INTRODUCTION

The VR63-4A/UL voltage regulator is designed for use on 50/60 Hz brushless generators. Regulator features include frequency compensation, overexcitation shutdown, a solid-state buildup circuit, and EMI filtering.

SPECIFICATIONS

Power Input

Range:	190 to 240 Vac, ±10%, 1-phase
Frequency:	50/60 Hz
Burden:	500 VA

Sensing Input

Configuration:	1-phase
Frequency:	50/60 Hz
Range:	100 to 120 Vac, ±10%
Burden:	1 VA

Power Output

Ratings

Maximum Continuous:	4 Adc, 63 Vdc, 252 W
One Minute Forcing:	7 Adc, 100 Vdc, 700 W

DC Field Resistance Rating

Minimum:	15 Ω
Maximum:	100 Ω

Voltage Adjustment

90 to 132 Vac

Regulation Accuracy

Better than ±1% no load to full load.

Response Time

<1.5 cycles for a ±5% 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 Vdc ±5 Vdc for a time inversely proportional to voltage magnitude, or within 0.2 seconds if the exciter field voltage exceeds 135 Vdc ±5 Vdc.

Voltage Buildup

Internal provisions for automatic voltage buildup from generator residual voltages as low as 10 Vac.

Power Dissipation

8 W maximum

Temperature

Operating:	–40 to 60°C (–40 to 140°F)
Storage:	–65 to 85°C (–85 to 185°F)

Vibration

Withstands the following:

2 to 26 Hz:	1.3 G
26 to 50 Hz:	0.036 inch double amplitude
50 to 500 Hz:	5.0 G

Shock

Withstands 15 G in each of three mutually perpendicular planes.

Weight

0.88 lb (0.4 kg)

Agencies

CSA Approved
UL Recognized
GOST-R Certified

FUNCTIONAL DESCRIPTION

Frequency Compensation

The frequency compensation characteristic of Figure 1 is used to improve system load pickup performance by restraining voltage recovery until frequency has also started to recover.

The regulator is shipped from the factory set at a 45-Hz corner frequency for 50 Hz systems. For 60 Hz systems, a 55-Hz corner frequency is achieved by removing the jumper from the HZ terminals.

Overexcitation Shutdown

If the exciter field voltage exceeds 100 Vdc ±5 Vdc, the regulator automatically removes the field current after a time delay. The time delay is inversely proportional to the magnitude of the detected overvoltage condition up to the 135 ±5 Vdc point. Beyond 135 Vdc ±5 Vdc, the field voltage is removed within 0.2 seconds. See Figure 2.

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

INSTALLATION

Mounting

The regulator may be mounted on the generator in any convenient position (optimum cooling occurs with the long side of the regulator vertical). Refer to the drilling diagram of Figure 3.

Exciter Field Power Circuit

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

Caution

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

Power/Sensing Input Circuit

Connect as shown in Figures 4 and 5. Power for the exciter field and regulator circuitry is derived from the generator output or auxiliary winding. The operable power input range is 190 to 240 Vac.

For sensing, single-phase voltage from the generator is connected between E1 and E4. Note that terminal 4 is common to both power and sensing.

Fuses

It is recommended that 7 A, 250 V fuses with a high interruption capability be installed per the interconnection diagram in Figures 4 and 5.

CAUTION

Fuses must be installed per the interconnection diagram to avoid interrupting field current directly.

Voltage Adjust Rheostat (VAR)

The VAR control adjusts generator output voltage. Turning the control clockwise increases voltage.

When using the remote voltage adjust rheostat (VAR), the VAR wire on the regulator should be cut and the rheostat connected to both ends. A 1 kΩ, ½ W resistor is adequate for most applications. See Figures 4 and 5.

Accessory Equipment

Voltage Adjust Rheostat with a locking, slotted shaft for remote mounting - Basler P/N 17727.

OPERATION

The following procedures are provided for VR63-4A/UL setup and adjustments.

CAUTION

Meggers and high-potential test equipment must not be used. Incorrect use of such equipment could damage the semiconductors contained in the regulator.

Preliminary Setup

1. Verify that the voltage regulator specifications conform with the generator system requirements.
2. Ensure that the regulator is connected to the generator correctly. See Figures 4 and 5.
3. Install fuses per *Mounting, Fuses*.
4. Set the regulator VAR control fully CCW and the remote VAR (if used) to the center position.

System Startup

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

Adjustments (Field Flashing)

When the regulator is operated with the generator for the first time, the polarity of residual magnetism may be reversed or too small to achieve the necessary buildup voltage for the regulator. If reversing the field connections does not induce buildup, and the residual voltage is still less than the specified value of 6 Vac, shut down the prime mover and proceed with the following steps.

1. With the prime mover at rest, apply a dc source (not grounded) of not more than 12 Vdc with Positive to F+ and Negative to F–, in series with a current-limiting resistor of 3 to 5 ohms.
2. Allow approximately three seconds before removing the dc source.
3. Start the prime mover and measure voltage at regulator leads 3 and 4. If this voltage is greater than 6 Vac, voltage buildup should be successful. If less than 6 Vac is measured, repeat the field flashing procedure.
4. If repeating steps 1 and 2 does not result in generator buildup, and the residual is greater than 6 Vac, replace the voltage regulator.

OPERATIONAL TEST

1. Connect the test setup as shown in Figure 6. Do not apply power. Ensure that the light bulbs are rated for 120 V and less than 100 W.
2. Adjust the VAR and/or remote VAR fully CCW.
3. Apply 240 Vac, 60 Hz power to the regulator.
4. Slowly turn the VAR control in the CW direction.

   RESULTS:

   a. Before the fully CW position is reached, the light bulb should reach full brightness to signify the regulator is controlling correctly.

   b. At this regulating point, a small change in the VAR adjustment should result in the light bulb turning fully on or off.

FIGURES

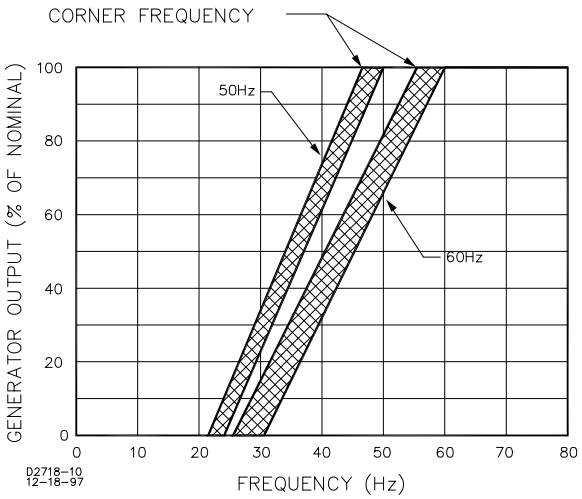

Figure 1. Frequency Compensation Curves

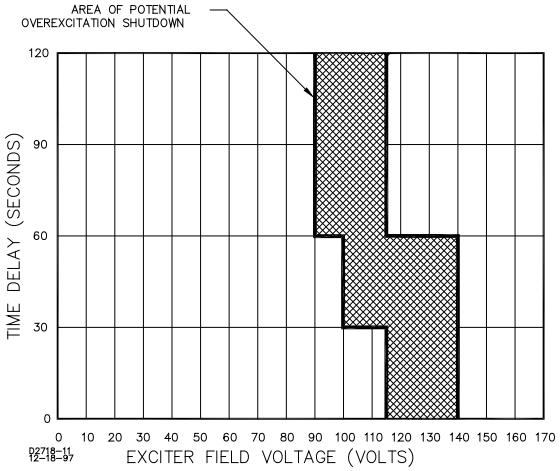

Figure 2. Typical Time Delay Characteristic Curves

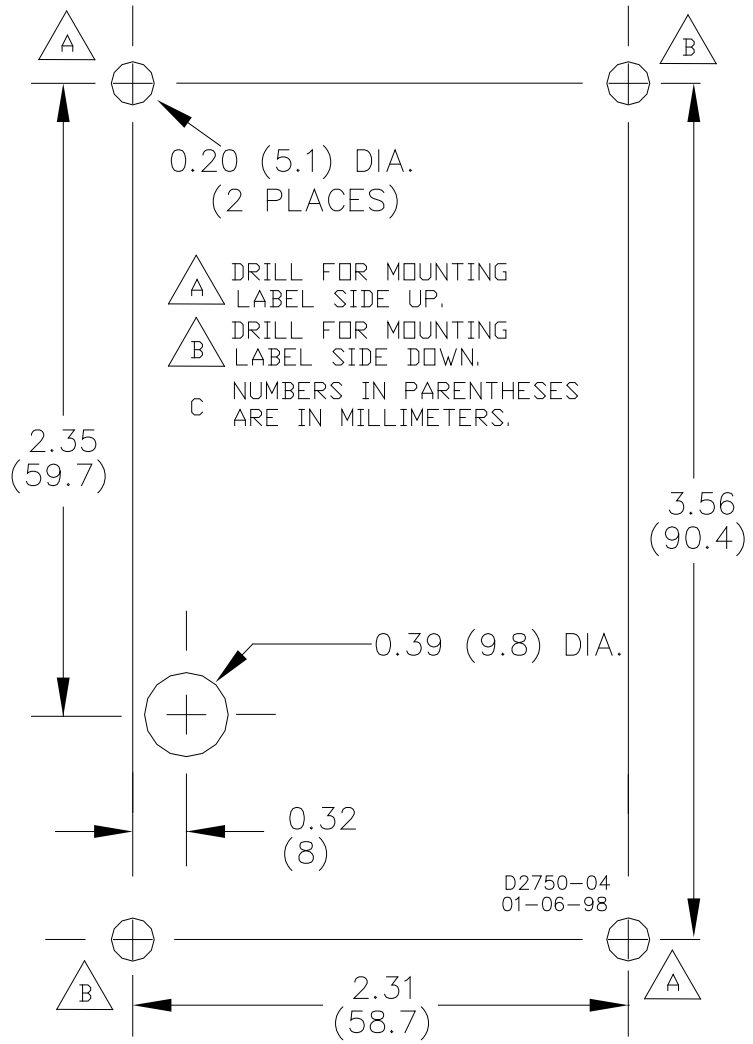

Figure 3. Drilling Diagram

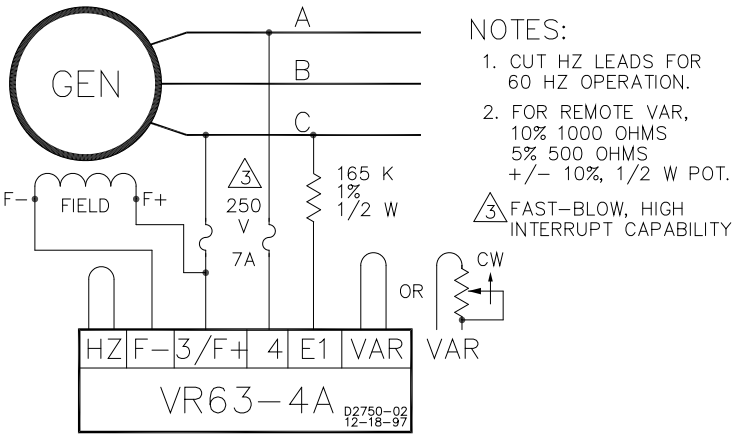

Figure 4. Interconnection Diagram, 208/240 V Nominal

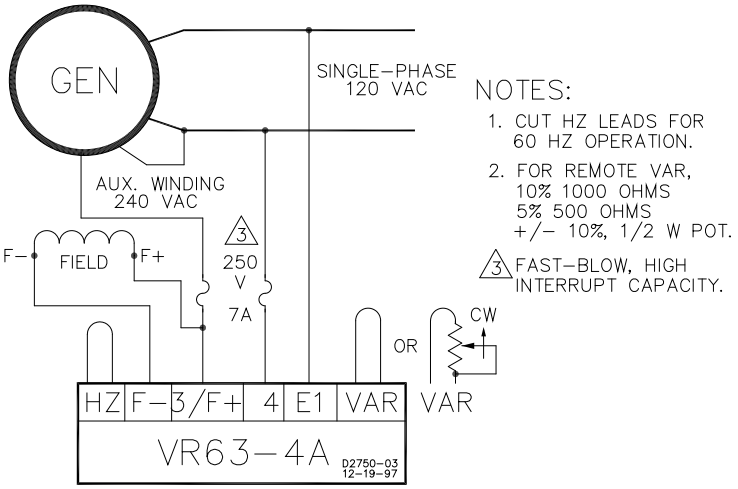

Figure 5. Interconnection Diagram, 120 V Generator with Auxiliary Winding

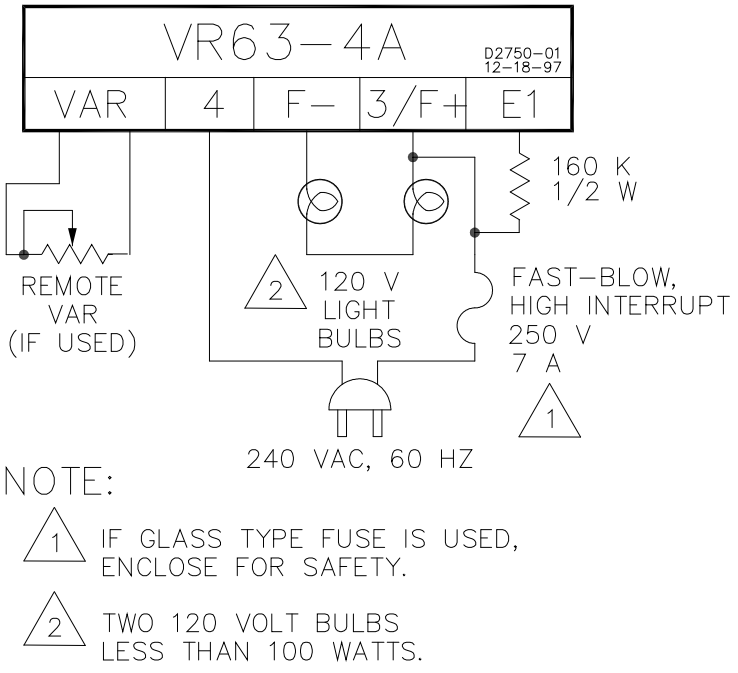

Figure 6. Operational Test