

# VR460

## *Generator Automatic Voltage Regulator Operation Manual*



Automatic Voltage Regulator Replacement for Stamford SX460\*

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\*Used for reference purposes only - not a genuine Stamford product.

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## 1. INTRODUCTION

### Sensing Input

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

### Output

Voltage	Max. 90 VDC @ 207 VAC
Current	Continuous 4A Intermittent 10A for 10 sec.
Resistance	Min. 15 ohms

### Voltage Regulation

<  $\pm 1.5\%$  ( with 4% engine governing )

### Voltage Build-up

Residual voltage at AVR terminal > 5 VAC

### Thermal Drift

0.05% per  $^{\circ}\text{C}$  change in AVR ambient

### External Volts Adjustmen

$\pm 7\%$  with 1K ohm 1 watt trimmer

### Unit Power Dissipation

Max. 10 watt

### Under Frequency Protection

Set point 95% Hz

### ( UFRO )

Slope 170% down to 30 Hz

### Soft Start Ramp Time

2 sec.

### Dimensions

135mm L \* 100mm W \* 49mm H

### Weight

243g  $\pm 2\%$

## 2. WIRING (Refer to Fig 4)

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

### Note :

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

## 3. NOTICE OF USE

### 3.1 See figure 1

1. The connection and examination procedures must be executed by the profession engineers.
2. Place the VR460 inside of the generator, especially the moisture-proof and anticorrosive space.

### 3.2 Startup procedure

1. The surface temperature pf the VR460 will be over  $60^{\circ}\text{C}$ .

2. When operations, please do not touch the warning signal of the heat sink.

### 3.3 System Startup

1. Ensure all the wire of the regulator are correctly connected and the proper fuse (5A250V) is installed.
2. Turn voltage potentiometer full anticlockwise ( lowest voltage level).
3. If used, turn external voltage potentiometer to the middle position.
4. Turn stability potentiometer full clockwise (highest stability level).
5. Connect a 110VDC meter across the field with proper polarity.
6. Connect a 300VAC meter across line to neutral of generator.
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.
8. Slowly adjust voltage potentiometer until the generator voltage reach the proper value.

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9. Turn the stability potentiometer clockwise until instability is shown, and then turn it anticlockwise slightly until both meter mention in (5) and (6) shown stable.
  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 (10) until stability is reached.

## **4. ADJUSTMENTS**

### **4.1 Frequency roll-off adjustment**

- If using 50Hz, please connect a jumper between Com and 50Hz. As 60Hz, between Com and 60 Hz.
- To reset the frequency roll-off, proceed as follow:
  1. Startup engine and build voltage.
  2. Adjust the engine speed 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 45Hz, for 60Hz operation, the frequency is 55Hz).

### **4.2 VOLTAGE ADJUSTMENT**

1. Adjust the front panel VOLT to vary the generator nominal voltage.
2. If used, a 1000 ~ 1500 $\Omega$  1/2 watt potentiometer may be connected to terminals VR and VR, refer to Figure 4.

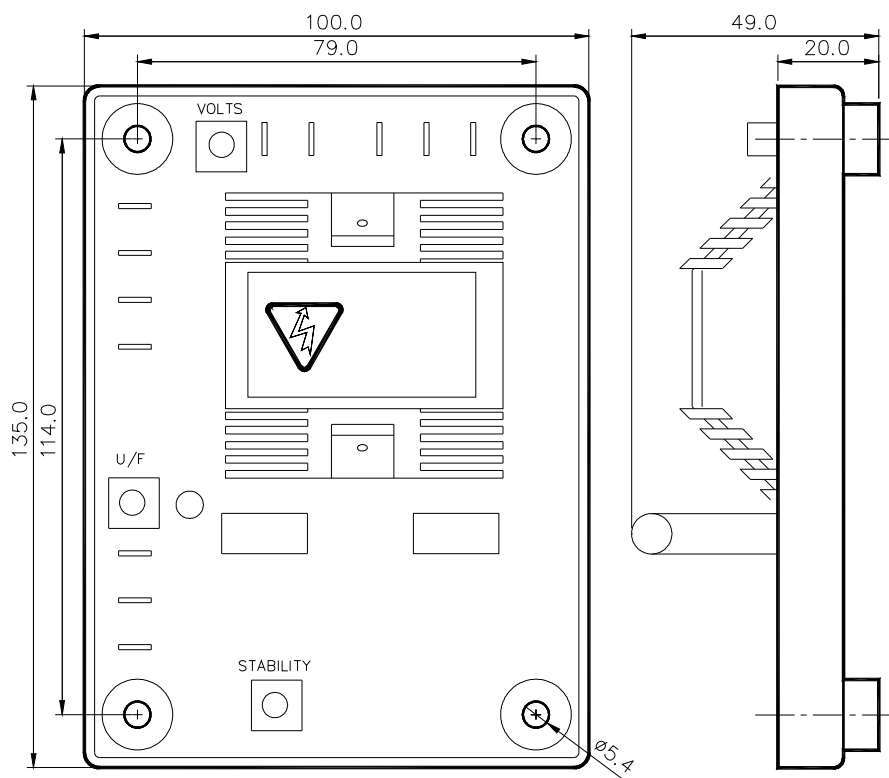
### **4.3 STABILITY ADJUSTMENT**

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 far CCW, the generator voltage may oscillate (hunt).
2. Rotated the front panel STAB control CCW until the system start oscillating and then rotate cw just past the point where oscillation occurred.

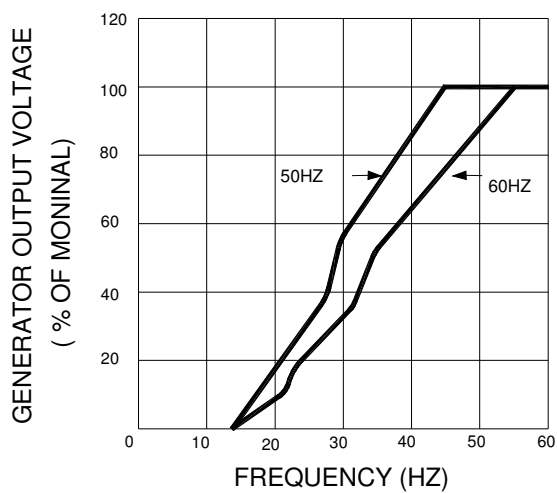
## **5. FIELD FLASHING**

When the regulator is operated with the generator for the first time, the polarity of residual magnetism may be reversed or too small to achieve the necessary build-up voltage for the regulator. If reversing the field connections does not induce build-up, and the residual voltage is less than the specified value of 5 Vac, shut down the Prime-mover and proceed with the following steps :

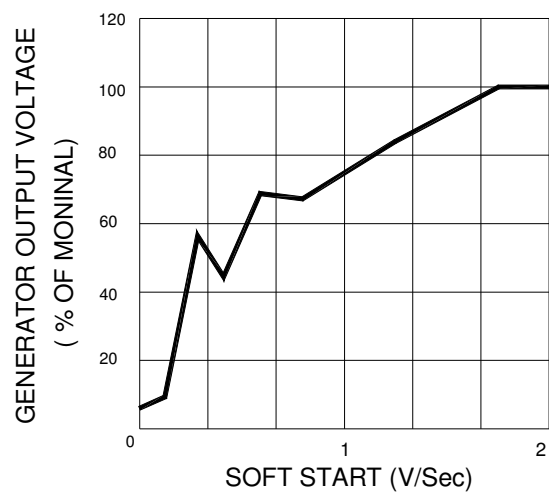
1. With the Prime-mover at rest and the regulator's field output wires disconnected, apply a DC source ( NOT grounded ) of not more than 12 Vdc with Positive to F+ and Negative to F-, in series with a current-limiting resistor of 3~5 ohms 20 watts.
2. Allow approximately 3 seconds before removing the DC source.
3. With the voltage regulator disconnected ( wires 3 and 4 ), start the prime mover and measure the "residual voltage" available at the AC output winding. If this voltage is greater than 5 Vac, reconnect voltage regulator, and voltage build-up should be successful. If less than 5 Vac is measured, repeat field flashing procedure.
4. If repeating steps a. and b. does not result in generator voltage build-up, and residual is greater than 5 Vac, replace voltage regulator.



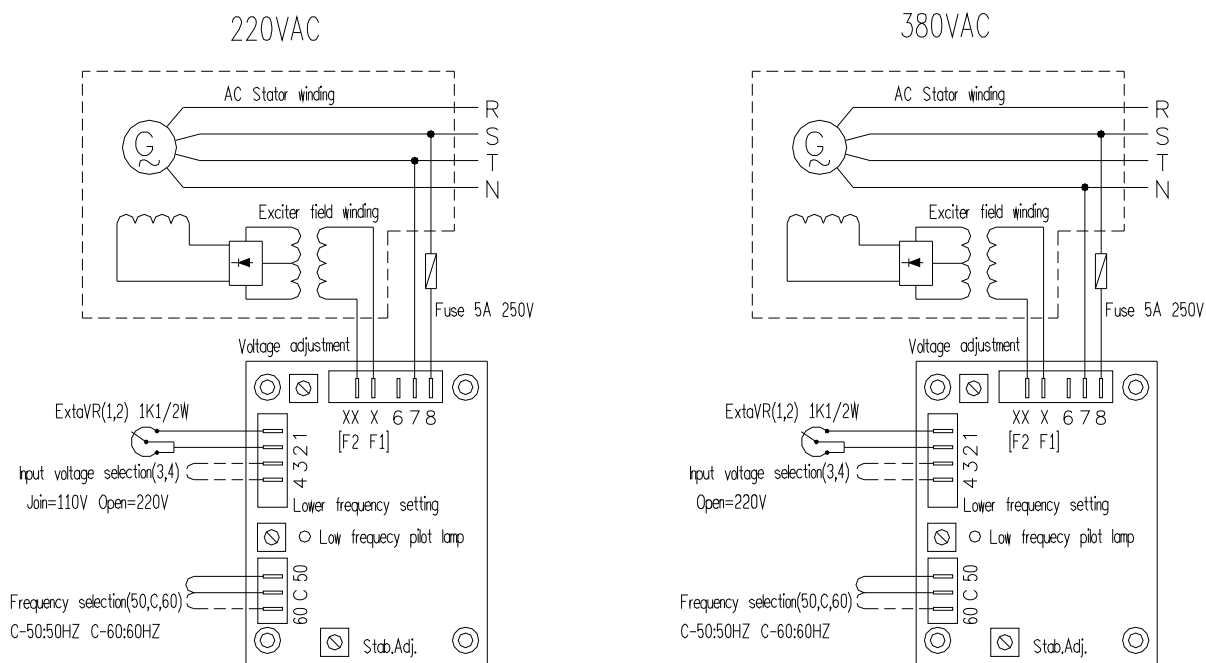
Outline Drawing  
Figure 1



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.

## 6. TROUBLE SHOOTING

SYMPTOM	CAUSE	CORRECTION
Voltage does not build up	Residual voltage below 5VAC	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
Output voltage low	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
Output voltage high	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	Poor adjustment is made	Read start procedure carefully and adjust again
	Field voltage requirement lower than the range of regulator	Contact your distributor to solve

P.S. Please use the fuse of the original generator if provided.