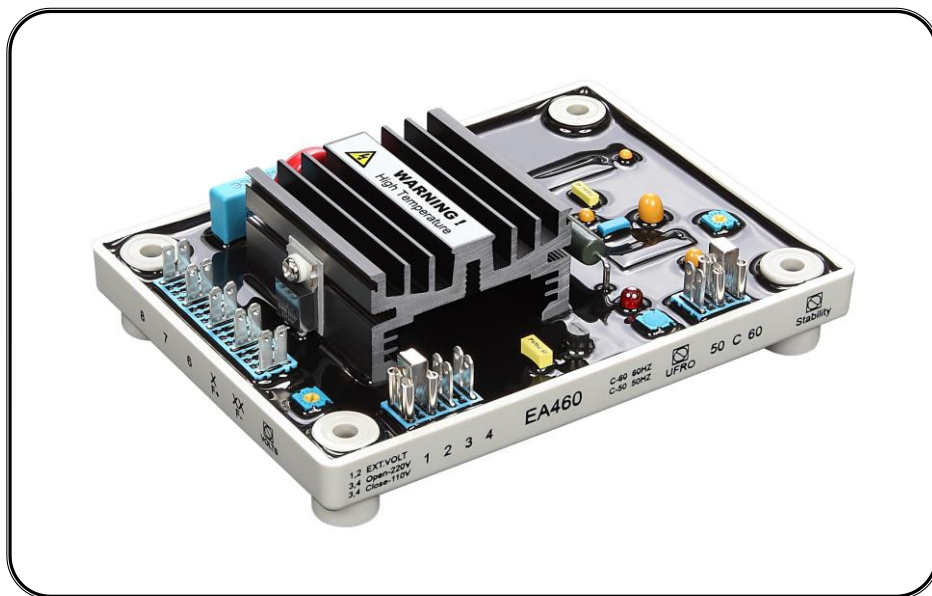


# EA460

## **Generator Automatic Voltage Regulator Operation Manual**



Self Excited Automatic Voltage Regulator  
Compatible with Newage SX460\*

\* Use for reference purpose only and do not imply that any part listed above is the product of the manufacturer.



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## SECTION 1 : SPECIFICATION

### Sensing Input

Voltage	95 – 132 Vac or 190 – 264 Vac 1 phase, jumper selectable
Frequency	50/60 Hz, selectable

### Excitation Output

Voltage	Max. 90 Vdc @ power input 207 Vac
Current	Continuous 4A Intermittent 6A for 10 secs.
Resistance	Min. 15 ohm

### External Voltage Adjustment

Max. +/- 7% @ 1K ohm 1 watt potentiometer

### Voltage Regulation

Less than +/- 1.5% ( with 4% engine governing )

### Build Up Voltage

5 Vac residual volts at power input terminal

### Soft Start Ramp Time

2 seconds +/- 10%

### Static Power Dissipation

Max.10 watts

### Under Frequency Protection

Set	point 95% Hz
Slope	170% down to 30 Hz

### Voltage Thermal Drift

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

### Environment

Operating Temperature	-40 to +70 °C
Storage Temperature	-40 to +85 °C
Relative Humidity	Max. 95%
Vibration	3 Gs @ 100 – 2K Hz

### Dimensions

135.0 (L) x 100.0 (W) x 45.0 (H) mm

### Weight

335 g +/- 2%

## SECTION 2 : WIRING (Refer to Figure 4)

- 2.1 Connect F1, F2 to DC output port.
- 2.2 Connect the sensing port at 7, 8 (the factory setup is 220V, if 110V is required, please join 3, 4)
- 2.3 External voltage regulator is as Figure 4.
- 2.4 Connect a jumper from COM to the 50 Hz terminal for 50 Hz operation.

### Note :

Please install 5A 250V fuse at power input port as Figure 4.

## SECTION 3 : NOTICE OF USE

- 3.1 See Figure 1
- 3.1.1 The connection and examination procedures must be executed by the profession engineers.
- 3.1.2 Place the EA460 inside of the generator, especially the moisture-proof and anticorrosive space.
- 3.2 Startup Procedure
- 3.2.1 The surface temperature pf the EA460 will be over 60 °C.
- 3.2.2 When operations, please do not touch the warning signal of the heat sink.

- 3.3 System Startup
- 3.3.1 Ensure all the wire of the regulator are correctly connected and the proper fuse (5A 250V) is installed.
- 3.3.2 Turn voltage potentiometer full anticlockwise ( lowest voltage level).
- 3.3.3 If used, turn external voltage potentiometer to the middle position.
- 3.3.4 Turn stability potentiometer full clockwise (highest stability level).
- 3.3.5 Connect a 110 Vdc meter across the field with proper polarity.
- 3.3.6 Connect a 300 Vac meter across line to neutral of generator.
- 3.3.7 Start and run the generator at no load and rated speed. The generator output voltage should build up to a minimum level if the voltage does not build up, It may cause by low residual voltage of generator. Refer to field flashing section in generator manual.
- 3.3.8 Slowly adjust voltage potentiometer until the generator voltage reach the proper value.

3.3.9 Turn the stability potentiometer clockwise until instability is shown, and then turn it anticlockwise slightly still both meter mention in (3.3.5) and (3.3.6) shown stable.

3.3.10 Interrupt regulator power for a short time (approximately 1 to 2 second). If the voltage still stable, the adjustment is now completed. Otherwise increase the stability slightly, repeat procedure (3.3.10) until stability is reached.

**SECTION 4 : ADJUSTMENTS**

**4.1 Frequency Roll-off Adjustment**

4.1.1 As using 50 Hz, please connect a jumper between Com and 50 Hz. As 60 Hz, between Com and 60 Hz.

4.1.2 To reset the frequency roll-off, proceed as follow :

- (1) Startup engine and build voltage.
- (2) Adjust the engine speedy down to low frequency.
- (3) Adjust the front panel U/F control until the output voltage low about 5V than nominal voltage. ( For 50Hz applications, the frequency “Roll-off” is factory preset to 45 Hz, for 60 Hz operation, the frequency is 55 Hz).

**4.2 Voltage Adjustment**

4.2.1 Adjust the front panel VOLT to vary the generator nominal voltage.

4.2.2 If used, a 1000 – 1500 ohm 1/2 watt potential meter may be connected to terminals VR and VR, refer to Figure 4.

**4.3 Stability Adjustment**

4.3.1 Adjust the front panel STAB control the system stable. Rotation of the front panel STAB control in the counter-clockwise (CCW) direction will speed response time. If rotated too for CCW, the generator voltage my oscillate (hunt).

**SECTION 5 : 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.

**5.1 The polarity of field is reversed**

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

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

5.2.1 Shut down generator, disconnect the wiring between AVR and generator then flash the field. Flashing duration = 3 seconds. (See wiring in Figure 6)

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.**

5.2.2 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 6.

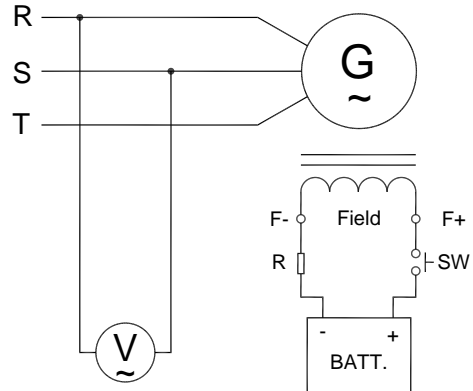


Figure 6 Manual Field Flash

**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.**

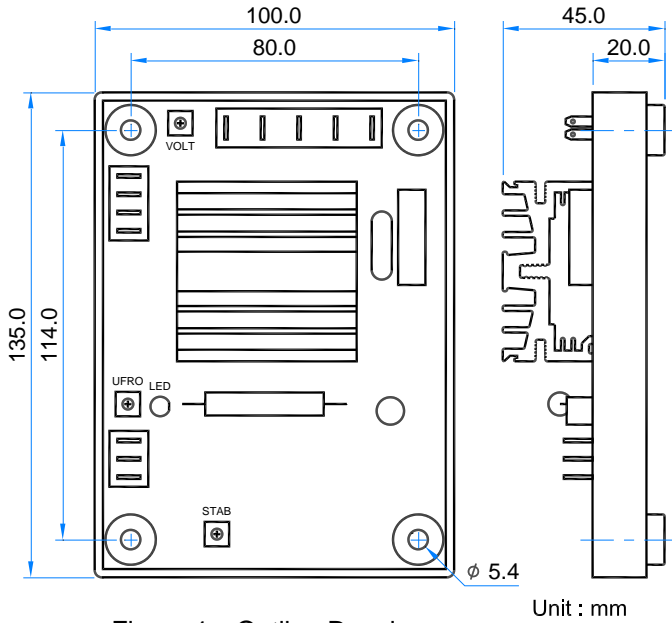
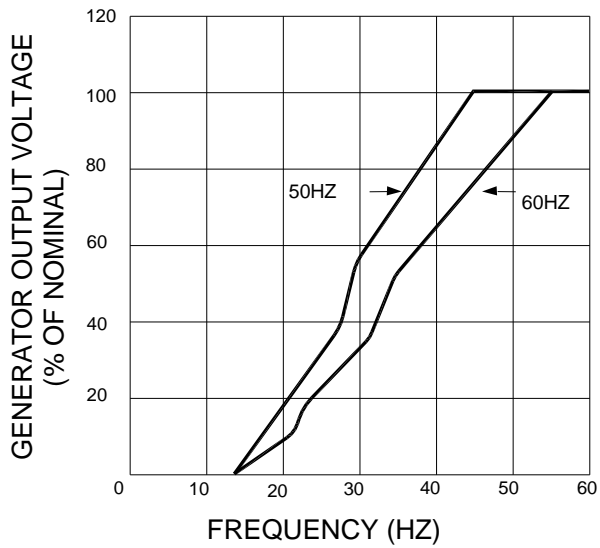


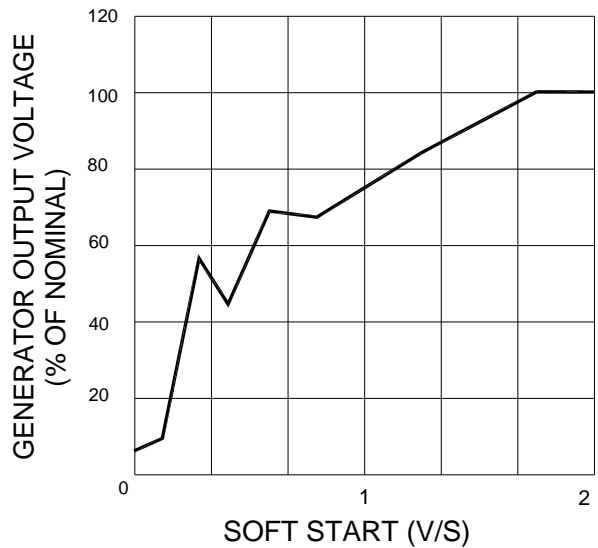
Figure 1 Outline Drawing

**ATTENTION**

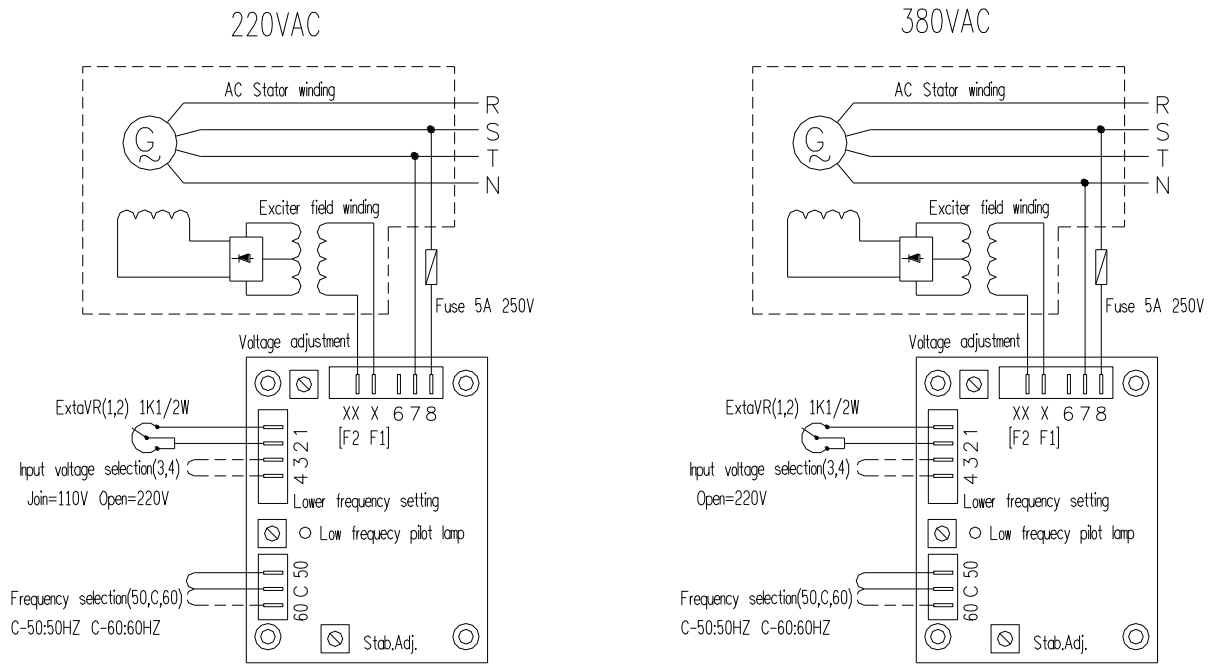
1. AVR can be mounted directly on the engine, genset, switchgear, control panel, or any position that will not affect operation. For dimension reference, please see Figure 1.
2. All voltage readings are to be taken with an average-reading voltmeter. Meggers and high-potential test equipment must not be used. Use of such equipment could damage the AVR.
3. 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.



Frequency Compensation Curves  
Figure 2



Soft Start Curve  
Figure 3



Wiring and adjustment  
Figure 4

**Note :**

1. When there is no connection to VR, 1 and 2 must be joined.
2. When LED lamp is light on, it means the frequency isn't enough ,The output voltage will decrease to prevent over load exciting current to damage the exciter field winding.

**SECTION 6 : TROUBLE SHOOTING**

SYMPTOM	POSSIBLE CAUSES	SOLUTIONS
Voltage does not build up	Residual voltage below 5 Vac	Flash generator field with proper method
	Incorrect wiring	Check wiring diagram for proper connection
	Power / sensing or field wires not connected	Connect the wires properly
	Generator not up to speed	Increase generator speed
Low output voltage	Poor adjustment is made	Read start procedure carefully and adjust again
	Frequency roll-off	Increase generator speed
	Incorrect voltage selection	Read user's manual to select correct voltage
Over output voltage	Poor adjustment is made	Read start procedure carefully and adjust again
	Incorrect voltage selection	Read user's manual to select correct voltage
Output voltage unstable (Hunting)	Poor adjustment is made	Read start procedure carefully and adjust again
	Field voltage requirement lower the rang of regulator	Connect appropriate resistors in series to increase total impedance

- ※ Use only the replacement fuses specified in this user manual.
- ※ Appearance and specifications of products are subject to change for improvement without prior notice.