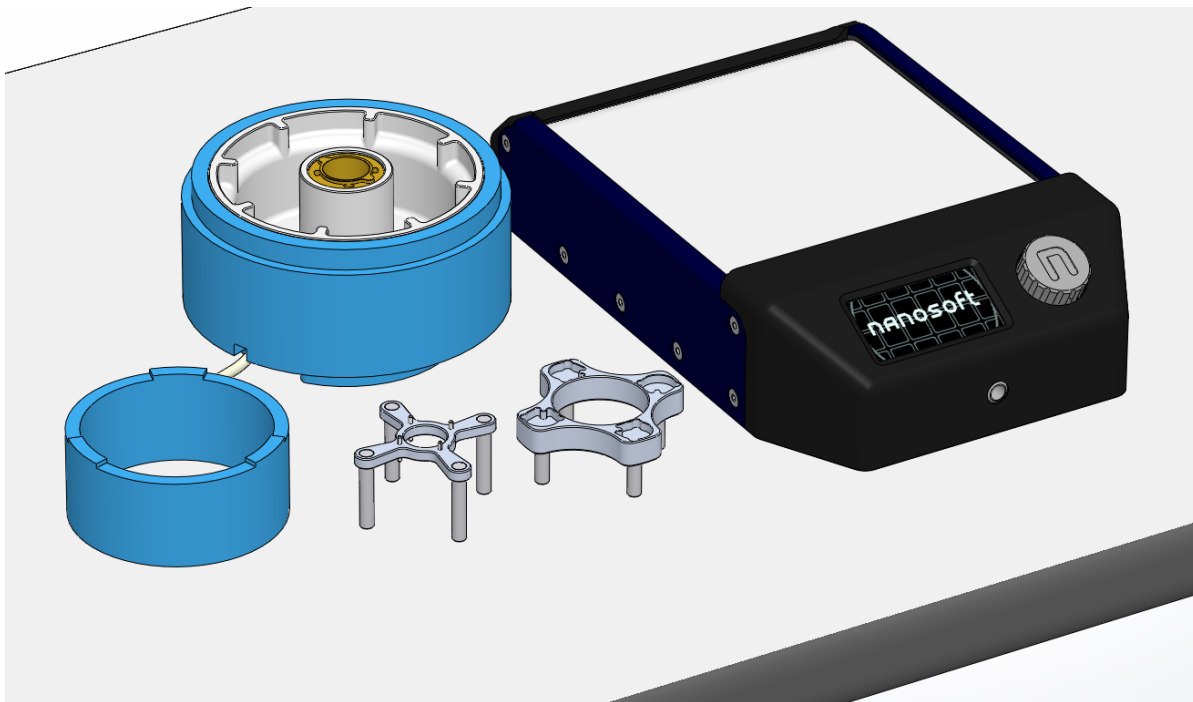


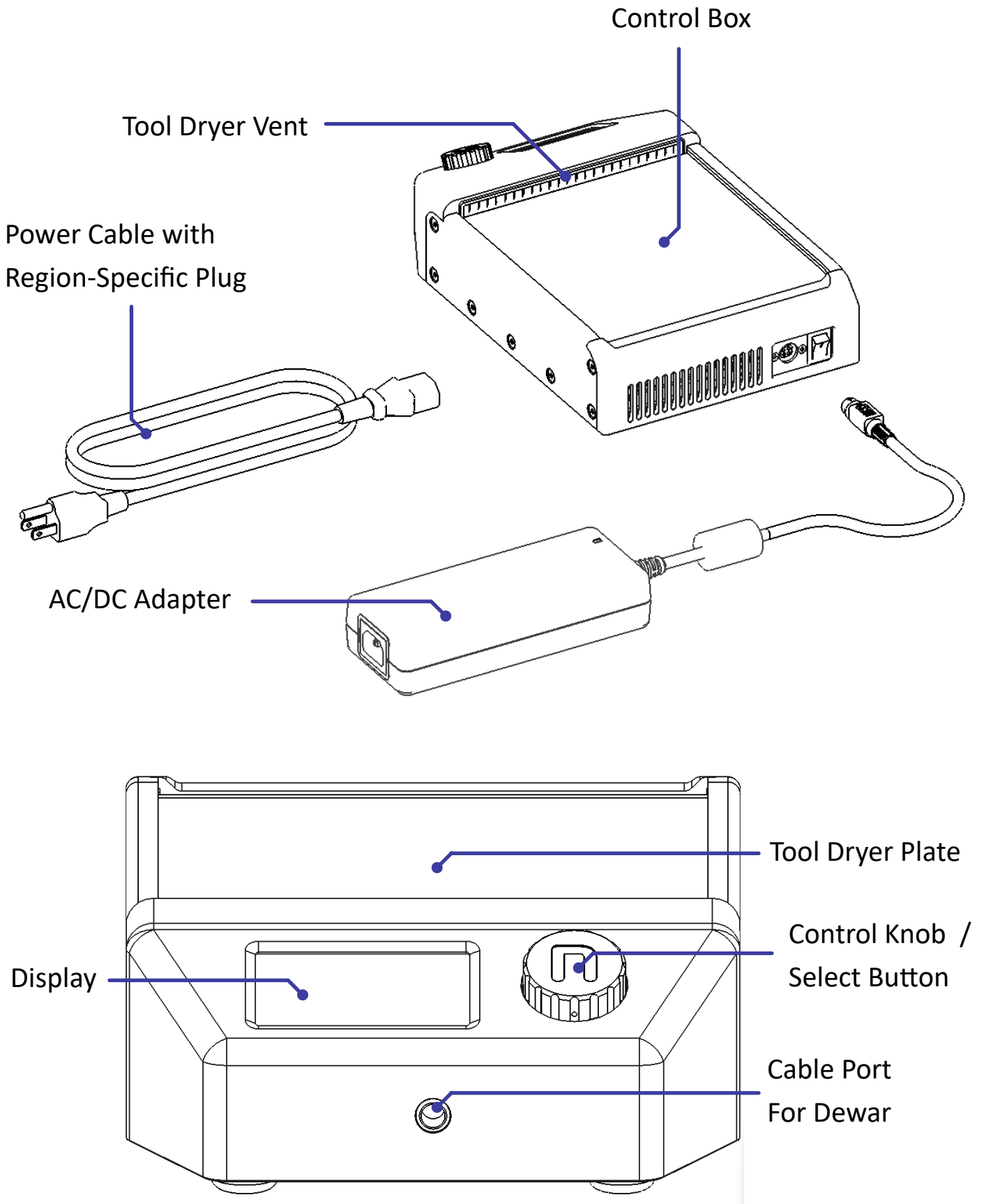
NANOSOFT

CRYOGENIC ELECTRON MICROSCOPY INNOVATION

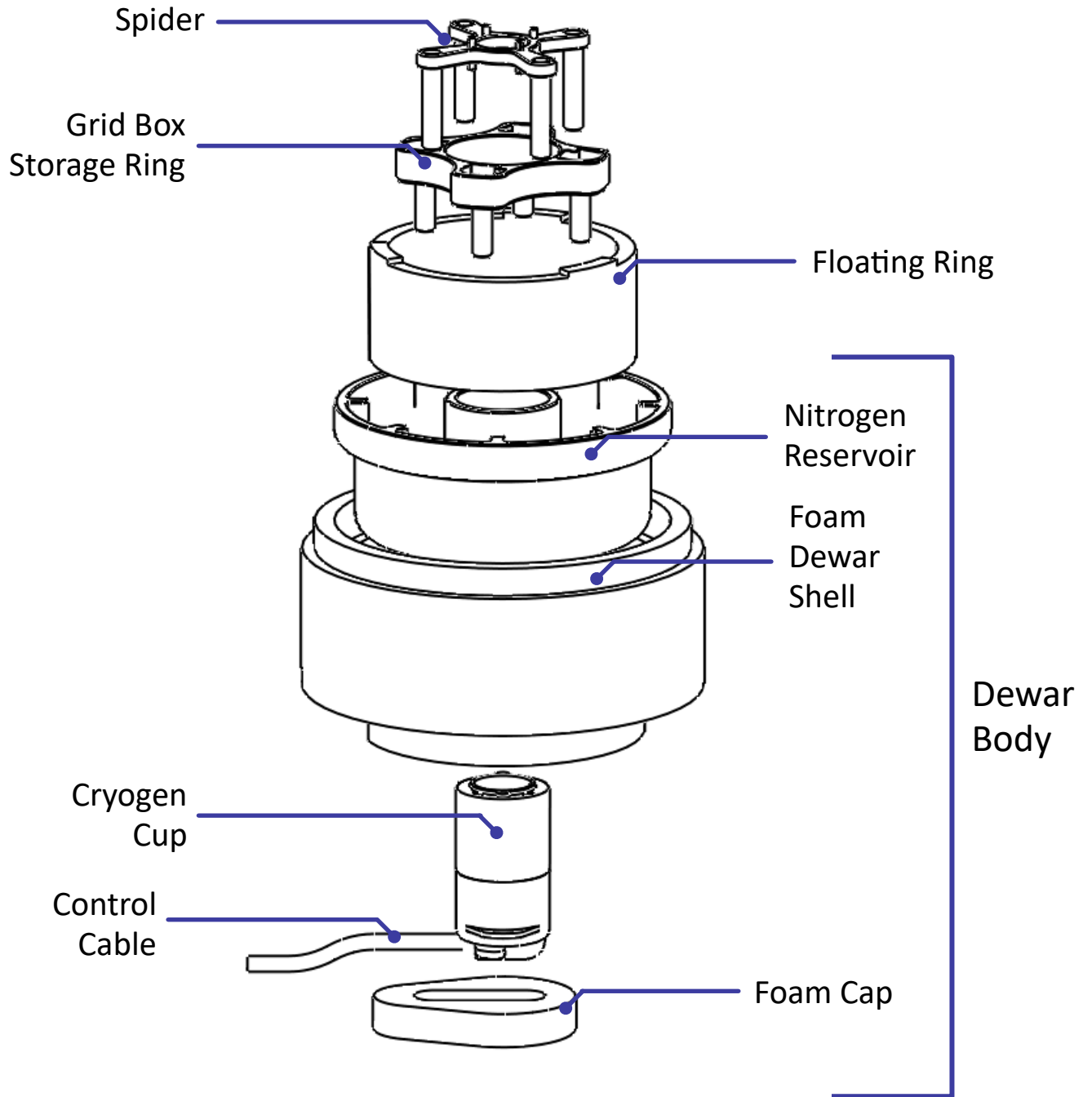


Temperature-Controlled Dewar and Tool Dryer User Guide

Included Hardware:

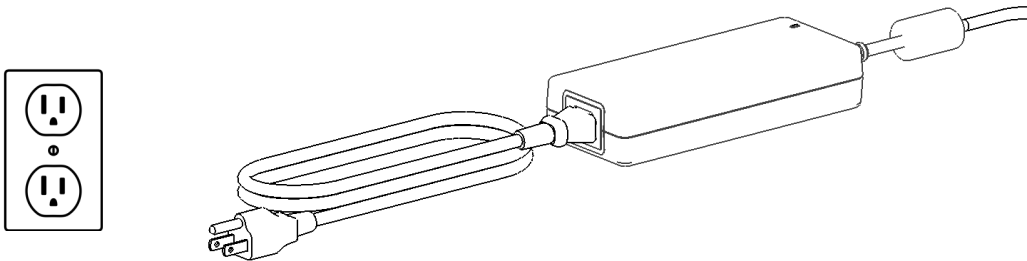


Dewar Assembly (If Purchased):

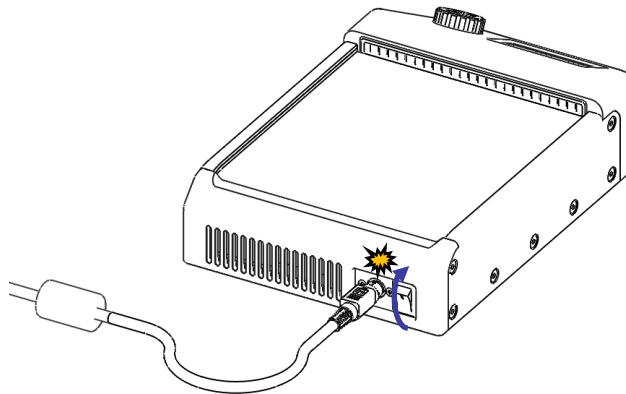


Unboxing and Assembly:

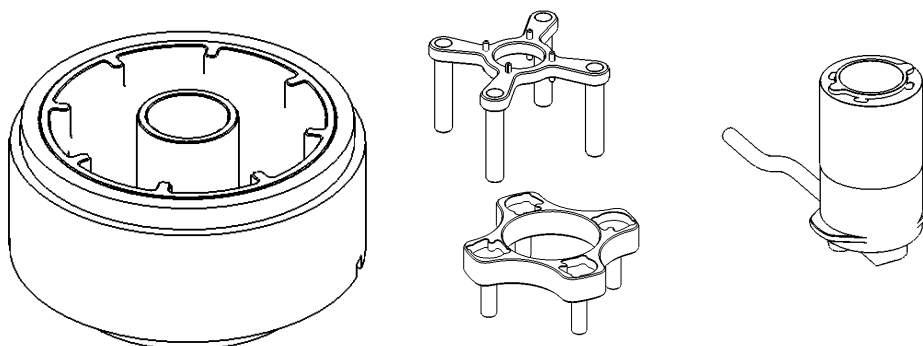
1. Remove the control box, AC/DC adapter, and power cable from the box
2. Connect the power cable to a wall outlet and the opposite end to the open socket on the AC/DC adapter. Note, the male plug may appear different depending on your region.



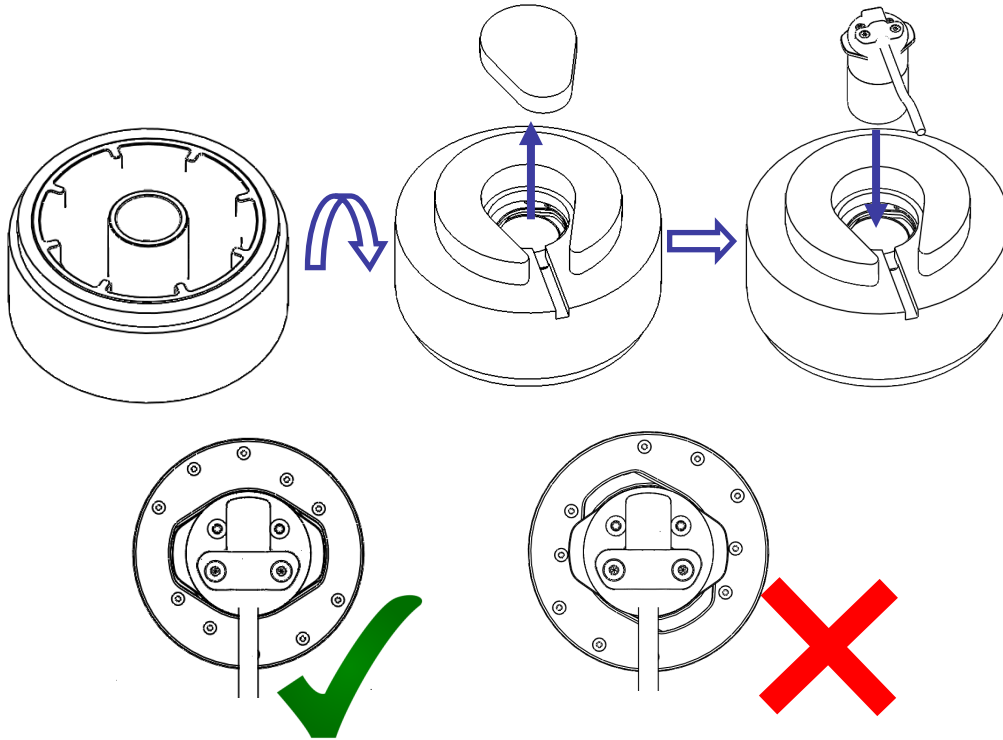
3. Push the circular connector of the AC/DC adapter to the power input on the rear of the control box until the locking mechanism clicks. Then toggle the power switch to turn on the control box



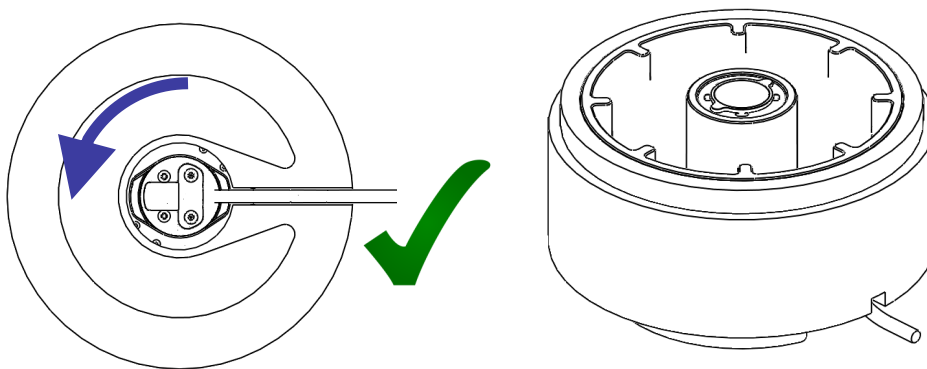
4. If the control box is being used as a tool warmer only, skip ahead to the next section. Otherwise, remove dewar assembly from box.



5. Invert the dewar body, remove the foam cap, then insert the cryogen cup into the center hole, ensuring that the openings on the nitrogen reservoir are aligned with the tabs of the cryogen cup.

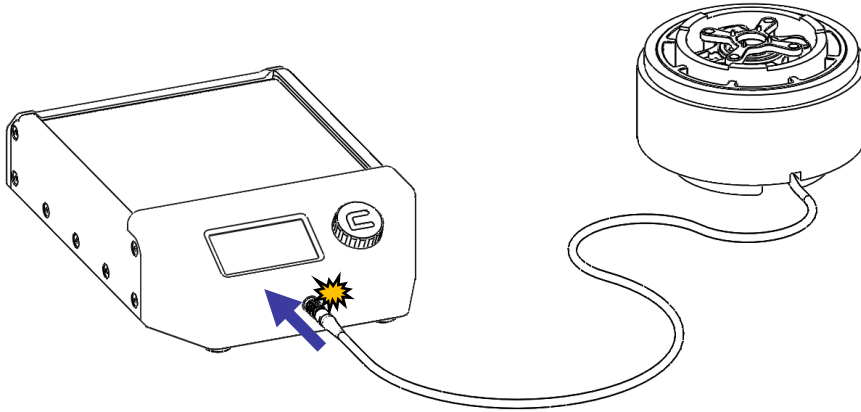


6. After inserting the cryogen cup, rotate the nitrogen reservoir inside the foam dewar shell 90° counterclockwise (as seen from below) until the cryogen cup is locked in place. The openings in the nitrogen reservoir should be inline with the cable exit path of the foam dewar shell.



7. Replace the foam cap and flip the assembly.

8. Insert the end of the dewar cable into the port on the front of the control box, ensuring that the two red dots are aligned with one another. The connector will click into place when seated correctly.



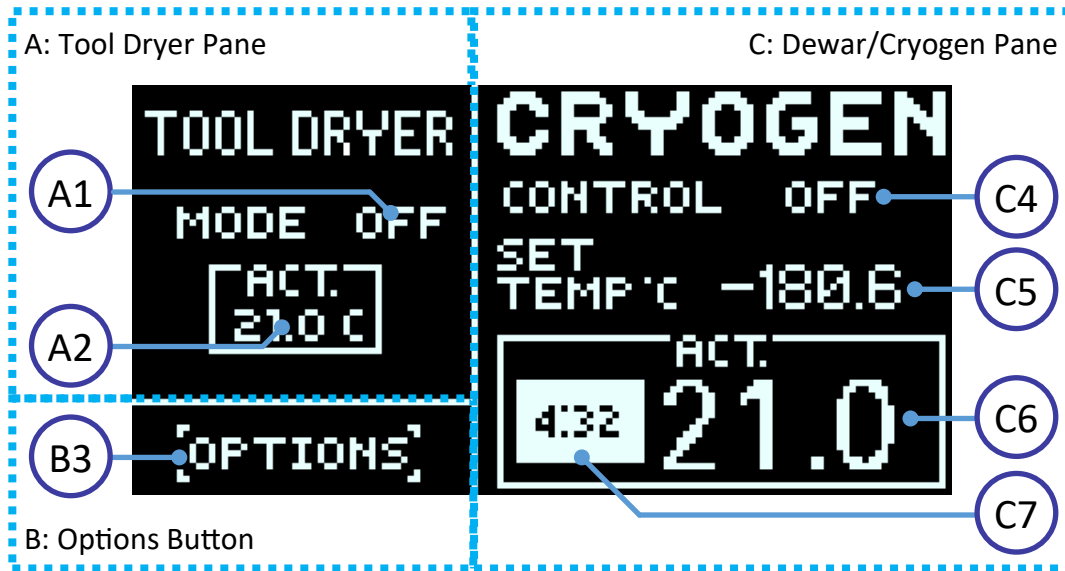
Note: Do Not Attempt To Rotate The Connector Once Inserted.

Control Box Interface:

The control box interface consists of two primary screens: the home screen and options menu. Rotating the control knob will cycle through the selectable items on the screen, with the current item indicated by an **open box**. Depending on the item, pressing the select button will either switch to a new screen or allow editing of the selected item (as indicated by a **closed box**). Rotate the knob to edit the variable, then press the select button again to confirm the change and return to menu control.

Home Screen:

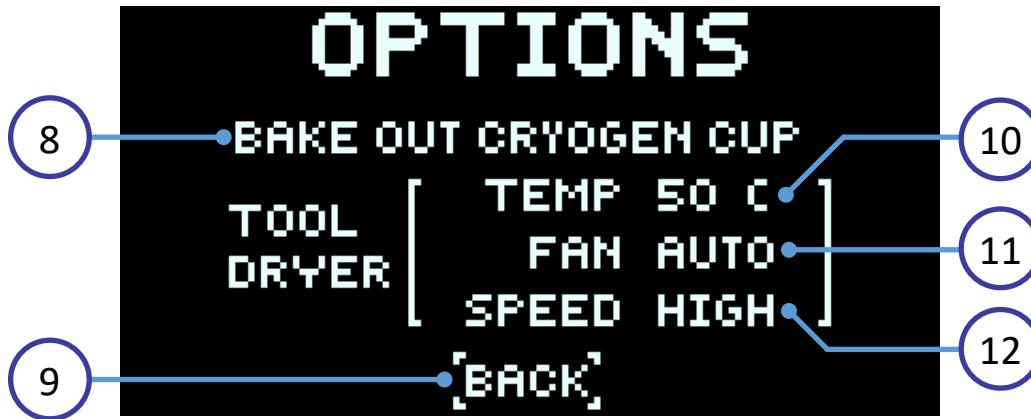
The home screen is divided into separate panes for the tool dryer (A), options button (B), and dewar (C) for easy control and monitoring of the primary functions. From the home screen, the user can monitor the current temperatures of the tool dryer and cryogen respectively, turn the tool dryer on and off, start and stop the cryogen control, and adjust the set temperature/mode of the cryogen controller.



Item	Name	Function	Options
A1	Tool Dryer Mode	Displays the current state of the tool dryer. Select to change the state between on and off.	ON OFF BAKE (During Bakeout)
A2	Tool Dryer Current Temp	Displays the actual temperature of the tool drying plate (in °C)	
B3	Options	Switches to the Options menu upon selection	
C4	Dewar Control State	Displays the current state of the cryogen temperature controller. Select to change the state between on and off. Will be locked during bakeout until bakeout is ended.	ON OFF
C5	Cryogen Set Temp	Displays the set temperature of the cryogen. Select to adjust the temperature or switch to frost mode.	-182.7 to -100.0 °C * to *** (Frost Mode) 50°C (During Bakeout)
C6	Cryogen Current Temp	Displays the actual temperature of the cryogen (in °C)	
C7	Bakeout Timer	When in bakeout mode, timer appears to display the time remaining until bakeout is finished.	

Options Menu:

The options menu lets the user change the parameters of the tool dryer such as the set temperature, fan mode, and fan speed. Additionally, the user can start and stop the bakeout process for the dewar from the options menu (See “Running The Bakeout Procedure” for more information).



Item	Name	Function	Options
8	Bakeout Start/End	Select to begin bakeout or end a bakeout in progress. Running a bakeout will lock out temperature control until the bakeout is ended.	
9	Return	Switches back to the home screen upon selection.	
10	Tool Dryer Set Temperature	Adjusts the set temperature of the tool dryer.	40 - 55 °C (Increments of 5°C)
11	Tool Dryer Fan Mode	Sets the mode of the tool dryer fan. See next section for details of fan modes.	OFF ON AUTO
12	Tool Dryer Fan Speed	Adjusts the speed of the tool dryer fan.	LOW MED HIGH

Operating the Tool Dryer:

To enable the tool dryer, select the Tool Dryer Mode (A1) on the main menu and rotate the knob to ON, then click again to confirm the change. By default, the tool dryer will heat to 50°C.

Adjusting the Set Temperature:

The temperature of the tool dryer can be adjusted through the Tool Dryer Set Temperature setting (10) in the options menu. Available temperatures are 40, 45, 50 (Default), and 55° C.

Adjusting the Fan Mode:

The Fan Mode (11) can be switched between ON, OFF, and AUTO (Default). When set to ON or OFF, the fan will hold the selected state independently of the tool dryer state. When set to AUTO, the fan will automatically turn on when the tool dryer reaches the set temperature, then stay on until the tool dryer is disabled or the tool dryer target temperature is changed.

Adjusting the Fan Speed:

The Fan Speed (12) can be switched between LOW, MED, and HIGH (Default). Running at higher speeds will increase the drying rate.

Operating the Temperature-Controlled Dewar:

The NanoSoft Temperature-Controlled Dewar is designed to be a drop-in replacement for the Thermo-Fisher Vitrobot dewar as well as the NanoSoft vitrification dewar. As such, it is compatible with the Vitrobot and all NanoSoft vitrification dewar parts including grid box rings, the NanoSoft spider, the NanoSoft ethane condenser, and the NanoSoft Igloo.

Preparing the Dewar:

Cool the system with LN₂ as normal until the temperature is sufficiently cold for condensing ethane (ideally below –150 °C). For fastest cooling, use the included spider with the legs extending downward into the LN₂ and ensure that the dewar control state (C4) is set to OFF. Once the ethane is finished condensing, carefully remove the spider. At this point, the dewar control can be switched to ON to start controlling the ethane temperature.

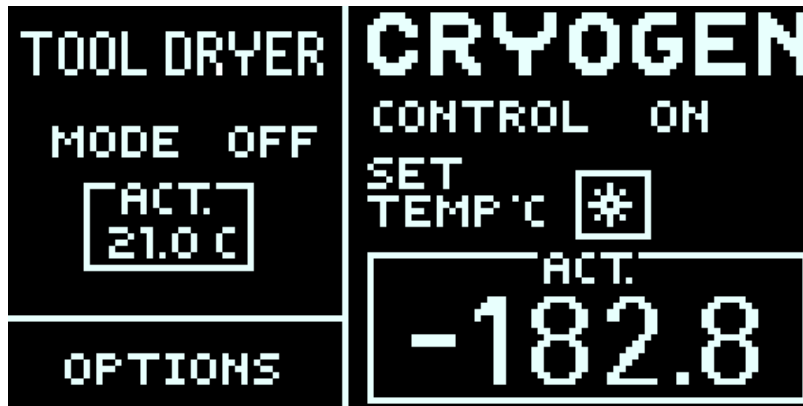
Adjusting the Target Temperature:

The dewar temperature adjustment setting (C5) allows for two modes of operation depending on your preferences: **Normal** and **Frost** modes.

Normal Mode: The target temperature can be freely adjusted within the range of -182.7 °C and -100° C in increments of 0.1°C. The ethane remains in its liquid state and is actively controlled to the target temperature.

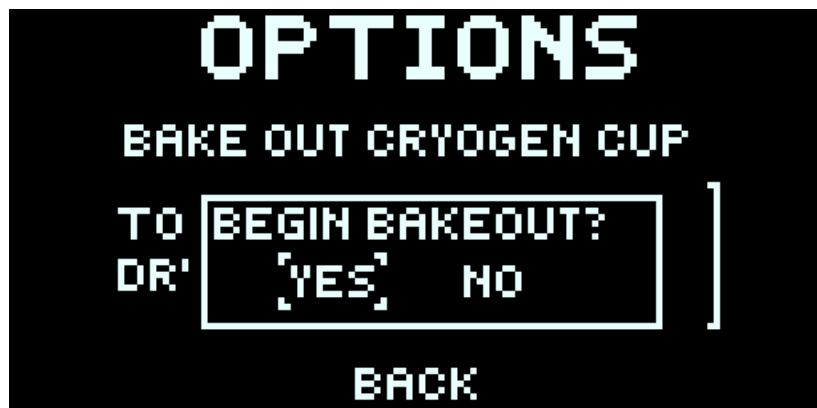
Note: Turning the knob quickly for three seconds will temporarily change the increment to 1.0°C to allow for large adjustments to the set temperature.

Frost Mode: This mode replicates the traditional process of plunging with a thin layer of ethane ice on the inside of the cryogen cup to ensure the lowest possible temperature for plunging. To enter frost mode, decrease the target temperature below -182.7 °C, at which point target temperature will be replaced by a snowflake icon. Continuing to decrease the temperature will bring up additional snowflakes (up to 3) with more snowflakes indicating faster ice formation. To melt the ice, increase the target temperature to return to normal mode.

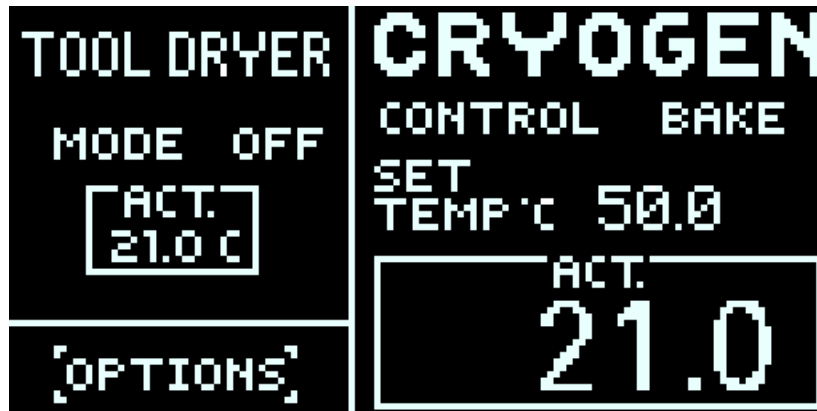


Running the Bakeout Procedure:

The temperature controller has a bakeout process whereby remaining liquid ethane can be boiled off and the temperature of the dewar assembly be brought to ambient temperature quickly. To start the bakeout process, navigate to the options screen and select “BAKEOUT CRYOGEN CUP” (8). A prompt will appear to confirm the bakeout prior to starting.



Upon confirmation, the interface will return to the main screen where both the dewar control state (C4) and dewar set temperature (C5) will update to indicate that a bakeout is in progress.



Note: While the bakeout is active, these settings cannot be modified; however, control can be restored by ending the bakeout at any point via the options menu.

The bakeout will quickly bring the cryogen cup to 50° C, then maintain this temperature for 5 minutes to warm the rest of the dewar. During the hold period, a timer will appear next to the dewar temperature readout indicating the remaining time. Once the timer has elapsed, the bakeout ends automatically.

