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Specifications

Power
110 VAC ± 10% 50/60 Hz
220 VAC ± 10% 50/60 Hz

Power Consumption
Furnace alone: 850 W
Furnace and pump: 1100 W Max

Dimensions
10³/₄"W x 15"D x 20¹/₄"H

Temperature
1200°C / 2190°F Maximum

Weight
59 lbs. (including packaging)

Muffle Chamber
3.75" diameter x 2.5" high

Accessories

1 Firing Tray
1 Cooling Tray
1 Owners Manual
2 Spare Fuses
Chapter One

Getting Started

You are undoubtedly eager to unpack, set up, and begin using your new furnace. Getting started will be much easier if you will carefully review the information in this chapter and follow the steps as outlined.

First...

Some things you should know before you unpack your furnace:

☑ When you unpack your furnace, be sure to save the carton and packing materials. These can be used again if there is ever a need to ship or return equipment.

☑ Be sure to read and save the printed shipping material packed with your furnace - it contains valuable information!

☑ DO NOT turn on the power to your furnace until you are instructed to do so.
**Unpacking**

1. If the packaging materials and/or the furnace appears to be damaged, please call your dealer before continuing.

2. Remove the furnace from the carton and place it on a flat surface.

3. Look up into the muffle area and locate the orange shipping bar and wingnuts. Remove the wingnuts, push the two bolts and attached brackets out of the orange bar. Finally remove the orange bar by sliding it out the side. Keep these parts in case there is a need to ship the furnace.

**Installing the Vacuum Pump**

4. Install the vacuum pump as follows:
   - Plug the vacuum pump's power cord into the outlet end of the short power cord supplied with the furnace.
   - Attach the other end of this short power cord to the international standard outlet on the rear of the furnace marked “VACUUM PUMP”.
   - Attach a \( \frac{1}{4} \) Inch vacuum rated hose from the vacuum pump to the brass fitting marked “VACUUM PUMP” at the rear of the furnace.

**Power**

5. The furnace requires 120 VAC and 10 amps of current. A special heavy duty power cord has been supplied with your furnace. **DO NOT OPERATE ON ANY OTHER POWER CORD. DO NOT OPERATE WITH AN EXTENSION CORD. OPERATING THIS FURNACE ON A CIRCUIT WITH OTHER FURNACES OR ELECTRICAL APPLIANCES THAT REQUIRE SIGNIFICANT POWER MAY CAUSE A CIRCUIT BREAKER TO TRIP.** Install the heavy duty power cord and plug the furnace into a grounded outlet.
6. Position the furnace so that the front is facing you. You should be able to reach the power switch on the right side of the furnace at the rear. Be sure to have at least 8 inches on all sides of the furnace to allow sufficient air flow to keep the furnace cool. Do not place anything flammable near the furnace.

7. Turn on the furnace using the power switch located on the right side on the rear of the furnace. The display should light up and the furnace should perform a series of internal self tests. During these self tests you will hear the vacuum valves and the pump cycle on and off.

8. The lift will move to its lowest position and stop. Place the firing tray on the center of the lift table.

Setting the Display Options

9. The furnace comes from the factory set to display information in metric units, i.e. temperature in degrees Centigrade and vacuum in centimeters of mercury. If you would prefer to work in English units, i.e. degrees Fahrenheit and vacuum in inches of mercury, perform the following procedure:

   ○ Press the Special Function button.
   ○ Turn the Select knob clockwise until “2” is displayed.
   ○ Press the Enter button.

The furnace will now operate in English units. Perform the following procedure to return to metric units:

   ○ Press the Special Function button.
   ○ Turn the Select knob counterclockwise until “1” is displayed.
   ○ Press the Enter button.

Vacuum

10. The furnace comes from the factory set to operate the vacuum pump by cycling it on and off as required to maintain the vacuum level set in the program. The furnace may be set to operate the vacuum pump continuously to
achieve maximum vacuum, by performing the following procedure:

- Press the Special Function button.
- Turn the Select knob to display “3”.
- Press the Enter button.

The furnace will now run the vacuum pump continuously when the program calls for vacuum. Perform the following procedure to return to the cycling mode:

- Press the Special Function button.
- Turn the Select knob to display “4”.
- Press the Enter button.

**Night Mode**

11. The furnace comes from the factory with the night mode temperature set to 100°C. The furnace will remain at this temperature when night mode is in operation. The night mode temperature can be changed by using the following procedure:

- Press the Special Function button.
- Turn the Select knob to display “5”.
- Press the Enter button.
- Use the Select knob to display the new night mode temperature.
- Press the Enter button.

The furnace will now use the new night mode temperature.

**IMPORTANT** - Before firing porcelain for the first time, it is best to rid the muffle of all moisture. Excess moisture may prevent the pump from reaching its preset level and shutoff to hold the vacuum. The easiest way to do this is to use the Night Mode set at about 120°C or 250°F.

12. The furnace is now ready to operate. Continue on to page 5 to begin learning about the front panel controls and indicators.
Front Panel Controls and Indicators

Main 4 Digit Display

- Indicates temperature if the temperature light is on. It is displaying actual temperature unless you are entering the speed for the program. Speed will be displayed as degrees per minute.

- Indicates vacuum level if the vacuum light is on.

- Indicates time in minutes, seconds if the min.sec light is on. NOTE that time is entered in minutes and seconds - not minutes and hundredths of minutes. Example: “5.45” is 5 minutes and 45 seconds.

- The “°F/Inches” light indicates that the furnace is operating with English units of measurement. Temperature will be in degrees Fahrenheit and vacuum will be in inches of mercury.

- The “°C/Centimeters” light indicates that the furnace is operating with metric units of measurement. Temperature will be in degrees Centigrade and vacuum will be in centimeters of mercury.

2 Digit Display

- Indicates active program number.

- Indicates Special Function number when entering a special function.

- Displays “Er” to indicate an error condition.
**Process Indicator**

- Indicates the item currently being entered during programming.
- Indicates the status of a program currently being run.

**Start Program**

- Pressing this button will start the current program.

**Glaze Program**

- Pressing this button will raise the lift, maintain the current temperature, and prompt for the entry of the glaze parameters. The glaze program will start running as soon as parameter entry is concluded. The Glaze Program is covered in detail in Chapter Three.

**Special Function**

- Press Special Function to perform a furnace setup or calibration function.
- Special functions are covered in detail in Chapter Four.

**Night Mode**

- Placing the furnace in night mode keeps the muffle idling at a low, predetermined temperature, to prevent a buildup of moisture from occurring during the night.
- Pressing the Night Mode button while a program is running will cause the furnace to enter the night mode as soon as the program is finished.
- Pressing Night Mode while the furnace is idling will cause the furnace to enter night mode immediately.
- Night mode is covered in detail in Chapter Four.
Select Knob

- The **Select** knob is used to enter numeric data.
- Turn the **Select** knob clockwise to increase the displayed number.
- Turn the **Select** knob counterclockwise to decrease the displayed number.

Enter

- Press **Enter** to input and store data, proceed to the next item, or when confirming input information.
- Press **Enter** to clear an error message on the display.

Program Number

- Press **Program Number** and turn the **Select** knob to change from the current program number to another program number you wish to run.

Display

Pressing **Display** will cause the 4 digit display to cycle:
- From temperature to vacuum;
- From vacuum to time remaining;
- From time remaining to temperature.
- After approximately a minute, the display will revert from the item being displayed back to temperature.

Program Edit

- Pressing **Program Edit** while the furnace is idling will allow you to edit a program and save the changed program. Editing programs is covered in detail in Chapter Two.
Pressing **Program Edit** while a program is running will allow you to make temporary changes to the program currently running. After the changed program has run, the program will revert to its original contents. Changing programs is covered in detail in Chapter Three.

**Up / Skip**

- While in idle mode press the ↑/Skip once and the lift moves upward. Press again and the lift stops moving.
- While the lift is moving down press the ↑/Skip and the lift will begin moving up.
- While a program is running press the ↑/Skip and the program will skip to the next step. For example, pressing the ↑/Skip while a program is in the pre-dry step will cause the lift to rise to the upper position and the rate rise step to begin.

**Down / Abort**

- While in idle mode press the ↓/Abort once and the lift moves downward. Press again and the lift will stop moving.
- While the lift is moving up press the ↓/Abort and the lift will begin moving down.
- While a program is running pressing the ↓/Abort will cause the program to abort and the lift to move to its lower position.
- Press the ↓/Abort while changing a program, or while entering a special function and the program entry or special function will abort without changing the previous contents of the program or special function.
- While in any mode press the ↓/Abort and furnace will return to idle mode.
Furnace Operation

The Pro 90 furnace has five operating modes:

- Idle
- Program Running
- Program Input
- Special Function Input
- Night Mode

Each of these operating modes will be discussed in detail in the following pages.

Idle Operation

The furnace will be in the idle mode of operation after any of the other modes are completed or whenever the \$/Abort button has been pushed to abort an operation. The furnace will idle at the entry temperature of the current program number displayed in the 2 digit display. The current program number can be changed by pressing the Program Number button and entering the new program number using the Select knob and pressing Enter.
Chapter Two

Entering a Program

Programs can be entered or changed while the furnace is idling. This procedure can be aborted and the original program will not be changed by pressing the \( \Delta / \text{Abort} \) button at any time. The procedure for entering and changing a program is the same.

1. Press **Program Edit** to begin the procedure.

2. Press **Enter** to make changes to the current program **OR** turn the **Select** knob to display a new program. Press **Enter**.

3. **Start Temp** - The “Start Temp” light will flash. Press **Enter** to accept the displayed start temperature **OR** use the **Select** knob to display a new start temperature. Press **Enter**. This is the temperature at which you want the furnace when the porcelain enters. The allowable range is \( 65^\circ \) to \( 650^\circ \) C (\( 150^\circ \) to \( 1200^\circ \) F).

4. **Pre Dry** - The “Pre Dry” light will flash. Press **Enter** to accept the time displayed, **OR** use the **Select** knob to display a new time. Press **Enter**. This is the time it will take to raise the lift from the lower position to the upper position. The lift will be raised in 5 evenly spaced steps during the programmed entry time. The time is entered in minutes.seconds. **Example:** 2.30 will raise the lift in two minutes and thirty seconds.

5. **Speed** - The “Speed” light will flash. Press **Enter** to accept the displayed value **OR** use the **Select** knob to display a new heat rate. Press **Enter**. The speed is the rate in degrees per minute the furnace temperature will rise during the heat rise step of the program. The acceptable range is \( 1^\circ \) to \( 150^\circ \) C (\( 2^\circ \) to \( 275^\circ \) F) per minute.
6. **Final Temp** - The “Final Temp” light will flash. Press Enter to accept the temperature displayed, OR use the Select knob to display a new final temperature. Press Enter. The acceptable range is the start temp to 1200°C (2192°F).

7. **Hold Time** - The “Hold Time” light will flash. Press Enter to accept the time displayed, OR use the Select knob to display a new time. Press Enter. This is the time that the porcelain will be held at the final temperature. The acceptable range is from 0 to 17 minutes and no seconds. The time is entered in minutes.seconds. *Example: 2.45 will hold the porcelain at the final temperature for two minutes and forty-five seconds.*

8. **Cool Time** - The “Cool Time” light will flash. Press Enter to accept the time displayed, OR use the Select knob to display a new time. Press Enter. This is the time it takes to lower the lift from the upper position to the lower position. The lift will be lowered in 5 evenly spaced steps during the programmed cool time. The acceptable range is from 0 to 17 minutes and no seconds. The time is entered in minutes.seconds. *Example: 4.15 will lower the lift in four minutes and fifteen seconds.*

9. **Vacuum Level** - The “Vacuum Level” light will flash. Press Enter to accept the displayed vacuum level, OR use the Select knob to display a new vacuum level. Press Enter. Select and enter “0” if vacuum is not wanted in this program. The vacuum level set with this feature is the target vacuum level for the program. The acceptable level is from 0.0 to 75.0 cm hg or 0.0 to 29.5 in hg. The furnace will convert any value less than 25.5 cm or 10.0 in to 0.0. When the rate rise step of the program begins, the vacuum pump will be started and a timer will begin. If the target vacuum level has not been reached within 120 seconds, the program will be aborted and “Er 1” will be displayed, indicating a vacuum error. If “Continuous Vacuum Pump” has been selected by using “Special Functions”, the vacuum pump will run throughout the vacuum cycle. If “Continuous Vacuum Pump” has not been selected, the vacuum pump will shut off after the target level has been reached and 30 seconds have elapsed. The vacuum pump will be restarted when the vacuum level has dropped to 3% below the target value. *Note: Vacuum level must approach the target vacuum level even if “Continuous Vacuum Pump” has been selected, otherwise the error condition will occur.*
10. **Release Temp** - If a vacuum level other than "0" was entered, the "Release Temp" light will flash. Press **Enter** to accept the displayed temperature OR use the **Select** knob to display a new value. Press **Enter**. The release temp is the temperature at which vacuum will be released during the rate rise step of the program. The acceptable range is from the entry temperature value to the final temperature value of the program. Enter the value of the final temperature if you want to maintain vacuum during the hold time step of the program.

11. **Release Time** - If a vacuum level other than "0" was entered and the release temp was set to the value of the final temp and a hold time was entered, the "Release Time" light will flash. Press **Enter** to accept the displayed release time OR use the **Select** knob to display a new release time. Press **Enter**. The release time is the amount of time to maintain vacuum during the hold time step of the program. The acceptable limits are from 0 to the time entered for the hold time step of the program.

12. After the last value has been entered the program is stored in permanent memory.
Chapter Three

Running a Program

Normal Programs

To run the program number currently on the 2 digit display, simply press the Start Program button. To run a different program number, press the Program Number button, then use the Select knob to display the desired program number. Press Enter. Press the Start Program button to begin the new program.

Glaze Program

The furnace offers a special glaze program. This program was designed to make quick adjustments to the glaze of a porcelain firing. The glaze program will allow you to temporarily adjust the current program and run this modified program without cooling down between firings. To use the glaze program, follow these steps:

1. Glaze - Press the Glaze Program button. The lift will immediately rise to the fully up position, and the current temperature will be maintained until the program modification steps have been completed.

2. Speed - The “Speed” light will flash. Press Enter to accept the displayed rate OR use the Select knob to display a new heat rate. Press Enter. The speed is the rate in degrees per minute the furnace temperature will rise during the heat rise step of the program. The acceptable range is 1° to 150° C (2° to 275° F) per minute.
3. **Final Temp** - The “Final Temp” light will flash. Press **Enter** to accept the displayed temperature **OR** use the **Select** knob to display a new final temperature. Press **Enter**. The acceptable range is from start temp to $1200^\circ$ C ($2192^\circ$ F).

4. **Hold Time** - The “Hold Time” light will flash. Press **Enter** to accept the time displayed **OR** use the **Select** knob to display a new time. Press **Enter**. This is the time the porcelain will be held at the final temperature. The acceptable range is from 0 to 17 minutes and no seconds. The time is entered in minutes.seconds. **Example:** 3.45 will hold the temperature for three minutes and forty-five seconds.

5. **Cool Time** - The “Cool Time” light will flash. Press **Enter** to accept the time displayed **OR** use the **Select** knob to display a new time. Press **Enter**. This is the time it will take to lower the lift from the upper position to the lower position. The lift will be lowered in 5 evenly spaced steps for the total time entered. The acceptable range is from 0 to 17 minutes and no seconds. The time is entered in minutes.seconds. **Example:** 2.15 will lower the lift in two minutes and fifteen seconds.

6. **Vacuum Level** - The “Vacuum Level” light will flash. Press **Enter** to accept the displayed vacuum level, **OR** use the **Select** knob to display a new vacuum level. Press **Enter**. Select and enter “0” if vacuum is not wanted in this program. The vacuum level set with this feature is the target vacuum level for the program. The acceptable level is from 0.0 to 75.0 cm hg or 0.0 to 29.5 in hg. The furnace will convert any value less than 25.5 cm or 10.0 in to 0.0. When the rate rise step of the program begins, the vacuum pump will be started and a timer will begin. If the target vacuum level has not been reached within 120 seconds, the program will be aborted and “Er 1” will be displayed, indicating a vacuum error. If “Continuous Vacuum Pump” has been selected by using “Special Functions”, the vacuum pump will run throughout the vacuum cycle. If “Continuous Vacuum Pump” has not been selected, the vacuum pump will shut off after the target level has been reached and 30 seconds have elapsed. The vacuum pump will be restarted when the vacuum level has dropped to 3% below the target value. **Note:** Vacuum level must approach the target vacuum level even if “Continuous Vacuum Pump” has been selected, otherwise the error condition will occur.
7. **Release Temp** - If a vacuum level other than "0" was entered, the "Release Temp" light will flash. Press **Enter** to accept the displayed temperature OR use the **Select** knob to display a new value. Press **Enter**. The release temp is the temperature at which vacuum will be released during the rate rise step of the program. The acceptable range is from the entry temperature value to the final temperature value of the program. Enter the value of the final temperature if you want to maintain vacuum during the hold time step of the program.

8. **Release Time** - If a vacuum level other than "0" was entered and the release temp was set to the value of the final temp and a hold time was entered, the "Release Time" light will flash. Press **Enter** to accept the displayed release time OR use the **Select** knob to display a new release time. Press **Enter**. The release time is the amount of time to maintain vacuum during the hold time step of the program. The acceptable limits are from 0 to the time entered for the hold time step of the program.

9. After the last value has been entered, the program will begin immediately.

---

**Changing a Program While It Is Running**

The furnace allows you to temporarily change a program while it is running. After the changed program has completed running, the program will revert to the original values.

1. At any time while a program is running, press the **Program Edit** button. The program number will be displayed in the 2 digit display. The 4 digit display will be blank. Press **Enter** to continue.

2. The light for the start temperature step will flash. Use the **Select** knob to make changes. Press **Enter** to continue. Repeat this step for each of the remaining steps.

3. After the last value has been entered, the furnace will continue running the program with the new values. When the program has finished running, it will revert to the original values.
**Skipping a Program Step**

The furnace allows you to manually override a program step and skip to the next step simply by pressing the \( \uparrow / \text{Skip} \) button. **Example:** The porcelain has dried sufficiently to be entered into the furnace, so you wish to skip the pre-dry step in the program. While the furnace is in the pre-dry step, press the \( \uparrow / \text{Skip} \) button and the furnace will skip to the rate rise step and immediately raise the lift to the full up position.

**Manual Lift Operation**

In the event of a power failure, the lift can be lowered manually. To manually lower the lift, first **turn the power off**. After the power has been turned off, use a \( \frac{1}{2} \) inch (13 mm) socket or a flat blade screwdriver to turn the inset hex cap (located on the back of the furnace near the bottom) **counterclockwise** while facing the rear of the furnace. The platform will descend.
Chapter Four

Special Function Input

The Pro 90 furnace has several special functions that allow the furnace operation to be customized to your requirements. Special functions are also used to calibrate the furnace.

Changing Operation From \(^{0}C\) to \(^{0}F\)

The furnace can be changed from metric to English units, or from English to metric units, while the furnace is in idle mode. Programmed values are automatically converted, so your programs will not be affected by this change. Follow these steps to convert:

- Press the Special Function button.
- Turn the Select knob until "2" is displayed.
- Press the Enter button.

The furnace will now operate in English units. Perform the following procedure to return to metric units:

- Press the Special Function button.
- Turn the Select knob until "1" is displayed.
- Press the Enter button.
Changing Vacuum Pump Operation

The vacuum pump can be set to operate continuously for maximum possible vacuum, or to cycle the vacuum pump on and off based on vacuum level. Follow these steps to select vacuum pump operation:

Vacuum Pump Cycles:

- Press the Special Function button.
- Turn the Select knob to display "4".
- Press Enter.

The furnace will now cycle the pump on and off based on the vacuum level.

Continuous Vacuum Pump:

- Press the Special Function button.
- Turn the Select knob to display "3".
- Press Enter.

The furnace will now run the vacuum pump continuously when vacuum is required in the program.

Night Mode Temperature and Operation

The Pro 90 furnace has a Night Mode feature that will reduce the temperature in the muffle and raise the lift to prevent moisture build up in the muffle. The night mode can be started from the idle mode or while a program is running. The furnace comes from the factory with the night mode temperature set at 100°C.

To set the Night Mode temperature:

- Press the Special Function button.
- Turn the Select knob to display "5".
- Press Enter.
- Press Enter to use the displayed temperature OR
- Use the Select knob to display a new value.
- Press Enter.
Starting Night Mode While the Furnace is Idling - Press the Night Mode button. The "Night Mode" light will come on to indicate Night Mode is operational. The temperature will drop to the Night Mode temperature and the lift will be raised to the upper position. The furnace will remain in this condition until the $/Abort button is pressed. When the $/Abort button is pressed, the furnace will return to the idle mode of operation, the lift will lower, and the muffle temperature will rise to the entry level of the current program.

Starting Night Mode While a Program is Running - Press the Night Mode button. The "Night Mode" light will come on to indicate Night Mode is operational. After the program has completed, the temperature will drop to the night mode temperature and the lift will be raised to the upper position. The furnace will remain in this condition until the $/Abort button is pressed. When the $/Abort button is pressed, the furnace will return to the idle mode of operation, the lift will lower, and the muffle temperature will rise to the entry level of the current program.

Change Vacuum Level in All Programs

If your vacuum pump becomes weak with age, or weather conditions prevent the furnace from achieving full vacuum, the vacuum level can be changed in all programs very simply.

To set the NORMAL vacuum level:

- Press the Special Function button.
- Use the Select knob display "6".
- Press Enter.
- Use the Select knob display the correct value.
- Press Enter.

To change the vacuum level in all programs to the NORMAL level:

- Press the Special Function button.
- Use the Select knob to display "7".
- Press Enter.

NOTE: The vacuum level will be changed in all programs that require vacuum. Those programs not using vacuum will not be affected. This procedure may take three minutes to complete.
**Adjust Calibration to Match Your Porcelain**

All porcelain furnaces fire slightly differently. Even porcelain furnaces from the same manufacturer can fire porcelains at slightly different temperatures. The Pro 90 furnace addresses this problem by allowing you to customize the calibration. This feature can be used to adjust your furnace to fire porcelains at manufacturers recommendations, or to adjust multiple furnaces to fire identically.

The Pro 90 calibration can be adjusted for normal high fusing porcelains and for the new low fusing porcelains. Use the low fusing adjustments if your porcelain fires at or below 800° C/1470° F. Use the high fusing adjustments if your porcelain fires above 800° C/1470° F. These adjustments do not affect each other, so both adjustments can be used if you fire both types of porcelain. From 0° to 50° C/90° F of adjustment can be made.

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**Adjust High Fusing Porcelain Calibration**
(800° C/1470° F or above)

**High Fusing Porcelain Overfires:**
- Press the **Special Function** button.
- Use the **Select** knob to display “18”.
- Press **Enter**.
- Use the **Select** knob to display the number of degrees to adjust the calibration **downward**.
- Press **Enter**.

**High Fusing Porcelain Underfires:**
- Press the **Special Function** button.
- Use the **Select** knob to display “19”.
- Press **Enter**.
- Use the **Select** knob to display the number of degrees to adjust the calibration **upward**.
- Press **Enter**.
Adjust Low Fusing Porcelain Calibration
(800° C/1470° F or below)

Low Fusing Porcelain Overfires:

○ Press the Special Function button.
○ Use the Select knob to display "16".
○ Press Enter.
○ Use the Select knob to display the number of degrees to adjust the calibration downward.
○ Press Enter.

Low Fusing Porcelain Underfires:

○ Press the Special Function button.
○ Use the Select knob to display "17".
○ Press Enter.
○ Use the Select knob to display the number of degrees to adjust the calibration upward.
○ Press Enter.

Return to Factory Calibration Setting:

○ Press the Special Function button.
○ Use the Select knob to display "15".
○ Press Enter. Low fusing and high fusing calibration adjustments will be removed.
Chapter Five

Maintenance

CAUTION

THE GASSES PRODUCED WHEN HEAT TREATING REFRACTORY MODELS WILL DAMAGE THE TRANSPARENCY OF THE QUARTZ TUBES IN THE MUFFLE CHAMBER AND MAY CAUSE VACUUM LEAKAGE. TO HELP EXTEND THE LIFE OF THE MUFFLE, IT IS NECESSARY TO PREHEAT REFRACTORY MODELS IN A BURNOUT FURNACE TO PREVENT THE GASSES FROM DAMAGING THE QUARTZ GLASS IN THE MUFFLE CHAMBER.

Cleaning Your Furnace

Your new furnace has been painted with an epoxy based paint and may be cleaned by using a soft cloth and kitchen cleaners such as "Fantastic®" or "Formula 409®". The front panel should be cleaned with a window cleaner such as "Windex®".

Never clean the display window with a dry cloth or tissue. Always moisten the cleaning cloth with a cleaner such as "Windex®".
Replacing the Muffle

The Pro 90 furnace contains a muffle module designed for simple service and replacement. The muffle module contains the heating chamber and the thermocouple. The replacement procedure is as follows:

1. Turn the power switch located at the rear of the furnace to the off position. Remove the power cord from the wall socket to prevent any chance of shock hazard. Allow the furnace to cool.

2. Remove the six Phillips head screws holding the muffle cover to the upright column. Remove the muffle cover by lifting it straight up until it clears the upright column.

3. Remove the thermocouple connector from the column by squeezing the two tabs and pulling away from the column. Remove the heating element connector from the column by squeezing the two tabs and pulling away from the column. Remove the four large Phillips head screws on the top of the muffle. Grasp the handle on the top of the muffle and lift vertically to remove the muffle from the vacuum chamber.

4. Inspect the O-ring for damage and replace if required. Clean the O-ring area and the sealing area of the new muffle with a mild cleaning solution such as "Windex®". Lower the new muffle into the vacuum chamber with the thermocouple closest to the column. Insert the four large screws into the top of the muffle and tighten. Install the thermocouple and the heating element connectors. These are keyed so it is not possible to plug them in incorrectly.

5. Install the muffle cover by lowering it over the upright column and aligning the screw holes. Install the six Phillips head screws that attach the muffle cover to the upright column.

6. Plug the power cord back into the wall socket and turn the power back on. Observe that the temperature begins to rise and stabilize at the entry temperature of the current program.

7. Fire a chip of porcelain to test the firing temperature of the new muffle. Adjust the calibration as described in Chapter Four: Adjust Furnace Calibration to Match Your Porcelain.