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# INSTRUCTION MANUAL FOR VOLTAGE REGULATOR Model: APR 63-5

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**BASLER ELECTRIC,****BOX 269,****HIGHLAND, IL 62249****PHONE 618/654-2341****FAX 618/654-2351****INTRODUCTION**

The Basler APR 63-5 Voltage Regulator is a CSA/UL approved unit contained in an encapsulated plastic case. The regulator controls the dc exciter field power of conventional, 50 or 60 hertz brushless generators that have a 63 Vdc field to regulate the output voltage.

Regulation is provided by sensing the generator output voltage, converting it to a dc signal and comparing the signal to a reference voltage signal. An error signal is developed and used to control the dc field power in order to maintain a constant generator output.

**SPECIFICATIONS****Certification:** UL Listed, CSA Certified

**DC Output Power:** 5.0 Adc @ 63 Vdc (315 W) maximum continuous, 8.5 Adc @ 105 Vdc (893 W) one minute forcing.

**Exciter Field DC Resistance:** 12.6 ohms minimum, 100 ohms maximum.

**AC Input Power:** 190 to 277 Vac  $\pm 10\%$ , single-phase, 50/60 Hz. Burden: 650 VA.

**AC Sensing Input:** 190 to 240 Vac (240 V tap), 380 to 480 Vac (480 V tap), single-phase, 50/60 Hz. Burden: 5 VA maximum.

**Voltage Adjust Range (Internal):** 170 to 264 Vac (240 V tap) or 340 to 528 Vac (480 V tap).

**External Voltage Adjust Rheostat:** 1,000 ohms, 2 W (supplied as an optional item).

**Voltage Build-Up:** Internal and automatic from generator residual voltage (6 Vac minimum).

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

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

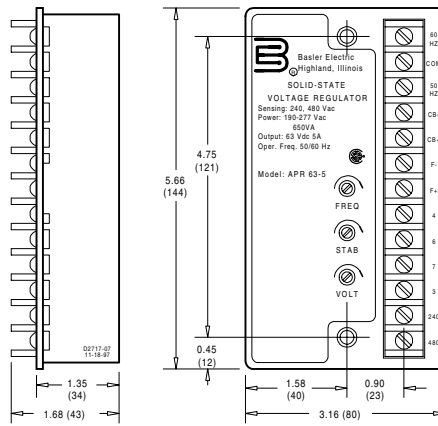
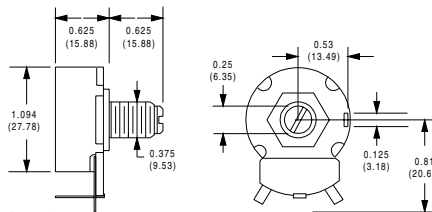
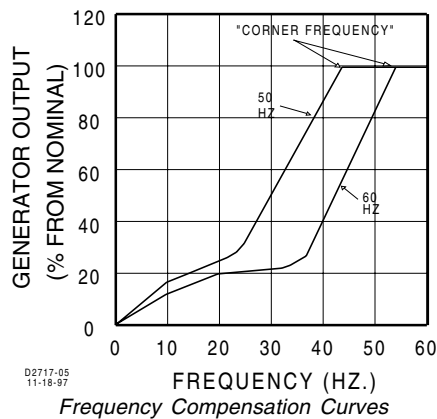
**Storage Temperature:**  $-65^{\circ}\text{C}$  ( $-85^{\circ}\text{F}$ ) to  $+85^{\circ}\text{C}$  ( $+185^{\circ}\text{F}$ ).

**FUSES**

Install 5 A, 250 V, high interrupting capacity, fast-blowing fuses in lines 3 and 4. See interconnection diagrams.

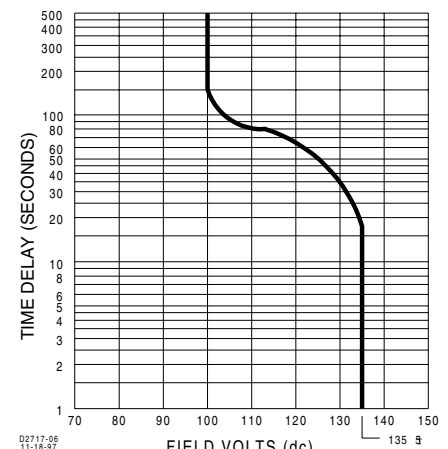
**MOUNTING**

The regulator may be mounted in any position. Refer to the outline drawing for dimensions. The regulator may be mounted directly on the generator set using  $\frac{1}{4}$ " hardware. Select the proper hardware to withstand any expected shipping or transportation conditions.

*APR 63-5 Outline Diagram**External Voltage Adjust Potentiometer (Optional), Basler P/N 17727***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 magnitude of the detected overvoltage condition. At approximately  $135 \pm 5$  Vdc, the field voltage is removed instantaneously. Refer to the following figure.

Upon detection of overexcitation and the resulting field voltage shutdown, the regulator will not reset or return to an operational condition until the generator output drops to less than 6 Vac for 10 seconds minimum.

*Typical Inverse Time Delay Characteristic Curves***REGULATOR CONTROLS****FREQ CONTROL**

This control prevents generator and regulator damage by dropping the generator output voltage when the generator frequency drops.

- Set generator RPM to desired frequency roll-off.
- Adjust **FREQ** control until voltage starts to drop off.
- Speed up generator to rated speed. Voltage should be at nominal.

**STAB CONTROL**

This control allows the generator response time (and thus voltage stability) to be adjusted. Use an oscilloscope or other voltage recording device to set this control.

- Rotation of **STAB** control CW will slow voltage response time.
- Rotation of **STAB** control CCW will speed response time. If rotated too far, generator voltage will hunt (oscillate).
- Rotate **STAB** control CW just past point where voltage oscillation occurs.

**VOLT CONTROL**

Rotation of **VOLT** control CW will increase generator output voltage.

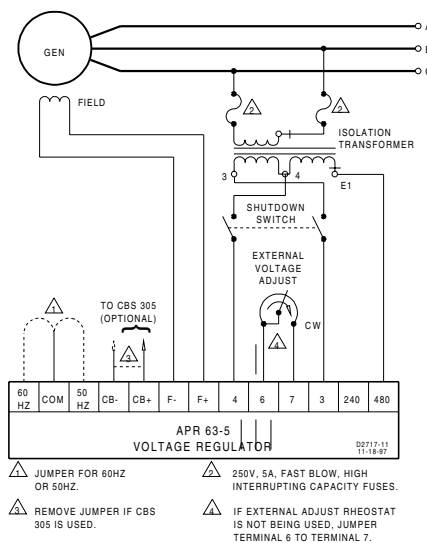
Removing jumper (terminals 6 and 7) and connecting external potentiometer (1,000 ohms, 2 watts) allows a  $\pm 10\%$  adjustment of voltage range with nominal set by **VOLT** control.

**INTERCONNECTION**

Refer to the following interconnection diagrams.

- Connect the jumper from COM to either the 50 Hz or 60 Hz terminal depending upon the generator frequency.

- Remove the jumper and connect terminals **CB-** and **CB+** to the CBS 305 inputs (if used). If the CBS 305 is not being used, leave the jumper in place.
- If an external voltage adjust control is being used, connect the potentiometer to terminals **6** and **7** as shown. If not, connect a jumper between terminals 6 and 7.
- Connect the exciter field to terminals **F+** and **F-**. Be sure to observe polarity.
- Connect the input power to the generator stator to provide power to terminals **3** and **4**. Fuse both leads. Install the optional shutdown switch, if desired.
- Connect the sensing input to either **240** or **480** depending on voltage. The sensing should be connected line-to-line.



*Isolation Transformer Interconnection Diagram*

### OPERATION

The following system operation procedures provide instructions for adjusting the APR 63-5 Voltage Regulator.

**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

To prevent damage to the regulator, complete the following steps before proceeding with system startup.

- Verify that the voltage regulator specification conforms with the generator system requirements.
- Ensure that the regulator is correctly connected to the generator. See interconnection diagram.
- Install fuses per *FUSES* paragraph.

During periods of prime mover idling, use the excitation shutdown switch.

### SYSTEM STARTUP

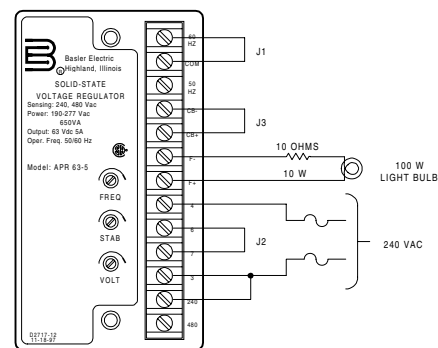
- Start the prime mover and bring it up to rated speed. Voltage should build up. If a minimum residual of 6 Vac is not present, perform field flashing.
- Slowly adjust **VOLT** control until voltage reaches nominal value. If used, adjust remote voltage adjust to set generator output to exact value desired.
- Apply and remove load to check stability. Adjust per *STAB CONTROL* paragraph if voltage is unstable.
- Reduce generator frequency (speed) to 55 Hz (on 60 Hz systems) or 45 Hz (on 50Hz systems). Check that generator output decreases from this point. If it does not, adjust per *FREQ CONTROL* paragraph.

### ACCESSORY EQUIPMENT

- Power Isolation Transformer* - BE 18674 001
- Parallel Compensation* - APM2000 and Current Transformer
- Manual Voltage Control* - MVC-300
- Current Boost System* - CBS305 and Current Transformer

### OPERATIONAL TEST

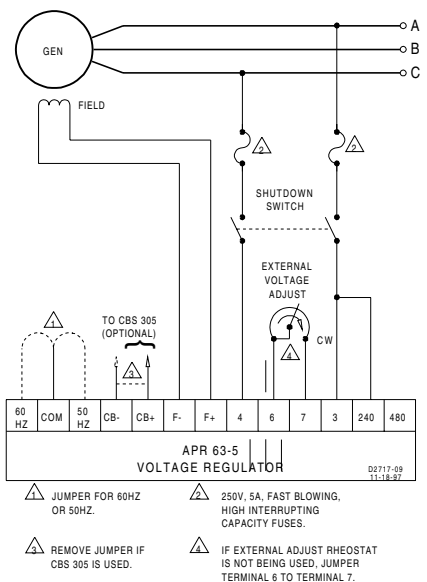
- Connect the test setup as shown below and apply 240 Vac as shown.
- Adjust the **VOLT** control fully CCW. Observe that the lamp is not lit.
- Adjust the **VOLT** control fully CW. Observe that the lamp is lit.
- Adjust the **VOLT** control until the lamp just goes out.



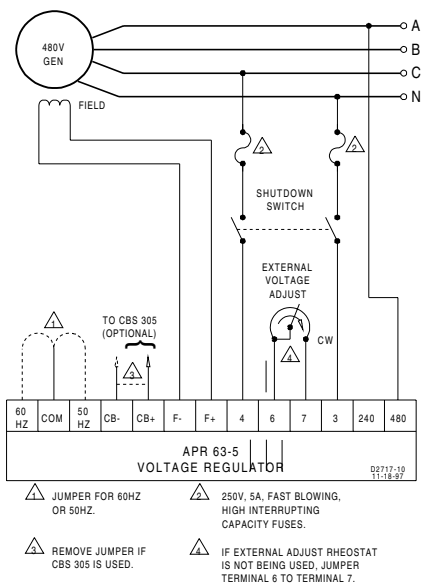
### FIELD FLASHING

When the regulator is operated with the generator for the first time, the polarity of residual magnetism may not be correct or the magnitude may not be enough. If the generator does not build up, shut down the prime mover and proceed as follows.

- With the prime mover at rest, apply a dc source (not grounded) of not more than 48 Vdc to terminals **F+** and **F-** in series with a limiting resistor. Use 1 ohm of resistance for each volt from the dc source with a power rating of at least 1 watt per volt.
- Allow approximately 30 seconds before removing the dc source.
- Start the prime mover and measure the voltage at the regulator leads **3** and **4**. If the voltage is greater than 6 Vac, voltage buildup should occur. Repeat flashing if less than 6 Vac residual is measured.



*240 Vac, 1-Phase Interconnection Diagram*



*480 Vac Interconnection Diagram*