



CATHODIC PROTECTION RECTIFIERS

A Hometown American Product

Universal Rectifiers, Inc.
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Operating and Maintenance Instructions

WARNING! This equipment poses an electrical shock hazard and the following should only be attempted by qualified personnel.

I. SITE SELECTION CONSIDERATIONS:

The following should be considered for site selection:	4. Avoid areas of direct sunlight and lack of proper air circulation. Do not install the rectifier in a confined area.
1. The proximity of the cathodic protection system.	5. Avoid areas that will promote human contact.
2. The proximity of the available A.C. power source.	6. Site selection should allow full accessibility to the rectifier and allow doors to open fully
3. Avoid congested areas of electrical or mechanical heat producing equipment.	

II. MOUNTING:

1. The rectifier must be mounted securely with minimum 5/16" diameter lag screws, anchor bolts, or machine bolts to a substantial, permanent, wall, pole or rack assembly.	3. When mounting the rectifier to a hollow wall or structure, check for concealed wiring, water lines, etc., before drilling any mounting holes.
2. The rectifier should be mounted level and straight to provide proper door operation	

III. WIRING:

1. All wiring must comply to the National Electrical Codes and all existing local codes.	5. The rectifier cabinet must be grounded by the terminal provided at the A.C. input power terminal block marked "G" or "GROUND".
2. Local electrical codes may require all wiring to be installed in approved conduit.	6. A.C. input power must be installed into the appropriate terminals marked "L" or "LINE" and "N" or "NEUTRAL".
3. A.C. power must be supplied from a disconnect circuit breaker or branch circuit protection circuit breaker.	7. The NEGATIVE output terminal must be wired to the STRUCTURE to be protected.
4. Wire sizes must comply to the National Electrical Code.	8. The POSITIVE terminal <u>must</u> be connected to the anodes.

IV. WIRING:

Operating personnel should observe the following before attempting to operate or adjust the rectifier:	Immediately. Do not attempt to operate rectifier until proper inspection and repairs have been completed
1. Do not tamper with A.C. power supply terminals of A.C. circuit within the rectifier unless the A.C. power, external to the unit, is turned "OFF". Contact with this high voltage can produce severe or fatal shock.	6. The positive D.C. output terminals should always be connected to the anodes. NEVER connect this positive D.C. terminal to the structure to be protected, as irreparable damage will occur to the structure.
2. Rectifiers with D.C. ratings above 50 volts D.C. have high voltage on the adjustment taps, A.C. to stack terminals, and can not be handled unless rectifier circuit breaker is turned "OFF".	7. Oil immersed rectifiers must have the oil level maintained at the specified level for proper cooling of components and also to meet rigid requirements for Class 1, Group D hazardous areas.
3. Do not exceed A.C. or D.C. ratings of the rectifier. Operating the rectifier at higher than nameplate ratings will result in eventual failure of the rectifier.	8. For three phase units, all similar (coarse or fine) voltage tap settings MUST be on the same "step" in all phases before A.C. power is turned "ON". Operating the rectifier with either the coarse or fine taps on different settings will destroy the transformer.
4. If overload protection trips repeatedly, investigate and eliminate cause before attempting further operation of rectifier.	9. Return instruction manual and wiring diagrams to pocket provided on the inside of door. Do not place in bottom of rectifier and allow ventilation to be restricted.
5. If rectifier components overheat, or there is any evidence of electrical failure, turn rectifier "OFF".	

V. ROUTINE CHECKS PRIOR TO OPERATION:

Your Universal Rectifier was fully inspected, carefully tested and was in top operating condition at the time of shipment. Instances where damage has resulted in shipping, handling, storage or installation are rare but possible. As a result, the following routine checks of your Universal Rectifier, as well as the external A.C. and D.C. circuits are recommended:	3. D.C. CIRCUITS. Zero the D.C. meters. External D.C. load should be in proper operating condition. Connect ground bed (anodes) to positive (+) D.C. output terminal. Connect structure to be protected to negative (-) D.C. output terminal.
1. VISUAL INSPECTION. Inspect unit for possible damage that may have resulted in shipping, handling, or installation. If damage exists, do not attempt operation of rectifier until repairs have been completed.	4. CONNECTIONS. Make sure all connections to and in your Universal Rectifier are tight. Where Universal voltage tap changer is used, voltage tap adjusting knobs need only be hand tight.
2. A.C. POWER SUPPLY. Check phase and voltage of A.C. power supply. These should correspond to A.C. ratings of the unit. Where rectifiers have dual voltage ratings (110/220 or 220/440) care should be taken to make A.C. connections for voltage employed. Notice tag attached to panel indicates A.C. voltage wiring of the unit. Wiring diagram indicates changes to be made for other input A.C. voltages.	5. OIL IMMERSSED UNIT. Check cleanliness of tank interior. Fill tank to proper level with electrical insulating transformer oil.

VI. TO PLACE YOUR UNIVERSAL RECTIFIER IN OPERATION:

When in operation, the actual D.C. voltage and current output of the Universal Rectifier are indicated by the voltmeter and ammeter on the instrument panel of the rectifier. Care should be taken that these meter readings do not exceed either the D.C. voltage or D.C. current ratings of the unit. If ratings are exceeded, turn A.C. power "OFF" immediately. During the voltage tap changing operation described below, the A.C. power should be turned "OFF" at the circuit breaker or safety switch.	Observe the above and proceed as follows: <ol style="list-style-type: none">1. Set all voltage tap controls on lowest setting.2. Turn external A.C. power supply "ON".3. Close circuit breaker or safety switch of rectifier ("ON" position).4. Check D.C. ammeter and voltage readings on instrument panel.
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VII. TO ADJUST D.C. VOLTAGE AND CURRENT:

The following steps should be followed in sequence observing precautions in steps I, II and III until desired D.C. current and/or voltage is attained.	2. Before Increasing coarse control setting, return fine control setting to lowest position. 3. Change coarse control setting to next higher position.
1. With coarse control at lowest setting, increase fine control setting in progressive steps throughout its full range and observe D.C. output voltmeter and ammeter.	4. Repeat steps 1,2, and 3. 5. Proceed in this manner until current output is obtained.

VIII. GENERAL MAINTENANCE INSTRUCTIONS:

1. Voltage, current and ambient temperature ratings of unit should not be exceeded.	4. All electrical connections should be tight.
2. Routine cleanliness should be maintained.	5. Severe overloads can permanently damage rectifiers and special precautions may be required for abnormal or persistent overload exposures.
3. Adequate ventilation must be provided – screened openings should be kept free of obstructions.	6. For oil immersed units, oil should be inspected periodically. Oil should be replaced when contaminated.

IX. MAINTAINING DESIRED CURRENT AND VOLTAGE:

The rectifier unit will respond to electrical changes in the system external to the unit, such as pronounced fluctuation of A.C. line voltage or changes in ground bed resistance. Such changes can alter the operating D.C. voltage and/ or current output of the rectifier. Periodic inspections should be made to assure desired operation and prevent any	overloading. Voltage adjustments should be made as required. A permanent record of the current and voltage readings should be maintained. Any pronounced change that is not attributable to voltage adjustment should be investigated.
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X. TROUBLE SHOOTING HINTS:

A wiring diagram for use by experienced personnel is provided. Only experienced electrical personnel should attempt location and repair of electrical difficulties, should they occur. Some symptoms of elementary trouble and the possible remedy are as follows:

1. NO D.C. CURRENT OR D.C. VOLTAGE OUTPUT.	CHECK: A.C. overload protection for blown fuses or tripped circuit breaker. Check A.C. power supply.
2. D.C. VOLTAGE BUT NO D.C. CURRENT READING.	CHECK: D.C. ammeter. Check D.C., connections and external D.C. circuit for electrical continuity.
3 D.C. CURRENT READING BUT NO D.C. VOLTAGE READING.	CHECK: Check D.C. Voltmeter.
4. MAXIMUM RATED D.C. VOLTAGE CANNOT BE ATTAINED.	CHECK: Check A.C. line voltage. Check voltage adjustment settings for maximum. Check accuracy of D.C. Voltmeter.
5. MAXIMUM RATED D.C. CURRENT CANNOT BE OBTAINED AT MAXIMUM D.C. VOLTAGE.	CHECK: Check load resistance of external D.C. circuit.

LIMITED WARRANTY

This equipment manufactured and designed by Universal Rectifiers, Inc. is warranted against defects in design, workmanship or materials, unless otherwise specified, for one year from the date of installation. The obligation of Universal Rectifiers, Inc. is limited to the adjustment, repair or replacement at its factory of the equipment, or part thereof which shall be found defective upon examination after being returned with transportation charges prepaid. Universal Rectifiers, Inc. warrants this product and its operation only. There is no other warranty or liability implied or expressed for the use or mis-use of this equipment.

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