

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

Power Input P1 & P2

Input

Voltage 30 ~ 260VAC, 40 ~ 500Hz
Single phase

Output

Voltage 85VDC @ 110VAC input
170VDC @ 220VAC input
Current Continuous 5A Max.
Intermittent 7A for 10 sec
Fuse Spec. 5*20mm S505-5A (Slow Blow Type)

Voltage Regulation

< ± 0.5% (with 4% engine governing)

Voltage Build-up

Residual voltage at AVR terminal > 5 VAC
@ 25Hz

Thermal Drift

0.05% per °C change in AVR ambient

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

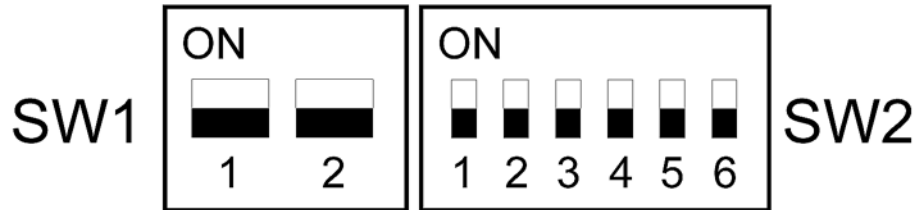
Weight

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.OFF 220V	SW2	4.OFF 5.OFF <90KW
	1.OFF 2.ON 380V		4.ON 5.OFF 90~500KW
	1.ON 2.ON 480V		4.ON 5.ON >500KW

		OFF	ON
SW2	1	1 PHASE	3 PHASE
	2	60Hz	50Hz
	3	O/E PROTECT ON	O/E PROTECT OFF
	6	CT 1A	CT 5A

SW1	SW2
SW1-1 & SW1-2 Sets the Generators Sensing Voltage	SW2-1 Set Sensing for 1 or 3 Phase
	SW2-2 Set Generator Frequency
	SW2-3 Set Over Excitation Protection ON or OFF
	SW2-4 & 5 Sets Generator Size
	SW2-6 Sets Size of Droop CT

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.

Under-Frequency Indicator

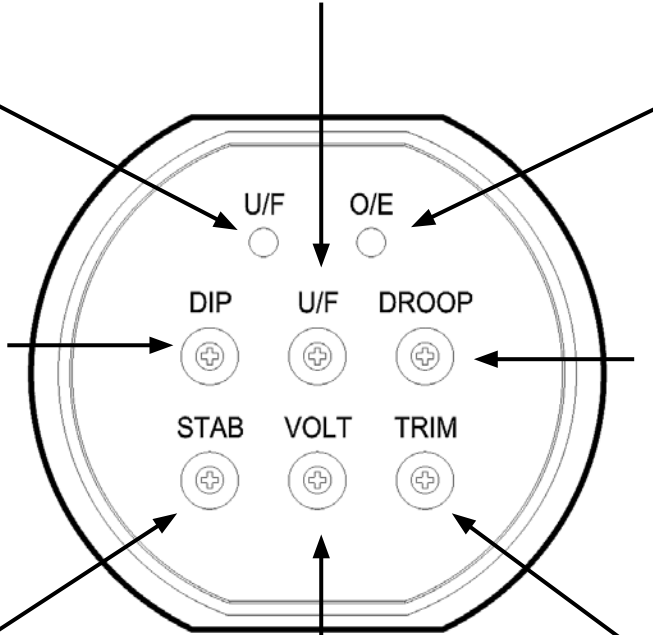
Over-Excitation Indicator

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.



VOLT Voltage Adjustment

Generator rated output voltage adjustment. Must be in accordance with the DIP Switch SW1-1 & 2 voltage range setting.

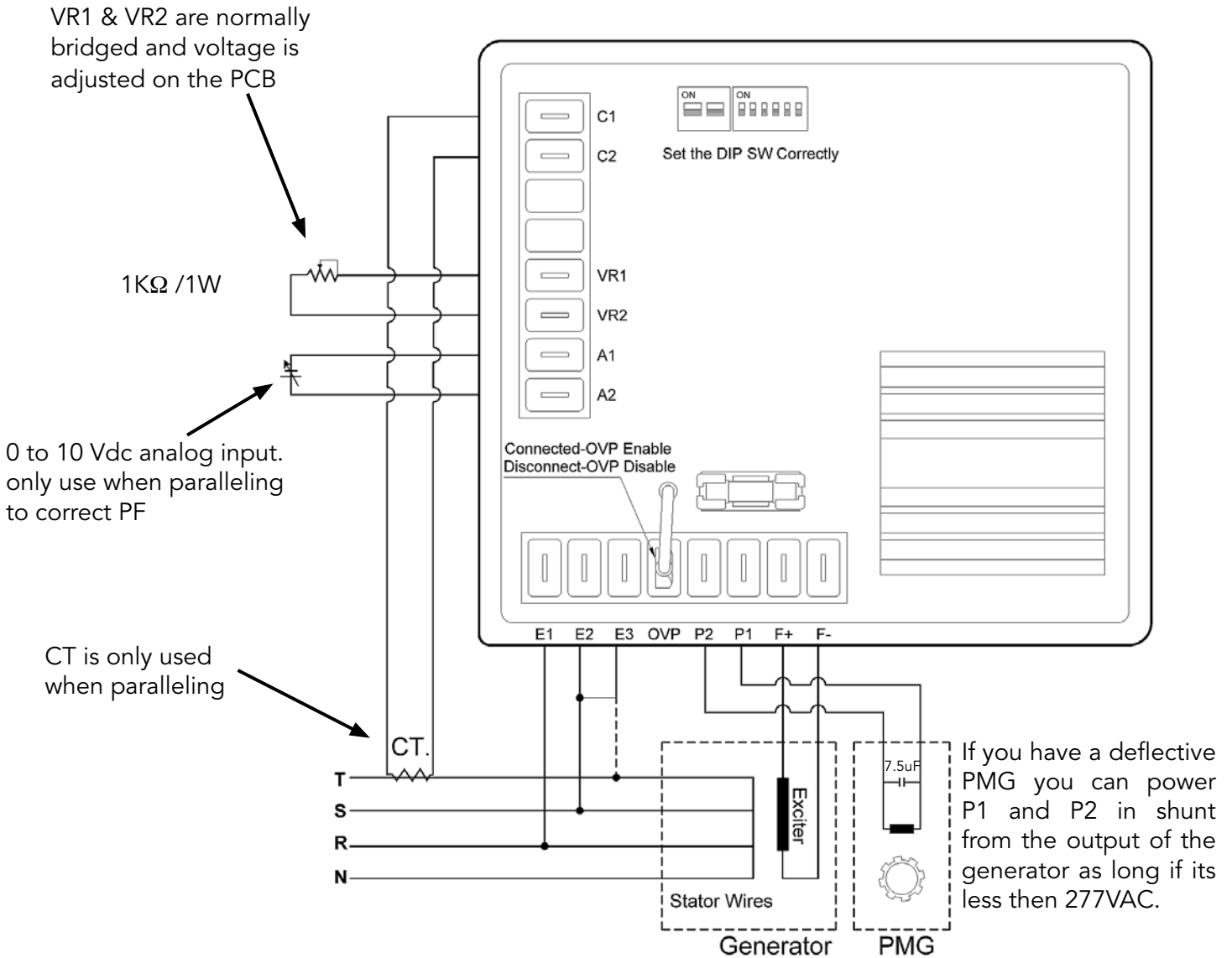
STAB Stability Adjustment

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 counter-clockwise, 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.

Wiring Connections



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.

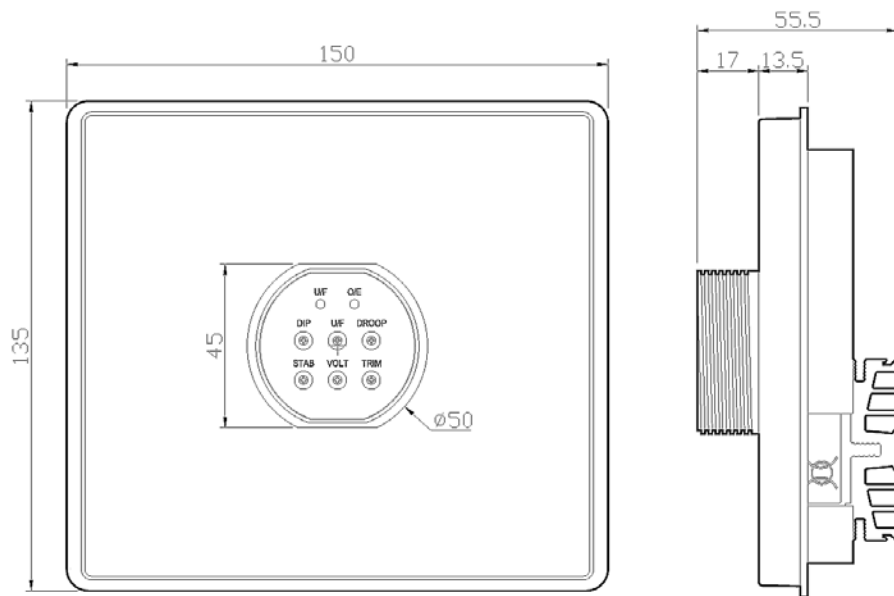
OVP Over Voltage Protection

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

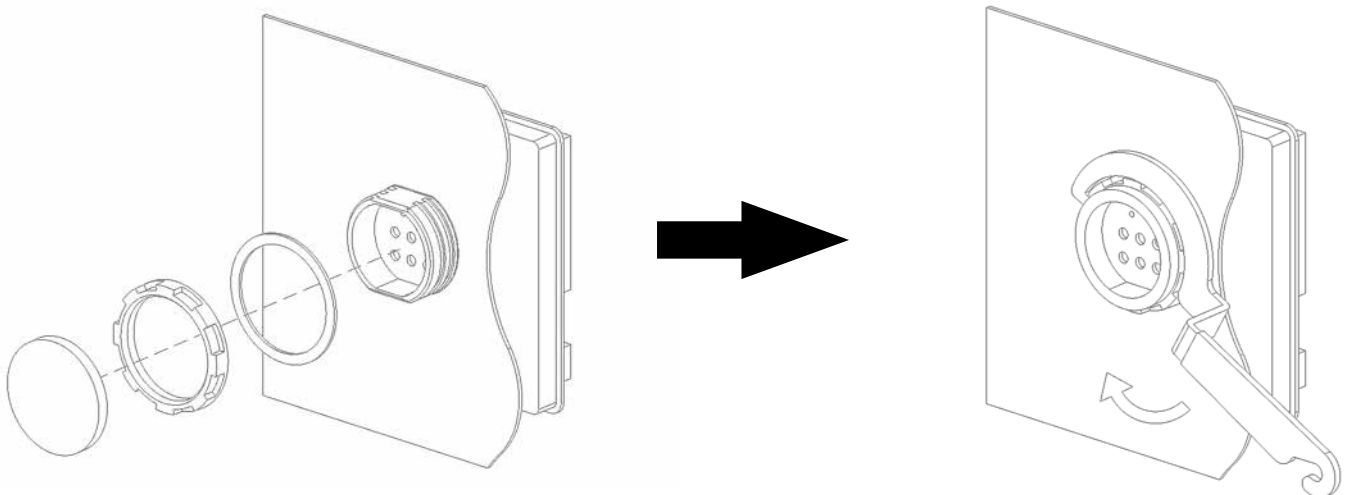
OVP Level Voltage

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

Outline Drawing



Installation



ATTENTION

1. AVR can be mounted directly on the engine, genset, switchgear, control panel, or any position that will not affect operation.
2. Plastic mounting torque: 30~50Kgf.cm

Warnings & Cautions





IMPORTANT INFORMATION

Please Read Carefully



This document is not intended to provide operational instructions. Appropriate Marathon Electric instructions provided with the generator and precautions attached to the generator should be read carefully prior to installation, operations and/or maintenance of the equipment. Injury to personnel or generator failure may be caused by improper installation, maintenance or operation.

The following  and  information is supplied to you for your protection and to provide you with many years of trouble free and safe operation of your Marathon Electric product:

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.**

CAUTION

- 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.

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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