

Detailed Directions for Use with the Pro 100 Series Furnaces

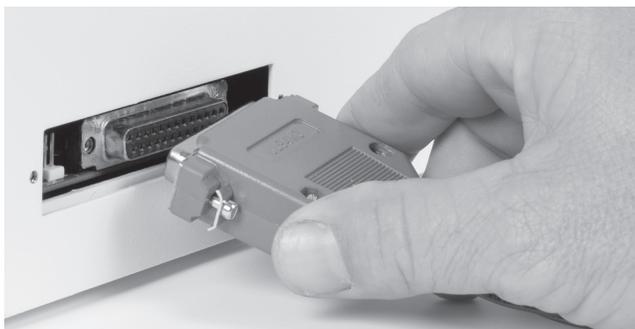


IMPORTANT: THE FURNACE AND THE PROCAL KIT FIRING TRAY MUST BE HEAT SOAKED AT $\geq 600^{\circ}\text{C}$ FOR AT LEAST AN HOUR TO GET CONSISTENT, REPEATABLE RESULTS.

Section A – Routine Quality

Control Checking

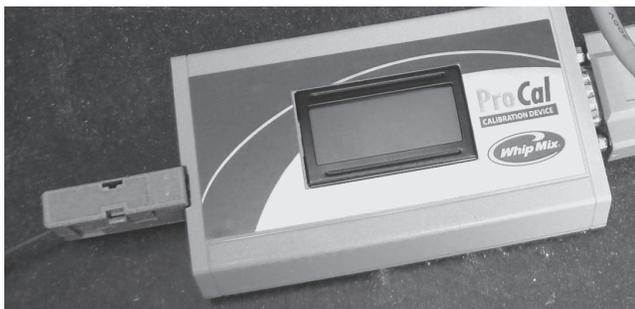
1. Remove the two thumbscrews on the right side of the furnace chassis, exposing the 25 pin connector.
2. Turn off the AC Line power to the furnace before inserting the 25 pin adaptor then plug the 9 pin ProCal cable into the adaptor. After the connector is seated, turn the AC Line power back on the furnace.



3. The table will drop automatically after the Power On Self Test has completed. Place firing tray on table after using centering pin to locate its position.



4. Raise table to close muffle. Allow the white cable to exit out the front of the muffle.
5. Connect instrument box to the green thermocouple connector, noting it will only plug in one way.



6. Press **SPECIAL FUNCTIONS** button on Pro 100 Furnace.



7. Rotate counter clockwise to **CALIBRATE OVEN.**



8. Enter **PASSWORD = 250**, then press **NEXT** button.



9. Enter the same **IDLE TEMPERATURE** as the **TARGET QC** temperature, don't forget to press the **NEXT** button on the furnace to enter your idle temp selection.



10. Important, wait for furnace to stabilize at selected value for 15-20 minutes before passing judgement on furnace calibration.

11. After the stabilization time record the “actual temp” on the furnace display and the temperature on the ProCal display on a piece of paper.

*** The ProCal is more stable than virtually any furnace it is present in. All furnaces turn the heater on until the target temperature is reached then switches it off and coasts downward until the thermocouple senses the temperature is just below the target, then repeats the cycle. This means there will be a slight oscillation of temperature a degree or two above the target and a degree or two below the target;

12. If the ProCal display value is higher than the furnace display the furnace is overfiring.

EXAMPLE: Idle temp 850°C
 Furnace actual temp=850°C
 ProCal display temp=855°C

The furnace is overfiring by 5°C at this temperature.

13. Repeat above procedure at 1000°C idle and again at 1150°C idle setting.

Example of results:

	Furnace	ProCal
850°C	850°C	855°C
1000°C	1000°C	1003°C
1150°C	1150°C	1152°C

14. Since all 3 QC checks show readings higher on the ProCal than on the furnace the furnace is overfiring. Use the ‘high fusing’ adjust feature to dial in compensation.

Since the high fusing adjust affects all programs over 800°C equally you may want to use a high fusing Adjustment valve of 3 degrees. (See section B to find procedure on entering high fusing adjustments.)

Important Note

The Fusing Adjustment function will render correction in the normal User Program firing mode **ONLY**. If you’ve got active Fusing Adjustments from previous QC Checks they will not correct the **Special Functions \ Calibrate Oven \ Password = 250 \ Idle** temperatures. **You ALWAYS get the temperature based on the most recent factory calibration in the Password = 250 mode.**

OK, what does that mean?

Here is an example:

You noted a 2 degree Overfire on a previous QC check and entered a 2 degree Overfire into the High Fusing Adjustment and all has been well for the last few months. Today you ran your next QC Check and this time you note a 3 degree Overfire situation in the Password = 250 mode. [Remember, the Password = 250 mode always references back to the factory calibration] You go to the Calibration – High Fusing adjustment, answer **YES** for overfire, but do you enter 2 degrees from the first correction plus

3 degrees from today’s QC check?

THE ANSWER IS DEFINITELY NO! If the needed correction in the current QC check indicates a 3 degree Overfire, just enter the 3 degrees and press the Next button. **The corrections are not cumulative.** Every time you press the **Next button the furnace first erases all previously stored correction values, it effectively restores the factory calibration for that temperature.** In other words it always wipes the slate clean, so any correction value you determine is needed during QC Checks in the Password = 250 mode is exactly the value you should enter in the Calibration - High Fusing mode.

Interpretation of Results

Consistency is more important than absolute accuracy for pure porcelain work. Notable exceptions to this are the CapTek process which depends on absolute accuracy for optimum infiltration. Once you have a furnace **setup and programmed to your liking, this is the BEST TIME to run a QC check as described in Section A to serve as a benchmark reference in case something goes astray in the future.**

The primary advantage of the ProCal is the ability to register temperature calibration data **AFTER** a problem has crept into the overall build-up and firing process, and immediately tell you whether the problem is with the porcelain mixture itself, the furnace, or a combination of both. **You can only have confidence in the data obtained from the ProCal if you routinely and regularly get consistent indications to base that confidence on.** Another way the ProCal can benefit you is by providing comparison data on all your Pro Series furnaces to ensure that every Pro Series furnace matches the results from all others with matched program parameters.

Section B – High Fusing Adjustments

Calibration – High Fusing Adjustment

Both the Password = 250 Idle temperature AND the High and Low Fusing Adjustments always reference back to the stored Factory Calibration point, not the previously stored adjustment.

What this means is that when you set the Idle Temperature in the Password = 250 mode to an Idle temperature of 850°C the furnace takes the muffle to the temperature corresponding to the value it saw when it was calibrated at 850°C at the factory.

Lets say that the ProCal reads 855°C when furnace reads 850, a 5 degree overfire (relative to the last factory calibration point).

You need to go into the **Special Functions \ Calibration - High Fusing Temperature Fusing adjustment** and dial in an offset which will result in User Programs firing 5 degrees lower at 850°C.

1. You would press **Special Functions**, rotate the knob to **Calibration-High Fusing**, and press the **Next** button.



Press **Special Functions** Button



Rotate Knob to “Cal – High Fusing”, Press **Next** The furnace would display “High Fusing – Overfires?” on the top line and **Yes** or **No** on the second line.



If we answer yes, we can input an Overfire value, if we answer **No**, we're actually saying that the furnace was Underfiring, not Overfiring.



2. In this example we were Overfiring by 5 degrees, so we answer **Yes** and press **Next** button.



3. The furnace will now display the last known Overfiring fusing adjust entry value; it might be 0, it might be 50, **IT DOES NOT MATTER WHAT IT SAYS. THE ONLY THING THAT IS IMPORTANT IS THE AMOUNT OF OVERFIRING YOU HAVE RIGHT NOW.**

Spin the dial to the desired value of 5 degrees of Overfire adjustment and press **Next** button. As soon as you press the **Next** button the **CURRENT** fusing offset value is stored to non-volatile memory (after erasing all previous values, either Overfire or Underfire).

If you are curious about what was previously stored you can go into the Fusing Adjust mode, inspect the stored value and back out without altering the value by pressing the **Special Functions** button [not the **Next** button].

4. The next time you run a normal firing program with a hold temperature above 800°C the furnace will automatically deduct 5 degrees from the programmed hold temperature and the actual temperature will be accurate.

Appendix – Special Functions Mode Menu Selections (Pro 100 only)

When you press the **Special Functions** button the first menu selections appear at the top below. As you rotate the knob Clockwise, the sequence of selections is shown below, from top to bottom:

Special Functions Menu

1. Night Mode
2. Change Idle Temp
3. Set Vacuum Level
4. Temp in C or F?
5. Prog Start Delay
6. Night Mode Temperature
7. Constant vc Pump
8. Sp Cool Position
9. Capital Letters?
10. Porcelain Names:
11. Cal Low Fusing
12. Cal High Fusing
High Overfires (Yes/No)?
Overfires – confirm Yes with Next button, enter amount, press Next button.
Underfires – rotate knob to No, confirm with Next button, enter amount, press Next button.
13. Print Form
14. Set Time & Date
15. Programs > Box
16. Programs > Box
17. Test Furnace
18. Calibrate Oven
Password – [rotate knob to 250], press Next button
Change Idle Temp
New Idle - xxx [enter temperature, press Next button]
Last button gives chance to change temperature again, press Next after.