



Power Protection & Conditioning

MCR Portable Series 50 Hz



Instruction Manual

While every precaution has been taken to ensure accuracy and completeness in this manual, SolaHD assumes no responsibility, and disclaims all liability for damages resulting from use of this information or for any errors or omissions.

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1.0 Important Safety Instructions

- Please read all safety, installation, and operating instructions before attempting to install or operate the unit.
- High voltages are present inside the unit. Do NOT reach inside the unit while it is energized.

To measure the voltage, de-energized the unit, connect the meter, and then re-energize the unit.

2.0 Warnings Defined



Danger: Indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury. This signal word is limited to the most extreme situations.



Warning: Indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury.



Caution: Indicates a potentially hazardous situation that, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

3.0 Introduction

The SolaHD Micro/Mini Computer Regulator (MCR) provides voltage regulation and isolation from both transverse and common mode noise for any type of load. It also suppresses transients with ferroresonant, protects overloads, and serves as a portable dedicated line. It is the ultimate in ac power conditioning equipment.

4.0 Installation Instructions

All regulators generate considerable heat and depend on the natural draft air circulation for adequate cooling. It is important that ventilation openings not be obstructed. Mounting in a confined or poorly ventilated space should be avoided unless special provisions have been made for ventilation.

The MCR units are equipped with one input on/off line switch, one 3-wire grounding type input cord/plug, and two or more 3-wire grounding output receptacles. No additional connections are required except for the customer's output cable(s).

The neutral side of the output voltage is grounded to the regulator chassis, as are the input cord and output receptacle ground connections.

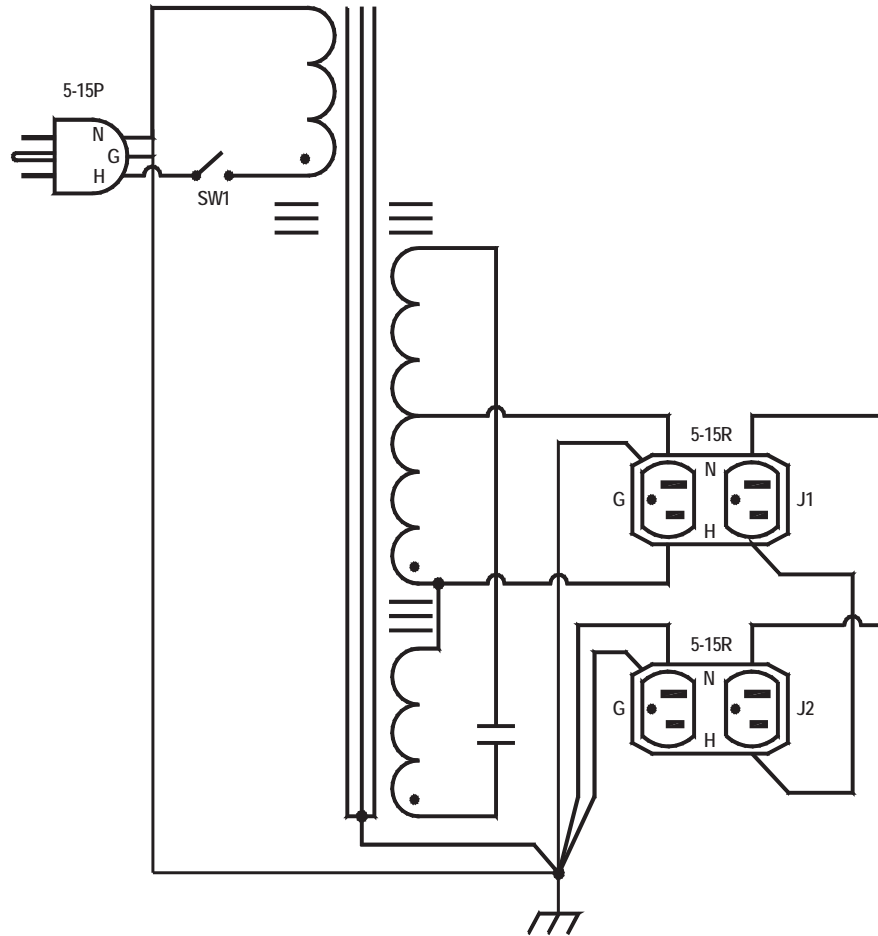
Table 1: Plugs & Receptacles

Model Number	Plug	Receptacle
63-13-650-6	5-15P	5-15R (4 PCS)



The unit is rated for 50 Hz operation only! Operation at 60 Hz will damage the unit and void any warranty.

5.0 Electrical Schematic



500 VA Schematic

6.0 Operating Notes & Data

6.1 Safety Notice

High voltages are present inside the unit. Do not reach inside the unit while it is energized. To measure voltage, de-energize the unit, connect the meter, and then re-energize the unit. The unit contains no user-serviceable parts.

6.2 Checking with Voltmeters

All input and output voltage measurements should be made with a true RMS voltmeter. A certain amount of harmonics in the output may cause other types—particularly rectifier types—to give inaccurate indications.

6.3 Rating & Characteristics

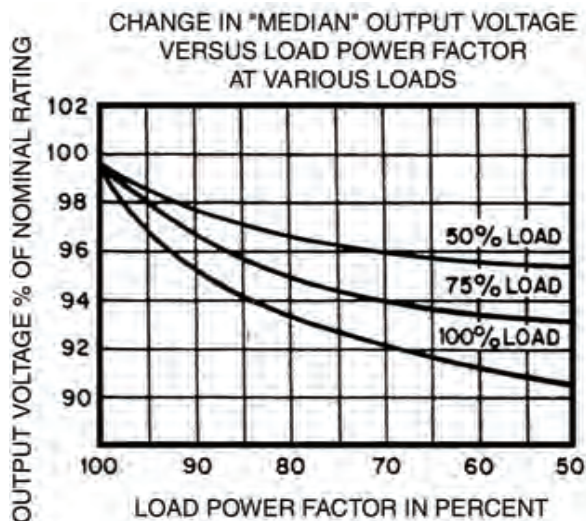
See the label of each regulator for the appropriate data.

6.4 Load Regulation

Changes in output voltage resulting from changes in resistive loads from no load to full load (100% P.F.) are approximately 4%.

6.5 Effect of Load Power Factor

“Median” value of output of voltage will vary from label rating if the load has a power factor other than that for which the transformer was designed. Load regulation will also be greater as the inductive load power factor is decreased. However, the resulting median values of output voltage will be regulated against supply line changes at any reasonable load or load power factor.



6.6 Operation with Switch-mode Power Supplies

If an MCR is used as a source for a switch-mode power supply, a slight amount of ringing may be noticed on the sine wave output of the MCR at half cycle intervals for a short duration. This ringing occurs at the point when the switch-mode power supply current demand drops to zero. The ringing need not be a cause for concern since it is of relatively low magnitude and frequency. Both series have been tested with a variety of switch-mode power supplies and it has been determined that the ringing never affected the dc outputs, nor has it been found to degrade the components of any switch-mode power supply.

6.7 Effect of Frequency

Changes in the frequency of the supply voltage will be directly reflected in the output voltage. A change of about 1.8% in output voltage will occur for every 1% change in input frequency, and in the same direction as the frequency change.

6.8 Response Time

An important advantage of the SolaHD principle of static magnetic regulation is its exceedingly fast response time compared with other types of ac regulators. Transient changes in supply voltage are usually corrected with 1-1/2 cycles or less; the output voltage will not fluctuate more than a few percent.

6.9 Input Characteristics

The MCR regulator transformer includes a resonant circuit, which is energized whether it is serving load or not. Therefore, the input current at no load is approximately 35% of the full-load level, even at light or no load. Input power factor will average 90–100% at full load, but may drop to about 75% at half load and 25% at no load. In any case, it is always leading.

6.10 Current Limitations

When the load is increased beyond the MCR rated value, a point is reached where the output voltage suddenly collapses and will not regain its normal value until the load is partially released. Under short circuit conditions, the load current is limited to approximately twice of the rated full-load value, and the input power to less than 10% of normal. The MCR will protect both itself and its load against damage from excessive fault currents. Fusing of load circuits is not necessary.

6.11 Operation with Motor Loads

Because of the current-limiting effect described above, special attention should be given to motor applications. In general, the regulator must have a load rating nearly equal to the maximum power drawn during the starting cycle. This may run from two to eight times the normal (running) rating of the motor. In doubtful cases, it is advisable to measure the actual starting current.

6.12 Operating Temperature

Standard units are designed to operate in ambient temperatures of -20°C to $+40^{\circ}\text{C}$. In operation, a temperature rise will occur whether or not the transformer is serving load. Normally, this rise may fall anywhere in the range of 45°C to 110°C , depending on the regulator type and rating. In any case, the maximum operating temperature at an ambient of $+40^{\circ}\text{C}$ is always within safe operating limits for the class of insulating material used.

6.13 Effect of Temperature

The output voltage will show a small change as the unit warms up to stable operating temperatures at a constant ambient temperature. This change may be about one or two percent, depending on the unit's VA rating. At a stable operating temperature, the output voltage will change slightly with varying ambient temperature. This shift is approximately one percent for each 40°C of temperature change.

7.0 Service & Maintenance

The unit is a simple, rugged device with no moving parts. Routine service and/or maintenance is not required. In cases of poor performance, please refer to "8.0 Troubleshooting" or contact SolaHD Technical Support for assistance.

7.1 Field Replacement of Capacitors

Capacitors used in all regulators are the highest commercial grade, with each one given a rigid acceptance test upon receipt. Nevertheless, as with all capacitors, there is a small percentage of failure. SolaHD guarantees free replacement at the factory of any capacitors which fail within one year of sale. Older units can be replaced at moderate charge.

Where technical help is available, it may be possible to test and identify defective capacitors in the field. Factory advice and cooperation must be requested in advance.

8.0 Troubleshooting

Problem	Action
Nominal voltage is too high	<ol style="list-style-type: none"> 1. The load may be considerably less than the full rating. See "6.4 Load Regulation". 2. The load may have a leading power factor.
Nominal voltage is too low	<ol style="list-style-type: none"> 1. The load power factor may be lagging. 2. The unit may be slightly overloaded. See "6.10 Current Limitations".
Unit does not regulate closely	<ol style="list-style-type: none"> 1. The unit may be slightly overloaded. See "6.10 Current Limitations". 2. Actual line voltage swings may be outside the rated range of the unit, particularly on the low side. 3. On varying loads, a certain amount of load regulation may be mixed with the line voltage regulating action. See "6.4 Load Regulation".
Output voltage is very low (20–60 V)	<ol style="list-style-type: none"> 1. Unsuspected or unplanned overloads of substantial size may occur intermittently (motor-starting currents, solenoid in-rush currents, etc.). See "6.10 Current Limitations". 2. One or more capacitors in the regulator may be defective.
No output voltage	<ol style="list-style-type: none"> 1. Check power source breakers or fuses. 2. Check input switch. 3. Check continuity between input terminals, and also between output terminals.
Transformer operating temperature	<ol style="list-style-type: none"> 1. The transformer used in the regulators is designed to operate at high flux density and relatively high temperatures. After connection to the line for 30 minutes or so, the transformer core structure may be too hot to touch with your bare hands. This is normal and should not cause concern.
Regulator is operating, but does not appear to have the correct output	<p>The steps below will usually establish whether the apparent poor performance is due to a fault in the regulator or to some peculiarity of the working load.</p> <ol style="list-style-type: none"> 1. Disconnect the working load. 2. Connect a dummy load of lamps, heaters, or other resistive loads (substantially equal to the full load rating of the regulator) directly across the output terminals. 3. Measure the output voltage of the regulator (using a true RMS type voltmeter) directly across the output terminals.
<p>For further assistance, please contact SolaHD Technical Support at: (800) 377-4384 U.S. (847) 268-6651 International E-mail: tech@solahd.com</p>	

9.0 Specifications

Operating Temperature Range	-20°C to +40°C
Phase	Single
VA	500
Input Voltage Range & Frequency	95–130 V ac, 50 Hz
Output Voltage & Frequency	120 V ac, 50 Hz
Output Voltage Regulation	±5% for an input line variation of ±10% / -20%
Output Harmonic Distortion	5% total RMS content at full load
Efficiency	90% at full load typical. No loss of output for line loss of 3 ms.
Noise Reduction	Common mode noise rejection exceeds 120 dB Transverse noise rejection exceeds 60 dB
Voltage Surge Suppression	Suppresses ANSI/IEEE C62.41-1980. Class A and B waveforms (formerly IEEE 587-1980).
Dimensions, in.	16.0 x 8.5 x 8.5
Weight, lb.	42

10.0 Product Registration & Warranty

10.1 Product Registration

To register your product for updates and information on service and support:

- Visit the Technical Support section of our Web site at:
<http://www.solahd.com/support/registration.htm>
- Click on the Product Registration link and fill in the form. This will register your product with SolaHD.

10.2 Warranty Information

Please see “Terms & Conditions of Sale”.

SOLAHD

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