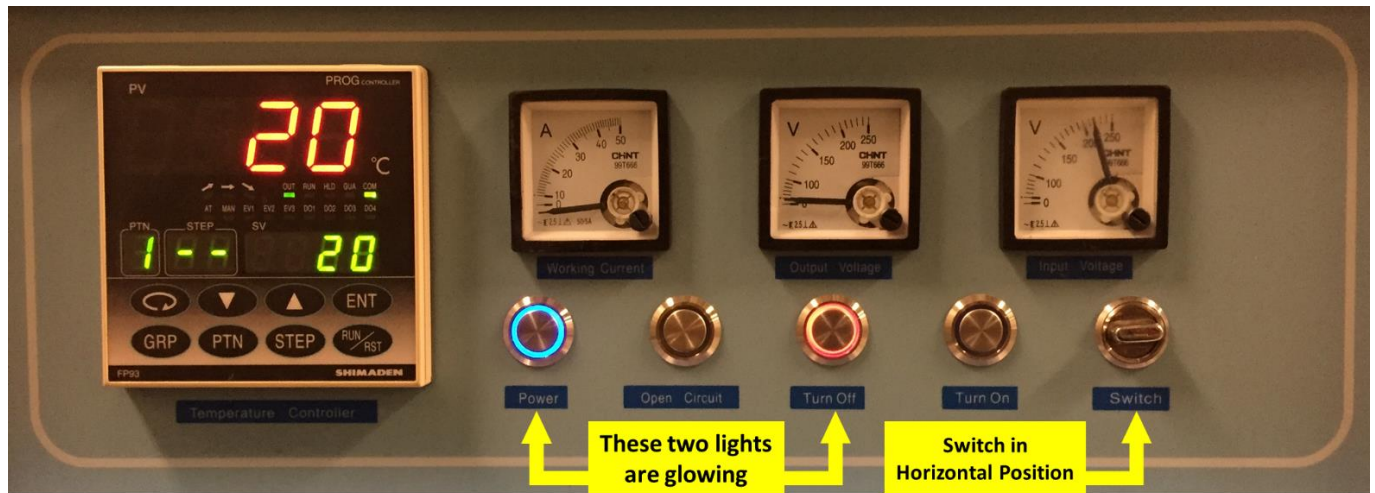


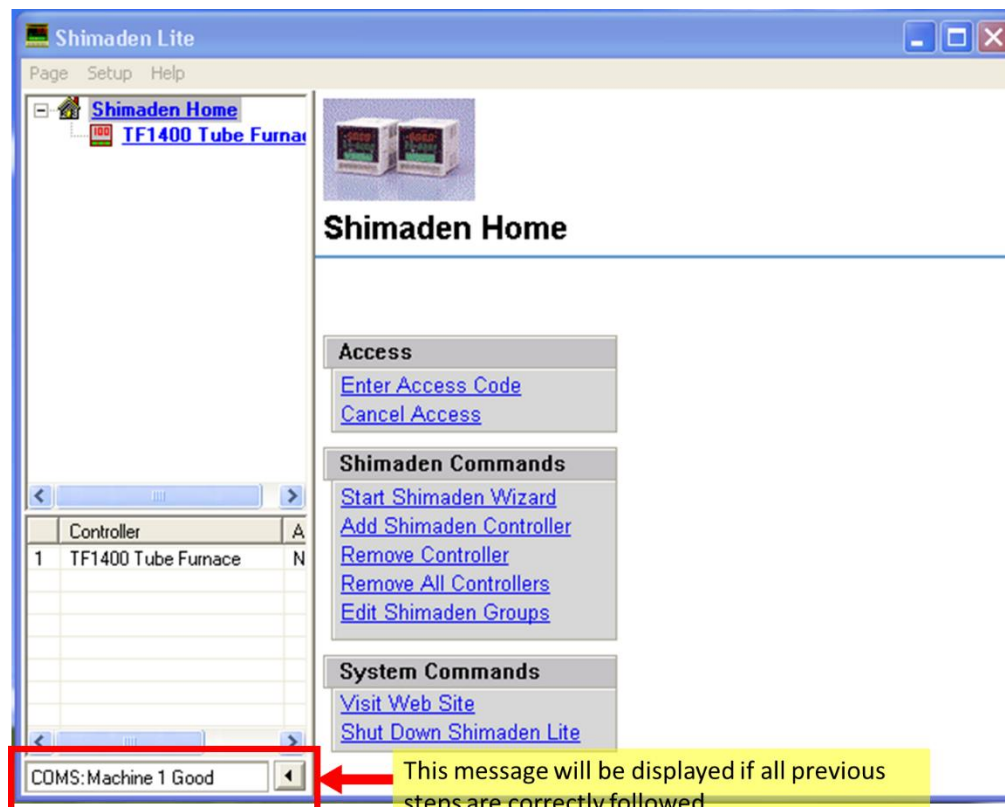
# Controlling and Setting up the TF1400 furnace using Shimaden Lite

## Initial Setup

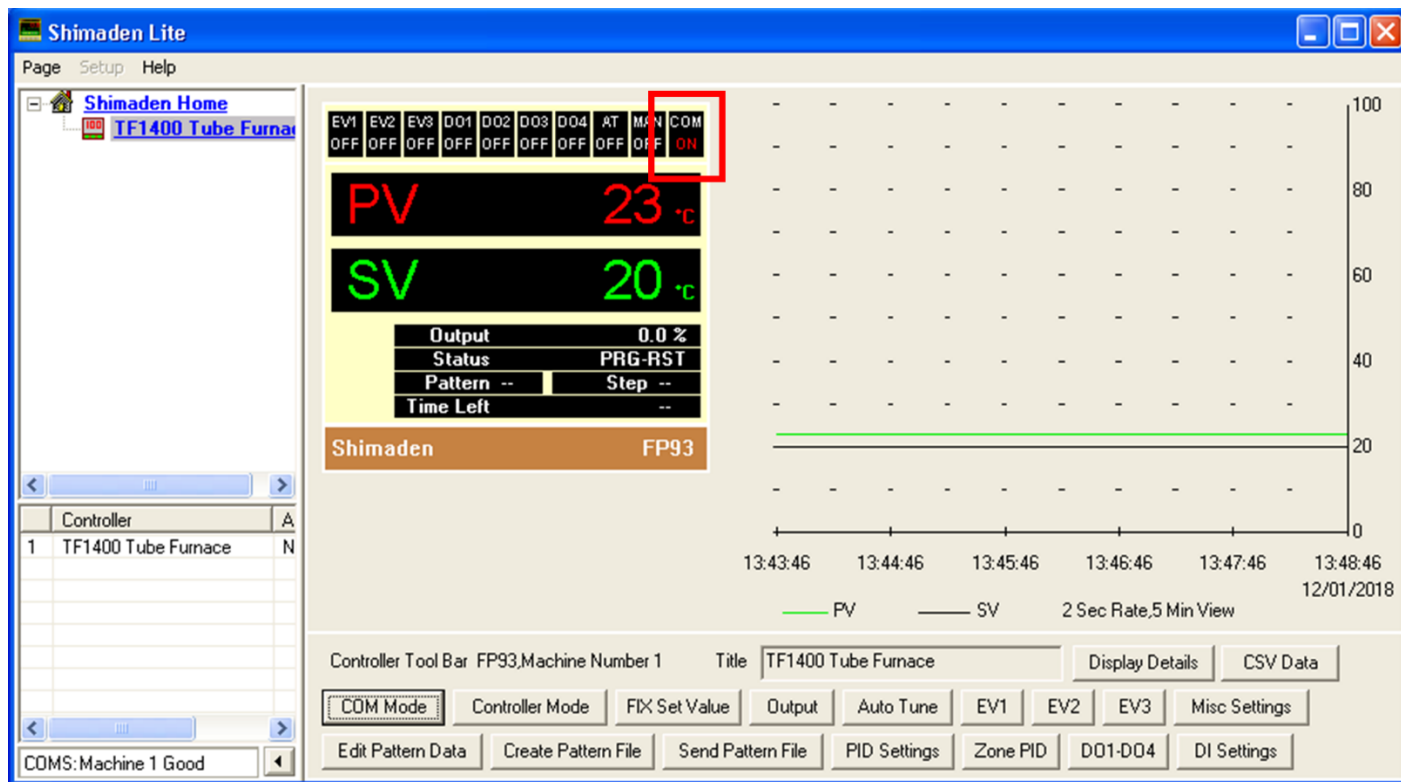
1. Ensure that the mains to the furnace are switched on (the blue ring is glowing) and the power switch (first control on the right side of the panel) is in the horizontal position. When done, the panel should look like this:



2. Log in to the Furnace Control Computer with your appropriate login ID and password. If you do not see your login ID, please get in touch with Dr. Shin for a new login ID.
3. Once you log in, double click the icon (located on your desktop).
4. The Shimaden Lite software will open up to the following window:



- On the navigation tree window (left panel of Shimaden Lite), click on **TF1400 Tube Furnace**. Ensure that the COM indicates ON. If it reads '**COM OFF**', click on the COM Mode button to switch the controller to **COM ON** mode.



- Now, you can set up your heat treatment cycle.

### Setting up the heat treatment cycle

- On the TF1400 Controller page, click on **Edit Pattern Data**. It will open up a window.

The screenshot shows the 'SET Pattern Parameters - FP93' dialog box. It contains the following fields and buttons:

- Program Mode: PRG (dropdown)
- Pattern Mode: 4 (dropdown), (1,2,4)
- Start Pattern: 1 (dropdown)
- Pattern Details section:
  - Timer Mode: Hour/Minute (dropdown)
  - Stop Mode: Off (dropdown)
  - Input Abnormal Mode: Hold (dropdown)
- FIX Settings section:
  - Set Value: 0 (text field)
  - PID No.: 0 (dropdown)
- Buttons on the right: Program, Exit, Pattern 1 (highlighted with a red box), Pattern 2, Pattern 3, Pattern 4, Summary.

2. Click on **Pattern 1**. This will open up a window to set the cycle. To program your cycle, you'll need the following information handy:
- End temperature for each stage
  - Time of heating/cooling to reach each that temperature

**(Note: Heating rate should not exceed 15°C/min)**

**Pattern Data 1, Steps 1-10**

**Pattern Setup**

Number of Steps: 4  
Number of Exec: 1  
Start SV: 20  
GUA Zone: 1  
PV Start: On

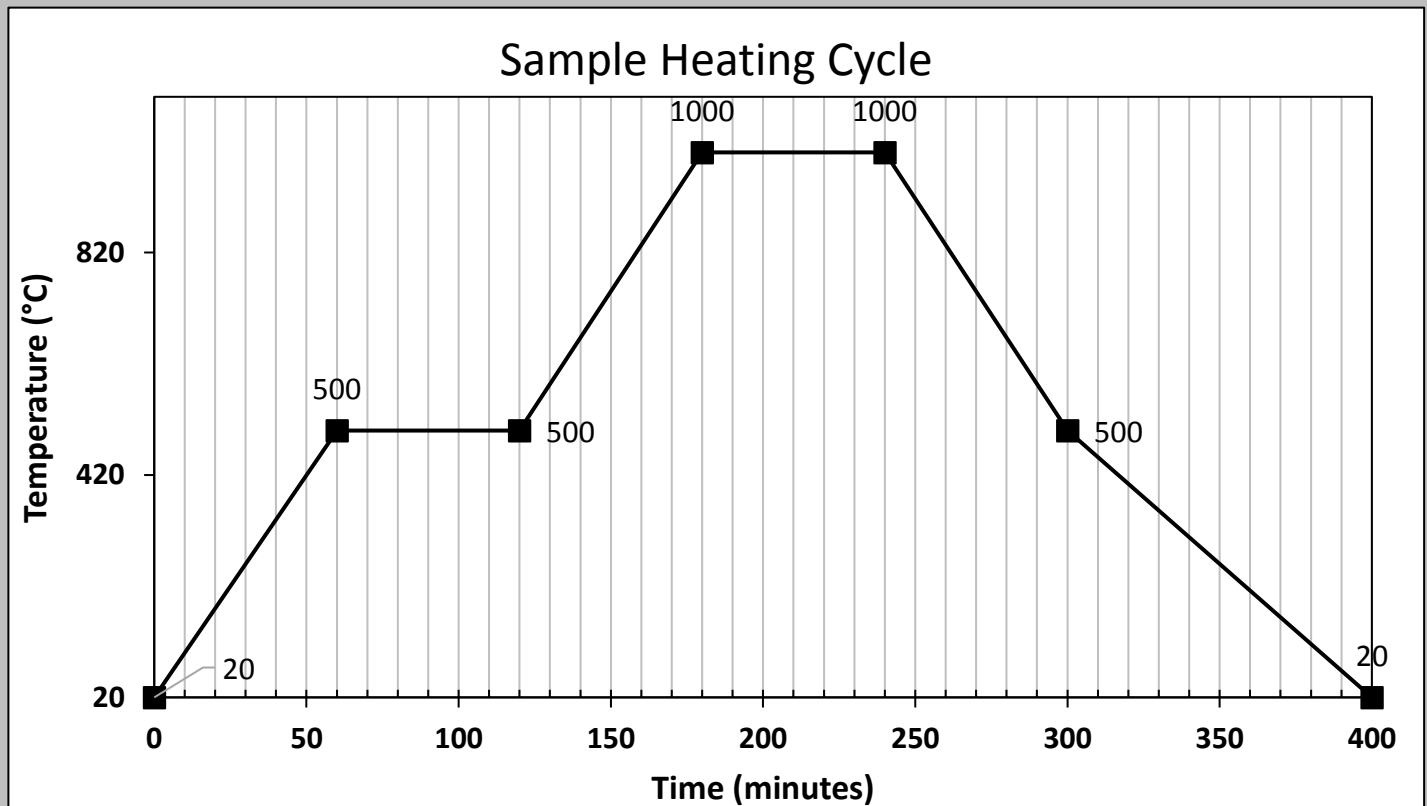
Events Time Signals

**Pattern Data**

Step	SV	Time (HH:MM)	PID No.
1	30	0:05	1
2	35	0:05	1
3	35	0:02	1
4	22	0:05	2
5	1100	1:40	3
6	1100	48:00	3
7	25	18:00	4
8	1200	0:15	3
9	366	4:30	3
10	0	0:01	0

OK Cancel

For illustration, we'll program the furnace to the following heating/cooling cycle:



In this case, the following number of steps can be seen:

Sr. No.	Temperature (°C)	Time per stage (HH:MM)	Heating/Cooling Rate (°C/min)	Type
1	500	60	8.34	Heat
2	500	60	0	Hold
3	1000	60	8.34	Heat
4	1000	60	0	Hold
5	500	60	8.34	Cool
6	20	100	4.8	Cool

Now, to program these values into the furnace, select the number of steps, and enter the values in the window.

*(Note: Cooling in furnace is by natural convection. Therefore, very fast cooling rates are not achievable. Please estimate your heating cycle accordingly)*

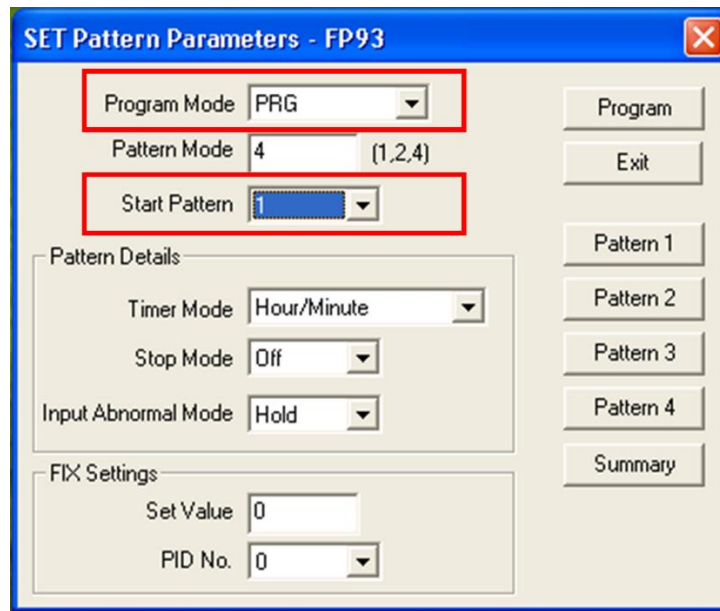
**FOR HEATING, USE PID 1**

**FOR COOLING, USE PID 2 or PID 3**

Step	SV	Time (HH:MM)	PID No.
1	500	01:00	1
2	500	01:00	1
3	1000	01:00	1
4	1000	01:00	1
5	500	01:00	2
6	20	01:40	2
7	25	18:00	4
8	1200	0:15	3
9	366	4:30	3
10	0	0:01	0

3. Click on OK and that will return you to the 'SET Pattern Parameters – FP93' window. Check the following two values in this window:

Program Mode = PRG
Start Pattern = 1



**SET Pattern Parameters - FP93**

Program Mode: **PRG** (dropdown menu)

Pattern Mode: **4** (dropdown menu) [1,2,4]

Start Pattern: **1** (dropdown menu)

**Pattern Details**

Timer Mode: **Hour/Minute** (dropdown menu)

Stop Mode: **Off** (dropdown menu)

Input Abnormal Mode: **Hold** (dropdown menu)

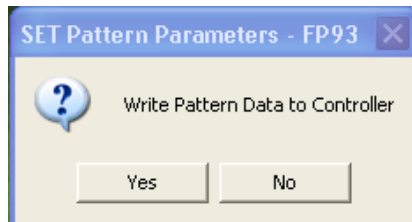
**FIX Settings**

Set Value: **0** (text input)

PID No.: **0** (dropdown menu)

Buttons: Program, Exit, Pattern 1, Pattern 2, Pattern 3, Pattern 4, Summary

4. Once confirmed, click on the button '**Program**'. You will be asked for confirmation. Click on **Yes**

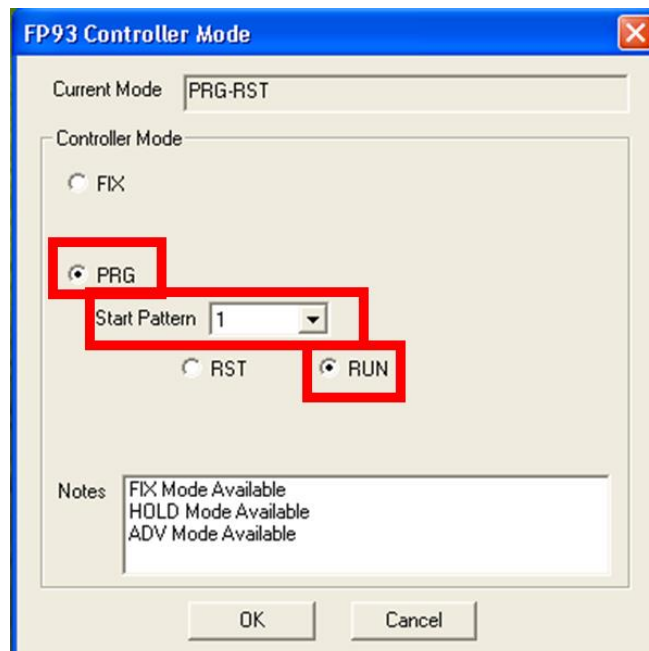


**SET Pattern Parameters - FP93**

Write Pattern Data to Controller

Buttons: Yes, No

5. A progress bar will show you the Heating cycle being written into the controller, and the pop up window will close. You will now be back on the **TF1400 Tube Furnace** home page.
6. Next, click on the **Controller Mode** button on the homepage. This will open the Controller Mode window. Ensure that the Controller mode is **PRG**, Start Pattern is **1**, and **RUN** box is selected.



**FP93 Controller Mode**

Current Mode: **PRG-RST**

**Controller Mode**

☐ FIX

☒ **PRG**

Start Pattern: **1** (dropdown menu)

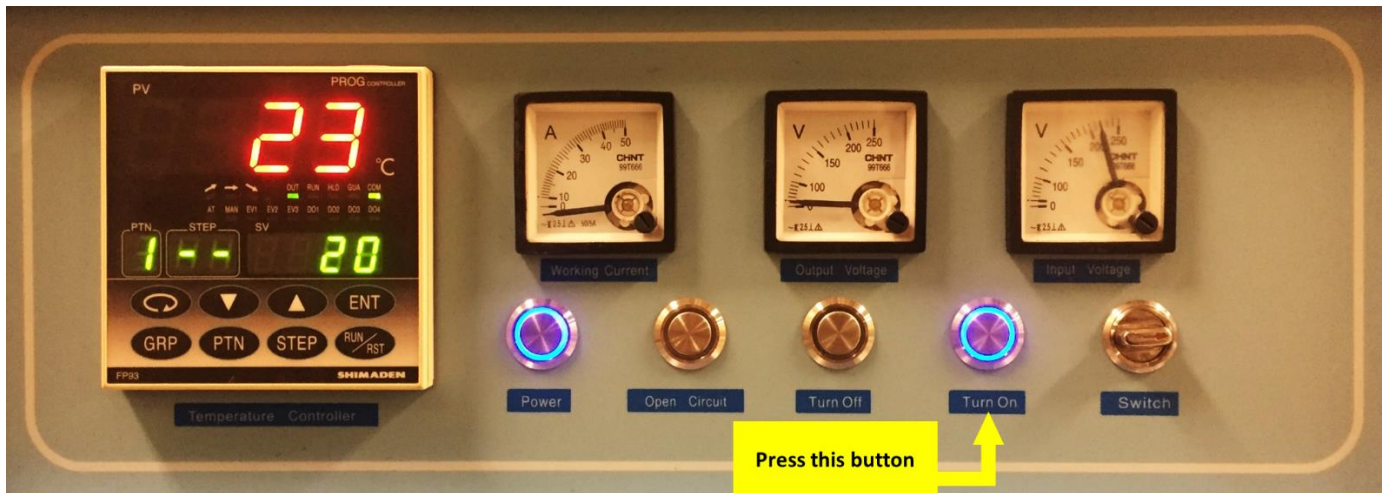
☐ RST ☒ **RUN**

**Notes**  
 FIX Mode Available  
 HOLD Mode Available  
 ADV Mode Available

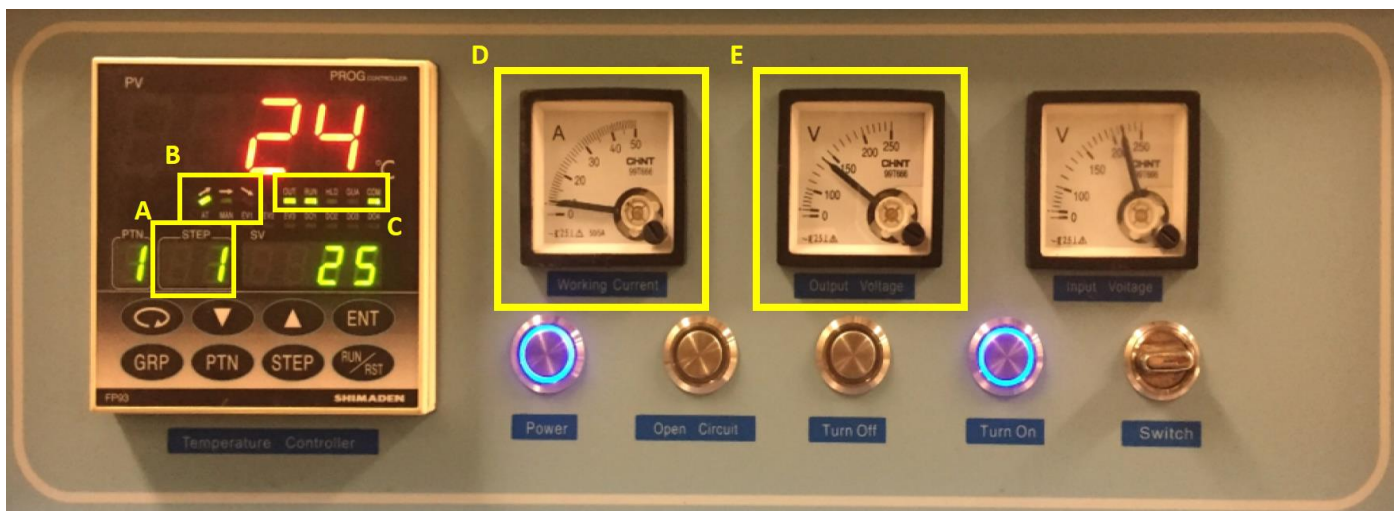
Buttons: OK, Cancel



7. Now, on the furnace control panel, press the **Turn On** button that turns on the High Voltage Circuit Breaker for the heating elements. As the heating elements stabilize, mount your sample in the furnace and carry out the vacuum procedure if required.



8. On the computer, press **OK** on the **FP93 Controller Mode** window. This will start the furnace cycle. Once the cycle starts, ensure that the following show up on the furnace control panel:
- A. Step = 1
  - B. RAMP UP (Assuming that heating cycle is your first step)
  - C. RUN light is on
  - D. Working Current is rising
  - E. Output Voltage is not zero



9. **DO NOT LOG OUT OF YOUR ACCOUNT.** [If you are leaving the computer unattended, stay logged in, and lock the desktop using the key combination ( **Windows** + **L** )]
10. If at any point, you need to cancel the cycle, click on **Controller Mode**, select **RST** and then select **OK**.
11. Once your entire heating cycle is completed, and the PV value displays in the range of 20°C – 30°C, power down the furnace by pressing the button **Turn Off**. Turn the **SWITCH** to the vertical position, and turn off the Power Mains.
12. Turn off Shimaden Lite on the computer, and log out of your account.
13. Retrieve your sample and ensure that the furnace workspace is clean and orderly.
14. Thank you for cooperating!