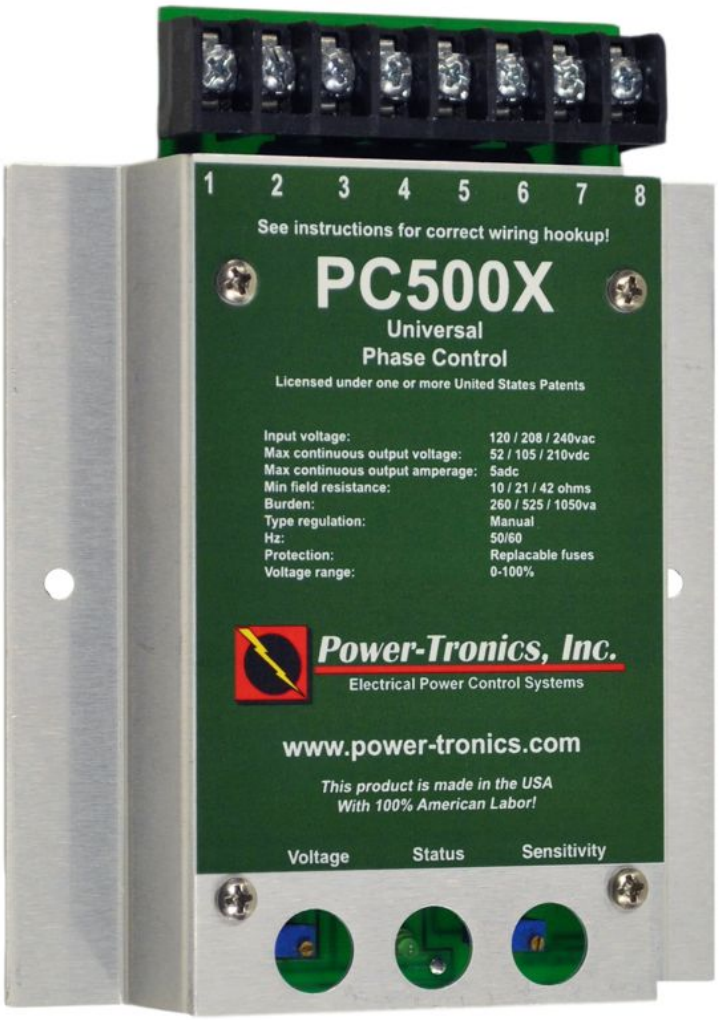
Power-Tronics, Inc. Electrical Power Control Systems

P.O. Box 291509 Kerrville, Texas 78029 Phone: 830.895.4700 Fax: 830.895.4737 Email: pti@power-tronics.com Website: www.power-tronics.com



PC500X

Universal Phase Control

The Power-Tronics PC500X Universal Phase Control is the latest upgrade for all UVR and XR series phase controls. The PC500X is also capable of replacing other manufacturers' phase controls and has optional Static Exciter Modules to boost its capacity to 30 amps DC!

The PC500X is a unique, Universal Phase Control that is designed specifically for Professional Service Technicians and the Electrical Repair Industry. It offers stable voltage control regardless of the connected load and ambient temperature. The PC500X is a ruggedized design and is engineered to provide a lifetime of trouble-free operation.

PLC and automated control is possible with the PC500X by simply adding an optional, inexpensive digital interface module. This capability makes the PC500X suitable for automated or unattended installations.

Like our previous models, the PC500X is fully repairable! All major electronic components are not encapsulated to facilitate repair while all sensitive components are encapsulated to protect them from contamination and moisture.

The PC500X is compatible with all previous and current optional modules available for use with Power-Tronics phase controls making it extremely simple to upgrade an older phase control installation with the modern features offered by the PC500X.

Specifications

Input Voltage:	120 / 208 or 240vac
Frequency:	50 or 60hz
Control Range:	0-100%
Output Voltage:	0-52vdc @ 120vac input 0-105vdc @ 240vac input 0-210vdc @ 240vac input
Maximum Continuous Output:	5adc
Minimum Field Resistance:	10.5Ω @ 52vdc output 21Ω @ 105vdc output 42Ω @ 210vdc output
Physical Size:	4.75 x 6 x 1 in.
Weight:	7 oz
Repairable:	Yes
Internal Protection:	Fuses, cartridge type
External Voltage Adjustment:	Yes
System Operating Indicator:	Yes
Optional Static Exciter Modules	Yes
Optional External Controls	Yes

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Table of Contents

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Introduction and Functional Description

Caution: Read This Installation Manual Carefully and Entirely!

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 phase control
ALWAYS ensure the phase control receives ample airflow
NEVER hold the PC500X in your hand when energized
NEVER install the PC500X in a place it can get wet or is exposed to the elements
NEVER mount the PC500X over a screw, bolt, rivet, welding seam, or other fastener
NEVER remove the PC500X cover while the unit is in operation
NEVER insert a screwdriver or other object under the phase control cover
NEVER install a switch in the DC portion of the phase control's wiring
NEVER USE A DIGITAL FREQUENCY METER (It *can give a false reading*!)

Functional Description

The PC500X Universal Phase control is the result of over 20 years of engineering efforts and offers high-demand features at a competitive price point. The PC500X is a proven design and is engineered to greatly simplify setup while offering extreme reliability. When properly installed, the PC500X Universal Phase control is 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 PC500X uses field-replaceable 20mm glass 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 PC500X Universal Phase control 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 Which Hookup Configuration to Use

STOP! **If you are using an optional SE350 or SE450 Static Exciter Module, *DO NOT* use these instructions for hookup! See the instructions that came with your module instead!**

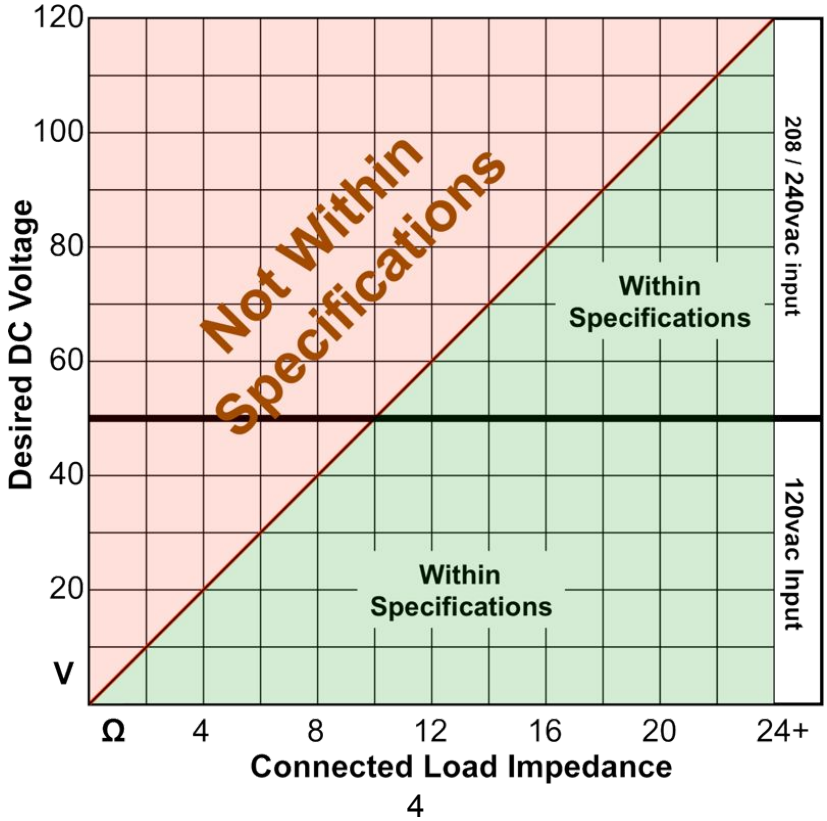
The PC500X Universal Phase control is configurable for 3 different output ranges suitable for use on a vast majority of loads with varying voltage or current requirements. It is necessary to choose the proper mode of operation for your connected load in order to get the most accuracy and greatest stability out of your PC500X

To determine the proper connection for your load you need to know any two of the following 3 specifications:

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

Using the specifications obtained from your connected load, select a Connection (A, B, C, or D) from the chart or graph below:

- Connected load will be an external rectifier bank or Triac. **Use Connection A (See Page 6)**
- Connected Load will be a coil or field and load field resistance is more than 40 ohms and excitation full load voltage is rated at 125vdc or less. **Use connection B (See Page 7)**
- Connected Load will be a coil or field and load field resistance is more than 21 ohms and excitation full load voltage is rated at 63vdc or less. **Use connection C (See Page 8)**
- Connected Load will be a coil or field and load field resistance is more than 10 ohms and excitation full load voltage is rated at 32vdc or less. **Use connection D (See Page 9)**



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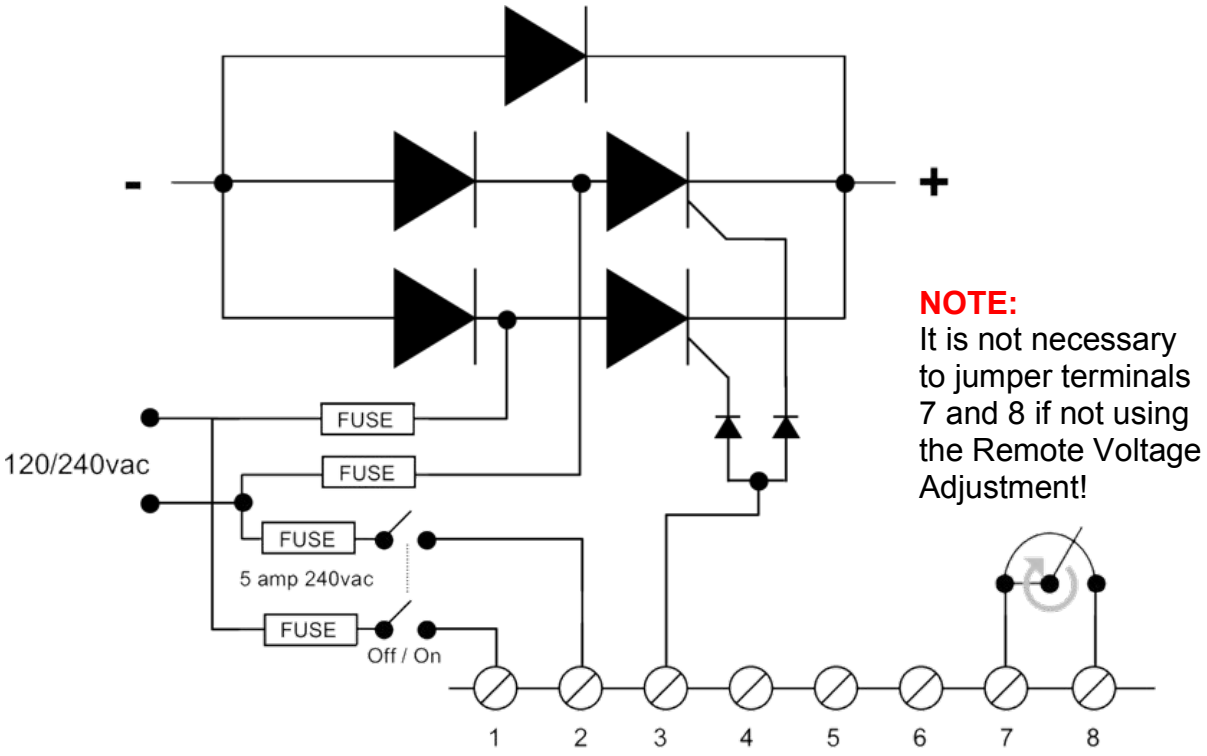
Connection A

Connection A is a Full-Wave rectified configuration, which allows a maximum of 210VDC at 5 ADC continuous with an input voltage of 240VAC and a phase control range of 0-100%.

This connection is typically used when the customer has an existing rectifier or Triac bank they would like to fire with the PC500X.

Note that the maximum input voltage to the PC500X Universal Phase control is 240VAC! DO NOT input 277VAC into the PC500X! Severe damage to the unit will result! **For use on 480V systems use a 480-240V step-down transformer.**



NOTE:
It is not necessary to jumper terminals 7 and 8 if not using the Remote Voltage Adjustment!

PC500X Universal Phase control

NOTE:
A disconnect or switch should be installed in series with the incoming power to terminals #1 and #2 on the PC500X.

NEVER install a switch or breaker on the DC or Exciter side of the phase control! Only install a switch or disconnect on the AC Side of the phase control!

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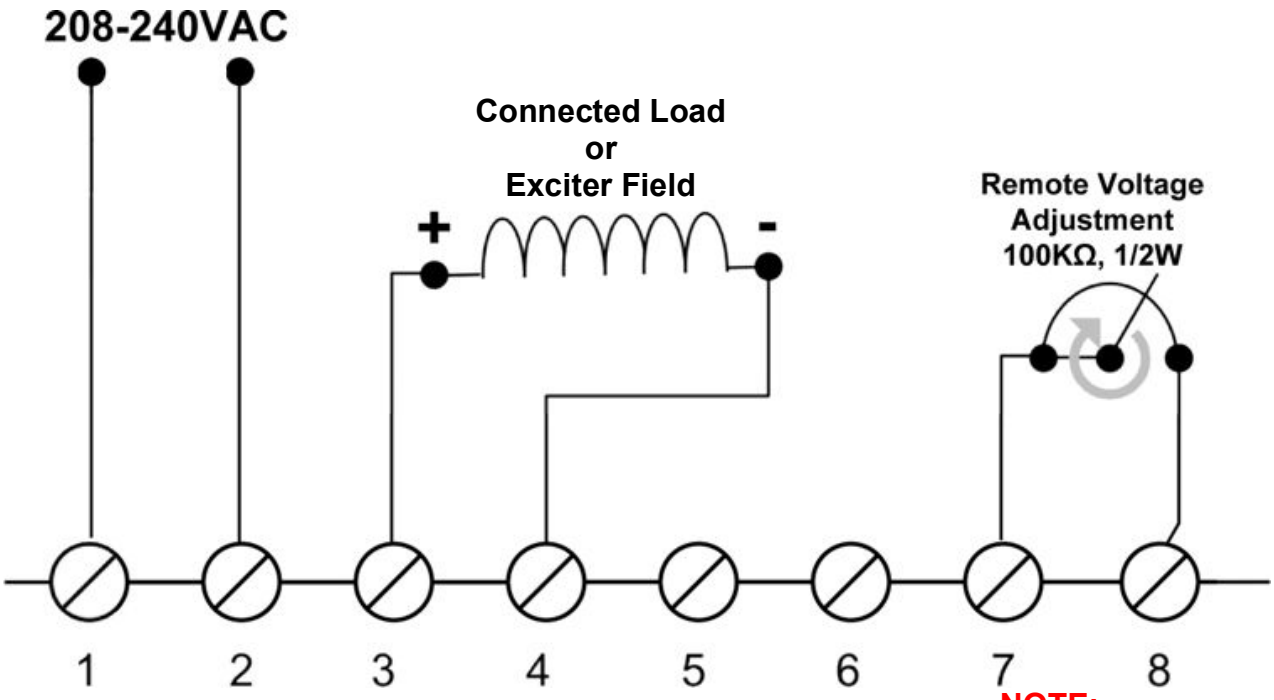
Connection B

Connection B is a Full-Wave rectified configuration, which allows a maximum of 210VDC at 5 ADC continuous with an input voltage of 240VAC and a phase control range of 0-100%.

This connection is typically used when the desired DC voltage is greater than 63VDC or where an output voltage above 100VDC is required.

Note that the maximum input voltage to the PC500X Universal Phase control is 240VAC! DO NOT input 277VAC into the PC500X! Severe damage to the unit will result! **For use on 480V systems use a 480-240V step-down transformer.**



PC500X Universal Phase control

NOTE:
It is not necessary to jumper terminals 7 and 8 if not using the Remote Voltage Adjustment!

NOTE:
A disconnect or switch should be installed in series with the incoming power to terminals #1 and #2 on the PC500X.

NEVER install a switch or breaker on the DC or Exciter side of the phase control! Only install a switch or disconnect on the AC Side of the phase control!

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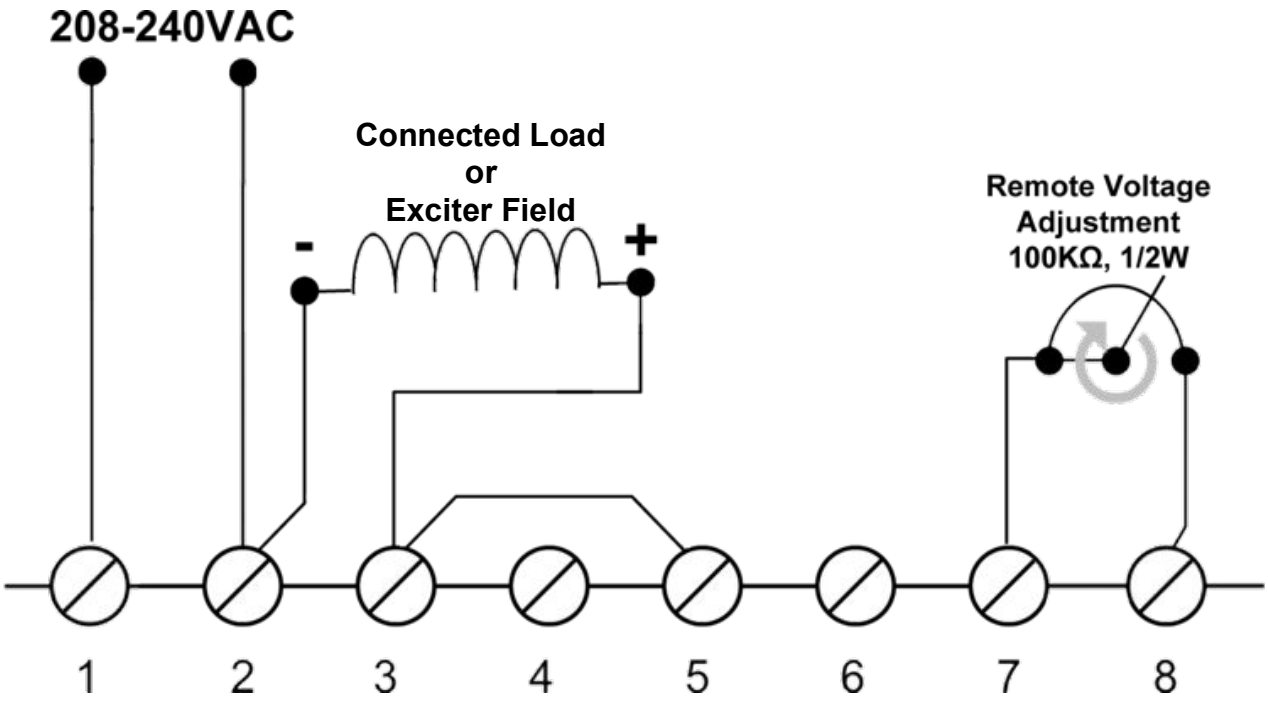
Connection C

Connection C is a Half-Wave rectified configuration, which allows a maximum of 105VDC at 5 ADC continuous with an input voltage of 240VAC and a phase control range of 0-100%.

This connection is typically used when the desired DC voltage is greater than 32VDC or where an output voltage above 63VDC, but less than 105VDC is required.

Note that the maximum input voltage to the PC500X Universal Phase control is 240VAC! DO NOT input 277VAC into the PC500X! Severe damage to the unit will result! **For use on 480V systems use a 480-240V step-down transformer.**



PC500X Universal Phase control

NOTE:
It is not necessary to jumper terminals 7 and 8 if not using the Remote Voltage Adjustment!

NOTE:
A disconnect or switch should be installed in series with the incoming power to terminals #1 and #2 on the PC500X.

NEVER install a switch or breaker on the DC or Exciter side of the phase control! Only install a switch or disconnect on the AC Side of the phase control!

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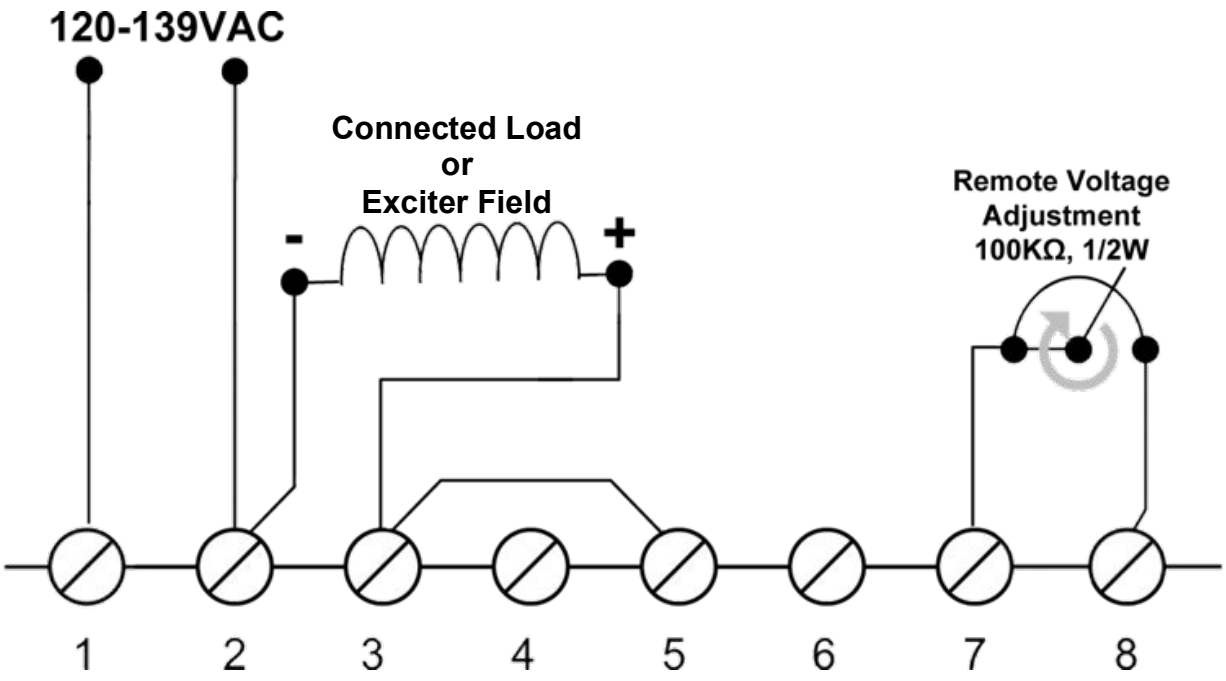
Connection D

Connection D is a Half-Wave rectified configuration, which allows a maximum of 52VDC at 5 ADC continuous with an input voltage of 120VAC.

This connection is typically used when the desired DC voltage is 32VDC or less. The maximum output voltage in this configuration is 52VDC!

Note that the maximum input voltage to the PC500X Universal Phase control in this configuration is 139VAC! DO NOT input 208/240VAC into the PC500X in this configuration! Severe regulation problems and possible damage to the phase control or exciter field can result! **For use on 480V systems use a 480-120V step-down transformer.**

Make sure Terminal #2 and F- from the load are connected together. Failure to verify this wiring before energizing the PC500X can result in severe damage or a no-control condition!



PC500X Universal Phase control

NOTE:
A disconnect or switch should be installed in series with the incoming power to terminals #1 and #2 on the PC500X.

NEVER install a switch or breaker on the DC or Exciter side of the phase control! Only install a switch or disconnect on the AC Side of the phase control!

NOTE:
It is not necessary to jumper terminals 7 and 8 if not using the Remote Voltage Adjustment!

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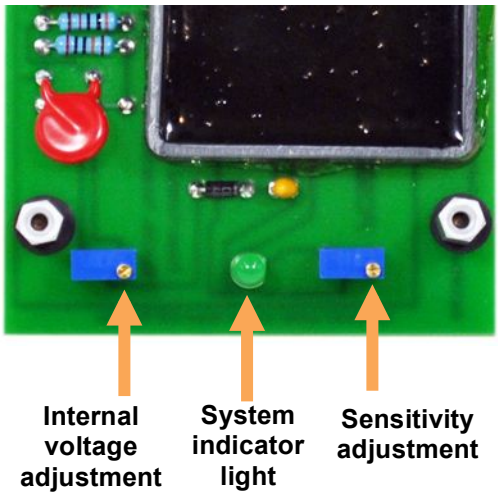
Initial Setup and Commissioning

1. Install the phase control and wire up to the correct wiring diagram (Connection A, B, C, or D).

2. If installing the PC500X on a load containing slip rings and brushes, verify that the brushes and brush riggings are isolated, ungrounded, and connected ONLY to the PC500X.

3. Turn the internal voltage control 15 or more turns counter clockwise (left) or until you hear the screw click. This procedure is necessary in case the original factory settings have been altered.



4. If you are using a remote voltage adjustment, set it at 50% of adjustment.

5. If you are using the PC500X on a synchronous motor, bring the motor up to operating speed and turn on the phase control switch (if used).

6. Set the internal voltage adjustment to the desired voltage setting for the connected load by turning the adjustment screw clockwise (right).
Note that the voltage adjustment is a 25-turn pot!

7. Check remote adjustment range (if used) for satisfactory sensitivity. If the adjustment range is too sensitive, slowly turn the Stability adjustment clockwise until a satisfactory adjustment range is achieved. **NOTE: You may need to adjust your Voltage adjustment during this process!**

8. Observe operation during no-load and full-load conditions. Once the voltage is set and adjustment characteristics are satisfactory the installation procedure is complete.

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Optional Power-Tronics Add-On Modules

Power-Tronics offers a wide array of optional add-on modules for the PC and XR series phase controls from static exciter modules to digital interface cards. For more information on any of the modules below, visit our online catalog at:

www.power-tronics.com

SE350

Static Exciter Module

Converts the PC500X into a 105VDC 30ADC Phase Control!

SE450

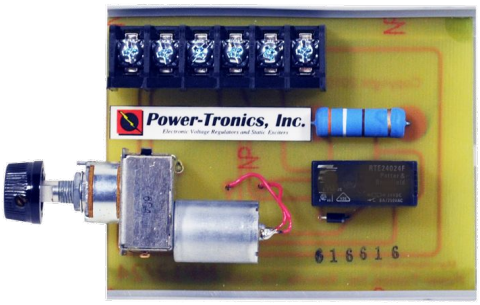
Static Exciter Module

Converts the PC500X into a 210VDC 30ADC Phase Control!

UIC200

Optical Interface Module

Allows the PC500X to be controlled externally by virtually any digital load-sharing controller, VAR controller, genset controller, or digital governor controller!



MP12/MP24

Motorized Potentiometer

Allows the PC500X to be externally controlled by older automated controllers using pulsed signals or dry contacts for control!

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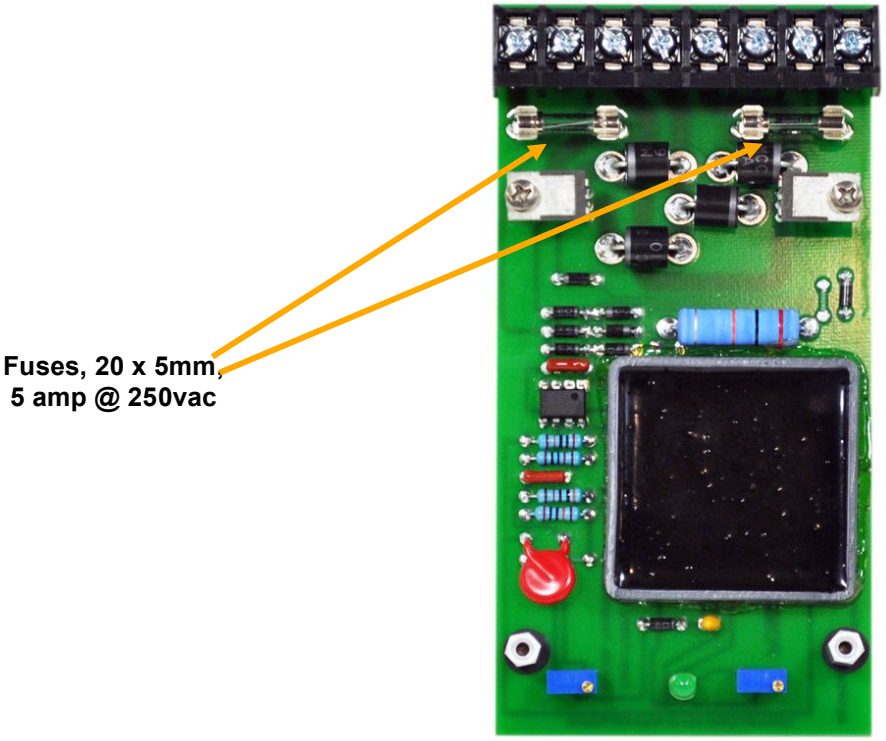
Fuse Replacement

The PC500X contains two 20mm cartridge fuses located for quick and convenient replacement should they blow. To replace the fuses, follow the instructions below.

Fuse size is 20mm x 5mm rated at 5A at 250VAC.
Power-Tronics Part Number: 5R3-403 (Comes as a package of 10 fuses)
Cooper-Bussmann Part Number: BK/GDB-5A



Fuse Replacement Procedure:

(Refer to the image above for easy reference)

- Remove the 2 screws located on the front of the mounting can near the terminal board.
- Loosen the 2 screws located on the front of the mounting can near the voltage and stability adjustment hole. (There is no need to completely remove these screws!)
- Partially separate the top of the phase control printed circuit card from the mounting housing. (Separate just enough to reach in and replace the fuses.)
- Replace open fuses then replace and re-tighten all screws.
- Fuse size is 20mm x 5mm, 5A @ 250VAC. **(DO NOT REPLACE WITH ANY OTHER TYPE OR RATING OF FUSE! YOU WILL VOID YOUR WARRANTY AND SEVERE DAMAGE AND PERSONAL INJURY COULD RESULT BY DOING SO!)**

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Bench Check Procedures

1. Wire up the phase control as shown in Figure A.

2. Connect up a 120 volt 50 to 150 watt light bulb to the F+ and F- Terminals.

3. Adjust the internal voltage and stability pots fully CCW (25 turns) or until a click is heard.

4. Input 120vac into the phase control at #1 and #2. (Fuse this input with fuses rated at 120 volts or higher and not more than 5 amps ac)

5. **Observation:** The green status light should be on and the light bulb across F+ and F- should be off. ***If the green status light is not on***, the internal fuses are blown in the phase control or there is internal damage to the phase control! **If the green status light is not on, do not continue this test!**

6. Turn the internal voltage adjustment CW until the light bulb across F+ and F- turns fully on, then adjust the internal voltage adjustment CCW until the light bulb is off.

7. Remove the 120vac from the phase control.

8. Connect up the phase control as shown in Figure B and perform all of the previous steps again. ***In this mode, the light bulb will only glow at half brightness!***

9. **If you were able to successfully perform all of these tests, the phase control is good.**

Figure A

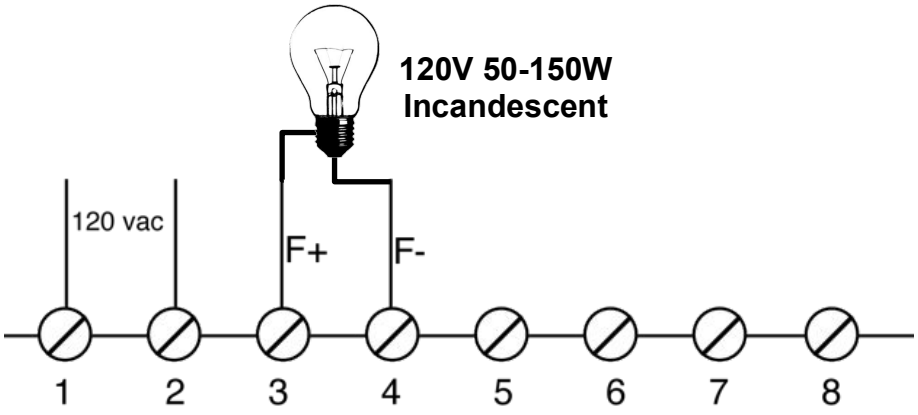
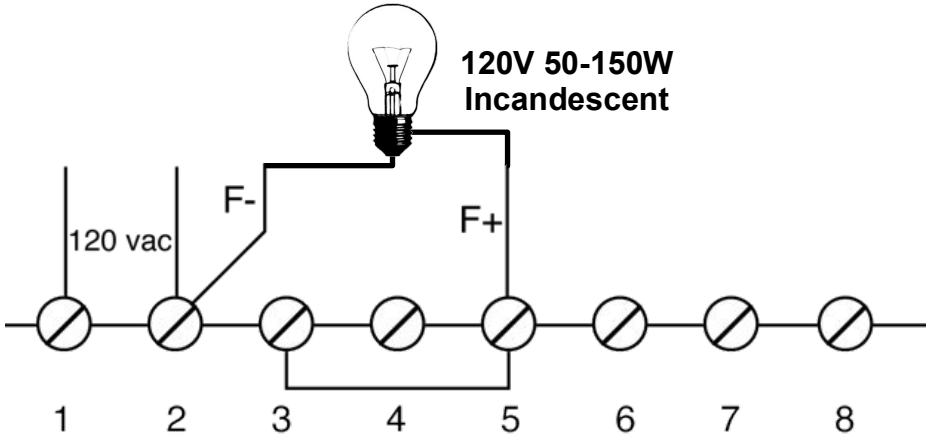


Figure B



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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 use of our products. 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., warranties **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 purchase receipt 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 electrical 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.
- Damage caused by excessive vibration.

No other warranty is expressed or implied.