CONTROL CONCEPTS INC.

INSTALLATION MANUAL
MODEL 3095-2001

DESCRIPTION:

The model 3095-2001 consists of three single-phase, phase-angle SCR power controllers, each of which linearly controls, with respect to a command signal, the power applied to a load.

FEATURES:

- Designed to comply with UL and CUL standards.
- Designed to comply with CE - Low Voltage directive.
- Circuit breakers provide protection for drivers.
- Soft start and missing cycle detection.
- Thermal switch contacts accessible.
- Load Voltage monitoring provided.
- Load Current monitoring provided.
- Heater current fault protection.
- Dual control connectors.
- Current Ratio Metering.

SPECIFICATIONS:

GENERAL

Overtemp Protection	A normally closed thermostat will open if the temperature exceeds 87°C. The contacts for this thermostat may be accessed on pins 4 and 5 of either command connector.
SCR Protection	Lamp driver is protected by fast acting, 40 Amp circuit breaker. Heater drivers are protected by fast acting, 30 Amp circuit breaker.
Power Terminal Block	Double row, 10 pole, terminal block is rated for 30 Amps at 600 Volts.
Control Connectors	Dual control connectors; 25 position D-type. Pinout per table 1 on page 7. 16 position ribbon cable header. Pinout per table 2 on page 7.
Dimensions	See figure 1 on page 5 for dimensions and mounting of unit.
User Replaceable Parts	F1 to F4 5 x 20mm, 1/2 Amp, 250 Volt, Slo-Blo.

POWER

Operating Voltage	Factory configured for 208 Vac Line operation. Supply tolerance is; +10%, -15%.
Frequency	50/60 Hertz.
Controller Independence	Removal of power to the lamp driver will not affect operation of the heater driver. Removal of power to the heater driver will not affect operation of the lamp driver.

ISOLATION

Control Input to Chassis	Hipot tested at 2500 Volts for 1 minute.
Control Input to Circuit Common	Hipot tested at 2500 Volts for 1 minute.

SPECIFICATIONS: (Continued)

ENVIRONMENTAL	
Ambient Temperature	Storage -40ºC to +85ºC. Operating +20ºC to +40ºC.
Humidity	0 to 90% (Non-condensing)
Altitude	Sea level to 10,000 feet.
Pollution	The 3095-2001 is designed according to pollution degree 2 guidelines.
Cooling	Customer must provide 40 Cubic feet per minute forced air over heatsink fins.

LAMP CONTROL	
Operating Voltage	0 to 208 V_{AC} output
Maximum Load Current	30 Amps RMS.
Lamp Enable Signal	24 Volts DC, 15mA max to enable lamp driver circuit. (Positive to terminal 14, Negative to terminal 13) (must enable when 20 V_{DC} or more, must disable when 5V_{DC} or less)
Control Mode	Single-phase, phase-angle control using inverse parallel SCR's. RMS value of load voltage is linear with respect to command signal. 0 to 10 Vdc command = 0 to 208 Vrms.
Soft Start & Ramp Rate	On application of power, the load voltage will ramp to desired output. After interruptions of ½ cycle or more, load voltage will reset to zero, then ramp to the desired output . The ramp rate is equal to a 0.2 second R/C time constant.
Current Limiting	Current limiting is provided to prevent the circuit breaker from tripping when power is applied to cold lamps. Factory set at 30 Arms.
Control Accuracy	Load voltage is accurate within 2% of span over the command signal range of 0.5 to 10V_{DC}. (Typical accuracy is 0.5%.)
Regulation	Line voltage fluctuations of +10% to -15% will result in a load voltage change of less than 0.5% over the command signal range of 0.5 to 10Vdc.
Command Signal	0 to 10 V_{DC}. 100 K input impedance

SPECIFICATIONS: (Continued)

HEATER CONTROL	
Operating Voltage Range	0 to 208 Volts RMS Output.
Maximum Load Current	30 Amps RMS.
Control Mode	Phase-angle, single-phase voltage applied to the inner and outer heaters is linearly controlled with respect to the command signal using inverse parallel SCR's. Two modes of control, full power (Ramp) or partial power (Servo) are dependent on the polarity of the command signal. A 0 to Positive (+) 10Vdc signal causes the RMS value of the voltage applied to the inner and outer heater to be equal. Both will be proportional to the command signal. (Ramp) A 0 to Negative (-) 10Vdc signal causes the RMS value of the voltage applied to the inner heater to be proportional to the command signal and the RMS value of the voltage applied to the outer heater to be a percentage of the inner heater voltage. (Servo) The percentage is adjustable by ratio potentiometer: 40% to 100%. The ratio adjustment is accessible through the lid.
Ratio Indicator	A digital display, viewed through the lid, indicates the voltage ratio as set by the ratio potentiometer.
Power Limiting	Power limiting will prevent the combined load power of the inner and outer heaters from exceeding 1500 Watts.
Current Limiting	Current limiting prevents the combined current of the inner and outer heaters from exceeding 9.5 Amps RMS.
Soft Start & Ramp Rate	On application of power, the load voltage will ramp to desired output. After interruptions of ½ cycle or more, load voltage will reset to zero, then ramp to the desired output. The ramp or slew rate is equivalent to an R/C time constant of approximately 0.3 seconds.
Control Accuracy	Load voltage accuracy is within 2% of span over the command signal range of 0.5 to 10 Vdc.
Regulation	Line voltage fluctuations of +10% to -15% will result in a load voltage change of less than 0.5% over the command signal range of 0.5 to 10Vdc.
Command Signal	0 to **+**10Vdc for RAMP mode. (See Control Mode, above.) 0 to **-** 10Vdc for SERVO mode. 100 KΩ minimum input impedance.
Open Heater Fault Detection	This feature is active only when the command signal is greater than +1 Vdc (Ramp mode). The load voltage to the inner and outer heaters will be interrupted in the event that any of the following conditions occur. 1.) If the outer heater current is less than 0.3 ±0.03 Arms. (Open outer heater) 2.) If the inner heater current is less than 0.1 ±0.01 Arms. (Open inner heater) 3.) If the inner heater current is greater than the outer heater current. (Wrong connections) Operating the reset switch with power applied resets the circuit.

SPECIFICATIONS: (Continued)

RETRANSMIT SIGNALS (metering)

Lamp Current	1 Volt = 10 Amps RMS lamp current.
Outer Heater Current	1 Volt = 6 Amps RMS outer heater current.
Heater Power	Inner and outer heater total power 1 Volt = 400 Watts. Inner heater only 1 Volt = 200 Watts
Load Resistance	Load => 10KΩ on each metering output.

DIAGNOSTIC INDICATORS: (See page 8 for location.)

Command Signals	Lamp:	Intensity of a GREEN LED is proportional to the magnitude of the lamp command signal.
	Outer Heater:	Intensity of a GREEN LED is proportional to the magnitude of the outer heater command signal.
	Inner Heater:	Intensity of a GREEN LED is proportional to the magnitude of the inner heater command signal.
Output Indication	Lamp:	Intensity of a GREEN LED is proportional to the magnitude of the lamp current.
	Outer Heater:	Intensity of a GREEN LED is proportional to the magnitude of the current in the outer heater.
	Inner Heater:	Intensity of a GREEN LED is proportional to the magnitude of the current in the inner heater.
Power & Current Limit	Power Limit:	A yellow LED is energized when the heater driver has reached power limit.
	Current Limit:	A yellow LED is energized when the heater driver has reached current limit.
	Lamp Current:	A yellow LED is energized when the lamp driver has reached current limit.
Control Mode	Ramp Mode:	A green LED is energized when the command signal is more positive than +0.025 V_{DC}.
	Servo mode:	A green LED is energized when the command signal is more negative than -0.025 V_{DC}.
Lamp Enable:		A green LED is energized when the lamp driver is enabled.
Load Fault	Open Load:	A red LED is energized if either the inner or outer heater is open.
	Wrong Connection:	A red LED is energized if the inner heater current is greater than the outer heater current.
	Reset:	Upon load fault, the heater drivers are disabled until the reset switch is operated.
Ratio Indicator:	Voltage Ratio:	A digital display, viewed through the lid, indicates the voltage ratio as set by the ratio potentiometer.

DIMENSIONS:

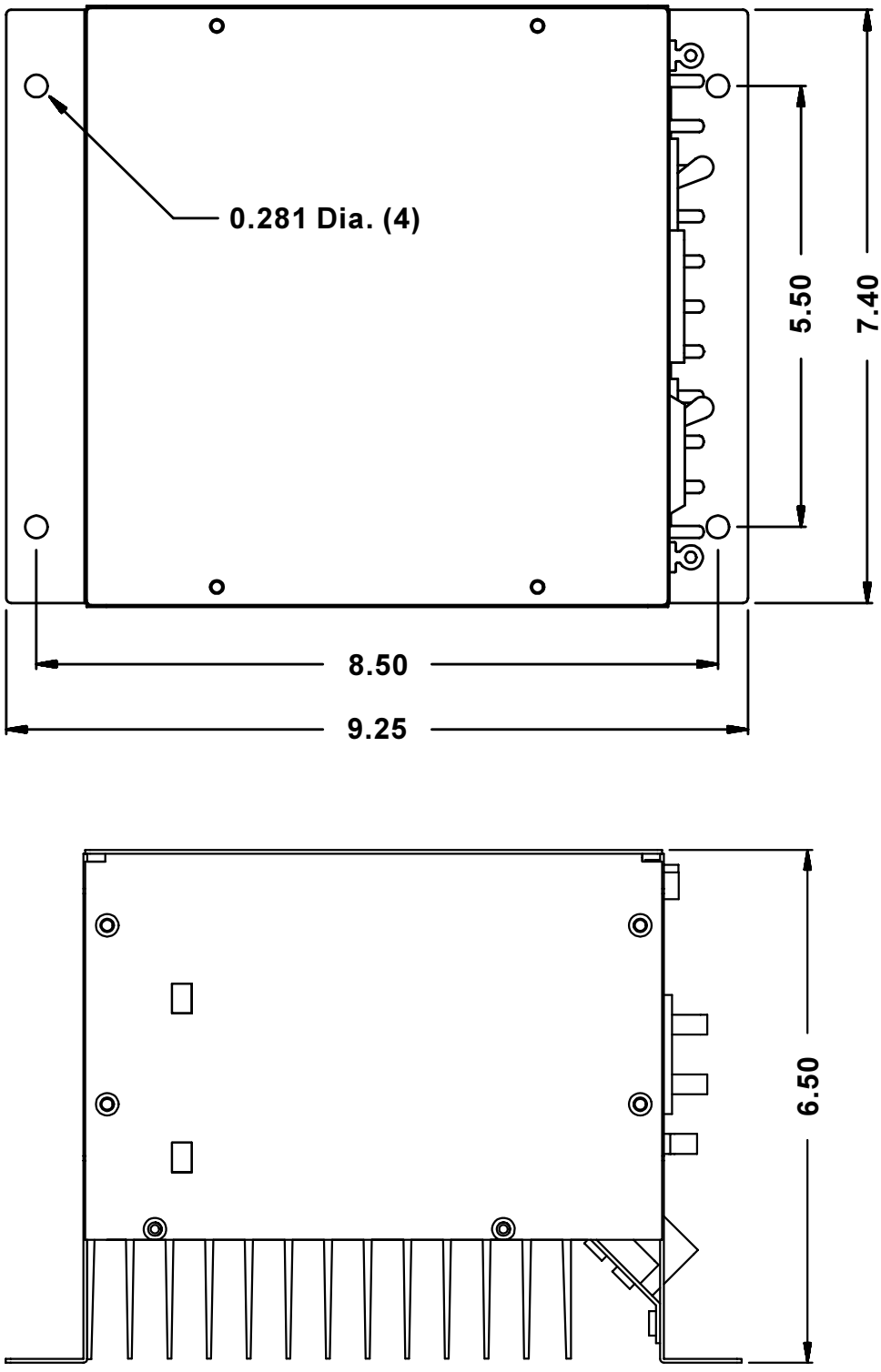

Figure 1. Model 3095 dimensions. (inches)

INSTALLATION:

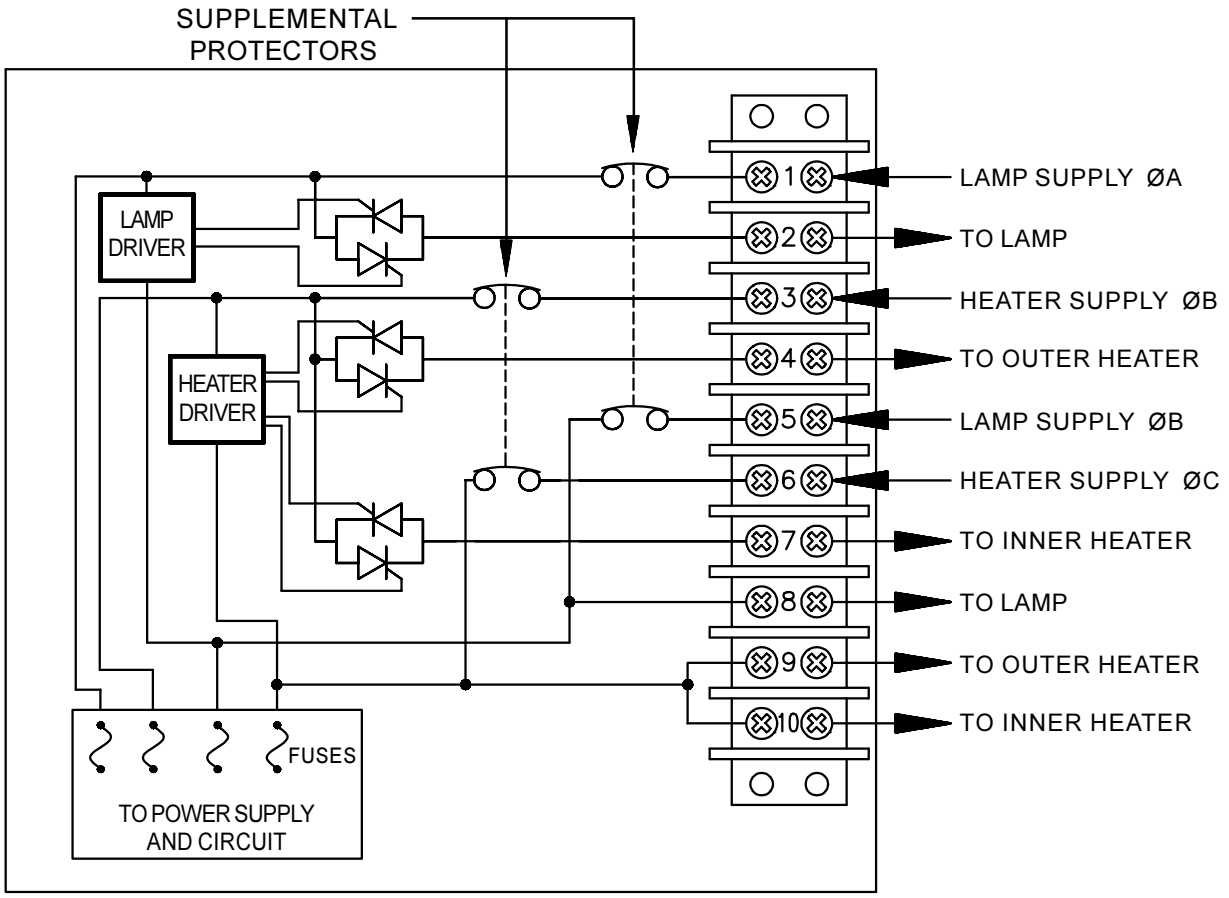

Fig. 2. Power connections

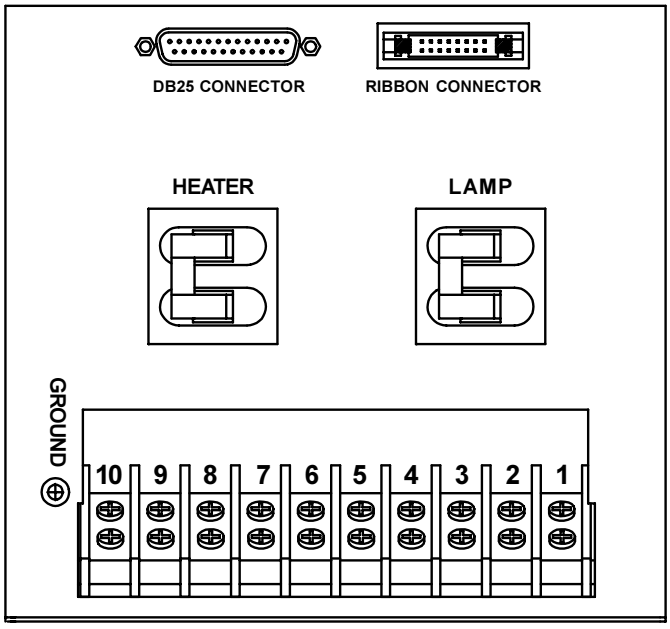

Figure 3. Connectors and Circuit Breakers.

COMMAND CONNECTORS:

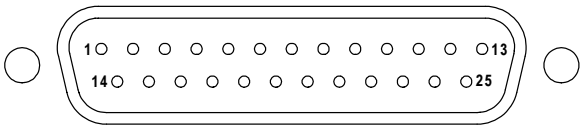

Figure 4. DB25 Connector.

PIN No.	FUNCTION
1	Heater Setpoint Input (0 to +10VDC) (0 to -10VDC
2	Lamp Setpoint Input. (0/10VDC)
3	Setpoint Signal Common
4	Overtemp Signal Output
5	Overtemp Signal Output
6	Lamp Current Retransmit
7	Total Power Retransmit
8	Inner Heater Power Retransmit
9	Retransmit Common
10	No Connection
11	No Connection
12	No Connection
13	Bake out Lamp Enable
14	+24 VDC
15	No Connection
16	No Connection
17	Heater Current Retransmit
18-25	No Connection

Table 1. Delta Connector Pinout.

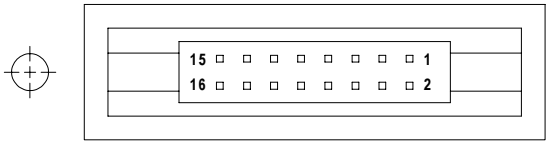

Figure 5. Ribbon Connector.

PIN No.	FUNCTION
1	Heater Setpoint Input. (0 to +10VDC) (0 to -10VDC)
2	Lamp Setpoint Input. (0/10VDC)
3	Setpoint Signal Common
4	Overtemp Signal Output
5	Overtemp Signal Output
6	Lamp Current Retransmit
7	Total Power Retransmit
8	Inner Heater Power Retransmit
9	Retransmit Common
10	No Connection
11	No Connection
12	No Connection
13	Bake out Lamp Enable
14	+24 VDC
15	No Connection
16	No Connection

Table 2. Ribbon connector Pinout.

CONTROL CONCEPTS

TEL: (952) 474-6200 (800) 765-2799
FAX: (952) 474-6070 www.ccipower.com

8077 Century Blvd
Chanhassen, MN 55317, USA

3095-2001 LID:

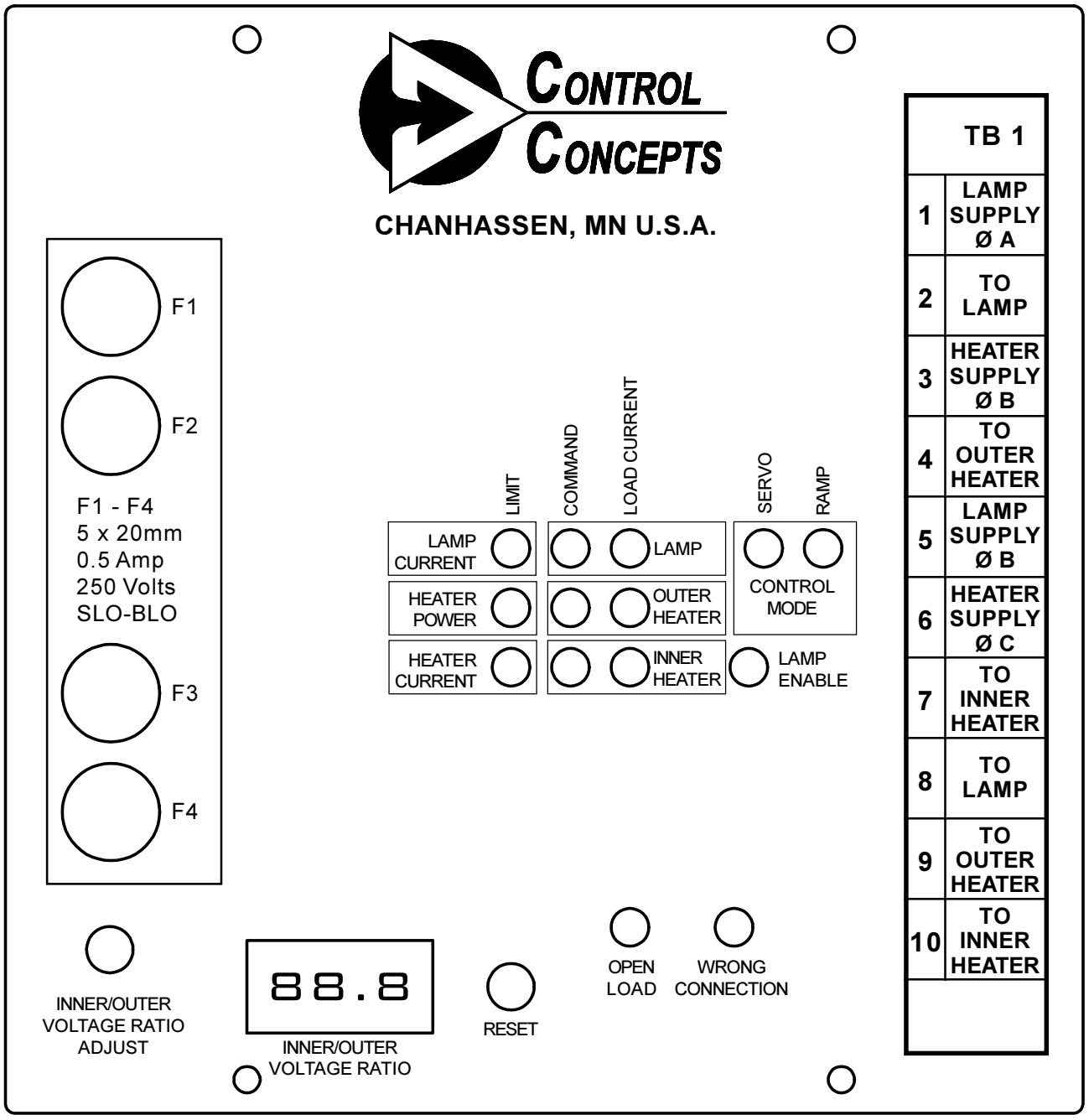

Fig. 6. 3095-2001 Lid.

CAUTION

NO USER REPLACEABLE PARTS INSIDE
DO NOT OPERATE UNIT WITH LID REMOVED
DO NOT OPERATE UNIT WITH FINGER GUARD REMOVED
REMOVE POWER WHEN REPLACING FUSES

EXTREME CAUTION IS URGED WHEN MAKING MEASURMENTS

LED CONDITIONS TABLE

LED LABEL	IF LED IS OFF:	IF LED IS ON:	IF LED IS BLINKING:
LAMP CURRENT LIMIT	OK	CURRENT LIMIT SETTING HAS BEEN REACHED	PROBLEM IS TYPICALLY A SHORTED LAMP
LAMP COMMAND	MISSING LAMP COMMAND OR COMMAND at ZERO	LED INTENSITY IS PROPORTIONAL TO MAGNITUDE OF COMMAND SIGNAL	PROBLEM IS TYPICALLY A SHORTED LAMP
LAMP LOAD CURRENT	NO COMMAND OR NO LOAD	LED INTENSITY IS PROPORTIONAL TO MAGNITUDE OF LOAD CURRENT	PROBLEM IS TYPICALLY A SHORTED LAMP
LAMP ENABLE	MISSING ENABLE SIGNAL	LAMP OUTPUT ENABLED	
HEATER POWER LIMIT	OK	REACHED POWER LIMIT SETTING	PROBLEM IS TYPICALLY A SHORTED HEATER
HEATER CURRENT LIMIT	OK	REACHED CURRENT LIMIT SETTING	PROBLEM IS TYPICALLY A SHORTED HEATER
OUTER HEATER COMMAND	MISSING OUTER HEATER COMMAND SIGNAL	LED INTENSITY IS PROPORTIONAL TO MAGNITUDE OF COMMAND SIGNAL	PROBLEM IS TYPICALLY A SHORTED HEATER
INNER HEATER COMMAND	MISSING INNER HEATER COMMAND SIGNAL	LED INTENSITY IS PROPORTIONAL TO MAGNITUDE OF COMMAND SIGNAL	PROBLEM IS TYPICALLY A SHORTED HEATER
OUTER HEATER LOAD CURRENT	OUTER HEATER OPEN OR NO COMMAND	LED INTENSITY IS PROPORTIONAL TO MAGNITUDE OF LOAD CURRENT	
INNER HEATER LOAD CURRENT	INNER HEATER OPEN OR NO COMMAND	LED INTENSITY IS PROPORTIONAL TO MAGNITUDE OF LOAD CURRENT	
SERVO MODE	COMMAND = POSITIVE 0.025 VOLTS OR MORE	HEATER IS IN SERVO MODE	
RAMP MODE	COMMAND = NEGATIVE 0.025 VOLTS OR LESS	HEATER IS IN RAMP MODE	
OPEN LOAD	OK	INNER OR OUTER HEATER OPEN	
WRONG CONNECTION	OK	INNER HEATER CURRENT GREATER THAN OUTER HEATER CURRENT OR OUTER HEATER OPEN	

THE CONTROLLER HAS BEEN FACTORY CALIBRATED FOR OPTIMUM PERFORMANCE.
IT IS NOT RECOMMENDED THAT ADJUSTMENTS OR REPAIRS BE ATTEMPTED IN THE FIELD.
TRUE RMS RESPONDING METERS MUST BE USED FOR VOLTAGE OR CURRENT MEASUREMENTS.

Part No. 5000095 - 1215
10/19/2001