

TECHNICAL MANUAL

R250

Automatic Voltage Regulator (AVR)

<https://gensetpart.com/generator-avr/>

COMPATIBLE REPLACEMENT PART

POPULACE has manufactured generator electronic parts in Xiamen, China since 2006.
1000+ SKUs in stock, 1-5 day dispatch, every unit burn-in tested before shipment.

Document contents

- Specification and technical characteristics
- Terminal assignment and wiring diagram
- Installation, adjustment and settings
- Troubleshooting table

This document is supplied by POPULACE Electronic Co., Ltd. as an installation and operating guide for a POPULACE compatible replacement part. It is not an original equipment manufacturer (OEM) document. Any brand names or part numbers mentioned are for cross-reference and identification purposes only and do not indicate affiliation with, or endorsement by, the respective manufacturers.

Why source this part from POPULACE

- Factory in Xiamen, China - operating since 2006 (20 years)
- Over 1000 SKUs held in stock; dispatch within 1-5 days
- Every unit burn-in tested at 65 C before shipment
- CE and ISO 9001 production system; full batch traceability
- Free technical support for wiring, settings and fault diagnosis

Get a quote / technical support

Web: <https://gensetpart.com>

Email: grace@genpart.cn

Phone / WhatsApp: +86-138-5038-3550

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正面 419*289mm

3.3 - Electrical faults

Fault	Action	Effect	Check/cause
No voltage at no load on start-up	Connect a new battery of 4 to 12 volts to terminals E- and E+ respecting the polarity for 2 to 3 seconds	The alternator starts up and its voltage is still correct when the battery is removed.	- Lack of residual magnetism
		The alternator starts up but its voltage does not reach the rated value when the battery is removed.	- Check the connection of the voltage reference to the A.V.R. - Faulty diodes - Induced short circuit
		The alternator starts up but its voltage disappears when the battery is removed	- Faulty A.V.R. - Exciter field short-circuited - Short-circuit in the main field. Check the resistance
Voltage too low	Check the drive speed	Correct speed	- Check the A.V.R. connections (A.V.R. may be faulty) - Field windings short-circuited - Rotating diodes burnt out - Main field winding short-circuited - Check the resistance
		Speed too low	- Increase the drive speed (Do not touch the A.V.R. pot (P1) before returning to the correct speed.)
Voltage too high	Adjust A.V.R. potentiometer	Adjustment ineffective	- Faulty A.V.R. - 1 faulty diode
Voltage oscillations	Adjust A.V.R. stability potentiometer		- Check the speed: possibility of cyclic irregularity - Loose terminals - Faulty A.V.R. - Speed too low on load (or U/F gradient set too high)
Voltage correct at no load and too low when on load (*)	Run at no load and check the voltage between E+ and E- on the A.V.R.		- Check the speed (or U/F gradient set too high) - Faulty rotating diodes - Short-circuit in the main field. Check the resistance - Faulty induced excitation
(*) Warning: For single-phase operation, check that the sensing wires coming from the A.V.R. are correctly connected to the operating terminals (see the alternator manual).			
Voltage disappears during operation	Check the A.V.R., the surge suppressor, the rotating diodes and replace any defective components	The voltage does not return to the rated value.	- Exciter winding open circuit - Faulty induced excitation - Faulty A.V.R. - Main field open circuit or short-circuited



Warning: after setting-up or trouble-shooting, replace all access panels or covers.

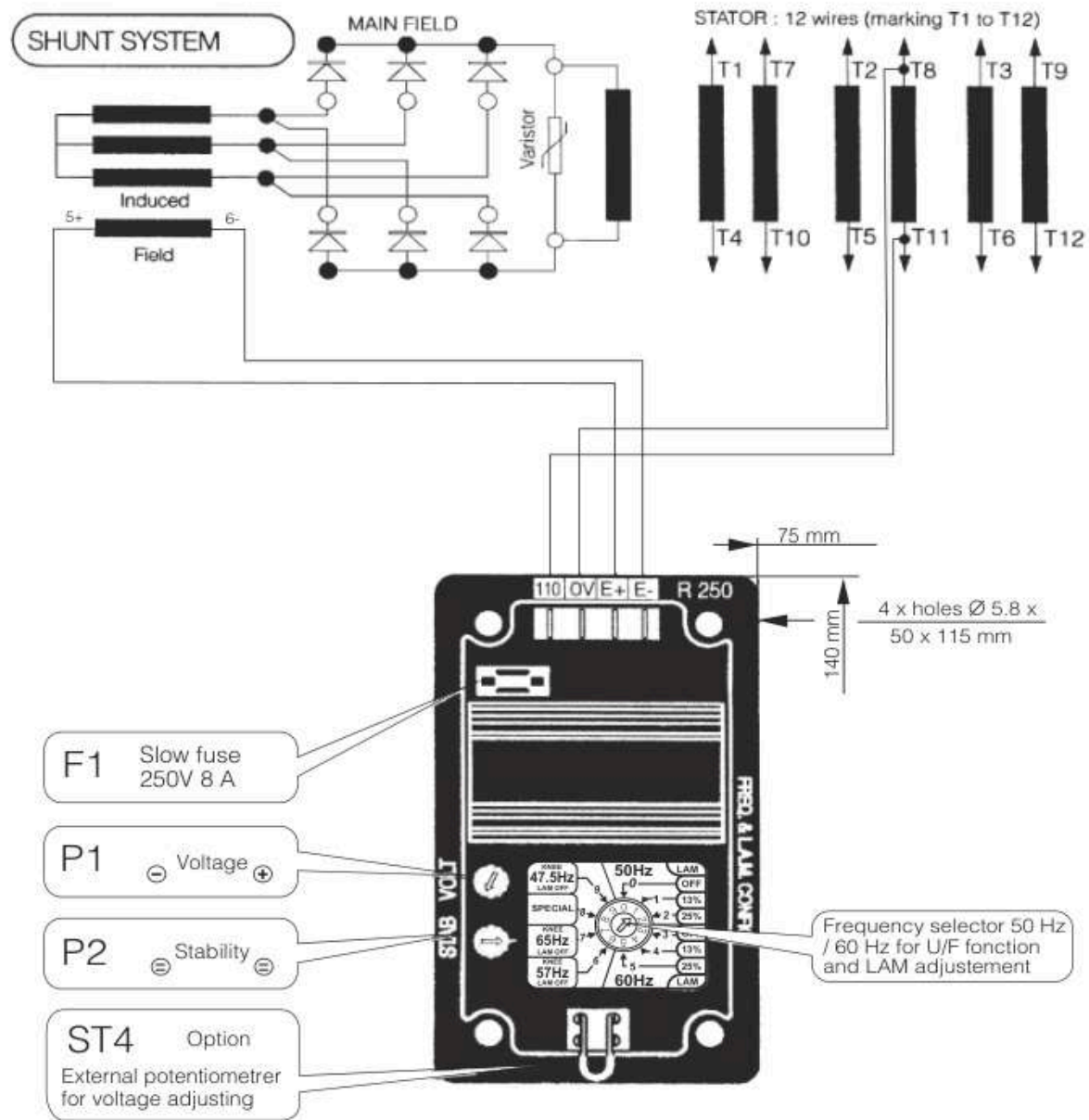
R250 A.V.R.

1 - SUPPLY

1.1 - SHUNT excitation system

The SHUNT excitation alternator is auto-excited with a R 250 voltage regulator.

The regulator controls the excitation current according to the alternator's output voltage. With a very simple conception, the SHUNT excitation alternator does not have a short circuit capacity.



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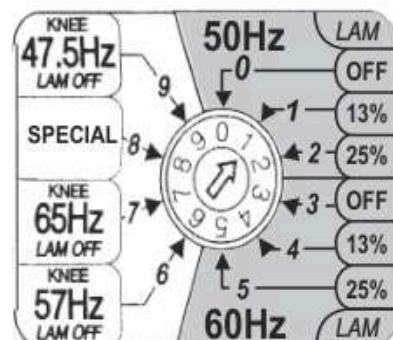
2 - R250 A.V.R.

2.1 - Characteristics

- Voltage regulation: around $\pm 0,5\%$.
- Supply range/voltage detection 85 to 139 V (50/60Hz).
- Rapid response time (500 ms) for a transient voltage variation amplitude of $\pm 20\%$.
- Voltage setting **P1**.
- Stability setting **P2**.
- Supply protected with an 8 A fuse, slow action (supports 10 A for 10 s).

2.2 - U/F Fonction and LAM

The threshold position (50 Hz - 60 Hz) to action the U/F fonction as well as the LAM setting type is selected using the potentimeter.



WARNING: The jumper settings must correspond to the rated operating frequency (see the nameplate on the alternator).
Risk of destruction for the alternator.

The threshold position and LAM fonction settings are done with the jumper.

Operating at 50 Hz: (U/F gradient)

0: threshold at 48 Hz without LAM for impacts between 30 and 40% of the rated load.

1: threshold at 48 Hz with LAM 13% for impacts between 40 and 70% of the rated load.

2: threshold at 48 Hz with LAM 25% for impacts > 70% of the rated load.

Operating at 60 Hz: (U/F gradient)

3: threshold at 58 Hz without LAM for impacts between 30 and 40% of the rated load.

4: threshold at 58Hz with LAM 13% for impacts 40 and 70% of the rated load.

5: threshold at 58Hz with LAM 25% for impacts > 70% of the rated load.

Specific operating

6: threshold at 57Hz without LAM for speed variations at a steady state > 2 Hz

7: threshold at 65Hz without LAM for variable speed and tractivelec / gearlec (U/F gradient).

8: special: the factory setting 48Hz 2U/F gradient ; a special programme is possible on request. This programme must be specified before ordering, during the project study.

9: threshold at 47.5 Hz without LAM for speed variations at a steady state > 2 Hz

2.3 - R250 A.V.R. option

- Potentiometer for voltage setting, 1000 Ω / 0,5 W min: setting range $\pm 5\%$.
- Remove the **ST4** jumper.

3 - INSTALLATION - COMMISSIONING

3.1 - Electrical checks on the AVR

- Check that all connections have been made properly as shown in the attached wiring diagram.
- Check that the position of the jumper corresponds to the operating frequency.
- Check whether the ST4 jumper or the remote adjustment potentiometer have been connected.

3.2 - Settings



The different settings made during the trial are to be done by qualified personnel. Respecting the load speed specified on the nameplate is vital in order to start a settings procedure. After operational testing, replace all access panels or covers.

The only possible settings on the machine are to be done with the A.V.R.

3.2.1 - R250 settings (SHUNT system)

Initial potentiometer positions

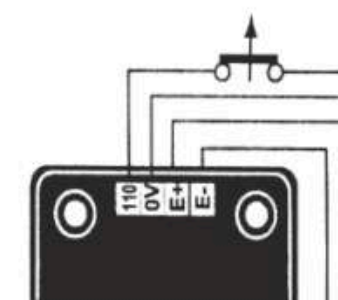
- voltage setting potentiometer P1 for the A.V.R.: full left
 - remote voltage setting potentiometer: in the middle.
- Operate the alternator at its rated speed: if the voltage does not rise it is necessary to re-magnetise the magnetic circuit.
- slowly adjust the voltage potentiometer of the A.V.R. **P1** until the output voltage reaches its rated value.
 - Stability setting with **P2**.

3.2.2 - Special type of use

WARNING

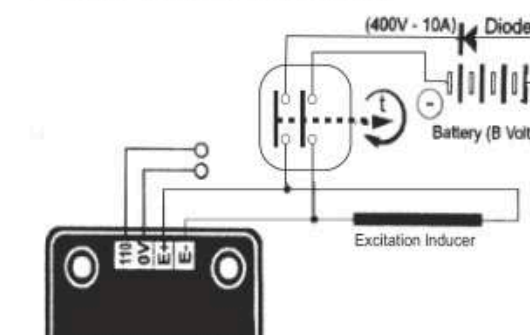
Excitation circuit E+, E- must not be left open when the machine is running: A.V.R. damage will occur.

3.2.2.1 - R250 field weakening (SHUNT)



The exciter is switched off by disconnecting the A.V.R. power supply (1 wire - 0 or 110V).
Contact rating: 16A - 250V AC

3.2.2.2 - R250 field forcing



The battery must be isolated from the mass.



Exciter field may be at line potential.