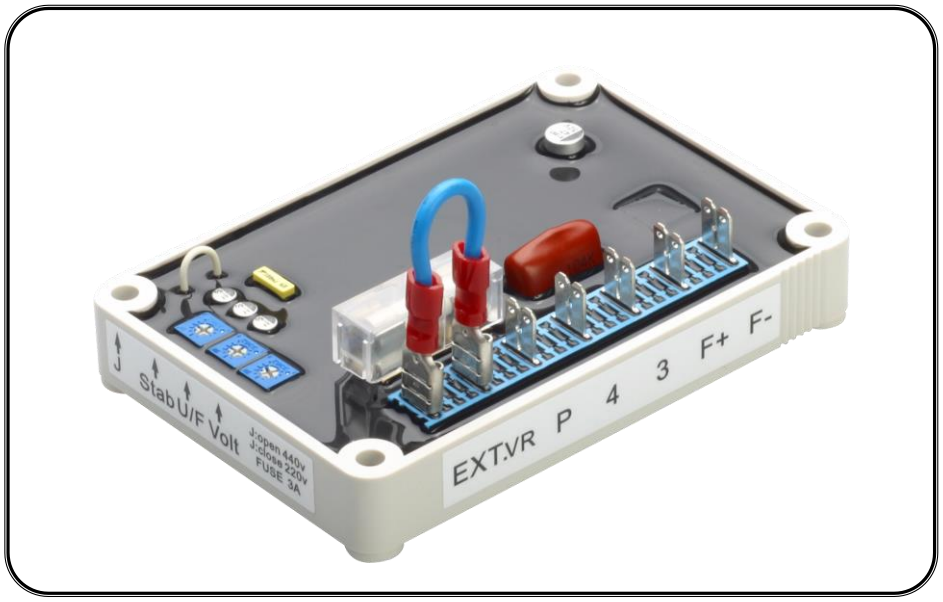
EA63-2.5S

Generator Automatic Voltage Regulator
Operation Manual



Self Excited Automatic Voltage Regulator
220 / 480 Vac
Use with Kutai EP200 Paralleling Module for parallel operation

* All manufacturer names and numbers are used for reference purpose only and do not imply that any part is the product of these manufacturer.

KUTAI

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ISO 9001
ETC

SECTION 1 : SPECIFICATION

Sensing Input

Voltage	165 – 260 Vac @ 220 Vac
	320 – 530 Vac @ 400 Vac
Frequency	50/60 Hz

Power Input

Voltage	120 – 260 Vac, 1 phase

Excitation Output

Voltage	Max. 32 Vdc @ power input 120 Vac
	Max. 63 Vdc @ power input 220 Vac
Current	Continuous 2.5A
	Intermittent 4A for 60 secs.
Resistance	Min. 25 ohms
Fuse Spec.	Slow blow 5 x 20mm S505-3.15A / 250V

External Voltage Adjustment

Max. +/- 15% @ 5K ohms 1 watt potentiometer

Voltage Regulation

Less than +/- 1% (with 4% engine governing)

Build Up Voltage

5 Vac residual volts at power input terminal

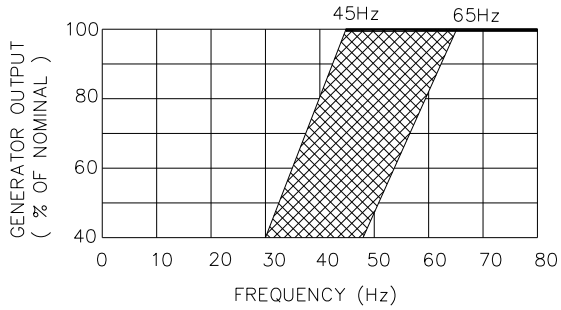

Figure 1 Typical Frequency Compensation Curves

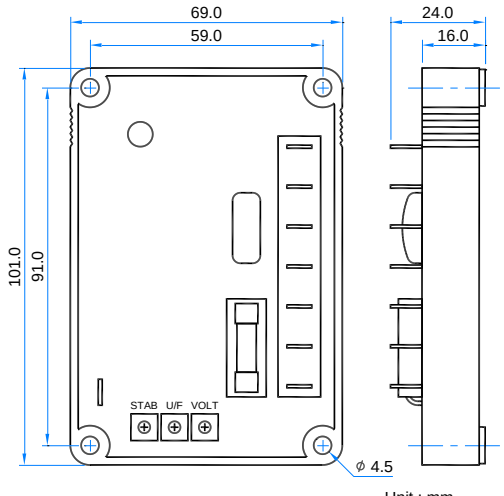

Figure 2 Outline Diagram

EMI Suppression

Internal electromagnetic interference filtering

Static Power Dissipation

Max.10 watts

Under Frequency Protection (Factory Presets)

Knee point adjustable range 45 – 55 Hz

Voltage Thermal Drift

Less than 3% at temperature range -40 to +70 ˚C

Environment

Operation Temperature	-40 to +60 ˚C
Storage Temperature	-40 to +85 ˚C
Relative Humidity	Max. 95%
Vibration	1.5 Gs @ 5 – 30 Hz
	5.0 Gs @ 30 – 500 Hz

Dimensions

101.0 (L) x 69.0 (W) x 24.0 (H) mm

Weight

107 g +/- 2%

TYPICAL FREQUENCY COMPENSATION CURVES (See Figure 1)

1. When the frequency of the generator is lower than the factory setting, the rated phase voltage will decrease to protect the regulator or exciter because of over exciter current,
2. Factory Setting：47 Hz +/- 4%

ATTENTION

1. **AVR can be mounted directly on the engine, genset, switchgear, control panel, or any position that would effects operation. For mounting, please see Figure 2.**
2. **All voltage readings are to be taken with an average-reading voltmeter Meggers and high-potential test equipment must not be used. Use of such equipment could damage the AVR.**
3. **Terminal："Fast-On" terminals 6.35mm (1/4 inch).**
4. **Improper setting of under-frequency protection could cause the output voltage of the unit to drop or become unstable under with changes in load. Avoid making any changes to the U/F setting unless necessary.**

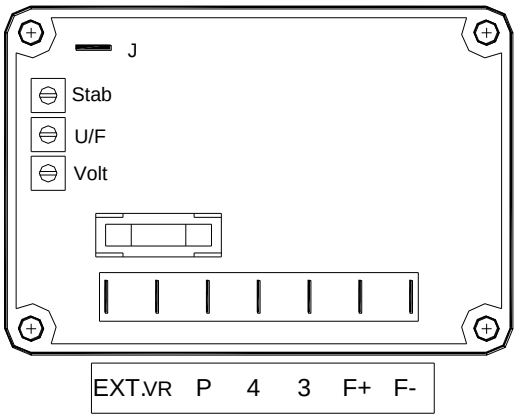

Figure 3 Potentiometer and Connector Locations

SECTION 2 : WIRING

2.1 Operation

2.1.1 F+, F- : Connect Exciter Field Power Circuit F+, F-

2.1.2 3, 4, P : Connect 3, 4 and 5 to the generator N, R, T

3, 4 : Power Input terminal

4, P : Sensing Input terminal (See Figure 5).

"J" jmper open sensing input 380 / 440 Vac

"J" jmper close sensing input 220 / 240 Vac

2.1.3 EXT.VR : Remove the jumper wire across terminals 6 and 7 and install a 5000 ohm rheostat. The two terminals must be by-pass when the external potentiometer is needless.

2.1.4 The corner frequency can be adjusted by the U/F ADJ rheostat on the AVR. Clockwise rotation results in raising the corner frequency.

(1) Adjust U/F Rheostat fully CCW.

(2) Start the generator and set at rated voltage.

(3) Adjust the generator frequency to the desired knee point frequency.

(4) Slowly adjust the U/F ADJ rheostat clockwise (CW) until the generator voltage just begins to decrease.

(5) 「Stability Adjustment」 clockwise slowly to change the feedback time between AVR and the generator. If the adjustment is too big, it might cause the voltage instable. If too small, the load voltage will change too much at heavy load.

(6) The suggestion is to trace by the multi-meter DCV. Adjust 「Stability Adjustment」 and try to make the multi-meter waving smaller. It can also improve the full load's voltage drift rate.

SECTION 3 : OPERATION PROCEDURE

Complete the following steps before proceeding with system start-up.

3.1 Preliminary Set-Up

3.1.1 Verify that the Regulator specifications conform to the requirements of the generator system.

3.1.2 Ensure the voltage regulator is correctly connected to the generator system.

3.1.3 Set the regulator 「VOLT ADJ」 and external 「VOLT ADJ」 as follow :

Regulator 「VOLT ADJ」 : Fully CCW

Remote 「VOLT ADJ」 : Centered

3.2 System Start-Up

3.2.1 Perform preliminary set-up as described in the above paragraphs.

3.2.2 Start prime mover and bring up to rated speed. Voltage should build up. If not, perform Field Flashing.

3.2.3 Slowly adjust the regulator VOLT ADJ CW until the generator output voltage reaches the normal value.

NOTE

If voltage does not build up to rated value, check generator for short or excessive load.

3.2.4 Ensure the regulator and the generator under normal operating conditions. The voltage regulation should less than +/- 1%. If the regulator is poor :

(1) The generator frequency is too slow that is less than the keen point of under frequency protection.

(2) The output wave of the generator is deformation.

(3) The ratio of capacity load is too high.

SECTION 4 : FIELD FLASHING

When the regulator is installed correctly but the generator is failed to generate power. Besides carbon brushes were worn out, here are two possible causes below.

4.1 The polarity of field is inverse

Solution : Exchange the connection of F+ and F-.

4.2 The residual voltage is less than 5 Vac, Solution 1 :

4.2.1 Shut down generator, disconnect the wiring between AVR and generator then flash the field. Flashing duration = 3 seconds. (See wiring in Figure 4)

Resistor 3 – 5 ohms for full wave AVR

Resistor 5 – 10 ohms for half wave AVR

Warning*!!* Over field flashing may damage the field winding of generator.

4.2.2 Restart generator and measure the residual voltage by AC Voltmeter, if it is still less than 5 Vac, repeat the previous process, after several times, the residual voltage still cannot be built, Kutai EB500 is strongly recommended, see Figure 4.

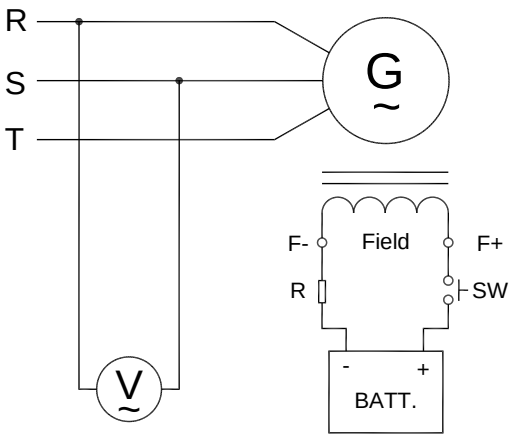

Figure 4 Manual Field Flash

4.3 Maintenance

Please regular maintain the regulator, keep the surface clean and avoid oil and mist adhering on the surface. All connectors, wires, and external potentiometer should be installed tightly and to prevent erosion.

WARNING

Overly field flashing may damage the AVR or generator excitation winding.

Please make sure you have read and understand the contents of the instruction manual prior to installation. Incorrect wiring connection may result in irreversible damage to the product and other equipments.

This Automatic Voltage Regulator is not equipped with loss-Sensing Protection function / Over Excitation Protection. An additional Over-Voltage Protection device for load may be required to avoid possible damage to the equipment or severe personal injury or death.

ATTENTION

The AVR reading AC voltage are all average value.

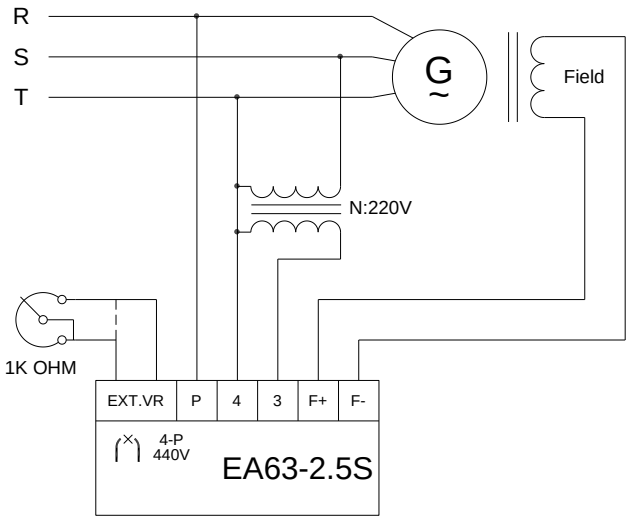

Figure 5 3Ø 3W 380 / 480 Vac

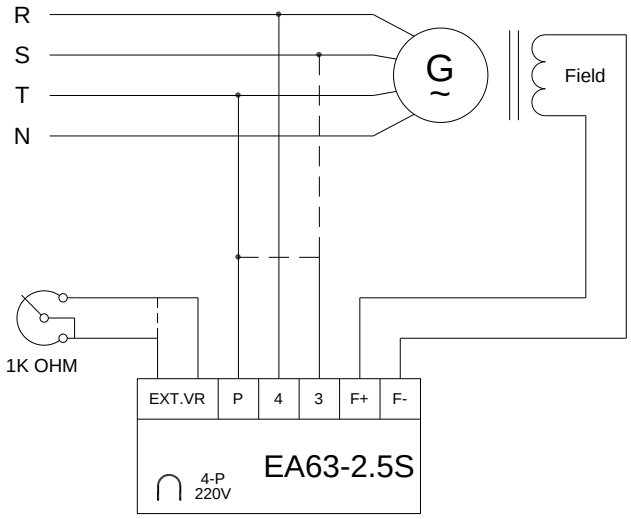

Figure 6 3Ø 3W 220 / 240 Vac

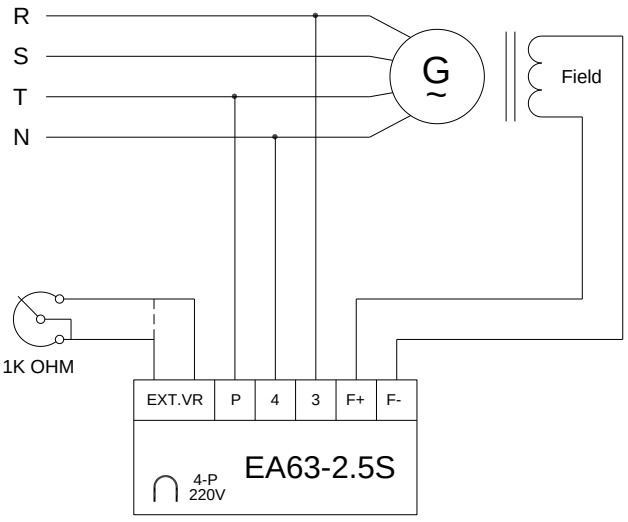

Figure 7 3Ø 4W 380 / 440 Vac

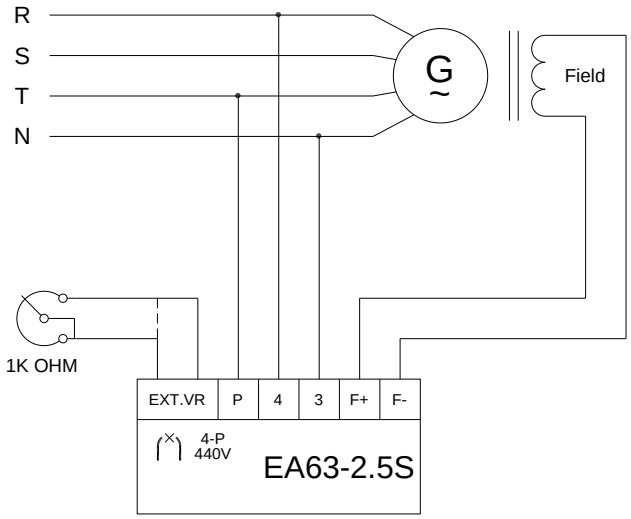

Figure 8 3Ø 4W 380 / 440 Vac

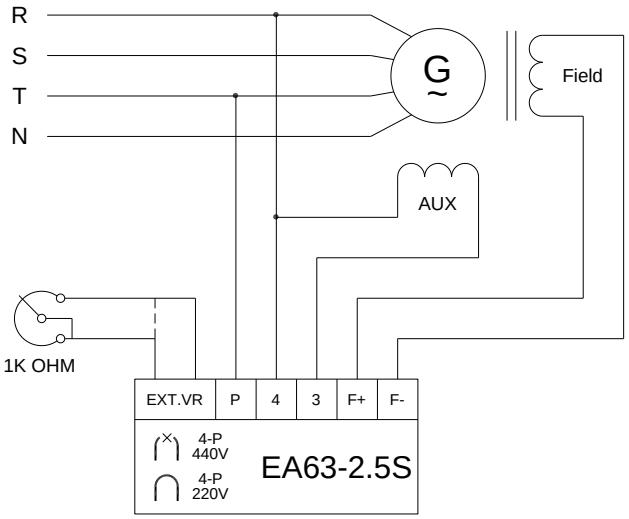

Figure 9 Auxiliary Winding (220 / 240 / 380 / 440 Vac)