Blue M 1200 C Box Furnace SOP

1. Scope

1.1   This document provides the operating procedures for the Blue M 1200 C box furnace.

2. Table of Contents

3. Reference Documents

3.1 Referenced within this Document

3.1.1 None

3.2 External Documents

3.2.1 None

4. Equipment and/or Materials

4.1 Wafer/Sample

4.2 Blue M Box Furnace

4.3 Boat/Rack

4.4 Crucible Tongs

5. Safety

5.1 Follow all Nanofab safety procedures.

5.2 Do not unplug the furnace.

5.3 Do not move the furnace.

5.4 Do not touch the insulator on the inside chamber walls.

5.5 Never inhale the particles of the insulator.

5.6 Use a sample boat or rack compatible with your process temperature.

5.7 Do not touch the furnace walls when operating at high temperature.

5.8 Use a crucible tong to handle the sample boat or rack when the furnace is hot.

5.9 Turn off the furnace completely when not in use.

5.10 Do not change settings of the controllers other than those referred to in this SOP.

5.11 Never exceed the maximum flow of the flowmeter (13 slpm).

6. Setup Procedures

6.1 Turn on the Furnace

6.1.1 Use the main power switch to turn on the furnace.

7. Furnace Procedures

7.1 Run a Stored Program

7.1.1 To run a stored program, press and hold RUN key on UP15O controller for at least one second. See *Figure 1, UP150 Controller*.

7.1.2 To stop a running program press and hold RESET key for at least one second.

7.2   Operate under Nitrogen Flow

7.2.1   Make sure that the flowmeter knob is completely closed and the flowmeter floater is at rest position.

7.2.2   Open the nitrogen cylinder valve.

7.2.3   Using the flowmeter knob, adjust the floater to the desired flow.

7.3   Program UP150 Controller

7.3.1   Press and hold SET/ENT key for at least 3 seconds to enter the operating parameters setting mode. "PRG" appears on PV display and "0" on SP display.

7.3.2   Change SP display to "—1" by pressing DOWN key once. The decimal point flashes.

7.3.3   Press SET/ENT key to confirm the change.

7.3.4   Press SET/ENT key once and to enter the program parameters setting mode. "EV1" appears on PV display and "0" on SP display.

7.3.5   Press SET/ENT key once. "ALl" appears on PV display and "9" on SP display.

7.3.6   If SP display shows a value other than "9", change it to "9" using UP/DOWN keys. When the decimal point flashes, press SET/ENT key once to confirm the change.

7.3.7   Press SET/ENT key once. "Al" appears on PV display.

7.3.8   Set the SP display to alarm temperature of your process (typically 10 °C higher than the highest temperature) using UP/DOWN keys. (ALl lamp turns on when this temperature is reached.) When the decimal point flashes, press SET/ENT key once to confirm the change.

7.3.9   Press SET/ENT key several times until "SSP" appears on PV display.

7.3.10 Set SP display to the initial temperature set point of your process in °C (typically 25 °C) using UP/DOWN keys (rninimumO, maximum'1200 °C). When the decimal point flashes, press SET/ENT key once to confirm the change.

7.3.11 Press SET/ENT key once. "SP1" appears on PV display.

7.3.12 Set SP display to the temperature set point of the first segment of your process in °C using UP/DOWN keys (minimum'O, maximum" 1200 °C). When the decimal point flashes, press SET/ENT key once to confirm the change.

7.3.13 Press SET/ENT key once. "tMl" appears on PV display.

7.3.14 Set SP display to the time duration of the first segment of your process in hours and minutes using UP/DOWN keys (minimum0.00, maximum'99.59 hours and minutes). When the decimal point flashes, press SET/ENT key once to confirm the change.

7.3.15 If more than one segment is needed, "SP2" SP16" and "tM2" ... "tMl6" can be set like steps 11 through 14.

7.3.16 If "tM(n)" is time duration of the last segment of your process, set "tM(n+1)" to "oFF" using UP/DOWN keys. When the decimal point flashes, press SET/ENT key once to confirm the change.

7.3.17 Press SET/ENT key once or several times until "JC" appears on PV display.

7.3.18 Set SP display using UP/DOWN keys to "0" for reset mode (controller shuts off its outputs at the end of the program), "1" for the hold mode (controller holds the temperature at the end of the program), and "2" for repeat mode (controller repeats the program continuously). When the decimal point flashes, press SET/ENT key once to confirm the change.

7.3.19 Press SET/ENT key once. "WtZ" appears on PV display.

7.3.20 Set SP display to the desired wait zone value of your process in °C using UP/DOWN keys. When the decimal point flashes, press SET/ENT key once to confirm the change. (A wait zone causes the controller to stop the program clock if at the transition from a ramp segment to a soak segment, the actual chamber temperature, PV, is not close enough to the set point. The program will continue when PV falls within the specified wait zone.)

7.3.21 Press and hold SET/ENT key for at least 3 seconds to exit the program parameters setting mode. The program is ready to run.

7.3.22 To optimize the operation of the controller, PID coefficients can be set.

7.3.22.1 Press and hold SET/ENT key for at least 3 seconds to enter the operating parameters setting mode. "PRG" appears on PV display and "0" on SP display.

7.3.22.2 Press SET/ENT key several times until "p" appears on PV display.

7.3.22.3 Change the SP display using the UP/DOWN keys according to the optimized PID coefficients table for proportional coefficient. (The table gives the PID coefficients for several temperatures. Choose a temperature closest to the highest temperature of your process.) When the decimal point flashes, press SET/ENT key once to confirm the change.

7.3.22.4 Press SET/ENT key once. "I" appears on PV display.

7.3.22.5 Change the SP display using the UP/DOWN keys according to the optimized PID coefficients table for integral coefficient. When the decimal point flashes, press SET/ENT key once to confirm the change.

7.3.22.6 Press SET/ENT key once. "d" appears on PV display.

7.3.22.7 Change the SP display using the UP/DOWN keys according to the optimized PID coefficients table for derivative coefficient. When the decimal point flashes, press SET/ENT key once to confirm the change.

7.3.22.8 Press and hold SET/ENT key for at least 3 seconds to exit the program parameters setting mode. The program is ready to run.

Figure 1, UP150 Controller

7.4   Monitor UP150 Program Status

7.4.1   When running a program, PV display always shows the chamber temperature, but SP display initially shows the target set point at the moment. The status of the running program can be monitored.

7.4.1.1   Press SET/ENT key once to see the current segment number on SP display. SEQ lamp turns on in this state.

7.4.1.2   Press SET/ENT key again to see the remaining segment time on SP display. SEQ lamp turns on in this state.

7.4.1.3   Press SET/ENT key again to return to he initial SP display.

7.4.2   A running program can be hold at any moment.

7.4.2.1   Press and hold SET/ENT key for at least 3 seconds. "HoLd" appears on PV display and "oFF" on SP display.

7.4.2.2   Change the SP display to "on" using UP/DOWN keys. When the decimal point flashes, press SET/ENT key once to confirm the change.

7.4.2.3   Press and hold SET/ENT key for at least 3 seconds to return to normal display. HLD lamp turns on.

7.4.3   To exit the hold mode:

7.4.3.1   Press and hold SET/ENT key for at least 3 seconds. "HoLd" appears on PV display and "on" on SP display.

7.4.3.2   Change the SP display to "oFF" using UP/DOWN keys. When the decimal point flashes, press SET/ENT key once to confirm the change.

7.4.3.3   Press and hold SET/ENT key for at least 3 seconds to return to normal display. HLD lamp turns off.

7.4.4   A running program can be advanced to the next segment at any moment.

7.4.4.1   Press and hold SET/ENT key for at least 3 seconds. "HoLd" appears on PV display and "oFF" on SP display.

7.4.4.2   Press SET/ENT key once. "AdV" appears on PV display and "oFF" on SP display.

7.4.4.3   Change the SP display to "on" using UP/DOWN keys. When the decimal point flashes, press SET/ENT key once to confirm the change.

7.4.4.4   Press and hold SET/ENT key for at least 3 seconds to return to initial normal display.

8. Revision History

Rev	Date	Originator	Description of Changes
1	27 May 2010	Sam Bell	