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 Manager 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

- **Decrease** or **Run Program**
- **Increase** or **Exit Program**

**Changing Display or Setting Parameters**

**SET/ENT** button

**RUN** and **RESET** buttons
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 \( \text{modE rES} \) is displayed again

10. Press **UP** button until **Local Mode** \( \text{modE LCL} \) is displayed

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

12. The **Red Indicator** will illuminate beside \( \text{L} \)

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. Press **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 ºC

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. 500ºC)

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 °C** 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*:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Default Values</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>PrG</td>
<td>1</td>
<td>Enters Program Menu</td>
</tr>
<tr>
<td>SSP</td>
<td>25</td>
<td>Starting Set Point</td>
</tr>
<tr>
<td>StC</td>
<td>1</td>
<td>Start Code</td>
</tr>
<tr>
<td>SP1</td>
<td>&lt;User Input&gt;</td>
<td>Segment 1 Setpoint Temperature</td>
</tr>
<tr>
<td>Tm1</td>
<td>&lt;User Input&gt;</td>
<td>Time Length for Segment 1</td>
</tr>
<tr>
<td>SP2</td>
<td>&lt;User Input&gt;</td>
<td>Segment 2 Setpoint Temperature</td>
</tr>
<tr>
<td>Tm2</td>
<td>&lt;User Input&gt;</td>
<td>Time Length for Segment 2</td>
</tr>
<tr>
<td>SP3</td>
<td>&lt;User Input&gt;</td>
<td>Segment 3 Setpoint Temperature</td>
</tr>
<tr>
<td>Tm3</td>
<td>&lt;User Input&gt;</td>
<td>Time Length for Segment 3</td>
</tr>
<tr>
<td>SP4</td>
<td>&lt;User Input&gt;</td>
<td>Segment 4 Setpoint Temperature</td>
</tr>
<tr>
<td>Tm4</td>
<td>oFF</td>
<td>Ends Setpoint and Time Selections</td>
</tr>
</tbody>
</table>
V. Setting Program – 9/9

The following Table continues the expected Program Parameters Sequence

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