



UNDERSTANDING POTENTIOMETER SETTINGS OF SPS BRAND AVR

SPS brand AVRs are fully tested on static test bench & DG set with standard configuration. Since each and every AVR is thoroughly tested on our test bench, we strongly recommend not to adjust any settings of AVR so that it gives trouble free performance.

In case if it is required to adjust the potentiometers (Pot) / Presets than only qualified person should attempt to adjust the pots after clearly understanding its functions. Below details explains clear understanding on various adjustments of potentiometers of SPS Brand AVRs.

Most of SPS brand AVRs are supplied with built in multi turn potentiometers. These pots are 25 turns type. So, for example 100 K ohms potentiometer will complete its entire range from 0 ohms to 100 K Ohms when potentiometer is rotated 25 turns. The reason for incorporating multi turn pots in SPS brand AVRs is that you can precisely adjust required parameters, specifically it helps when adjustments are required to be done on DG sets under vibration conditions.

Note: Since our products are continuously updated the specifications and adjustments settings may be different than below mentioned. We request you to kindly refer latest data sheet of individual models or contact at info@spsindia.biz for latest information.

- 1) **VOLTS or V.SET:** These notations are labelled on AVR where pot is located. Both notation indicate that you can adjust AC terminal voltage of alternator. Normally this pot is factory set to 415 V AC or 220 V AC depending upon AVR model. In order to increase the terminal voltage of alternator, rotate the pot clock wise and in order to decrease the terminal voltage rotate the pot anti clockwise.
- 2) **STAB:** Indicates “Stability”. Stability and response time of alternator voltage is adjusted using these pot. **STAB pot is optimally factory set and is strongly recommended not to adjust this pot.** Rotating these pot to clock wise will result in decrease of response time but if further rotated to clock wise will result in to unstable voltage or hunting of terminal voltage of alternator. Rotating the pot to anti clock wise will again stabilize the terminal voltage. If pot is further rotated to anti clockwise direction than voltage will remain stable, but response time will increase. Increase in response time will result in larger voltage dip / rise under sudden load variations. Therefore in order to get optimum response time it is recommended to rotate the pot in clock wise direction till voltage hunting is observed, now rotate pot to anti clockwise direction such that voltage hunting just stops. This sets AVR response circuit to take lowest possible time to stabilize the terminal voltage.
- 3) **UFRO:** “UNDER FREQUENCY ROLL OFF”, a frequency measuring circuit continuously monitors the alternator output and provides under speed protection of excitation system, by reducing the output voltage proportionally with speed below pre-settable threshold. Usually the pre-set threshold level is 47 Hz for 50 Hz alternator and 57 Hz for 60 Hz alternator. UFRO pot is factory set to 47 Hz. By rotating UFRO pot to clock wise will decrease threshold level below 47 Hz and rotating the pot to anti clockwise direction will increase the threshold above 47 Hz. **It is strongly recommended not to adjust these pot because by wrongly adjusting the pot will cause field winding burn out.**
- 4) **UFRO LED or UFI or UF LED:** Whenever UFRO circuit gets activated, it is indicated by an light indicator (LED lamp). Terminal voltage will drop gradually with speed when LED turns ON. This helps the user to understand why voltage is reducing.



- 5) **O/L SET or AMP or O/L or O/E or OE:** This terms indicates over excitation or over load conditions of field windings. Two type of over excitation protections are provided in SPS brand AVRs. Either of one - over excitation voltage protection or over excitation current protection with tripping functions are available in AVR. In case of over excitation voltage protection, DC field voltage is monitored. If DC field voltage exceeds threshold value then internal timer will be activated and will cut off field supply after 20 to 25 seconds. In case of over excitation current protection, DC field current is monitored. If DC field current exceed threshold value than internal timer will be activated and will cut off field supply after 20 to 25 seconds. In above both cases it will be required to halt the engine to re-set the error.

In order to set any threshold value other than factory setting, then please follow below procedure. For over excitation voltage setting which is measured at F1 and F2. The DC over voltage level is factory set at 75 V (+/- 2 %). If output DC voltage at F1 and F2 exceeds more than 75 V the over excitation LED will be ON indicating that internal timer is activated at that moment. If the over excitation still continues, then after 20 Seconds the DC voltage at F1 and F2 will be cut OFF and alternator terminal voltage will be zero. The LED still continues to glow indicating over excitation voltage Trip. To reset the timer, stop the engine and again restart the engine to develop AC voltage. To change threshold voltage level to any other value, rotate potentiometer clockwise to set DC voltage level below 75 V and rotate potentiometer anticlockwise to set DC voltage above 75 V. In order to set desired threshold DC voltage level, first connect the AVR to alternator, with DC voltmeter connected to terminal F1 and F2 of AVR . Start engine and load the alternator such that the DC excitation voltage at F1 and F2 matches the name plate excitation voltage. Now rotate O/L SET potentiometer clockwise or anticlockwise such that at desired voltage the LED just get ON. For e.g. the threshold voltage level is factory set at 75 V and if it is required to set threshold level af 60 V, then load the alternator till DC voltage at F1 and F2 is 60 volt. At this stage the LED will be OFF since it is set factory set at 75 V. Now rotate potentiometer clockwise till the LED gets fully ON at 60 V DC. Now if it is required to set threshold voltage at 85 V, then load alternator till you get 85 V DC at F1 and F2. The LED will be ON since factory setting is 75 V. Now rotate potentiometer anticlockwise till the LED starts getting OFF.

To set over excitation current threshold level, which is measured by connecting a DC ampere meter in series with F1. The DC current threshold level is factory set at 4 A (+/- 2 %). If output current exceeds more than 4 A then LED will turn ON indicating that internal timer is activated at that moment. If the over excitation still continues, then after 25 seconds the DC voltage at F1 and F2 will be cut OFF and alternator terminal voltage will be zero. The LED still continues to glow indicating Trip condition. To reset the timer, stop the engine and again restart the engine to reset the error. To change O/L level to any other value, rotate potentiometer clockwise to set level below 4 A and rotate potentiometer anticlockwise to set above 4 A. In order to set desired threshold current level, first connect the AVR to alternator, with DC Ampere meter connected in series of F1 of AVR. Start engine and load the alternator such that the DC excitation current matches the name plate excitation current. Now rotate pot clockwise or anticlockwise such that at desired current the LED just gets ON. For e.g. the threshold current level is factory set at 4 A and if it is required to set trip current level at 3.5 A, then load the alternator till DC current is 3.5 At. At this stage the LED will be OFF since it is set factory set at 4 A. Now rotate potentiometer clockwise till the LED gets fully ON at 3.5 A DC. Now if it is required to set threshold trip current at 4.5 A, then load alternator till you get 4.5 A DC. The LED will be ON since factory setting is 4 A. Now rotate potentiometer anticlockwise till the LED starts getting OFF.



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- 6) **OLI or OEI or OE LED:** Whenever a over excitation condition arises, LED will turn ON indicating activation of timer. After tripping the LED will continue to glow, indicating status of tripping.

- 7) **DROOP:** When two or more alternators are run in parallel, load sharing can be achieved by quadrature droop method. The quadrature droop connections allows a voltage to be injected in to the sensing circuit from the secondary of a current transformer. This transformer is connected to the AVR, terminals Q1 and Q2, so as to inject a voltage which adds directly to the sensed voltage when the line carries reactive lagging current, causing the regulator to reduce the alternator voltage and throw off reactive load in a parallel alternator system. The AVR has internal burden resistor of 0.1 ohms for the paralleling current transformer on terminal Q1 and Q2. The C.T. should be selected to give 4 to 5 A AC in to this burden for 10 - 15 % droop.