RMS450 RMS AUTOMATIC VOLTAGE REGULATOR (AVR)
SPECIFICATION, INSTALLATION AND ADJUSTMENTS

General description

RMS450 is a half-wave phase-controlled thyristor type Automatic Voltage Regulator (AVR) and forms part of the Excitation system for a brush-less generator.

In addition to regulating the generator voltage, the AVR circuitry includes under-speed and sensing loss Protection features. Excitation power is derived directly from the generator terminals.

Positive voltage build up from residual levels is ensured by the use of efficient semiconductors in the power circuitry of the AVR .

The AVR is linked with the main stator windings and the exciter field windings to provide closed loop control of the output voltage with load regulation of +/- 1.0%.

In addition to being powered from the main stator, the AVR also derives a sample voltage from the output windings for voltage control purposes. In response to this sample voltage, the AVR controls the power fed to the exciter field, and hence the main field, to maintain the machine output voltage within the specified limits, compensating for load, speed, temperature and power factor of the generator.

A frequency measuring circuit continually monitors the generator output and provides output under-speed protection of the excitation system, by reducing the output voltage proportionally with speed below a pre-settable threshold. A manual adjustment is provided for factory setting of the under f requency roll off point, (UFRO). This can easily be changed to 50 or 60 Hz in the field by push-on link selection.

Provision is made for the connection of a remote voltage trimmer, allowing the user fine control of the generator's output.

An analogue input is provided allowing connection to a Newage Power Factor controller or other external devices with compatible output.

The AVR has the facility for droop CT connection, to allow parallel running with other similarly equipped generators.

Technical specification

SENSING INPUT

Voltage	Jumper selectable
	190-264V ac 1 phase
	350-420V ac 2 phase
Frequency	50-60 Hz nominal

POWER INPUT

Voltage	100-264 V ac 1 phase
Frequency	50-60 Hz nominal

OUTPUT

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

REGULATION
+/- 0.5% (see note 1)

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

TYPICAL SYSTEM RESPONSE

AVR response	20ms
Filed 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
4.8 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 ^{o}C
Relative Humidity 0-70 ^{o}C		95% (see note 6)
Storage temperature		-55 to +80 ^{o}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.

FITTING AND OPERATING

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 'jumper' 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 Ø). 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 Xfully 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.