

## SAFETY PRECAUTIONS

For PowerPlus's Standard, Modular, High Rate, Deep Cycle Gel, Modular Gel, OPzV, front access T & FT ranges valve regulated lead acid batteries.

### General Information

In normal use, PowerPlus VRLA batteries will emit no gases. However there is the possibility that under abnormal operating conditions or as a result of damage or abuse; the batteries might release hydrogen. In order to ensure the proper function of its batteries PowerPlus strongly recommends compliance to its operating installation and maintenance instructions.

### Receiving

Every precaution has been taken to pack the battery for shipment to assure its safe arrival. Upon receipt of shipment all cartons should be inspected and matched against packing list. Any shortages of batteries, cables or hardware should be immediately reported to PowerPlus. As soon as you receive the battery, check the packing material for evidence of damage in transit. If packing material is physically damaged, make a notation on the bill of lading before you sign it. Any damages upon receipt of shipment should be claimed as freight damage to the shipper. No replacement will be made unless missing or damaged items are properly noted on receiving documents before customer signature.

### Storage

If batteries are not installed immediately they should be stored indoors in a cool, clean and dry area. Do not store at temperatures above 110°F (43.3°C) or below 20°F (-6.66°C). Storage time will be reduced by one half for each 18°F above 77°F. Batteries not placed in service for several months will self-discharge and reduce the specific gravity of the electrolyte. Refresh charges may be applied when open circuit voltage falls to 2.07 volts per cell, and/or every 6 months at 77°F (25°C), whichever occurs first (see charging section for specifications).

### Location

Before proceeding with installation, review battery system drawings and assemble according to provided instructions. Normal battery operating temperatures are between 68°F (20°C) and 77°F (25°C). Internal battery connections should be re-torqued annually. Locate cabinets & racks in a clean, cool, dry place so batteries are not affected by sources of radiant heat, such as sunshine, heating units, radiators, steam pipes, and so on.

### Battery Connections

When installing batteries in a system, prepare contact surface of terminals to a clean, metallic finish. Use a wire brush to clean battery terminals and a plastic bristle brush to clean cable lugs. Apply a thin coat of an approved anti-corrosive compound to all contact surfaces of battery terminals. Torque all connections to the recommended value. Apply a final thin coat of anti-corrosive compound to all metal surfaces.

### Charging

Batteries are shipped from PowerPlus at approximately 95% capacity, and will attain 100% capacity after 6 months on float charge. All batteries shipped fully charged lose some charge in transit or storage. At the first opportunity, they should be given an initial charge, using the constant voltage method. Batteries must be maintained on float charge and should be fully recharged within 24hrs after any discharge. A high rate charge may be used to speed up the charging process, but only after a discharge. High rate charging should last for maximum 6-8 hours, and then all batteries should be put back on float charge. All charging must be at fixed voltage.

Recommended Charging Parameters:

Float voltage: 2.25 - 2.30 volts/cells

High rate charge voltage: 2.31 - 2.35 volts/cells

\*Above 2.37 volts/cell batteries may emit hydrogen gas

\*Average ambient temperature: 77 °F (25°C)

**Maintenance**

The following minimum maintenance procedures must be followed and recorded in the Service Report. Insufficient records and /or failure to perform maintenance on the battery system may conditionally void the warranty.

**Monthly Inspections:**

- 1- General inspection of batteries, racks or cabinets.
- 2- Check charger voltage and current operation.
- 3- Measure float charge voltage at battery terminals.
- 4- Measure float charge current.
- 5- Check battery environment and ambient temperatures.

**Semi-Annual: (perform monthly inspection plus)**

- 1- Spot check individual battery temperatures.
- 2- Measure individual battery float voltages.

**Annual: (perform semi-annual inspection plus)**

- 1- Detailed visual inspection of individual batteries.
- 2- Inspect all connections for cleanliness, corrosion, etc.
- 3- Measure micro OHM meter value of all terminal connections.
- 4- Re-torque all connections to recommended values.
- 5- Perform general system maintenance, clean batteries, racks or cabinets.

**Bi-Annual: (perform annual inspection plus)**

Perform discharge test at rated capacity monitoring parameters continuously.

Note: Some larger and / or custom designed battery systems may require more frequent specialized maintenance inspections.

**Safety tips:**

- 1- Limit access to authorized personnel only.
- 2- Read all instructions and specifications prior to performing work on the batteries.
- 3- Do not smoke, light matches or cause sparks near any storage battery.
- 4- Remove rings and metal watchbands and jewelry before working on batteries.
- 5- Do not place tools or metal objects on battery.
- 6- Use insulated tools when working on battery.
- 7- Make sure installation is in accordance with engineering instructions prior to battery start-up.
- 8- Review all battery specifications from instructions.
- 9- Perform routine maintenance from instructions.

