RM-650 Recharge Module

User's Guide

Albércorp.

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If you desire to contact Albércorp for any reason, please contact:

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Safety Information

- Except as explained in this manual, do not attempt to service Albércorp equipment yourself. Opening the equipment may expose you to dangerous voltages. Refer servicing beyond that described in this manual to authorized personnel.
- Do not allow liquids or moisture to get into the equipment. If liquid does get into the equipment, unplug it immediately and contact your nearest authorized service center or Albércorp directly.
- Ensure equipment is provided adequate ventilation. Do not block equipment ventilation openings.
- Do not exceed equipment voltage or power ratings and capabilities.
- Make sure that equipment is properly grounded.
- Do not let unauthorized persons operate or service the equipment.
- Use of this product in a manner not specified could compromise the designed-in safety of this product.

WARNINGS

Do not connect the RM-650 to a protected power source. Severe damage may result if the normal 115VAC line goes down and the RM-650 remains on.

The RM-650 must be powered on and the rotary switch must be set to Off/Reset before connecting across a disconnect switch.

Voltage must be less than 10 volts at the disconnect switch before making this connection.

You must observe correct polarity when making this connection.

User injury or equipment damage may result if the above warnings are not observed.

Table of Contents

1. Receiving

Upon receipt, visually inspect the RM-650 to verify there is no shipping damage. It is your responsibility to initiate and settle damage claims with the shipper. Albércorp will assist with claims if necessary, but will not be liable for shipping damage not reported to the shipper. You should also verify the items received match the packing slip. Albércorp is not responsible for missing items not reported within ten days after receipt by the customer.

1.1. Contact Information

Proper connection of equipment to the device under test is essential to the correct functioning of your system. If you have any questions about equipment connection or operation, please contact us. Call Albércorp at (561) 997-2299, or fax us at (561) 997-5588. Request RM-650 assistance.

2. General Description

The Albércorp RM-650 Recharge Module is a current limiting instrument that facilitates the recharging of a battery that has been disconnected from the power bus. The unit applies a resistance across a disconnect switch and limits current to 700 amps. Typical maximum current is 650 amps. Heavy-duty current cables that connect the RM-650 rear panel terminal pads to a disconnect switch are supplied with the unit.

- Reduces the risk of high-current draw when reconnecting a battery to the power bus.
- Easy-to-read LEDs indicate current, voltage, and process status.
- Protected against overcurrent and overvoltage.
- Front panel terminals for easy voltage and current measurement.
- Automatic or manual operation.
- AC powered, portable, and easy to use in shop or field.
- Handle and wheels for easy moving.

RM-650 operation consists of connecting the instrument across the disconnect switch and selecting manual or automatic operation. LEDs provide information on current, voltage, and process status. The unit is powered from 115VAC and may be used immediately upon receipt. No calibration is required.

3. Controls and Indicators

This section describes the controls and indicators on the RM-650. Additional item descriptions may appear elsewhere in this manual or in related manuals.

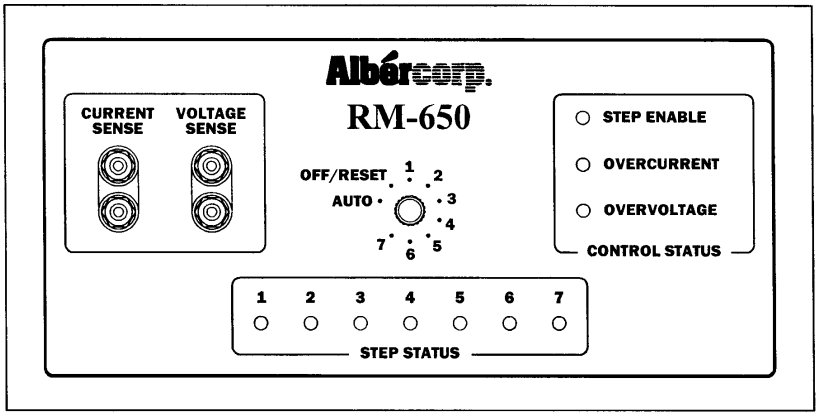

Figure 1. RM-650 Main Panel

3.1. Main Panel Controls

Manual or Automatic rotary switch - Activates the operation of the RM-650. Selects automatic operation, manual operation, and off/reset. With manual operation, the user selects the next resistance step applied across the disconnect switch.

3.2. Rear Panel Controls

On / Off switch - Part of the AC Power Entry Module. Turns the main power off or on. Does not initiate the test.

4 amp fuse - A replaceable fuse located in the AC Power Entry Module.

3.3. Main Panel Connectors

Current Sense - For determining the current level flowing through the RM-650.

Voltage Sense - For reading the voltage across the disconnect switch / RM-650 rear panel terminal pads.

3.4. Rear Panel Connectors

AC Power Entry Module - Connects the RM-650 to a 115VAC power source. Do not connect to a protected power source. See the RM-650 warnings before making this connection.

Terminal Pads - Pads for connecting the RM-650 to the positive and negative on the disconnect switch. See the RM-650 warnings before making these connections.

3.5. Main Panel Indicators

Step Enable LED - On indicates current is less than 450 amps. Off when current is 450 amps or greater.

Overcurrent LED - On indicates current is greater than 700 amps. The RM-650 is disabled when this LED is on.

Overvoltage LED - On indicates voltage is greater than 10 volts. The RM-650 is disabled when this LED is on.

Step Status LEDs - When flashing, indicates the step (resistance level) at which the RM-650 is operating, and indicates current is 450 amps or greater. When on (not flashing), indicates current is less than 450 amps and the function of that step is complete.

LED Indicator	LED Status		Refer to the Manual
Step Enable	On: Current is less than 450 amps	Off: Current is 450 amps or more	
Overcurrent	On: Current is 700 amps or greater.	Off: Current is less than 700 amps.	See the Overcurrent, Overvoltage and Reset section.
Overvoltage	On: Voltage is 10 volts or greater.	Off: Voltage is less than 10 volts.	See the Overcurrent, Overvoltage and Reset section.
Step Status	On: Current is less than 450 amps and the step is done.	Flashing: Current is 450 amps or greater and the step is in process.	See the Manual Mode or Automatic Mode Operation section.

Figure 2. LED Indicators

4. Using the RM-650

This section describes how to connect the RM-650 and operate it in manual and automatic modes.

WARNING

✓ RM-650 on ✓ Set to Off/Reset ✓ Less than 10 volts ✓ Correct polarity

Before connecting across the disconnect switch: Power on the RM-650. Set the rotary switch to Off/Reset. You must measure less than 10 volts across the open disconnect switch. Observe correct polarity when connecting. You may injure yourself or damage the equipment if you don't follow these instructions when making this connection.

The RM-650 generates heat and requires adequate ventilation on all sides. Keep the unit at least six inches away from other surfaces. Do not obstruct air flow. Keep the unit vertical, on its wheels. Do not lay the unit horizontally, as this will inhibit heat dissipation.

4.1. Connecting the Unit

Connect the RM-650 as follows. Figure 2 shows a typical RM-650 to disconnect switch connection.

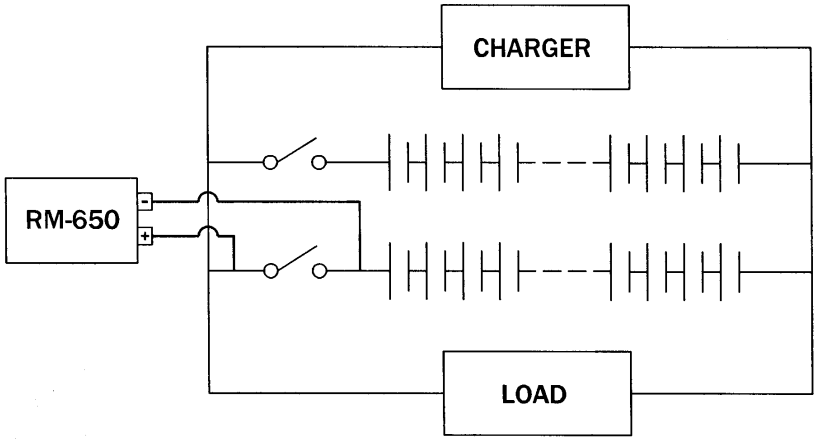

Figure 3. RM-650 to Disconnect Switch Schematic

1. Connect the AC cord to the RM-650 rear panel AC Power Entry Module. Connect the other end to a 115VAC source. Do not connect to a protected power source.

   WARNING: Do not connect the RM-650 to a protected power source. Severe damage may result if the normal 115VAC line goes down and the RM-650 remains on.

2. To power on the RM-650, set the rear panel AC power switch to On.
3. Set the main panel rotary switch to Off/Reset.
4. Using a digital voltmeter, measure the voltage across the disconnect switch. If it is less than 10 volts, continue with the next step. If the voltage is 10 volts or greater, STOP. Do not continue.
5. Confirm the RM-650 is powered on and set to Off/Reset.

6. Connect the current cables to the RM-650 rear panel terminal pads, observing polarity: red cable to positive, black cable to negative.
7. Connect the other end of the current cables across the open disconnect switch as described in a) or b) below. Be certain to observe polarity: red cable most positive; black cable most negative:
    a. If the disconnect switch is on the positive side of the battery, connect the positive cable to the positive bus and connect the negative cable across the open disconnect switch to the most positive point of the battery.
    b. If the disconnect switch is on the negative side of the battery, connect the positive cable to the most negative point of the battery and connect the negative cable across the open disconnect switch to the negative bus.
8. Connect a digital voltmeter to the RM-650 Voltage Sense terminals on the main panel. If the voltage reading is less than 10 volts and the polarity is correct, continue with the manual or automatic mode section of this manual. If the voltage is 10 volts or greater, or the polarity is wrong, STOP. Do not continue.

4.2. Manual Mode Operation

To operate in manual mode, do the following.

1. With the rotary switch at Off/Reset, observe the Step Enable LED.

   If the LED is on, the current through the RM-650 is less than 450 amps.

   If the LED is off, the current is 450 amps or greater. Power down the RM-650 and disconnect from the disconnect switch. The test cannot continue.

   NOTE: If the Overcurrent or Overvoltage LED is on, refer to the *Overcurrent, Overvoltage and Reset* section.

2. If the Step Enable LED is on, turn the rotary switch to 1. The Step Status 1 LED lights. The Step Enable LED may be on or off, depending on the current.

   If the Step Status 1 LED flashes, the current is 450 amps or greater.

   If Step Status is on (not flashing), the current is less than 450 amps, and the function of that step is complete.

   NOTE: If you advance the rotary switch before the step is complete, refer to the *Overcurrent, Overvoltage and Reset* section.

3. When Step Status 1 is on (not flashing) and Step Enable is on, turn the rotary switch to 2. The Step Status 2 LED lights. The Step Enable LED may be on or off.

4. Observe the LED status as previously described and continue incrementing the rotary switch up through step 7. Remember: Do not activate the next step until the active step LED stops flashing.

5. When all the Step Status LEDs are on (not flashing), and Step Enable is on, measure the current and voltage on the RM-650:

   a. Connect a millivoltmeter to the Current Sense terminals.

   b. Read the voltage. A reading of 1mV indicates 7 amps of current is flowing through the RM-650. **NOTE**: You may measure this current at any time during the test.

1 mV = 7 amps	10 mV = 70 amps	100 mV = 700 amps

   c. Connect a voltmeter to the Voltage Sense terminals and read the voltage.

   d. If you determine the current and voltage levels are acceptable, the test is complete.

   WARNING: It is the user's responsibility to determine what current and voltage levels are safe and acceptable for connecting the battery back to the power bus.

6. After the test is complete, set the rotary switch to Off/Reset.

7. Disconnect the current cables from the disconnect switch.

8. Set the RM-650 AC power switch to Off if done.

4.3. Automatic Mode Operation

To operate in automatic mode, do the following.

1. With the rotary switch at Off/Reset, observe the Step Enable LED.

   If the LED is on, the current through the RM-650 is less than 450 amps.

   If the LED is off, the current is 450 amps or greater. Power down the RM-650 and disconnect from the disconnect switch. The test cannot continue.

   NOTE: If the Overcurrent or Overvoltage LED is on, refer to the *Overcurrent, Overvoltage and Reset* section.

2. If the Step Enable LED is on, turn the rotary switch to Auto. The Step Status 1 LED lights. The Step Enable LED may be on or off, depending on the current.

   If the Step Status 1 LED flashes, the current is 450 amps or greater.

   If Step Status is on (not flashing), the current is less than 450 amps, and the function of that step is complete.

3. When Step Status 1 is on (not flashing) and Step Enable is on, the RM-650 advances to step 2. The Step Status 2 LED lights. The Step Enable LED may be on or off.

4. The unit automatically continues to increment up to step 7.

5. When all the Step Status LEDs are on (not flashing), and Step Enable is on, measure the current and voltage on the RM-650:

   a. Connect a millivoltmeter to the Current Sense terminals.

   b. Read the voltage. A reading of 1mV indicates 7 amps of current is flowing through the RM-650. **NOTE**: You may measure this current at any time during the test.

1 mV = 7 amps	10 mV = 70 amps	100 mV = 700 amps

   c. Connect a voltmeter to the Voltage Sense terminals and read the voltage

   d. If you determine the current and voltage levels are acceptable, the test is complete.

   WARNING: It is the user's responsibility to determine what current and voltage levels are safe and acceptable for connecting the battery back to the power bus.

6. After the test is complete, set the rotary switch to Off/Reset.

7. Disconnect the current cables from the disconnect switch.

8. Set the AC power switch to Off if done.

4.4. Overcurrent, Overvoltage and Reset

The Overcurrent LED, Overvoltage LED, and Off/Reset rotary switch are on the RM-650 front panel.

Overcurrent LED - When on, this LED indicates that the internal current flowing through the RM-650 is greater than 700 amps. This disables the RM-650 and terminates the test. To restart in manual mode, turn the rotary switch to Off/Reset and refer to the *Manual Mode Operation* section of this manual. If this LED lights while in automatic mode, you may attempt the test using manual mode.

Overvoltage LED - When on, this LED indicates that the voltage at the disconnect switch terminals is greater than 10 volts. This disables the RM-650. Testing cannot continue. Power down the RM-650, and disconnect the current cables from the disconnect switch.

5. Preventive Maintenance

The RM-650 requires minimal preventive maintenance. Inspect the current cables periodically to confirm the connectors are firmly attached and clean.

With the unit disconnected from all AC and DC voltage sources, you may open the cabinet and blow out any dust that may have accumulated. There are no internal air filters to clean.

6. RM-650 Specifications

Power

- Less than 2 amps or 250 watts at 115VAC ±10% 60Hz

Fuses (Rear panel)

- One 4 amp fuse, fast blow. Part of power entry module.

Inputs (Rear panel)

- Terminal pads for connection to a disconnect switch.
- AC Input. Part of power entry module.

Outputs (Front panel)

- Current Sense terminals for internal current indication.
- Voltage Sense terminals for terminal pad / disconnect switch voltage indication.

Controls

- AC Power on/off. Rocker switch; part of power entry module. Rear panel.
- Manual/Automatic select. Rotary switch to select automatic mode, off/reset, or manual steps. Front panel.

Indicators (Front panel)

- Step Enable LED. Current status and ready indicator.
- Overcurrent LED. Current status indicator.
- Overvoltage LED. Voltage status indicator.
- Step Status LEDs (7). Current and step status indicator.

Ventilation Requirements

- Unit must be kept at least six inches away from other surfaces.
- Air flow must remain unobstructed.

Installation Requirements

- Unit must be operated in a normal, vertical position. (Wheels on floor.)

Dimensions

- Weight 70 lbs.
- Size 35"H x 18"W x 16"D

Operating Environment

- Operating Temperature Range: 20°F to 140°F

Accessories

- Current Cables 8 ft standard