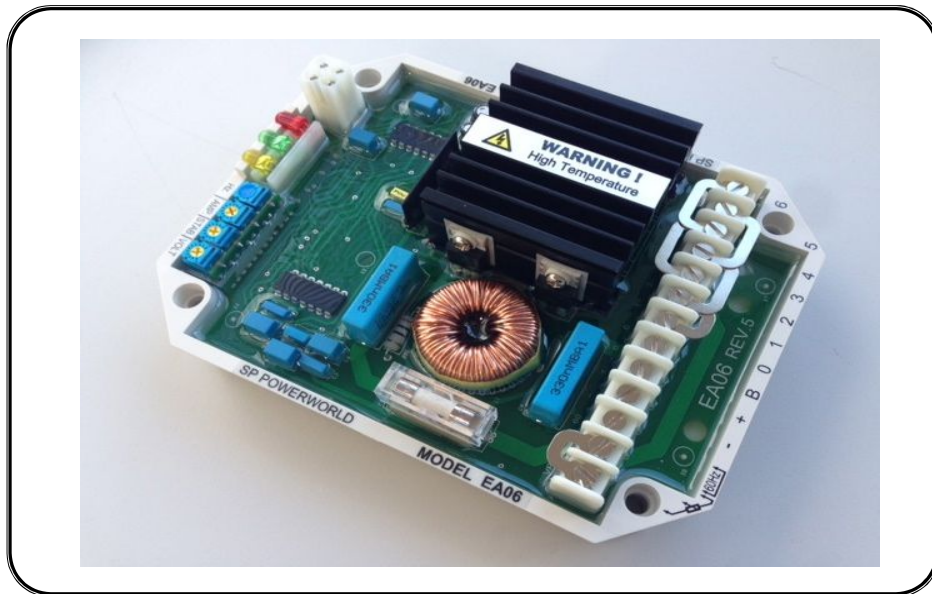


# EA06

## *Generator Automatic Voltage Regulator Operation Manual*



Suitable for use on single phase or three phase self excited brushless type generator.

Compatible replacement for Meccalte UVR-6 & SR7.

\* Not a genuine Meccalte product.



This component must be housed inside alternator terminal box and be fitted by a competent electrical engineer.

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## 1. SUMMARY

EA06A is equipped with 3 separate sensing inputs (1-2, 3-4, 5-6 terminals R.S.T phase), which can survey from single up to three phase voltages and check the average voltage from Y · YY or  $\Delta$  wiring accordingly to the generator requirement or user preference.

## 2. SPECIFICATION

### Sensing Input

Voltage Range 170~280VAC / 270~520VAC  
(Single phase or 3 phase selectable by wiring) 50/60 Hz

### Power Input + · 2

Voltage 50 ~ 280V 50/60 Hz

### Output + · -

Voltage Max. Output 63 VDC  
Current Continuous 6A  
Max. Intermittent 7A for 10 sec

### Exciter Field DC Resistance

10 ~ 100 Ohm

### Voltage Regulation

<  $\pm 1\%$  (with 4% engine governing)

### Voltage Build-up

Residual voltage at AVR terminal > 5 VAC, 25Hz

### External VR

100K ohm 1/2 watt  $\pm 5\%$

The AVR is equipped with adjustable under frequency protection and over voltage protection to prevent generator from overloading and over excitation.

The 3 LED each represents (Green) normal operation, (Red) under frequency and (Yellow) over excitation.

The built in EMS filter helps to prevent possible interference from the AVR to the generator.

### Over Excitation Protection

25 ~ 55VDC @ 0.1 ~ 20sec

### Under Frequency Protection

Adjustable range 42 ~ 62 Hz

### EMI Suppression

Internal electromagnetic interference filtering

### Unit Power Dissipation

Max. 5 watt

### Operating temperature

-40 ~ 65 °C

### Storage temperature

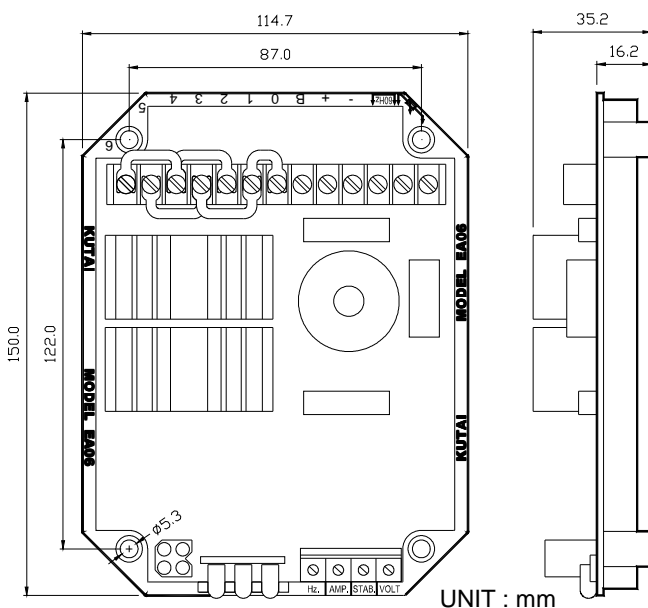
-40 ~ 80 °C

### Dimensions

150mm L \* 114.7mm W \* 35.2mm H

### Weight

520g  $\pm 2\%$



Outline and Drilling Diagram  
Figure 1

### Mechanical Specification

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 1.
2. Secure all wiring connection. Do not install AVR at a place with high vibrations to prevent loose connections. For safety do not touch the heat sink while in operating.
3. Fuse specification : 20mm 6.3A / 250V.

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### 3. WIRING / ADJUSTMENTS

#### 3.1 Field Excitation Wiring +, -

- Connect AVR “+” to generator excitation winding “+” and AVR “-” to generator excitation winding “-”.

**NOTE**

**Field Resistance most be between 10~ 100 Ohm.**

- If field resistance is less than 10 Ohm when generator is under full load and the field voltage is under the maximum output, please series a suitable wattage (W) resistor to have the overall field resistance to equal to 10~ 100 Ohm.

#### 3.2 Sensing / Power Input 「 1-2 、 3-4 、 5-6 」

- Total of 3 sets of independent sensing inputs, each input voltage equals to 220V (Center), can be series into Y or  $\Delta$  to connect to the generator output (3 Phases) for example R-T, S-T, R-T, or joint connected into a single phase sensing (See Figure 2 to 13).
- Terminal + 、 2 is the AVR power input, voltage range from 50 ~ 280V.

#### 3.3 Frequency Selection (60 Hz)

When the 2 terminals marked as 60Hz on the AVR is bridged, the system frequency is 60Hz. In the contrary, when bridge is removed the system frequency is 50Hz.

#### 3.4 External Voltage Adjustment VR

Connect a 100K Ohm 1/2W voltage rheostat at VR terminals to enable a  $\pm 5\%$  voltage adjustment from rated voltage.

\* The terminals must be bridged when the external voltage adjustment function is none required.

#### 3.5 Terminals B 、 0 can remain not connected

#### 3.6 Voltage Adjustment VOLT

User can adjust the generator voltage By rotating the “VOLT” potentiometer on the AVR. By rotating the potentiometer clockwise to increase voltage and decreasing when rotated counterclockwise. The voltage adjust rate is less than 1% when the power factor equals to 1 to 0.8 (PF 1 to 0.8) and frequency variation within 6%.

#### 3.7 STAB. Stability Adjustment

- Slowly and precise adjustment of “STAB” potentiometer can change the respond time between the AVR and generator. Inadequate adjustment will cause voltage instability and over adjusting will cause sudden overly voltage variation under heavy load.
- Analogue type multi voltmeter is suggested when adjusting the voltage stability. Adjust the “STAB” potentiometer until the pointer on the multi voltmeter is oscillating to its minimal.

#### 3.8 External Volt Adjustment

Please reference from 3.4 External Voltage Adjustment VR.

#### 3.9 Circuit Protection

- AMP. Over excitation protection (Overload protection)

Set the “AMP” Overload protection value (25 to 55VDC) according to the generator maximum excitation voltage. When over excitation occurs wait for 20 seconds then decrease the generator voltage to 30 to 50VAC. When the Over excitation protection is activated the yellow LED will illuminate, the higher the over excitation value is the shorter delay time it is. The generator will require stopping operation to reset.

- Hz. Under Frequency Protection Adjustment

Hz. Is used to set the under frequency protection knee point. When the generator frequency declines to setting point, the generator voltage will also decrease in the same time to prevent high excitation current from damaging the AVR or the exciter, adjustment procedure :

1. Start generator and let voltage build up.
2. Adjust engine frequency to the appropriate low frequency value.
3. Slowly adjust Hz. Potentiometer until the red LED illuminates.

### 4. OPERATION PROCEDURE

#### 4.1 Please confirm the follow condition before starting the generator :

- Starting Setting

1. Confirm if the AVR specification conforms to the system requirements ?
2. Confirm the AVR wiring ?

3. Confirm correct frequency selected ?
4. Confirm the generator rated voltage with the AVR sensing input ?
5. Adjust "VOLT" potentiometer fully counterclockwise?  
Adjust "STAB" potentiometer to the center position?  
Adjust "AMP" potentiometer fully clockwise?

## 4.2 Starting Generator

1. Reconfirm all setting and wiring.

### ATTENTION

**The AVR reading AC voltage are all average value.**

2. Start generator and adjust to rated frequency. The first measured voltage value should be under the rated voltage. If not, then reconfirm the start setting.
3. Slowly adjust "VOLT" potentiometer to the rated voltage, at this time the generator voltage may become unstable. Adjust the "STAB." potentiometer anticlockwise, until the oscillation stabilizes. Over adjustment may cause short oscillation when load applied or load type varies.

### SUGGESTION

**Adjust the "STAB." potentiometer to the point where the oscillation occurs and then adjust the potentiometer counterclockwise by 1/6 of rotation.**

4. If voltage can not be adjusted or to the rated value, please check to see if the generator frequency is too slow (Under frequency protection activated). If residual voltage is below 5VAC, then please execute field flashing to help build up the residual voltage.
5. Make sure the generator and AVR are both under normal operation conditions.
6. The voltage adjustable range should be  $\pm 1\%$  under no load or full load. If the adjustable range in not within such range, please check the below :
  - Generator under frequency (Lower than low frequency protection knee point).
  - Severely deformed generator output ware form.
  - Capacitive load over ratio (Power factor in lead).
  - Change the AVR and restart.

- Under over excitation voltage protection (Overload protection).

## 4.3 Field Flashing (See Figure 2)

When the regulator is operated with the generator for the first time, the polarity residual magnetism may not correct or the magnitude not enough. If the generator does not build-up after startup, shut down the prime mover and proceed with the following steps:

1. Stop generator operation, disconnect AVR + and – wirings then apply a DC source (Not grounded) of not more than 12VDC, to generator F+ (Positive) and F– (Negative) in series with a limiting resistor of 3 to 5 ohms 20 watt.
2. Allow approximately 3 seconds before removing the dc source.
3. Start generator and measure residual voltage at generator leads 1~6. If measured voltage is greater then 5VAC please carefully reconnect all AVR wirings. Please repeat field flashing procedure if less than 5VAC residual voltage is measured.
4. If residual voltage is greater than 5VAC, but AVR still unable to build up voltage, please replace with another AVR.

### WARNING

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

## 4.4 Maintenance

Regular maintenance to make sure the AVR surface is clean and free from oil or moisture. All connection terminals and wirings must be firmly tightened and no signs of visible oxidation or erosion.

### ATTENTION

**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.**

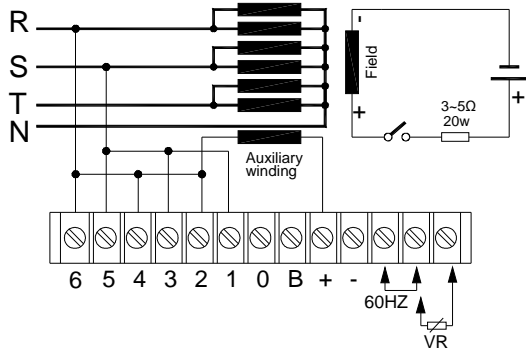


Figure 2 Field Flashing

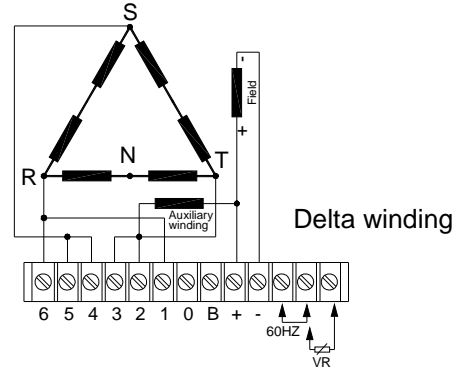


Figure 3 3Ø 120 / 240V With auxiliary winding

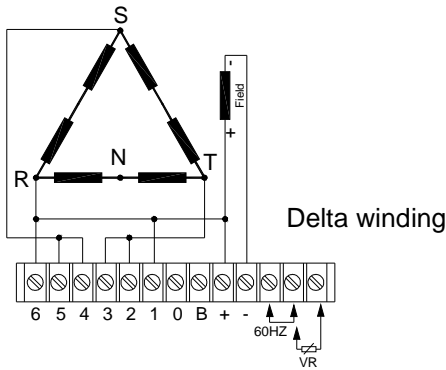


Figure 4 3Ø 220V

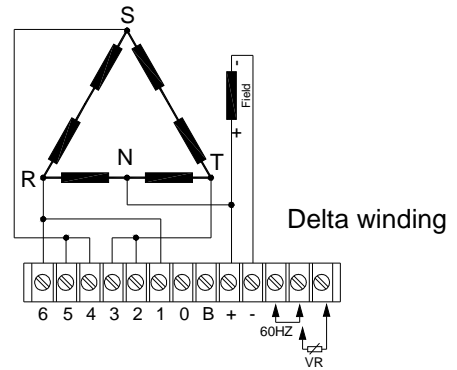


Figure 5 3Ø 220 / 440V

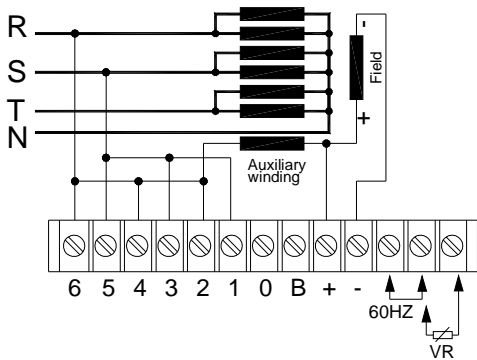


Figure 6 1Ø 220V With auxiliary winding

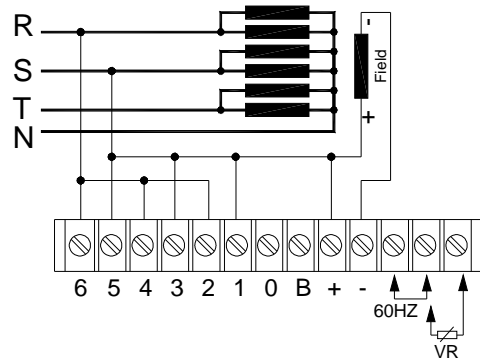


Figure 7 1Ø 220V

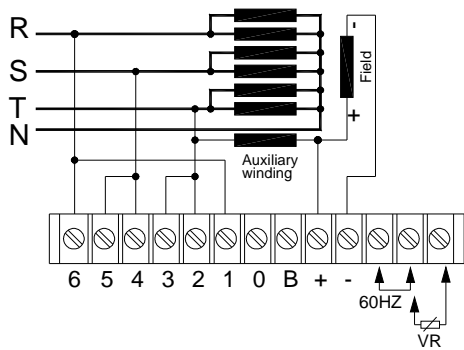


Figure 8 3Ø 220V With auxiliary winding

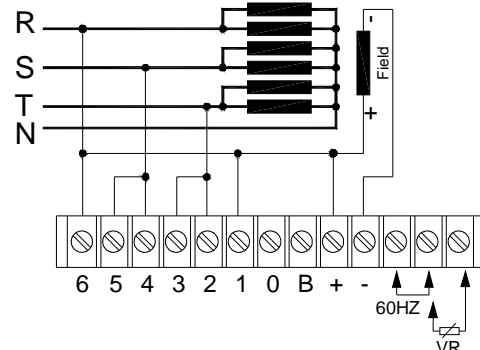


Figure 9 3Ø 220V

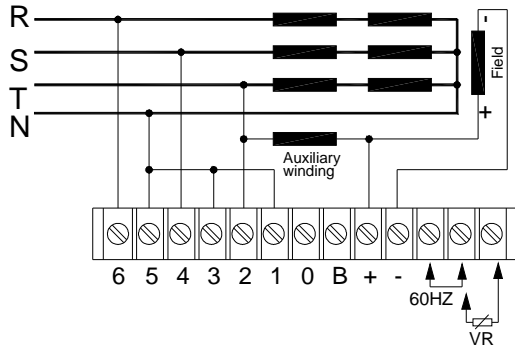


Figure 10 3Ø 380 / 480V With auxiliary winding

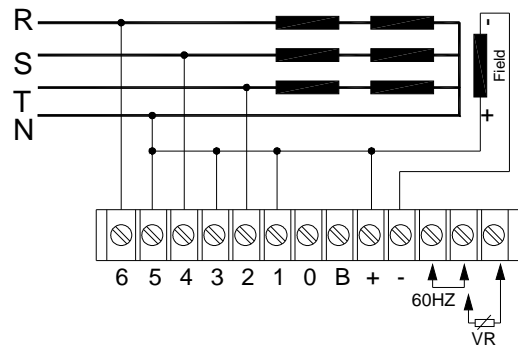


Figure 11 3Ø 380 / 480V

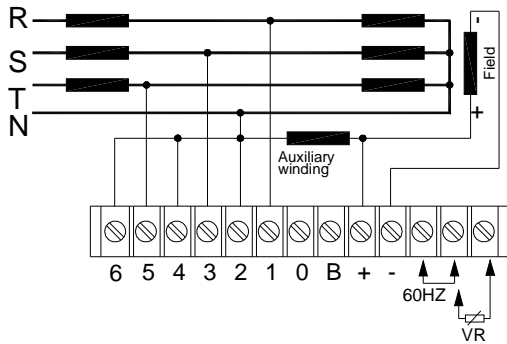


Figure 12 3Ø > 480V With auxiliary winding

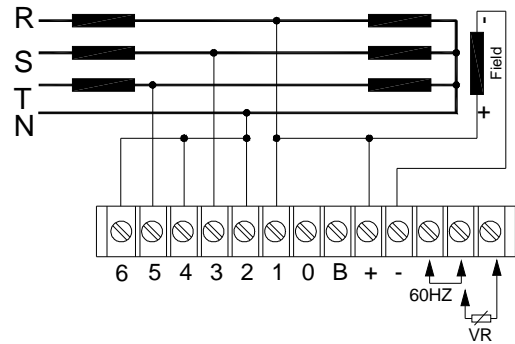


Figure 13 3Ø > 480V

## EA06 For Replacing Mec Calte SR7 Diagram

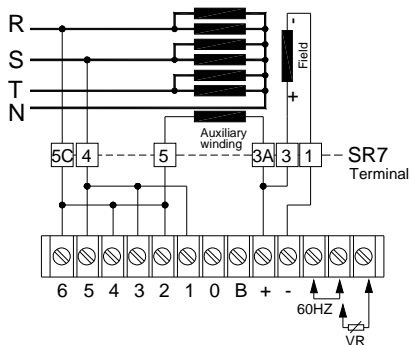


Figure 14 1Ø 220V With auxiliary winding

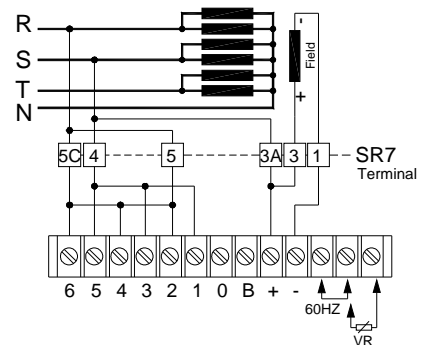


Figure 15 1Ø 220V

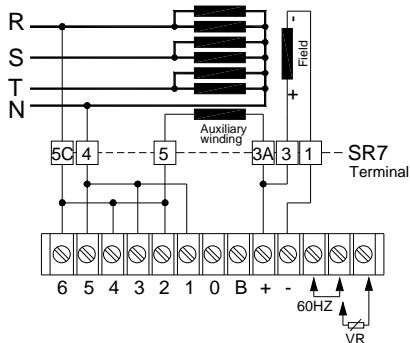


Figure 16 1Ø 380 / 480V With auxiliary winding

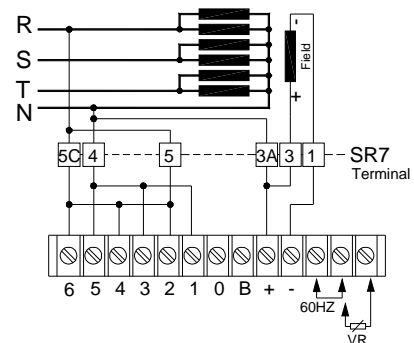


Figure 17 1Ø 380 / 480V

※ Use Only Original Supplied Protection Fuse.

※ Please accept our sincere apology if any modification in performance, specification or appearance is made without prior notice.