



## CFM12

### Critical Flashing Module REV. 4



The Power-Tronics CFM12 Critical Flashing Module is a convenient and compact optional build up module for all Power-Tronics UVR and XR series Universal Voltage Regulators. The CFM12 offers an easy method to add a fully automatic battery flashing unit to any generator.

The CFM12 is a unique Critical Flashing Module designed specifically for generators with very low AC residual voltage, brush-type generators, and for any installation where guaranteed buildup is required. Operation is completely automatic and installation into a Power-Tronics regulating system is quick and easy.

The CFM12 Critical Flashing Module is an encapsulated design to withstand the harshest environmental conditions and provide extreme reliability. The control unit is encapsulated in an epoxy resin to insulate it from any contamination and moisture that may be present and to protect the control circuitry from any vibration that may be present.

The CFM12 Critical Flashing Module is compatible with all previous and current UVR and XR series Universal Voltage Regulators as well as select VR series voltage regulators. The CFM12 is also a very simple upgrade for installations using Power-Tronics BU120/240, BU500, or AFM500X series buildup modules!

### Specifications

Sensing Voltage:	208/240vac
Frequency:	50-400Hz
Buildup Pullout Voltage:	140-160vac
Output Voltage:	12vdc
Maximum Continuous Output:	12adc
Minimum Field Resistance:	1 $\Omega$
Storage Device:	Rechargeable, Sealed Battery
Battery Charger Input Voltage:	120 / 240vac*
Physical Size:	6 x 6 x 3 in.
Weight:	4 lbs
Encapsulated:	Yes

\* Voltage **MUST** be specified when placing order!



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## Introduction and Functional Description

# Caution: Read This Installation Manual Carefully and Entirely!

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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!

**ALWAYS** perform all setup procedures off-line

**ALWAYS** wear eye protection

**ALWAYS** strip wire insulation properly or use insulated connectors

**ALWAYS** use analog metering equipment when setting up the regulating system

**ALWAYS** ensure the CFM12 receives ample airflow

**NEVER** hold the CFM12 in your hand when energized

**NEVER** install the CFM12 in a place it can get wet or is exposed to the elements

**NEVER** mount the CFM12 over a screw, bolt, rivet, welding seam, or other fastener

**NEVER** disconnect the wiring while the unit is in operation

**NEVER** insert a screwdriver or other object under the CFM12

**NEVER** install a switch in the DC portion of the module's wiring

**NEVER** touch any exposed part of the CFM12 while in operation

**NEVER USE A DIGITAL FREQUENCY METER** (It can give a false reading!)

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## Functional Description

The CFM12 Critical Flashing Module is a proven design based on industry-standard flashing procedures and safety policies. The CFM12 provides a very compact automatic flashing or battery-flashing source to any Power-Tronics voltage regulating system quickly, easily, and safely.

When the generator is first energized, the voltage regulator typically begins its buildup mode where it brings the generator up to a given point before it goes into its regulation mode. Sometimes, however, the generator may have extremely low residual AC voltage or just have a hard time building up. In these situations, the voltage regulator has a difficult time building up the voltage to a point it can regulate. The solution in most situations like this is to flash the generator.

The CFM12 provides a fully automatic method to flash the generator during startup. Automatic flashing is often used on generators with sliprings and brushes and for generators with very low residual AC voltage (typically less than 3VAC) or in installations where a guaranteed buildup is required, such as hospitals, nursing homes, or correctional facilities.

The CFM12 Critical Flashing Module is based on time-proven flashing methods and features an extremely robust and reliable design. Both voltage inputs and battery inputs are unfused to attempt to force buildup even during a fault condition. Because of its simplicity and modular design, the CFM12 is quickly and easily serviced should the need ever arise.

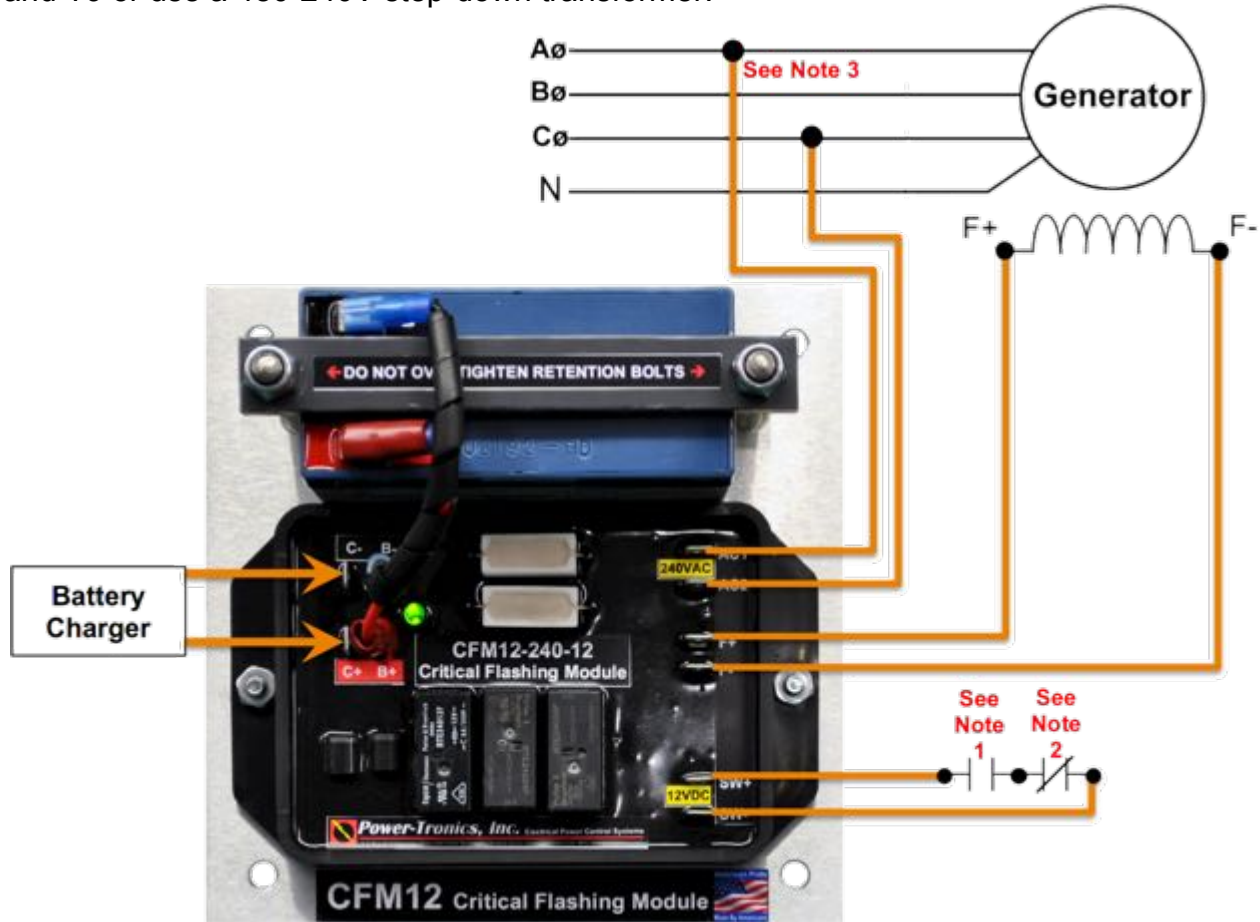


## 208 / 240V Hookup Diagram

This configuration uses the onboard 12V battery to build the terminal voltage to a point that the automatic voltage regulator can take over and perform its function. The CFM12 will automatically disconnect itself when the sensed voltage reaches approximately 140-160vac.

**Take special care to follow the wiring directions precisely! DO NOT use a signal voltage different from that marked on the CFM12 unit! Severe damage to the CFM12 will result!**

**Note that the maximum input voltage to the CFM12 Critical Flashing Module is 240VAC! DO NOT input 277VAC into the CFM12!** Severe damage to the unit will result! For use on 480V systems, either connect the unit to the winding center taps T7 and T9 or use a 480-240V step-down transformer.



**Note 1:** Oil or fuel pressure switch, relay or engine start circuit.

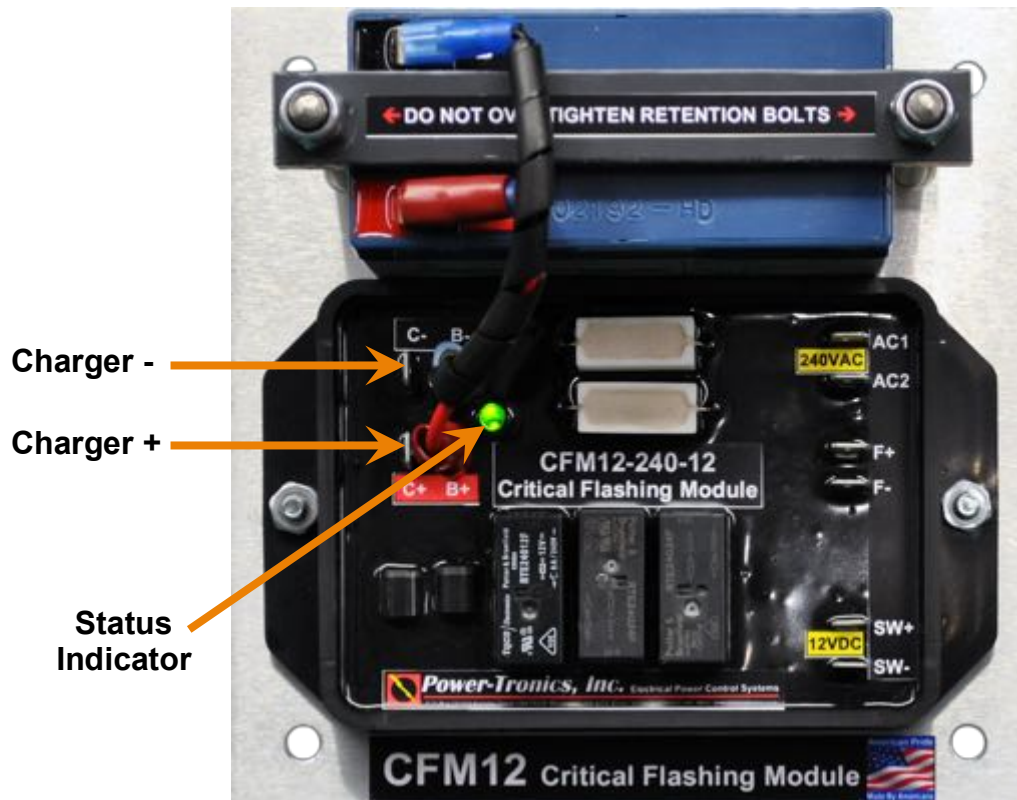
**Note 2:** This circuit should open when the voltage regulator off/on switch is in the off position.

**Note 3:** If Using the CFM12 on a 480V or higher generator, connect terminals 1 and 2 to the center taps of the stator leads T7 and T9, or use a step-down transformer as appropriate to supply 240vac to the CFM12.



## Initial Setup and Commissioning

1. Refer to your voltage regulator's instruction manual for initial setup and commissioning of the voltage regulator.
2. Verify that the positive (red) terminal is disconnected from the CFM12's internal battery.
3. Install the battery charger supplied with the CFM12 as shown in the hookup diagram on page 4 or 5. The terminals on the battery charger leads will be marked with a section of red vinyl tubing covering the positive terminal. If there is no marking on your terminals, the striped or ribbed wire is positive and the smooth or unmarked wire is negative. The positive lead from the charger connects to C+ and the negative terminal to C- on the CFM12 control module.
4. Observe the indicator light on the CFM12 circuit card. It should glow green if the battery charger is correctly connected. If the indicator is glowing, reconnect the red lead to the positive terminal on CFM12's internal battery.
5. Wire the CFM12 into your generator and regulating system as shown in the hookup diagram on page 4 or 5. The CFM12 is capable of being used on generators with field resistances down to  $1\Omega$ . If your field resistance is lower than  $1\Omega$ , please install a  $3\Omega$  100W power resistor in series with the F+ lead from the CFM12.
6. Verify that your wiring is correct, and then proceed to test the generator for proper buildup. When satisfactory buildup is achieved installation is complete.







## **Application Troubleshooting**

<b>Problem:</b>	<b>Possible Cause</b>
No Voltage	1 3 5 7 9 11 13 15 20 22
Pulsating Voltage	4 5 6 12 16
Flickering Voltage	4 6 7 14
High Voltage	6 7 8 9 12 13 15 17 18 20 21
Voltage Drop on Load	5 8 10 12 16
Low Voltage	1 5 8 12 13
Poor Voltage Regulation	2 4 10 12 13 16
No Voltage Control	1 13 15 19 20 21

### **Possible Causes:**

1. Open or loose connection, poor brush and slip ring contact, fuses are open in the regulator.
2. Unbalanced generator load.
3. Open exciter field or defective generator.
4. Non linear load or defective connection in exciter field.
5. Open diode in exciter or shorted rotor in generator.
6. Loose component in voltage regulator.
7. Loose wiring connections.
8. Input voltage to regulator is too low.
9. Exciter field is grounded.
10. Non linear load or wrong selection for regulator hookup.
11. Exciter fields are reversed.
12. Wrong selection of regulator wiring configuration.
13. Defective voltage regulator.
14. SCR or Inverter drive effecting generator waveform.
15. Defective CFM12 Critical Flashing Module.
16. Isolation transformer is too small.
17. Isolation transformer is needed.
18. Exciter fields are not isolated from other circuits.
19. Input and field circuit are being fed by a common cable or conduit.
20. Incorrect hookup or wiring.
21. Exciter field is grounded.
22. Drained battery.



## **Bench Test Procedure**

If you suspect a problem with your CFM12, it is possible to perform a bench test to verify functionality of the unit and determine if a repair or service is necessary. To perform a bench test on the CFM12, follow the directions below:

1. Verify that the battery is connected to terminals B+ and B- on the CFM12 control module.
2. Disconnect the charger from C+ and C- and verify that the status indicator is lit. If the indicator is lit, the battery contains a charge. **If the indicator does not light, verify the charger's operation in the next step. If the charger tests good, replace the battery.**
3. Disconnect the battery from B+ and B- and reconnect the charger to C+ and C-. Plug the charger into a 120V wall outlet and verify that the status indicator is lit. **If the indicator is lit, the charger is functioning normally. If the indicator does not light, replace the charger.**
4. Reconnect the battery to B+ and B- and connect a 12VDC light bulb to terminals F+ and F-. **The light bulb should be dark.**
5. Attach a jumper between terminals SW1 and SW2. **The light bulb should be bright.**
6. Apply rated sensing voltage to terminals AC1 and AC2. **The light bulb should be dark.** You may hear the relays buzz when you first apply the sensing voltage. If the buzzing does not stop, please contact Power-Tronics for assistance.

If your CFM12 passed all of the operational tests above, the unit is good. If any one of the tests failed or you are unsure of the result, please contact Power-Tronics for assistance.



## **Battery Replacement**

The internal battery on the CFM12 is considered to be a consumable item and will need replacement from time to time. The battery is not covered under product warranty.

**The recommended service interval for battery replacement is every 12 months in standby installations, or every 6 months in prime-power installations.**

To test operation of the internal battery, verify that the battery leads are connected to B+ and B- on the CFM12 control module. Disconnect the charger from C+ and C- and verify that the status indicator is lit. If the indicator is not lit, verify that the charger is working properly. Disconnect the internal battery from B+ and B-, then connect the charger to C+ and C-. Plug the charger into a 120V wall outlet and verify that the status indicator is lit on the CFM12 control module. If the indicator is lit, the charger is good, if not, the charger is bad and needs replacement. If the charger is good, but the battery fails to light the status indicator, replace the battery.

The battery voltage can also be tested with a multimeter. If the battery voltage reads 12.5V or higher, the battery is likely good. If the battery voltage is below 12V it should be replaced.

To replace the battery, remove the 2 retention nuts from the battery retention brace and pull the battery out of it's holder. Insert the new battery with the terminals facing the same direction as the old one. Reinstall the retention brace and retention nuts. Do not overtighten the retention nuts, it is only necessary to get them snug. The nuts are self-locking and do not require torquing.

### **Replacement Parts Information:**

#### **Battery:**

**Rating:** 12V @ 1.4Ah

**Type:** Sealed Lead-Acid

**Replacement Part Number:** Power-Tronics 5R1-215, Power-Sonic PS-1212, Panasonic LC-R121R3P or equivalent

#### **Battery Charger:**

**Rating:** 12V @ 300mA

**Type:** Switching Mode, Automatic Float/Charge

**Replacement Part Number:** Power-Tronics 5R1-214, Power-Sonic PSC-12300A-C or equivalent





## Installation Warranty Form

It is very important that you fill out this form completely when installing a voltage regulator. This form serves as a history record on the application. This form also contains the information needed by Power-Tronics, Inc., for repair and troubleshooting of any product you may be having problems with.

**Failure to fill out this form during installation will result in a cancellation of your warranty coverage! Filling out this form takes only minutes but will save hours or days later on if your product should require service!**

Product		Other options			
Serial Number					
Date of Installation					
Type of Generator				Model #	
	Brush type	<input type="checkbox"/>			
	Brushless	<input type="checkbox"/>			
AC Stator Information					
Wired for	Volts	Phase	Hz		
Generator Configuration: Lead					
Exciter/Rotor Information					
Exciter field resistance		$\Omega$		@ F+ / F-	$\Omega$
Exciter field volts		vdc		@ Slip Rings	$\Omega$
Description of problem with product or generator					
Your phone number			Name:		
Your fax number			Ship to Address:		
Your email address			Ship to City, State, Zip:		



## **PRODUCT WARRANTY**

**Power-Tronics, Inc.**, assumes no liability for damages 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**.

**Power-Tronics, Inc.**, warrants **only parts and workmanship** of this product for a **period of 2 years from the original date of purchase from Power-Tronics, Inc.** Under warranty, Power-Tronics, Inc. will replace, exchange or repair the defective product **without labor or parts cost to the customer**. Remaining warranty of the original product will be transferred to the replaced or repaired product. To obtain warranty, a copy of the original Installation Warranty Form must be sent in with the defective product, which clearly shows the purchase date and serial number of the defective part. A repair request form must be sent in with the product before repairs will begin. You can obtain this form by contacting Power-Tronics, Inc.

**Send repairs to: Power-Tronics, Inc., 2802 Cobbler Ln., Kerrville Texas USA 78028.**

***Send in repairs only by UPS or FedEx. USPS will NOT deliver to our facility!***

**Any one of the following conditions will void the warranty:**

- ❖ Overheating of the power supply resistor on the printed circuit card.
- ❖ Overheating of the SCR or freewheeling diode.
- ❖ Physical damage to the printed circuit card, housing or components.
- ❖ Unauthorized repair or alteration of printed circuit card.
- ❖ Installation by anyone other than a qualified professional generator service technician.
- ❖ Conductive or corrosive contamination of the circuit card.
- ❖ Removal of our company identification from the product.
- ❖ Removal of any conformal coating of the printed circuit card or components.
- ❖ Overheating of foil on the printed circuit card.
- ❖ Inappropriate or infeasible application.
- ❖ Use with any external device other than manufactured by Power-Tronics, Inc.
- ❖ Failure to fill out the attached warranty card during installation

**No other warranty is expressed or implied.**