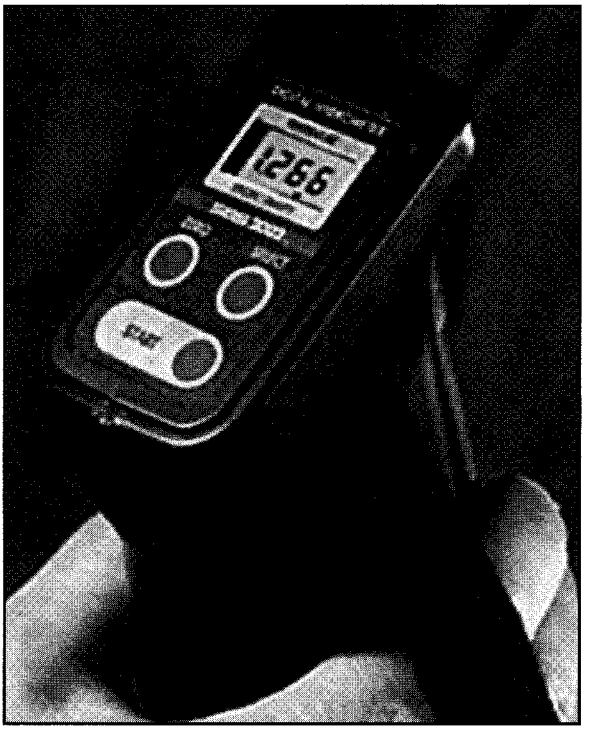
SBS 2002

INSTRUCTION MANUAL

SBS 2002 Digital Hydrometer



SBS

STORAGE BATTERY SYSTEMS

N56 W16665 RIDGEWOOD DRIVE
P.O. BOX 160
MENOMONEE FALLS, WI 53052-0160

CAUTION

- The prism surface in the sample chamber is the most sensitive part of the unit. Be very careful not to scratch the prism surface, and be sure to use soft tissue paper when wiping the prism surface.
- Except for the measurement of electrolyte solution of a lead acid battery, do not use the SBS 2002 for the measurement of other electrolyte solutions like alkaline batteries, etc.
- Electrolyte contains sulfuric acid, which is a poison. If skin and clothing get in contact with it, it may cause burn; if it gets in the eye, it may cause blindness. Therefore, always wear protective glasses and rubber gloves. If electrolyte is splashed on to skin or clothes, flush with sufficient water; and especially, if it gets into the eye, flush with clean water for 15 minutes and get prompt medical attention.

TEMPERATURE

In case you measure the electrolyte which has a big difference between ambient temperature, pay attention to the following points:

The unit compentsates for temperature atuomatically according to the temperature detected at the prism in the sample chamber. If the sample temperature, is different from the prism temperature, wait for 3 seconds for every 2°F difference between these temperatures before pressing the start switch. (Wait for some time before pressing the start switch if any difference between these temperatures is suspected.)

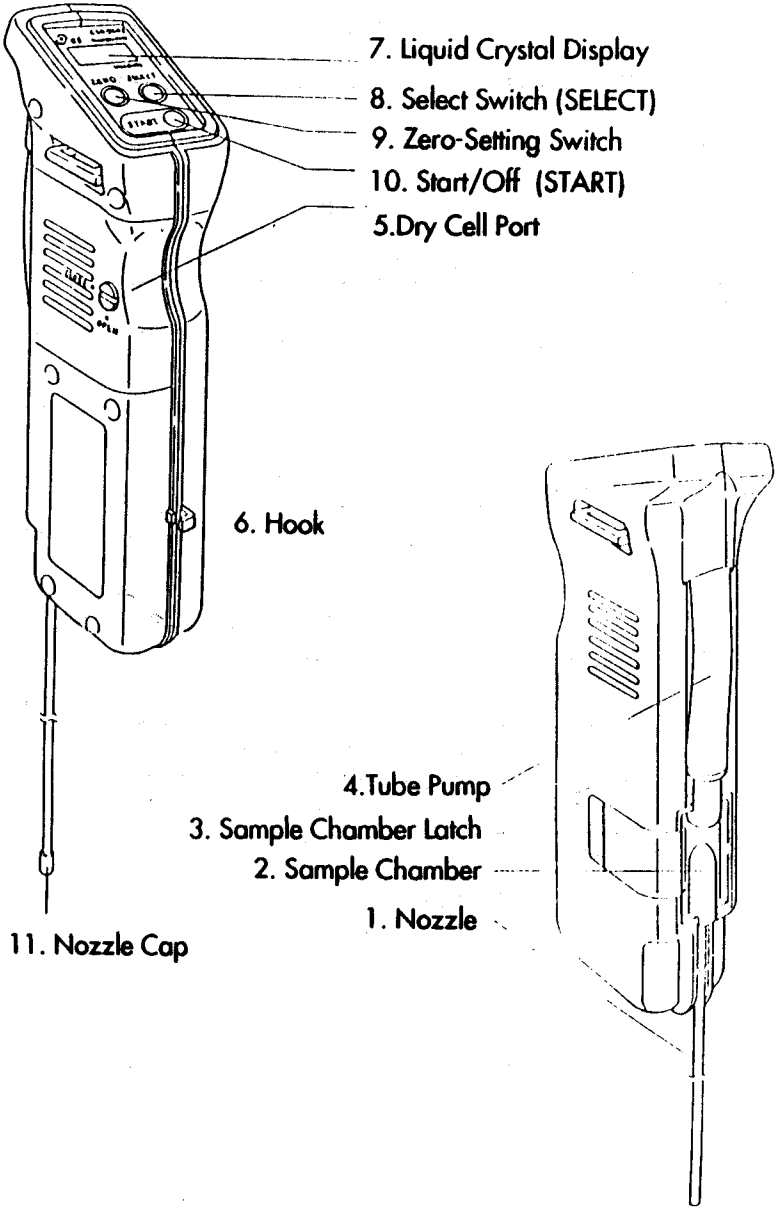
TABLE OF CONTENTS

CONTENTS OF SBS 2002 PACKAGE

Unpack the SBS 2002 package, and immediately check for the following contents:

- SBS 2002 Unit - 1
- Nozzles - 3 (two spares)
- Dry cell - 9 volt battery - 1
- Instruction Manual - 1

1. NAMES AND FUNCTIONS OF PARTS



1. **Nozzle**
   The sample is sucked through this nozzle

2. **Sample Chamber**
   The sucked sample gets in the sample chamber for measurement

3. **Sample Chamber Locking Latch**

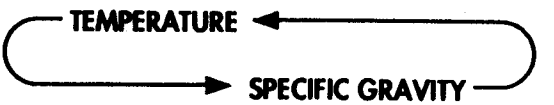
4. **Tube Pump**
   The tube pump is made of rubber. Squeeze and release the tube pump in sucking the sample

5. **Dry Cell Inserting Port**
   A Dry cell is housed in this dry cell compartment. Remove the cover in fitting or replacing the dry cell.

6. **Hook**
   A hook to hold the nozzle.

7. **Liquid Crystal Display**
   The liquid crystal display displays measured values digitally.

8. **Select Switch (SELECT)**
   The select switch is used to select a measurement mode the measurement modes change in turn as follows as you press the select switch:



9. **Zero-Setting Switch (ZERO)**
   The zero-setting switch is used for zero-adjustment.

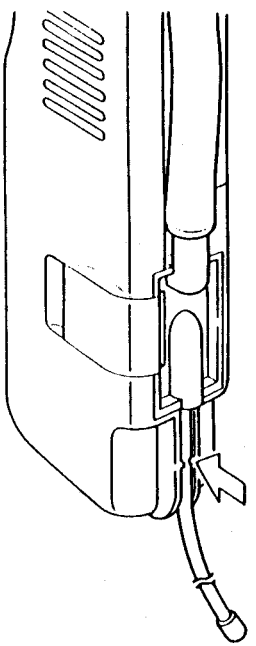
10. **Start/Off (START)**
    The specified measurement takes place when you press the START Switch. The display will be turned off when you keep the START Switch pressed for 2 seconds or longer.

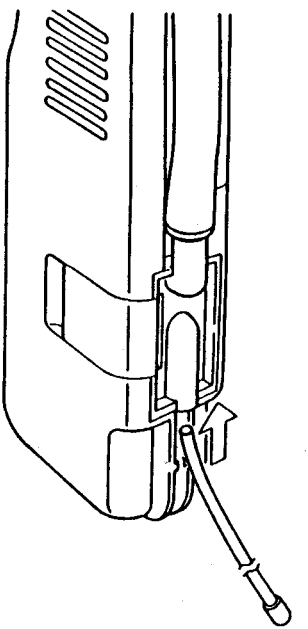
11. **Nozzle Cap**
    The nozzle cap protects the tip of the nozzle.

2. HOW TO INSTALL THE SAMPLE NOZZLE

The nozzle has been packed separately from the main unit. Install the nozzle to the main unit by following the procedure described below:

- 1. Push-in the nozzle to the hole provided at the bottom of the sample chamber until it stops.
- 2. Then, fit the nozzle to the slit by pushing it hard with the thumb, and fix the sample chamber.





After the nozzle has been attached by the above steps. Check that the nozzle has been positioned properly by sucking water. In case of leakage or some other problem, repeat the installation of the nozzle.

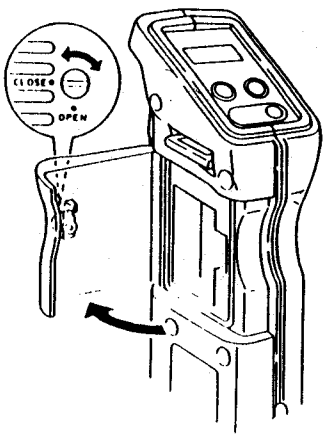
3. INSERTION OF DRY CELL BATTERY

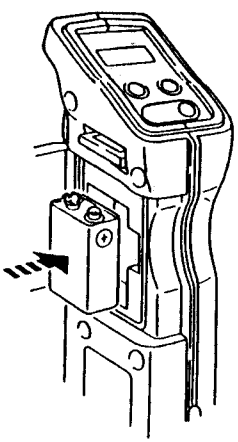
- 1. Open the cover of the battery inserting port with a screw driver.
- 2. Install the battery with proper polarity in the battery inserting port.
- 3. When the battery is installed in the battery inserting port, close the cover and lock it.

Note: The electric circuit of the SBS 2002 turns on once a battery is installed, Thus, the SBS 2002 does not have a power switch. Depress Start switch for 2 seconds and the unit will shut off.

If there is no plan to use the unit for more than a month, keep the battery removed from the unit.

Note: Use 9v alkaline batteries for maximum service life. Alkaline cells offer about 2000 uses.





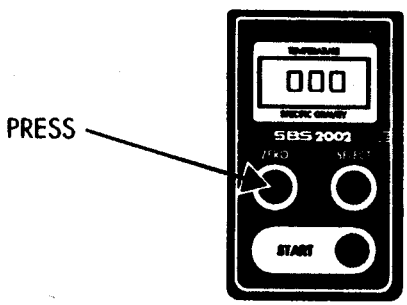
4. ZERO SETTING (CALIBRATION)

► 1. Remove the cap of the nozzle.

► 2. Dip the tip of the nozzle in water, and then squeeze and release the tube pump. The water is sucked into the sample chamber in this process.

► 3. Confirm that the sample chamber has been filled with water. If bubbles are still in the sample chamber, operate the tube pump again to suck water to fill the sample chamber.

► 4. Press the ZERO setting switch."000" will blink three times, and "000" will be displayed on the liquid crystal display.



► 5. Now, the zero-setting is over. Take the nozzle out of the water and squeeze the tube pump to drain the water from the sample chamber. Claibration of unit is done by using water and pushing zero switch.

Leave the SBS 2002 at the place of measurement for some time before making measurement so that the temperature of the SBS 2002 is sufficiently close to the ambient temperature.

The zero-setting status remains as it is until the voltage of the battery becomes too low or the battery itself is removed.

Zero-setting can be made anytime. When zero-setting is made again, the new zero-setting status replaces the previous status.

It is desirable to use distilled water for zero-setting. City water may also be used because the impurity level is usually as small as 0.01%.

Leave the distilled water at the place of measurement for some time before zero setting so that it's temperature is close to the ambient temperature.

5. MEASUREMENT OF SAMPLE

► 1. Press the SELECT switch to move the triangle mark to a desired measurement item on the display. The mark moves to the next item every time you press the SELECT switch. You may measure either specific gravity or temperature.

► 2. Dip the tip of the nozzle in the sample, and squeeze and release the tube pump to suck the sample electrolyte into the sample chamber.

► 3. Press the START switch. The triangle mark blinks three times, and the result of measurement is displayed on the liquid crystal display.

► 4. Squeeze and release the tube pump to drain the sample electrolyte. Then move to the next cell and repeat steps 2 and 3. The total time to test a cell should be 3-5 seconds.

► 5. The display value remains on the LCD Panel for 5 minutes if left alone.

► 6. Keep the START switch pressed for more than 2 seconds to switch the unit off.

► 7. Squeeze and release the tube pump several times to drain the sample electrolyte. If you are storing the SBS 2002, fill the chamber with water several times by pressing and depressing tube pump, to flush sample chamber.

Measured result may not be correct if direct sunshine falls on the sample chamber. Face your back to the sun or cover the sample chamber with your hand at measurement.

If it is difficult to remove the sample liquid from the nozzle by operating the tube pump, apply a tissue paper to the tip of the nozzle, and squeeze it out slowly.

Note: The small amount of sample electrolyte remaining in the nozzle will have little affect on consecutive measurements.

6. MAINTENANCE

- After measurement, suck and drain distilled water or city water several times to clean the Sample Chamber, and drain the water well before storing.
- Do not store the SBS 2002 in a humid place or a place in direct sunlight.
- The body of the tester is made of plastics, never use solvents (thinner, benzine, gasoline, etc.) on the tester.
- Never splash water on the unit.

7. EXPLANATION OF ERROR MESSAGES

The SBS 2002 gives an error indication when something is wrong with your operation. Error indications that may appear on the LCD Panel are explained below.

► "AAA" Zero-setting error

- This error indication appears when zero-setting is attempted on air without water in the sample chamber.
- This error indication appears also when zero-setting is attempted with ordinary sample in the sample chamber.

Note: This error may not occur when the concentration of sample is low (close to that of water). and it is necessary to make sure that the liquid is water in attempting a zero-setting.

- This error indication may also appear when the prism surface is dirty. If this is suspected, remove two screws of the sample chamber, pull up the acrylic cover and clean the prism surface well with a tissue paper or something-

► "LLL" Sampling error

This error appears when measurement is made while the sample is not covering the sample chamber or while the sample is incompletely covering the sample possibly due to inclusion of bubbles.

► "HHH" Range-over error

- This error indication appears at if the sample is out of the range of the SBS 2002.

► **HHH Battery error**

- This error indication appears at zero-setting and measurement when the battery is low. Please replace the battery with a new one.

Note: The SBS 2002 may operate in an abnormal manner without displaying "HHH" when the battery is getting low. Please replace the battery.

► **"••••" Temperature error**

- This error indication appears at measurement if the temperature of the sample chamber is below -14°F or above 122°F.
- This error indication will also appear at zero-setting if the temperature is out of the range

8. TROUBLE

When a problem is suspected, check the following first before asking for repair.

► **Is the Battery Low?**

The unit does not measure correctly if the battery is low. Check the battery voltage using a multimeter. If the battery is low, replace it with a new battery.

► **Is the Gasket Damaged in the Sample Chamber?**

Take the cover of the sample chamber from the unit, and check it for deformation or damage.

If the gasket has been deformed or damaged, replace it with a new one. (The gasket can be purchased from your dealer).

After replacing the gasket be sure to refit the cover of the sample chamber correctly.

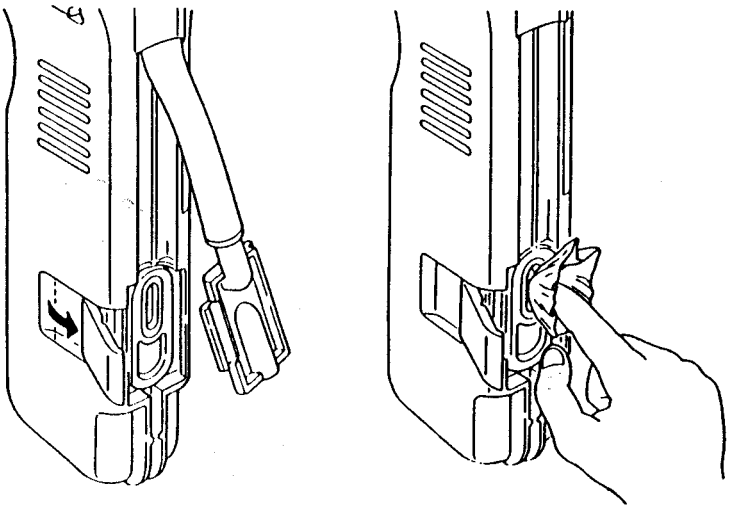
- **Is the Tube Pump Damaged?**
- **Is the Nozzle Damaged?**
- **Is the Cover of the Sample Chamber Damaged?**
- **Is the Nozzle Loose at the Cover of the Sample Chamber?**

Suck water with the pump, and check the tube pump, nozzle and cover of sample chamber for damage. Check the nozzle also whether it is loose. (A liquid leakage or air leakage would be observed if the tube pump, nozzle or cover has been damaged or the nozzle is loose.)

If damage is found, replace the affected part. (Two spare nozzles have been provided as accessories. Other parts can be purchased from your dealer.)

- **Is the Prism Surface Stained or Blurred?**

Remove the cover of the sample chamber from the unit (see Page 4), and check the prism surface for stains or blurs. Wipe the prism surface if stained or blurred. Do not use any solvents to clean prism. Use water or alcohol and soft towel to clean prism.



- **Is There Much Difference between the Room Temperature and the Sample Temperature?**

The Unit makes automatic temperature correction by detecting the temperature of the prism existing in the Sample Chamber. If the temperature of sample is different form that of the Unit, wait for three seconds per the difference of 2°F (30 seconds if the difference is 20°F after sucking the sample before pressing the start switch.)

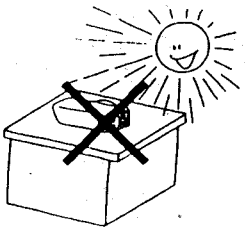
Symptom	Checkpoint
"HHH" displayed at zero setting	Is the battery low?
"AAA" displayed at zero setting	Is water in the sample chamber? Are bubbles in the sample chamber? Are you making zero-setting on a sample? Is the battery low? Is gasket damaged in the sample chamber? Is the tube pump damaged? Is the nozzle damaged? Is the cover of the sample chamber damaged? Is the prism surface stained or blurred?
Measurement Unstable	Is there much difference between the room temperature and the sample temperature? Is the battery low? Is the gasket 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 stained or blurred? Is the nozzle loose at the cover of the sample chamber?—
Measured values are lower than those measured by other hydrometers	Check the values of other hydrometers again. Is the battery low? Is gasket damaged in the sample chamber? Is the tube pump damaged? Is the nozzle loose at the cover of the sample chamber? Is the nozzle damaged? Is the cover of the sample chamber damaged? Is the prism surface stained or blurred?
Nothing is displayed at pressing the switch	Is the battery missing in the unit? Is the battery low?
Any symptoms other than above	Contact your dealer.

9. SPECIFICATIONS

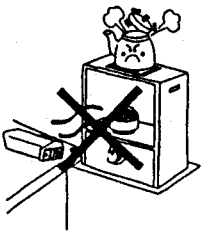
Model No.	SBS 2002
Application	This unit measures the specific gravity of diluted sulfuric acid (H2s04) used for lead acid batteries. The sensor inside the unit detects the specific gravity of the acid and the temperature inside the chamber. The unit indicates those values digitally. The specific gravity is automatically calibrated to 25°C (77°F).
Method of Detection	Specific Gravity ▶ Light refraction system Temperature ▶ Platinum membrane thermal sensor
Range of Measurement	1.000~1.300
Indicator	Liquid crystal digital indicator Temperature (inside sample chamber) = 3 digits Specific Gravity = 4 digits (decimal)
Accuracy	Temperature — Accuracy -10~+10° C 14-50° F + or - 0.005 10~30° C 50-86° F + or - 0.002 Normal Range 30~50° C 86-122° F + or - 0.005
Measuring Time	Within 4 seconds after pushing "START" button (Indicator displays value for 5 minutes and then automatically shuts off.)
Power Supply	DC9v Alkaline or Manganese dry battery Capable of delivering approximately 1200 readings with an alkaline battery.
Dimensions	7.5 x 4.6 x 22 cm - 2.95" x 1.81" x 8.66"
Suction Nozzle	Approx. 20 cm long - 7.8" long
Accessories	Dry battery 9 volt 1 pc, 1 operation manual

OPTIONS

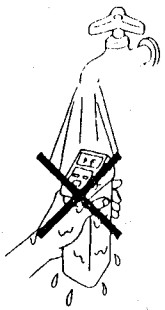
- SPARE PARTS KIT P.N. 2002KIT
- HOLSTER P.N. 2002HOL
- N.I.S.T. CERTIFICATE P.N. 2002NIST



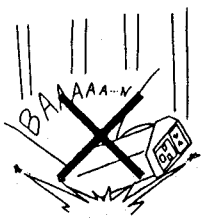
Do not leave the Unit under direct sunshine.



Do not leave the Unit close to a heat source.

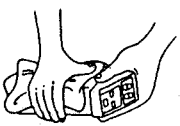


Never splash water on the Unit.

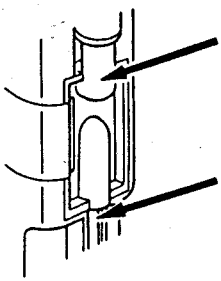


Never let the Unit fall or give shocks to the Unit.

Never clean the Unit using a petroleum solvent.



When the body gets wet, wipe off the moisture with dry cloth.



Be sure not to have leakages at the Nozzle or the Sample Chamber.

GUARANTEE

This product carries a 30 day Money Back Guarantee from the date of purchase (invoice date). All requests MUST OBTAIN A RETURN AUTHORIZATION NUMBER from SBS. NO REFUNDS WILL BE ISSUED WITHOUT THIS R.A.N. TO OBTAIN A R.A.N. CALL STORAGE BATTERY SYSTEMS, INC. FROM 8:00 A.M. THRU 5:00 P.M. CST MON-FRI. AT (262) 703-5800. HYDROMETER SALES UNIT MUST BE RETURNED IN RESELLABLE CONDITION REFUNDS SUBJECT TO FREIGHT AND HANDLING CHARGES.
Refunds beyond 30 days subject to 25% restocking charge.

12 MONTH WARRANTY

This product is warranted against defective materials and craftsmanship for a 12 month period from date of purchase. If the SBS 2002 is defective in materials or workmanship or fails during normal use within warranty period, contact SBS (262) 703-5800 Monday-Friday, 8:00 A.M.-5:00., CST. THERE ARE NO OTHER WARRANTIES EXPRESSED OR IMPLIED EXCEPT WHERE STATED WITHIN. In no event shall Storage Battery Systems, Inc. be liable for consequential, incidental or special damages. The buyers sole remedy and the limit of SBS liability for any loss whatsoever, shall not exceed the purchase price paid by the purchaser for the units(s) to which a claim is made. The remedies outlined above are the buyers only remedies.

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