marathon™
Generators

PM500
Hybrid Analog/Digital Voltage Regulator
Installation Manual

A Regal Brand

REGAL
Specifications

Sensing Input E1, E2, E3
- **Voltage**: 220 ~ 600VAC, 50 / 60Hz
- DIP Switch SW1-1, 2 Selectable
  - 175 ~ 280VAC @ 220VAC
  - 330 ~ 515VAC @ 380/440VAC
  - 420 ~ 660VAC @ 480/600VAC
- **Frequency**: Single or 3 phase Input
  - DIP Switch SW2-1 Selectable

External Volts Adjustment
- 5% with 500ohm 1 watt trimmer
- 10% with 1000ohm 1 watt trimmer

Excitation Resistance
- > 9 ohm

Max. Power Dissipation
- 12 watt

Current Compensation
- 1 or 5A > 0.2VA (DIP Switch SW2-6 Selectable)
  - (C1,C2)
    - Max. ±7% @ P.F ±0.7

Analogue Voltage Input
- Un0 ~ 15% @ 0 ~ 10VDC or 0 ~ ±5VDC

Under Frequency Protection (Factory Setting)
- 50 Hz system presets knee point at 47 Hz
- 60 Hz system presets knee point at 57 Hz

Response Time
- <1 Cycle

Plastic Mounting Torque
- 30~50 Kgf.cm

Dimensions
- 150mm L * 135mm W * 55.5mm H

Weight
- 470g ± 2%

**ATTENTION**

1. All voltage readings are to be taken with an average-reading voltmeter.
2. High-potential test equipment must not be used. Use of such equipment could damage the AVR.
### Dip Switch Setting

**SW1**
- 1. OFF 2. ON 380V
- 1. ON 2. ON 480V

**SW2**
- 1. OFF 2. OFF 220V
- 4. OFF 5. OFF <90KW
- 4. ON 5. OFF 90~500KW
- 4. ON 5. ON >500KW

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<td>O/E PROTECT ON</td>
<td>O/E PROTECT OFF</td>
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<td>6</td>
<td>CT 1A</td>
<td>CT 5A</td>
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<table>
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<th><strong>SW1</strong></th>
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<td>SW2-2 Set Generator Frequency</td>
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**Adjustment**

**U/F Under Frequency Protection Adjustment**
When generator RPM falls below the knee point, the under frequency protection circuit will activate and the voltage and frequency begin to decrease in linear descend. Select frequency 60 or 50Hz according to the generator in use.

**DIP U/F Dip Adjustment**
When U/F protection is activated, the voltage droop ratio can be adjusted via the DIP VR. The adjustable range is 3-10 V/Hz.

**DROOP Droop Adjustment**
When paralleling, AVR increase or decrease its voltage output, when phase current leads or lag the voltage. The increase & decrease range can be preset by the DROOP adjustment.

**STAB Stability Adjustment**
Correct stability adjustment must be conducted while the generator is operating without load. First adjust the STAB potentiometer (POT) clockwise until the voltage becomes unstable, and then slightly adjust it anti-clockwise (About 1/5 turn). When the voltage just reaches the critical point (Knee point) of stabilization, where the voltage is stable yet very close to becoming unstable.

**TRIM Trim Adjustment**
When terminal A1 and A2 are biased with a DC voltage (0~10V), the TRIM is then used to adjust the influence this DC has on the output voltage of the AVR. If the TRIM (POT) is adjusted fully counterclockwise, any bias voltage will not cause any influence. On the contrary if the TRIM is adjusted fully clockwise, then any signal will produce a maximum 10% effect.

**VOLT Voltage Adjustment**
Generator rated output voltage adjustment. Must be in accordance with the DIP Switch SW1-1 & 2 voltage range setting.
VR1 & VR2 are normally bridged and voltage is adjusted on the PCB.

0 to 10 Vdc analog input. only use when paralleling to correct PF.

CT is only used when paralleling.

CT.

1KΩ /1W

1KΩ

NOTICE

1. Sensing Voltage can be set from 200 to 600 Volts Program SW 1-1&2 correctly. For single phase sensing bridge E2 & E3 and move SW2-1 to OFF.

2. The AC voltages recorded by the AVR are average values.

3. External VR: 500 ohms 1 Watt gives 5% adjustment range.

4. External VR: 1K ohms 1 Watt gives 10% adjustment range.

ATTENTION

OVP function can be used once only.

**OVP** Over Voltage Protection
Sensing Voltage higher than the OVP level will activated the SCR to short the power cause the fuse blown. Please replace the new fuse and disconnect OVP wire before restart AVR.

**OVP Level Voltage**

- 220V : 310 ~ 330 Vac
- 380V : 560 ~ 580 Vac
- 480V : 700 ~ 720 Vac
Installation

ATTENTION

1. AVR can be mounted directly on the engine, genset, switchgear, control panel, or any position that will not affects operation.

2. Plastic mounting torque: 30–50Kgf.cm
Warnings & Cautions

- **WARNING**
  - Buyer shall be solely responsible for determining the adequacy of the product for any and all uses to which Buyer shall apply the product. The application by Buyer shall not be subject to any implied warranty of fitness for a particular purpose.
  - For safety, Buyer or User should provide protective guards over all shaft extensions and any moving apparatus mounted thereon. The User is responsible for checking all applicable safety codes in his area and providing suitable guards. Failure to do so may result in bodily injury and/or damage to equipment.
  - Hot oil can cause severe burns. Use extreme care when removing lubrication plugs.
  - Disconnect power and lock out drive equipment before working on a generator.
  - Always keep hands and clothing away from moving parts.
  - The lifting eyes on the generator are not to be used to lift the entire generator set. Only the generator may be safely lifted by the lifting eyes. Do not use the conduit box for lifting or support of the generator.
  - Install and ground the generator per local and national codes.
  - Discharge all capacitors before servicing the generator.
  - Misapplication of a generator in a hazardous environment can cause fire or an explosion and result in serious injury.
  - Never attempt to measure the temperature rise of a generator by touch. Temperature rise must be measured by thermometer, resistance, imbedded detector or thermocouple.
  - Operation of a generator at higher than its nameplate ratings may result in fire, damage to equipment or serious injury to personnel.
  - Do not apply any force to the generator fan when rotating the generator rotor.
  - Generators should not be operated faster than their rated speed.
  - The following statement is only applicable to high voltage generators (above 5000 V). A grounding strap is supplied from the generator neutral to ground. This grounding strap not only bleeds off any voltage potential on the main stator after the high potential test, but also bleeds off any static charge that can build-up on the main stator during shipment and storage. **THIS GROUND STRAP IS NOT A PERMANENT PART OF THE GENERATOR CONSTRUCTION. REMOVE THIS GROUND STRAP ONLY AFTER A PERMANENT GROUND IS INSTALLED ON THE GENERATOR MAIN STATOR (not supplied by Marathon Electric), OR THE GENERATOR FINAL INSTALLATION IS COMPLETE.**
  - Mounting bolts should be routinely checked to ensure that the unit is firmly anchored for proper operation.
  - Consult qualified personnel with questions. All electrical repairs must be performed by trained and qualified personnel only.
  - For inverter applications, follow the inverter manufacturer’s installation guidelines.
  - Make sure the generator is properly secured and aligned before operation.
  - When installing the generator, insure that loose parts or tools do not fall inside the generator.
  - When connecting the generator, be sure to follow the correct wiring diagram for the desired voltage. Insure that the voltage regulator is connected per the wiring diagram.

- **CAUTION**
  - Resellers/Buyers agree to also include this entire document including the cautions and warnings above in a conspicuous place and in a conspicuous manner in writing to instruct users on the safe usage of the product.

**RESALE OF GOODS**

In the event of the resale of any of the goods, in whatever form, Resellers/Buyers will include the following language in a conspicuous place and in a conspicuous manner in a written agreement covering such sale:

The manufacturer makes no warranty or representations, express or implied, by operation of law or otherwise, as to the merchantability or fitness for a particular purpose of the goods sold hereunder. Buyer acknowledges that it alone has determined that the goods purchased hereunder will suitably meet the requirements of their intended use. In no event will the manufacturer be liable for consequential, incidental or other damages. Even if the repair or replacement remedy shall be deemed to have failed of its essential purpose under Section 2-719 of the Uniform Commercial Code, the manufacturer shall have no liability to Buyer for consequential damages.

Resellers/Buyers agree to also include this entire document including the cautions and warnings above in a conspicuous place and in a conspicuous manner in writing to instruct users on the safe usage of the product.

This information should be read together with all other printed information supplied by Marathon Electric.

For more information contact: Regal Beloit America, Inc., 100 E. Randolph St., Wausau, WI 54401
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