

POWER BATTERY COMPANY, INC.

CV VRLA STATIONARY BATTERIES

INSTALLATION AND OPERATIONS MANUAL

TABLE OF CONTENTS

Section 1	General Information
Section 2	Safety Information
Section 3	Receipt and Storage
Section 4	General Installation Procedures
Section 5	Installation
Section 6	Operations
Section 7	Technical Support
Appendix 1	Electrolyte volume and weight
Appendix 2	Short circuit and internal resistance values
Appendix 3	Battery Drawings

Section 1. General Information

The Power CV battery is a valve regulated lead acid low maintenance storage device designed for use in standby and medium duty cycling applications. This type of battery has no special ventilation or handling requirements. Because the electrolyte is immobilized, the batteries are considered nonspillable and can be handled and shipped accordingly.

Section 2. Safety Information

Lead acid batteries require care in installation and maintenance. Unsafe practices or procedures can result in injury or death to personnel and explosion and fire if proper safety precautions are not followed. The following precautions apply:

1. Disconnect all power before attempting to install remove or perform maintenance work on a CV battery system. Be careful when taking readings not to short the terminals, as injury and battery damage can occur.
2. Do not tamper with any parts of the battery, including cover, valves, and terminals.
3. Keep batteries clean and dry. Use one pound of soda per gallon of water to neutralize any electrolyte that may be present.
4. Keep connections clean and tightened to the proper level.
5. In case of a cell rupture, contact with the electrolyte, which is a solution of sulphuric acid, may occur. If contact with electrolyte is made, flush the contacted body part with water.
6. Do not attempt to operate the battery in a space that does not have ventilation suitable for human habitation. Gases are released from the cells at a very low rate, but the space must have some ventilation. Hydrogen gases are explosive if allowed to accumulate to 4% of the total volume.
7. Keep all metallic objects away from the cell terminals, as shorting the cells can result in the sudden release of large amounts of current which can result in injury or fire.

Section 3. Receipt and Storage

3.1 Receipt

Upon receipt, inspect the shipment for damage and completeness compared to the bill of lading, and the bill of materials. Report damage or shortages to the appropriate party immediately.

3.2 Storage

CV batteries are shipped fully charged from the factory. If they are to be stored six months or less in temperatures less than 77 deg. F/25 deg. C., they should not need to be recharged. For every 14-18 degrees F increase over 77, the storage time

between charges is halved. Storage in conditions of high heat, and without proper charging can result in loss of warranty.

Section 4. General Installation Procedures

4.1. Temperature.

Installing the battery in temperatures below 68 degrees F will result in a loss of rated capacity, and in temperatures above 85 degrees F in a loss of life. It is also important to install the battery in a position that will result in a consistent temperature for all cells in the battery. Locations where the sun shines on part of the battery, or where cooled air exhausts on part of the battery will result in improper charging, and a shortening of battery life.

4.2. Ventilation

It is vital that there be sufficient ventilation for human habitation in the battery room. There will be little or no heat generated by the battery during normal operations, but there will be some gases, oxygen and hydrogen emitted from the cells. These gases must be allowed to escape.

4.3 Floor Loading

Before installing the battery, it must be ascertained that the floor will support the battery. It is the responsibility of the installer to ensure adequate floor loading capability.

4.4 Seismic Considerations

Power CV batteries are capable of withstanding seismic events of UBC zone 4 magnitudes in horizontal stacks of up to 8 high when properly installed and anchored. Suitable floor anchoring is the responsibility of the installer.

4.5 Unpacking

CV modules with cells are shipped on pallets in the horizontal configuration. The packing order of modules is not necessarily the order in which the modules must be installed, so careful attention to the wiring diagram must be paid. The connectors and accessories are packed separate from the modules, but on the same pallets, and should be counted carefully.

Section 5. Installation

5.1 General.

CV modules must be installed and operated in the horizontal position only, in stacks up to 8 high. The termination is generally configured to be at the top for both positive and negative.

Handle the modules by using the lifting straps, connecting to the front and rear mounting channels. Never attempt to lift the modules by the terminals, as damage may occur and the warranty will be voided.

5.2. Installation

- A. Locate and mark the position on the floor where the battery is intended to be installed.
- B. Using the wiring diagram provided, locate the bottom module, and install on the mounting base. Locate the base in the proper position, and level it using shims.
- C. Carefully lift and position the remaining modules in accordance with the wiring diagram. In the case of multiple stacks, the stacks should be directly next to each other. Tie plates are provided for securing stacks together.
- D. Cell-to-Cell Electrical Connections.

Proper connections are important for the performance of the cells and safety of the installation personnel. Careful attention to the wiring diagram is required. Ensure all connections are clean and no-ox grease is applied after installation.

Caution: remove all rings, watches and jewelry prior to installing the intercell connectors. Hazardous voltages are present.

When proper connections have been established, tighten the terminal bolts to 150 inch pounds.

- E. Terminal assembly

Install the terminal plates by first installing the plastic angle supports to the top module. Then bolt the terminal plates to the top cell terminals, to the support bracket. There is a transparent cover that covers both terminal plates.

- F. Cabling to the charger

The cable to the charger should be sized for low voltage drop (no more than 10 mv per three feet of cable).

Section 6. Operations

6.1 Commissioning

The battery should be placed on charge as soon as possible after installation, at the float voltage level, compensated for temperature if appropriate. If an acceptance test is to be conducted, the battery should be kept on charge for at least 24 hours before the test is started.

6.2 Float Voltage

The float voltage is at a level that is influenced by the specific gravity of the cells, in this case, 1.300. The recommended float voltage is 2.25 volts per cell at 77 degrees F (25 degrees C). Floating at too low a level will result in a loss of capacity and shorter life; floating at too high a level will increase the grid corrosion rate and shorten the life. The batteries should be charged on a constant voltage charger, well regulated.

6.3 Temperature Compensation for Charging

If the ambient temperature of the battery room is significantly different from the rated temperature, the charger should be adjusted for that temperature. The factor is -1.7 mv per degree F, -3 mv per degree C.

6.4 Maximum Charge Current

Although the battery is self-regulating in terms of the current that it will accept, an unregulated power supply source can overcharge the battery. The maximum charge current should be the $C/5$ rate in amperes. For example, if the CV 1050 cell has a five hour current rating of 200 amperes, that is the maximum current to which the battery should be exposed.

6.5 Recharge

After discharge, the battery should be recharged as soon as possible. Leaving the battery in a full or partially discharged condition will result in damage to the plates and will shorten the life of the battery. Recharge can be accomplished at the float voltage level, but if a faster recharge is desired, the charger can be set at 2.30 VPC for a time not to exceed 36 hours.

6.6 Equalization

Equalization charges are maintenance procedures which are not required for CV batteries, unless due to an external condition such as uneven temperatures, deep discharges, etc, the cell voltages have become inconsistent (greater than .05 volts between cells). In that case, refer to 6.5 above.

6.7 Maintenance

Maintenance consists of:

- A. Keeping the battery clean and dry
- B. Taking cell voltage readings on a six month interval
- C. Checking the torque of the terminal connections annually
- D. Keeping records of the temperature, cell voltages, battery condition, float current and system voltage on at least a semi-annual basis

Section 7. Technical Support

Power Battery Company may be contacted at the following locations for technical support:

USA

Power Battery Co
Paterson, NJ
Tel: 973-523-8630
Fax: 973-523-3023

Canada

Power Battery Co.
Iberville, Que.
Tel: 450-346-3273
Fax: 450-346-8003

Europe

Power Batteries Ltd.
Romsey, Hampshire UK
Tel: 44-1794-835900
Fax: 44-1794-835910

Appendix 1**The Volume and Weight of Electrolyte
for POWER CV Cells**

CV cell Model	Volume(gal) 25 Deg F	Weight(Lbs/Kg)
CV 210	0.77	7.90/3.61
CV 315	1.15	11.90/5.42
CV 420	1.52	15.73/7.15
CV 525	1.90	19.65/8.93
CV 630	2.27	23.47/10.67
CV 735	2.63	27.19/12.36
CV 840	3.00	31.10/14.13
CV 945	3.37	34.83/15.83
CV 1050	3.74	38.70/17.59
CV 1155	4.11	42.48/19.31
CV 1260	4.48	46.35/21.07
CV 1365	4.85	50.24/22.82
CV 1470	5.23	54.08/24.58
CV 1575	5.60	57.93/26.33
CV 1680	5.97	61.80/28.09
CV 1890	6.81	70.41/32.00
CV 2100	7.48	77.40/35.18
CV 2310	8.22	84.96/38.62
CV 2520	8.96	92.70/42.14
CV 2835	10.11	104.49/47.50
CV 3150	11.22	116.10/52.77
CV 3465	12.33	127.44/57.93
CV 3780	13.44	139.05/63.20
CV 4095	14.55	150.72/68.51
CV 4410	15.69	162.24/73.75
CV 4725	16.80	173.79/79.00
CV 5040	17.91	185.40/84.270

Appendix 2

Internal resistance and short circuit data for POWER CV Cells

Cell Type	I/R m ohms	Short circuit Ampere
CV210	0.800	2500
CV315	0.640	3125
CV420	0.560	3570
CV525	0.500	4000
CV630	0.440	4545
CV735	0.400	5000
CV840	0.370	5405
CV945	0.310	6455
CV1050	0.260	7695
CV1155	0.230	8695
CV1260	0.210	9525
CV1365	0.200	10000
CV1470	0.180	11115
CV1575	0.170	11765
CV1680	0.160	12500
CV1890	0.155	12900
CV2100	0.130	15390
CV2310	0.115	17390
CV2520	0.105	19050
CV2835	0.103	19400
CV3150	0.087	23000
CV3465	0.077	26000
CV3780	0.070	28600
CV4095	0.067	30000
CV4410	0.060	33300
CV4725	0.057	35100
CV5040	0.053	38000

Appendix 3

DRAWINGS