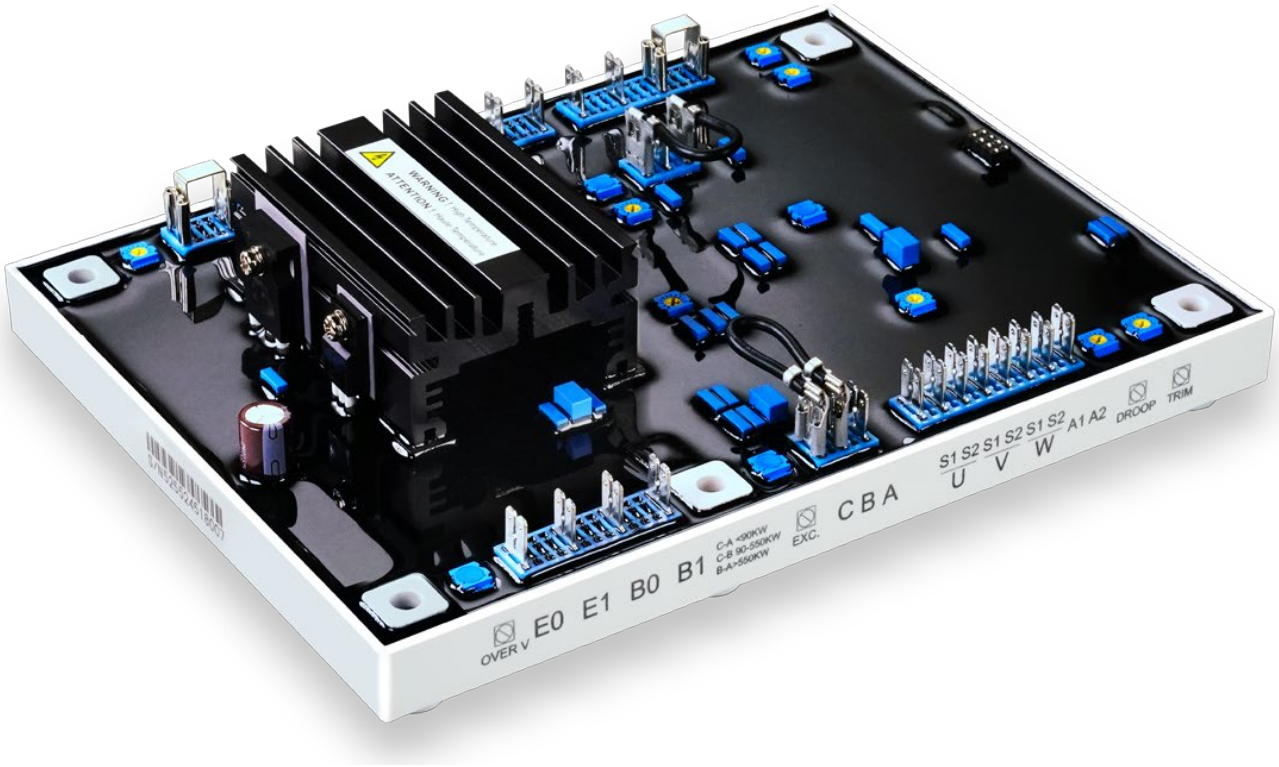
ADVR-321

Universal Hybrid Analog-Digital Voltage Regulator Operation Manual



Analog / Digital, Three-phase sensing, Excitation Current 4 Amp
Half-wave Rectifier Output

For use with PMG brushless generators with paralleling compatibility Compatible with Newage Stamford MX321*

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

SECTION 1 : SPECIFICATION

Sensing Input (6、7、8) RMS Reading

Voltage 180 – 270 Vac 3 phase

Frequency 50/60 Hz (Jumper selected)

Power Input(PMG) (P2、P3、P4)

Voltage 120 – 220 Vac 3 phase

Frequency 60 – 120 Hz

Excitation Output (X、XX)

Continuous 120 Vdc 2.7 to 4A[*1] @220Vac 3 phase

Max. 180 Vdc 7A for 8 Sec @220Vac 3 phase

Resistance Min. 15 Ohms, Max. 100 Ohms

PMG Input voltage must exceed 120 Vac.

External Voltage Adjustment (1、2)

Max. +/- 10% @ 5 K Ohms 1 watt potentiometer

Voltage Thermal Drift

Less than 3%[*2] from -40 to +70 ˚C

Soft Start Ramp Time

0.4 to 4 Sec +/-10% (Ramp adjustable)

Voltage Regulation

Less than +/- 0.5% RMS (with 4% engine governing)

Quadrature Droop Input (S1、S2 W phase)

Input Resistance 10 Ohms

Sensitivity 0.22A for 5% droop (PF=0) (Droop adjustable)

Max. Input 0.33A

Analogue Voltage Input (A1、A2)

Input Resistance greater than 1K ohms

Max. Input +/- 5 Vdc or 0 to 10 Vdc[*3]

Each 1 Vdc can affect 0 to 5% of the generator output voltage. (Trim adjustable)

Typical System Response

Less than 20 ms

Under Frequency Knee Point Thermal Drift

Less than +/- 0.1 Hz from -40 to +70 ˚C

Under Frequency Protection Knee Point Factory Preset

50 Hz system knee point preset at 45 Hz

60 Hz system knee point preset at 55 Hz

Under Frequency Voltage Droop rate from 4V/Hz–15V/Hz (Dip adjustable)

Under Frequency Voltage Recovery 200V/s – 30V/s (Dwell adjustable)

Static Power Dissipation

Max. 12 watts

Over Excitation Protection

Factory Preset Excitation Voltage 120V +/- 2V (EXC. adjustable)

Delay 8–15 seconds (inverse time curve)

This function can be disabled. (Turning EXC. fully clockwise.)

Sensing Input Overvoltage Protection (E0、E1)

Factory Preset 300 Vac +/- 5V (Over V Adjustable)

Delay 1 second (fixed)

Circuit Breaker Trip Coil Voltage: 10 to 30 Vdc / 0.5 Amp

Circuit Breaker Trip Coil Resistance: 20 to 60 Ohms

Current Limit Input (S1、S2 U、V、W phase)

10 Ohms Burden

The secondary overcurrent detection range of the CT can be set from 0.3 A to 1.0 A.

Factory Preset 1 A (I Limit Adjustable)

Delay 10 second (fixed)

This function can be disabled. (Turning I Limit fully clockwise.)

Environment

Operating Temperature -40 to +70 ˚C

Storage Temperature -40 to +85 °C

Relative Humidity Max. 95%

Vibration 5.5Gs @ 60Hz

Dimensions

203.5 (L) x 153.6 (W) x 46.8 (H) mm

8.01 (L) x 6.05 (W) x 1.84 (H) inch

Weight

754 g +/- 2%

1.66 lb +/- 2%

Notes

*1 De-rate linearly from 4.0 A at 50˚C to 2.7A at 70˚C

*2 The voltage value is measured after 10 minutes of operation.

*3 Any device connected to the analog input terminal must be completely isolated from ground, with an insulation withstand voltage greater than 500 Vac.

Attention!!

Improper setting of Under Frequency Roll Off 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 UFRO setting unless necessary.

SECTION 2 : APPEARANCE / DIMENSIONS / INSTALLATION DIAGRAM

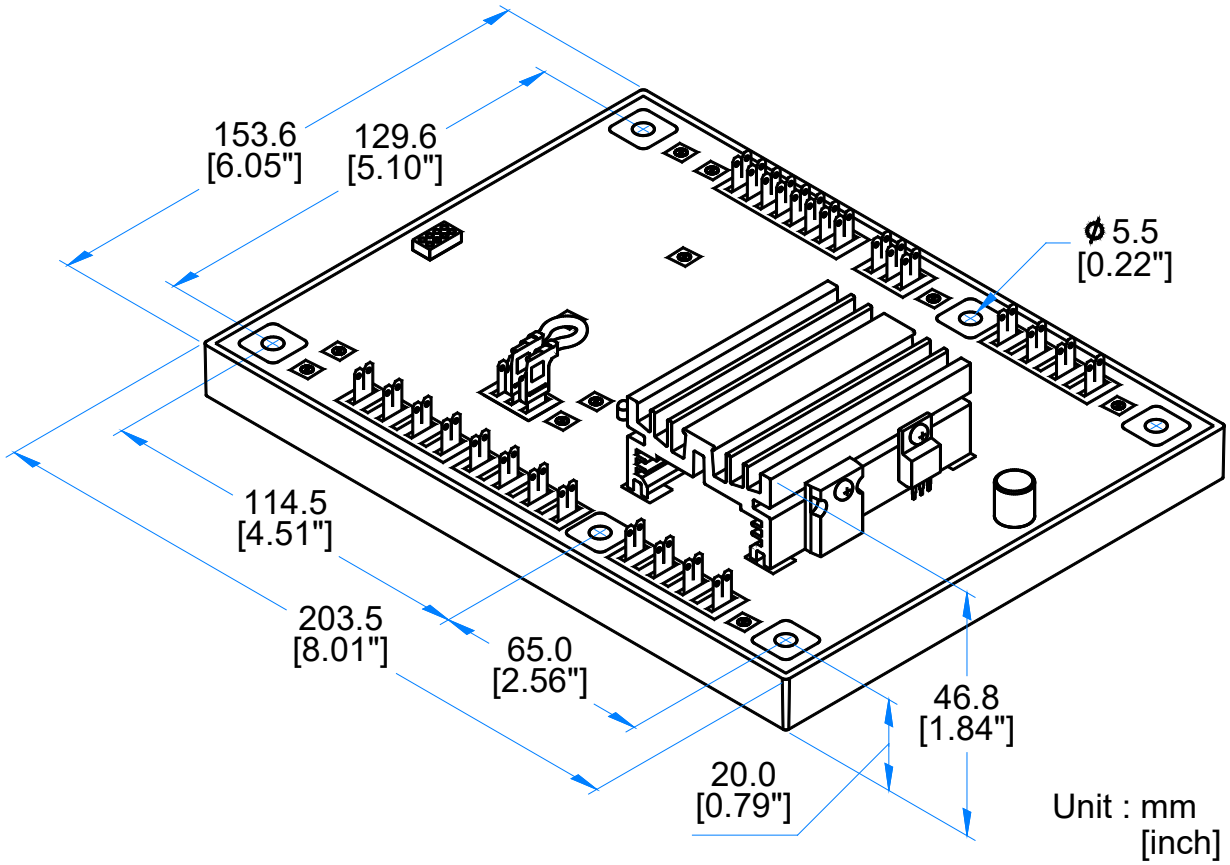


Fig. 1 Dimension Drawing

Caution!!

1. **The voltage regulator should be installed inside the generator control panel, and its installation environment must not be in a high-temperature or high-humidity condition.**
2. **When installing the voltage regulator, ventilation conditions should be considered to ensure proper heat dissipation; the outline dimensions and mounting hole sizes are shown in Figure 1.**
3. **When installed under high-vibration conditions, the connecting wires must be securely tied and fixed to prevent loosening or friction with other objects.**
4. **The installation and maintenance of this product must be carried out by qualified professional personnel**

SECTION 3 : INDICATORS, POTENTIOMETER ADJUSTMENTS AND PIN DESCRIPTIONS

LED will illuminate when the following conditions are detected:
1.Low Frequency
2.Over Excitation Voltage
3.Output Over Voltage
4.Output Over Current

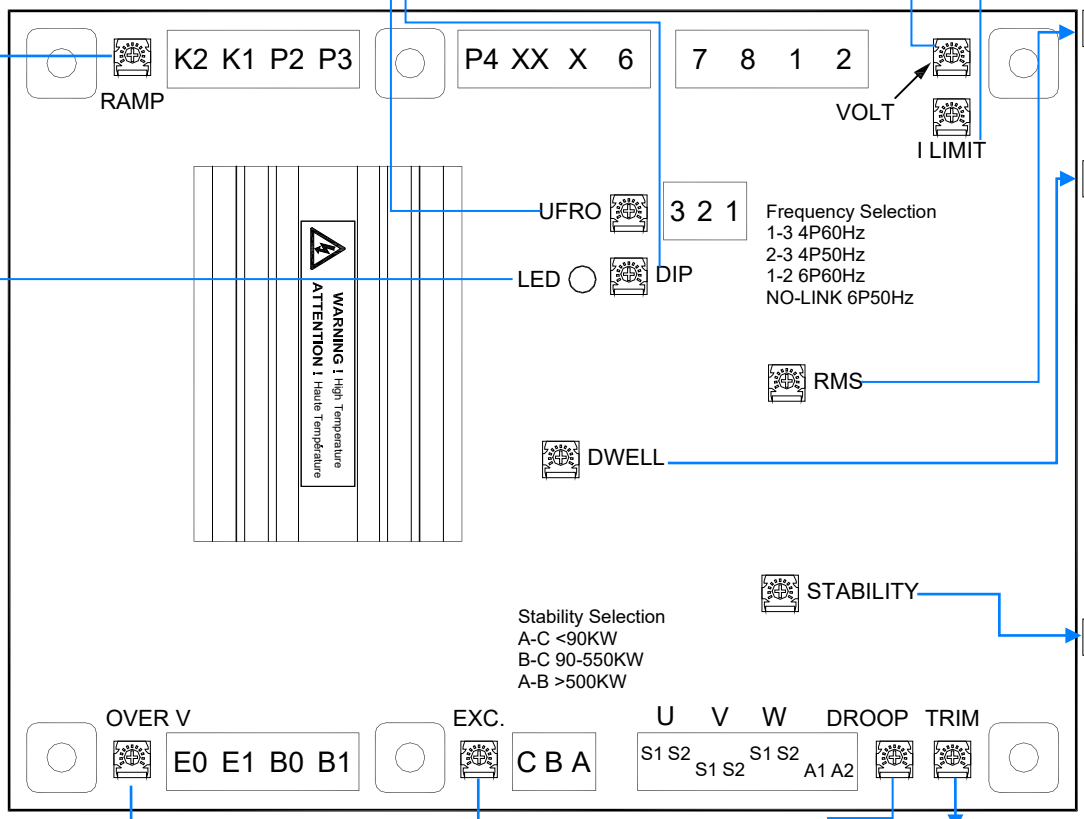
RAMP : Voltage Build-up Time Adjustment
Adjust the time from generator startup until the voltage begins to build up to the set value.
Adjustment range: 0.4 – 4s, factory preset 4s.

UFRO : Under Frequency Roll Off (UFRO) Adjustment *5
When the generator frequency falls below the set value, the output voltage decreases according to the DIP switch setting ratio.
50 Hz system: Adjustable from 50 to 40 Hz, factory preset 45 Hz
60 Hz system: Adjustable from 60 to 50 Hz, factory preset 55 Hz

DIP : Under Frequency Voltage Droop Adjustment
When the generator frequency falls below the set value, the voltage reduction ratio can be adjusted via the DIP potentiometer.
Adjustment range: 4 to 15 V/Hz, factory preset 15 V/Hz.

VOLT: Voltage Adjustment
Adjusts the generator output voltage.
Adjustment range: 180 – 270 Vac, factory preset: 220 V

I LIMIT : Overcurrent Trip Point Setting
When the secondary current of the CT is detected to exceed the set value, the field output will be shut down after a 10-second delay.
Adjustment range: Detection current 0.3 – 1A, factory preset 1A.
Turning it fully clockwise disables this protection*6



RMS: Three-Phase RMS Value Adjustment *5
Fine-tuning range of RMS value correction

DWELL : The generator engine has limited capacity to tolerate sudden load increases. After the under-frequency condition is cleared, the AVR introduces a time delay before increasing the excitation voltage, allowing the engine speed to return to normal.
Adjustment range: 200 V/s to 30 V/s, factory preset: 30 V/s

STABILITY :
Adjusts the stability of the generator output voltage. Turning clockwise increases the damping effect.

OVER V : Overvoltage Detection Protection Adjustment
When the detected voltage exceeds the set value, the field output will be shut down after a 1-second delay.
Adjustment range: 260 to 320 Vac, factory preset: 300 V*5

EXC. : Over-Excitation Voltage Protection Adjustment
When the field voltage exceeds the set value, the field output will be shut down after a delay of 8 to 15 seconds.
Adjustment range: Field voltage 60 to 160 V, factory preset: 120 V*5
Turning it fully clockwise disables this protection*6

TRIM : Analog Input Sensitivity Adjustment
Adjusts the proportional effect of the analog voltage input from A1, A2 on the generator voltage.
Each 1 Vdc can affect 0 to 5% of the output voltage.
Factory preset: 0%

DROOP : Current Compensation Voltage Droop Adjustment
Adjusts the proportional effect of the input current from W phase S1, S2 on the generator voltage.
Refer to ***Section 5. Wiring Diagram.***
Each 0.22 A can affect 0 to 5% of the voltage variation.
Factory preset: 0%

*5 : This is the factory default setting, which is semi-restricted. Incorrect settings may cause damage to the alternator.
*6 : When the potentiometer is turned clockwise to the second-to-last mark (see figure below), it reaches the maximum setting value; turning it fully clockwise (see figure below) disables this protection function.


Max. Setting Value


Disables this Function

SECTION 4 : TERMINAL DESCRIPTION

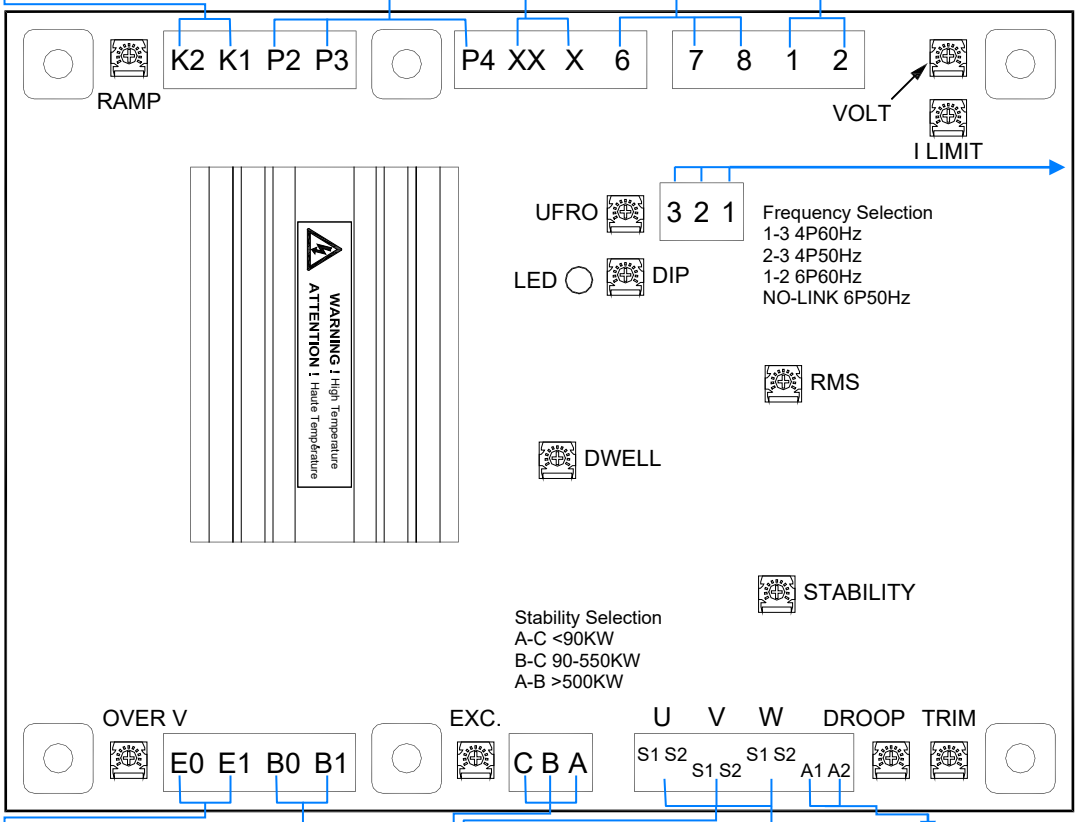
K1、K2 AVR Operation Switches
When K1 and K2 are disconnected, the AVR output is immediately shut down (including the reset of all protection lockout outputs). During normal operation, K1 and K2 must be kept connected.

P2、P3、P4 Three-Phase (PMG) Input
Input voltage range: 120 – 220 Vac three-phase
Field output is shut down when voltage is below 120 V

X、XX Excitation Output
Connects to generator field
X = F+、XX = F-

6、7、8 Three-Phase Sensing Voltage Input
Input voltage range: 180 – 270 Vac three-phase
If the voltage is not compatible, an isolation transformer must be used. The secondary voltage of the isolation transformer shall be 220V, with a capacity greater than 50 VA.

1、2 External Voltage Adjustment Input
Connect a 5k Ohm 1 W adjustable potentiometer to adjust the generator output voltage.
When not in use, it must be kept short-circuited.



1、2、3 System Frequency Selection
Select wiring according to the number of poles of the generator and the system frequency.
1-3 Short-circuited for 4P60Hz
2-3 Short-circuited for 4P50Hz
1-2 Short-circuited for 6P60Hz
1 2 3 Open-circuited for 6P50Hz

B0、B1 Fault Trip Solenoid Output
When the AVR detects an abnormal fault in the generator (over-excitation, overvoltage, or overcurrent), the AVR supplies power to the MCCB trip solenoid to disconnect the load from the generator.
Trip solenoid resistance: 20 to 60 Ohm.
When not in use, it must be kept free.

E0、E1 Sensing Input Overvoltage Protection
When the input voltage at E0 and E1 exceeds the set voltage (300 V), the field output will be shut down after a 1-second delay. When not in use, it must be kept free.

S1、S2 Connect three-phase CT terminals
Overcurrent Detection Protection Input
Connects to the generator current transformer (CT). When the current reaches the set value, the AVR automatically reduces the output voltage to limit the generator output current.
If the condition persists for more than 10 seconds, the field output will be shut down.
The secondary overcurrent detection range of the CT can be set from 0.3 A to 1.0 A.

A、B、C Stability Range Selection
Select the stability system range according to the generator capacity.
A–C short-circuited for less than 90 kW
B–C short-circuited for 90 to 550 kW
A–B short-circuited for greater than 500 kW

A1、A2 Analog Voltage Input
An external controller provides an analog voltage input of ±5 V or 0 to 10 V to control the generator voltage. When not in use, it must be kept free.
Each 1 Vdc can affect 0 – 5% of the generator output voltage.
Note: Any signal connected to the analog input terminals must be completely isolated from ground, with an insulation withstand voltage of at least 500 Vac.

S1、S2 (W) Current Compensation Input
When generators are operated in parallel, connect the input point of the droop CT that provides the AVR with power factor–related voltage drop signals.
Input impedance: 10 Ohm, maximum input: 0.33 A
0.22 A corresponds to a 5% voltage droop (at PF = 0)

SECTION 4 : WIRING DIAGRAM

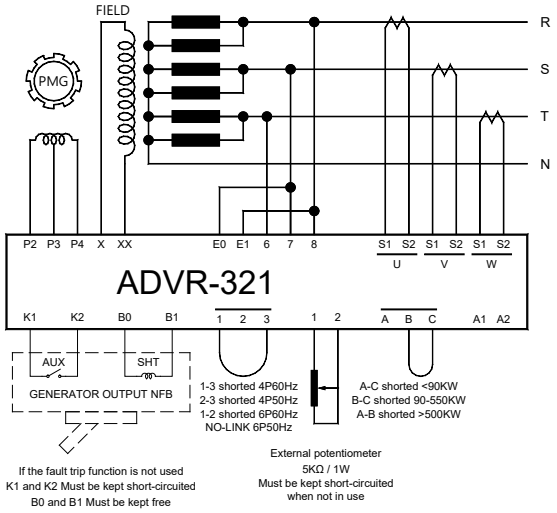


Fig. 2 220 Vac

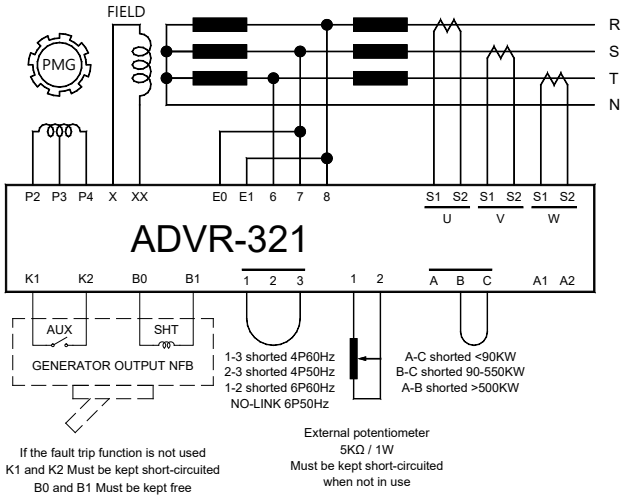


Fig. 3 380/440 Vac

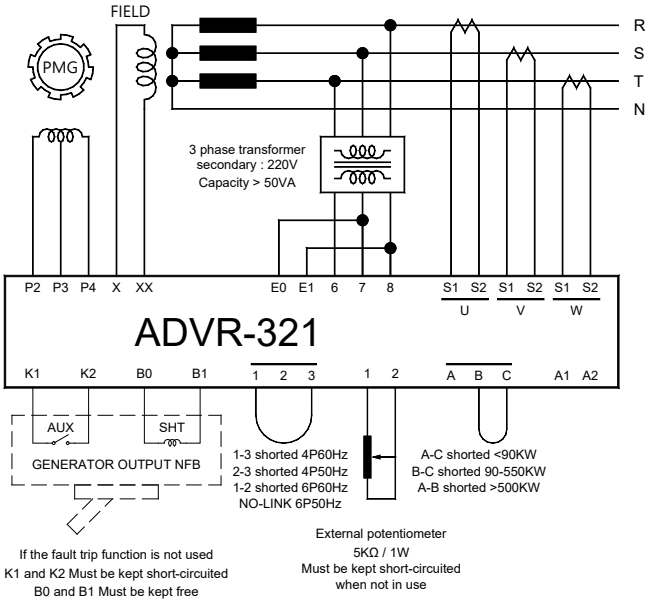


Fig. 4 Non-220 Vac System

Caution!!

1. **Before measuring with a high resistance meter or withstand voltage tester, the regulator wiring must be disconnected to prevent damage to the regulator from high voltage.**
2. **Do not allow the terminals of the external potentiometer to contact ground, as the voltage at these terminals may be higher than ground potential. Failure to observe this may result in damage to the regulator.**
3. **Before installation, the user must carefully read and fully understand all contents of this manual. Incorrect wiring may cause irreparable damage to the regulator and related components.**
4. **Connection terminal specification: 6.35 mm (1/4 inch) flag terminal.**

※ Product performance, specifications, and appearance are subject to change without prior notice due to improvements. Your understanding is appreciated.