

PowerSafe V Front Terminal Batteries

Installation, Operation
and Maintenance Manual

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



Handling

PowerSafe® V Front Terminal 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 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

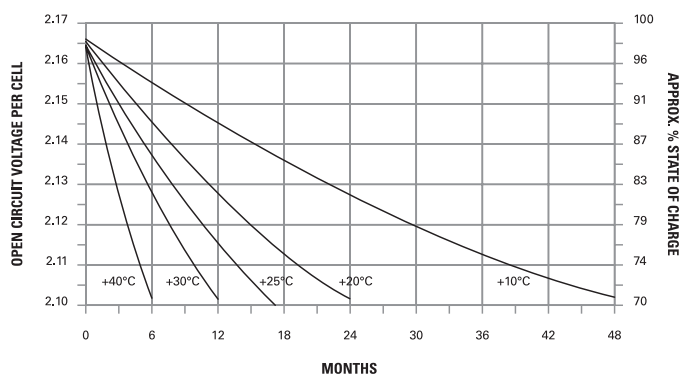
Upon the receipt of the shipment, check the contents for damage and against the packing slip. Immediately inform EnerSys of any damaged or missing items. EnerSys® is not responsible for shipment damage or shortages that the receiver does not report to the carrier.

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 monoblocs 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

Monoblocs 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 the monoblocs or strings at a constant voltage equivalent to 2.29 - 2.40Vpc with a minimum 0.1C₁₀ 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 0.1C₁₀ 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 or
- Charge for 24 hours at the recommended boost charge voltage of 2.40Vpc at 20°C. 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

It is recommended that PowerSafe® V Front Terminal batteries are installed on their base. Please consult your EnerSys representative about any other installation orientation.

Each monobloc is supplied with 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. The fastener torque value is indicated on the product label.

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

5. Operation

The battery will give the best performance and service life when working at a temperature of 20°C. The maximum operating temperature range is -30°C to +45°C.

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 2.27Vpc at 25°C / 77°F. The minimum charging voltage, at any temperature, is 2.21Vpc. For temperatures other than this, the recommended float voltage temperature compensation is as follows:

	Temperature (°C / °F)						
	10/50	15/59	20/68	25/77	30/86	35/95	40/104
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 V Front Terminal 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 0.1C₁₀ Amps.

5.3. Grid Assist Cycling Applications

In instances where the time to repeat duty is critical the charge voltage should be set to 2.40Vpc at 20°C, with the rectifier current limit set to a minimum of 0.1C₁₀ Amps. Fast charge should be stopped and reverted to float voltage once full state of charge is reached. Further details can be found in our application guide.

5.4. Periodic Boost Charge

In normal operation a periodic boost charge is not required. However, in some cases such as when there has been no discharge duty over a 12 month period, a boost charge equivalent to 2.40Vpc at 20°C for maximum of 10 hours can be applied.

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

Correction factors of the capacity, according to the temperature are illustrated in the performance datasheet.

Operation of valve regulated batteries at temperatures higher than 20°C will reduce life expectancy. Life is reduced by 50% for every 10°C rise in temperature.

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.

- **Monthly (record all readings)**

- Measure the battery string voltage. If necessary, adjust the float voltage to the correct value.
- Check the ambient temperature in the immediate environment.

- **Every six months (record all readings)**

- Measure the battery string voltage. If necessary, adjust the float voltage to the correct value.
- Measure individual bloc voltages. After 6 months of operation blocs should be within 5% of the average voltage value.
- 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 invalidate the warranty.

Keep a logbook to record values, power outages, discharge tests, etc. An autonomy check can be done once a year.

Contact EnerSys® if you have any questions regarding maintenance.

7. Disposal

PowerSafe® V Front Terminal 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.

Notes



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