



PowerSafe®

✓ Front Terminal

Telecommunications

Instruction Sheet



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Read these instructions immediately upon receipt. PowerSafe® V Front Terminal batteries are safe when operated and handled properly. It is vitally important that you observe the precautions recommended in this instruction sheet.
YOU SHOULD BE TRAINED IN HANDLING, INSTALLING, OPERATING AND MAINTAINING BATTERIES BEFORE YOU WORK ON ANY BATTERY SYSTEM.

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.



When working on batteries wear safety glasses with side shields, rubber gloves and protective clothing. All metallic personal objects, such as rings, watches, bracelets, etc, should be removed before starting work on the battery! Only use insulated tools!



Electrolyte is corrosive.



In case of **SKIN CONTACT** with electrolyte, **IMMEDIATELY**

1. **REMOVE** contaminated **CLOTHING**
2. **FLUSH** the area **THOROUGHLY** with **WATER**
3. Get **MEDICAL ATTENTION**



In case of **EYE CONTACT** with electrolyte, **IMMEDIATELY**

1. **FLUSH THOROUGHLY** for at least 15 minutes with large amounts of **WATER**.
2. Get **MEDICAL ATTENTION**.



In case of electrolyte **CONTACT WITH CLOTHING OR MATERIAL, IMMEDIATELY**

1. **REMOVE CONTAMINATED CLOTHING**
2. Apply large amounts of water to affected area.
3. Wash clothing as soon as possible.



Batteries can generate gases which, when released, can explode, causing blindness and other serious personal injury.



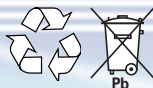
Warning: batteries remain live even though they are disconnected. No rings or metal bracelets should be worn during the assembly of the battery. Do not place electrically conductive objects such as tools etc. on top of the battery! Warning: cells are heavy, use proper lifting technique.



Do not allow flames, embers or sparks near the battery due to the risk of explosion or fire!

The Instruction Sheet must be strictly observed. Non-compliance with the Instruction Sheet, use of non OEM spares or use of additives to the electrolyte or unauthorized tampering will void the warranty.

Spent batteries with this symbol are reusable products and have to be put into a recycling system. Used batteries must be disposed of as special waste in accordance with all standards.



WARNING!

PowerSafe® V Front Terminal batteries are supplied in a charged state and are capable of extremely high short circuit currents. Take care to avoid short-circuiting terminals of opposite polarity.

1. Receiving the battery

1.1 In-Transit Damage or Short Shipments

Upon receipt of a shipment, check that the packaging of items delivered is undamaged and match the carrier's Bill of Lading. Report any damage or shortages to the carrier. EnerSys® is not responsible for shipment damage or shortages that the receiver does not report to the carrier.

1.2 Shipment Damage or Shortages

Open the shipping containers and check the contents for damage upon receipt. Immediately inform EnerSys of any damaged or missing items. EnerSys is not responsible for damaged or missing items after a shipment has been in storage.

2. Storage

2.1 Storage Conditions and Time

Store the batteries in a clean, cool, dry area. Batteries lose capacity during storage.

High temperature increases the rate of capacity loss and reduces the storage life.

The following chart shows the relationship between temperature and storage time.

- 12 months at 65°F (18°C)
- 6 months at 86°F (30°C)
- 3 months at 104°F (40°C)

At the end of the storage period or when cell voltages fall to 2.10 (12.60/6.3V per bloc), whichever comes first, the batteries must be given a freshening charge at 2.25 – 2.27Vpc at 77°F (25°C) for 48 – 96 hours.

Failure to comply with these instructions can result in reduced capacity and service life.

2.2 Freshening Charge

Charge the monoblocs, or string at a constant voltage equivalent to 2.27Vpc with 10% of the C₈ current available for a period of at least 24 hours.

3. Battery Location

The battery compartment/room must have adequate ventilation to limit hydrogen accumulation to a maximum of 1% by volume of free air.

4. Installation

Install the batteries in accordance with the instructions and/or layout drawing, taking care to ensure correct terminal location and polarity. On each bloc the positive and negative terminals are identified with "+" and "-" symbols.

Connect the blocs with the connectors and fasteners provided. The fastener torque value is:

Type	Fastener Size	Torque in lb / Nm
12V100FC	M8 Female	44 / 5
12V101F	M8 Female	44 / 5
12V125F	M6 Male	80 / 9
12V155FS	M6 Male	80 / 9
12V170FS	M6 Male	80 / 9
12V190F	M6 Male	80 / 9

5. Operation

5.1 Temperature

Optimum battery operating temperature is 68°F (20°C) to 77°F (25°C).
The operating temperature should not exceed 14°F (-10°C) to 113°F (45°C).

5.2 State of Charge

For chargers with automatic temperature compensation the recommended float voltage temperature compensation is:

- +3mV per cell per 1.8°F (1°C) below 77°F (25°C)
- 3mV per cell per 1.8°F (1°C) above 77°F (25°C)

5.3 Discharge

Do not over-discharge the battery. This can be avoided by including a Low Voltage Disconnect switch in the circuit or by disconnecting the battery from the load when the end discharge voltage is reached.

5.4 Recharge

After a discharge the battery should be recharged as soon as possible.
The battery must not be in a discharged condition for more than 72 hours.

5.5 Commissioning charge

Before use, the batteries should be charged at a constant charging voltage (with a charging current limited to 0.1C₁₀) with one of the following methods:

- Charge during 96 hours with the floating voltage between 2.27 and 2.30 Vpc in ambient temperature range between 59°F (15°C) to 77°F (25°C).
- or charge with the 2.40Vpc boost charge voltage during minimum 24 to 48 hours maximum to reduce the commissioning charging period (the battery will then be switched over to float charging, maintain the battery under floating voltage for 24 hours before any discharge test, see hereafter).

Note: If the battery is to be subjected to a discharge test, the test will be performed immediately after the commissioning charge has been carried out. Check that the battery is fully charged.

6. Float Voltage

The recommended float charge voltage is 2.28 volts per cell at 68°F (20°C).

Following a commission charge and after six months continuous charge at the recommended float voltage, individual cell voltages will stabilize within ±4.5% of the mean applied voltage.

However, immediately following commissioning and for the initial six months of continuous float charge, individual cell voltage values outside the above tolerance may be observed without adverse effect. There is no relationship between a cell's float voltage and its discharge capacity. Cells are perfectly capable of giving their discharge capacity even when outside the ±4.5% range.

After six months service, should any individual cell or monobloc show a continuing reduction or increase in voltage outside the above limits over three successive monthly periods, EnerSys® should be contacted for advice. When the average ambient temperature deviates more than ±9°F (±5°C) from the reference temperature 68°F (20°C), it is necessary to adjust the float voltage as follows:

Temperature	Float voltage range per cell
32°F (0°C)	2.33-2.36V
50°F (10°C)	2.30-2.33V
68°F (20°C)	2.27-2.30V
77°F (25°C)	2.25-2.28V
86°F (30°C)	2.24-2.27V
95°F (35°C)	2.22-2.25V
104°F (40°C)	2.21-2.24V

If the charger does not permit an adjustment of float voltage in relation to the temperature, it is possible to set a float voltage value according to the temperature ranges as indicated in the last table of this publication.

Charging Current

A discharged Valve Regulated Lead Acid (VRLA) battery will accept a high recharge current, but for those seeking a more economical charging system a current limit of 0.08 C₁₀ (A) is adequate.

Fast Recharge

Increasing the charge voltage to 2.40Vpc with a current limited to 0.1 C₁₀ (A) can reduce recharge times. Fast charge should be stopped after approximately 10 to 15 hours. This charge regime, in order to achieve a normal service life, must not be used more than once per month.

Float Charge Ripple

Excessive ripple on the D.C. supply across a battery has the effect of reducing life and performance.

It is therefore recommended that voltage regulation across the system, including the load but without the battery connected, under steady state conditions, should be better than ±1% through 5% to 100% load.

State of Charge

The battery state of charge can be determined approximately by measuring the open circuit voltage after the battery has been at rest for a minimum of 24 hours at 77°F (25°C).

Voltage	State of charge
2.14Vpc	100%
2.10Vpc	80%
2.07Vpc	60%
2.04Vpc	40%
2.00Vpc	20%

Open circuit voltage variation with temperature is 2.5mV per 18°F (-7.8°C).

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.

7. Maintenance

In practice the user usually specifies the maintenance schedule based on site criticality, location and manpower. The following is the recommended minimum maintenance schedule:

Every Six Months (Record All Readings)

Measure, at the battery terminals, the string voltage. If necessary adjust the charger float voltage to the correct value.

Measure individual bloc voltages. The blocs should be within 5% of the average. All readings should be recorded in a format where sudden deviations and trends are easily identifiable.

Inspect for loose or corroded connectors, acid leaks and dust. If necessary isolate the string/blocs and clean with a soft damp cloth. Do not use solvents or scouring powders to clean the blocs. Contact EnerSys® if you have any questions regarding maintenance.

8. Disposal

PoweSafe® 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.

9. Shipping

Approved as non-hazardous cargo for ground, sea and air transportation in accordance with US DOT Regulation CFR and ICAO and IATA Packing Instruction 806. Please see our SDS for complete details at: www.enersys.com.