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**INSTRUCTION MANUAL  
FOR  
VOLTAGE REGULATOR  
Model: AVR120-6  
Part Number: 9 3177 00 100**

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

The AVR120-6 Voltage Regulator is designed for use on 50/60 Hz brushless generators in the range of 50 - 625 kVA. The regulator includes frequency compensation, overexcitation shutdown, a solid-state build-up circuit, EMI filtering, Droop Input, and Accessory Input.

**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:**

6 Adc at 110 Vdc (660 W) maximum continuous, 10 Adc at 200 Vdc (2,000 W) forcing for 10 seconds (at 240 Vac input).

**Exciter Field DC Resistance:**

18.3 ohms, minimum.

**AC Power Input:**

Operating range: 180 Vac to 277 Vac, Single-phase, 50/60 Hz or 125 Hz PMG.

**Sensing Input:**

342-528 Vac, single-phase, 50/60 Hz.

**Regulation Accuracy:**

Better than  $\pm 0.5\%$  no load to full load.

**EMI Suppression:**

Internal electromagnetic interference filter (EMI filter).

**Overexcitation Shutdown:**

Field voltage shuts down after time delay if exciter field voltage exceeds a setpoint adjustable approx. 75-125 Vdc. (See *Overexcitation Shutdown* for description).

**Voltage Buildup:**

Circuitry provides automatic voltage buildup from generator residual voltages as low as 5 Vac.

**Terminations:**

Screw type.

**Droop Input:**

5A, <10VA. Adjustable up to 6% for 0.8 power factor or 10% for zero power factor at 1 P.U. current.

**Accessory Input:**

Application of a  $\pm 3$  Vdc signal causes a  $\pm 30\%$  change in setpoint. NOTE: +3 Vdc across terminals A to C equals a -30% setpoint.

**PHYSICAL SPECIFICATIONS****Operating Temperature:**

0° C (32° F) to +60° C (+140° F).

**Storage Temperature:**

-30° C (-86° F) to +70° C (+158° F).

**Vibration:**

Withstands 1.5 Gs at 5 to 29 Hz; 0.036" double amplitude at 29 to 52 Hz; and 5 Gs at 52 to 500 Hz.

**Shock:**

Withstands up to 15 Gs in each of three mutually perpendicular axes.

**Weight:**

0.38 kg (12.58 oz.) Net.

**FUSES**

Although the AVR120-6 has an internal fuse, 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 *Out-line Diagrams*.

**NOTE**

Fuse must be installed per the interconnection diagrams to avoid interrupting the field current.

**V/HZ "CORNER FREQUENCY" SELECTION AND ADJUSTMENT**

The regulator is preset for 50 Hz systems with the corner frequency at 47 Hz. Cutting the 50 /60 Hz select jumper (JP1) sets the regulator for use with 60 Hz systems.

The corner frequency can be adjusted by the **UF ADJ** rheostat on the AVR. Clockwise rotation results in raising the corner frequency (shifting the curve to the right). To set the UF rheostat:

1. Adjust the UF Rheostat fully CCW.
2. Start the generator and set at rated voltage.
3. Adjust the generator frequency to the desired kneepoint frequency.
4. Slowly adjust the **UF ADJ** rheostat clockwise (CW) until the generator voltage just begins to decrease and the **UF LED** turns on.

**OVEREXCITATION SHUTDOWN**

Overexcitation shutdown removes the output power if the exciter field voltage exceeds the setpoint. If exciter field voltage exceeds the setpoint, the regulator automatically removes field current, after a time delay. The time delay is inversely proportional to the magnitude of the detected overvoltage condition. At twice the setpoint, the field voltage is removed after a minimum of 10 seconds.

The regulator also features an Instantaneous Overexcitation shutdown that removes output power if the field voltage exceeds approximately 240 Vdc.

After output power is removed, the regulator can be reset by decreasing the power input voltage to less than 6 Vac for a minimum of 2 seconds. This may be accomplished by stopping the prime mover or by interrupting the regulator power input with a reset switch.

**STABILITY ADJUST**

An internal screwdriver adjustable potentiometer provides adjustment to the response rate of the generator output voltage to a change in load. For normal operation, the stability select jumper (JP2) should be cut. However, leaving jumper JP2 uncut may allow for operation on larger machines.

**QUADRATURE DROOP CONTROL**

When paralleling is required, a 5A secondary current transformer (CT) must be connected to terminals 1 and 2. The ratio of the CT must be chosen so that the maximum current applied to terminals 1 and 2 does not exceed 5A RMS. These terminals must be shorted when paralleling is not required. The amount of droop is adjusted by means of the QDC (quadrature droop control) potentiometer. Fully clockwise is the maximum with at least a 10% droop at zero power factor and at least a 6% droop at 0.8 power factor. Observe the correct phase relationship when connecting the CT. See diagrams for interconnections.

**OPERATION**

The following system operation procedures provide instructions for adjusting the AVR120-6 voltage regulator. Symptoms resulting from a faulty regulator and certain generator system problems are included, together with suggested remedies.

Complete the following steps before proceeding with the system startup.

**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 the voltage regulator is correctly connected to the generator system.
3. Install the fuses as described in *Fuses*.

- Set the regulator **VOLT ADJ** and remote **VOLT ADJ** (if used) as follows:  
Regulator **VOLT ADJ** - Fully CCW  
Remote **VOLT ADJ** - Centered
- Rotate the **QDC ADJ** fully CCW.
- Center the **STAB ADJ**.
- Short terminals **A** and **C** if Accessory Input is not used.
- Short terminals **1** and **2** if Droop Input is not used.

#### SYSTEM STARTUP

- Perform preliminary setup as described in the above paragraphs.

#### NOTE

All voltage readings are to be taken with an average reading voltmeter.

- Start prime mover and bring up to rated speed.

**RESULT:** Voltage should build up. If not, perform field flashing.

- Slowly adjust the regulator **VOLT ADJ** CW until the generator output voltage reaches the nominal value. If used, adjust the remote **VOLT ADJ** to set the generator voltage to the exact value desired.

**RESULT:** Voltage should build up to rated value. If voltage does not build up to rated value, check generator for short or excessive load.

- Check regulator under normal operating and loading conditions.

**RESULT:** Voltage regulation should be better than  $\pm 0.5\%$  no-load to full-load. If regulation is not within this range, verify the prime mover is at rated speed. Voltage reduction under load may be due to speed change from no load to full load, causing the frequency compensation (V/Hz) circuit to reduce voltage at lower frequencies.

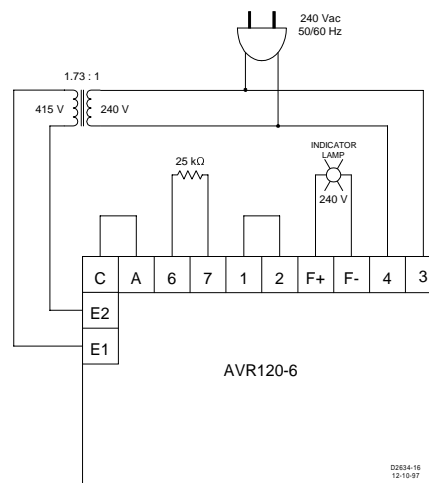
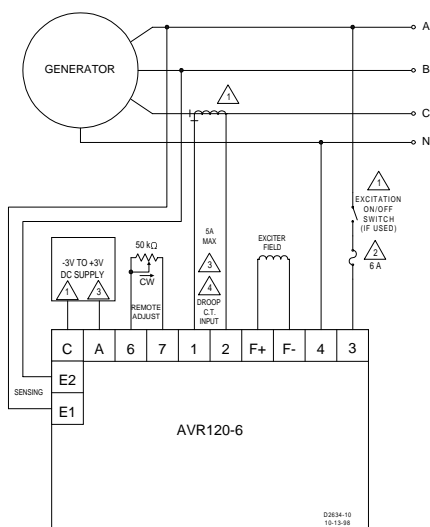
#### OPERATIONAL TEST

- Connect the test setup as shown in the following figure, *Operational Test*. Do not apply power. Ensure that the light bulb is rated for 240 V and less than 100 W.

- Adjust the regulator **VOLT ADJ** maximum CW, and the **STAB ADJ** to center.
- Apply 240 V, 50/60 Hz power to the regulator. The light bulb should illuminate.
- Slowly adjust the regulator **VOLT ADJ** control CCW. At the regulation point, the light bulb should extinguish. Small adjustments above and below this level should cause the light bulb to go off and on.

The following notes ( $\Delta$ ) apply to the interconnection diagrams:

- Item not supplied by Basler Electric.
- Select fuses with high interrupting capacity.
- Apply a short across these terminals if not used.
- Shown for A-B-C phase sequence.
- Dimensions are in inches (millimeters).

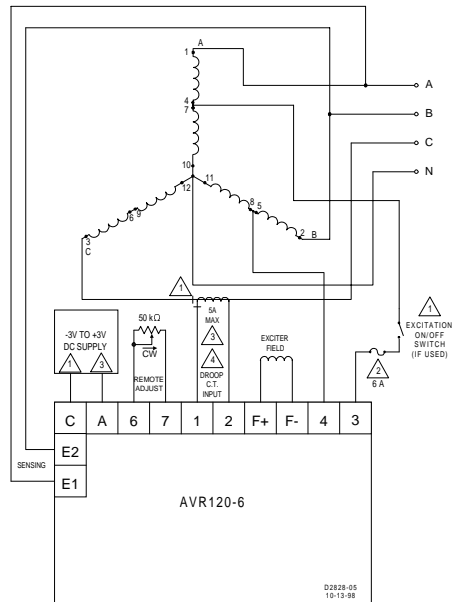


*Operational Test*

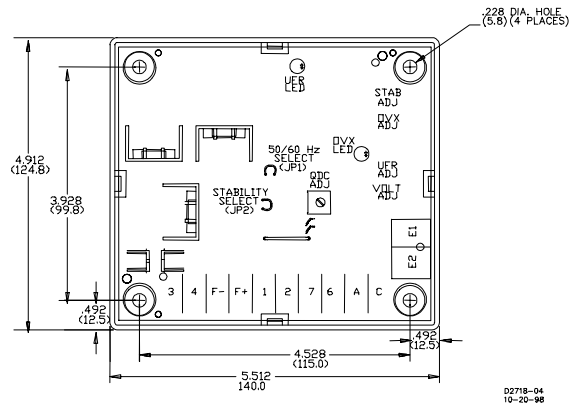
#### WARNING!

Do not exceed 277 Vac on AC power input.

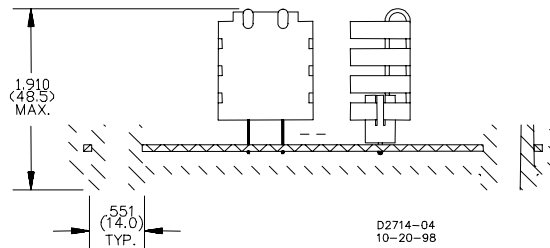
Interconnection Diagram, 240/415 V Nominal, 3-Phase, 4-Wire, Wye Connection



*Interconnection Diagram, 277/480 V Nominal, 3-Phase, 4-Wire, Wye Connection*



*AVR120-6 Outline Diagram (Top View)*



*AVR120-6 Outline Diagram (Side View)*