PowerSafe SBS XL

PowerSafe SBS XL Batteries
Installation, Operation and Maintenance Manual

EnerSys

Power/Full Solutions

Visit us at **www.enersys.com**

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.

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 60°C (140°F), or incinerate. Metallic parts under voltage are present on the battery, avoid short circuit. Do not place tools or items on top of the battery.

Recycle scrap batteries. Contains lead.

Handling
PowerSafe® SBS XL blocs and cells 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 leak off 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

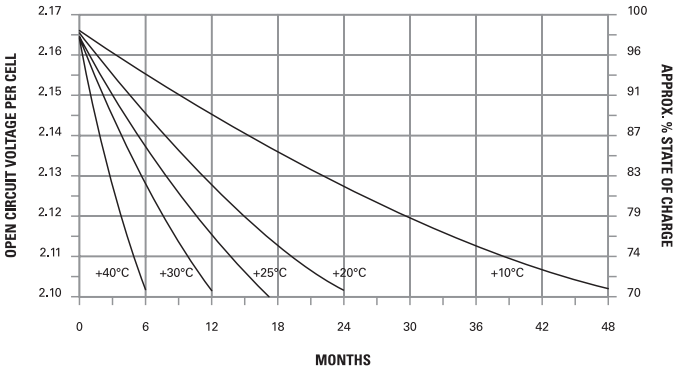
Upon the receipt of the shipment, check the contents for damage and against the packing slip. Immediately inform EnerSys of any damaged or missing items. EnerSys® is not responsible for shipment damage or shortages that the receiver does not report to the carrier.

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 blocs and cells lose capacity through self-discharge. High temperatures increase the rate of self-discharge and reduce the storage life.

The chart below 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 open circuit voltage audit intervals are:

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

Blocs/cells must be given a refresh charge when the OCV approaches the equivalent of 2.10 Volts per cell or when the maximum storage time is reached, whichever occurs first.

2.2. Refresh Charge

Charge at a constant voltage equivalent to 2.29 – 2.40Vpc with a minimum $0.1C_{10}$ Amps available for a period of 24 hours.

2.3. Commissioning Charge

Before commencing operation, the battery must be given a commissioning charge. The batteries should be charged using constant voltage with a minimum charge current of $0.1C_{10}$ Amps with no load connected to the battery. Either of the following methods can be used:

- Charge for 96 hours at the recommended float voltage of 2.29Vpc at 20°C / 68°F or
- Charge for 24 hours at the recommended boost charge voltage of 2.40Vpc at 20°C / 68°F. The battery will then be switched over to float charging, maintaining the battery under floating voltage for 24 hours before any discharge test.

3. Battery Location

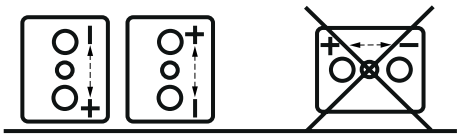
The battery compartment/room must have adequate ventilation to limit hydrogen accumulation. Batteries must be installed in accordance with the IEC 62485-2 standard and any other local/national laws and regulations.

4. Installation

PowerSafe SBS XL batteries are designed for stable grid float applications (non-cyclic applications). 12V blocs can be installed on their base or horizontally on their longest side whilst 2V cells can be mounted in any orientation except inverted.

With regards to the installation of 2V cells in horizontal orientation specifically, the instructions below must be complied with:

- Do not use terminal posts to lift or handle cells.
- Do not install the cells in such a way that the box-lid seal is resting on a runner.
- Always ensure that the arrow on the lid of each unit is pointing in vertical orientation.



Each bloc / cell is supplied with terminal/connector fasteners.

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

Connect the blocs / cells with the connectors and fasteners provided. The fastener torque value is 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 20 to 25°C (68 to 77°F). The operating temperature range is as follows:

- SBS XL 2V cells: -40°C to +50°C (-40°F to +122°F)
- SBS XL 12V blocs: -40°C to +65°C (-40°F to +149°F).

5.1. Standby / Float Operation

Constant voltage chargers are recommended. The charging voltage should be set at the equivalent of 2.29Vpc at 20°C (68°F) or 2.275Vpc at 25°C (77°F).

The recommended float voltage temperature compensation is:

- +3mV per cell per °C below 20°C
- –3mV per cell per °C above 20°C

The charging voltage at 46°C (115°F) and above is capped at 2.21Vpc.

The voltage should be measured at the battery terminals and should be the mean value across the whole string.

Due to the phenomena of gas recombination, it is not uncommon to note a variation in individual block float voltages of 2% (or up to 5% for relatively new batteries). However, the total voltage of the battery shall be within the limits stated above.

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 $0.1C_{10}$ Amps.

5.3. Periodic Boost Charge
In normal operation, a periodic boost charge is not required. However, in some cases such as when extended or repeated line power outages result in the battery experiencing extended periods of undercharging, a boost charge equivalent to 2.40Vpc at 20°C for a maximum of 15 hours can be applied.

5.4. Ripple Current
Unacceptable levels of ripple current from the charger or the load can cause permanent damage and a reduction in service life. It is recommended to limit the continuous ripple current to $0.05C_{10}A$.

5.5. 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.

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-out.

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

Effect of temperature

The temperature has an effect on the battery capacity. With increased operating temperature the capacity increases; likewise with decreasing temperature the capacity decreases. Allowances must be made when conducting checks and tests at temperatures different to that used for battery sizing.

6. Maintenance and Records

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 VRLA batteries is scheduled every 6 months. However, as a result of the increased design life inherent with the SBS XL range this interval frequency can be extended to deliver additional Total Cost of Ownership (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 / cell voltages. After six months of operation, blocs/cells should be within 2% of the voltage value during float charge, as specified in chapter 5.1.
- Check the ambient temperature in the immediate environment and adjust voltage compensation as necessary.
- Inspect for contamination by dust, loose or corroded connections. If necessary, isolate the string/bloc/cell 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 invalidate the warranty.

State of health monitoring

Typically a load test can be carried out once a year.

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

- A discharge test should only be carried out on a fully charged battery.
- For a new battery a discharge test should only be carried out after the commissioning charge is completed as specified in section 2.3.

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).

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/cell voltage throughout the duration of the test at regular intervals.

Following the capacity test the battery should be fully recharged in accordance with instructions in section 5.

Ohmic measurements

The correct way to use Ohmic readings is as a trending tool over time to detect potentially weak or troublesome blocs/cells in a VRLA battery string in float in 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 bloc to bloc/cell to cell in state of charge, separator acid content, recombination efficiency, etc. it is not unusual for these initial readings to be typically ± 50% of the mean. If some blocs/cells 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 6 months, the previous mentioned variations tend to normalise. At this point another set of Ohmic readings should be taken and used as the "baseline" readings. At this point, the blocs/cells should be typically within ± 30% of the average.

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

7. EnerSys EnVision™ Connect System Monitor FCC / IC Specific Information (*)

All our EnerSys batteries with EnVision™ Connect system monitor technology have been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult an experienced technician for help.

This device complies with part 15 of the FCC Rules and with Industry Canada's licenseexempt RSSs. Operation is subject to the following two conditions:

1. This device may not cause harmful interference; and
2. This device must accept any interference, including interference that may cause undesired operation.

Caution: Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. The device must not be co-located or operating in conjunction with any other antenna or transmitter.

(*) Chapter 7 is only relevant to blocs fitted with optional EnerSys ACE chips.

8. 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.

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