Lindberg Blue M Furnace Training Notebook

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Before you begin…

- ❑ Complete the required safety training modules on UC Learning
  - ❑ Laboratory Safety Orientation (Fundamentals) 2013
  - ❑ Hazardous Waste Management
  - ❑ Compressed Gas Safety
- ❑ Submit a copy of your Training Transcript to Lab Manager
- ❑ Review the MSE Policies and Regulations
- ❑ Fill out the MSE 150, 250, 309 FAU Authorization Form with PI signature
- ❑ Provide your ENGR username to Lab Manger to set up Faces account
- ❑ Arrange a time for training with Lab Manager
- ❑ Schedule your reservation on Faces for your training

Lindberg M Furnace Operation

I. Controller Panel

II. Startup and Sample Loading

III. Single Setpoint Operation

IV. Exiting Single Setpoint

V. Setting Program

VI. Running Program

VII. Holding Program

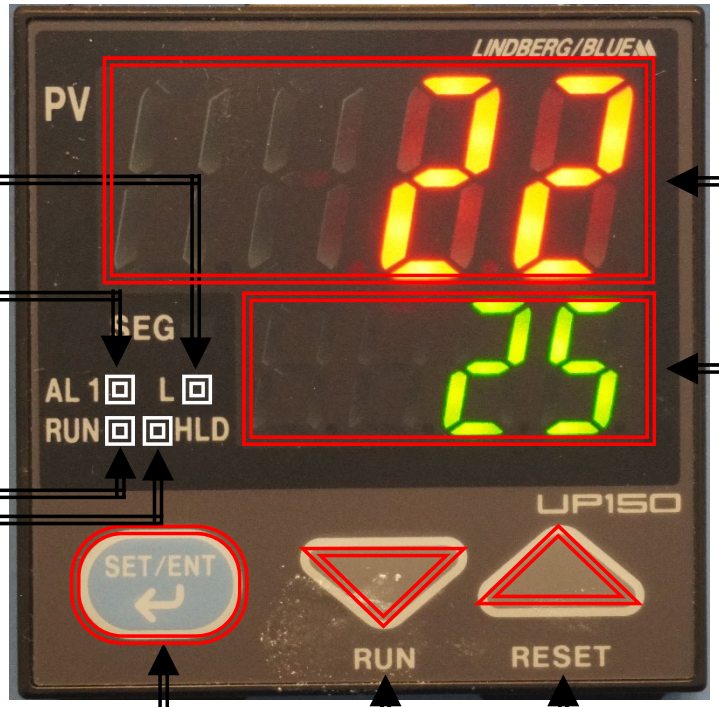
VIII. Advancing Program

IX. Ending Program

X. Sample Unloading

XI. Cleanup

I. Controller Panel – 1/1



Local Mode Indicator

AL 1 Alarm Indicator

RUN Indicator

HLD "Hold" Indicator

PV Window shows current temperature

SV Window shows temperature setpoint

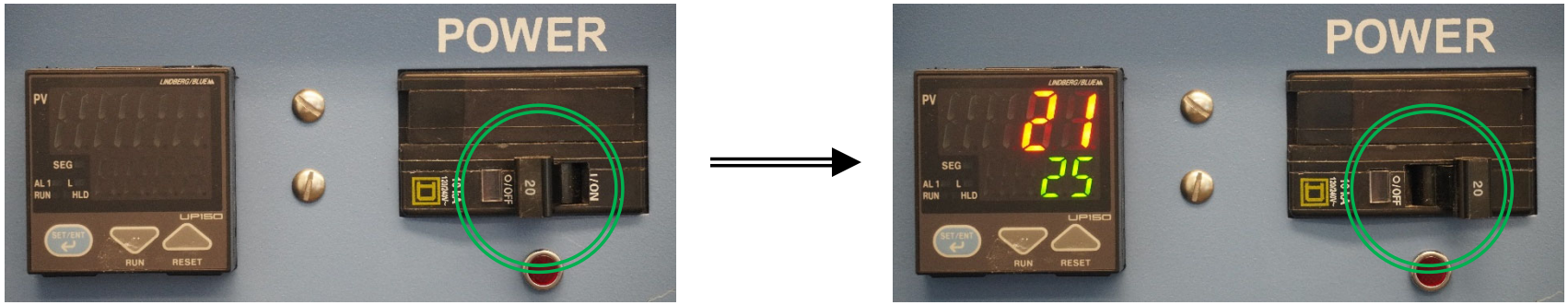
Changing Display or Setting Parameters

Increase or Exit Program

Decrease or Run Program

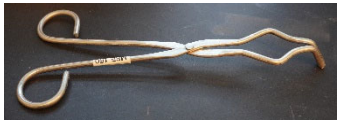
II. Startup and Sample Loading – 1/1

1. Turn the ***Furnace On*** by switching the ***Power*** to ***ON*** position

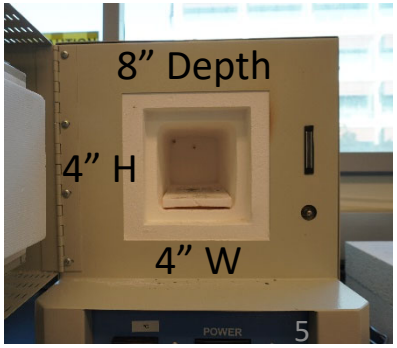


2. Open the ***Furnace Chamber*** by using both ***Door Handles*** as leverage

3. Insert the ***Sample*** into the ***Furnace Chamber*** with provided ***Tongs***



Note: Only Non-Hazardous Samples are allowed – check with Lab Manager first before inserting new materials



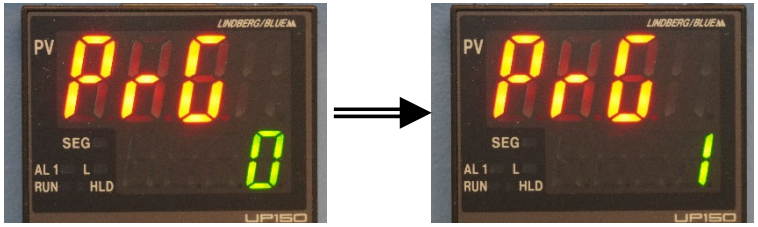
4. Close the ***Furnace Chamber***

III. Single Setpoint Operation – 1/2

The following describes entering ***Single Setpoint*** or ***Local Mode***

1. Hold the ***SET/ENT*** button for 3 seconds until ***Mode*** "***modE***" shows ***Reset*** "***rES***" displayed

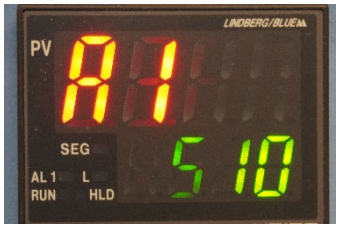
2. Press ***SET/ENT*** button until ***Program*** "***PrG***" with a value "***0***" is displayed



3. Press the ***UP/RESET*** button until a lower display value of "***1***" appears

4. Press ***SET/ENT*** button to confirm ***Program*** is ***ON*** with value "***1***" displayed

5. Press ***SET/ENT*** until the ***High Temperature Alarm*** setpoint "***A1***" is displayed



6. Select an alarm set point 10°C above the target set point (e.g. 510°C)

7. Press ***SET/ENT*** to confirm alarm set point

Note: Whenever value of setpoint or parameter is changed, the decimal point flashes to remind you to register the changed value with the SET/ENT button

III. Single Setpoint Operation – 2/2

8. Hold the ***SET/ENT*** button for 3 seconds to exit the menu

9. Hold the ***SET/ENT*** button for 3 seconds until "***modE rES***" is displayed again

10. Press ***UP*** button until ***Local Mode*** "***modE LCL***" is displayed

11. Press ***SET/ENT*** to confirm ***Local Mode***

12. The ***Red Indicator*** will illuminate beside "***L***" ⟹

13. Use the ***ARROW*** buttons to select ***Local Setpoint*** temperature (e.g. 200°C)

14. Press ***SET/ENT*** to confirm ***Local Setpoint***

15. The ***ARROW*** buttons will allow adjustment to the ***Local Setpoint*** and pressing ***SET/ENT*** will register the new value

IV. Exiting Single Setpoint – 1/1

The following describes exiting ***Single Setpoint*** or ***Local Mode***

1. Hold the ***SET/ENT*** button for 3 seconds until ***Local Mode*** "***modE LCL"*** is displayed

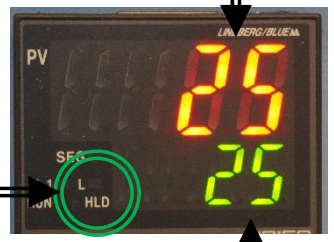
2. Press ***DOWN*** button until ***Reset*** "***modE rES***" is displayed

3. Press ***SET/ENT*** to confirm ***Reset*** and stop the furnace

4. The ***Red Indicator*** "***L***" or ***Local Mode*** will disappear

5. The upper display "***PV***" will continue to show the ***Current Temperature***

6. The lower display "***SV***" will show the ***Start Set Point*** value of 25°C



V. Setting Program – 1/9

The following describes creating a simple ***Program*** with multiple steps

1. Before starting, confirm "***RUN***" and "***L***" indicators are not lit

2. If either indicator is on, perform the following:
   a) Hold the ***SET/ENT*** button for 3 seconds until "***modE***" is shown
   b) Select ***Reset*** "***rES***" using the ***ARROW*** buttons
   c) Press ***SET/ENT*** to confirm

3. Hold ***SET/ENT*** button for 3 seconds until ***Mode*** "***modE"*** and ***Reset*** "***rES"*** is displayed

4. Press ***SET/ENT*** until ***Key Lock*** "***LoC***" is displayed

5. Confirm value is set to "***0***" and press ***SET/ENT***

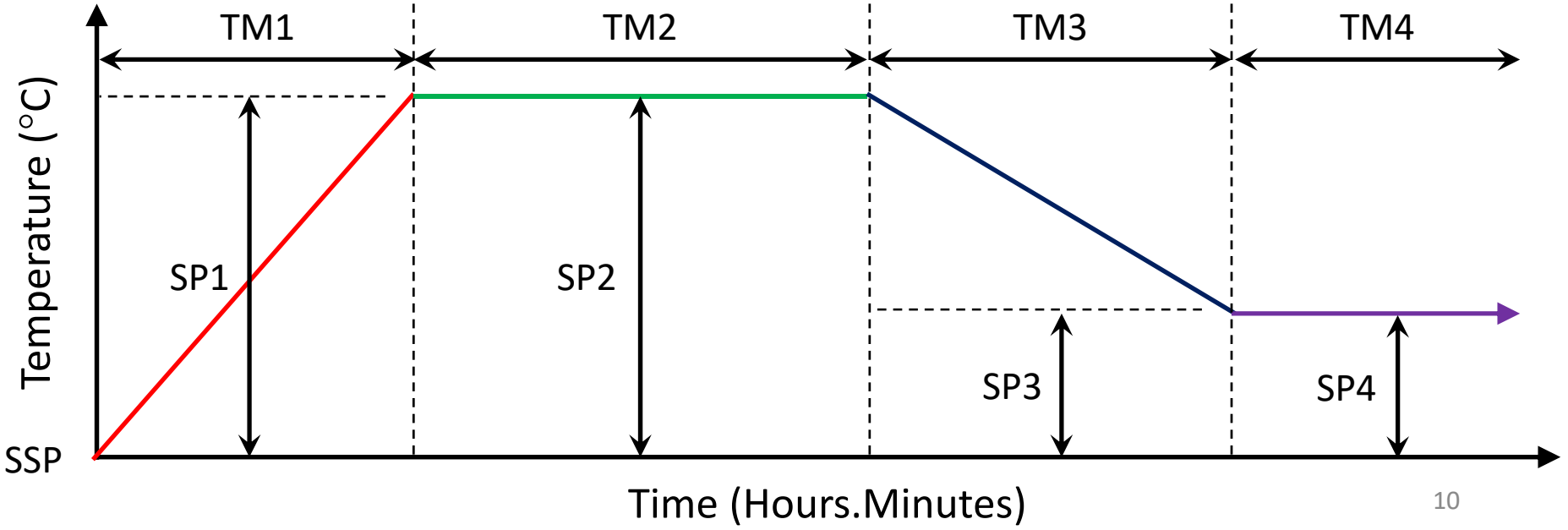
V. Setting Program – 2/9

6. Press ***SET/ENT*** until ***Program*** "***PrG***" is displayed

7. Press ***UP*** button until "***1***" is displayed

8. Presse ***SET/ENT*** to enter the ***Programming Menu***

The below ***Temperature Profile*** illustrates the ***Program Parameters***

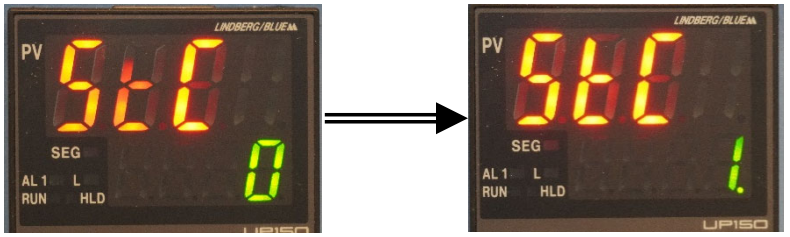


V. Setting Program – 3/9

9. Use ***ARROW*** buttons to set the ***Start Setpoint*** "***SSP***" to ***25 ℃***

10. Press ***SET/ENT*** to confirm value and advance to the ***Start Code*** "***StC***" parameter

11. Confirm value is set to "***1***" to start program with ***Current Temperature***



12. Press ***SET/ENT*** to advance to the ***Set Point 1*** "***SP1***" parameter

13. Use ***ARROW*** buttons to set ***1st Set Point Temperature*** (e.g. 500°C)

14. Press ***SET/ENT*** to confirm value and advance to ***Time 1*** "***tM1***" parameter

15. Use ***ARROW*** buttons to set ***1st Time Period*** between 0.00 to 99.59 corresponding to ***hours.minutes*** (e.g. 1 hour)

V. Setting Program – 4/9

16. Press ***SET/ENT*** to confirm value and advance to the ***Set Point 2*** "***SP2***" parameter

17. Use ***ARROW*** buttons to set ***2nd Set Point Temperature*** or ***Dwell Segment*** (e.g. 500°C)

18. Press ***SET/ENT*** to confirm value and advance to the ***Time 2*** "***tM2***" parameter

19. Use ***ARROW*** buttons to set the ***2nd Time Period*** or ***Dwell Time*** (e.g. 2 hours)

20. Press ***SET/ENT*** to confirm value and advance to the ***Set Point 3*** "***SP3***" parameter

21. Use ***ARROW*** buttons to set ***3rd Set Point Temperature*** or ***Cooling Segment*** (e.g. 100°C)

22. Press ***SET/ENT*** to confirm value and advance to the ***Time 3*** "***tM3***" parameter

23. Use the ***ARROW*** buttons to set the ***3rd Time Period*** or ***Cooling Time*** (e.g. 1 hour)

V. Setting Program – 5/9

24. Press ***SET/ENT*** to confirm value and advance to the ***Set Point 4*** "***SP4***" parameter

25. Use ***ARROW*** buttons to set ***4th Set Point Temperature*** or ***Off Segment*** (e.g. 100°C)

26. Press ***SET/ENT*** to confirm value and advance to the ***Time 4*** "***tM4***" parameter

27. Use ***ARROW*** buttons to set value to "***oFF***" to turn off ***Furnace*** and stop further inputs to setpoints and time parameters

28. Press ***SET/ENT*** to confirm value and advance to the ***Event 1 Type*** "***EV1***" parameter

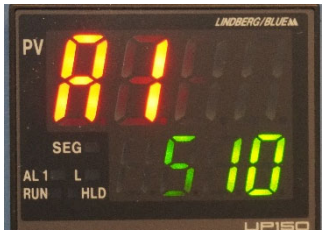
29. Value should always be set to "***0***"

30. Press ***SET/ENT*** to advance to the ***Alarm 1 Type*** "***AL1***" parameter

31. Value should always be set to "***9***"

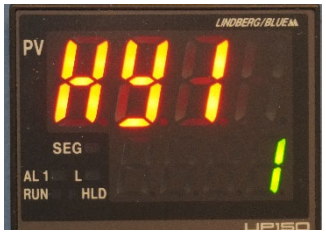
V. Setting Program – 6/9

32. Press SET/ENT to advance to the ***High Temperature Alarm*** "***A1***" parameter



33. Use ***ARROW*** buttons to set a value of ***10℃*** higher than highest target setpoint (e.g. 510°C)

34. Press ***SET/ENT*** to confirm value and advance to the ***Alarm 1 Hysteresis*** "***HY1***" parameter



35. Value should always be set to ***1***

36. Press ***SET/ENT*** to confirm value and advance to the ***Event 2 Type*** "***EV2***" parameter

37. Value should always be set to "***0***"

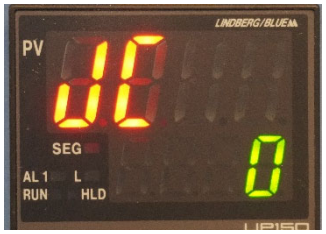
38. Press ***SET/ENT*** to advance to the ***Alarm 2 Type*** "***AL2***" parameter

39. Value should always be set to "***oFF***"

V. Setting Program – 7/9

40. Press ***SET/ENT*** to confirm value and advance to the ***Junction Code*** "***JC***" parameter

41. Use ***ARROW*** buttons to set "***JC***" value to…
    a) A value of ***0*** to stop program and turn off heaters to Furnace ***(default value)***
    b) A value of ***1*** will hold the setpoint at this last segment indefinitely
    c) A value of ***2*** will cause program to repeat "continuously"
    d) A value of ***3*** will revert to the Local Setpoint value



42. Press ***SET/ENT*** to confirm value and advance to the ***Wait Zone*** "***WTZ***" parameter

43. Use ***ARROW*** buttons to set the "***WTZ***" value to "***oFF***"

44. Press ***SET/ENT*** button to confirm value and return to ***Starting Setpoint*** display

45. Hold ***SET/ENT*** for 3 seconds to exit the programming menu

V. Setting Program – 8/9

The following ***Table*** summarizes the expected ***Program Parameters Sequence***

Parameter	Default Values	Meaning
PrG	1	Enters Program Menu
SSP	25	Starting Set Point
StC	1	Start Code
SP1	<User Input>	Segment 1 Setpoint Temperature
Tm1	<User Input>	Time Length for Segment 1
SP2	<User Input>	Segment 2 Setpoint Temperature
Tm2	<User Input>	Time Length for Segment 2
SP3	<User Input>	Segment 3 Setpoint Temperature
Tm3	<User Input>	Time Length for Segment 3
SP4	<User Input>	Segment 4 Setpoint Temperature
Tm4	oFF	Ends Setpoint and Time Selections

V. Setting Program – 9/9

The following ***Table*** continues the expected ***Program Parameters Sequence***

Parameter	Default Values	Meaning
EV1	0	Event 1 (DO NOT CHANGE!)
AL1	9	Alarm 1 (DO NOT CHANGE!)
A1	+10°C	Set Alarm 1 value to +10°C to highest temperature
HY1	1	Hysteresis for Alarm 1
EV2	0	Event 2 (DO NOT CHANGE!)
AL2	oFF	Alarm 2 (DO NOT CHANGE!)
JC	0	Stop Program
	1	Hold at Last Setpoint Temperature
	2	Repeat Continuously
	3	Revert to Local Setpoint
WTZ	oFF	Wait Zone

VI. Running Program – 1/1

The following describes how to ***Run*** the created ***Program***

1. Hold the ***DOWN/RUN*** button until the "***RUN***" indicator lights up

2. If the ***Junction Code*** "***JC***" value was set to "***1***" (hold option), the "***HLD***" indicator will light up at the end of the program

VII. Holding Program – 1/1

The following describes how to ***Hold*** a running ***Program***

1. Hold the ***SET/ENT*** button for 3 seconds until "***modE"*** is displayed

2. Press ***SET/ENT*** button until "***HoLd***" is displayed

3. Use the ***ARROW*** buttons to set…
   a) A value of "***on***" will pause and enter ***Hold*** mode
   b) A value of "***off***" will stop the ***Hold*** mode

4. Press ***SET/ENT*** button to confirm choice

5. Hold ***SET/ENT*** for 3 seconds to exit the menu

VIII. Advancing Program – 1/1

The following describes how to ***Advance*** or ***Skip*** a ***Segment*** in ***Program***

1. Hold the ***SET/ENT*** button for 3 seconds until "***modE"*** is displayed

2. Press ***SET/ENT*** button until "***AdV***" is displayed

3. Use the ***ARROW*** buttons to set…
   a) A value of "***on***" will ***Advance the Program*** by one Segment
   b) A value of "***off***" will **NOT** ***Advance the Program***

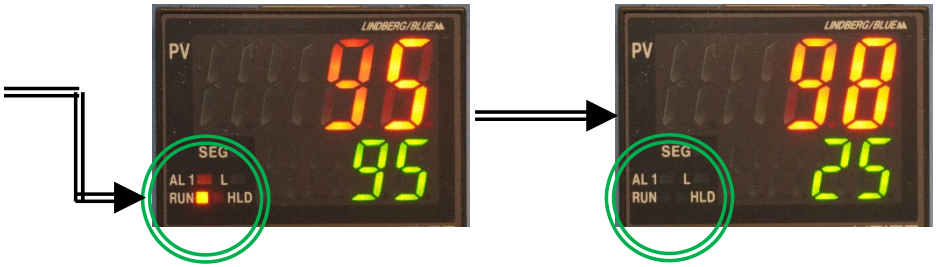
4. Press ***SET/ENT*** button to confirm choice

5. The controller will automatically return to the normal display and increment the program segment by one

IX. Ending Program – 1/1

The following describes how to ***End*** a running ***Program***

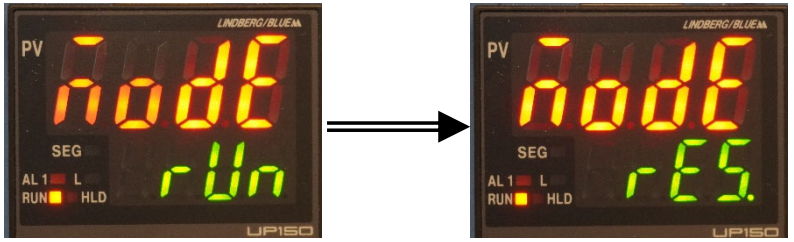
1. Hold the ***UP/RESET*** button until the "***RUN*** or "***HLD***" indicator turns off



2. Alternatively, you can also hold the ***SET/ENT*** button for 3 seconds until "***modE"*** is displayed

3. Use ***ARROW*** buttons to select ***Reset*** "***rES***"

4. Press ***SET/ENT*** to confirm ***Reset***



X. Sample Unloading – 1/1

1. Wait until the temperature reaches a SAFE temperature to open the furnace

Note: Remember to ONLY open the furnace if it does not pose a threat to yourself or others in the lab!

2. Wear the provided ***Heat Resistant Gloves***

3. Carefully open the ***Furnace Chamber*** by using both ***Door Handles*** as leverage

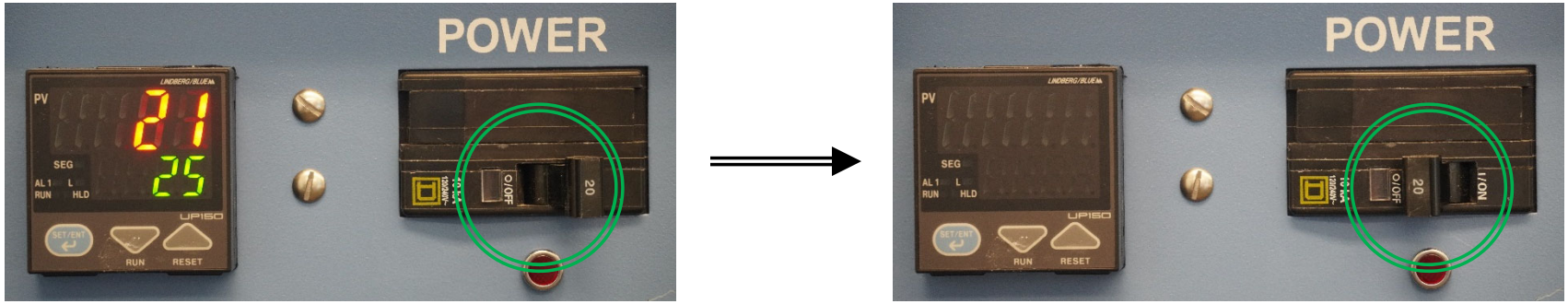
4. Carefully remove your sample with provided ***Tongs***

5. Carefully place on top of the provided ***Fire Bricks*** to cool

6. Close the ***Furnace Chamber***

XI. Cleanup – 1/1

1. Turn the ***Furnace Off*** by switching the ***Power*** to ***OFF*** position



2. Cleanup the area around the ***Furnace*** and remove any potential dust or debris

3. Record your usage on the ***Sign-in Sheet*** for the furnace