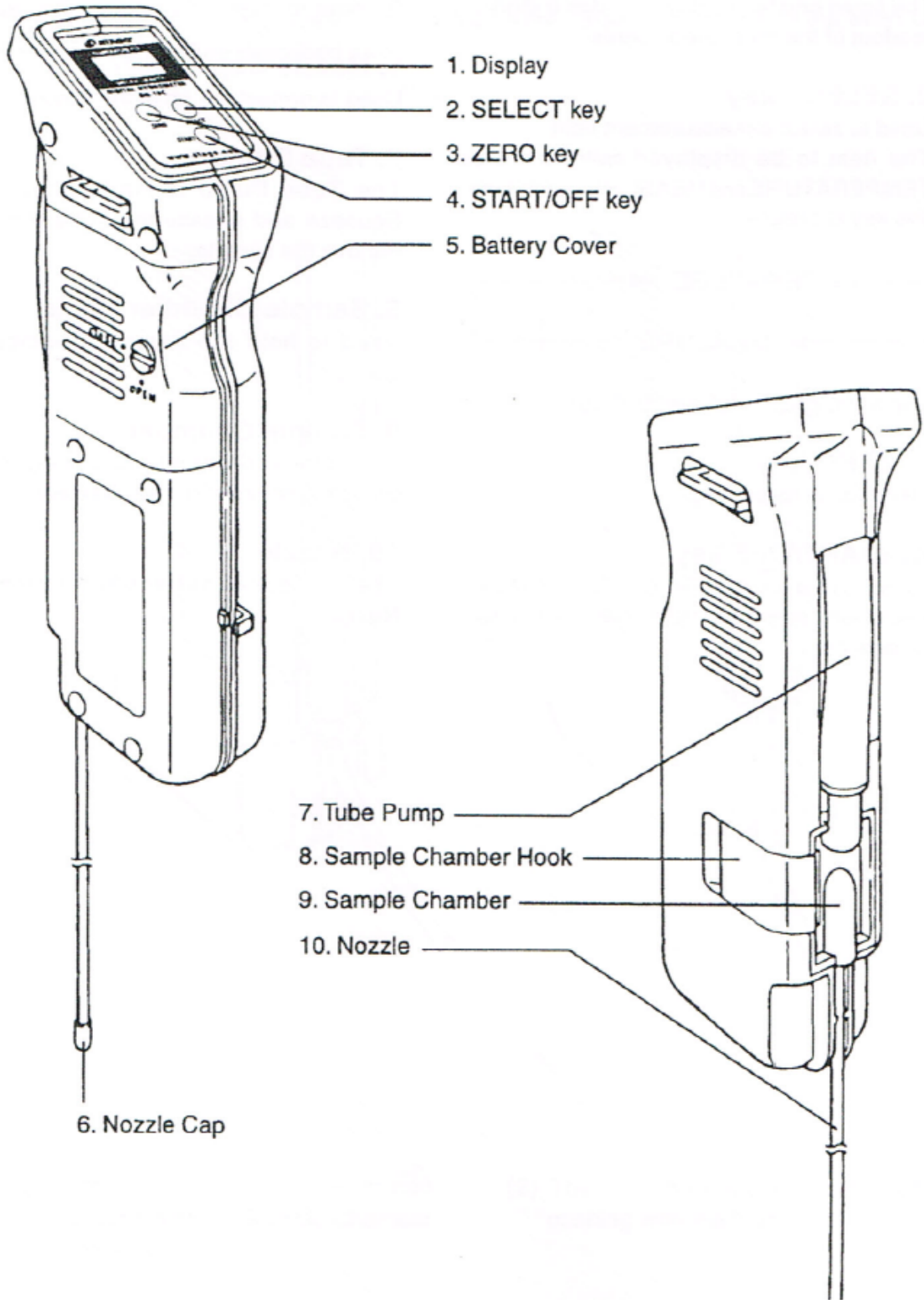
1. Names and Functions of Parts



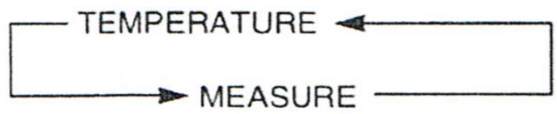
1. Display

The LCD provides a digital readout of the measured values.

2. SELECT key

Used to select a measurement item.

The item to be displayed switches between TEMPERATURE and MEASURE each time this key is pressed.



(Specific gravity of electrolyte)

3. ZERO key

Used for zero-setting

4. START/OFF key

Press to take measurement. To turn off the instrument, press and hold down the key for 2 seconds.

5. Battery Cover

Remove to replace battery.

6. Nozzle Cap

Used to protect tip of nozzle.

7. Tube Pump

The Tube Pump is made of rubber. Squeeze and release the Tube Pump to remove the sample.

8. Sample Camber Hook

Used to hold the Sample Chamber in place.

9. Sample Chamber

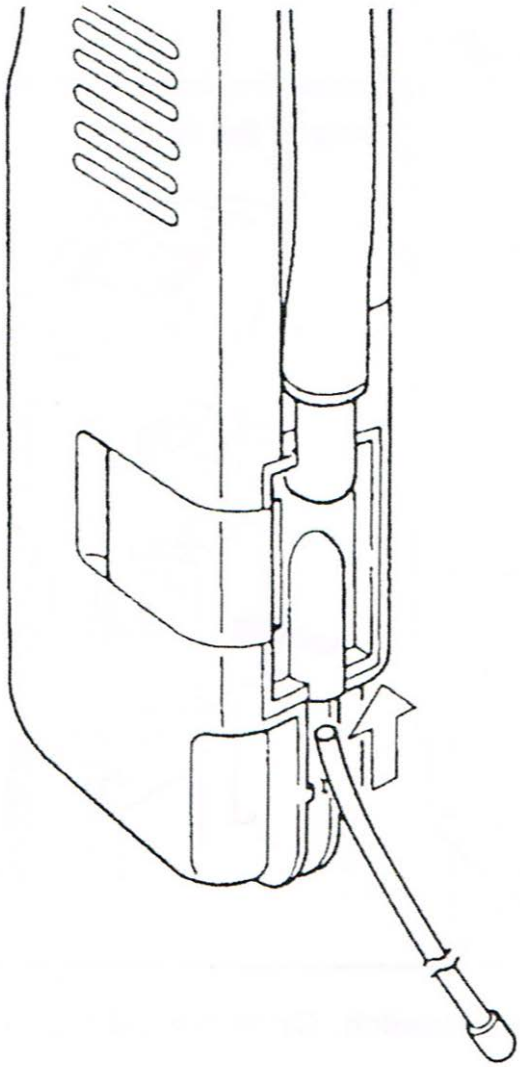
The removed sample is stored in the Sample Chamber for measurement.

10. Nozzle

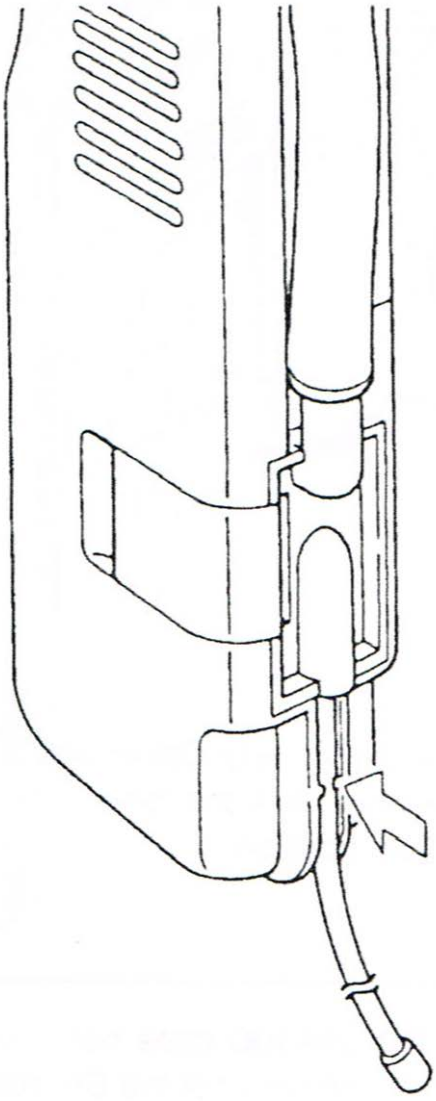
The Sample is extracted through the Nozzle.

2. Inserting the Nozzle

The Nozzle is packed separately from the Main unit. Insert the Nozzle to Main Unit following the procedure described below.



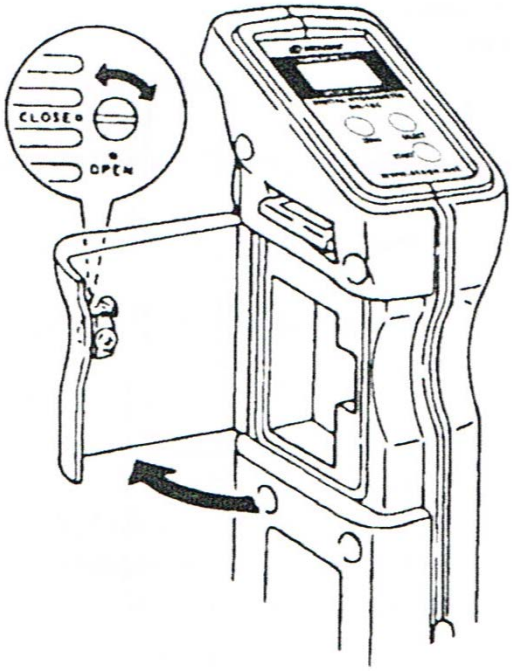
(1) Push the Nozzle into the hole located at the bottom of the Sample Chamber until it stops.



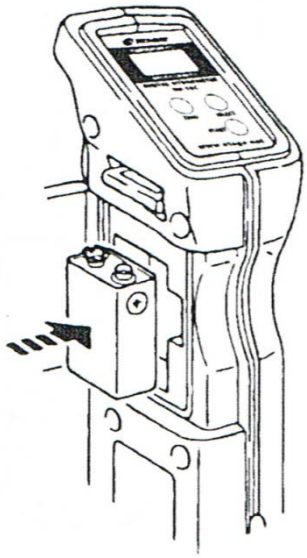
(2) Then, fit the nozzle into the slit by pushing with the thumb.

3. Inserting the Battery

(1) Using a screwdriver, turn the locking pin to the "OPEN" position and open the Battery Cover.



(2) Insert the battery as indicated, take note of the polarity.



Note: The battery (006P) provided with the Unit as an accessory is to be used to check that the Unit operates properly. The battery itself is not guaranteed, and be sure to use a new battery if its voltage is low.

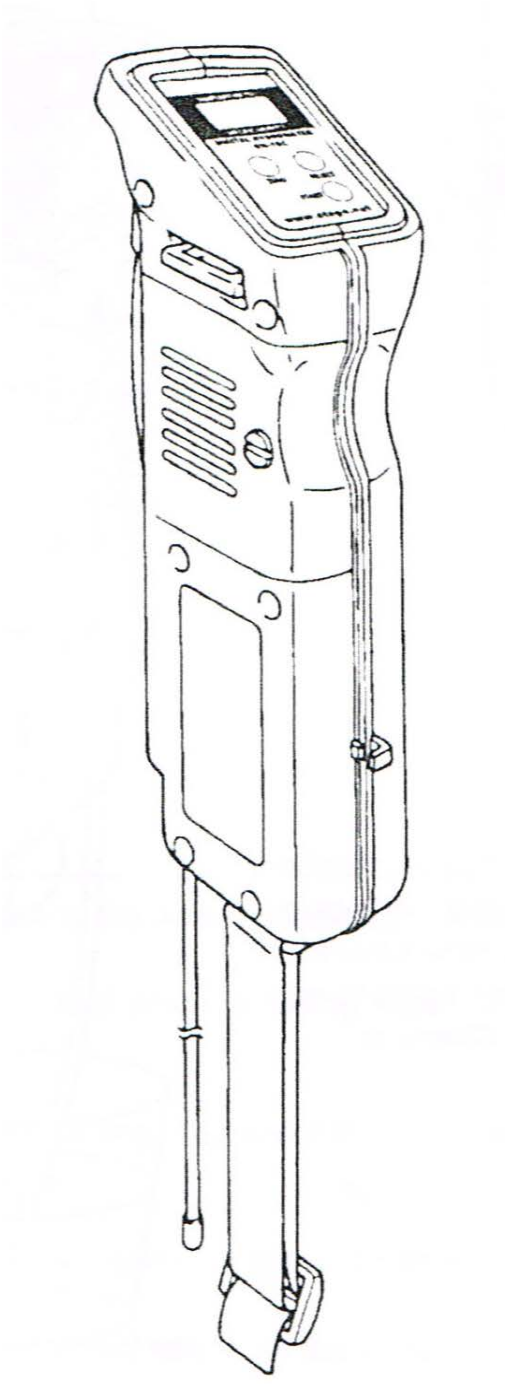
(3) Close the Battery Cover and using a Screwdriver, turn the locking pin to the "CLOSE" position.

Note: The SG-1000 does not have a power switch. Once the battery is inserted the electric circuit of the unit is on. Remove the battery from the unit for long periods of non-use and storage.

- **Replace with a new 9V alkaline battery when power is low.**
- **Use of an alkaline battery can provide twice as many measurements compared to an ordinary 9V battery. (approximately 2000)**

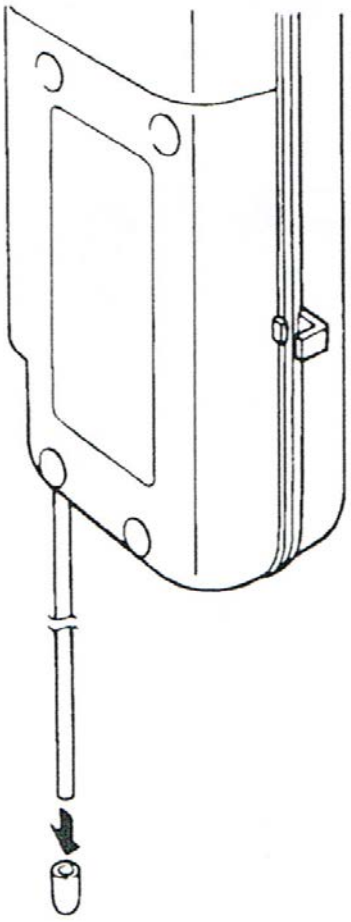
4. Attaching the Wrist Strap

Attach the wrist strap to the hook located on the lower side of the Main Unit. When measuring samples, loop the strap around your wrist to avoid any accidents.

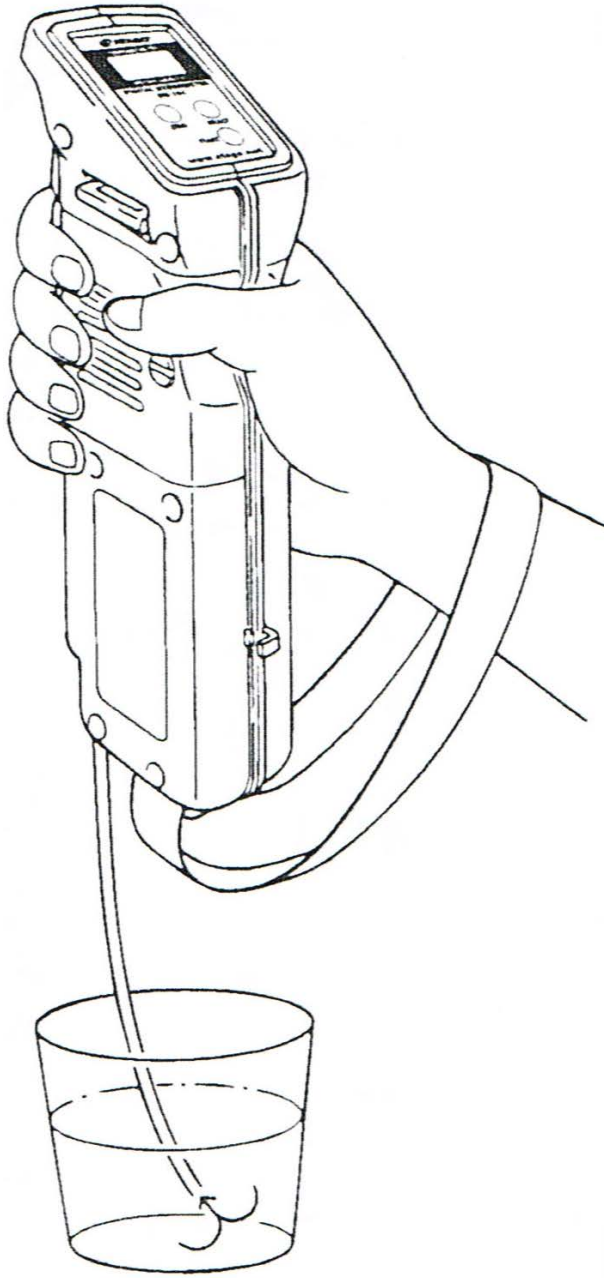


5. Zero Setting

(1) Remove the Nozzle Cap

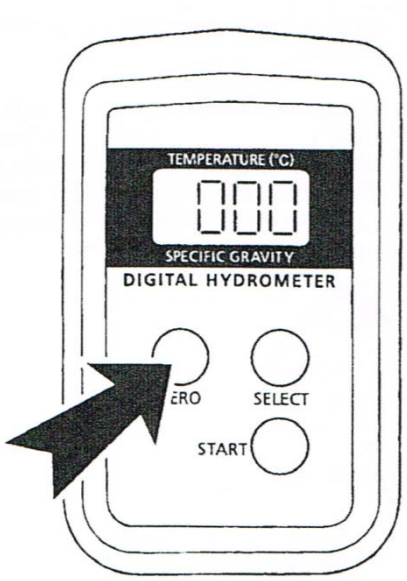


(2) Dip the tip of the Nozzle in water, and squeeze and release the Tube pump. The water will be drawn into the Sample Chamber.

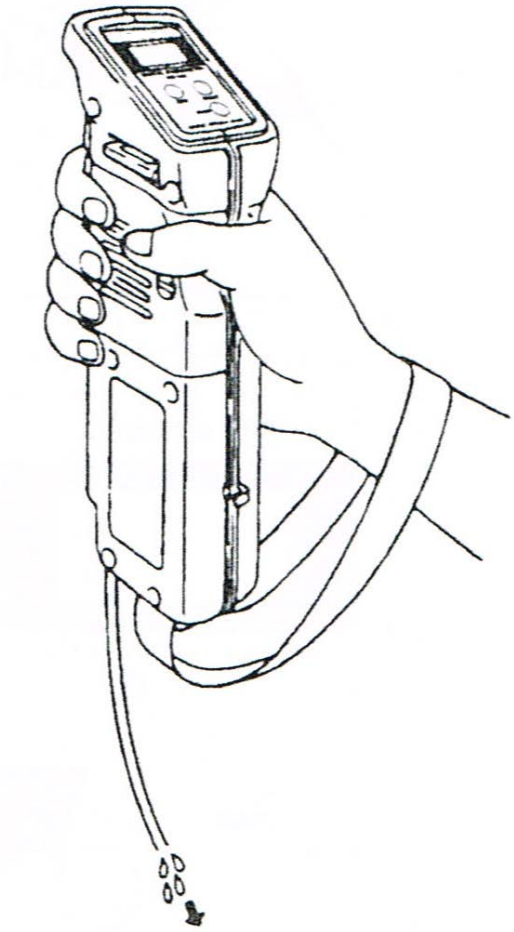


(3) Confirm that the Sample Chamber has been filled with water. If bubbles are present in the Sample Chamber, operate the Tube Pump again to refill water into the Sample Chamber.

(4) Press the ZERO key. “000” will blink three times and “000” will be displayed.



(5) Zero-Setting is now complete. Remove the Nozzle from the water and squeeze the Tube Pump to drain the water from the Sample Chamber.



- **Allow the unit to equilibrate to the ambient temperature before taking measurements.**
- **Zero-setting can be performed anytime. Using water, the unit will be calibrated to zero.**
- **Use distilled water for zero-setting. Tap water may be used if the impurity level of the water is less than 0.01%.**
- **Before zero-setting, the water used should also be at the ambient temperature.**
- **Zero-setting should be performed whenever the battery is replaced.**

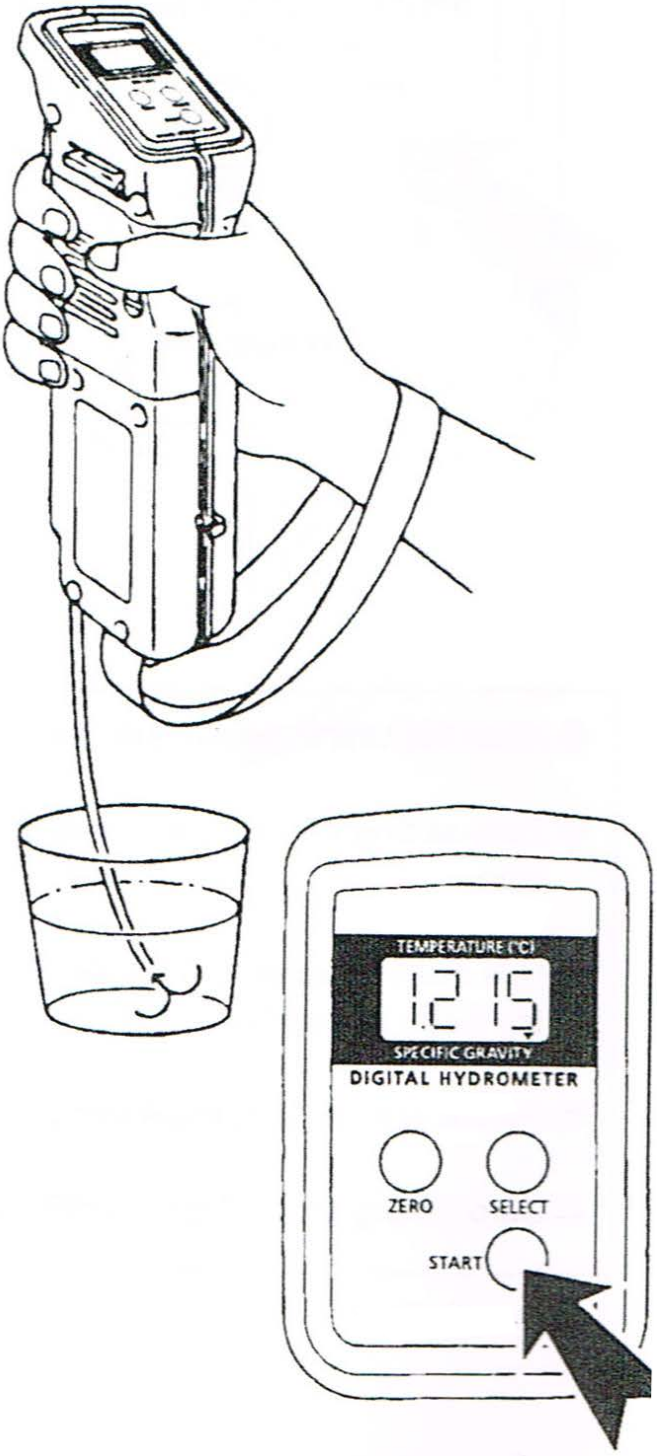
6. Measurement of Sample

(1) Press the SELECT key to move the triangle mark to the desired measurement item on the display.

(2) Dip the tip of the Nozzle into the electrolyte sample and squeeze and release the Tube Pump a few times to draw the sample into the sample chamber.

Once the sample is drawn into the unit, Drain it completely and then refill the sample into the unit again. This process will help prevent cross contamination from the previous sample measured.

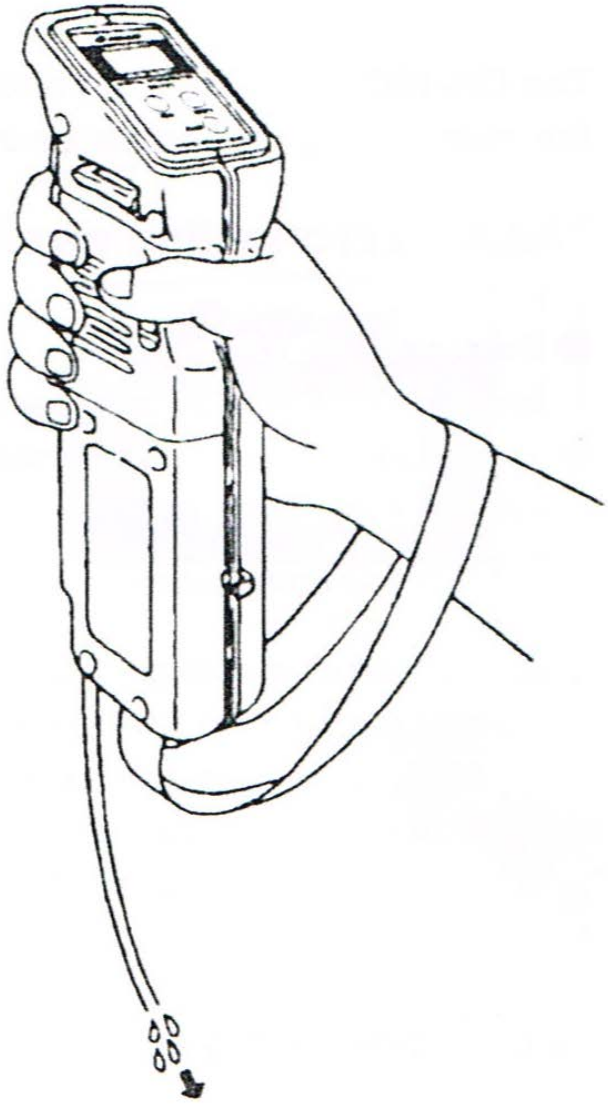
(3) Press the START key to take a measurement. The triangle mark will blink three times and the measurement result will be displayed.



(4) The displayed value will remain on the LCD for 5 minutes.

(5) To reset the display, press and hold down the START switch for 2 seconds.

(6) Before storing the SG1000F, squeeze and release the Tube Pump several times to drain the sample from the Chamber. Then, repeat filling and draining the Sample Chamber several times with water. Drain the water well before storing.



- **If electrolyte is left in the Sample Chamber for a few days, the prism surface will be soiled and consequently cause errors during measurement. To clean the prism surface, use a soft tissue soaked with ethyl or isopropyl alcohol. If the electrolyte is left in the Sample Chamber for a long period of time, corrosion of the prism occurs and will cause permanent damage to the unit.**
- **The Sample Chamber should be shaded when taking measurements. Erroneous measurements may result if the Sample Chamber is exposed to too much external light.**
- **When sample liquid cannot be removed from the Nozzle by operating the Tube Pump, apply tissue paper to the tip of Nozzle and manually squeeze it out.**

7. Explanation of Error Messages

The SG-1000 will indicate an error message when there is a problem with the operation on the instrument. Error messages that may be displayed are explained below.

"AAA" Zero-setting error

- Zero-setting was performed without water in the Sample Chamber.
- Zero-setting was performed with a sample other than water in the Sample Chamber.

Note: This error message may not occur when the concentration of the sample is low (close to that of water). Be sure distilled or tap water is used when performing zero-set.

"LLL" Sampling error

- Electrolyte in the Sample Chamber is insufficient to cover the prism surface or air bubbles may be present.

"HHH" Range-over error

- The sample measured is out of range of the SG-1000.

"HHH" Battery error

- This error message is displayed after zero-setting and measurement when the battery is low. Replace the battery with a new one.
- The SG-1000 may operate in an abnormal manner without displaying the "HHH" when the battery is low. Replace the battery when abnormal operation is noticed.

". . ." Temperature Error

- The temperature of the sample in the Sample Chamber is below 14 degrees F or above 122 degrees F.
- This error will also appear after zero-setting if the temperature is out of range.

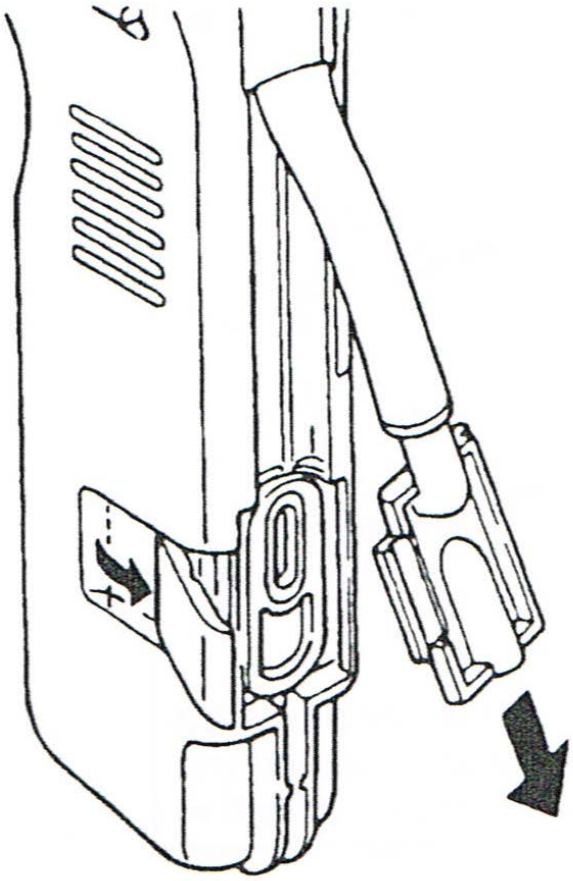
8. Temperature Display

(1) Press the SELECT key to move the triangle mark to Temperature, and the temperature will be displayed.

(2) The temperature indicated is the temperature of the Sample Chamber and is not a direct measurement of the temperature of the sample.

9. Maintenance

(1) To replace the Tube Pump, slide it to the left to release and replace it with a new one.



(2) After measurement, fill and drain the Sample Chamber with distilled or tap water several times to clean. Completely drain before storing the Unit.

(3) Do not store in a location of high humidity or in direct sunlight.

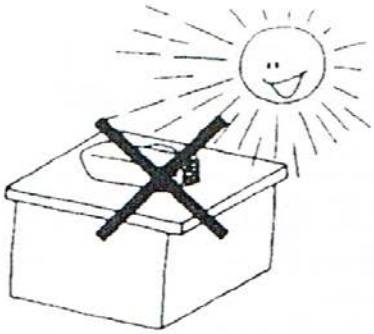
(4) The body casing of the unit is made of plastic. Do not use, or make contact with any organic solvents on the unit.

If the SG-1000 is dropped, check for any of the below symptoms.

Symptom	Remedy
The unit will not turn on. The contact plate in the battery compartment may have been bent creating a gap between the plate and the battery.	Restore contact between the contact plate and battery by using a screwdriver to return the plate to the normal position.
The Sample Chamber, Sample Hook and/or Tube Pump may have been freed from the normal position.	Make sure the Sample Chamber Hook is properly attached to the unit. Adjust the Sample Chamber and Tube Pump into position and lock in place with the Hook.
Unit is cracked.	Any cracks in the casing cannot be repaired. Return the unit to the manufacturer.

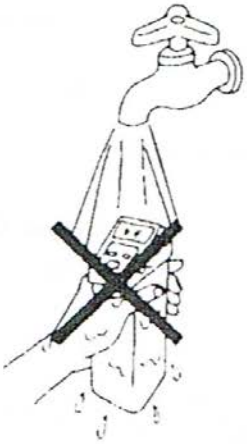
The SG-1000 is a precision optical instrument and should be handled with care. Do not drop or subject to any heavy impact or shock.

Refer to the images on the next page.



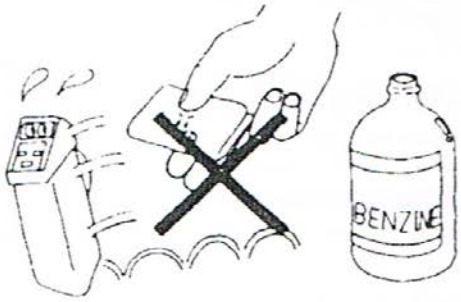
Do not leave the Unit under direct sunlight.

Do not leave the Unit close to any heat source.



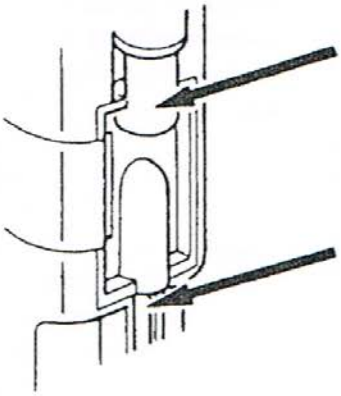
Do not expose the Unit to water.

Do not drop or subject to any heavy impact or shock.



Do not use any organic solvents to clean the Unit.

If the unit gets wet, wipe off any moisture with a dry cloth.



Check periodically for any leakage at the Nozzle or Sample Chamber.

10. Trouble?

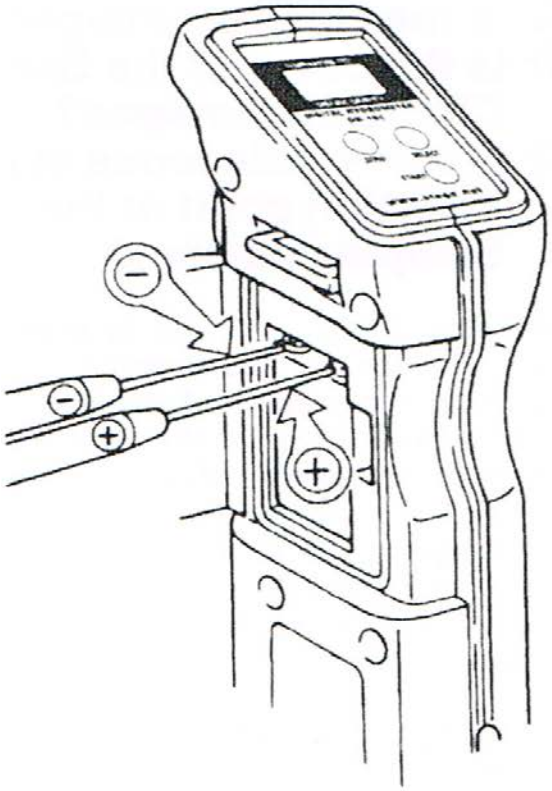
If any problem in operation is suspected, check the following reference list for repair before contacting the manufacturer.

Symptom	What to Check
1."HHH" is displayed at zero-setting.	▪ Does the battery need replacement?
2. "AAA" is displayed at zero-setting.	▪ Is there water in the Sample Chamber? ▪ Are there bubbles in the Sample Chamber? ▪ Is the zero-setting being performed? ▪ Does the battery need replacement? ▪ Is the O-ring damaged in the Sample Chamber? ▪ Is the Tube Pump damaged? ▪ Is the Nozzle damaged? ▪ Is the cover of the Sample Chamber damaged? ▪ Is the prism surface strained or blurred?
3. Measurement is unstable.	▪ Is the ambient temperature and the sample temperature close to equilibrium? ▪ Does the battery need replacement? ▪ Is the O-ring damaged in the Sample Chamber? ▪ Is the Tube Pump damaged? ▪ Is the Nozzle damaged? ▪ Is the cover of the prism surface stained or blurred? ▪ Is the Nozzle loose at the insertion point of the Sample Chamber?
4. Measured values are lower than those measured by other hydrometers.	▪ Check the values of the other hydrometers again. ▪ Does the battery need replacement? ▪ Does the battery need replacement? ▪ Is the O-ring damaged in the Sample Chamber? ▪ Is the Tube Pump damaged? ▪ Is the Nozzle damaged? ▪ Is the cover of the prism surface stained or blurred?
5. Nothing is displayed when a key is pressed.	▪ Check that the battery is properly inserted. ▪ Does the battery need replacement?
6. Other symptoms not mentioned above.	▪ Contact your supplier or manufacturer.

*Is the power level of the battery low?

The unit does not measure if the battery is low. The battery level can be checked by using a multimeter. If the mattery is low, replace it with a new battery. (Refer to page 8 on how to replace the battery and other remarks.)

The unit uses a 9V DC battery (006P)

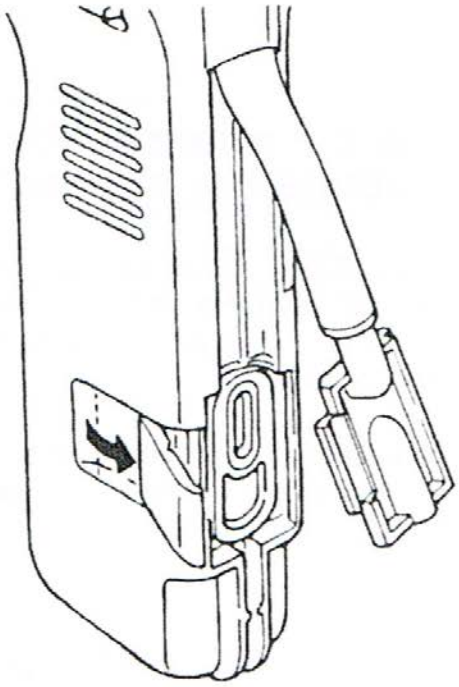


*Is the O-ring damaged in the Sample Chamber?

Remove the Sample Chamber cover from the unit (see page 4), and check the O-ring for deformation or damage.

If the O-ring has been damaged replace it with a new O-ring which can be purchased from your dealer.

After replacing the O-ring, properly replace the Sample Chamber cover.



***Is the Tube Pump damaged?**
***Is the Nozzle damaged?**
***Is the cover of the Sample Chamber damaged?**
***Is the Nozzle loose at the insertion point of the Sample Chamber?**

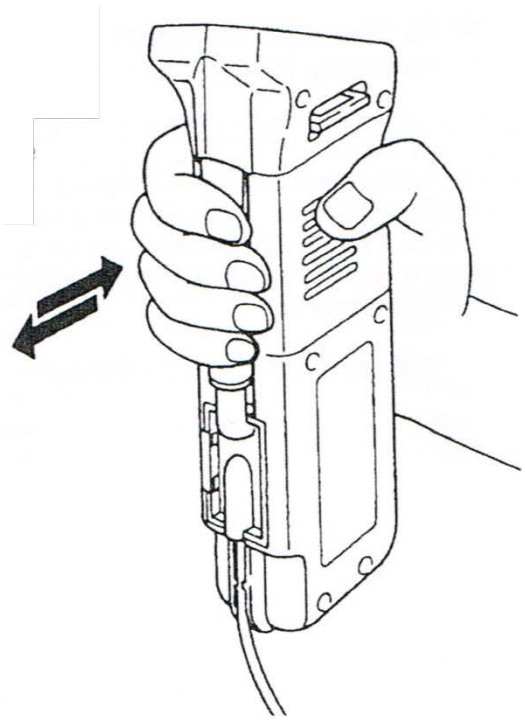
Squeeze the Tube Pump to draw water into the Sample Chamber. At the same time check the Tube Pump, Nozzle, and cover of the Sample Chamber for damage. Make sure the Nozzle is securely attached. (Leakage of liquid or air can be observed if the Tube Pump, Nozzle or cover has been damaged, or the Nozzle is loose.)

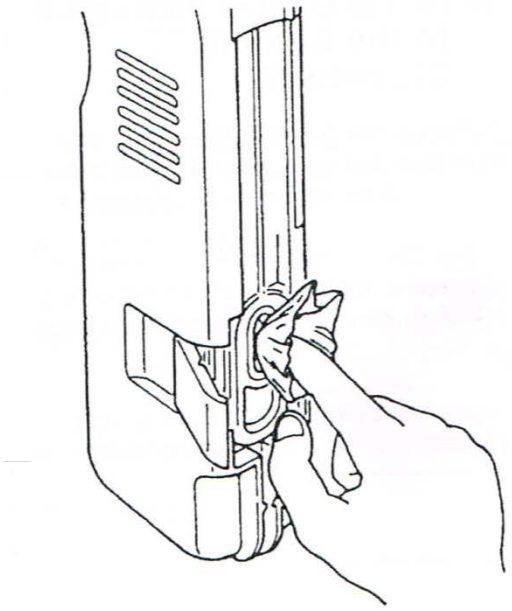
If damage is found, replace the damaged part. (Two spare Nozzles have been provided as accessories.) Parts can be purchased from your dealer or manufacturer. See page 4 and 5.

***Is the prism surface stained or blurred?**

Remove the cover of the Sample Chamber from the unit and check the prism surface for stains or blurs.

If stained or blurred, using a soft tissue, wipe with water or ethyl or isopropyl alcohol.





*Is there a difference between the room temperature and sample temperature?

The unit automatically compensates for temperature by detecting the temperature of the sample in the Sample Chamber. If the temperature of the sample is different from that of the Unit, wait 3 seconds for every 2 degree F (1 degree C) after extracting the sample before pressing the START key.

11. Specifications

Model	SG-1000
Detection method	Optical refraction
Measurement range	Specific gravity of electrolyte 1.000 to 1.300 (Resolution: 0.001)
Measurement accuracy	Specific gravity of electrolyte ±0.002 (50 to 86F) (10 to 30C) ±0.003 (32 to 50F or 86 to 104F) (0 to -10C or 30 to 40C) ±0.005 (14 to 32F or 104 to 122F) (-10 to 0C or 40 to 50C)
Sample chamber temperature	14 to 122F (-10 to 50C)
Operating temperature	41 to 104F (5 to 40C)
Power source	DC 9V (006P Battery)
Dimensions	7 x 4 x 21cm
Weight	Approx. 235g (including battery)