

MODEL 1802 & 1805

INSTALLATION & MAINTENANCE MANUAL

CONTROL CONCEPTS, INC. 2 YEAR LIMITED WARRANTY

CONTROL CONCEPTS, INC. warrants that the products delivered will be as described in the sales order or contract.

CONTROL CONCEPTS, INC. warrants to the original user that CONTROL CONCEPTS, INC. products will be free from defects in materials and workmanship for a period of two (2) years after the date CONTROL CONCEPTS, INC. ships such products.

If any CONTROL CONCEPTS, INC. product is found to be defective in material or workmanship during the applicable warranty period, CONTROL CONCEPTS, INC.'s entire liability, and purchasers sole and exclusive remedy, shall be the repair or replacement of the defective product at CONTROL CONCEPTS, INC.'s election. CONTROL CONCEPTS, INC. shall not be liable for any costs or expenses, whether direct or indirect, associated with the installation, removal or re-installation of any defective product. All shipping and freight costs are the responsibility of the customer. CONTROL CONCEPTS, INC.'s limited warranty shall not be effective or actionable unless there is compliance with all installation and operating instructions furnished by CONTROL CONCEPTS, INC., or if the products have been modified or altered without the written consent of CONTROL CONCEPTS, INC., or if such products have been subject to accident, misuse, mishandling, tampering, negligence or improper maintenance. Any warranty claim must be submitted to CONTROL CONCEPTS, INC. in writing within the stated warranty period.

CONTROL CONCEPTS, INC.'s limited warranty is made in lieu of, and CONTROL CONCEPTS, INC. disclaims all other warranties, whether expressed or implied, including but not limited to any IMPLIED WARRANTY OF MERCHANTABILITY, ANY IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE, any implied warranty arising out of a course of dealing or of performance, custom or usage of trade.

CONTROL CONCEPTS, INC. SHALL NOT, UNDER ANY CIRCUMSTANCES BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, LOSS OF PROFITS, REVENUE OR BUSINESS) OR DAMAGE OR INJURY TO PERSONS OR PROPERTY IN ANY WAY RELATED TO THE MANUFACTURE OR THE USE OF ITS PRODUCTS. The exclusion applies regardless of whether such damages are sought based on breach of warranty, breach of contract, negligence, strict in tort, or any other legal theory, even if CONTROL CONCEPTS, INC. has notice of the possibility of such damages.

By purchasing CONTROL CONCEPTS, INC.'s products, the purchaser agrees to the terms and conditions of this limited warranty.

WARNING: The Control Concepts, Inc. power controllers use power thyristors to switch voltage to the connected load. Line voltage must be assumed at the output terminals at all times, even when the control signal has been removed and the load voltage appears to be off. It has been mandated by the National Electrical Code and the Occupational Safety and Health Act of 1970 that a physical disconnect be opened ahead of all remotely actuated controls before performing any maintenance work on the controller or its connected load.

PROPRIETARY DATA

© Copyright 2020, Control Concepts, Inc. Chanhassen, MN 55317

The information and design disclosed herein are the property of Control Concepts, Inc. and may not be used, reproduced or disclosed in any form except as granted in writing by:

CONTROL CONCEPTS, INC
8077 CENTURY BLVD
CHANHASSEN, MN 55317
PHONE: (952) 474-6200
TOLL FREE: (800) 765-2799
FAX: (952) 474-6070
www.ccipower.com

TABLE OF CONTENTS

DESCRIPTION:.....	4
THEORY OF OPERATION:.....	4
MODEL No. IDENTIFICATION:.....	4
INSTALLATION:	4
SPECIFICATIONS:.....	5
ELECTRICAL CONNECTIONS:.....	6
TROUBLE SHOOTING:	7
ADJUSTMENTS:.....	7
MANUFACTURED BY:.....	7

DESCRIPTION:

The models 1802 and 1805 are single-phase, phase-angle, SCR power controllers with half wave DC output.

The 1802 controller responds to command signals of 0 to 5Vdc, 0 to 10Vdc or a potentiometer.

The model 1805 controller responds to 4/20mA signals only.

FEATURES:

Soft start & missing cycle detection.

Both controllers include soft-start and missing cycle detection. If a line voltage interruption of one half cycle or more occurs, this feature will set the output to zero, then ramp the DC output back to the desired voltage. This process takes about 3 to 5 seconds. In-rush currents that can occur in loads with low cold resistance are reduced.

Isolation.

The command signal is electrically isolated from the line and load voltages and all signals and voltages are electrically isolated from the heat sink.

THEORY OF OPERATION:

The models 1802 and 1805 are phase-angle controller, therefore, the load voltage is controlled by turning the SCR on for a portion of each positive electrical half cycle as shown in figure 1.

As the command signal is increased, the SCR is turned ON earlier in the cycle. As the command signal is decreased, the SCR is turned on later in the cycle.

The waveform shown as E_L represents the "ON" time of the SCR in each half cycle and therefore represents the voltage waveform applied to the load. The load voltage can be varied with infinite resolution from 0 to 100 percent of the line voltage.

Circuit tolerances may limit the maximum load voltage to approximately 70.7% of the supply voltage.

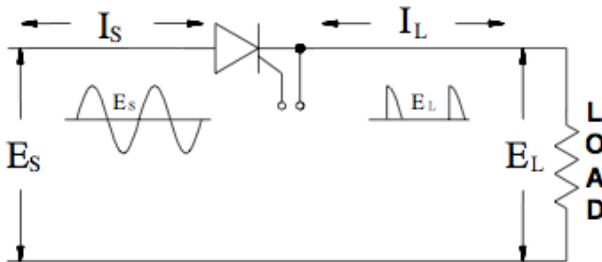


Figure 1. Phase angle control at 50% power

MODEL No. IDENTIFICATION:

MODEL NUMBER: 1802 - (V-A) - CS
1805 - (V-A) - CS

V = Rated voltage:

12 = 120Vac

24 = 240Vac

48 = 480Vac

57 = 570Vac.

A = Rated amps:

10, 20, 30 or 40 amps

CS = Command Signal

1802 0/5Vdc, 0/10Vdc or Pot.

1805 4-20mA input only

Note:

The addition of "-FC" at the end orders a firing circuit only.

When ordering a replacement or spare firing circuit, specify the power line voltage, the current rating, and the serial number of the controller.

INSTALLATION:

The controller must be mounted on a vertical surface such that the heat radiating fins are vertical and located in an environment that is protected from dirt and dust and will not exceed 135°F.

The wiring must be per local electrical codes.

The supply and load terminals will accept up to # 6 wire. The terminals for the circuit transformer and control signals accept wire up to # 14.

The terminals for the control signals and circuit transformer are plug-in and may be removed by pulling perpendicular to the circuit card.

NOTES:

1. The circuit transformer must be connected to the same supply as the controller and the load.

A common installation error has been that of the circuit transformer being powered from a different phase or being connected across the controller rather than the supply.

2. It is recommended that the controller and the load be protected with fast acting class "T" fuses such as described in the specification portion of this instruction manual.

TORQUE TABLE FOR USD CONNECTORS



Wire Size	Recommended Torque
10 -14 ga	35 in-lbs
8 ga	40 in-lbs
4 - 6 ga	45 in-lbs
2-3 ga	50 in-lbs

SPECIFICATIONS:

Control Mode	Single-phase; Phase-angle; RMS value of the voltage applied to the load
Command Signal	1802: 0/5Vdc, 0/10Vdc or Potentiometer 1805: 4-20mA Impedance = 200 ohms
Control Range	6 to 97% of line voltage typical.
Linearity	RMS load voltage is linear within 2% of span of the command signal.
Zero and Span Adjustment	User adjustable over range of $\pm 20\%$ of span.
Isolation	Dielectric strength input/line & load voltage/heatsink 4000V _(RMS) . Insulation resistance input/line & load voltage/heatsink 10^{10} ohms. Maximum capacitance input to output 8pf.
Cooling	Convection
Mounting	Must be mounted on vertical surface with fins vertical. Units may be mounted adjacent to each other. Heat sink is electrically isolated.
Line voltage	120, 240, 480 or 575Vac $\pm 10\%$, -20% 50/60 Hertz
Diagnostic Indicator	The intensity of an LED varies as a function of the command signal. Feature provides a quick and safe means to check controller operation.
Physical	Weight: 10 thru 40 amp 2 lbs Dimensions: Refer to installation drawing
Environment	Operating: 0 to 55°C (32 to 131°F) Storage: -40 to 80°C (-40 to 176°F) Humidity: 0 to 95% Non-condensing
dv/dt & Transient Voltage	200 volts/usec minimum A dv/dt snubber and a metal oxide varistor (MOV) are provided to protect against high frequency transients (dv/dt) and voltage spikes.
Dissipation	1.5 watts per Amp of controlled current.
Recommended Fusing	Special semiconductor fuses are not required. It is recommended that the controller and load be protected with fast acting class "T" fuses such as Bussmann type JJS or JJN fuses. Control Concepts maintains an inventory of fuses and fuse holders for your convenience.

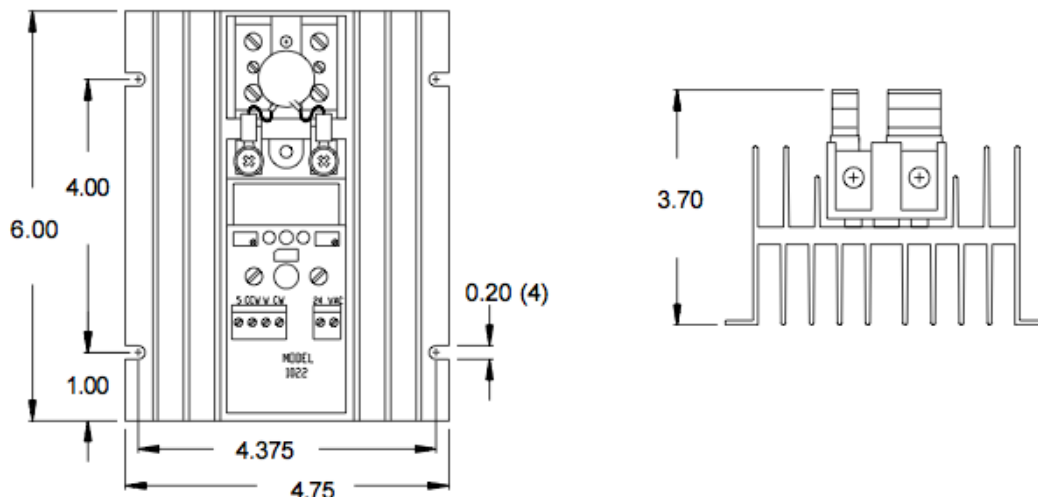


Fig. 2. Mounting dimensions of 10 to 40 AMP controller

ELECTRICAL CONNECTIONS:

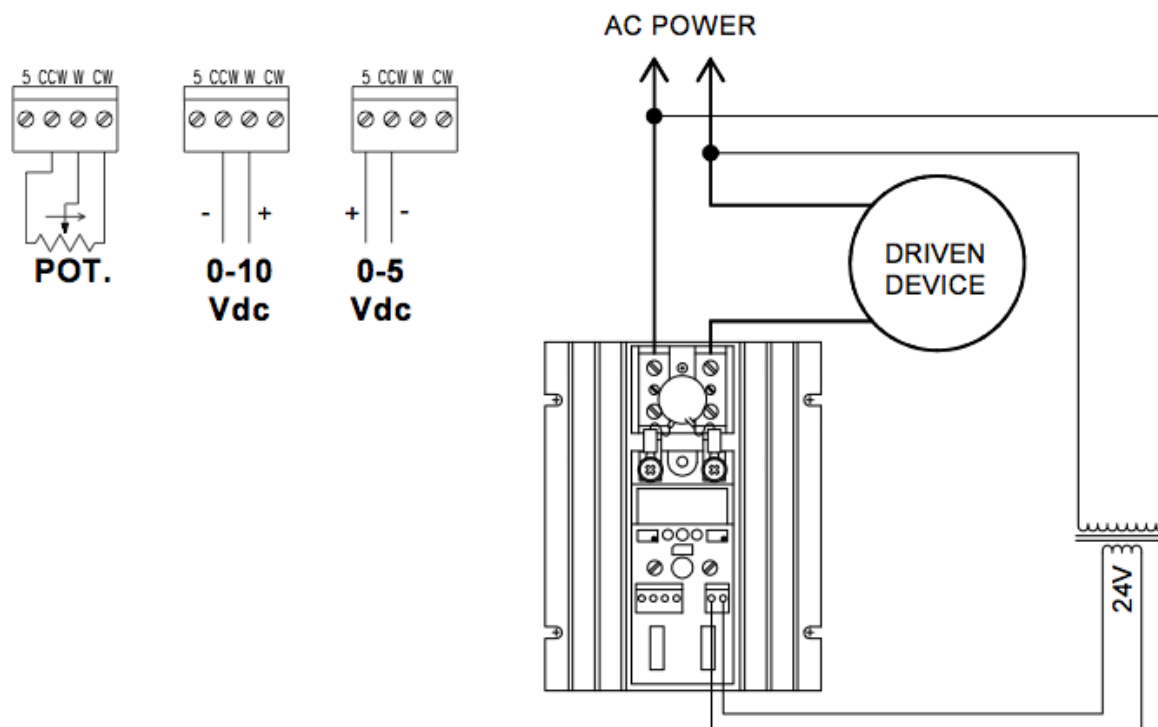


Figure 3. 1802 Command and power connections.

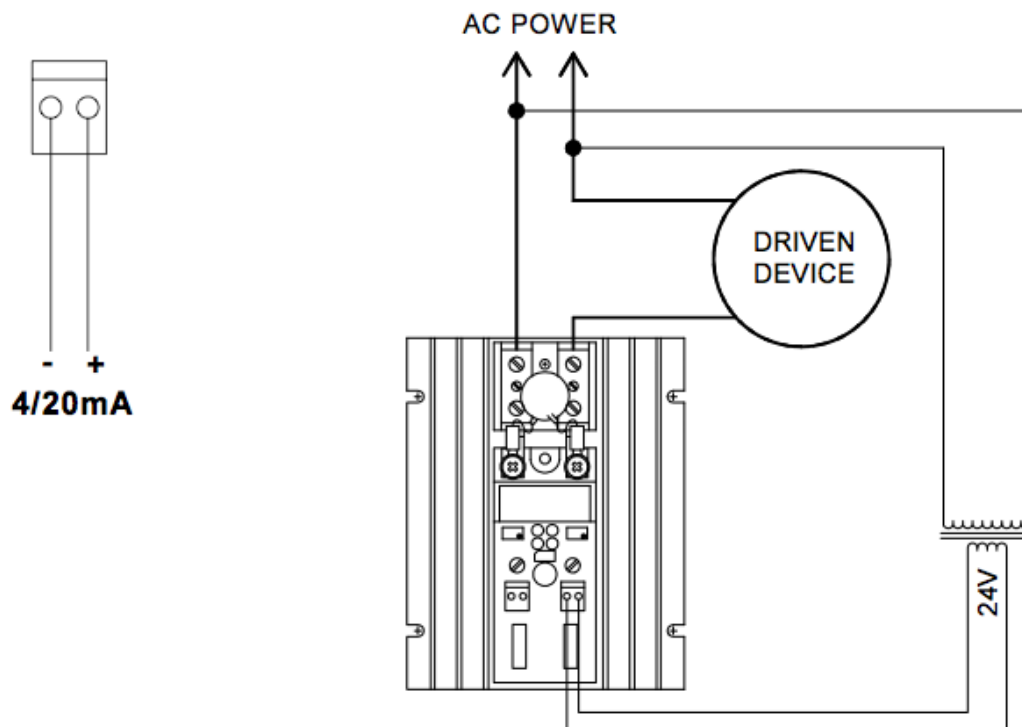


Figure 3. 1805 Command and power connections.

TROUBLE SHOOTING:

CAUTION: High voltage exists on the supply and load terminals of this controller and may exist on other equipment located near the controller. Use extreme caution to avoid electrical shock.

The LED located on the controller circuit can be used to aid in determining problems. This LED varies in intensity proportional to the command signal and therefore should be proportional to the load voltage.

THE FOLLOWING ARE SYMPTOMS AND POSSIBLE CAUSES:

NO LOAD POWER: LED not ON:

Determine that the command signal is applied to the controller. Determine that 24 volts is applied to the circuit.

NO LOAD POWER: LED intensity can be varied:

Determine that all fuses are "OK". If the voltage across the SCR module is equal to the line voltage the SCR module has probably failed. NOTE: If a replacement SCR module is ordered, please specify the voltage, current rating and the serial number of the controller.

LOAD POWER IS MAXIMUM AND CANNOT BE REDUCED: LED is ON:

Determine that the command signal can be adjusted to zero. Also remove the green plug-in connector to remove the command signal. If the LED is not off, the circuit card has failed.

LOAD POWER IS MAXIMUM AND CANNOT BE REDUCED: LED is OFF:

Remove the 24Vac plug in connector. If the load still has power the SCR module has probably failed as a short allowing full power at be applied to the load. To determine if the SCR module has shorted remove power and then the line and load connections and measure the resistance across the line and load terminals on the SCR module. If the resistance is less than 10000 ohms the module has failed. NOTE: If a replacement SCR module is ordered specify the voltage and current rating of the controller and the serial number of the failed unit.

LOAD VOLTAGE SNAPS ON:

Determine that the primary of the circuit transformer is connected to the same supply as the controller and load. See page 4.

MAXIMUM LOAD VOLTAGE CANNOT BE OBTAINED:

Determine that the primary of the circuit transformer is connected to the same supply as the controller and load. Typically this problem is caused by the primary being connected across the load and line connection at the controller. See page 3.

ADJUSTMENTS:

The zero and span adjustments have been factory adjusted to provide zero load voltage when the minimum command signal is applied and to provide rated output voltage to the load when the maximum command signal is applied. Further adjustment of these settings should not be required. If it is desired to readjust the zero and span settings the following procedures should be followed.

NOTE: Voltage and/or current measurements should be taken with meters that provide true RMS readings due to the chopped waveforms provided by the SCR controller. Adjust the zero potentiometer with the minimum command signal applied such that the load voltage is just zero. (Clockwise rotation of both the span and zero potentiometer increase the load voltage) Adjust the span potentiometer with the maximum command signal applied such that load voltage equals the rated voltage of the controller. It may be necessary to repeat these steps due to interaction that can occur. The 1802 and 1805 controllers have line voltage compensation therefore if the supply voltage is above the nominal rating the controller will supply the nominal rated voltage to the load. For example, if a controller rated for 240 volt operation is supplied from a 260 volt supply and the maximum command signal is applied the controller will supply only 240 volts to the load thereby eliminating the effects of line voltage changes.

MANUFACTURED BY:



TEL: (952) 474-6200

(800) 765-2799

FAX: (952) 474-6070

www.ccipower.com

8077 Century Blvd
Chanhassen, MN 55317, USA