



SX440 AUTOMATIC VOLTAGE REGULATOR (AVR)

Technical specification

INPUT

Voltage 190-264V ac
 Frequency 50-60 Hz nominal
 Phase 1
 Wire 2

OUTPUT

Voltage max 90V dc at 207V ac input
 Current continuous 4A dc
 Intermittent 6A for 10 secs
 Resistance 15 ohms minimum

REGULATION

+/- 1% (see note 1)

THERMAL DRIFT

0.04% per deg. C change in AVR ambient (note 2)

TYPICAL SYSTEM RESPONSE

AVR response 20ms
 Filled current to 90% 80 ms
 Machine Volts to 97% 300ms

EXTERNAL VOLTAGE ADJUSTMENT

+/-10% with 1 k ohm 1 watt trimmer (see note 3)

UNDER FREQUENCY PROTECTION

Set point 95% Hz (see note 4)
 Slope 170% down to 30 Hz

UNIT POWER DISSIPATION

12 watts maximum

BUILD UP VOLTAGE

4 Volts @ AVR terminals

ANALOGUE INPUT

Maximum input +/- 5V dc (see note 5)
 Sensitivity 1v for 5% Generator Volts (adjustable)
 Input resistance 1k ohm

QUADRATURE DROOP INPUT

10 ohms burden
 Max. sensitivity: 0.07 A for 5% droop 0PF
 Max. input: 0.33A

ENVIRONMENTAL

Vibration 20-100 Hz 50mm/sec
 100Hz 2kHz 3.3g
 Operating temperature -40 to +70 °C
 Relative Humidity 0-70 °C 95% (see note 6)
 Storage temperature -55 to +80 °C

NOTES

1. With 4% engine governing.
2. After 10 minutes.
3. Applies to Mod status S onwards. Generator de-rate may apply. Check with factory.
4. Factory set, semi-sealed, jumper selectable.
5. Any device connected to the analogue input must be fully floating (galvanically isolated from ground), with an insulation strength of 500V ac.
6. Non condensing.

SUMMARY OF AVR CONTROLS

CONTROL	FUNCTION	DIRECTION
VOLTS	TO ADJUST GENERATOR OUTPUT VOLTAGE	CLOCKWISE INCREASES OUTPUT VOLTAGE
STABILITY	TO PREVENT VOLTAGE HUNTING	CLOCKWISE INCREASE THE DAMPING EFFECT
STAB SWITCH	TO OPTIMISE TRANSIENT PERFORMANCE	SEE TABLE ABOVE
UFRO	TO SET THE UFRO KNEE POINT	CLOCKWISE REDUCES THE KNEE POINT FREQUENCY
DROOP	TO SET THE GENERATOR DROOP TO 5% AT 0PF	CLOCKWISE INCREASES THE DROOP
VTRIM	TO OPTIMISE ANALOGUE INPUT SENSITIVITY	CLOCKWISE INCREASES THE GAIN OR SENSITIVITY

ADJUSTMENT OF AVR CONTROLS

VOLTA GE ADJUSTMENT

The generator output voltage is set at the factory, but can be altered by careful adjustment of the VOLTS control on the AVR board, or by the external hand trimmer if fitted. Terminals 1 and 2 on the AVR will be fitted with a shorting link if no hand trimmer is required.

CAUTION Do not increase the voltage above the rated generator voltage. If in doubt, refer to the rating plate mounted on the generator case.

CAUTION Do not ground any of the hand trimmer terminals as these could be above earth potential. Failure to observe this could cause equipment damage.

If a replacement AVR has been fitted or re-setting of the VOLTS adjustment is required, proceed as follows:

CAUTION

1. Before running generator, turn the VOLTS control fully anti-clockwise.
2. Turn remote volts trimmer (if fitted) to midway position.
3. Turn STABILITY control to midway position.
4. Connect a suitable voltmeter (0-300V ac) across line to neutral of the generator.
5. Start generator set, and run on no load at nominal frequency e.g. 50-53Hz or 60-63Hz.

6. If the red Light Emitting Diode (LED) is illuminated, refer to the Under Frequency Roll Off (UFRO) adjustment.
7. Carefully turn VOLTS control clockwise until rated voltage is reached.
8. If instability is present at rated voltage, refer to stability adjustment, then re-adjust voltage if necessary.
9. Voltage adjustment is now completed.

STABILITY ADJUSTMENT

The AVR includes a stability or damping circuit to provide good steady state and transient performance of the generator.

The correct setting can be found by running the generator at no load and slowly turning the stability control anti-clockwise until the generator voltage starts to become unstable.

The optimum or critically damped position is slightly clockwise from this point (i.e. where the machine volts are stable but close to the unstable region).

OPTIMUM RESPONSE SELECTION

The stability selection jumpers should be correctly linked, A-B, B-C or A-C at the bottom of the board for the frame size of the generator, (see drawing).

UNDER FREQUENCY ROLL OFF (UFRO) ADJUSTMENT

The AVR incorporates an underspeed protection circuit which gives a volts/Hz characteristic when the generator speed falls below a presettable threshold known as the "knee" point.

The red Light Emitting Diode (LED) gives indication that the UFRO circuit is operating.

The UFRO adjustment is preset and sealed and only requires the selection of 50 / 60Hz using the jumper link.

For optimum setting, the LED should illuminate as the frequency falls just below nominal, i.e. 47Hz on a 50Hz system or 57Hz on a 60Hz system.

DROOP ADJUSTMENT

Generators intended for parallel operation are fitted with a quadrature droop C.T. which provides a power factor dependent signal for the AVR. The C.T. is connected to S1, S2 on the AVR.

The DROOP adjustment is normally preset in the works to give 5% voltage droop at full load zero power factor.

Clockwise increases the amount of C.T. signal injected into the AVR and increases the droop with lagging power factor (cos φ). With the control fully anti-clockwise there is no droop.

TRIM ADJUSTMENT

An analogue input (A1 A2) is provided to connect to the Newage Power Factor Controller or other devices. It is designed to accept dc signals up to +/- 5 volts.

CAUTION Any devices connected to this input must be fully floating and galvanically isolated from ground, with an insulation capability of 500 Vac. Failure to observe this could result in equipment damage.

The dc signal applied to this input adds to the AVR sensing circuit. A1 is connected to the AVR 0 volts. Positive on A2 increases excitation. Negative on A2 decreases excitation.

The TRIM control allows the user to adjust the sensitivity of the input. With TRIM fully anti-clockwise the externally applied signal has no effect. Clockwise it has maximum effect.

Normal setting is fully clockwise when used with a Newage Power Factor Controller.

REFER TO GENERATOR WIRING DIAGRAM FOR CONNECTION DETAILS

