

Instruction Sheet



Important

Please read this manual immediately on receipt of the battery before unpacking and installing. Failure to comply with these instructions will render any warranties null and void.

Any data, descriptions or specifications set forth herein are subject to change without notice. Before using the product(s), the user is advised and cautioned to make its own determination and assessment of the suitability of the product(s) for the specific use in question and is further advised against relying on the information contained herein as it may relate to any general use or indistinct application. It is the ultimate responsibility of the user to ensure that the product is suited and the information is applicable to the user's specific application. The product(s) featured herein will be used under conditions beyond the manufacturer's control and therefore all warranties, either express or implied, concerning the fitness or suitability of such product(s) for any particular use or in any specific application, are disclaimed. The user expressly assumes all risk and liability, whether based in contract, tort or otherwise, in connection with the use of the information contained herein or the product itself.

Care for your safety



No smoking, no naked flames, no sparks



Shield eyes



Read instructions



Electrical hazard



Electrolyte is corrosive



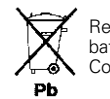
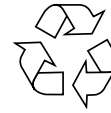
Danger



Clean all acid splash in eyes or on skin with plenty of clean water. Then seek medical help. Acid on clothing is to be washed with water



Warning: Risk of fire, explosion, or burns. Do not disassemble, heat above 149°F (65°C), or incinerate. Avoid any short circuit. Metallic parts under voltage on the battery, do not place tools or items on top of the battery



Recycle scrap batteries. Contains lead

Pb

BCI Warning



DANGER Contains: Lead, Sulfuric Acid (Electrolyte), Lead Compounds.

Harmful if swallowed, inhaled, or in contact with skin. Acid causes severe skin burns and eye damage. May damage fertility or the unborn child if ingested or inhaled. May cause harm to breast-fed children. May cause cancer if ingested or inhaled. Causes skin irritation, serious eye damage. Contact with internal components may cause irritation or severe burns. Causes damage to central nervous system, blood and kidneys through prolonged or repeated exposure if ingested or inhaled. Irritating to eyes, respiratory system, and skin. May form explosive air/gas mixture during charging. Extremely flammable gas (hydrogen). Explosive, fire, blast or projection hazard.

Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Wash thoroughly after handling. Do not eat drink or smoke when using this product. Avoid contact during pregnancy/while nursing.

Wear protective gloves/protective clothing, eye protection/face protection. Use only outdoors or in a well-ventilated area. Avoid contact with internal acid. Do not breathe dust/fume/gas/mist/vapors/spray. Keep away from heat/sparks/open flames/hot surfaces. No smoking. IF SWALLOWED OR CONSUMED: rinse mouth. Do NOT induce vomiting. Call a poison center/doctor if you feel unwell. IF ON CLOTHING OR SKIN (or hair): Remove/Take off immediately all contaminated clothing and wash it before reuse. Rinse skin with water/shower. IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER or doctor/physician. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If exposed/concerned, or if you feel unwell seek medical attention/advice. Store locked up, in a well-ventilated area, in accordance with local and national regulation. Dispose of contents/container in accordance with local and national regulation. Keep out of reach of children.

Handling

PowerSafe® SBS XL batteries are supplied in a charged condition and are capable of extremely high short circuit currents. Take care to avoid short-circuiting terminals of opposite polarity.

Keep flames away

In case of accidental overcharge a flammable gas can be released through the safety vent. Discharge any possible static electricity from clothes by touching an earth connected part.

Tools

Use tools with insulated handles. Do not place or drop metal objects on the battery. Remove rings, wristwatch and articles of clothing with metal parts that may come into contact with the battery terminals.

California Proposition 65 Warning - Battery posts, terminals, and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and reproductive harm. Wash hands after handling.

1. Receiving

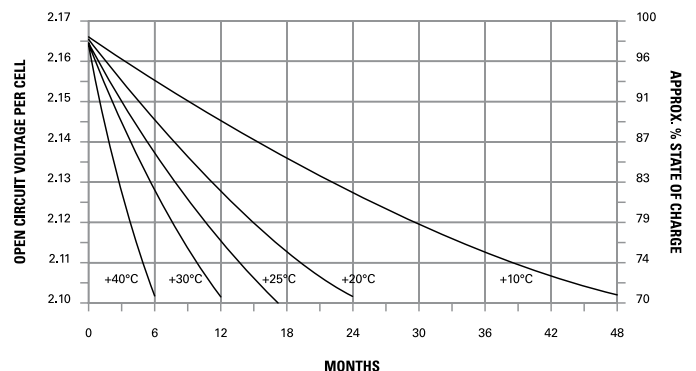
Upon the receipt of the shipment, check the contents for damage and against the packing slip. Immediately inform EnerSys® of any damaged or missing items. EnerSys is not responsible for shipment damage or shortages that the receiver does not report to the carrier.

2. Storage

2.1. Storage Conditions and Time

If a battery cannot be immediately installed it should be stored in a clean, cool and dry area. During storage monoblocs, lose capacity through self-discharge. High temperatures increase the rate of self-discharge and reduce the storage life.

The chart to the right shows the relationship between Open Circuit Voltage (OCV) and storage time at various temperatures.



The maximum storage times before a refresh charge is required and recommended OCV audit intervals are:

Temperature °F (°C)	Storage Time (Months)	OCV Audit Intervals (Months)
50 (10)	48	12
59 (15)	34	12
68 (20)	24	12
77 (25)	17	6
86 (30)	12	6
95 (35)	8.5	3
104 (40)	6	3

Batteries must be given a refresh charge when the OCV approaches the equivalent of 2.10 Volts per cell (Vpc) or when the maximum storage time is reached, whichever occurs first.

2.2. Freshening Charge

Charge the module or string of modules at a constant voltage equivalent to 2.27Vpc with current limited to 10A per 100Ah nominal capacity for a period of at least 24 hours, but with a maximum of 48 hours. Use temperature compensation as indicated in Section 5. Start monitoring the charging current 21 hours after initiating the freshening charge. The charge is complete when the current stabilizes. Current stabilization is defined as three current readings at least one hour apart within five percent of each other. Do not charge in an air tight enclosure.

Completing a freshening charge according to the instruction will reset the storage OCV audit interval and suggested maximum storage time. If voltage drops below 2.10Vpc contact EnerSys for instruction.

3. Battery Location

Batteries must be installed in accordance with local/national laws, regulations and standards. The battery compartment/room must have adequate ventilation to limit hydrogen accumulation to a maximum of 1% by volume. Please contact your EnerSys® representative for further advice on this topic.

4. Installation

PowerSafe® SBS XL batteries can be installed on their base or horizontally on their longest side.

Each monobloc is supplied with the terminal/connector fasteners.

On each monobloc the positive terminal is identified by a "+" symbol. Install the batteries in accordance with the instructions and/or layout drawing, taking care to ensure correct terminal location and polarity.

Connect the blocs with the connectors and fasteners provided. Torque the fasteners to the value indicated on the product label.

Place the insulating covers in position immediately after tightening the fasteners.

5. Operation

Optimum performance and service life are achieved at a temperature of 68°F (20°C) to 77°F (25°C). The operating temperature range is -40°F (-40°C) to 131°F (55°C) with short term excursions to 149°F (65°C) permissible.

5.1. Standby / Float Operation

Constant voltage chargers are recommended. The charging voltage should be set at the equivalent of 2.29Vpc at 68°F (20°C) or 2.27Vpc at 77°F (25°C). The minimum charging voltage, at any temperature, is 2.21Vpc. The recommended float voltage temperature compensation is as follows:

	Temperature °F (°C)						
	50 (10)	59 (15)	68 (20)	77 (25)	86 (30)	95 (35)	104 (40)
Recommended	2.33	2.31	2.29	2.27	2.25	2.23	2.21
Minimum	2.31	2.29	2.27	2.25	2.23	2.21	2.21

5.2. Charging Current

Due to the very low internal resistance PowerSafe SBS XL batteries will accept unlimited current during recharge but for cost and practical purposes in float applications where recharge time to repeat duty is not critical, the rectifier current can be limited to the load plus 0.1C₈ Amps.

5.3. Discharging

Batteries must not be left in a discharged condition after supplying the load but must immediately return to recharge mode.

Failure to observe these conditions may result in greatly reduced service life.

5.4. Accidental Deep Discharging

For optimum operation the minimum voltage of the system should be related to the duty as follows:

Duty	Minimum end voltage
5 min ≤ t ≤ 1h	1.65V
1h ≤ t ≤ 5h	1.70V
5h ≤ t ≤ 8h	1.75V
8h ≤ t ≤ 20h	1.80V

In order to protect the battery it is advisable to have system monitoring and low voltage cut off.

Deep discharge will produce a premature deterioration of the battery and a noticeable reduction in the life expectancy of the battery.

5.5. Effect of Temperature

The temperature has an effect on the battery capacity. With increased operating temperature capacity increases, likewise with decreasing temperature the capacity decreases. Temperatures exceeding 95°F (35°C) will increase the Total Cost of Ownership (TCO) of this battery.

6. Maintenance

In practice, the user usually specifies the maintenance schedule based on site criticality, location and manpower. However, the following may be used as a suggested maintenance schedule. Typically, the maintenance frequency for standard Valve Regulated Lead Acid (VRLA) batteries is scheduled every 6 months but as a result of the increased design life inherent with the PowerSafe SBS XL battery range this interval frequency can be extended to deliver additional TCO benefit, particularly during the early period of service (as the battery approaches 80% of the intended service it would be beneficial to increase the frequency of maintenance).

Keep a logbook to record values, power outages, discharge tests, etc.

- Measure the battery string voltage. If necessary, adjust the float voltage to the correct value.
- Measure individual bloc voltages. After 12 months of operation blocs should be within stated tolerance of the average voltage value as specified in the Instruction Manual.
- Check the ambient temperature in the immediate environment.
- Inspect for contamination by dust, loose or corroded connections. If necessary, isolate the string/bloc and clean with a damp soft cloth.

Warning: Do NOT use any type of oil, solvent, detergent, petroleum-based solvent or ammonia solution to clean the battery containers or lids. These materials will cause permanent damage to the battery container and lid and will void the warranty.

6.1. State of Health Monitoring

A load test should be carried out typically once a year.

Capacity discharge testing is considered as the only true guide to state of health but can be complemented by the use of Ohmic measurement trending e.g. Conductance.

- A discharge test should only be carried out on a fully charged battery.

Ensure the battery is fully recharged before capacity testing and always complete a full discharge test (partial discharges can lead to false assessment of state of health). Capacity tests must be performed in accordance with IEEE Standard 1188.

Best practice is to define the discharge test based on the application in terms of the load, autonomy or what is practical. The load and end of discharge voltage should be based on published performance literature. Depending on the operating temperature, a compensation correction factor may be required.

Log individual bloc voltage throughout the duration of the test at regular intervals.

Following the capacity test the battery should be fully recharged by commissioning or float charging.

6.2. Ohmic Measurements

The correct way to use Ohmic readings is as a trending tool over time to detect potentially weak or troublesome blocs in a VRLA battery string in float service. When the string is first installed and stabilized, a set of "initial" Ohmic readings should be taken. Since at this time there may still be some significant variations cell to cell in state of charge, separator acid content, recombination efficiency, gel stability, etc. it is not unusual for these initial readings to be about $\pm 50\%$ around average. If there were some monoblocs that exceed this, it would be judicious to equalize charge the string and do a capacity test.

After the string has been in service for about six months, the previous mentioned variations tend to normalize. At this point another set of Ohmic readings should be taken and considered the "baseline" readings. At this point, the monoblocs should be within about $\pm 30\%$ of average string readings.

These individual cell "baseline" readings will serve as a reference for trending purposes for comparison to readings taken later in life. On a yearly basis, Ohmic readings should be taken, recorded and compared to the baseline readings. If a monobloc Ohmic reading should vary more than 50% from the baseline value, the cell/battery should be further evaluated to determine the cause. A performance or capacity test should be part of this evaluation.

7. Disposal

PowerSafe® SBS XL batteries are recyclable. Scrap batteries must be packaged and transported in accordance with prevailing transportation rules and regulations. Scrap batteries must be disposed of in compliance with local and national laws by a licensed or certified lead acid battery recycler.

Please call EnerSys® at 1-800-538-3627 for recycling assistance.



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