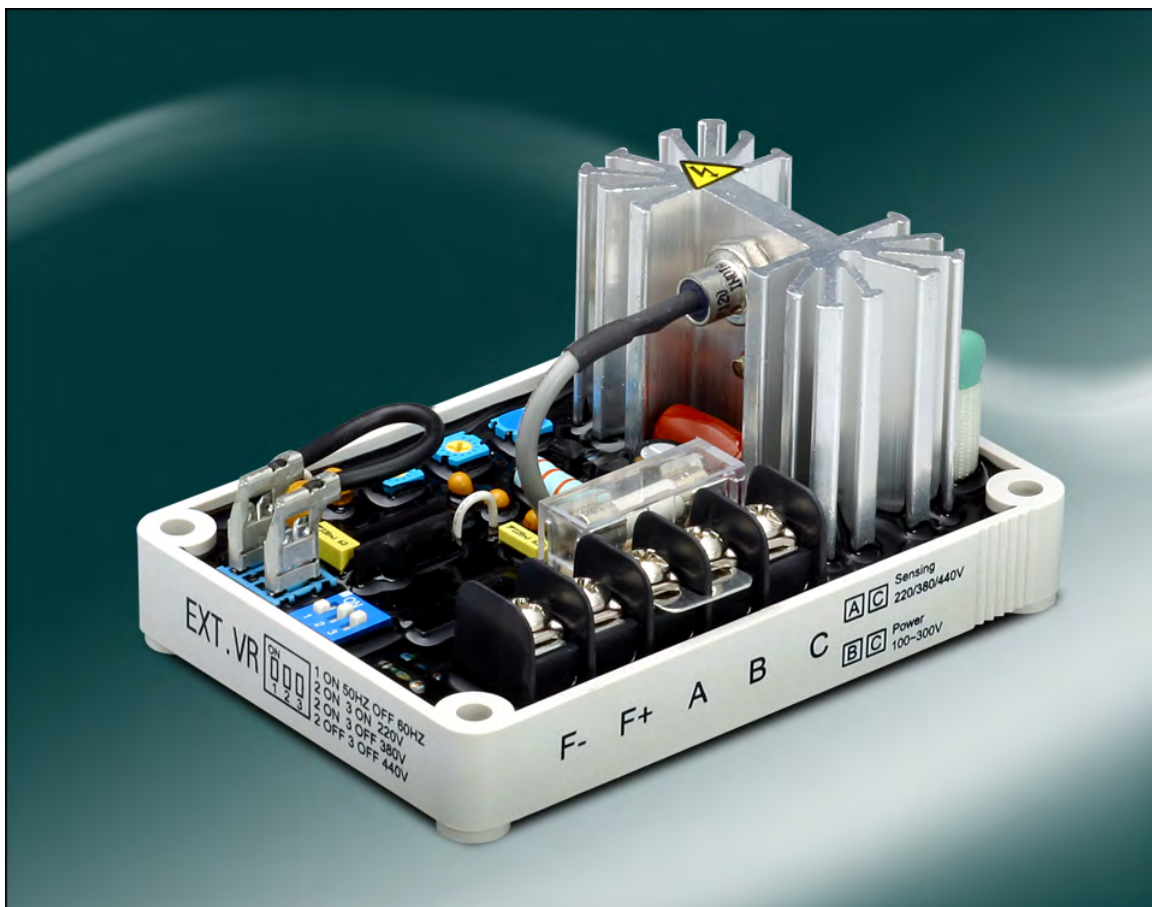


VR648-A

Universal AVR

Generator Automatic Voltage Regulator
Operation Manual



5 Amp Automatic Voltage Regulator for Generators

1. INTRODUCTION

Sensing Input

Voltage 220 / 380 / 440 VAC, 1 phase,
2 wire DIP switch selectable
Frequency 50/60 Hz, DIP switch selectable

Power Input

Voltage 100 ~ 300 VAC, 1 phase 2 wire
or Genset Auxiliary Winding

Output

Voltage Max. 63 VDC @ 220 VAC input
Max. 90 VDC @ 240 VAC input
Current Continuous 5A
Intermittent 7A for 10 sec
Resistance Min. 10 ohms Max. 100 ohms

Voltage Regulation

< ± 0.5% (with 4% engine governing)

Voltage Build-up

Residual voltage at AVR terminal > 5 VAC

Thermal Drift

0.03% per °C change in AVR ambient

External Volts Adjustment

7% with 1K ohm 1 watt trimmer

EMI Suppression

Internal electromagnetic interference filtering

Unit Power Dissipation

Max. 8 watt

Under Frequency Protection (Factory Setting)

60 Hz system presets knee point at 55 Hz
50 Hz system presets knee point at 45 Hz

Soft Start Ramp Time

3 sec.

Dimensions

101mm L * 69mm W * 47.5mm H

Weight

183g ± 2% (Approx. 6.5 oz.)

2. WIRING

In a standard AVR, when the generator has an unbalanced load, the NEUTRAL conducts the current from this unbalanced load, and the voltage from the N to the 3 phases constantly changes the sensing reference input voltage to the AVR making it hard to have a constant output voltage on the generator.

This model VR648 AVR corrects this problem by *sensing* directly from the output of the generator whether it is 208, 220, 380, or 480 volts.

1. When the rated voltage of the generator is 200-250VAC, the input terminals B&C and sensing terminals A&C are connected to the same generator phases (as in figure 3 factory setting), or can be connected independently as shown as figure 2.
2. When the voltage of the generator is 380-480V, the **power** input terminals B & C and **sensing** terminals A & C are connected separately (as shown in Figure 4 or figure 5). Power inputs B & C must never exceed 300 VAC.

3. F+, F- terminals connect to the generator field. (J and K)

4. For use with independent power winding, see Fig.10

EXT.VR is rated at 1K Ohm 1W. Keep terminals shorted when the external pot is not used.

P.S. For A, B, C, F+, F- use AWG 16 1.25 mm wire gauge rated 85°C @600V.

The EXT.VR connection wires must be insulated.

3. ADJUSTMENTS

Voltage setting for 220V / 380V / 440V and frequency setting for 50/60HZ is shown in figure7. Double check the voltage and frequency setting before starting the generator.

CAUTION :

THE GENERATOR OR AVR MAY BE DAMAGED IF THE VOLTAGE DIP SWITCHES OR THE FREQUENCY JUMPER IS SET WRONG!!

UFRO DIP:

Close - refer to solid curve in Figure 8.

Open - refer to dotted curve in Figure 8.

- 1 Before starting the generator, set the voltage and stability, adjustment full CCW and with the engine running, set the voltage adjustment CW to the voltage required. (If you are using an external remote pot, set this pot to its center position before adjusting the pot on the AVR)
2. Adjust the "STAB" CW slowly until the voltage becomes unstable and then back it up. When under-adjusted, the AVR reaction time is slow. By using an old-fashioned needle voltmeter, adjusting the "stability" is easier. Look for a stable needle when changing load.

4. FIELD FLASHING

When the regulator is operated 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 wires does not induce build-up, and the residual voltage is less than than 5 Vac, stop the engine and proceed with the next steps:

1. With the engine at rest and the regulator's field wires disconnected, apply DC voltage from a 12 volt battery to the fields with the Positive to F+ and Negative to F-, using a 20 watt or greater current-limiting resistor rated 3 to 5 ohms . (The genset battery is OK, but DO NOT connect Battery Negative to the F- or frame ground if the AVR is connected!)
2. Flash allowing 3 seconds before removing the DC volts.
3. Disconnect the AVR (wires 3 and 4) start the generator and measure the "residual voltage. If this voltage is now greater than 5 Vac, reconnect the voltage regulator. But if it is less than 5 Vac, repeat the field flashing procedure.
4. If repeating steps a and b does not result in generator voltage build-up, but residual is greater than 5 Vac, replace the voltage regulator.

5. TROUBLE SHOOTING

| SYMPTOM | CAUSE | CORRECTION |
|---------------------------|---|---|
| Voltage does not build up | Engine speed is too low. | refer to the Generator Manual. |
| | Residual voltage is too low. | refer to the Generator Manual. |
| | B,C,F+,F- wires are not connected right. | refer to Figure 2 ~ Figure 5. |
| | Defective Generator. | refer to the Generator Manual. |
| Out voltage low | The input wiring of A,B,C are not correct. | refer to Figure 2 ~ Figure 5. |
| | Check the external potentiometer. | Check wiring and potentiometer. |
| | Genset operating "under frequency". | refer to the Generator Manual. |
| | The exciter does not match the AVR. | refer to the Generator Manual. |
| Fuse blown | The voltage / frequency selector setting is not correct. | refer to Figure 7. |
| | The exciter current is too high or wiring error | refer to the Generator Manual. refer to Figure 2 ~ Figure 5. |
| Out voltage high | A and C terminals are not connected to the correct generator terminals. | refer to Figure 2 ~ Figure 5. |
| | The voltage / frequency selector setting is not correct. | refer to Figure 7. |
| Out voltage instable | Stability is not adjusted properly.. | refer to the section about adjustment |

6. FIGURE AND SIZE

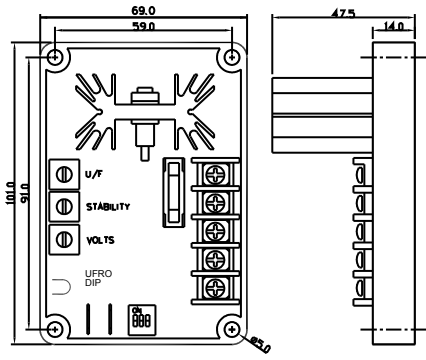


Fig. 1

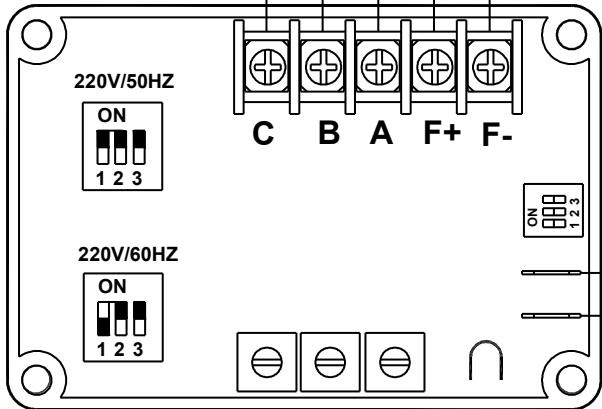
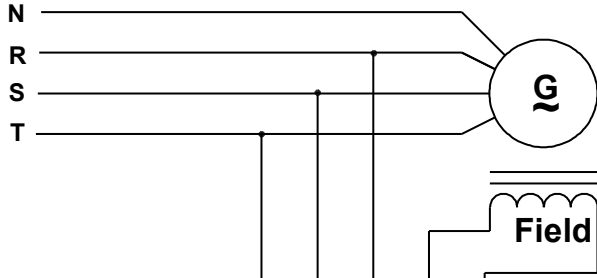


Fig. 2

U/F STAB VOLT UFRO DIP

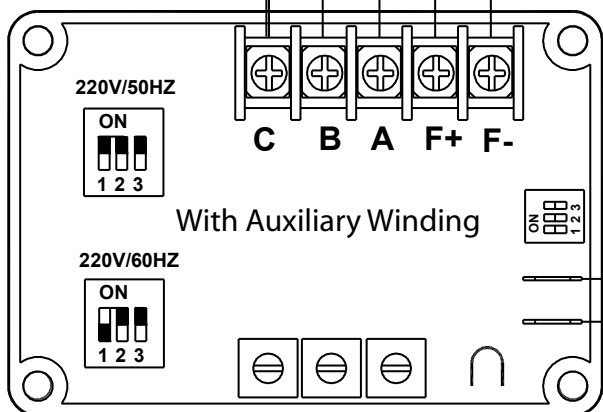
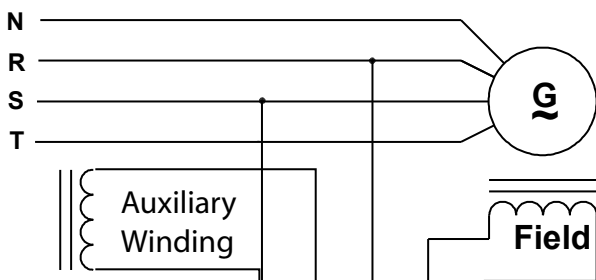


Fig. 10

U/F STAB VOLT UFRO DIP

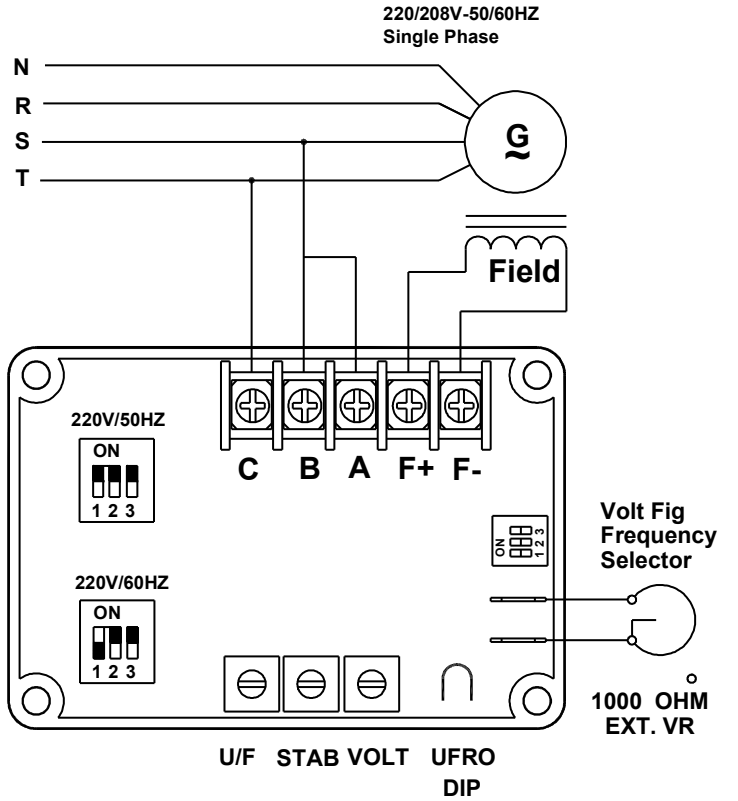


Fig. 3

U/F STAB VOLT UFRO DIP

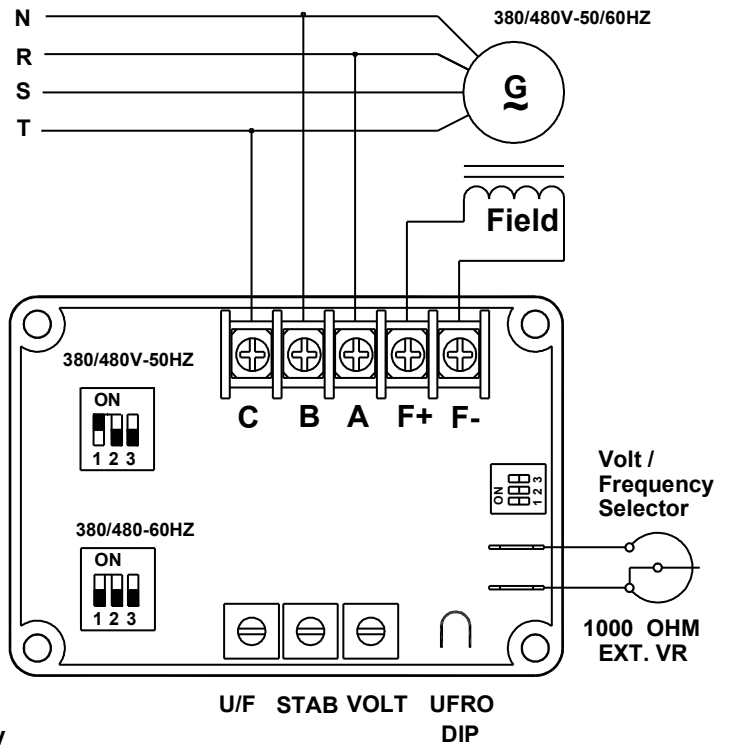


Fig. 4

U/F STAB VOLT UFRO DIP

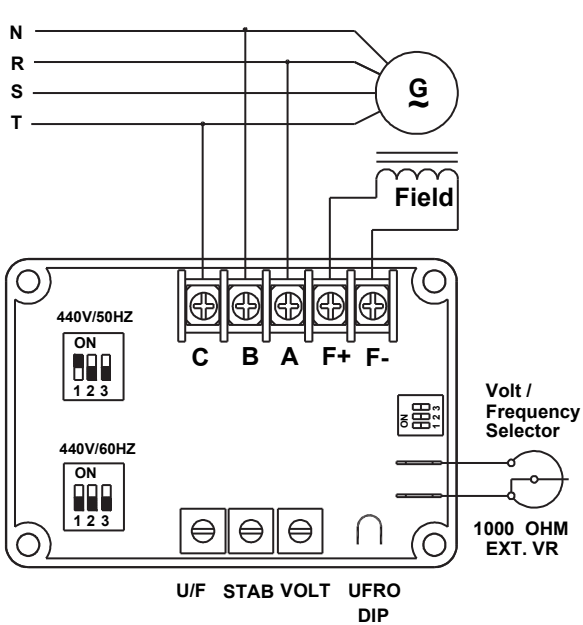
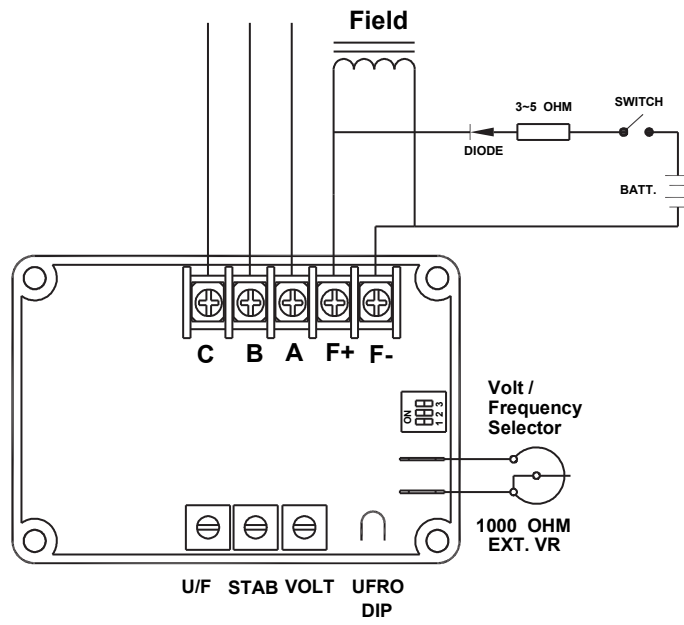


Figure 5



Flash with Battery
Figure 6

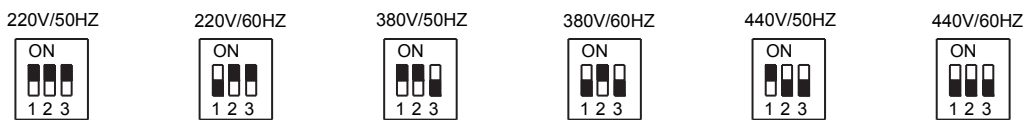
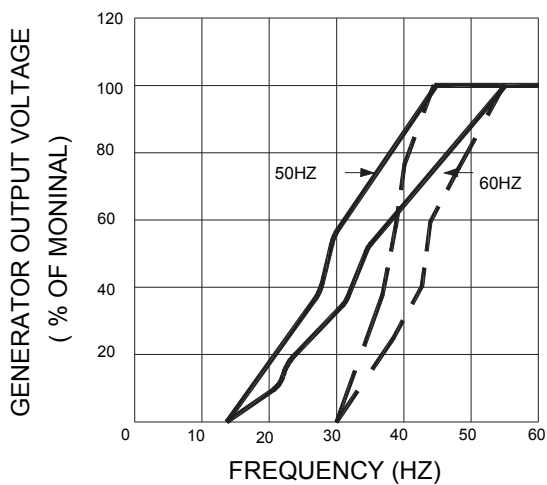
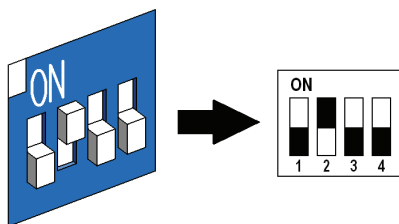
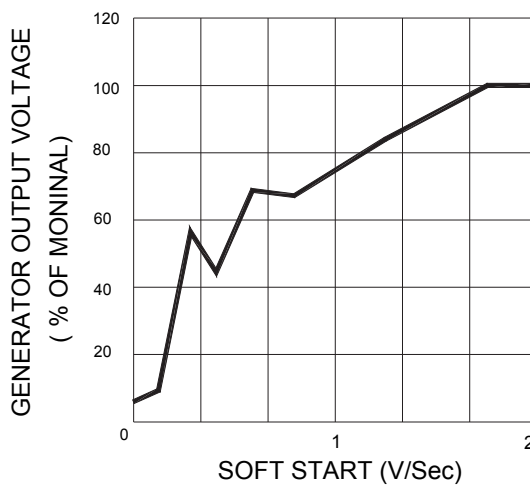


Figure 7



Frequency Compensation Curves
Figure 8



Soft Start Curve
Figure 9