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**INSTRUCTION MANUAL  
 FOR  
 VOLTAGE REGULATOR  
 Model: VR63-4/UL**

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**INTRODUCTION**

The VR63-4/UL Voltage Regulators are designed for use on 50/60 Hz brushless generators. The regulator includes frequency compensation, overexcitation shutdown, a solid-state build-up circuit, and EMI filtering.

**WARNING**

To prevent personal injury or equipment damage, only qualified technicians or operators should install, operate, or service this device.

**ELECTRICAL SPECIFICATIONS**

**Dc Output Power:**

4 Adc at 63 Vdc (252W) maximum continuous,  
 7 Adc at 100 Vdc (700W) forcing one minute (at 240 Vac input).

**Exciter Field Dc Resistance:**

15 ohms minimum; 100 ohms maximum.

**Ac Power Input:**

Operating range: 190 Vac to 240 Vac,  $\pm 10\%$   
 Single phase, 50/60 Hz, Burden 500 VA.

**Sensing Input:**

190-240 Vac, Single phase, 50/60 Hz  $\pm 10\%$ ,  
 common with AC Power Input.

**Voltage Adjust Range:**

171-264 Vac.

**Regulation Accuracy:**

Better than  $\pm 1.0\%$  no load to full load.

**Response Time:**

Less than 1.5 cycles for  $\pm 10\%$  change in  
 sensing voltage.

**EMI Suppression:**

Internal electromagnetic interference filter  
 (EMI filter).

**Overexcitation Shutdown:**

Output power is removed under the following  
 conditions: Exciter field voltage exceeds  
 $100 \pm 5$  Vdc for a time inversely proportional to  
 voltage magnitude, or instantaneously if the  
 exciter field voltage exceeds  $135 \pm 5$  Vdc.

**Voltage Build-up:**

Internal provisions for automatic voltage build-  
 up from generator residual voltages as low as  
 10 Vac.

**Power Dissipation:**

8 Watts maximum.

**PHYSICAL SPECIFICATIONS**

**Operating Temperature:**

$-40^\circ\text{C}$  ( $-40^\circ\text{F}$ ) to  $+60^\circ\text{C}$  ( $+140^\circ\text{F}$ ).

**Storage Temperature:**

$-65^\circ\text{C}$  ( $-85^\circ\text{F}$ ) to  $+85^\circ\text{C}$  ( $+185^\circ\text{F}$ ).

**Vibration:**

Withstands 1.3 Gs at 2 to 27 Hz; 0.036"  
 double amplitude at 27 to 52 Hz; and 5 Gs at  
 52 to 1000 Hz.

**Shock:**

Withstands up to 20 Gs in each of three  
 mutually perpendicular axes.

**Weight:**

14 oz. (0.40 kg) Net.

**CSA Approved/UL Recognized**

**FUSES**

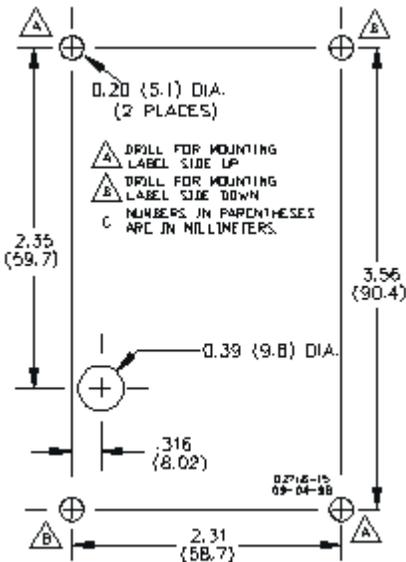
It is recommended that fuses with high  
 interruption capability be installed per the  
 interconnection diagram to protect wiring from  
 faults before the regulator. Refer to the  
*Interconnection Drawings*.

**NOTE**

Fuse must be installed per the  
 interconnection diagrams to avoid inter-  
 rupting the field current.

**MOUNTING**

The regulator may be mounted in any  
 position. Refer to the drilling diagrams.



*Drilling Diagram*

**EXCITER FIELD POWER CIRCUIT (wires F+ and F-).**

Connect the regulator wire F+ to the brushless  
 exciter field terminal F+, and wire F- to  
 terminal F-.

**CAUTION**

The dc resistance of the exciter field  
 must be equal to or greater than 15 ohms  
 and less than 100 ohms.

**POWER/SENSING INPUT CIRCUIT (wires 3 and 4)**

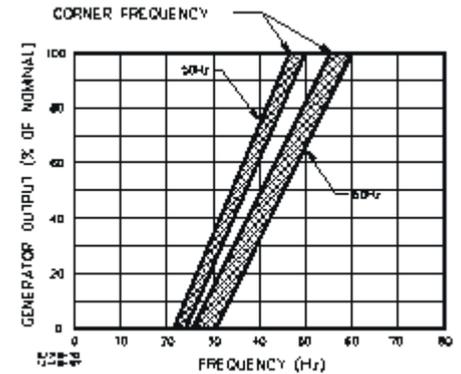
Connect as shown by the *Interconnection  
 Diagrams*.

Power for the exciter field and regulator  
 circuitry is derived from the generator output  
 or auxiliary winding. The operable power  
 input range is 171 to 264 Vac and is  
 connected to Terminals 3 and 4.

**FREQUENCY COMPENSATION**

The frequency compensation characteristic is  
 to improve system load pickup performance  
 by restraining voltage recovery until frequency  
 has also started to recover.

For 50 Hz system, the regulator is preset at  
 the factory for a 45 Hz "corner frequency".  
 For 60 Hz systems, a 55 Hz "corner  
 frequency" is achieved by cutting the external  
 Hz jumper wires on the generator. Be sure to  
 insulate the the two wires so that they are not  
 exposed.

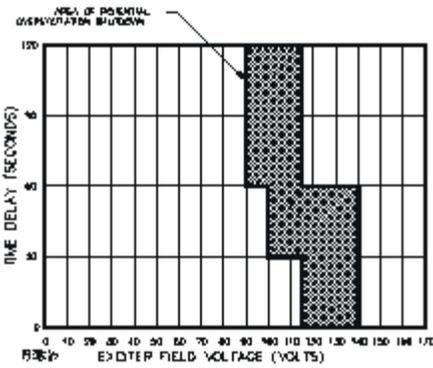


*Frequency Compensation Curves*

**OVEREXCITATION SHUTDOWN**

If the exciter field voltage exceeds  $100 \pm 5$   
 Vdc, the regulator automatically removes the  
 field current after a time delay. The time  
 delay is inversely proportional to the mag-  
 nitude of the detected overvoltage condition  
 up to the 135 Vdc point. Beyond 140 Vdc, the  
 field voltage is removed within 0.2 seconds.

After shutdown, reset the regulator by  
 decreasing voltage below 6 Vac either by  
 stopping the prime mover or interrupting the  
 regulator input with a reset switch for 2  
 seconds or more.



Typical Time Delay Characteristic Curves

**VOLTAGE ADJUST RHEOSTAT**

Screwdriver adjustable potentiometer adjusts generator output voltage. Adjustment CW increases voltage.

When using remote voltage adjust rheostat (VAR), the VAR wire on the regulator should be cut and the rheostat connected to both ends. A 1 kohm and 1/2 watt resistance is adequate for most applications. See *Interconnection Diagrams*.

**OPERATION**

The following system operation procedures provide instructions for adjusting the VR63-4/UL Voltage Regulator.

**CAUTION**

Meggars and high potential test equipment must not be used. Incorrect use of such equipment could damage the

semiconductors contained in the regulator.

**PRELIMINARY SET-UP**

To prevent damage to the regulator, complete the following steps before proceeding with system start-up.

- a. Verify that the voltage regulator specification conforms with the generator system requirements.
- b. Ensure that the regulator is correctly connected to the generator. See *Interconnection Diagram*.
- c. Install fuses per *FUSES* paragraph.
- d. Set the regulator VAR fully CCW and the remoteVAR (if used) to centered.

**SYSTEM START-UP**

- a. Start the prime mover and bring up to rated speed. Voltage should buildup. If a minimum residual of 6 Vac is not present, perform field flashing.
- b. Slowly adjust VAR CW until voltage reaches nominal value. If used, adjust remote voltage adjust to set generator output to exact value desired.

**OPERATIONAL TEST**

- a. Connect the test setup as shown in *Operational Test*. Do not apply power. Ensure that light bulbs are rated for 120 V and less than 100 W.
- b. Adjust regulator VAR and/or remote VAR to maximum CCW.
- c. Apply 240V, 60 Hz power to regulator.

- d. Slowly adjust the regulator VAR control CW.

**RESULT:**

- 1) Before minimum brilliance is reached, the light bulb should attain maximum brilliance to signify the regulating point.
- 2) At the regulating point, a small change in the VAR should turn the light bulb on or off.

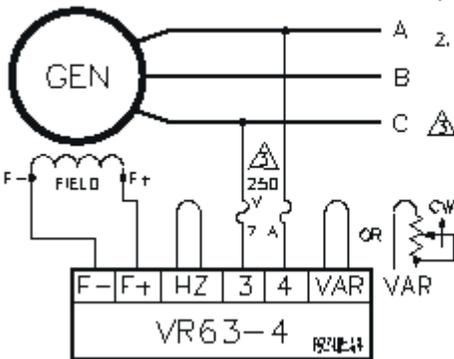
**FIELD FLASHING**

When the regulator is operated with the generator for the first time, the polarity of residual magnetism may not correct or the magnitude not enough. If the generator does not build-up after startup, shut down the prime mover and proceed with the following steps:

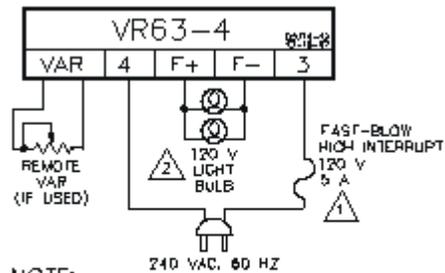
- a. With the prime mover at rest, apply a dc source (not grounded) of not more than 12V, to terminals F+(positive) and F-(negative) in series with a limiting resistor of 3-5 ohms.
- b. Allow approximately 3 seconds before removing the dc source.
- c. Start prime mover and measure voltage at regulator leads 3 and 4. If voltage is greater than 6 volts, voltage build-up should be successful. Repeat field flashing procedure if less than 6 V residual is measured.
- d. If repeating steps 1 and 2 does not result in generator voltage build-up, replace the voltage regulator.

**NOTES:**

- 1 CUT HZ LEADS FOR 60 HZ OPERATION
2. FOR REMOTE VAR. 10% 1000 OHMS 5% 500 OHMS +/- 10% 1/2 W POT.
- 3 FAST-BLOW, HIGH INTERRUPT CAPABILITY.



Interconnection Diagram, 208-240 V Nominal



- NOTE:**
- 1 IF GLASS TYPE FUSE IS USED. ENCLOSE FOR SAFETY.
  - 2 TWO 120 VOLT BULBS LESS THAN 100 WATTS.

Operational Test