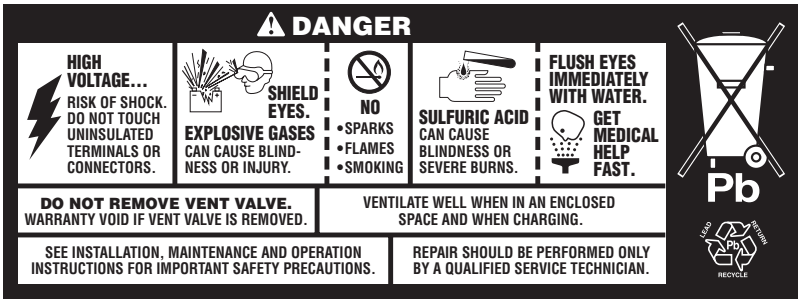
12AVR-125L/LLP
12AVR-145L/LLP

VALVE-REGULATED BATTERIES

INSTALLATION AND OPERATING INSTRUCTIONS



California Proposition 65 Warning

Batteries, battery posts, terminals and related accessories contain lead and lead compounds, and other chemicals known to the state of California to cause cancer and birth defects or other reproductive harm.
Wash hands after handling!

SAFETY PRECAUTIONS

Although most valve-regulated batteries have the electrolyte immobilized within the cell, the electrical hazard associated with batteries still exists. **Work performed on these batteries should be done with the tools and the protective equipment listed below.** Valve-regulated battery installations should be supervised by personnel familiar with batteries and battery safety precautions.

Protective Equipment

To assure safe battery handling, installation and maintenance, the following protection equipment should be used:

1. **Safety glasses or face shield**
2. Acid-resistant gloves
3. Protective aprons and safety shoes
4. Proper lifting devices
5. Properly insulated tools

Procedures

The following safety procedures should be followed during installation: **(Always wear safety glasses or face shield.)**

1. Under normal operating conditions, they do not present any acid danger. However, if the battery jar or cover is damaged, acid could be present.
   Sulfuric acid is harnful to the skin and eyes. Flush affected area with water immediately and consult a physician if splashed in the eyes.
2. Prohibit smoking and open flames, and avoid arcing in the immediate vicinity of the battery.
3. Do not wear metallic objects, such as jewelry, while working on batteries.
4. Keep the top of the battery dry and clear of all tools and other foreign objects.
5. Provide adequate ventilation (per IEEE standard 1187 and/or local codes) and follow recommended charging voltages.
6. Extinguishing media: Class ABC extinguisher.
   Note: CO_2 may be used but not directly on the cells due to thermal shock and potential cracking of cases.
7. **Never** remove or tamper with pressure relief valves. Warranty void if vent valve is removed.
8. Inspect all flooring and lifting equipment for functional adequacy.
9. Adequately secure battery modules, racks, or cabinets to the floor.
10. Connect support structure to ground system in accordance with applicable codes.

SPECIFICATIONS

Product Code	Nominal Voltage	Ampere Hours @ 8-hour Rate	Ampere Hours @ 10-hour Rate	Length	Width	Height	Total Weight	Acid Volume
12AVR-125L	12V	120	125	16.82 in. 427.2 mm	6.97 in. 177.0 mm	10.10 in. 256.5 mm	120lbs. 54.4 kg	2 gal. 7.57 L
12AVR-125LLP	12V	120	125	17.90 in. 454.7 mm	6.97 in. 177.0 mm	9.36 in. 237.7 mm	120lbs. 54.4 kg	2 gal. 7.57 L
12AVR-145L	12V	145	150	16.82 in. 427.2 mm	6.97 in. 177.0 mm	10.10 in. 256.5 mm	100lbs. 45.4 kg	2.2 gal. 8.25 L
12AVR-145LLP	12V	145	150	17.90 in. 454.7 mm	6.97 in. 177.0 mm	9.36 in. 237.7 mm	100lbs. 45.4 kg	2.2 gal. 8.25 L

RECEIVING & STORAGE

Receiving Inspection

Upon Receipt, and at the time of actual unloading, each package should be visually inspected for any possible damage or electrolyte leakage. If either is evident, a more detailed inspection of the entire shipment should be conducted and noted on the bill of lading. Record receipt date, inspection data and notify carrier of any damage.

Unpacking

1. Always wear eye protection.
2. Check all batteries for visible defects such as cracked containers, loose terminal posts, or other unrepairable problems. Batteries with these defects must be replaced.
3. Check the contents of the package against the packaging list. Report any missing parts or shipping damage to your East Penn agent or East Penn Mfg. Co., Inc. immediately.
4. Never lift batteries by the terminal posts.
5. Always lift batteries by the bottom or use the lifting handles.

Storage

1. Cells should be stored indoors in a clean, level, dry and cool location. Recommended storage temperature is 0°F to 90°F (-18°C to 32°C).
2. Stored lead-acid batteries self discharge and must be given a boost charge six months from date of manufacture to prevent permanent performance degradation. Record dates and conditions for all charges during storage.
3. Do not store beyond 12 months.

BATTERY INSTALLATION

General

Caution should be taken when installing batteries to insure no damage occurs. The battery cabinet, tray, rack, etc. shall be inspected for sharp edges that could cause damage to the battery casing. Batteries shall not be dropped, slid, or placed on rough or uneven surfaces such as tray lips or grated flooring. Mishandling of batteries could result in equipment damage or human injury. East Penn will not be liable for damage or injury as a result of mishandling or misuse of the product.

Grounding

When grounding the battery system, proper techniques should be applied per electrical standards, such as NEC and/or local codes.

Battery Installation Procedure

The 12AVR-125L/LLP & 12AVR-145L/LLP batteries are provided with inter-battery bus bars to connect batteries in series to create battery strings. One bus bar is provided with the accessory kit and comes complete with hardware to create various size strings of batteries as specified for the application (e.g., 24V or 48 V battery strings).

BATTERY INSTALLATION *(con't)*

Battery Installation Procedure *(con't)*

1. Before proceeding with the installation of the battery, review or determine the arrangement of the batteries for the application.
2. The battery terminals are precoated with NO-OX-ID A® compound. If terminals appear dirty, clean surface areas of the exposed terminals with a non-abrasive cloth and recoat with NO-OX-ID A® (provided with accessory kit).
3. If the case is dirty when removed from the shipping container, clean the case with a cloth dampened with water before installing it in the battery stand.

   Caution: Use only water to clean batteries.
4. Gently install batteries into position as determined in Step 1. The battery should be oriented so that the negative (–) post of one battery is adjacent to the positive (+) post (post of opposite polarity) of next or adjacent battery.

   Caution: Do not lift the battery (ies) alone or with one handle. Two persons are always required to lift the battery. Hoist battery on pallets or use lifting sling with spreader bar.
5. Coat inter-battery bus bars, provided with battery kit, with NO-OX-ID A® before assembling them to batteries.
6. Using 1/4-20 hardware and inter-battery bus bar provided, connect batteries into strings as determined in Step 1. (See Figure 2), Torque connections to 60 in-lbs.
7. Using cabling provided with the plant, connect the battery string to the plant bus as determined in Step 1. Terminate these cable leads with the appropriate wire lugs.
8. Dress the cable leads from the batteries to the plant bus work and torque battery connections to 60 in-lbs. See specifications provided with the plant for plant bus work torquing requirements.

CHARGING

Batteries shall be charged by a constant potential method. A potential of 13.62 ± 0.06 volts per 12V 12AVR-125L/LLP battery or 13.50 ± 0.06 volts per 12 V 12AVR-145L/LLP battery for constant voltage is recommended for float-standby applications at 77°F (25 C). For systems without a temperature compensation device, the float voltage should be reduced by 18mV/°C/battery for temperatures above 77°F (25°C). This adjustment is automatically performed in systems with either a step or a slope compensation device.

Caution: Failure to reduce float voltage in systems without temperature compensation may result in premature failure or thermal run-away.

Operating 12AVR-125L/LLP or 12AVR-145L/LLP batteries for any length of time outside the recommended voltages and/or temperatures will result in reduced performance and premature failure and may reduce or void the warranty.

BATTERY STRING FLOAT VOLTAGE

It is extremely important to maintain the battery at the proper float voltage. The recommended float voltage per battery is 13.62 volts ± 0.06 volts at a battery temperature of 77°F (25°C) for 12AVR-125L/LLP and 13.50 volts ± 0.06 volts for 12AVR-145L/LLP.

To determine the battery string float voltage, use the following equation:

Battery String Float Voltage	**=**	**recommended float voltage per battery**	**x**	**number of batteries**

For example: A 4-battery (48-volt) string of 12AVR-125L/LLP batteries should be floated at:

Battery String Voltage	**=**	**13.62 volts**	**x**	**4 batteries**
Battery String Voltage	**=**	**54.48 volts**		

For example: A 4-battery (48-volt) string of 12AVR-145L/LLP batteries should be floated at:

Battery String Voltage	**=**	**13.50 volts**	**x**	**4 batteries**
Battery String Voltage	**=**	**54.00 volts**		

RECORD KEEPING

Voltages, Temperatures, & Ohmic Readings

Record keeping is an important part of stationary battery maintenance and warranty coverage. This information will help in establishing a life history of the battery and inform the user if and when corrective action needs to be taken. (Refer to Appendix A, Battery Maintenance Report)

While it is acceptable to operate at temperatures less than 77°F (25°C), it will require longer charging time to become fully recharged. Also, the capacity will be less at operating temperatures below 77°F (25°C).

After installation and when the batteries have been on float charge for one week, the following data should be recorded:

1. Battery string terminal voltage
2. Charger voltage
3. Individual battery float voltages
4. Individual battery ohmic readings
5. Ambient temperatures
6. Terminal connections should be checked to verify that the installer did torque all connections properly. Micro-ohm readings should be taken across every connection. Refer to meter manufacturer's instructions for proper placement of probes. If any reading differs by more than 20% from its initial installation value, re-torque the connections. If the reading still remains high, clean contact surfaces according to installation portion of manual.

MAINTENANCE

Always wear eye protection when working on or near batteries. Keep sparks and open flames away from batteries at all times.

Annual Inspection (1)

1. Conduct a visual inspection of the battery(ies).
2. Record the battery string voltage.
3. Record the charge voltage.
4. Record the individual battery voltages. The accuracy of the DMM (Digital Multimeter) must be 0.05% (on dc scale) or better. The DMM must be calibrated to NIST traceable standards. Because float readings are affected by discharge and recharges, these readings must be taken when batteries have been on continuous, uninterrupted float for at least one month. Batteries should be within +/- 0.30 volts of the average battery float voltage.
5. Record the ambient temperatures.
6. Record individual battery ohmic readings.
7. Record all interunit and terminal connection resistances. Micro-ohm readings should be taken during this inspection. If any reading differs by more then 20% from initial readings taken, retorque the connection. Recheck the micro-ohm reading. If the reading remains high, clean the contact surface according to installation portion of manual.

(1) **Other Maintenance Inspection intervals follow IEEE 1188.**

Rectifier Ripple Voltage

Acceptable charging ripple (peak to peak) shall be less than 0.5% of the manufacturer's recommended string float voltage or have a duration shorter than 8 milliseconds.

Battery Cleaning

Batteries, cabinets, racks and modules should be cleaned with clear water or a mixture of baking soda and water. Never use solvents to clean the battery.

Capacity Testing

Capacity test should not be run unless the battery's operation is questionable. Do not discharge the batteries beyond the specified final voltage. When discharging at higher rates, extra connectors may need to be added to prevent excessive voltage drop. When performing capacity testing and recording data use IEEE 1188 instructions. Should it be determined that any individual battery(ies) or cell(s) need to be replaced, contact your nearest East Penn agent or East Penn Service Center.

UL Recognized Component

APPENDIX A

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VALVE-REGULATED BATTERIES

12AVR-125L/LLP
12AVR-145L/LLP

BATTERY MAINTENANCE REPORT

Date _____ No. of Calls _____

Company _____ Type _____

Address _____ Date New _____

Battery location and/or number _____ Date Installed _____

Individual Battery Readings

Charger Output _____ Amp Air Temperature _____ °F

Total Battery String Voltage _____ Panel Meter Volts _____

Year				Year				Year				Year			
Unit Number	Volts	Ohms or Mhos		Unit Number	Volts	Ohms or Mhos		Unit Number	Volts	Ohms or Mhos		Unit Number	Volts	Ohms or Mhos	
1				1				1				1			
2				2				2				2			
3				3				3				3			
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40				40				40				40			
Avg. Voltage				Avg. Voltage				Avg. Voltage				Avg. Voltage			

Readings Taken By _____ Remarks/Recommendations _____

Readings should be taken at installation and annually thereafter.

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