CONTROL CONCEPTS

MODEL 1822 & 1825
INSTALLATION & MAINTENANCE MANUAL

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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 Heath 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.

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DESCRIPTION:

The models 1822 and 1825 are single phase DC power controllers. The 1822 controller responds to command signals of 0-5Vdc, 0-10Vdc or a potentiometer signal. The model 1825 controller responds to a 4-20mA current command signal.

Both models control the average DC voltage to the load proportional to the command signal.

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.

MODEL No. IDENTIFICATION:

MODEL: 1822-[v-a]-[V]-[fb]-[cs]-SC[xxx]
1825-[v-a]-[V]-]fb]-[cs]-SC[xxx]

1822 (0-5Vdc, 0-10Vdc or potentiometer control)
1825 (4-20mA input)
[v-a] = Input voltage & output current rating:
12-10 = 120 Vac & 10 Amps DC.
12-20 = 120 Vac & 20 Amps DC.
24-10 = 240 Vac & 10 Amps DC.
24-20 = 240 Vac & 20 Amps DC.
[V] = Output voltage
95VDC = 95 Volts D.C. output rating.
190VDC = 190 Volts D.C. output rating.
[fb] = feedback
AVG = average feedback
FAVG = fast average feedback
RMS = True RMS voltage feedback
[cs] = command signal
1822, 0-5, 0-10 or pot
1825, 4/20mA

-SC[xxx] = optional.
The addition of **"-SCxxx"** specifies that the controller has been modified to have a different input command.
Example, "-**SC1/5Vdc**" means the controller will operate with a 1 to 5 Volt DC control signal.

Example **1825 - 24-10 - 190VDC - FAVG** specifies a phase-angle controlled DC power source requiring 240 Volts AC input, controls 190 Volts DC@ 10 Amps to the load and has a fast average response.

THEORY OF OPERATION:

The model 1822 and 1825 are phase-angle controllers with full wave bridges to provide a DC output. The load voltage is controlled by turning the appropriate SCR on for a portion of each electrical half cycle of the line voltage as shown in figure 1.

The waveform shown as E_S represents the Source voltage.

The waveform shown as E_C represents the "ON" time of the SCRs in each half cycle and therefore represents the voltage waveform applied to the bridge rectifier.

The waveform shown as E_L represents the rectified voltage which is applied to the load.

To increase the load voltage, the SCRs are turned ON earlier in the cycle. To decrease the load voltage, the SCRs are turned on later in the cycle. The DC load voltage can be varied from 0 to full output.

Output voltages are limited to 95 Volts DC max. for a 120 Volt AC line and 190 Volts DC max. for a 240 Volt AC line.

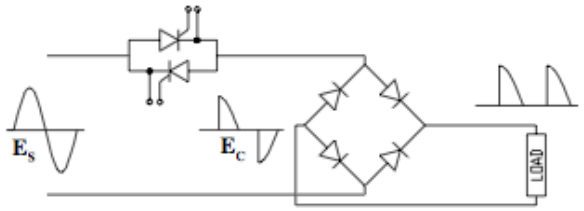


Figure 1. Phase angle control at 50% power

INSTALLATION:

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

The wiring must be per local electrical codes. The supply and load terminals will accept # 14 to # 2 wire. The terminals for the control signals will accept # 30 to # 14 wire.

NOTE: It is recommended that the controller and the load be protected with fast acting class "T" fuses such as Bussmann type JJN.

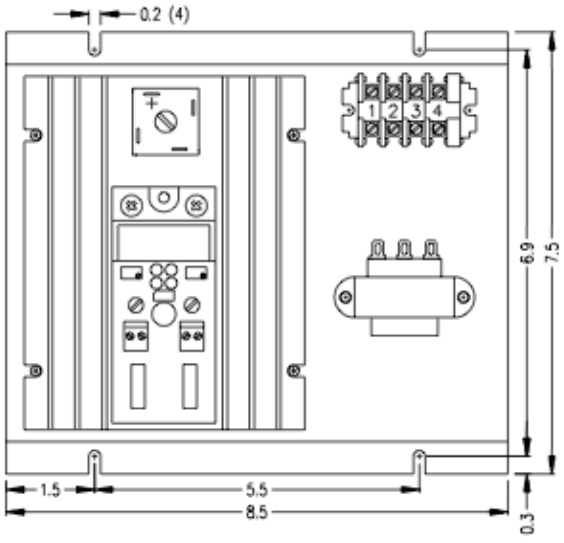
Control Concepts stocks a complete line of fuses and fuseholders for your convenience.

Fuse	CCI Stock No.
15 Amp, 300 Volt fuse	42110-0430-315
25 Amp, 300 Volt fuse	42110-0430-325
2 pole Fuse holder 30A max, 300 Volts	43112-0430-330

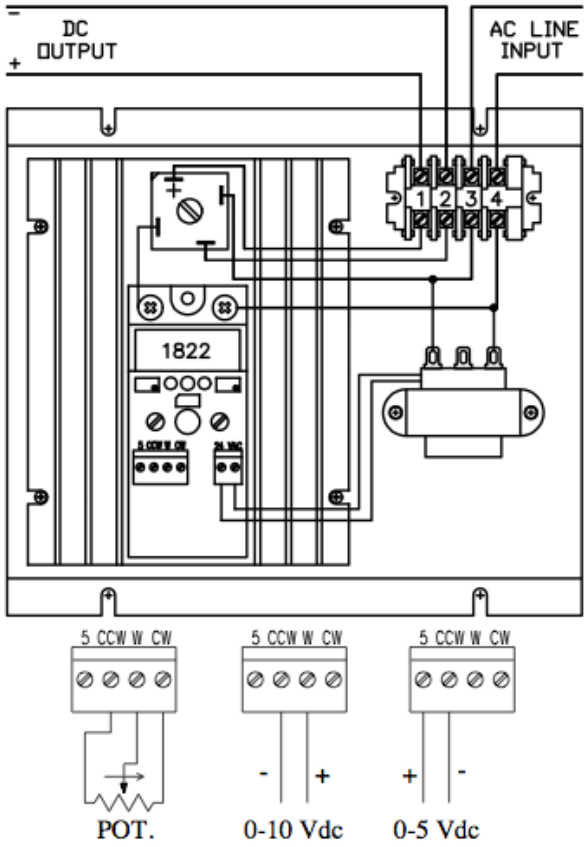
SPECIFICATIONS:

Control Mode	Single-phase; Phase-angle, with a rectifier to apply DC voltage to the load.
Command Signal	Model / Signal / Input impedance 1822: 0-5Vdc 100K Ohms 0-10VDC & Pot 200K Ohms 1825: 4-20mA; 200 Ohms
Control Range	0 to 95 Volts DC or 0 to 190 Volts DC
Linearity	Average DC load voltage is linear within 2% of span of the command signal.
Zero and Span Adjustment	Adjustable over range of +20% of span
Isolation	Dielectric strength input/line & load voltage/heatsink 2500V(rms) Insulation resistance input/line & load voltage/heatsink 1010 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 or 240 Vac +10%,-15% 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: approximately 4 lbs Dimensions: Refer to installation drawing below
Environment	Operating:0 to 55oC (32 to 131oF) Storage: -40 to 80oC (-40 to 176oF) 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 watt per amp of controlled current

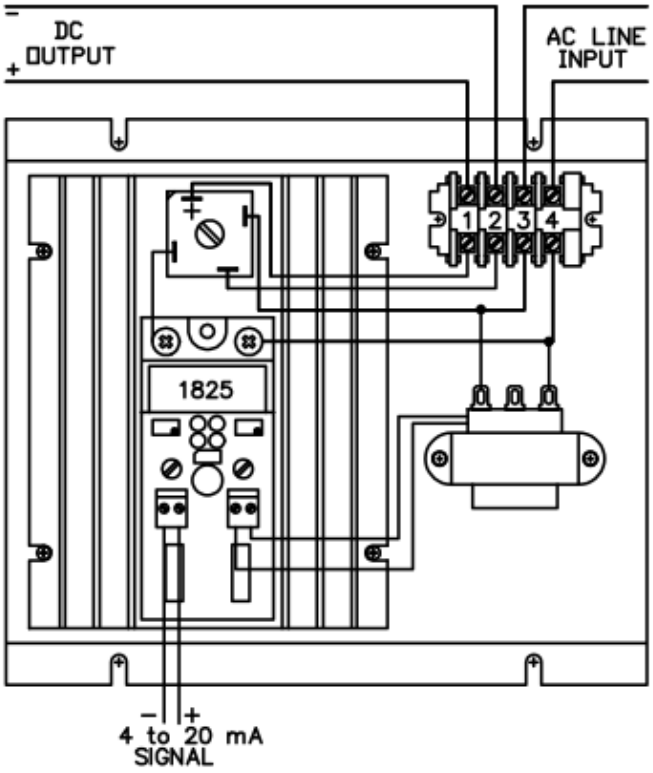
INSTALLATION DIMENSIONS:



MODEL 1822 ELECTRICAL CONNECTIONS:



MODEL 1825 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 wires are applied to the correct terminals on the command connector and that the command signal is not at minimum. Determine that 24 volts AC is applied to the circuit. Circuit card may have failed.

NO LOAD POWER: LED intensity can be varied:
Determine that line voltage is present. Set command signal to maximum, if the voltage across the SCR module is equal to the line voltage, the SCR module has probably failed.

LOAD POWER IS MAXIMUM AND CANNOT BE REDUCED: LED is ON:
Determine that the command signal is at zero. An easy way to do this is to remove either of the green connectors from the circuit board. If the LED remains on, the circuit board may have failed.

LOAD POWER IS MAXIMUM AND CANNOT BE REDUCED: LED is OFF:
The SCR module has probably failed as a short allowing full power at be applied to the load.
To confirm a shorted SCR module, remove the circuit board and measure the voltage across the line and load terminals on the SCR module. If the voltage is less than 2 Volts the SCR 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 as well as the number on the SCR module. (see spare parts section of this manual)

CONTROLLER BLOWS FUSES WHEN COMMAND SIGNAL IS INCREASED.
Determine if the bridge rectifier has failed. **Remove power from controller**. Disconnect all the wires that go to the bridge. Use an ohmmeter to measure the resistance across the AC input of the bridge rectifier. Observe the reading, then reverse the leads. If the resistance is less than 100K ohms either way, the bridge has failed.

ZERO AND SPAN ADJUSTMENTS:

The zero and span adjustments have been factory calibrated. Further adjustment of these settings should not be necessary. If it is desired to readjust the zero and span settings, the following procedure should be followed.

1. Adjust the zero potentiometer with the minimum command signal applied, so that the load voltage is just zero.
2. Adjust the span potentiometer with the maximum command signal applied so that load voltage equals the rated voltage of the controller (95 or 190 Volts DC).

It may be necessary to repeat these steps due to interaction between the zero and span pots.
(Clockwise rotation of both the span and zero potentiometer increase the load voltage.)
These controllers have line voltage compensation. If the supply voltage goes above the nominal rating, the controller will supply the calibrated voltage to the load. For example, a controller is rated for 240Vac line input with 190Vdc output: If the line goes to 260Vac when a maximum command signal is applied; the controller will supply no more than 190 Volts DC to the load. This feature reduces the effects of line voltage changes.

SUGGESTED SPARE PARTS:

MODEL NUMBER	SCR MODULES:
1822-12-10 or 1825-12-10	1652-12-10-T
1822-12-20 or 1825-12-20	1652-12-20-T
1822-24-10 or 1825-24-10	1652-24-10-T
1822-24-20 or 1825-24-20	1652-24-20-T
BRIDGE RECTIFIER:	20050-0325-460

NOTE: If replacement parts are ordered, specify the voltage, current rating and serial number of the controller as well as the part numbers.

REFERENCE DRAWINGS:

Model 1822 Schematic: B1000466
Model 1825 Schematic: B1000324

MANUFACTURED BY:

CONTROL CONCEPTS

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