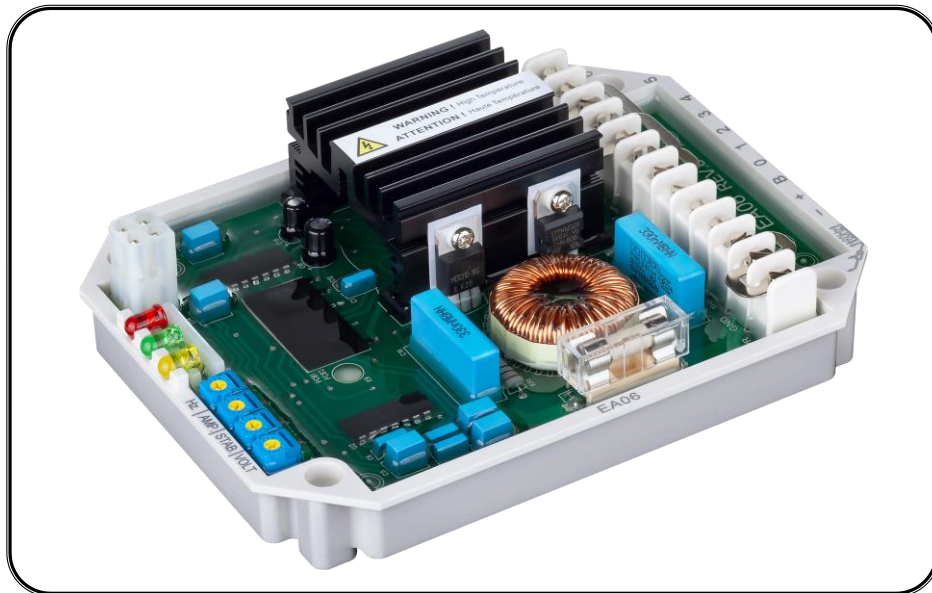


EA06

Generator Automatic Voltage Regulator Operation Manual



Suitable for Single or Three Phase Self Excited Brushless Generator
Compatible replacement for Mecc Alte UVR6

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

SECTION 1 : SUMMARY

EA06 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 Δ wiring accordingly to the generator requirement or user preference.

SECTION 2 : SPECIFICATION

Sensing Input (1-2, 3-4, 5-6)

Voltage 100 – 290 Vac / 270 – 520 Vac
1 or 3 phase, selectable by wiring
Frequency 50/60 Hz

Power Input (+, 2)

Voltage 50 – 280 Vac
Frequency 50/60 Hz

Excitation Output (+, -)

Voltage Max. 63 Vdc @power input 220 Vac
Current Continuous 6A
Intermittent 7A for 10 secs.
Resistance 10 – 100 ohms
Fuse Spec. Slow blow 5 x 20mm S505-6.3A / 250V

External Voltage Adjustment

Max. +/- 5% @ 100K ohms 1/2 watt potentiometer

Voltage Regulation

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

Build Up Voltage

5 Vac 25 Hz residual volts at power input terminal

Soft Start Ramp Time

4 seconds +/- 10%

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.

EMI Suppression

Internal electromagnetic interference filtering

Static Power Dissipation

Max.5 watts

Over Excitation Protection

25 – 55 Vdc @ 0.1 – 20 sec

Under-Frequency Knee Point Thermal Drift

Adjustable range 42 – 62 Hz

Voltage Thermal Drift

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

Environment

Operating Temperature -40 to +60 °C
Storage Temperature -40 to +80 °C
Relative Humidity Max. 95%
Vibration 1.5 Gs @ 5 – 30 Hz
5.0 Gs @ 30 – 500 Hz

Dimensions

150.0 (L) x 115.0 (W) x 41.0 (H) mm

Weight

440 g +/- 2%

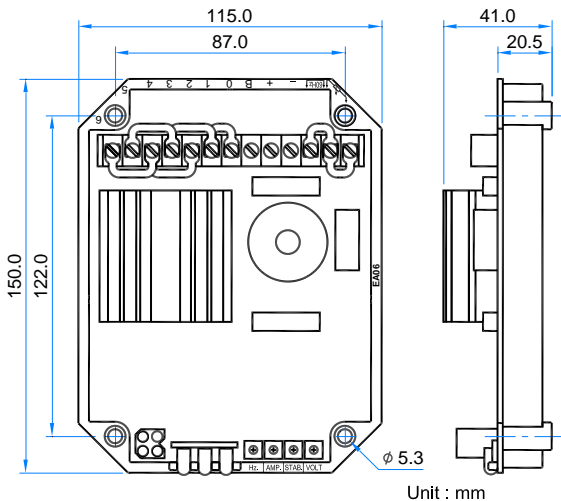


Figure 1 Outline Drawing

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. 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 operation.
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.

SECTION 3 : WIRING / ADJUSTMENTS

3.1 Field Excitation Wiring 「+ , -」

- 3.1.1 Connect AVR terminal 「+」 to field 「+」, connect AVR terminal 「-」 to the field 「-」.

<p style="text-align: center;">NOTE</p>
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<p>The Exciter field resistance is between 10 – 100 ohm.</p>

- 3.1.2 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」

- 3.2.1 Total of 3 sets of independent sensing inputs, each input voltage equals to 120 / 240V (Center), can be series into Y or Δ to connect to the generator output (3 Phases) for example R-T, T-S, S-R, or joint connected into a single phase sensing (See Figure 2 to 13).

- 3.2.2 Terminal +, 2 is the AVR power input, voltage range from 50 – 280V.

3.3 Frequency Selection (60 Hz)

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

3.4 External Voltage Adjustment VR

Connect a 100K Ohms 1/2W voltage rheostat at VR terminals to enable a +/- 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 VOLT. Voltage Adjustment

User can adjust the generator voltage by rotating the 「VOLT」 potentiometer on the AVR. Rotate the potentiometer clockwise to increase voltage and decreasing when rotate 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

- 3.7.1 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.

- 3.7.2 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 Circuit Protection

- 3.8.1 AMP. Over Excitation Protection Adjustment (Overload protection)

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

- 3.8.2 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 :

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.

SECTION 4 : OPERATION PROCEDURE

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

- 4.1.1 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?

4.1.2 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 5 Vac, 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 +/- 1% under no load or full load. If the adjustable range is not within such range, please check the below :
 - A. Generator under frequency (Lower than low frequency protection knee point).
 - B. Severely deformed generator output wave form.
 - C. Capacitive load over ratio (Power factor in lead).
 - D. Change the AVR and restart.
 - E. Under over excitation voltage protection (Overload protection).

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 inverse

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 2)
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 2.

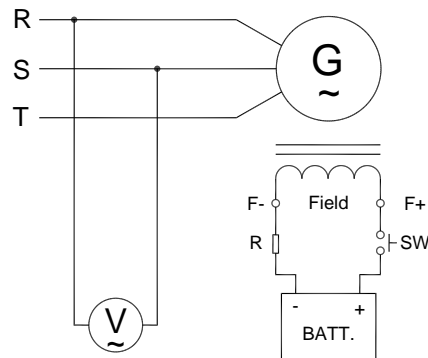


Figure 2 Manual Field Flash

5.3 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.

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.

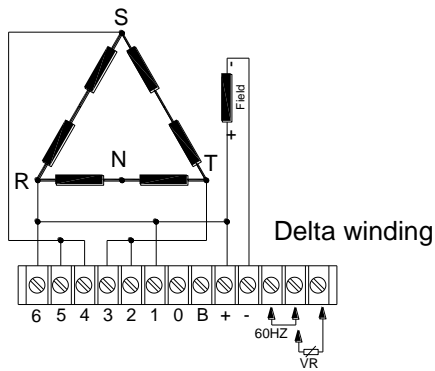


Figure 3 3 phase 120 / 240 Vac

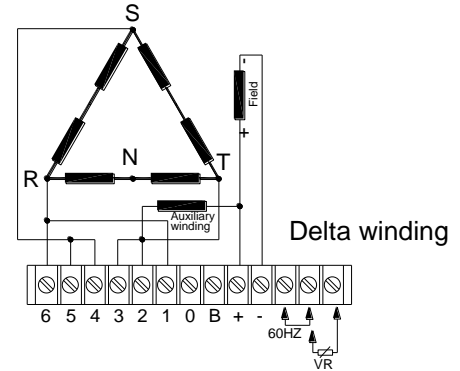


Figure 4 3 phase 120 / 240 Vac With auxiliary winding

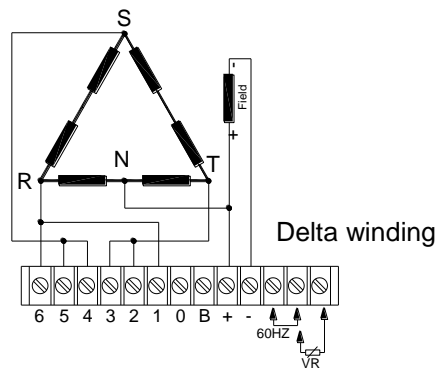


Figure 5 3 phase 240 / 277 Vac

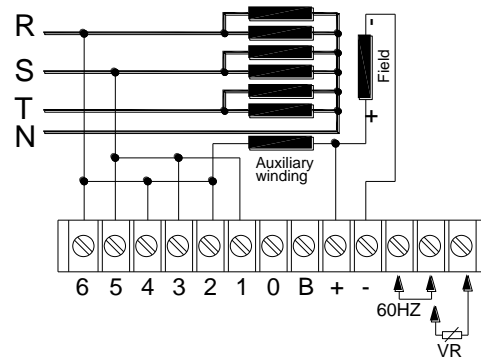


Figure 6 1 phase 120 / 240 Vac With auxiliary winding

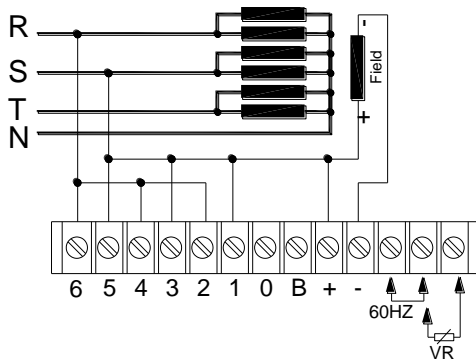


Figure 7 1 phase 120 / 240 Vac

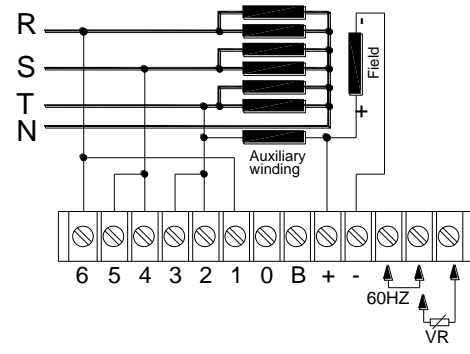


Figure 8 3 phase 120 / 240 Vac With auxiliary winding

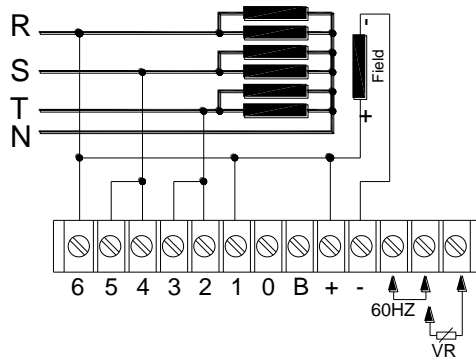


Figure 9 3 phase 120 / 240 Vac

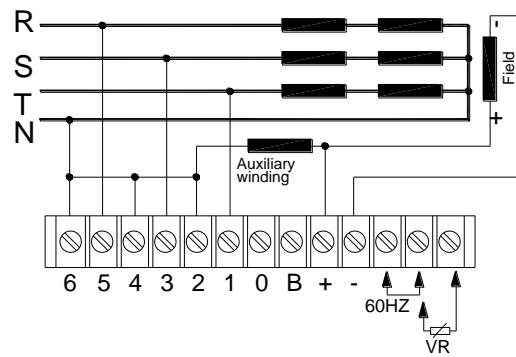


Figure 10 3 phase 380 / 480 Vac With auxiliary winding

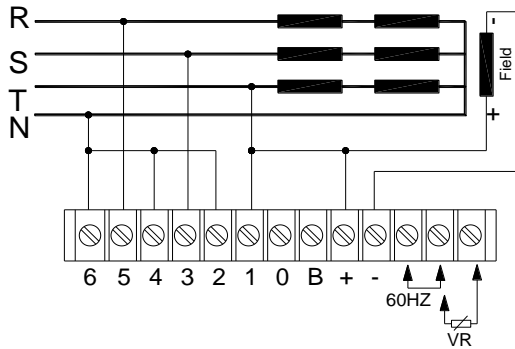


Figure 11 3 phase 380 / 480 Vac

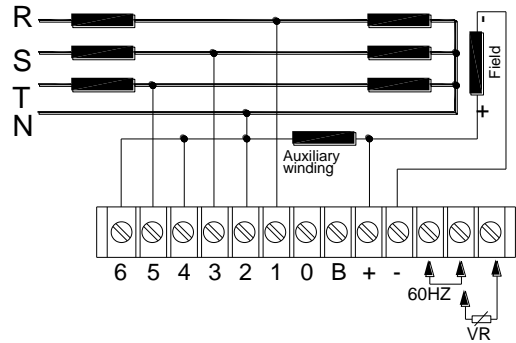


Figure 12 3 phase \geq 480 Vac With auxiliary winding

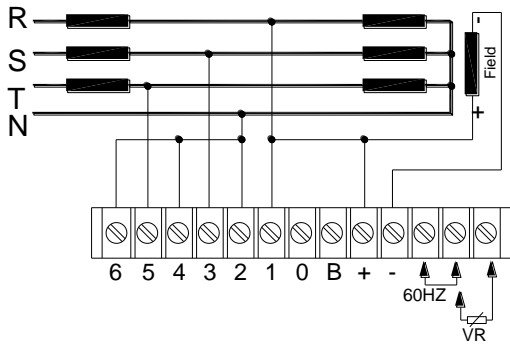


Figure 13 3 phase \geq 480 Vac

EA06 For Replacing Mec Calte SR7 Diagram

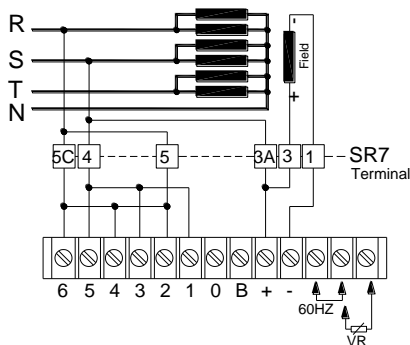


Figure 14 1 phase 120 / 240 Vac

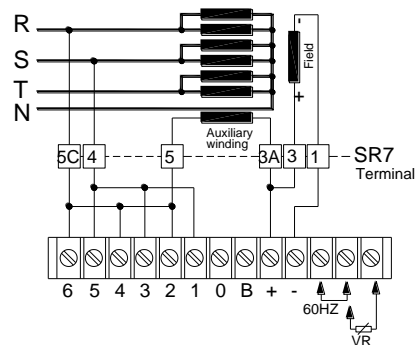


Figure 15 1 phase 120 / 240 Vac With auxiliary winding

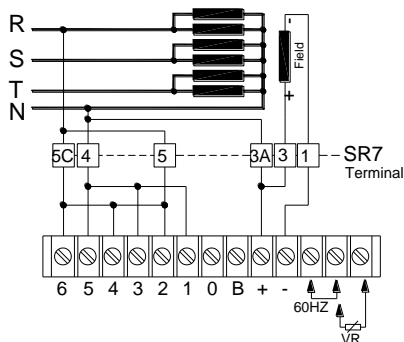


Figure 16 1 phase 380 / 480 Vac

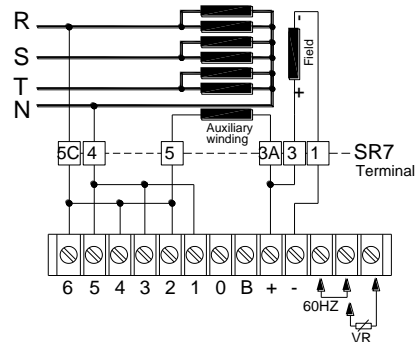


Figure 17 1 phase 380 / 480 Vac With auxiliary winding

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