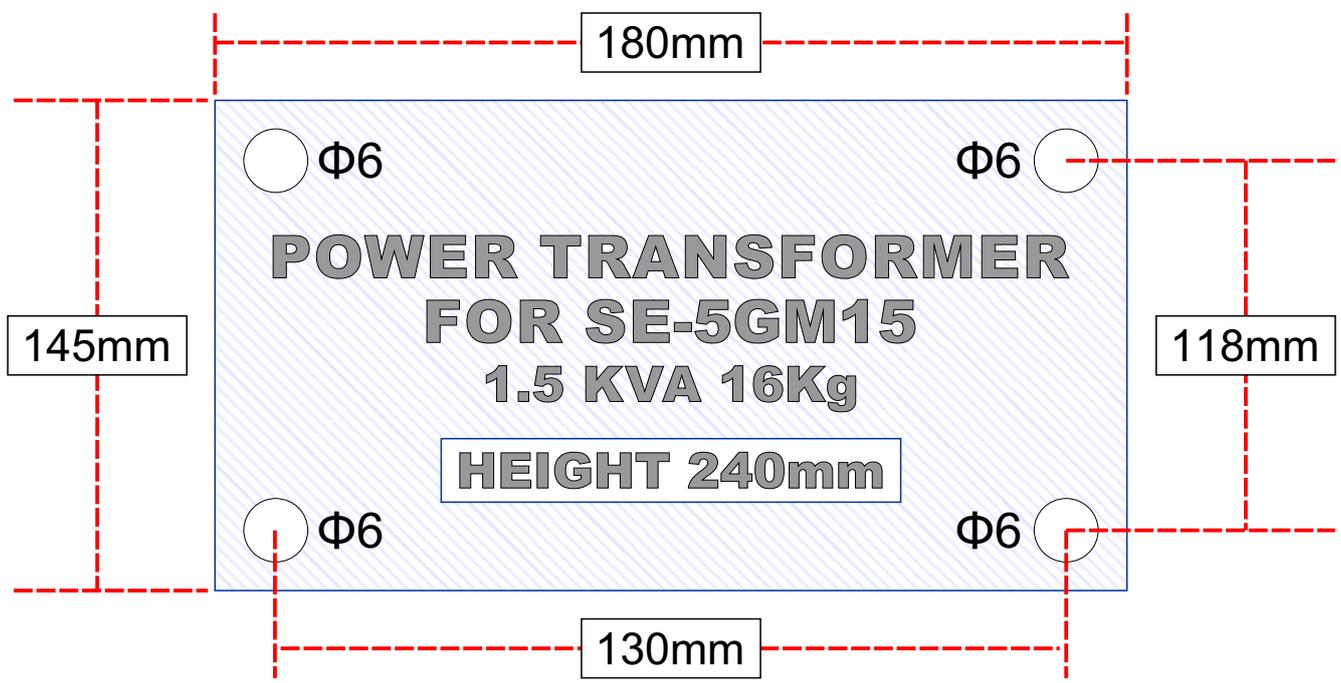
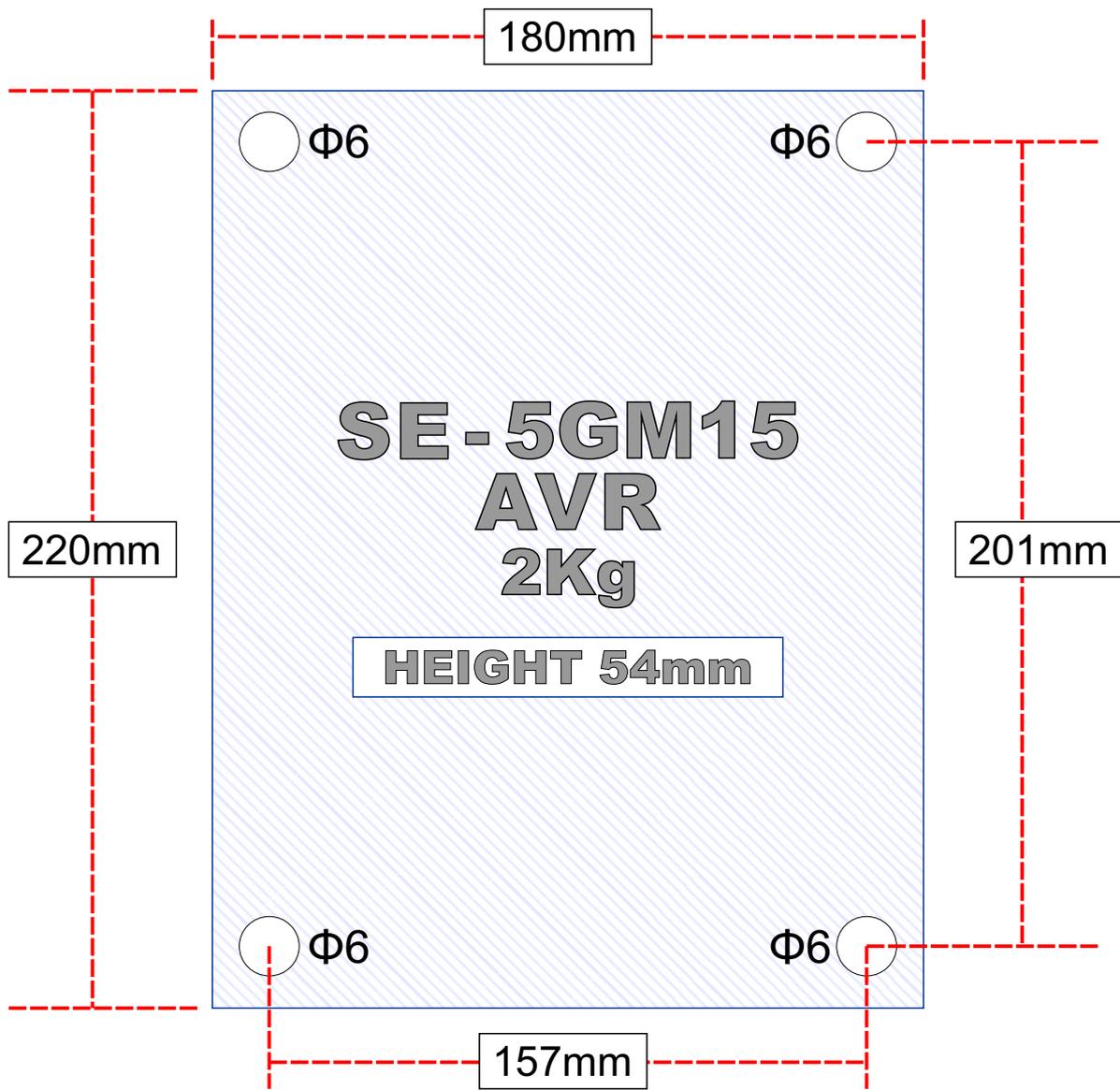


SE-5GM15
AUTOMATIC VOLTAGE REGULATOR

USER MANUAL

SE-5GM15 AUTOMATIC VOLTAGE REGULATOR





GENERAL DESCRIPTION

MODEL SE-5GM15

The **SE-5GM15** is a fullwave phase controlled thyristor type AVR. The excitation power is delivered from a three-phase permanent magnet generator (PMG). The SE-5GM15 works normally with ANY PMG frequency (30Hz - 300Hz). It also features (+/-) 5v VAR/PF control if needed.

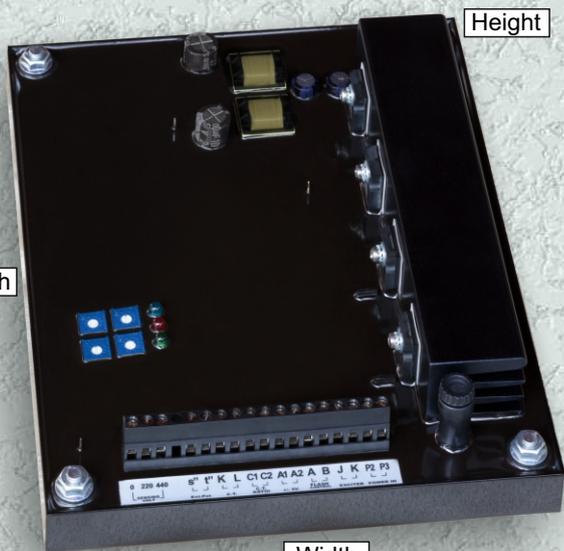
TECHNICAL SPECIFICATION

- INPUT 200 - 500 V
- FREQ. 40 - 70 Hz
- 2 PHASE ONLY
NO USE OF NEUTRAL
- AUTOMATIC FLASH
- OPER. TEMP +80°C MAX
- ADJUSTABLE UNDER FREQUENCY PROTECTION
- OUTPUT VOLT 80% OF P2-P3
- CURRENT 10A CONTINUOUS
- EXC.FIELD 4 Ohm MIN
- REGULATION +/- 1%
- QUADRATURE DROOP FOR PARALLELED OPERATION
- POWER ON INDICATOR

Length

Height

Width



ADJUSTMENTS

- **VOLT** for voltage output level
- **STAB** for stability voltage control
- **P/F** for power factor correction
- **U/F** for under frequency protection
- **FINE POT** for external voltage level

Dimensions (mm)

Length	Width	Height	Weight (Kg)
220	180	54	2.2

DESIGN AND MANUFACTURE BY RESEARCH TEAM OF POWER ELECTRONICS C.O. GREECE

SE-5GM15 WITH PMG

- AUTOMATIC FLASH.
- 50 - 60 Hz COMPATIBILITY.
- UNDER FREQUENCY PROTECTION.
- P/F COMPENSATED IN PARALLEL OPERATION.
- POWER ON INDICATION.
- CABLE CHECKER IN PARALLEL OPERATION.
- REGULATION +/- 0.5%
- OPERATIONAL TEMPERATURE 80°C MAX

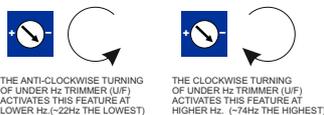
SPECIFICATION

INPUT		OUTPUT	
VOLT AC	200 - 500	VOLT	80% OF P2-P3
PHASE	2	CURRENT	10 Amperes CONT
FREQUENCY	40 - 70 Hz	EXC. FIELD	4 Ohms MIN
PMG P2-P3	30 - 300 Hz	OPER. TEMP	80°C MAX
PMG P2-P3	20 - 300 V	REGULATION	+/- 1%

IMPORTANT INSTALLATION NOTES

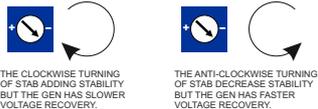
- FOR EXCLUSIVE SINGLE OPERATION THE USE OF "CT" IS **NOT** NECESSARY.
- IN CASE OF USING "CT" CURRENT TRANSFORMER IT MUST BE TO PHASE V.
- CONNECT FINE VOLTAGE POT ON PANEL (500 Ohm) OR ELSE YOU MUST LINK TERMINAL s'-t'.
- USE MAX 6 AMPERES FUSES.
- A1-A2 ARE FOR (+/-) 5v VAR/PF CONTROL OTHERWISE LEAVE TERMINALS UNCONNECTED.
- C1-C2 LINKED FOR CURRENT TRANSFORMER RATIO / 5
- C1-C2 OPEN FOR CURRENT TRANSFORMER RATIO / 1
- GREEN LED CABLE CHECKER LIGHTS ONLY WHEN THE POLARITY OF CURRENT TRANSFORMER AND THE R-T PHASES ARE CORRECT.

UNDER FREQUENCY PROTECTION

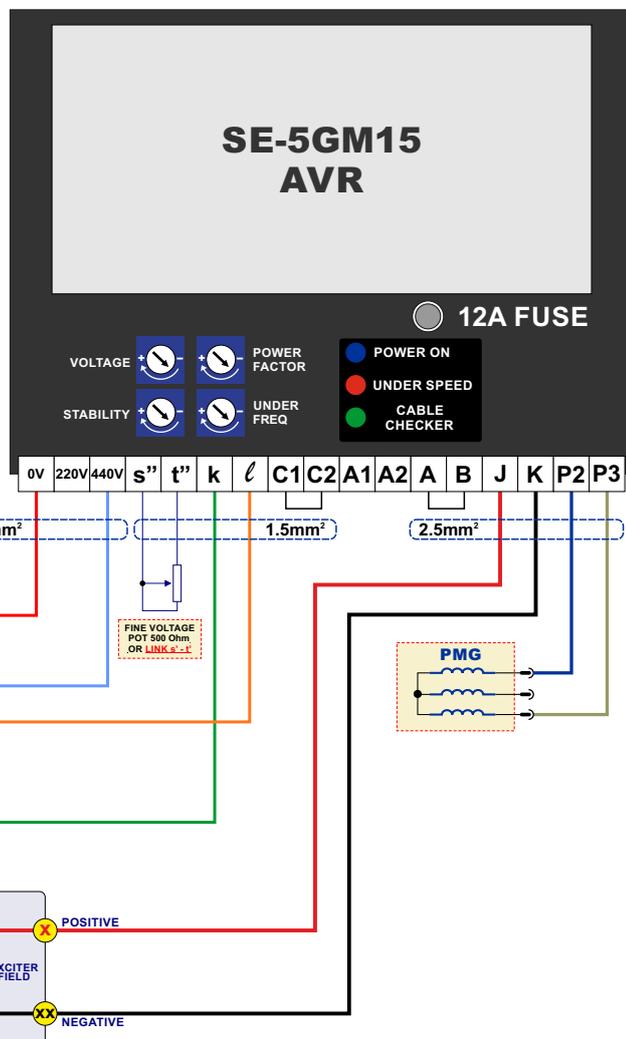
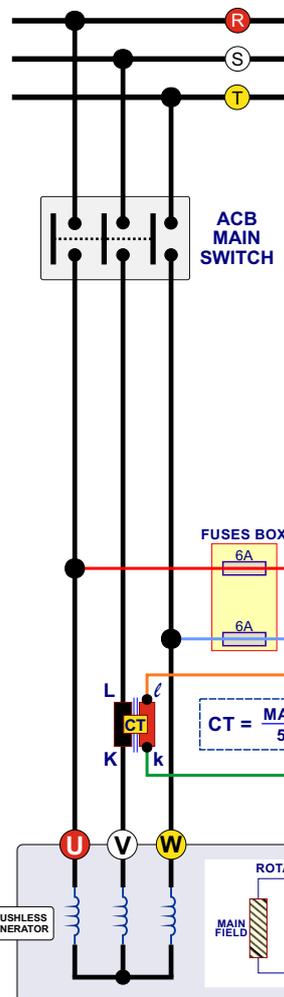


(PRE-ADJUSTED)

STABILITY



220 - 440 V BUS BAR



SE-5GM15 WITH PMG

- AUTOMATIC FLASH.
- 50 - 60 Hz COMPATIBILITY.
- UNDER FREQUENCY PROTECTION.
- P/F COMPENSATED IN PARALLEL OPERATION.
- POWER ON INDICATION.
- CABLE CHECKER IN PARALLEL OPERATION.
- REGULATION +/- 0.5%
- OPERATIONAL TEMPERATURE 80°C MAX

SPECIFICATION

INPUT		OUTPUT	
VOLT AC	200 - 500	VOLT	80% OF P2-P3
PHASE	2	CURRENT	10 Amps CONT
FREQUENCY	40 - 70 Hz	EXC. FIELD	4 Ohms MIN
PMG P2-P3	30 - 300 Hz	OPER. TEMP	80°C MAX
PMG P2-P3	20 - 300 V	REGULATION	+/- 1%

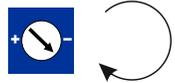
IMPORTANT INSTALLATION NOTES

- FOR EXCLUSIVE SINGLE OPERATION THE USE OF "CT" IS **NOT** NECESSARY.
- IN CASE OF USING "CT" CURRENT TRANSFORMER **IT MUST BE TO PHASE V.**
- CONNECT FINE VOLTAGE POT ON PANEL (500 Ohm) **OR ELSE YOU MUST LINK TERMINAL s' - t'.**
- USE MAX 6 AMPERES FUSES.
- A1-A2 ARE FOR (+/-) 5v VAR/PF CONTROL OTHERWISE LEAVE TERMINALS UNCONNECTED.
- C1-C2 LINKED FOR CURRENT TRANSFORMER RATIO / 5
- C1-C2 OPEN FOR CURRENT TRANSFORMER RATIO / 1
- GREEN LED CABLE CHECKER LIGHTS ONLY WHEN THE POLARITY OF CURRENT TRANSFORMER AND THE R-T PHASES ARE CORRECT.

UNDER FREQUENCY PROTECTION



THE ANTI-CLOCKWISE TURNING OF UNDER FREQ TRIMMER (U/F) ACTIVATES THIS FEATURE AT LOWER Hz. (~22Hz THE LOWEST)



THE CLOCKWISE TURNING OF UNDER FREQ TRIMMER (U/F) ACTIVATES THIS FEATURE AT HIGHER Hz. (~74Hz THE HIGHEST)

(PRE-ADJUSTED)

STABILITY

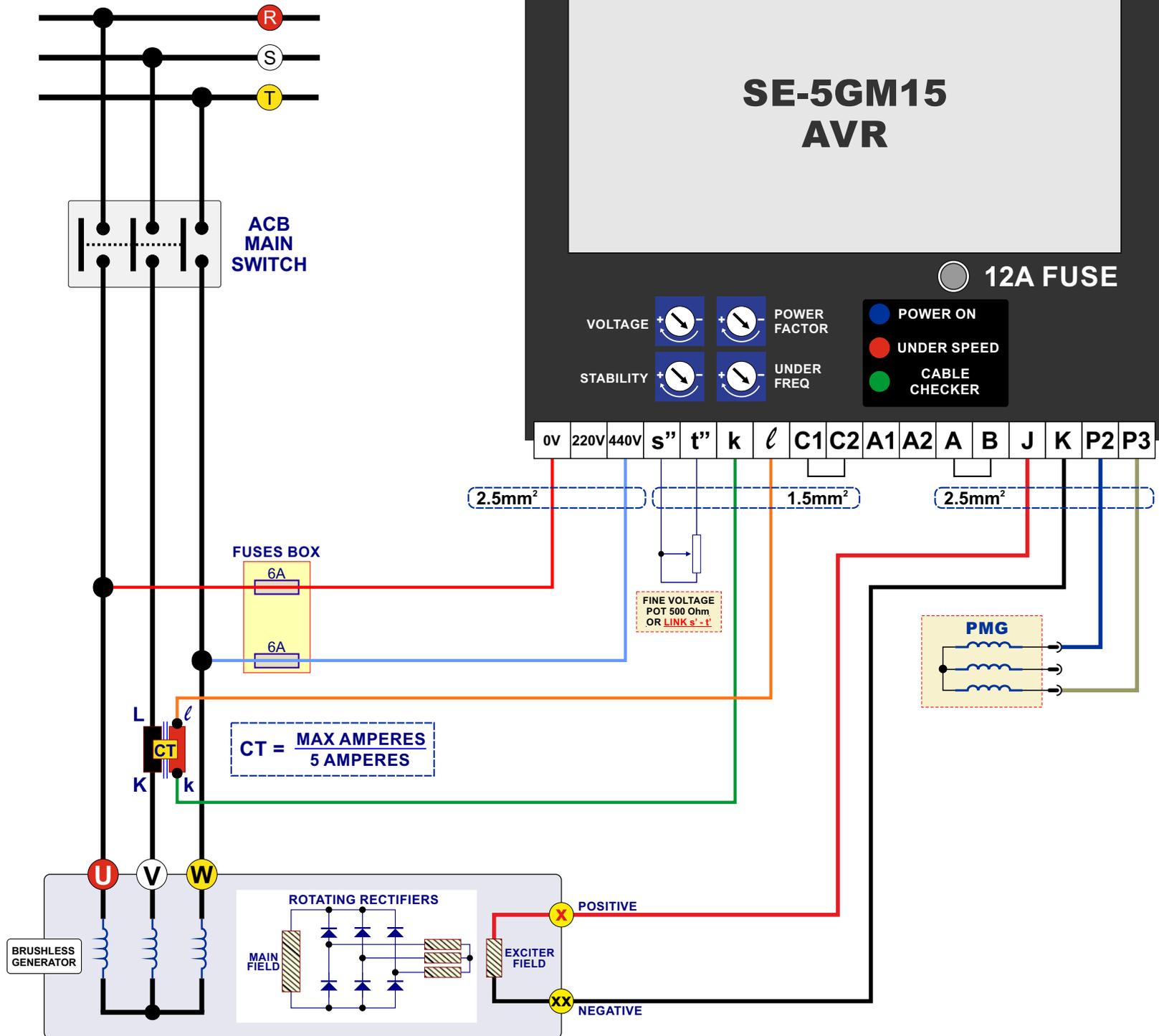


THE CLOCKWISE TURNING OF STAB ADDING STABILITY BUT THE GEN HAS SLOWER VOLTAGE RECOVERY.



THE ANTI-CLOCKWISE TURNING OF STAB DECREASE STABILITY BUT THE GEN HAS FASTER VOLTAGE RECOVERY.

220 - 440 V BUS BAR



SE-5GM15 AVR

12A FUSE



- POWER ON
- UNDER SPEED
- CABLE CHECKER

0V 220V 440V s'' t' k l C1 C2 A1 A2 A B J K P2 P3

2.5mm²

1.5mm²

2.5mm²

FUSES BOX

6A

6A

FINE VOLTAGE POT 500 Ohm OR LINK s' - t'

PMG

L K

$CT = \frac{MAX\ AMPERES}{5\ AMPERES}$

U V W

ROTATING RECTIFIERS

POSITIVE

NEGATIVE

BRUSHLESS GENERATOR

MAIN FIELD

EXCITER FIELD

SE-5GM15 WITH TRANSFORMER

- AUTOMATIC FLASH.
- 50 - 60 Hz COMPATIBILITY.
- UNDER FREQUENCY PROTECTION.
- P/F COMPENSATED IN PARALLEL OPERATION.
- POWER ON INDICATION.
- CABLE CHECKER IN PARALLEL OPERATION.
- REGULATION +/- 0.5%
- OPERATIONAL TEMPERATURE 80°C MAX

SPECIFICATION

INPUT		OUTPUT	
VOLT AC	200 - 500	VOLT	80% OF P2-P3
PHASE	2	CURRENT	10 Amps CONT
FREQUENCY	40 - 70 Hz	EXC. FIELD	4 Ohms MIN
PMG P2-P3	30 - 300 Hz	OPER. TEMP	80°C MAX
PMG P2-P3	20 - 300 V	REGULATION	+/- 1%

IMPORTANT INSTALLATION NOTES

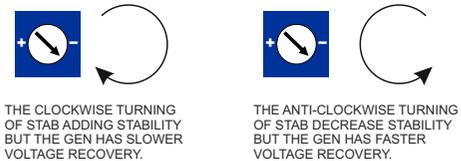
- FOR EXCLUSIVE SINGLE OPERATION THE USE OF "CT" IS **NOT** NECESSARY.
- IN CASE OF USING "CT" CURRENT TRANSFORMER **IT MUST BE TO PHASE V.**
- CONNECT FINE VOLTAGE POT ON PANEL (500 Ohm) **OR ELSE YOU MUST LINK TERMINAL s' - t'.**
- USE MAX 6 AMPERES FUSES.
- A1-A2 ARE FOR (+/-) 5v VAR/PF CONTROL OTHERWISE LEAVE TERMINALS UNCONNECTED.
- C1-C2 LINKED FOR CURRENT TRANSFORMER RATIO / 5
- C1-C2 OPEN FOR CURRENT TRANSFORMER RATIO / 1
- GREEN LED CABLE CHECKER LIGHTS ONLY WHEN THE POLARITY OF CURRENT TRANSFORMER AND THE R-T PHASES ARE CORRECT.

UNDER FREQUENCY PROTECTION

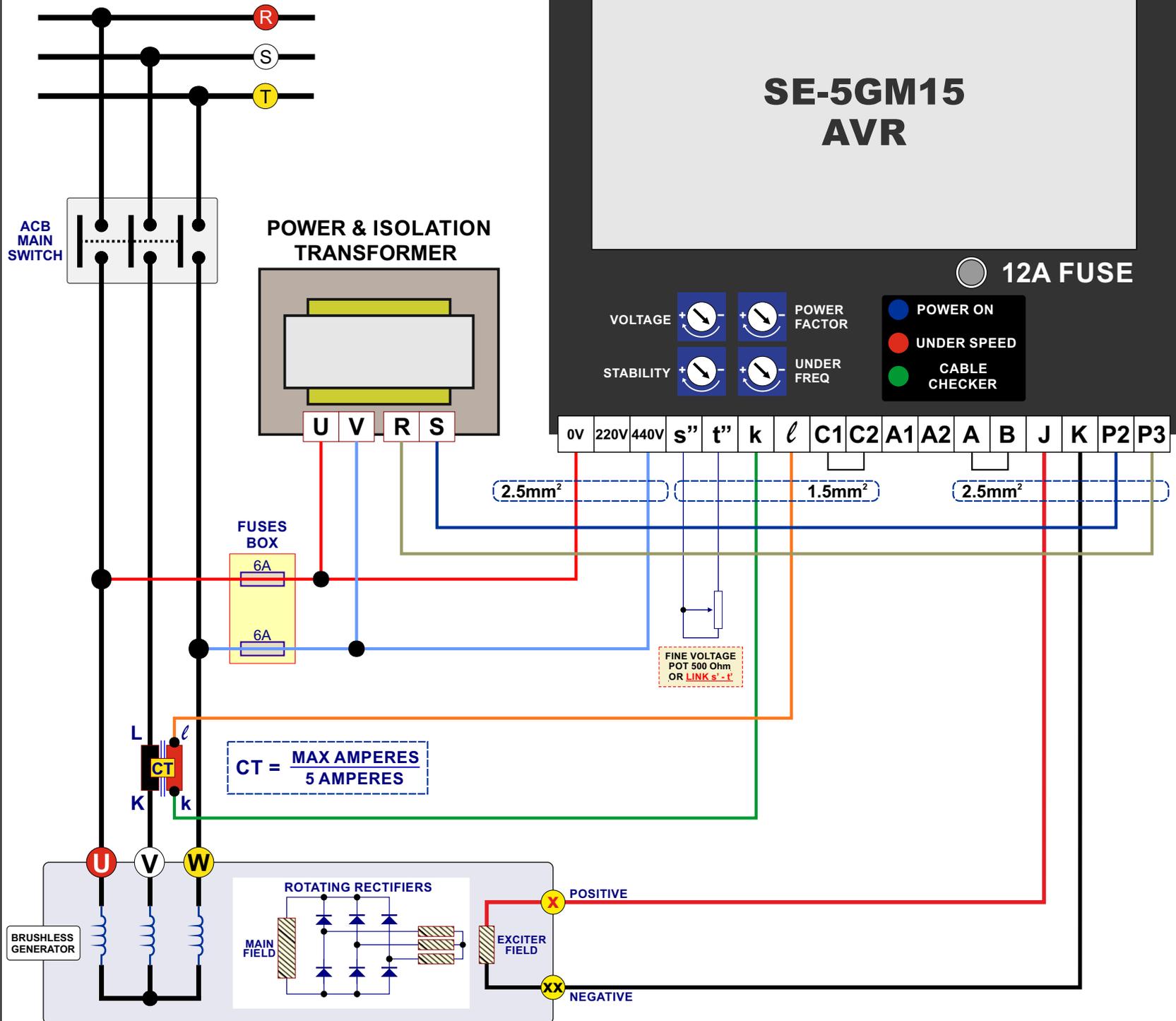


(PRE-ADJUSTED)

STABILITY



220 - 440 V BUS BAR



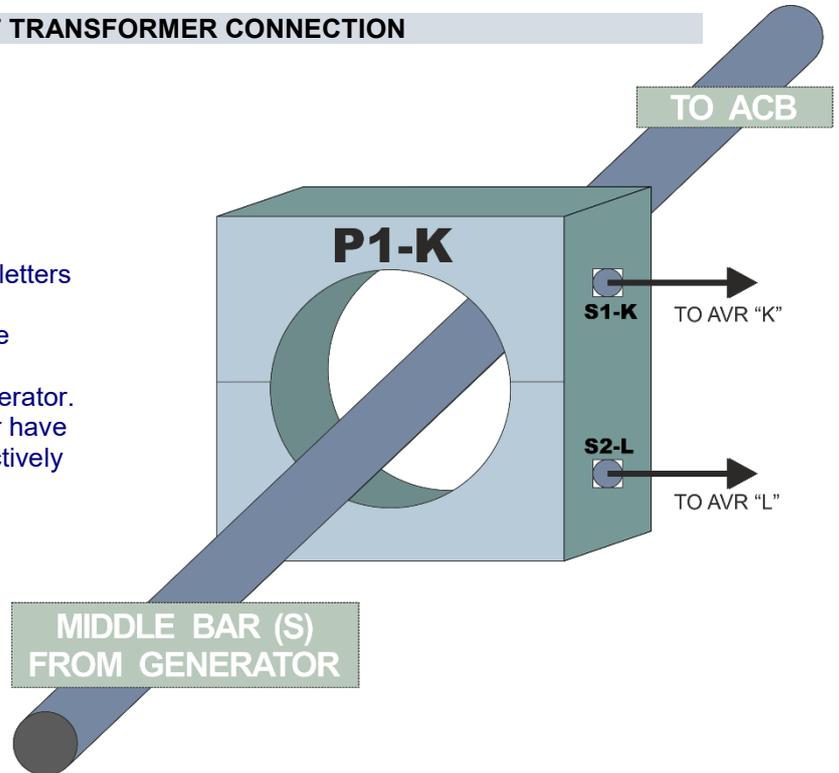
INSTRUCTIONS TO INSTALLING AND ADJUSTING THE AVR

MODELS: SE-5GM15

CURRENT TRANSFORMER CONNECTION

1. It is **necessary** that the current transformer **must** be installed to the phase that also goes to terminal "V" of the AVR.
2. The current transformer has from one side the letters K (or P1) and on the other side L (or P2). From the side, K (or P1) enters the bar from the generator and as it exits from the L (or P2) it is going to ACB i.e. to main switch of the generator. The two-connecting point of current transformer have the letters k-l (or s1-s2) and correspond respectively with K-L of the AVR.

The current ratio of the CT is:
AMPERES OF GENERATOR
FOR FIVE AMPERES



CONNECTING EXTERNAL VOLTAGE POTENTIOMETER

The connection of the external pot does not need any polarity because it is doing the work of a rheostat. The value as with all our AVRs is always 500 Ohms.

EXCITATION POLARITY

The correct polarity of the feeding DC current to the exciter from the AVR J-K is a must otherwise the exciter will be demagnetized and will not build-up any voltage. If that happens we have to re-magnetize the exciter so **after we disconnect the J-K cables from the AVR** and while the engine has the right periods we connect (with the right polarity) a 12V car battery to the generator side exciter J-K for about 15 minutes. After the re-magnetization, we can restore the J-K connections to the AVR.

BLUE LED

The blue led is a "power on" indicator. It shows that the AVR is powered.

WRONG CABLE CONNECTION MUST BE AVOIDED

INSTRUCTIONS TO INSTALLING AND ADJUSTING THE AVR

MODELS: SE-5GM15

U/F - Under Frequency Protection. It protects the generator from over-excitation current due to lower engine revs. To adjusting the "U/F" trimmer proceed as follows:

The AVR comes with pre-configured **Under frequency** protection. If re-adjusting is to be needed, proceed to the follows:

1. We turn all the way (anti-clockwise) the trimmer **U/F**.
2. We start the engine and set it to normal run (50Hz or 60Hz)
3. We reduce the fuel from the Governor until the periods are 6Hz less than the normal e.g. If the engine is running on 50Hz, then the periods are to be reduced to 44Hz and if the engine is running on 60Hz, then the periods are to be reduced to 54Hz.
4. Turn clockwise the "Under U/F" trimmer until the **red led** lights up.
Note that the generator voltage will also starts to drop.

After that procedure, we can have brought up speed to the normal levels.

STAB - Stability. It eliminates the voltage fluctuations.

To adjusting the STAB trimmer, proceed as follows:

1. Turn anti-clockwise the Stab trimmer all the way (1 turn).
2. Turn clockwise the STAB trimmer and set it just after the voltage fluctuation stops.
*Setting the trimmer at a far clockwise position will decrease the generator sensitivity. This may result to extensive voltage recovery time due to the vast self-induction loads.

UNDER FREQ PROTECTION

ONE TURN TRIMMER



THE CLOCKWISE TURNING OF U/F TRIMMER ACTIVATES THIS FEATURE AT HIGHER Hz. (~74Hz THE HIGHEST)

THE ANTI-CLOCKWISE TURNING OF UNDER U/F TRIMMER ACTIVATES THIS FEATURE AT LOWER Hz. (~22Hz THE LOWEST)

(DEFAULT (PRE-ADJUSTED) VALUE FOR 380V: 44 Hz

(DEFAULT (PRE-ADJUSTED) VALUE FOR 440V: 54 Hz

After that procedure, we can have brought up speed to the normal levels.

STAB - Stability. It eliminates the voltage fluctuations.

To adjusting the STAB trimmer, proceed as follows:

1. Turn anti-clockwise the Stab trimmer all the way (1 turn).
2. Turn clockwise the STAB trimmer and set it just after the voltage fluctuation stops.
*Setting the trimmer at a far clockwise position will decrease the generator sensitivity. This may result to extensive voltage recovery time due to the vast self-induction loads.

STABILITY

ONE TURN TRIMMER



THE CLOCKWISE TURNING OF STAB ADDING STABILITY BUT THE GEN HAS SLOWER VOLTAGE RECOVERY.

THE ANTI-CLOCKWISE TURNING OF STAB DECREASE STABILITY BUT THE GEN HAS FASTER VOLTAGE RECOVERY.

(PRE-ADJUSTED TO THE POSITION YOU SEE HERE)

VOLT - Voltage. Voltage adjustment. It co-operates with the external pot.

To adjusting the VOLT trimmer, proceed as follows:

Since the engine has the right-periods (cycles), then the remote knob is adjusted to the middle position. Then the VOLT trimmer (which is located in the main unit) is adjusted until the right voltage is reached. All the above adjustments i.e. U/F, STAB, VOLT, must be done without any load in the generator, the switch (ACB) must be in OFF position.

P/F - Power Factor. This adjustment is done when the generator is already in parallel with another or others.

To adjusting the P/F trimmer proceed as follows:

We start by placing the trimmer to the middle position.

If turning it anti-clockwise, the amperes of generator build-up in relation to the other generator.

If the trimmer is moved in a clockwise manner, the amperes are reduced in relation to the other or others generators.

GREEN LED CABLE CHECKER. The green led will help to achieve the right installation.

It will light **only*** if all the below are ok:

1. The circuit of this led will activated, if only if a current transformer is installed.
2. The generator is 20% at least under load.
3. The identity of the phases is ok.
4. The suggestion of the phases is ok.
5. The polarity of current transformer is ok.

*If there is more than one wrong cable connection at the same time, there is a chance that the green led will be lighten.