

## INTRODUCTION

The BE300PM static voltage regulator regulates voltage on a 50- or 60-Hz generator with a brushless exciter and a permanent magnet generator (PMG) excitation system.

## ELECTRICAL SPECIFICATIONS

### Output Power

Maximum Continuous: 3 Adc at 63 Vdc (190 W)  
One-Minute Forcing: 5 Adc at 100 Vdc (500 W) with 240 Vac power input

### Exciter Field DC Resistance

Minimum: 15  $\Omega$

### Input Power

Range: 171 to 264 Vac, single-phase  
Frequency: 250 to 300 Hz,  $\pm 10\%$   
Burden: 500 VA

### Sensing Input

Range: 171 to 264 Vac, single-phase  
Frequency: 50 to 75 Hz

### Fuse

Bussmann GDC-4A or equivalent  
Rating: 4 Aac, 250 Vac  
Type: Glass tube, 5 x 20 mm, time delay

### Voltage Adjustment Range

171 to 264 Vac

### Regulation Accuracy

Better than  $\pm 1.0\%$ , no-load to full-load

### EMI Suppression

Internal electromagnetic interference (EMI) filtering

### Voltage Buildup

Automatic voltage buildup occurs for residual generator voltages as low as 10 Vac.

### Power Dissipation

8 W maximum

## PHYSICAL SPECIFICATIONS

### Temperature

Operating:  $-40$  to  $60^{\circ}\text{C}$  ( $-40$  to  $140^{\circ}\text{F}$ )  
Storage:  $-40$  to  $85^{\circ}\text{C}$  ( $-40$  to  $185^{\circ}\text{F}$ )

### Vibration

20 to 60 Hz with 0.035" displacement  
1,000,000 cycles @ 30 Hz in all planes

### Shock

Withstands 15 G in each of three perpendicular planes.

### Moisture and Humidity

Tested per MIL-STD-705B, Method 711-1C

### Salt Fog

Tested per ASTM B117-73

### Weight

184 g (6.5 oz) net

## Terminal Type

$\frac{1}{4}$  inch male quick connect with insulating barrier

## Agency Certification

Standard CSA-C22.2 No. 0 and 14  
File LR 23131

## OVEREXCITATION PROTECTION

If the exciter field voltage exceeds 85 to 90 Vdc, the BE300PM automatically removes field power after a time delay. This delay is inversely proportional to the field voltage.

When field power is removed due to overexcitation, the BE300PM will not reset or return to operation until the generator output is interrupted.

## CONTROLS

BE300PM controls consist of jumpers and screwdriver adjusted potentiometers.

### Potentiometer Controls

BE300PM potentiometer controls are accessible through the controller front panel and are shown in Figure 1.

#### VOLT Control

This control raises and lowers the generator output voltage.

#### STAB Control

This control adjusts the stability by increasing and decreasing the response time of the BE300PM.

#### U/F Control

This control adjusts the corner frequency point of the BE300PM frequency compensation characteristic.

#### Optional Remote Voltage Adjust Rheostat

If remote adjustment of the generator output is desired, the Voltage Adjust Rheostat jumper must be replaced with a user-supplied rheostat. A 2,000 ohm,  $\frac{1}{2}$  watt rheostat will provide  $\pm 10\%$  voltage adjustment. For  $\pm 5\%$  voltage adjustment, use a 1,000 ohm,  $\frac{1}{2}$  watt rheostat. Figure 2 shows the proper remote rheostat connections. Refer to *Operating Procedures* for instructions on setting up the remote rheostat.

### Jumpers

Two jumpers control BE300PM operation: the Corner Frequency jumper and the Voltage Adjust Rheostat jumper. These jumpers are shown in Figure 3.

#### Corner Frequency Jumper

BE300PM controllers are delivered with the nominal corner frequency preset to 58 hertz in the 60 hertz mode. For 50 hertz operation, and a nominal corner frequency of 48 hertz, the Corner Frequency jumper must be moved to the 50 Hz terminal.

#### Voltage Adjust Rheostat Jumper

BE300PM controllers are delivered with the Voltage Adjust Rheostat jumper connected across terminals 6 and 7. This enables adjustment of the generator output voltage through

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the controller's internal Voltage Control potentiometer. Clockwise rotation of the Voltage Control potentiometer increases the generator voltage.

## INPUT POWER

Power for the exciter field and BE300PM is derived from the permanent magnet generator (PMG) output. The acceptable power input range is 171 to 264 Vac. Connect the PMG input power wiring to terminals 3 and E3/4. Typical connections are shown in Figure 2.

## SENSING INPUT

BE300PM sensing is derived from the generator output. The acceptable input range is 171 to 264 Vac. Connect the generator sensing wiring to terminals E1 and E3/4. Typical connections are shown in Figure 2.

## EXCITER FIELD POWER CIRCUIT

Controller terminal F+ is connected to the brushless exciter field positive terminal and controller terminal F- is connected to the brushless exciter field negative terminal.

### Caution

The exciter field dc resistance must be no less than 15 ohms.

If the exciter field dc resistance is less than 15 ohms and the full-load field current does not exceed the maximum continuous current rating of the controller, a resistor of sufficient wattage must be added in series with the field to increase the total resistance to  $\geq 15$  ohms.

## STABILITY ADJUST

The stability adjust potentiometer allows for tuning of the regulator to optimize generator voltage settling time. Achieving the desired voltage stability on larger machines may not be possible with adjustment of the Stability Adjust potentiometer alone. If this occurs, cutting both stability circuit-selection jumpers (see Figure 4) will allow adjustment to the desired stability.

## FREQUENCY COMPENSATION

The frequency compensation feature improves system load pickup performance by restraining voltage recovery until the frequency has also started to recover. Figure 5 illustrates the underfrequency characteristics of the BE300PM.

The corner frequency range is set for 50 hertz or 60 hertz by connecting the Corner Frequency jumper to the appropriate terminal. The adjustable range is 54 to 61 hertz in 60 Hz operation and 45 to 51 hertz in 50 Hz operation. Refer to *Controls, Jumpers* for details on selecting the corner frequency range.

The corner frequency setting is adjusted by the Underfrequency control (potentiometer). Clockwise rotation of the Underfrequency control increases the corner frequency and counterclockwise rotation decreases the corner frequency. If user adjustment of the factory-set Underfrequency potentiometer is desired, follow the *Preliminary Setup* and *System Startup* procedures.

## INSTALLATION

### Mounting

The BE300PM controller may be mounted on the generator in any convenient position. Figure 6 shows the mounting dimensions. Dimensions are shown in inches with millimeters in parenthesis.

The recommended mounting hardware is two #8 or M4 screws tightened to a torque of 9 inch-pounds (1 newton meter). Nylon-lined locking nuts are recommended when installing the controller with loose hardware.

### Connections

BE300PM controller terminals consist of quarter-inch, quick-connect tabs.

Figure 2 shows typical connections for the BE300PM controller.

## OPERATING PROCEDURES

The following procedures can be used when adjusting the BE300PM controller. Symptoms caused by certain generator system problems or a faulty controller are included along with suggested remedies.

### Caution

Meggers and high-potential test equipment must not be used. Use of such equipment may damage the semiconductors contained in the controller.

### Preliminary Setup

Complete the following steps before proceeding with system startup.

1. Verify that the BE300PM specifications conform to the requirements of the generator system.
2. Ensure that the controller jumpers are positioned as follows:
  - a. If a remote voltage adjust rheostat will not be used, ensure that the Voltage Adjust Rheostat jumper is connected across terminals 6 and 7.
  - b. If a 54 to 61 hertz corner frequency is desired, connect the Corner Frequency jumper to the 60 Hz terminal. If a 45 to 51 hertz corner frequency is desired, connect the Corner Frequency jumper to the 50 Hz terminal. The corner frequency is fine-tuned in the *System Startup* procedure.
3. Ensure that the connections between the generator system and the controller are correct.
4. Set the BE300PM Voltage control fully counterclockwise and the remote voltage adjust rheostat (if used) to the center position.
5. Adjust the BE300PM stability control fully clockwise. This provides the most stability and the slowest response.
6. If user adjustment of the Underfrequency control is required, start with the potentiometer adjusted to the fully counterclockwise position. Then, slowly adjust the potentiometer clockwise to set.

## System Startup

### Notes

Use an average-reading voltmeter for all voltage readings.

Perform the steps under *Preliminary Setup* prior to *System Startup*.

1. Start the prime mover and bring it up to rated speed. Generator voltage should build up.
2. Slowly adjust the BE300PM Voltage control until the generator voltage reaches the nominal level.  
If used, the remote voltage adjust rheostat is now capable of adjusting generator output voltage.  
If the voltage does not build up to the rated level, check the fuse and the generator output for excessive load or a short circuit.
3. Apply and remove the generator load to verify stability.  
If the generator responds too slowly or hunts (oscillates), check the generator output for excessive load or a short-circuit. Adjust the controller's Stability control with no load applied.

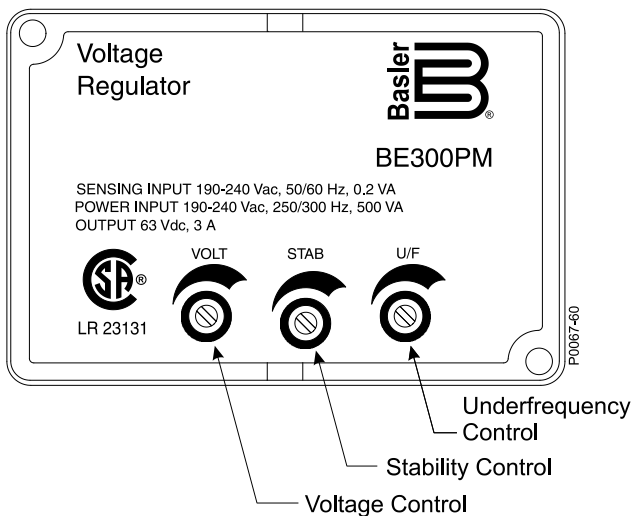


Figure 1. Potentiometer Controls

4. Check regulation under normal operating conditions. If the regulation is poor:
  - a. Verify that the prime mover is operating at rated speed.
  - b. Verify that the voltmeter is connected to the same point as the controller sensing.
  - c. Use an average-sensing voltmeter (not an rms-sensing voltmeter).
  - d. Verify that underfrequency is not in effect.
5. Verify the corner frequency setting by slowly reducing the generator frequency until the generator output voltage just starts to decrease.

If adjustment of the corner frequency is required:

- a. Rotate the Underfrequency control fully counterclockwise.
- b. Reduce the generator frequency from nominal (either 50 Hz or 60 Hz) to the desired corner frequency.
- c. Slowly adjust the Underfrequency control clockwise until the generator output voltage just starts to decrease.

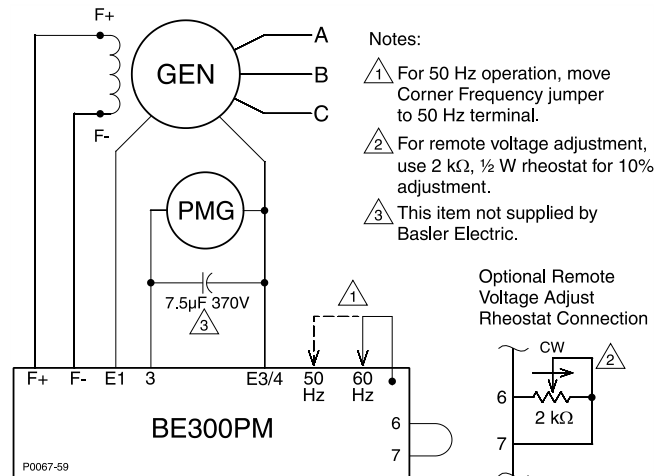
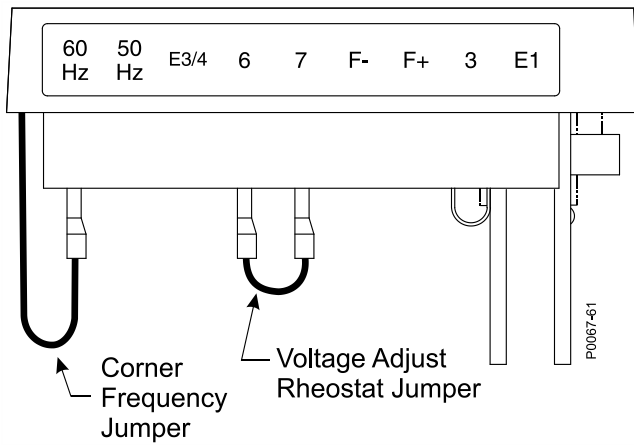
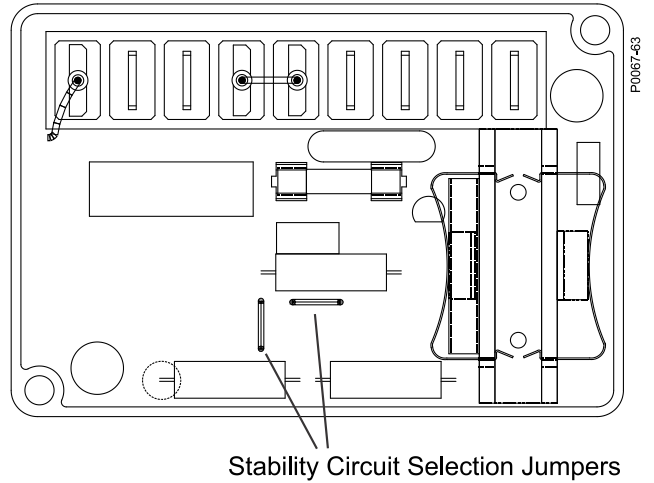


Figure 2. Typical Connections

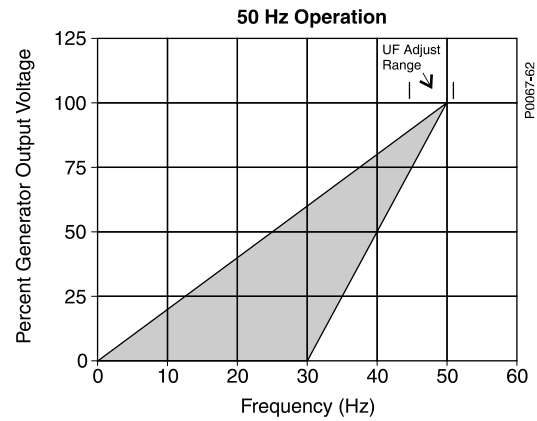
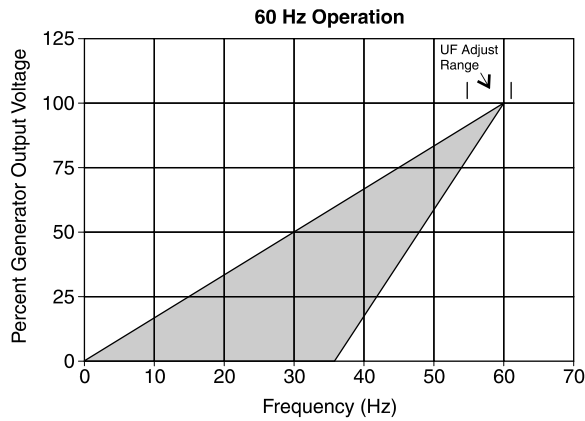
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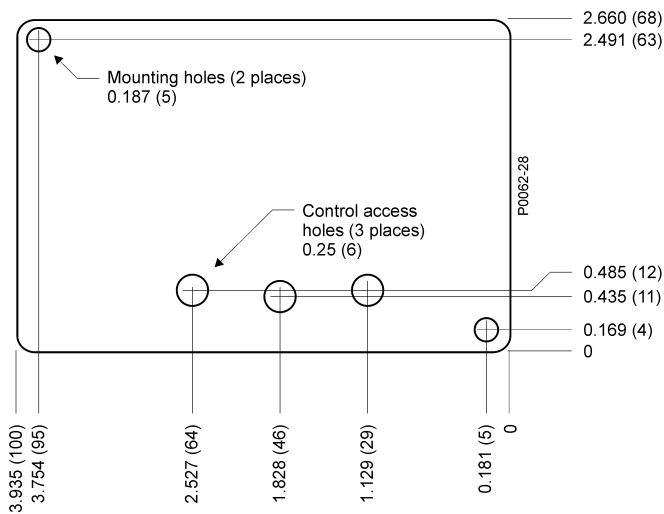
**Figure 3. Corner Frequency and Voltage Adjust Rheostat Jumper Locations**



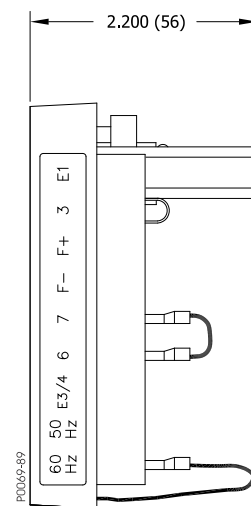
**Figure 4. Stability Circuit Selection Jumper Locations**



**Figure 5. Frequency Compensation Characteristics**



**Figure 6. Panel Drilling and Mounting Dimensions**



**Figure 7. Side-View Dimensions**