



# PC2000B-3P Series

## 3-Phase Phase-Controlled Power Supply

The Power-Tronics PC2000B-3P Series of 3-Phase DC Power Supplies are a self-contained complete industrial DC power supply designed for operation at 125/250vdc at up to 200Adc!

The PC2000B-3P Series is uniquely designed to sit in a compact footprint while being passively convection cooled for a long service life. Because of its unique modular design, the PC2000B-3P Series minimizes downtime should a repair ever be necessary! The compact design allows a wide variety of installation methods, including installations where space is at a premium.

Retrofitting an existing application with non-standard transformer voltage is easy thanks to the wide range of suitable input voltages to the rectifier section! Designing a new installation is simplified thanks to the ability to accept standard transformer secondary voltages.

The PC2000B-3P Series is a time-proven design, utilizing high-reliability components and a unique modular design to simplify repair should any failure occur.

The PCM-3P control module includes an internal 0-10VDC or 4-20mA interface module to allow a wide variety of VAR, PF, or other PLC controls to remotely control the unit.

An optional PCM-3PAF control module is available with onboard residual self-flashing capability to allow for use on shunt-powered generator sets (with appropriate PLC control).

The PC2000B-3P Series is designed to provide a lifetime of service and is specifically built to minimize failures and potential downtime!

### Specifications

Input Voltage (PC2125B-3P):	160 - 240vac, 3 $\phi$
Input Voltage (PC2250B-3P):	320 - 416vac, 3 $\phi$
Frequency:	50 or 60 Hz
Output Voltage (PC2125B-3P):	0-225vdc @ 240vac input
Output Voltage (PC2250B-3P):	0-390vdc @ 416vac input
Maximum Continuous Output:	200Adc
Minimum Field Resistance:	.83 $\Omega$ (PC2125B-3P) 1.7 $\Omega$ (PC2250B-3P)
Physical Size:	22 3/4 x 24 1/4 x 9 in.
Weight:	35 lb.
Control Module:	PCM-3P
Optional Control Module:	PCM-3PAF
Internal Protection:	Fuses, cartridge type
External Voltage Control:	Yes, 0-10vdc @ 4-20mA
Output Limiter:	42-100% of Max Output

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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 regulator

**ALWAYS** ensure the static exciter receives ample airflow

**ALWAYS** use adequate fusing

**NEVER** hold the static exciter in your hand or lap when energized

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

**NEVER** mount the static exciter over a screw, bolt, rivet, seam, or other fastener

**NEVER** remove the regulator cover while the unit is in operation

**NEVER** insert a screwdriver or other object under the regulator cover

**NEVER** touch any exposed part of the chassis during operation (**LIVE HEATSINKS**)

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

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

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## Functional Description

The PC2000B-3P Series of Phase Controlled Power Supplies is the result of over 35 years of engineering efforts and offers high-demand features at a competitive price point. The PC2000B-3P Series of Phase Controlled Power Supplies are a proven design and is engineered to greatly simplify setup while offering extreme reliability. When properly installed, the PC2000B-3P Series of Phase Controlled Power Supplies are designed to provide a lifetime of service.

An automatic phase control has several automated tasks it must perform in order to provide reliable, clean, and regulated electricity. It must maintain a preset setpoint and protect both itself and the connected load should a fault situation arise.

The PC2000B-3P Series of Phase Controlled Power Supplies use field-replaceable cartridge fuses to protect its internal circuitry should a fault occur and the load current exceeds what the phase control is capable of delivering. It also contains reliable circuitry that is designed to maintain a setpoint regardless of outside influences or ambient temperature.

Due to its extreme simplicity, the PC2000B-3P Series of Phase Controlled Power Supplies is uncommonly reliable and offers features and accuracy usually only offered by much more complicated and often much more expensive phase controls.

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## Determining Correct Application Sizing

The PC2000B-3P Series 3-Phase Power Supplies are designed for use with 160-240VAC or 320-416VAC 3Ø input. It contains internal suppression for use with brush-type loads such as synchronous motors. Before installation, it is necessary to verify that the PC2000B-3P Series is the correct product for your application.

To determine if the PC2000B-3P Series is the correct product for your generator you need to know any two of the following 3 specifications from the rating plate of your generator:

- 1: Exciter Field Voltage (in DC Volts) [Generally given in full load Voltage on nameplates]
- 2: Exciter Field Resistance (in Ohms) **[See Note Below]**
- 3: Exciter Field Amperage (in DC Amps) [Generally given in full load Amps on nameplates]

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**Using the specifications obtained from your generator exciter, verify that your generator fits the specifications from the chart below:**

- ☐ Connected load full load voltage is **125VDC or less**, and your control field resistance is **.83Ω or greater**. **Use PC2125B-3P**
  - ☐ Connected load full load voltage is **250VDC or less**, and your control field resistance is **1.7Ω or greater**. **Use PC2250B-3P**
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**WARNING:** BRUSH AND SLIP RING CONNECTION PROBLEMS ARE THE #1 SOURCE OF VOLTAGE CONTROL PROBLEMS AND FAILURE OF PHASE CONTROLS!!! **DO NOT INSTALL THE PC2000B-3P SERIES IF THE BRUSHES AND/OR SLIP RINGS ARE NOT IN EXCELLENT CONDITION!!!**

**STOP AND CORRECT BRUSH AND SLIP RING CONNECTION PROBLEMS IF ANY OF THE FOLLOWING CONDITIONS ARE PRESENT:**

- ☐ GROOVES IN SLIP RINGS
- ☐ ROUGH SLIP RING APPEARANCE OR GHOSTING (CHATTERING)
- ☐ OIL CONTAMINATION ON BRUSHES OR SLIP RINGS
- ☐ DULL, ROUGH, STRIPED, PITTED, OR METALLIC APPEARANCE OF BRUSH FACES
- ☐ FIELD RESISTANCE MEASURED BETWEEN SLIP RING BRASS AND FIELD RESISTANCE MEASURED BETWEEN FIELD LEADS EXCEEDS 1-2% DIFFERENCE

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## Note about Field Resistance

When measuring field resistance on a brush-type device, such as a synchronous motor, measure the resistance through both the field leads as well as directly on the slip rings themselves.

**The readings you obtain should ideally be the same, but *no more than 1% difference*.**

If you show more than 1% difference in reading your device has brush and ring contact problems and will need cleaning or maintenance before installing the PC2000B-3P.

**Failure to correct brush and ring contact problems will result in severe damage to the phase control as well as possible PERMANENT damage to the slip rings themselves!**

**NEVER use emery cloth, carborundum stones, “comm sticks”, or Tuner cleaner to dress or clean slip rings!**

They will make a bad problem much, much worse! Only use Garnet or Flint sandpaper and clean with a clean rag soaked with Acetone for best results!

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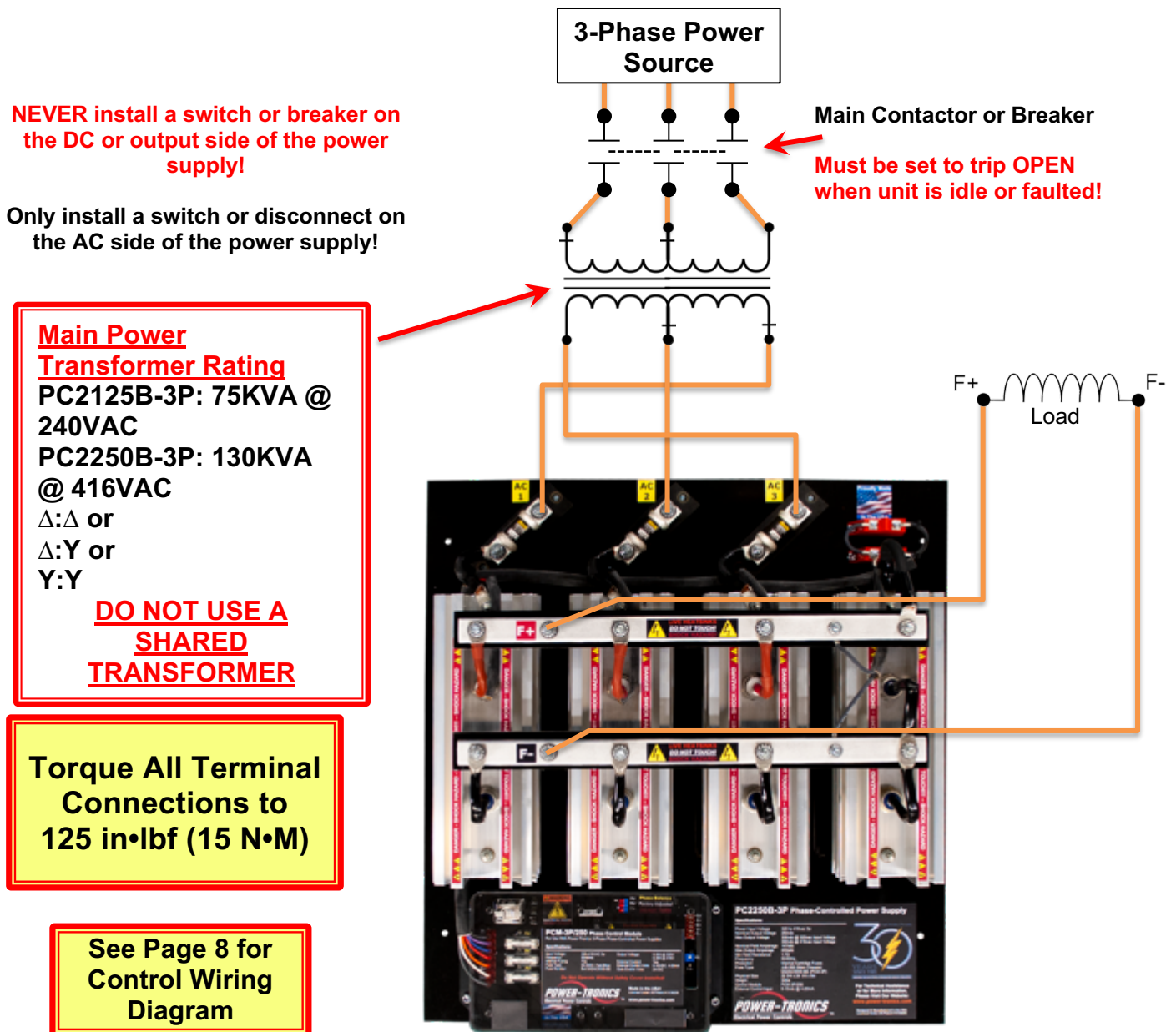
# Input Power & Field Connection Diagram

(See page 8 for control wiring diagrams)

The PC2000B-3P Series Power Supply is a half-controlled 3-phase Full-Wave rectified industrial DC power supply, which allows a maximum of 225/390VDC at 200 ADC with an input voltage of 240/416VAC 3 $\phi$ .

This product is typically used on inductive loads such as synchronous motors or slip-ring generators with full load field voltages of 125/250VDC or less and full load exciter field amperages between 80 and 160ADC.

**Note that the maximum input voltage to the PC2125B-3P is 240VAC 3 $\phi$ ! Maximum input voltage to the PC2250B-3P is 416VAC 3 $\phi$ ! **DO NOT input inappropriate voltage into the PC2000B-3P Series!** Severe damage to the unit will result!**



For Technical Support:

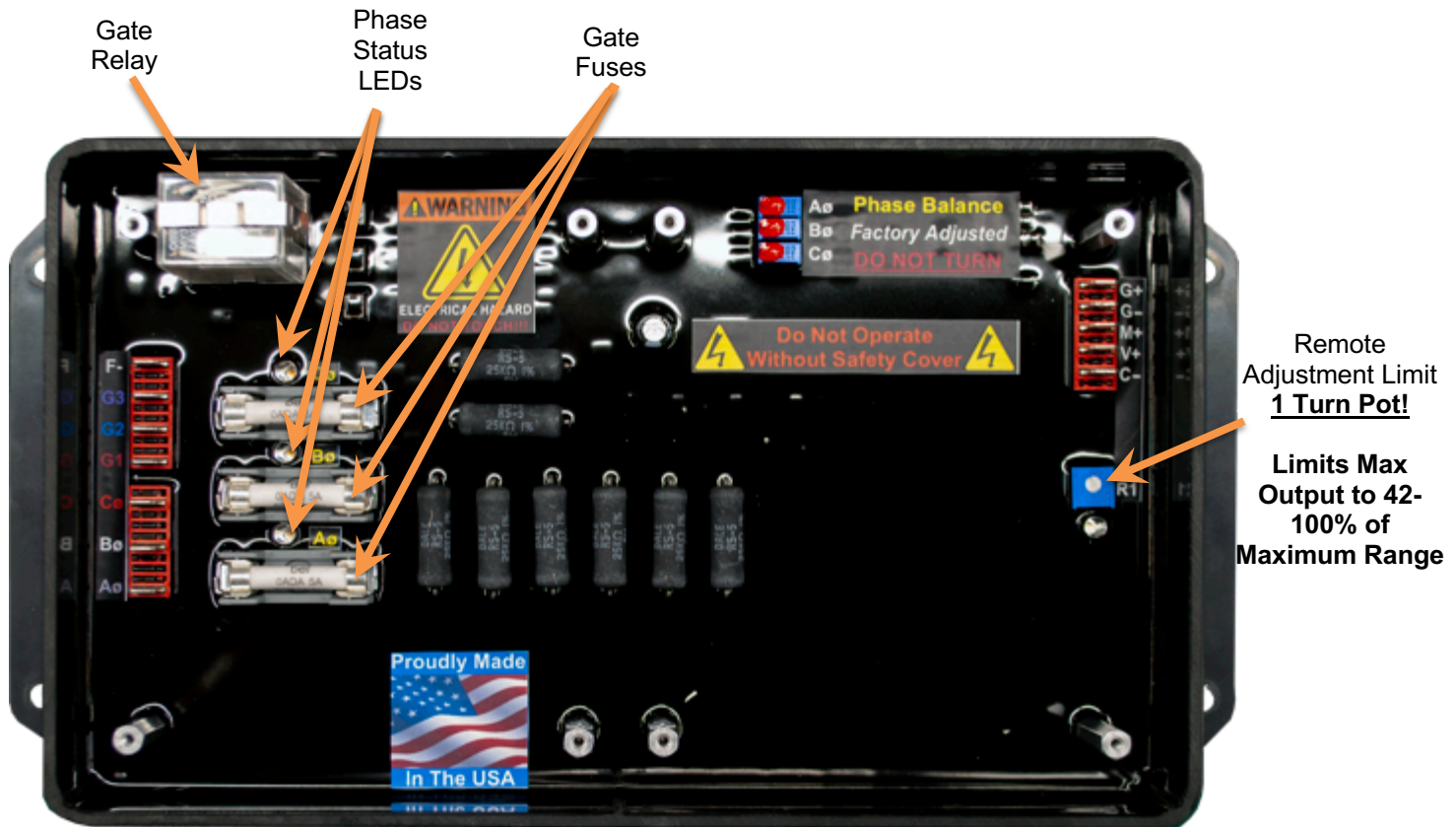
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## PCM-3P Control Module

The PCM-3P Control Module is an integrated device designed to replace multiple discrete components in previous generations of DC Power Supplies. It incorporates a Phase Control Module, AC Input Filtering, and integrated 0-10VDC / 4-20mA Interface Module.

The unitary design simplifies installation in the field, and greatly simplifies replacement if a fault occurs with the control module. The unit has 7 color-coded wires with quick-connect terminals, and can be quickly swapped out in under 5 minutes without the need to remove the chassis from its enclosure or tray.



### Terminal Descriptions:

**Colored Terminals (Aø, Bø, Cø, G1, G1, G3, F-):**  
Chassis Wiring (Color-Coded)

**G+ & G-:**

Gate Enable Pins

Apply 24VDC to G+ & G- To Run Exciter

**V+, M+ & C-:**

Input for 0-10V (V+ & C-) or 4-20mA Signal (M+ & C-)

**For Technical Support:**

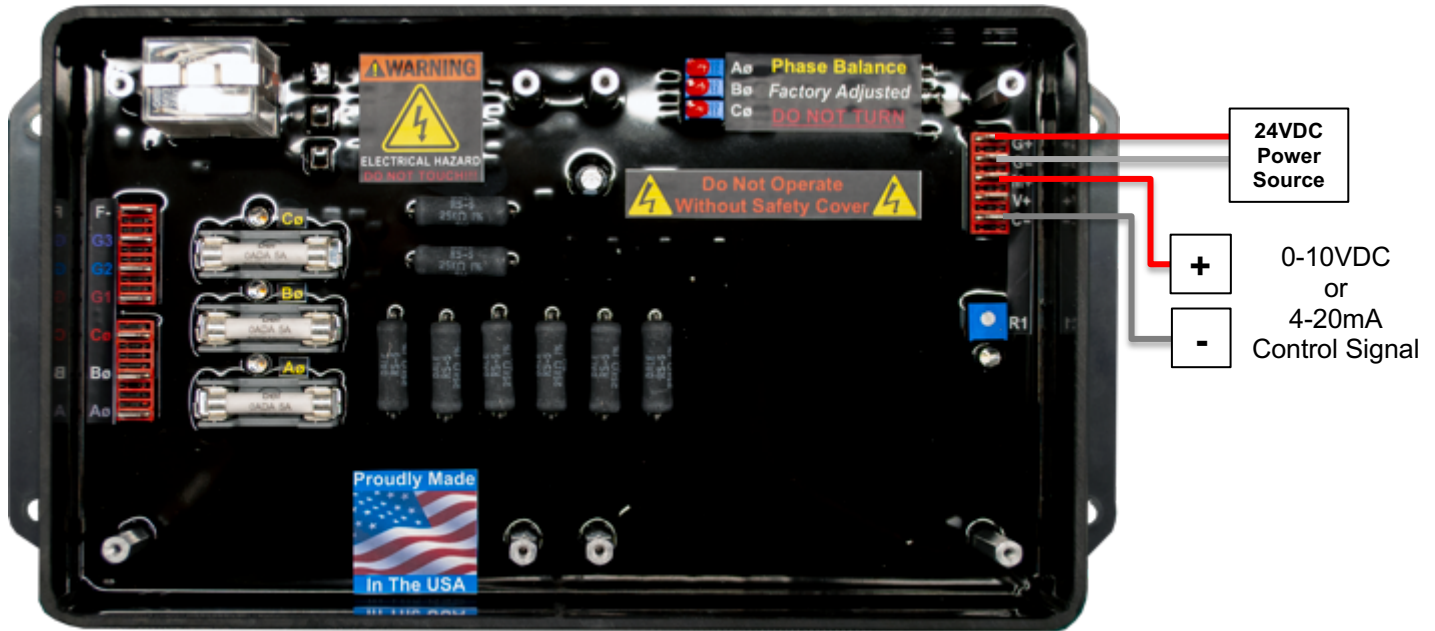
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## Standard Control Wiring Diagram

This wiring diagram shows the control wiring configuration.  
Power wiring is shown on Page 6.

**Note that the PCM-3P requires control signal from a 0-10V or 4-20mA source such as a PLC.**



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## Initial Setup and Commissioning

1. Install the PC2000B-3P Series Power Supply and wire according to the correct wiring diagram and control wiring diagram (**Pages 6-8**).
2. If installing the PC2000B-3P Series Power Supply on a load containing slip rings and brushes, verify that the brushes and brush riggings are isolated, ungrounded, and connected **ONLY** to the PC2000B-3P Series Power Supply.
3. Base Voltage and is preset from the factory for use with the internal 0-10V or 4-20mA interface module.
4. If you are remotely controlling the PC2000B-3P Series Power Supply with a 4-20mA control signal, verify that the control wires are connected to M+ and C-. For 0-10V control signals, connect control wires to V+ and C- for a higher impedance input.
5. If you are using the PC2000B-3P Series Power Supply on a synchronous motor, bring the motor up to operating speed and energize the gate relay, G+ & G-
6. Adjust the remote control voltage until reaching the desired voltage setting for the connected load.
7. Observe operation during no-load and full-load conditions. Once the voltage is set and adjustment characteristics are satisfactory the installation procedure is complete.

**NOTE:** Tolerances in control arrangements can cause the base voltage to rise preventing the PC2000B-3P Series Power Supply from reaching 0VDC output. If this occurs, the base voltage can be adjusted using the **Phase Balancing** adjustment potentiometers on the PCM-3P control module. Contact Power-Tronics for assistance if making this adjustment.

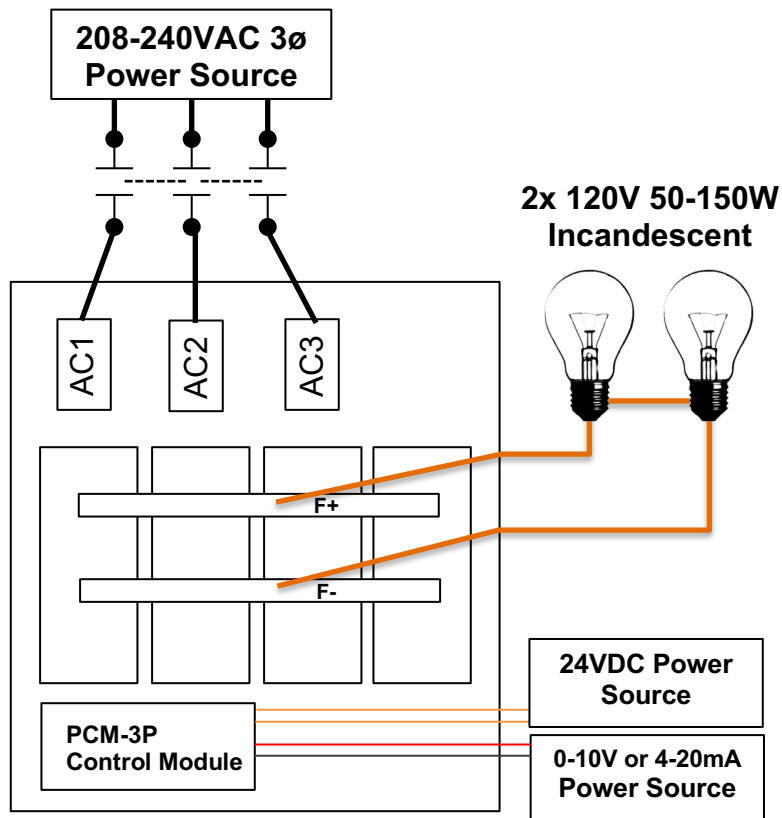
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# Bench Check Procedures

1. Wire the PC2000B-3P Series as shown in the figure below.
2. Connect two 120 volt 50 to 150 watt light bulbs in series to the F+ and F- Terminals.
3. Install a switched 24vdc power source to terminals G+ and G- on the PCM-3P Control Module.
4. Input 208-240VAC, 3 $\phi$  fused at no more than 5A into the PC2000B-3P Series. **The test light should be OFF.**
5. Turn on the 24vdc power source to terminals G+ and G- on the PCM-3P Control Module. **The test light should be OFF.**
6. Slowly increase external 0-10V control signal until the lights glow. **The test light should light to FULL Brightness.**  
**NOTE: The Power-Supply should act similar to a light dimmer!**
7. Slowly decrease external 0-10V control signal until the lights go dark. **The test light should be OFF.**  
**NOTE: The Power-Supply should act similar to a light dimmer!**
8. Turn off power and disconnect the PC2000B-3P Series from your power sources. Inspect all electronic components on the PC2000B-3P Series to ensure they are isolated from touching any part of the housing or chassis.
9. If you were able to successfully perform all of these tests, the PC2000B-3P Series is good.



## Fuse Replacement Information:

PC2000B-3P Series Main Chassis:  
 Rating: 200A @ 600VAC  
 Qty: 3  
 PTI Part # 5CF-808  
 Cooper-Bussman Part # JJS-200

PCM-3P Control Module:  
 Rating: 5A @ 600VAC/DC  
 Qty: 3  
 PTI Part # 5R3-795  
 Bel Part # 0ADAC5000-BE

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# 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 Model:	Additional Module(s) or Options:
Serial #:	
Date of Installation:	
<b><u>This Section for Brushless Generators Only</u></b>	
Exciter Field Voltage:	Exciter Field Resistance:
<b><u>This Section for Brush-Type Generators Only</u></b>	
Shunt-Field Voltage:	Shunt-Field Resistance:
Rotor Resistance @ Brush Leads:	Rotor Resistance on Slip-Rings:
Rotor Excitation Voltage:	
<b><u>Generator Wiring/Usage Information</u></b>	
Generator Leads (Check One:) <input type="checkbox"/> 12 <input type="checkbox"/> 10 <input type="checkbox"/> 6 <input type="checkbox"/> 4 (3Ø) <input type="checkbox"/> 4 (1Ø) <input type="checkbox"/> 3	
Generator Wiring Mode (Check One:) <input type="checkbox"/> High-Wye <input type="checkbox"/> Low-Wye <input type="checkbox"/> Series Delta	
<input type="checkbox"/> Zig-Zag <input type="checkbox"/> Double-Delta <input type="checkbox"/> Single-Phase <input type="checkbox"/> Other	
Terminal Voltage:	Residual AC Voltage:
Rated KW:	Rated KVA:
Primary Load (Please Explain):	
<b><u>Repair/Warranty Request Information</u></b>	
Company Name:	
Contact Person:	
Telephone Number:	
Email Address:	
Ship-To Address (City, State, Zip, Country):	
Problem Description/History (Please be detailed!!!):	

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# 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 3 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.**

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