



AVR 8-120

Alternator Voltage Regulator
with droop CT connections

DESCRIPTION

The AVR-8 voltage regulator is an electronic device which lets the alternator to produce a fixed output voltage.

The device has open chassis, resin molded design. It is intended to be mounted in the alternator's terminal box. The unit does not include moving parts; therefore it is able to operate in highly vibrating environments.

The device measures phase-to-neutral or phase-to-phase voltage of the alternator and adjusts the DC voltage applied to the excitation winding until reaching the desired voltage.

The unit offers low-frequency protection feature. A frequency measuring circuit continually monitors the generator output and provides output for low-frequency protection of the excitation system, by reducing the output voltage proportionally with frequency below a manually adjustable threshold. The nominal frequency can easily be changed to 50 or 60Hz in the field by push-on link selection.

Sensing loss protection circuit terminates the excitation and protects the windings if there is no voltage on the sensing input.

The excitation power is derived directly from the generator terminals. The required minimum residual voltage for build up is 4V,AC.

The output stage of the device is a half-wave thyristor output associated with a free-wheeling diode.

Basically the unit is compatible with all brushless type alternators. A stability adjustment potentiometer is also provided for this purpose.

A $\pm 3V$ analog input is provided allowing external voltage adjustment.

The AVR has the facility for droop CT connection to allow parallel running with other similarly equipped generators.

An overload protection circuit limits the output current to its nominal value. This prevents a device failure under overload or short circuit conditions.



FEATURES

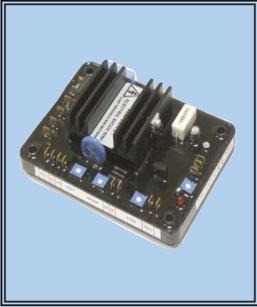
- ❑ Universal operation
- ❑ Half-Wave thyristor output
- ❑ Designed for highly vibrating environments
- ❑ Built-in voltage adjustment
- ❑ Stability adjustment
- ❑ Compatible with various types of alternators
- ❑ External trimmer voltage adjustment input
- ❑ Analog voltage adjustment input
- ❑ Droop input for parallel running
- ❑ Sensing input provides phase-phase or phase-neutral control
- ❑ Compatible for 50 and 60Hz
- ❑ Low frequency protection
- ❑ Exciter over current protection
- ❑ High temperature protection
- ❑ Sensing loss protection
- ❑ Optional adjustable overload limit



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Alternator Voltage Regulator



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INSTALLATION

WARNING: The unit is designed only for installation within other equipment by professional installers.

WARNING: To avoid risk of shock, do not touch terminals and Heatsink which may have hazardous voltage.

VOLTAGE ADJUSTMENT

The generator output voltage is set at the factory, but can be altered using the VOLT potentiometer or by an external trimmer (if fitted). Terminals T1 and T2 on the AVR will be linked together if no external trimmer is used.

WARNING: Do not increase the voltage above the rated generator voltage.

WARNING: Do not ground any of the trimmer terminals as these could be above earth potential.

If voltage adjustment is required, proceed as follows:

1. Before running generator, turn the VOLT control fully counter-clockwise.
2. Turn external hand trimmer (if fitted) to the midway position.
3. Turn STABILITY control to midway position.
4. Connect a suitable voltmeter (0-300V,AC) across line to neutral of the generator.
5. Start the genset, and run on no load at nominal frequency (e.g. 50-53Hz or 60-63Hz.)
6. If the red LED turns on, refer to the Low Frequency adjustment.
7. Carefully turn VOLT control clockwise until rated voltage is reached.
8. If instability is present at rated voltage, refer to stability adjustment, then re-adjust voltage if necessary.
9. Voltage adjustment is now completed.

STABILITY ADJUSTMENT

The stability potentiometer adjusts the reaction speed of the device. This helps the unit to comply with various alternators.

The correct setting can be found by running the generator at no load and slowly turning

the stability control counter-clockwise until the generator voltage starts to become unstable.

The optimum or critically damped position is slightly clockwise from this point.

The stability selection 'jumper' should be correctly linked, A-B, B-C or A-C at the bottom of the board for the frame size of the generator.

LOW FREQUENCY PROTECTION ADJUSTMENT

The low frequency protection circuit shuts off the excitation voltage in order to prevent damage during engine stopping under load. The factory set value for the protection is 45Hz. Turning the FREQ potentiometer counter-clockwise increases the set value. The red LED indicates that the Under-Frequency-Protection is active.

DROOP ADJUSTMENT

Generators intended for parallel operation are fitted with a quadrature droop Current Transformer (CT). The CT is connected to S1, S2 terminals on the AVR. The DROOP adjustment is normally preset in the factory to give a maximum 7% voltage droop at full load. Turning the DROOP potentiometer counter-clockwise decreases the droop voltage.

ANALOG ADJUSTMENT

An analog input (A1 A2) is provided to connect devices which have analog AVR control output. The input is designed to accept DC signals up to ± 3 volts.

WARNING: Any devices connected to this input must be fully floating and galvanically isolated from ground with an insulation capability of 500V,AC. Failure to observe this could result in equipment damage.

The DC signal applied to this input adds to the AVR sensing circuit. A1 is connected to the AVR ground. Positive on A2 increases excitation. Negative on A2 decreases excitation.

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TECHNICAL SPECIFICATIONS

INPUTS AND OUTPUTS	
SENSING INPUT	
	90-150V,AC (L-N) (see Connection diagram)
	50-60Hz nominal
POWER INPUT	
	90-150V,AC (L-N)
FREQUENCY	50/60Hz
OUTPUT	
	Max 90V,DC at 207V,AC input
	Continuous: 8A,DC Intermittent: 10A for 10 sec.
PROTECTIONS AND PARAMETERS	
REGULATION	±1.5% (see Note 1)
MINIMUM FIELD RESISTANCE	13 ohms
THERMAL DRIFT	0.03% per °C change in AVR ambient (see Note 2)
TYPICAL SYSTEM RESPONSE	AVR Response: 20ms
SOFT START	2 seconds
EXTERNAL VOLTAGE ADJUSTMENT	±10% with 2k ohm 1 watt trimmer
UNDER FREQUENCY PROTECTION	42-50Hz or 52-60Hz (adjustable)
UNIT POWER DISSIPATION	18 watts maximum
BUILD UP VOLTAGE	4V,AC at AVR terminals
ANALOG INPUT	±10% with ±3V,DC (see Note 3)
QUADRATURE DROOP INPUT	Max. Input: 5A Max. Droop: 7% (adjustable)
ENVIRONMENTAL	
OPERATING TEMP	-4°F to 158°F (-20°C to 70°C)
STORAGE TEMP	-22°F to 176°F (-30°C to 80°C)
MAX. HUMIDITY	95% non-condensing
DIMENSIONS	5.24" (133mm) L x 3.86" (98mm) W
FIXING CENTERS	4.49" (114mm) L x 3.11" (79mm) W
WEIGHT	0.55 lbs (250 grams)

NOTES

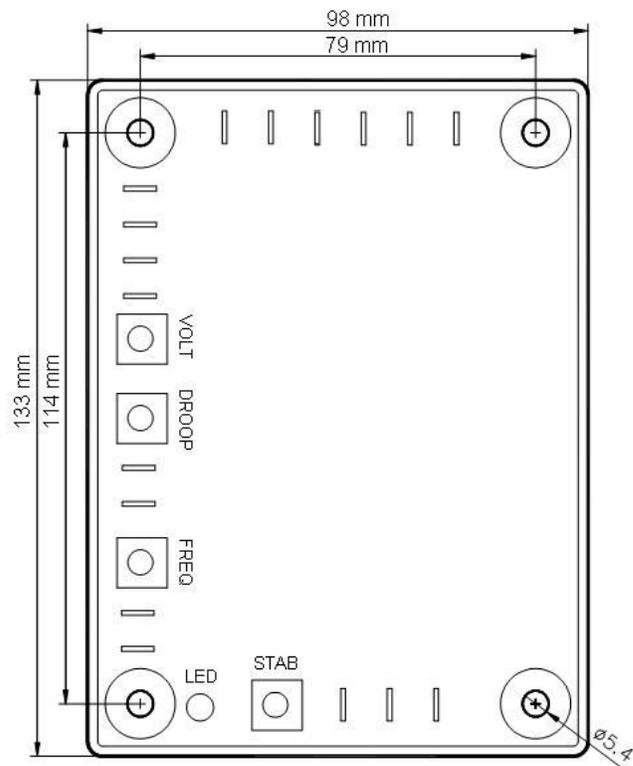
1. With 4% engine governing.
2. Heated up to 70°C
3. Any device connected to the analog input must be fully floating (galvanically isolated from ground), with an insulated strength of 500V,AC.

MINIMUM FIELD RESISTANCE

CONTINUOUS					
Sensing Voltage	277	240	208	139	120
ms	17.31	15.00	13.00	8.69	7.50
STARTUP (5 second limit)					
Sensing Voltage	277	240	208	139	120
ms	8.66	7.50	6.50	4.34	3.75

The rated minimum residual voltage for the AVR series is 5V.

MECHANICAL DRAWING



WIRING

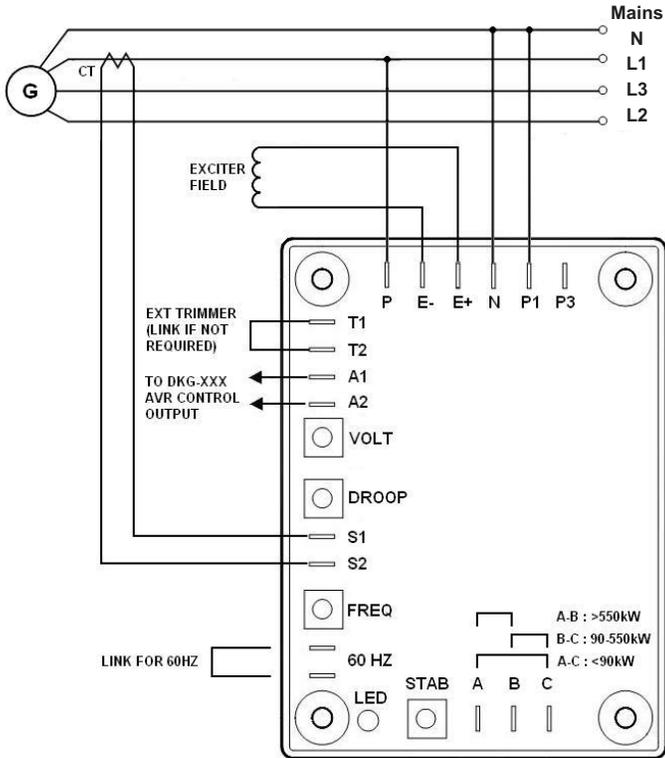
1	P: Alternator phase input
2	N: Alternator neutral input
3	P1, P3: Voltage sensing inputs (Please refer to Connection diagrams on next page)
4	T1, T2: External trimmer terminals. Link if not required.
5	E+, E-: Excitation winding connections
6	S1, S2: Droop CT input terminals
7	A1, A2: Analog controller input
8	60Hz: Link for 60Hz usage
9	A, B, C: Link A-C for under 90KW Link B-C for 90 ~ 550KW Link A-B for over 550KW

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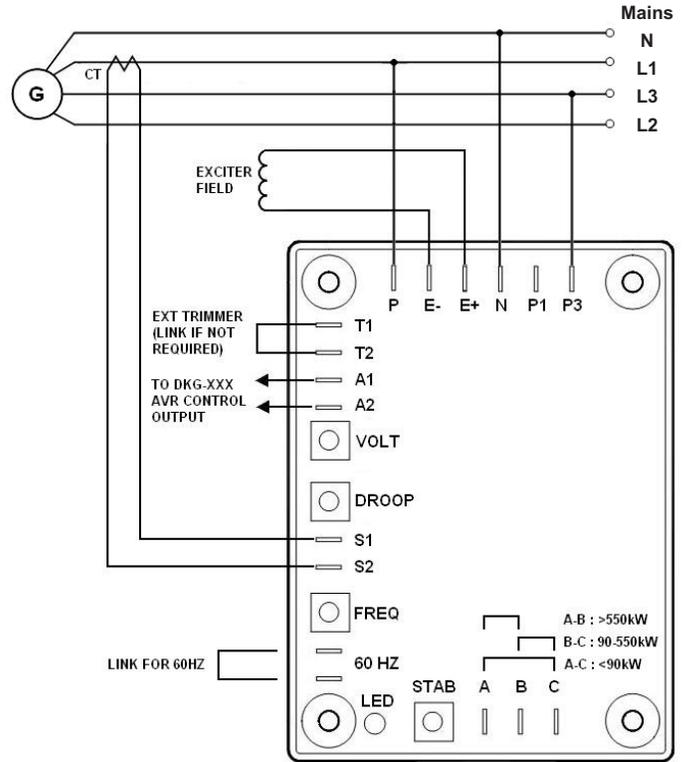
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CONNECTION DIAGRAMS

PHASE-NEUTRAL SENSING



PHASE-PHASE SENSING



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