

### 7.3 Furnace Calibration

To access the Calibration Screen, go the [Maintenance](#) Screen.



Click on the [Calibrate](#) button as shown below.



The following pop-up window will appear.

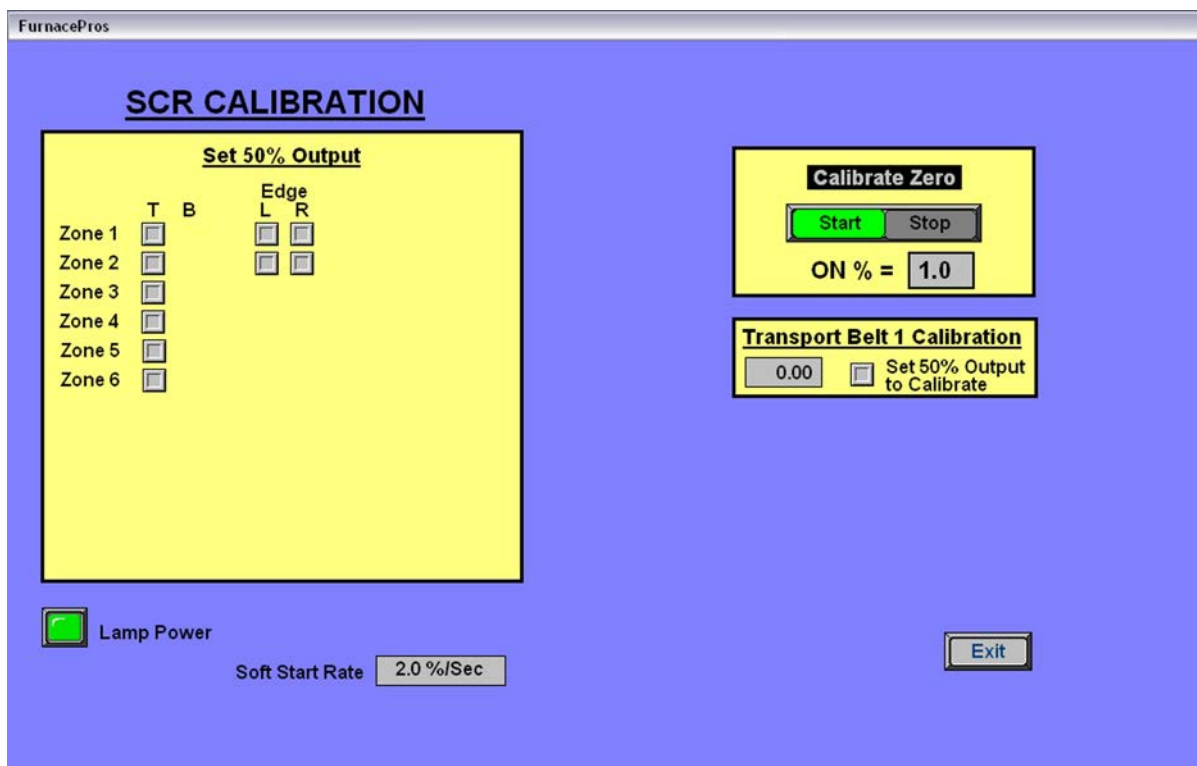


Figure 7-4: Calibration pop-up window

### 7.3.1 SCR Calibration

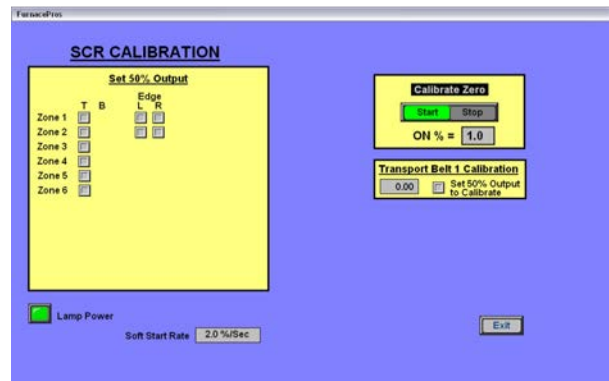
SCR calibration is an important part of maintaining consistent thermal process profiles. To complete the calibration, each SCR will need its ZERO trimpot and SPAN trimpot adjusted. ZERO and SPAN controls allow the user to calibrate each SCR output to the process command signals from its respective PLC Analog Output module. Due to some interaction between the ZERO and SPAN controls, it may be necessary to repeat these adjustments several times.

**Tools Required: True RMS or Peak-Responding Voltmeter**

#### Step 1: ZERO the SCR

From the on-screen SCR Calibration pop-up window:

- Go to the [Calibrate Zero](#) box.
- Set the value in the [ON %](#) box to 1.0.
- Click on the Start button.



 **DANGER: High voltage is now present at the SCR's!**

- Go to the furnace cabinet side panel and start with one SCR. It is recommended that you choose an orderly pattern that will leave all SCR's adjusted.
- Locate the Command Indicator, a green Light Emitting Diode (LED) located between the ZERO trimpot and SPAN trimpot on the SCR module. The intensity of this LED will vary with the output of the unit. The correct ZERO trimpot setting is at the point where the LED cycles between no light and partially illuminated.

#### If the LED is illuminated:

Turn the ZERO trimpot screw until the LED goes out. Do not turn the screw any further. Go to the next SCR.

#### If the LED is not illuminated when you first observe it:

Turn the ZERO trimpot screw until the LED illuminates and then turn the screw the opposite direction until the LED goes out. Go to the next SCR.

#### If the LED never illuminates:

Try setting the value in the [On %](#) field in the [Calibrate Zero](#) box to any value between 0.5 and 2.0 and go back to step e) above. If the SCR still does not calibrate, the SCR may be damaged. Contact FurnacePros Technical Support for further assistance.

- Repeat this process for all SCR's.
- When the ZERO adjustments are finished for all SCR's, select the [Stop](#) button in the [Calibrate Zero](#) box of the Calibration pop-up window. This action will remove the high voltage from the SCR's.

#### Step 2: Adjust the SPAN

The PLC Analog Out modules apply a DC signal over a range of 0-5 Vdc or 0-10 Vdc to the command input on each SCR module. The RMS voltage applied to the lamps from the SCR Output varies linearly with this DC command signal applied from the Analog Out.

Calculate the full scale RMS voltage by multiplying the peak or supply voltage by 0.707.

$$\text{RMS Voltmeter Reading} = (\text{Peak Voltage}) \times 0.707$$

For Example:

$$170V_{rms} \approx 240V_{AC} \times 0.707$$

$$270V_{rms} \approx 380V_{AC} \times 0.707$$

$$340V_{rms} \approx 480V_{AC} \times 0.707$$

$$390V_{rms} \approx 550V_{AC} \times 0.707$$



**DANGER: High voltage is now present at the SCR's!**

Remember: this RMS value is your target for setting the SPAN on each SCR.

a) From the SCR Calibration window, in the [Set 50% Output](#) box, select the checkbox for the first SCR (Zone 1-T). See the following examples to understand how the SCR's are referenced:

Zone 1, column T is the SCR controlling the top lamps in Zone 1

Zone 1, column B is the SCR controlling the bottom lamps in Zone 1

Edge (row 1, column L) is the SCR controlling the first edge heater on the left side of the furnace (facing the furnace entrance).

Edge (row 2, column R) is the SCR controlling the second edge heater on the right side of the furnace (facing the furnace entrance).

b) Locate the selected SCR in the electronics cabinet and connect a true RMS or peak-responding voltmeter across the load.

c) Adjust the SPAN trimpot screw until your meter shows the correct RMS target value (remember to adjust for the RMS value – not peak! – if you are using a peak-responding voltmeter). Clockwise adjustment increases the output while counter-clockwise adjustment decreases the output.

d) Repeat this procedure for all SCR's, selecting the SCR's one at a time as was performed in step a) above.

e) During this process, the lamps are on with 50% power being supplied. Because of the possibility of overheating, power supplied to the lamps will shut off after two minutes. Please note that while the PLC is applying a command signal for 50% power to the lamps, you should be setting the SPAN for the full RMS target value.

Note: DO NOT open Fuse Blocks for SCR Calibration

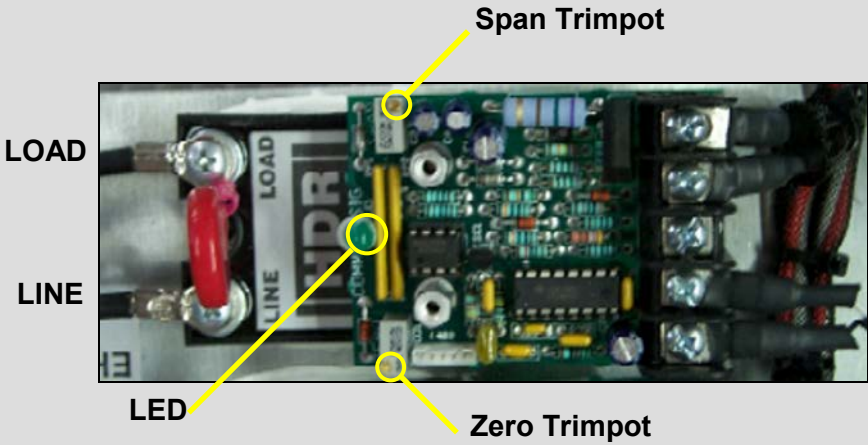
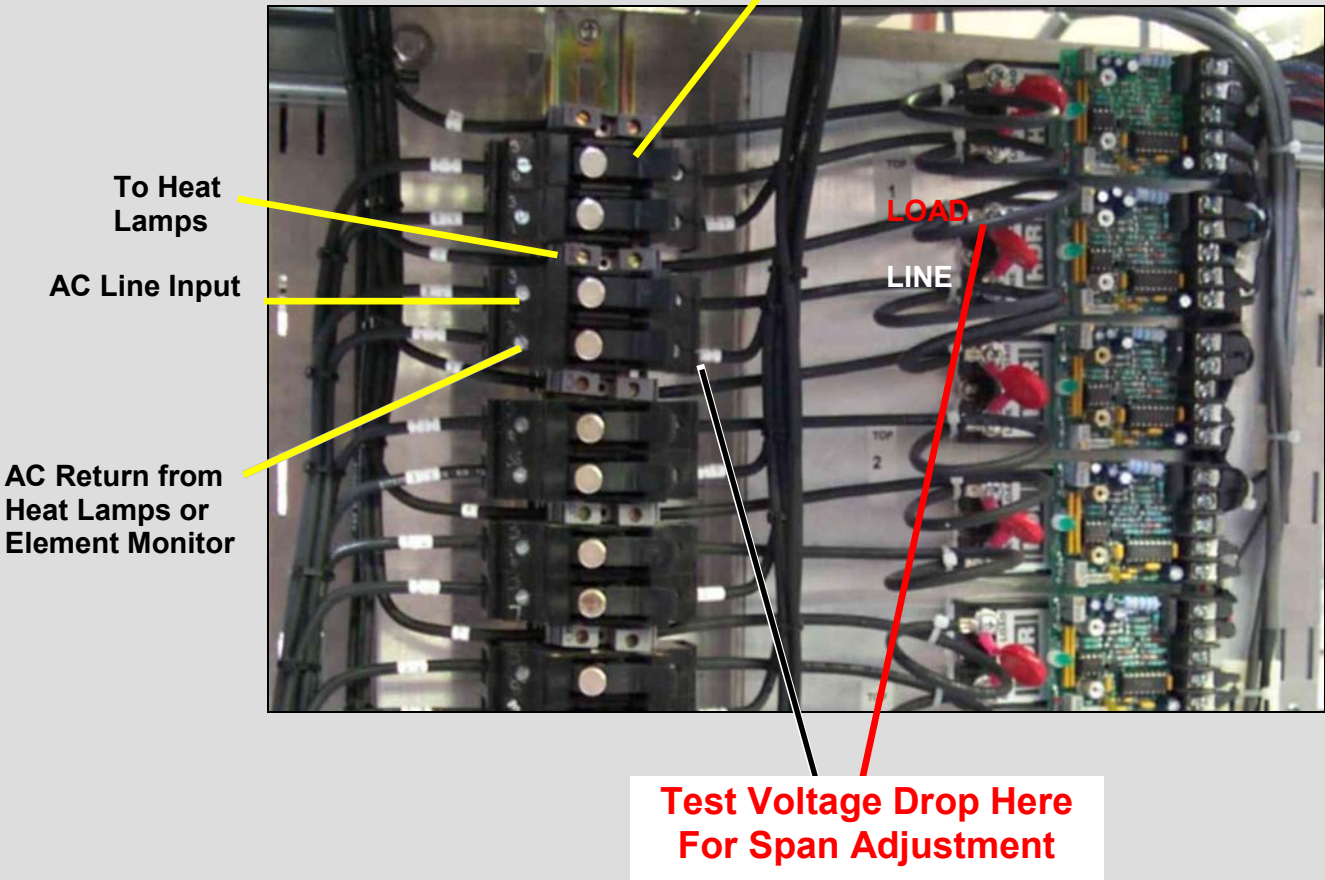


Figure 7-5: SCR Calibration Diagram & SCR Detail

### 7.4.3 SCR

A silicon-controlled rectifier (SCR) controls the level of current supplied to the heat lamp. The SCR control line is taken from an analog brick 0-5 V DC Output module connected to the PLC controller. The SCR supply power is in phase with the lamp voltage for accurate power application.

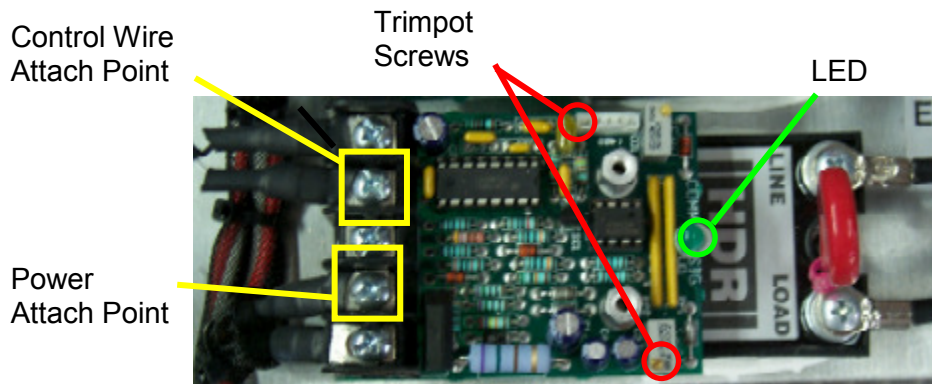


Figure 7-15: Silicon-Controlled Rectifier (SCR )

### 7.4.4 Fuses

Fuses are used throughout the furnace. The terminal block type of connector allows for safe and easy inspection or replacement.

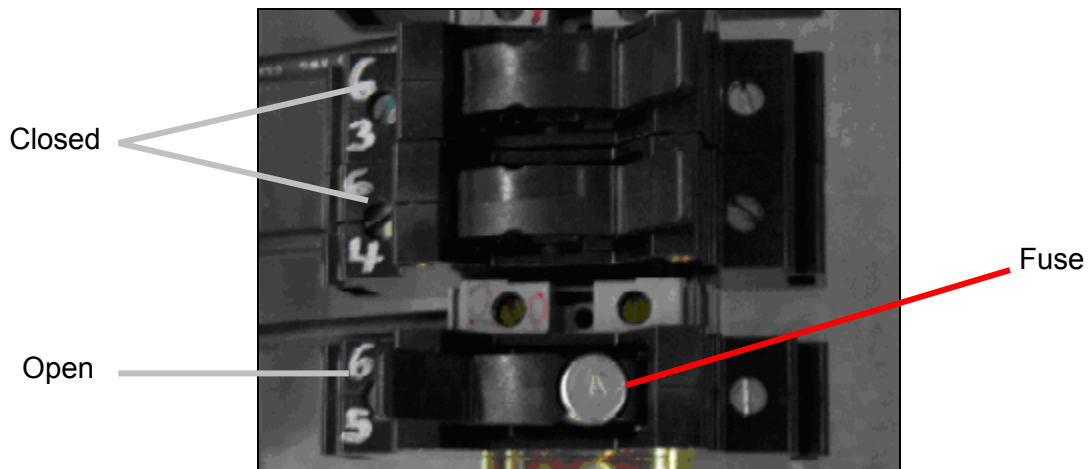


Figure 7-1: Fuse Block

To inspect the fuse, flip the toggle cover open and remove the fuse. Test for continuity with a multi-meter as necessary.