

**CONTROL
CONCEPTS
INC.**

**MODEL 1849
INSTRUCTION MANUAL**

**SINGLE-PHASE, PHASE-ANGLE
SCR CONTROLLER WITH DC OUTPUT**

DESCRIPTION:

The model 1849 is a single-phase, phase-angle SCR controller which linearly controls the DC voltage to the load.

The command signal terminals are isolated from the line and load, and all are isolated from the heat sink.

Features of the model 1849:

1. Choice of command signal. The 1849 can accept 0 to 5 Vdc, 4 to 20 mA or a potentiometer. (1K - 20K pot.) See figures 1, 2 & 3 on page 3 for details.

2. Remote RUN-STOP control. Two terminals are provided on the command signal connector to permit this remote function. The user has a choice of normally closed or normally open contacts. The selection is made with a jumper on connector P6. See figures 4, 5 & 6 on page 4 for details.

3. Dual line voltage. The controller may be operated on 120 Vac - 15/+10% or 240 Vac - 15/+10%. The operating voltage may be selected on the circuit board. See figure 8 on page 6 for details.

MODEL No. IDENTIFICATION:

1849 - A - (XXX)V - 20A - (OUT)Vdc - (CMD.)

1849 Variable DC Controller

A = Average Voltage Feedback.

(XXX) = Line Voltage Choices:

120 or 240 Volts AC

20 = Frame Current Rating (Amps)

(OUT) = DC Voltage Output

102 Volts DC (Max @ 120 Volt Line)

(CMD.) = Command signal choices:

0/5 Volts DC (std)

4/20 mA

POT (1 to 20K Potentiometer)



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INSTALLATION:

The controller must be mounted with the fins of the heatsink oriented vertically so that air may pass freely between them, thus providing cooling to the fins. Allow 2" space on top and bottom

Mounting dimensions are shown in figure 11 & 12 on page 8.

Be certain that the switch and jumper on the circuit board are set to their proper positions before applying voltage. See figure 8 on page 6 for details.

It is recommended that a disconnect be installed in the line ahead of the controller.

Class "T" or semiconductor type fuses which are rated at about 125% of the maximum anticipated load are recommended to protect the controller and the load.

Power is applied to the terminals marked **LINE 1** and **LINE 2**.

The load may be connected to the + and - terminals.

Wire range; 18-12 AWG

Torque; 3.5 - 5.3 in.-Lbs.

Strip length; .39"

If the remote run-stop feature will not be used, place jumper on P6 to pin 2 only and make no connection to the run terminal (#6) on P8 (command connector).

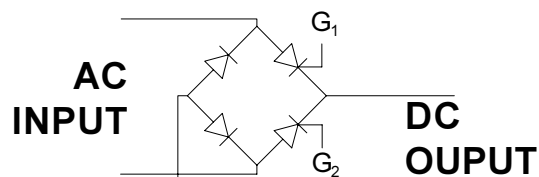
THEORY OF OPERATION:

The heart of the SCR power controller is the SCR (Silicon Controlled Rectifier). The SCR has two states, ON and OFF, and allows current to flow in only one direction when turned on.

The model 1849 uses a hybrid SCR - Diode full-wave bridge to achieve DC output.

When a small signal is applied between the gate and cathode terminals, the SCR will begin to conduct. Once turned on, it will remain on until the current through it is reduced below a very low value.

Power is regulated by advancing or delaying the point at which the SCR is turned on within each half-cycle.



SPECIFICATIONS:

Control Mode:	Single-phase, phase-angle SCR controller with DC output.								
Command Signal:	<table><tr><td>Input Signal</td><td>Input Impedance</td></tr><tr><td>0 to 5 Vdc</td><td>200 Kohms</td></tr><tr><td>4/20 mA</td><td>249 ohms</td></tr><tr><td>Potentiometer</td><td>200 Kohms</td></tr></table> (1K, 1/4 watt potentiometer recommended for optimum linearity, up to 20K pot is permissible.)	Input Signal	Input Impedance	0 to 5 Vdc	200 Kohms	4/20 mA	249 ohms	Potentiometer	200 Kohms
Input Signal	Input Impedance								
0 to 5 Vdc	200 Kohms								
4/20 mA	249 ohms								
Potentiometer	200 Kohms								
Control Range:	0 to ((Line Voltage -2) x 0.9).								
Linearity:	Output will be linear within 0.5% of span over entire range of control.								
Zero & Span Adjustments:	Multi-turn potentiometers allow zero and span adjustments of $\pm 25\%$ of span.								
Supply Voltage:	115 Vac -15% +10% or 230 Vac -15%, +10%. Switch selectable, single-phase, 50/60Hz.								
Environment:	<table><tr><td>Operating temperature;</td><td>0 to 55°C (32 to 132°F).</td></tr><tr><td>Storage temperature;</td><td>-40 to 85°C (-40 to 176°F).</td></tr><tr><td>Humidity;</td><td>0 to 95%, non-condensing.</td></tr></table>	Operating temperature;	0 to 55°C (32 to 132°F).	Storage temperature;	-40 to 85°C (-40 to 176°F).	Humidity;	0 to 95%, non-condensing.		
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Humidity;	0 to 95%, non-condensing.								
Electrical Isolation:	<table><tr><td>Control signal to supply and load voltage;</td><td>3750 Vpeak.</td></tr><tr><td>Heatsink to supply and load voltage;</td><td>2500 Vpeak.</td></tr></table>	Control signal to supply and load voltage;	3750 Vpeak.	Heatsink to supply and load voltage;	2500 Vpeak.				
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Heatsink to supply and load voltage;	2500 Vpeak.								
Cooling:	Convection cooling.								
Status indicator:	The intensity of the green LED on the firing circuit is directly proportional to the level of command signal, and therefore proportional to the output signal.								

ADJUSTMENTS

An Average responding meter should be used for measurements.

CAUTION: HIGH VOLTAGES EXIST INSIDE THE CONTROLLER.

ZERO & SPAN POT ADJUSTMENT

1. With minimum control signal (0 Volts or 4mA), adjust the ZERO pot for **no** output at the + & - terminals.
2. With control signal set at 100%, adjust the SPAN pot for desired **maximum** DC Voltage output at the + & - terminals.
3. Because the ZERO and SPAN pots interact, steps 1 and 2 may have to be repeated.

20KHZ POT

This has been calibrated at the factory. Misadjustment of this pot could cause erratic operation, overheating of the controller and may void your warranty.

CONTROL CONNECTIONS:

BE CERTAIN THAT POWER HAS BEEN REMOVED FROM THE CONTROLLER BEFORE REMOVING THE LID.

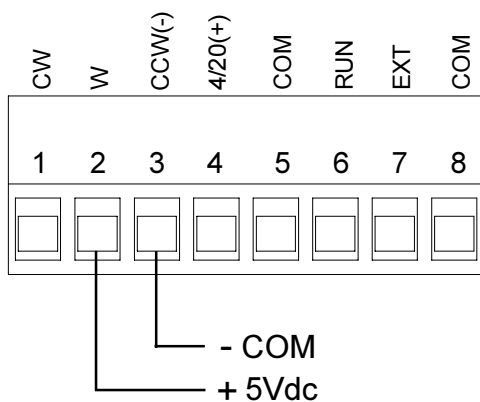
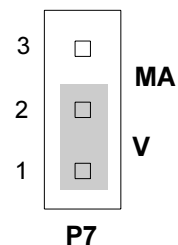


Figure 1. Connecting a 0 to 5 Vdc command signal input.



To enable a voltage command signal input, the jumper must be across pins P7-1 & P7-2.

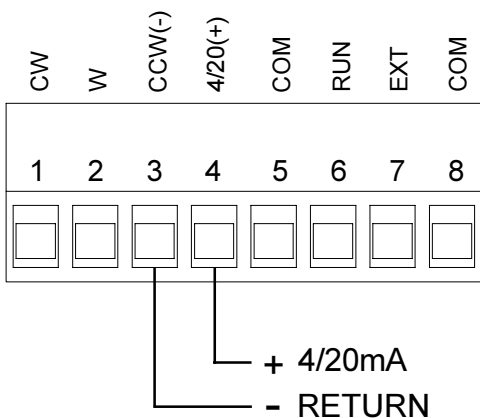
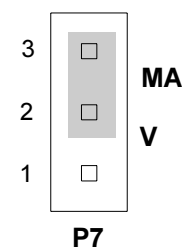


Figure 2. Connecting a 4 to 20 mA command signal input.



To enable a current command signal input, the jumper must be across pins P7-2 & P7-3.

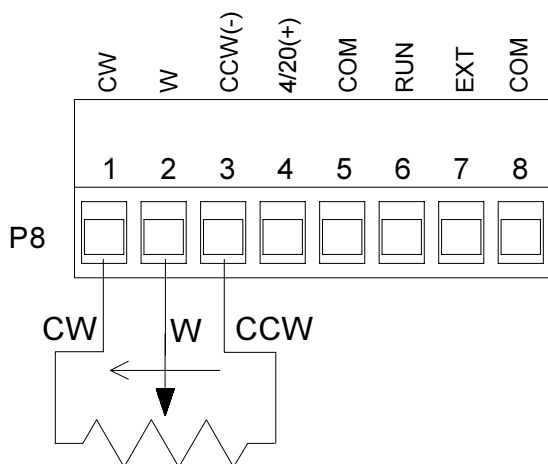
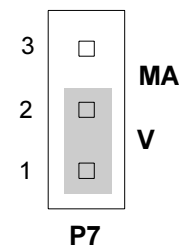


Fig. 3. Connecting a potentiometer as a command signal control.



To enable a potentiometer command signal input, the jumper must be across pins P7-1 & P7-2.

CONTROL CONNECTIONS:

BE CERTAIN THAT POWER HAS BEEN REMOVED FROM THE CONTROLLER BEFORE REMOVING THE LID.

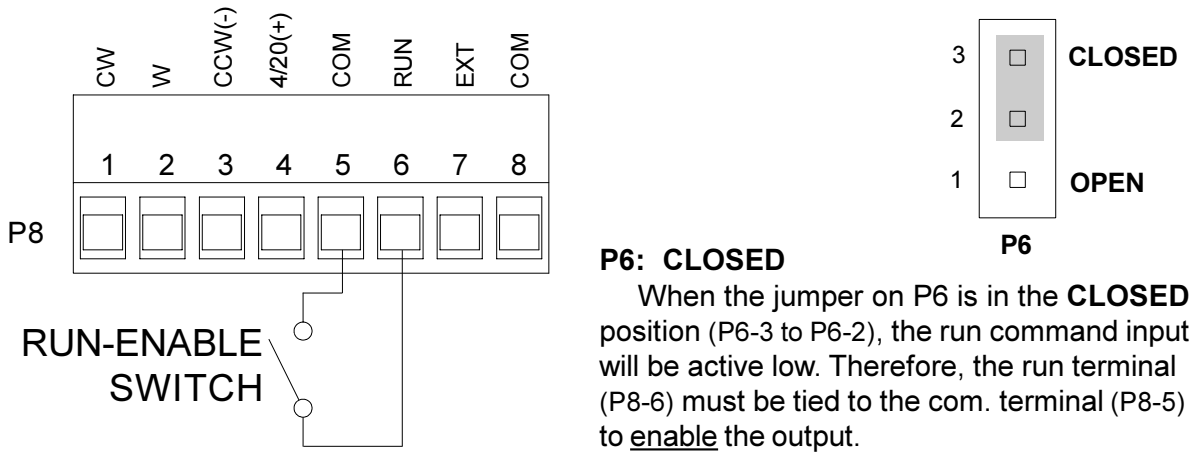


Figure 4. Connecting a run-enable Switch.

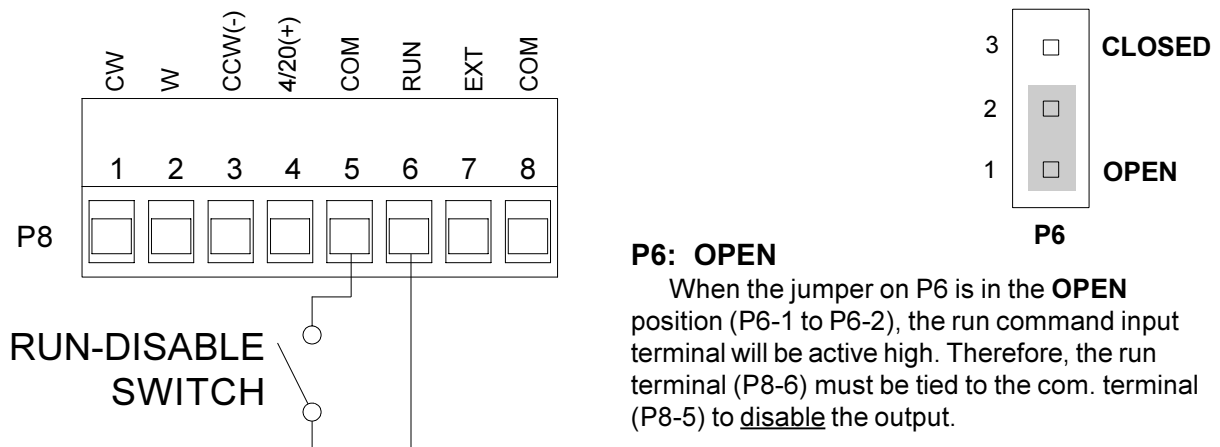


Figure 5. Connecting a run-disable Switch.



Figure 6. Disabling the external run-stop switch feature.

INSTALLATION:

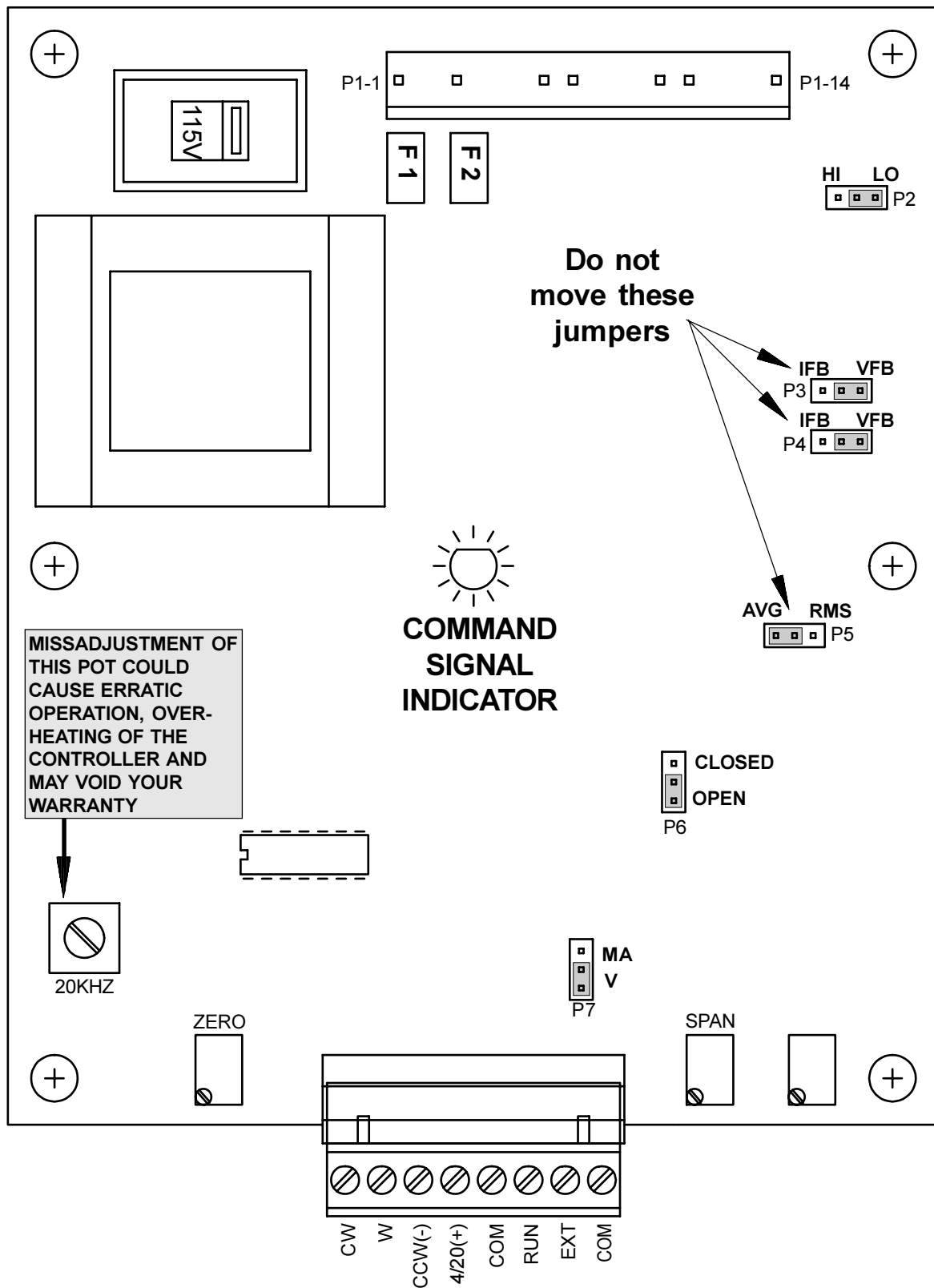


Figure 7. Circuit board layout. (Top view.)

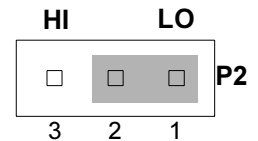
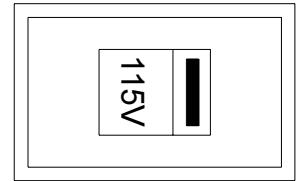
INSTALLATION:

BE CERTAIN THAT POWER HAS BEEN REMOVED FROM THE CONTROLLER BEFORE REMOVING THE LID.

JUMPER CONNECTIONS:

P2: HI - LO.

When the unit is controlling 120 Vac, this jumper must be in the **LO** position (P2-1 to P2-2).



When the unit is controlling 240 Vac, the jumper must be in the **HI** position (P2-2 to P2-3).

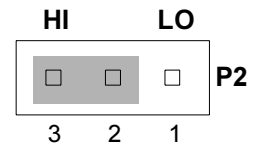
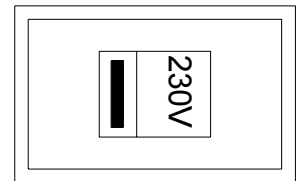
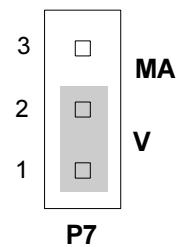


Figure 8. Line voltage selection.

P7: V - MA.

To enable the voltage or potentiometer command signal input, the jumper must be in the **V** position (P7-1 to P7-2).



To enable the current command signal input, the jumper must be in the **MA** position (P7-2 to P7-3).

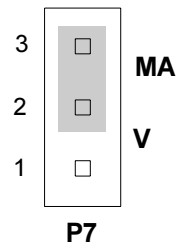


Figure 9. Voltage - current command select.

POWER TERMINAL DESIGNATIONS:

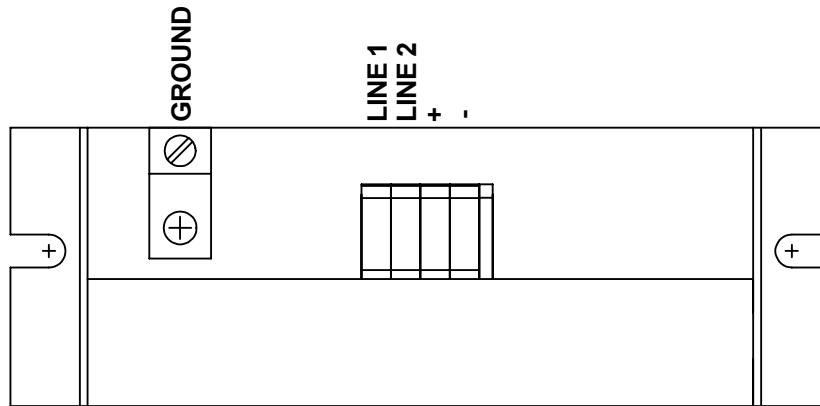


Figure 10. Power Connections on Model 1849.

TROUBLESHOOTING:

CAUTION: HIGH VOLTAGES EXIST INSIDE THE CONTROLLER.

Following are symptoms and possible causes for problems which may occur.

NO OUTPUT AT STARTUP .	1. Check for 5V on command connector P8 between pin 1 (CW) and pin 3 (CCW). IF 5 Vdc IS NOT DETECTED; IS POWER CONNECTED AND PRESENT BETWEEN LINE 1 and LINE 2 TERMINALS ON POWER CONNECTOR? IS THE VOLTAGE SWITCH IN THE CORRECT POSITION? HAVE THE FUSES CLEARED? 2. Check connector P7 for position of jumper for desired command input. 3. Check command signal wiring on P8. 4. Check position of jumper on P6 (Closed - open) connector. 5. Check position of 115-230 switch on circuit. If 240 Vac is applied to unit with switch in 115 volt position, the solder in fuses on circuit board may be blown. Return unit to factory for service.
FULL COMMAND: HALF OUTPUT	On 240 Volt unit, P2 jumper may be in "LOW" position.
HALF COMMAND: FULL OUTPUT	On 120 Volt unit, P2 jumper may be in "HIGH" position.
NO OUTPUT: LED "ON"	Check for bad connection. Check that connector P1 is seated properly. Substitute circuit board if a similar one is available.
FULL OUTPUT: LED OFF	Likely that SCR is shorted.
HALF OUTPUT: LED OFF	Likely that SCR driver is bad. Unplug connector P1 and retry. Substitute circuit board if a similar one is available.

INSTALLATION DIMENSIONS:

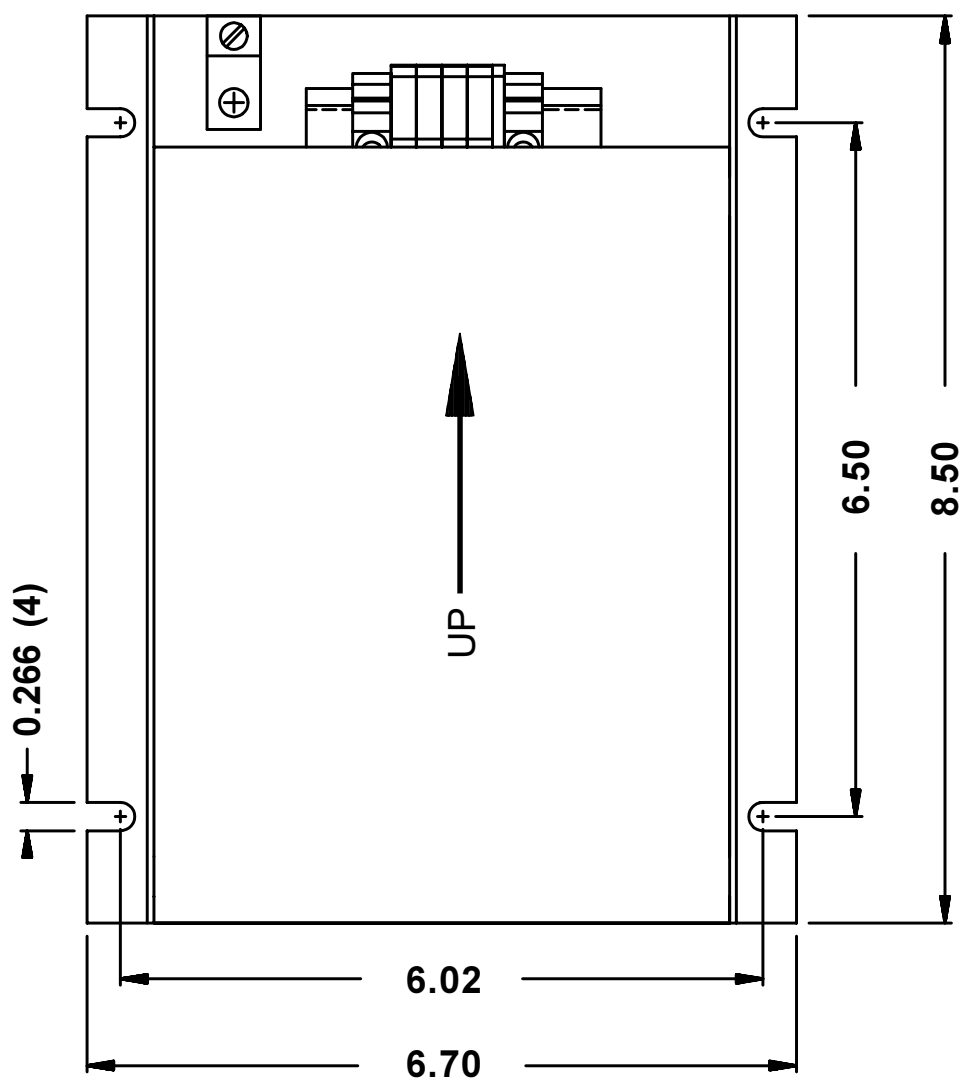


Figure 11. Dimensions and Top View of Model 1849.

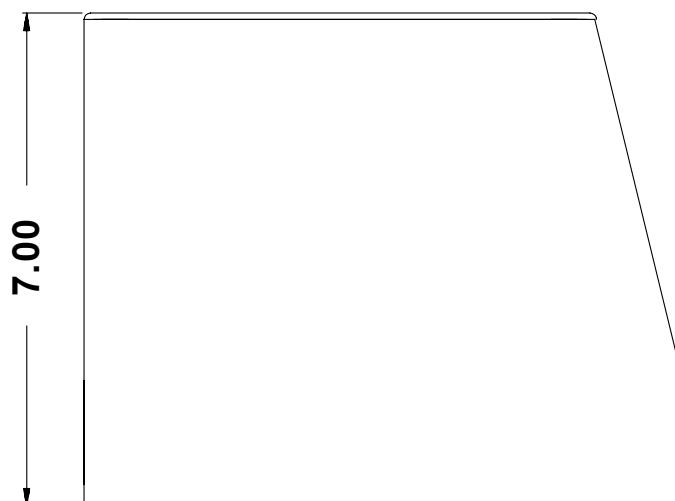


Figure 12. Dimensions and Side View of Model 1849.