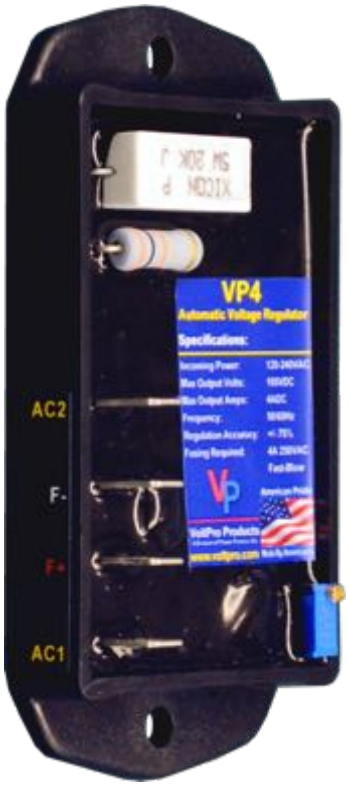
VoltPro Products

A Division of Power-Tronics, Inc.

VoltPro VP4

Automatic Voltage Regulator



The VoltPro VP4 Automatic Voltage Regulator is an affordable generator voltage regulator that is designed for the consumer market and can replace many popular voltage regulating systems on small portable generators and larger brushless generators up to 300kw.

VoltPro uses only high quality name-brand parts to manufacture the VP4, and every single regulator is vigorously tested both by static and real generator testing before final packaging to ensure that each unit conforms to our strict manufacturing and performance standards.

The VP4 is specifically designed to be very simple to install. It has only 4 connections to make to the generator and only one simple voltage adjustment screw. The regulator automatically matches itself to the generator, eliminating time and frustration during setup and commissioning.

Due to its extremely compact design, the VP4 is able to fit into very tight locations and is designed to replace compact OEM designs for many popular brands of generator sets, and owing to its totally encapsulated design it is able to withstand extremely harsh vibration and environmental conditions!

As with all of VoltPro's products, the VP4 is designed, manufactured, tested, and packaged in the USA!

Specifications:

Input / Sensing Voltage	120 / 240vac
Maximum Continuous Output Amperage	4adc
Average Field Voltage	32/63vdc
Maximum Field Forcing Voltage	52/105vdc
Minimum Field Resistance	8/16Ω
Frequency	50/60hz
Regulation Accuracy	+/- .75%
Minimum Buildup Voltage	3.5vac
Dimensions	4.05 x 2.1 x .75in
Weight	2.5oz
Customer Fusing Required	**Fast Blow 4A @ 250vac**

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Warning: **Do not use digital equipment to read voltage, Hz, or amperage during this installation. Use only analog sensing equipment! Failure to do so may result in damage to equipment or in personal injury! Make sure that all setup is done off line. Always wear eye protection and NEVER hold the regulator in your hand when energized!**

Installation Instructions:

Before installing the VP4 Automatic Voltage Regulator, you must determine your excitation voltage and field resistance to determine if the VP4 will work for your application.

For *Single-Phase* generators with excitation voltage **LESS THAN 32VDC** and field resistance **GREATER THAN 8Ω**, See **Connection 1**

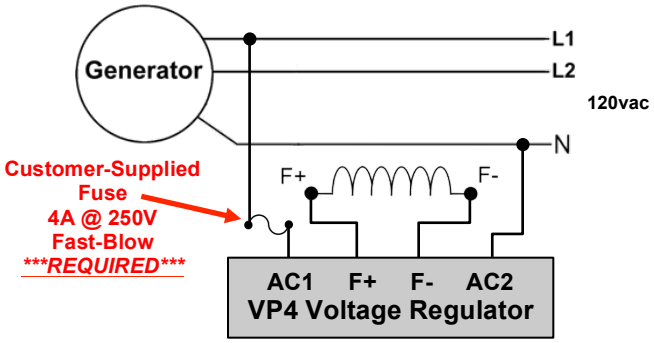
For *Single-Phase* generators with excitation voltage **63VDC OR LESS** and field resistance **GREATER THAN 16Ω**, See **Connection 2**

For 208/240V *Three-Phase* generators with excitation voltage **63VDC OR LESS** and field resistance **GREATER THAN 16Ω**, See **Connection 3**

For 416/480V *Three-Phase* generators with excitation voltage **63VDC OR LESS** and field resistance **GREATER THAN 16Ω**, See **Connection 4**

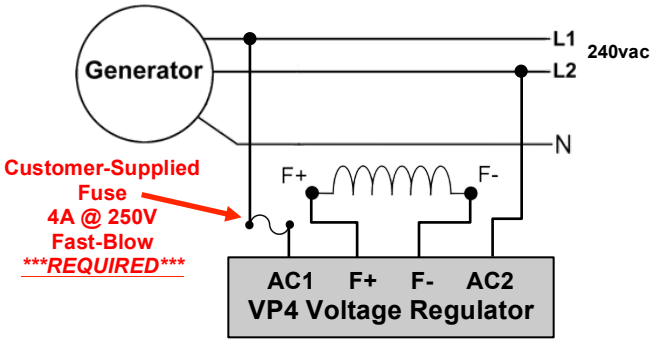
After performing a complete check of the generator and removing the original voltage regulator, install the VP4 voltage regulator and follow the wiring instructions below:

Connection 1



DO NOT connect the input of the VP4 to DPE, Aux, AREP, or PMG Windings!!!

Connection 2



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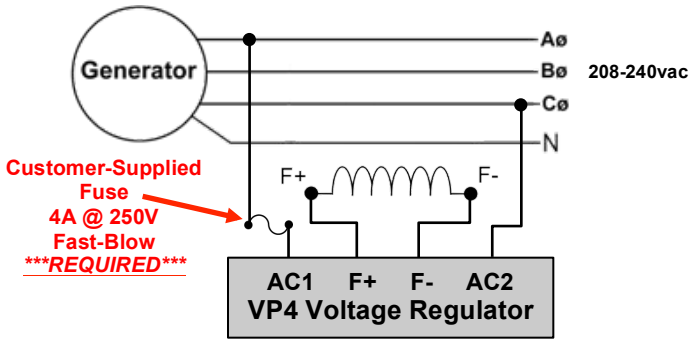
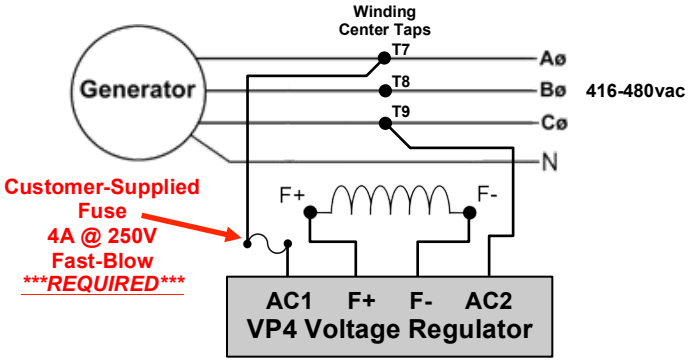
Connection 3



DO NOT connect the input of the VP4 to DPE, Aux, AREP, or PMG Windings!!!

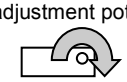
Connection 4



DO NOT connect the input of the VP4 to DPE, Aux, AREP, or PMG Windings!!!

Install the VP4 and connect as shown in the diagrams above. Connection 1 can only produce a maximum of 52vdc to the exciter field and should be used on low voltage exciters of 32vdc or less. Connections 2, 3 and 4 can produce a maximum of 105vdc to the exciter field and can be used on most brushless generators and smaller portable generators with brushes and slip rings. **Mount the regulator where it can receive cooling airflow!**

Start up the generator without load and bring up to rated speed and adjust the AC voltage if needed. The regulator is set to 120vac from the factory and will need to be adjusted to a higher voltage on 208 or 240vac systems. The adjustment potentiometer is a 25-turn design. It will take several turns of this pot to adjust the voltage.



Voltage adjustment - Turn CW to Raise

Run the generator for a few minutes and observe for proper operation before adding load.

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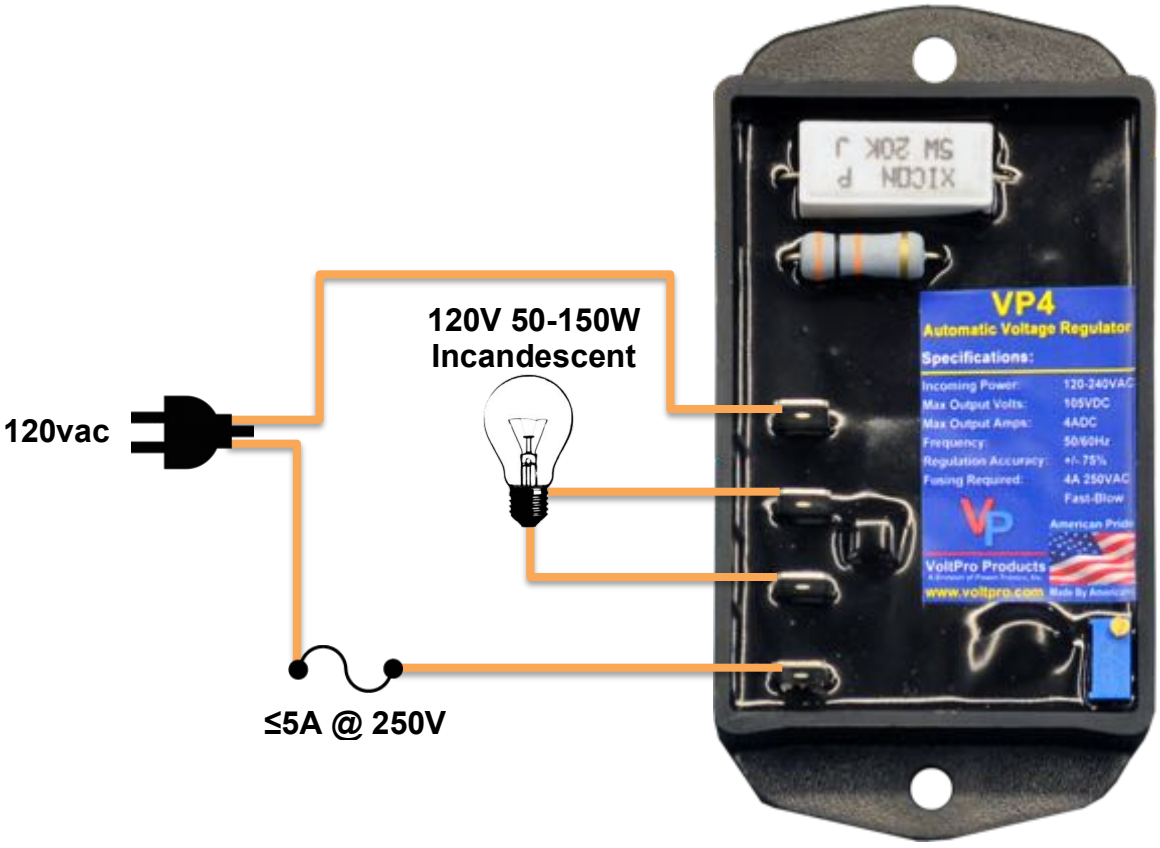
Bench-Test Procedure

1. Wire up the regulator as shown below.
2. Connect up a 120 volt 50 to 150 watt light bulb to the F+ and F- Terminals.
3. Adjust the internal voltage pot fully CCW (25 turns) or until a click is heard.
4. Input 120vac into the regulator at AC1 and AC2. (Fuse this input with fuses rated at 120 volts or higher and not more than 5 amps AC)
5. **Observation:** The the light bulb across F+ and F- should be off. **If the light is already on or if the fuse blows, do not continue this test! Regulator is defective!**
6. Turn the internal voltage adjustment CW until the light bulb across F+ and F- lights to half-brightness, then adjust the internal voltage adjustment CCW until the light bulb is off.
7. Remove the 120vac from the regulator.
8. **If you were able to successfully perform all of these tests, the regulator is good.**



VP4 FAQ's

Features & Sizing:

Q: ***Can the VP4 be used with generators over 240V?***
A: Yes. The VP4 can be used with higher voltage generators with a proper step-down transformer or by center-tapping your stator leads at T7 and T8 on 10 and 12 lead generators.

Q: ***My generator requires more than 63Vdc field voltage. Can I still use the VP4?***
A: Most likely not. The VP4 has a maximum forcing voltage of 105Vdc with a 240Vac input. Some brushless generators will still operate satisfactorily within these parameters, but most will require a full-wave rectified voltage regulator for higher field forcing voltages.

Q: ***How can I determine if I can use the VP4 on my generator?***
A: Your exciter field voltage should be 63Vdc or less, and your full load exciter field current should be less than 4Adc. Usually this information will be written on the generator nameplate. If you do not have this information, it can be easily calculated:

- Measure your exciter field resistance using a multimeter on your field leads. Record this value. If you have a brush-type generator, also take a resistance reading on your slip rings: the value you obtain on the slip rings should be no more than 1% difference from the value you obtained through the field leads.
- Next, start and run the generator and apply 12V from a battery through your field leads and record the AC voltage produced by the generator. To determine your full load exciter field voltage, use the following formula:

$$E_{Exc.} = \frac{E_{Gen.Conf.}}{\left(\frac{E_{Gen.Output}}{E_{Battery}}\right)} * 2$$

Where $E_{Gen.Conf.}$ is your Generator's configured voltage (eg: 120, 208, 240, 480V, etc), $E_{Gen.Output}$ is your recorded output voltage, and $E_{Battery}$ is your battery voltage (12V usually).

- Next, calculate your maximum exciter field amperage using your measured field resistance and your calculated exciter voltage using the following formula:

$$I = \frac{E}{R}$$

Where I is your maximum exciter field current, E is your calculated field voltage from the above formula, and R is your measured field resistance.

- **If your maximum field voltage is less than 63Vdc and your maximum exciter field current is less than 4Adc, the VP4 will fit your application.**

Q: ***Does the VP4 have underfrequency protection?***
A: Yes, in the form of an idle protection circuit. The VP4 will attempt to hold the generator voltage at it's setpoint until the frequency falls to approximately 45 Hz at which point the voltage will drop dramatically to protect the regulator and generator rotor.

Q: ***Is the VP4 compatible with my "X Brand Name" generator?***
A: The VP4 is a universal, generic replacement voltage regulator. It is compatible with all makes and models that fall within its voltage and current design limits.

Q: ***I have a 3 phase generator, can I use the VP4?***
A: Yes. For best regulation, feed the regulator with 240V from 2 phases.

Q: ***I have a generator with a PMG, can I use the VP4?***
A: Yes. You will bypass the PMG and power the regulator from the generator stator like a standard generator.

Q: ***I have a 480V generator, can I power the VP4 with 277V?***
A: No. You will destroy the regulator if you do! If your generator is a 10 or 12 lead set, simply tap T7 and T8 for 240V input to the regulator. If you have a 4 lead generator, you will need to use a step-down transformer.

Q: ***Can the VP4 use an external rectifier or static exciter module?***
A: No. The VP4 is a single-purpose regulator and will destroy any sort of rectifier module it is connected to! There is also a risk of catastrophic damage to the generator rotor! If you need a higher current capacity than the VP4 is capable of delivering, you will need a different voltage regulator.

Technical Help:

Q: ***My Generator doesn't generate when I start it up with the VP4 connected.***

A: • Verify you have the regulator hooked up properly as shown in the instruction booklet.
• Check your fuse and replace if blown. If you blow fuses when starting up, verify that the VP4 fits your application.
• Check your incoming AC voltage at AC1 and AC2 on the VP4: You should have at least 3.5V for proper buildup.
• Perform a bench-test as shown in the instruction booklet to verify that the VP4 is good.

Q: ***My Generator doesn't come up to the proper voltage when switched on.***

A: Verify that you have turned up the voltage adjustment pot and are running at the proper speed. The voltage regulator will be in idle-protection mode below 45 Hz, and the voltage adjustment will be set at 120V from the factory.

Q: ***I have tried to adjust the voltage on the VP4, but my voltage remains too low.***

A: The adjustment pot on the VP4 is a 25 turn pot. The adjustment is slower at lower voltages than at higher voltages. The VP4 comes set for 120V from the factory and will need to be adjusted for operation on 240V systems.

Q: ***I have erratic voltage regulation, pulsating voltage, or wide voltage swings.***

A: • Verify that you are running at the proper speed. Speeds below 45 Hz will cause the voltage to vary widely
• Make sure you have the voltage adjustment set properly, if it is set too low, the regulator may still be attempting to build itself up
• Check for loose or poor connections at the push-on terminals at the top of the VP4.
• What kind of load is attached to the generator? VFD, UPS, and non-linear loads in excess of 25% of the total LOAD (not capacity) of the generator will cause waveform distortions and poor or erratic regulation issues.
• In brushless sets, check the rectifiers on the rotating ring and verify that all are not shorted, broken, or burned.
• In brush-type sets, check the brushes and rings for proper contact. Pull the brushes out of the holders and inspect the faces. A surface other than mirror smooth indicates contact problems. Check your field resistance both through the brushes and directly on the slip rings with a multimeter: The value you measure should vary by no more than 1% MAXIMUM! Do not attempt to dress the rings with a seating stone, you will make the problem worse.

Q: ***My voltage fluctuates a couple of volts during operation.***

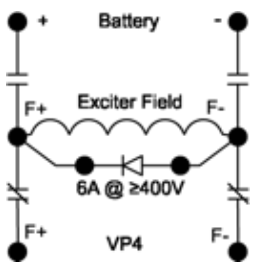
A: The VP4 should regulate +/-.5% of the setpoint during normal operation. This translates into +/-1V or so at 240V. Load variations or harmonics from a low-end genset can cause larger voltage deviations.

Q: ***My voltage runs away (goes high and uncontrollable) when the regulator is switched on.***

A: • Perform a bench test on the regulator to make sure it is good
• Make sure the field or brush holders (on brush type units) are not grounded
• Check if the exciter field is grounded. It should be isolated.
• If you have a brushless genset, check the rotating rectifiers. A shorted rectifier can cause a runaway condition when the generator is energized.
• The VP4 should be directly connected to the generator field. If there is an external flashing source or other device connected to the field leads, it should be disconnected for proper operation.

Q: ***My generator has low residual AC voltage and requires a battery flash.***

A: • Install a VPBF8 Automatic Battery Flash Module, this will automate battery flashing for you!
• If you wish to install a manual flashing circuit, you will need a DPDT momentary pushbutton switch rated at no less than 10A @ 28VDC and a diode rated at no less than 6A @ 400V. Refer to the contact diagram below for correct wiring. PAY SPECIAL ATTENTION TO WIRING POLARITY!!! The switch should be oriented such that the contacts are closed between the VP4 and exciter field when in its normal position (IE: Push-to flash).



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Warranty Disclaimer

VoltPro, a division of Power-Tronics, Inc, assumes no liability for damages, electrical or physical due to incorrect voltage or other voltage related damages resulting from either output of the generator or input to the generator exciter system. These problems should be protected with external devices provided by the customer such as fuses, surge suppressors, over/under voltage and frequency controls.

Because this product is fully encapsulated and it would be impossible to determine cause of failure, there is no warranty offered. We do certify that this product is manufactured with only the highest quality parts and is fully tested by both static testing and functionally tested on an electrical generator before final packaging.

This product should only be installed and maintained by a competent electrical generator technician.

Technical assistance for this product is only available through our web site http://www.voltpro.com . VoltPro does not allow returns or refunds, all sales are final.

No other warranty is expressed or implied.

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