C&D TECHNOLOGIES

Condensed Installation & Operating Procedures

I. BATTERY DESCRIPTION

The valve regulated lead acid (VRLA) battery is a minimal maintenance system, which utilizes an oxygen recombination cycle to minimize gassing and eliminate electrolyte maintenance. The dilute sulfuric acid electrolyte is immobilized either in absorbent glass mat (AGM) separators or in a gel medium. Each of the 2 VDC cells in each battery has a unique self-resealing one way valve to relieve any excess pressure generated during overcharging conditions.

II. SAFETY CONCERNS

Installation and servicing of batteries should be performed or supervised by personnel knowledgeable of lead acid batteries and required personal and equipment safety precautions.

• Electrical Hazards

Battery systems present a risk of electrical shock and high short circuit current. Remove metal objects (e.g. watches and rings); use insulated tools; wear eye protection and rubber gloves. Observe circuit polarities and do not make or break live circuits.

• Disposal

Lead acid batteries are to be recycled.

Batteries contain lead and immobilized dilute sulfuric acid. Dispose of in accordance with Federal, State and local regulations. Do not dispose of in a landfill, lake or other unauthorized location.

• Chemical Hazards

Any gelled or liquid emissions from a battery is electrolyte which contains dilute sulfuric acid which is harmful to the skin and eyes; is electrically conductive and is corrosive. If electrolyte contacts the skin, wash immediately and thoroughly. If electrolyte enters the eyes, also seek medical attention. Neutralize spilled electrolyte with a solution of 1 lb. bicarbonate of soda (baking soda) to 1 gallon of water.

• Fire, Explosion and Heat Hazards

Batteries can contain an explosive mixture of hydrogen gas which can vent under overcharging conditions. Do not smoke or cause sparks in the vicinity of the battery. Do not install and charge batteries in a sealed container. Mount the individual batteries with a minimum of 0.5" between units to allow for convection cooling. If contained, assure the container or cabinet and room have adequate ventilation to prevent accumulation of potentially vented gas. Refer to the current issue of the National Electric Code.

• Caution

Do not attempt to remove battery vents or add water. This presents a safety hazard and voids the warranty.

III. RECEIVING INSTRUCTIONS

Upon receipt, inspect the batteries for physical damage to the containers and terminals. It found, a claim must be filed with the carrier within 10 days.

The batteries are shipped fully charged. Their open circuit voltage should be a minimum of 2.09 volts/cell (6.27 and 12.54 VDC for 6 and 12 volt batteries respectively).

IV. STORAGE INSTRUCTIONS

Store batteries in a clean, dry, cool area away from radiant heat sources. Recharge batteries in storage every 6 months or when their open circuit voltage declines to 6.2 and 12.4 volts for 6 and 12 volt batteries respectively (which ever occurs first).

V. INSTALLATION INSTRUCTIONS

Typically individual batteries are connected in series to form a higher voltage string of batteries (e.g. 4 each 12 volt batteries connected in series for a 48 volt battery system).

Two or more strings may then be connected in parallel to increase the total capacity of the system (e.g. two strings of 48 volt 75 ampere hour batteries connected in parallel for 48 volts at 150 ampere hours capacity).

Refer to figure 1, 2 and 3 for series and parallel connected batteries.

1. Series Connection of Individual Batteries

Place the individual batteries on the rack or shelf with 1/2 inch spacing between the individual units. If installing the units side to side, all the batteries should be placed with terminals of the same polarity (POS. or NEG.) the front of the rack or shelf. If installing end to end the NEG. (-) terminal of battery 1 should be installed adjacent to the POS. (+) terminal of battery 2. Refer to figure 2.

The battery terminals and contact surfaces of the inter unit connecting cable lugs or bus bars should be cleaned with a brass bristle brush and lightly coated with protective No Ox Id or NCP 2 terminal grease.

Assemble the inter unit connections torquing the bolted connections to the values noted in table 1.

Starting at the battery which is to be the positive output, label it as number 1 and then label the following batteries in ascending numerical order.

Measure the open circuit voltage of the series connected string of batteries. It should be approximately equal to the number of units times the per unit voltage. If this is not the case determine the cause and correct before proceeding (e.g. reversed polarity unit).

Select the appropriate size cable per the NEC code to handle the battery charge and discharge current. A fuse or circuit breaker should be used in the battery output circuit. With the circuit breaker or fuse open, connect the battery to the charger/load circuit.

2. Parallel Connection of Individual Strings of Batteries

When separate strings of batteries are to be connected in parallel their open circuit voltage's should be within 1 VDC of each other prior to making the connections.

Each of the individual battery strings should be cabled separately to a common, junction point or box. They should not be "daisy chained" in parallel. Each string should also contain a separate fuse or disconnect switch to facilitate maintenance.

Refer to figure 3 for typical parallel connections.

The parallel connections should be completed only when the charger and load are not connected to the battery output circuit.

VI. FRESHING CHARGE

Once installed the battery system should receive a 24 hour freshing charge at 2.4 volts per cell average (14.4 volts/unit and 7.2 volts/unit average for 12 and 6 volt units respectively).

VII. FLOAT CHARGING

Following the freshing charge the battery system should be placed in operation at a float voltage of between 2.25 and 2.30 volts/cell average (approximately 6.8 and 13.7 volts/unit average for 6 and 12 volt units respectively).

VIII. PERIODIC MAINTENANCE

These VRLA batteries are maintenance free with respect to the electrolyte. However the charging voltage, temperature, performance and connection resistances must be periodically monitored and any necessary corrective actions taken to assure reliable standby power when required.

The following maintenance schedule should be followed:

Quarterly

- Check pilot units temperature at the negative terminal.
- Measure and record the system float charging voltage.
- Measure and record the individual units float charging voltage.

Semi Annually

- Repeat the quarterly checks.
- Optionally perform a 10 second high rate (e.g. 100 ampere) load test on the individual units.
- Optionally perform an impedance or conductance test for the purpose of trending battery over time.

Annually

- Repeat the semi annual checks.
- Retorque all inter unit connecting hardware per table 1.
- Perform inter unit connector resistance checks.

IX. PERFORMANCE TESTS

The battery system should be given a capacity discharge test at acceptance when new and biannually thereafter. When the capacity declines to 85% of rating the battery should be capacity tested annually.

The load current used for the capacity test should be derated for testing temperatures below 75ºF.

TABLE 1

Battery Terminal Torque Requirements

Battery	Bolt Size	Wrench Size	Initial Torque		Annual Retorque	
			in.-lb.	N-m	in.-lb.	N-m
UPS12-100MR, UPS12-150MR, UPS12-210MR	#10-32	3/8"	40	4.5	32	3.5
UPS12-300MR, UPS12-350MR, UPS12-400MR, UPS12-490MR, UPS12-490MRLP, UPS12-540MR, UPS12-620MR	1/4-20	7/16"	110	12.4	110	12.4
TEL12-30, TEL12-45	#10-32	3/8"	40	4.5	32	3.5
TEL12-70, TEL12-80, TEL12-90, TEL12-105FS, TEL12-125, TEL6-180	1/4-20	7/16"	110	12.4	110	12.4
DCS-33IT, DCS-50IT	#10-32	3/8"	40	4.5	32	3.5
DCS-75IT, DCS-88HIT, DCS-100HIT	1/4-20	7/16"	110	12.4	110	12.4
BBG-85	#10-32	3/8"	40	4.5	32	3.5
BBG-165RT, BBG-180RT, BBG-210RT	1/4-20	7/16"	110	12.4	110	12.4
VRS-33IT, VRS-50IT	#10-32	3/8"	40	4.5	32	3.5
VRS-75IT, VRS-88HIT, VRS-100HIT	1/4-20	7/16"	110	12.4	110	12.4
SGC12-30, SGC12-45	#10-32	3/8"	40	4.5	32	3.5
SGC12-70, SGC12-80, SGC12-90, SGC12-105FS, SGC12-125, SGC6-180	1/4-20	7/16"	110	12.4	110	12.4

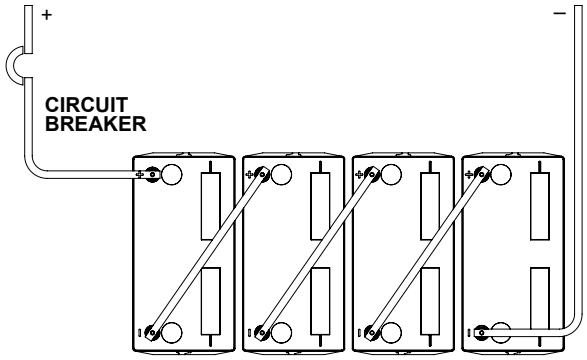

FIGURE 1-SINGLE STRING 48 VDC BATTERY

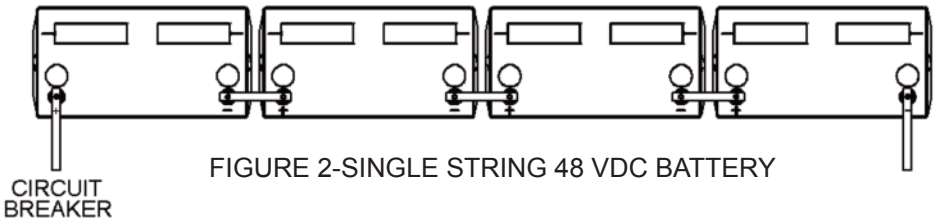

FIGURE 2-SINGLE STRING 48 VDC BATTERY

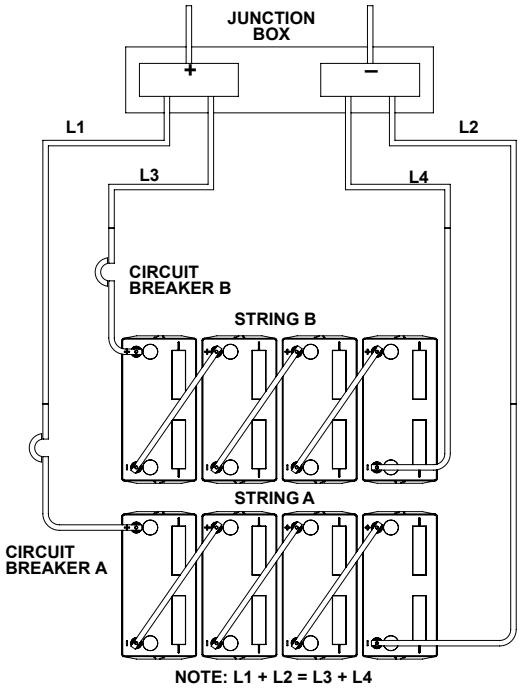

FIGURE 3-PARALLEL STRINGS OF 48 VDC BATTERIES

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