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## 0.1 Introduction

3D Systems would like to congratulate you on the purchase of the ProJet™ XL Finisher. We pride ourselves in our ability to offer our customers the latest idea in parts finishing solutions. We at 3D Systems are confident that your system will provide valuable service for many years to come.

- [About This Guide](#)
- [Copyright- ProJet™ XL Finisher](#)
- [Other Useful Documents](#)
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## About This Guide

This guide will help you:

- Understand all safety aspects when operating the system and when handling partially-cured material.
- Prepare your facility for the finisher installation
- Understand how the finisher works
- Properly unpack and set up the finisher
- Understand how to operate and properly maintain the finisher
- Understand the part finishing processes

## Copyright- ProJet™ XL Finisher

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Every effort has been made to ensure that the information in this manual is accurate. Other company and product names mentioned herein are trademarks of their respective companies. Mention of third-party products is for informational purposes only and constitutes neither an endorsement nor a recommendation.

The product described in this user guide incorporates copyright protection technology that is protected by method claims of certain U.S. patents and other intellectual property rights that are owned by 3D Systems®. Reverse engineering is prohibited.

ProJet™ XL Finisher provides professional, convenient and complete post-curing of parts that are produced from the 3-D modeler system. It does not require a special technical staff to supervise the system. All design and process considerations are compatible with an RP environment.

## Other Useful Documents

VisiJet® Material Handling Guide - The Material Handling Guide provides the information you need to safely manage your inventory of VisiJet® material for the ProJet™ 3-D Modelers. It also provides valuable application and operating tips, part finishing instructions, and troubleshooting information to help you build robust and aesthetically pleasing parts with VisiJet® material.










VisiJet® Material Safety Data Sheets (MSDS's) – These are online copies of the printed VisiJet® model material MSDS and VisiJet® support material MSDS that ship with VisiJet® materials. Make sure everyone in your facility who handles VisiJet® materials reads these MSDS's and follows the safety guidelines in them.

## Special Features

The sturdy construction and high grade insulation of the ProJet Finisher XL contributes to excellent high temperature performance. Other special features include: \* Proportional digital CONTROL instrument to control temperature fluctuations.

- Manual reset HI-LIMIT instrument to protect the chamber workload as well as the finisher itself.
- Unique design to combine forced circulated air through side ducts for the ultimate in temperature performance.
- Welded double wall construction and fiberglass insulation to reduce heat loss.
- Silicone rubber gaskets further minimize heat leakage.
- Scratch-resistant baked enamel exterior and stainless steel interior for easy cleaning.
- Space-saving, stackable design.

## 0.2 Safety Requirements & Safety Guidelines

|   |  |  |
|---|--|--|
|    | <p>To ensure personal safety and to avoid damage to the ProJet™ XL Finisher, read and understand all safety guidelines in this document.</p>   |  |
|    | <p><b>WARNING:</b> Read this guide and observe all safety precautions before using this equipment. Failure to observe these precautions can result in equipment damage and severe injury. Setup, maintenance, and operation of this equipment must only be performed by qualified personnel.</p> |  |
|    | <p><b>WARNING:</b> All grounding and safety equipment must be in compliance with applicable codes, ordinances, and accepted safe practices.</p>  |  |
|    | <p><b>WARNING:</b> Do not use the finisher in wet, corrosive, or explosive atmospheres.</p>  |  |
|  | <p>Do not use flammable solvent or flammable material in this Finisher. Do not process closed containers of any substance or liquid in this Finisher because they may explode when heated.</p>   |  |
|  | <p>Never operate Finisher in excess of the maximum operating temperature of 204°C (400°F).</p>   |  |
|  | <p>Never open the chamber door when the Finisher chamber temperature is above 100°C (212°F). Wait until it cools to the TEMPCONTROL setpoint or below as shown on the TEMPCONTROLPV display. (See p. 3.)</p>   |  |
|  | <p>Do not tip the tray of hot dip-finishing liquid. Scoop out the liquid before moving the tray, or wait for the liquid to cool and solidify.</p>  |  |



## 0.3 Facility Requirements

- 0.3.1 ProJet™ XL Finisher Physical Specification
- 0.3.2 ProJet™ XL Finisher Functional Specifications
- Pre-Installation Checklist

## 0.3.1 ProJet™ XL Finisher Physical Specification

### Chamber Size in./(cm)

| Width   | Depth   | Height  |
|---------|---------|---------|
| 30 (76) | 18 (46) | 22 (56) |

### Finisher Size in / (cm)

| Width   | Depth   | Height  |
|---------|---------|---------|
| 34 (86) | 23 (58) | 36 (91) |

### Finisher Weight

|                                    |                  |
|------------------------------------|------------------|
| <b>Approximate net weight</b>      | 245 lbs (112 kg) |
| <b>Approximate shipping weight</b> | 320 lbs (146 kg) |

### Electrical Requirement

#### Power

Line voltages may vary in some geographical locations. If your line voltage is much lower than the oven voltage rating, warm up time will be longer and motors may overload or run hot. If your line voltage is higher than nameplate rating, the motor may run hot and draw excessive amps. If the line voltage varies more than 10% from the oven voltage rating, some electrical components such as relays, temperature controls, etc. may operate erratically.

The finisher is bench oven to 204° (400°F) with forced convection airflow.

| Volts | Amps | Hertz | Phase | Heater (KW) | Hardwire  |
|-------|------|-------|-------|-------------|---|
| 120   | 21.6 | 50/60 | 1     | 2.4         | Must be hardwired to the electric supply using 10 AWG or larger wires suitable for at least 75°C (167°F). |
| 240   | 10.8 | 50/60 | 1     | 2.4         | Must be hardwired to the electric supply using 10 AWG or larger wires suitable for at least 75°C (167°F). |

**240 Volts Only: will operate satisfactorily on a minimum of 208 volts, but with a 25% reduction in heater power.**

## 0.3.2 ProJet™ XL Finisher Functional Specifications

Actual finisher's function results may vary slightly depending on operating conditions. Minimum operating temperature is based on 20°C ambient temperature measured at the air inlet with the exhaust air damper fully open.



**WARNING: Do not exceed a total of 400 pounds for stacked finisher.**

**NOTE: Dampers must be open to operate at the minimum.**

**NOTE: Time to Temperature values may vary slightly depending on operating conditions.**

|  |                         |
|--|-------------------------|
| Time to temp with no load- 40°C to 150°C     | 15 minutes              |
| Time to temp with no load- 40°C to 204°C     | 26 minutes              |
| Recovery time after door open 1 min. @ 150°C | 3 minutes               |
| Recovery time after door open 1 min. @ 204°C | 6 minutes               |
| Operating range                              | 35°C at 204°C           |
| Control stability                            | +/- 0.5°C               |
| Maximum load capacity                        | 400 lbs. (182 kg)       |
| Maximum shelf load                           | 200 lbs. (91 kg)        |
| Exhaust capacity                             | Adj. to 3 CFM (1.4 lps) |

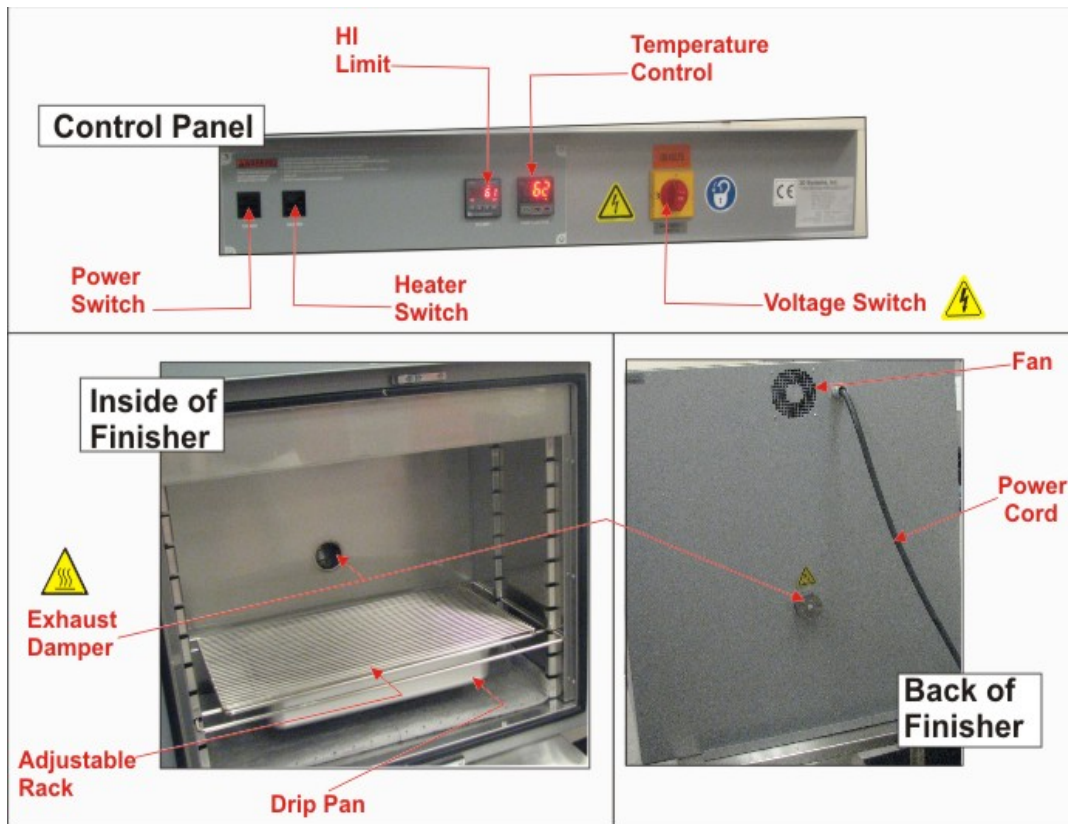
**NOTE: Time to Temperature and Temperature Uniformity values are based on 240V/60 Hz operation, with control panel located on top. Actual results may vary slightly depending on unit configuration and operating conditions.**

## Pre-Installation Checklist

- Read this guide carefully. Make use of its instructions and explanations. Safe, continuous, satisfactory, trouble-free operation depends primarily on how well you understand and maintain the Finisher.
- Verify line voltage. Your facility's line voltage must correspond to the voltage shown on the Finisher's nameplate. [See 0.3.1 ProJet™ XL Finisher Physical Specification](#) .
- Verify clearance. You need at least 8 cm (3 in) of clearance at the Finisher's sides, and 5 cm (2 in) clearance at the rear of the Finisher to ensure adequate air circulation, component cooling, and effective temperature control. Take special care to not block the openings on the sides and rear of the Finisher.
- The table, bench, or stand you place the Finisher on must be stable, level, and able to support 78kg (172lb), the weight of the Finisher plus a full tray of VisiJet support material and 9kg(20lb) of VisiJet parts on the shelf.

## 0.4 Familiarization

Review illustration to gain an understanding of where features are located.



## 0.5 Installation

This section describes unpacking and how to set up the finisher for operation. Ensure that all facility requirements are met to ensure optimum performance when operating.

- [05.1 Unpacking and Inspection](#)
- [05.2 Setup](#)

## 05.1 Unpacking and Inspection

Remove all packing materials and thoroughly inspect the oven for damage of any kind that could have occurred during shipment.

- Ensure the carton and plastic cover sheet inside carton are still in good condition.
- Look at all outside surfaces and corners of the oven for scratches and dents.
- Check the panel control function to ensure it is working properly.
- Check the door and latch for smooth operation.

If damage exist or if items are missing from packaging, contact [3D Systems Customer Support](#).

### **Your shipment should include:**

- One (1) ProJet XL Finisher
- Two (2) Shelves
- One (1) Damper assembly

### **Accessory Kit Contains:**

- One (1) Set of gloves
- One (1) Declarations of Conformity
- One (1) Box of Kimwipes
- One (1) Set of Toggles
- Two (1) Rolls of pads

## 05.2 Setup



**WARNING: All grounding and safety equipment must be in compliance with applicable codes, ordinances and accepted safe practices.**

- Place finisher on a bench top or an stand. The oven must have a minimum of two (2) inches (5 cm) clearance in the rear to provide proper ventilation.
- The finisher may be placed next to another cabinet, or next to another oven, with three (3) inch (8 cm) clearance (the doors will still open).
- Make sure finisher is level; this will assure proper heat distribution and operation of all mechanical components.
- Identify correct power source indicated on the specification plate.



**All grounding and safety equipment must be in compliance with applicable codes, ordinances and accepted safe practices.**

### Power

Line voltages may vary in some geographical locations. If your line voltage is much lower than the oven voltage rating, warm up time will be longer and motors may overload or run hot. If your line voltage is higher than nameplate rating, the motor may run hot and draw excessive amps. If the line voltage varies more than 10% from the oven voltage rating, some electrical components such as relays, temperature controls, etc. may operate erratically.

- Hard wire oven directly to the electric supply (see [Electrical Specifications](#)).



## 0.6 Operation

This section describes how to load parts in the finisher when you are ready to remove bulk support material. It also describes how to start finishing cycle and provides detailed operating instructions for the TEMP CONTROL and HI LIMIT control.



**Do not use the finisher in wet, corrosive, or explosive atmospheres. Users in the United States must comply with Occupational Safety and Health Act (OSHA) of 1970, Section 5, and all relevant local safety rules and regulations. Refer to the OSHA and National Fire Protection Association (NFPA) safety standards for further information.**

### Before You Start a Finisher Cycle

- Read this User's Guide. Carefully follow all of its safety, operation, and maintenance instructions.
- Verify line voltage. It must match to the voltage shown on the nameplate, see "Power requirements."
- Verify fresh air, exhaust, and electrical cabinet openings. Remove any restrictions in or near the fresh air and exhaust openings. Never let them become clogged to the point they impede air flow.
- The damper may need to be opened for the Finisher to operate properly in the 70°C to 75°C temperature range for VisiJet parts.
- Put on gloves.



**IRRITANT! A small amount of uncured VisiJet model material might be on the surface of a part when you remove it from the modeler. Repeated skin contact with uncured VisiJet model material can cause allergic skin irritation or rash. Wash hands with soap and water if you contact VisiJet model material. For further safety information, see your VisiJet Material Handling Guide and the VisiJet model material MSDS.**

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- 0.6.2 Before Starting
- 0.6.3 Loading Parts in the Finisher
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## 0.6.5 Temp CONTROL Settings

The Finisher has been tested and preset at the factory for normal operating conditions. In most applications, it will not be necessary to alter the Finisher's settings, except for the TEMP CONTROL setpoint. This section contains information and reference material to change the setpoint, change the display from °C to °F, and access the control's operating and set-up parameters.




The TEMP CONTROL was carefully programmed at the factory. The parameters that may be accessed include tuning functions, display functions, and thermocouple selection. If you need to recalibrate the TEMP CONTROL for a specific operating condition, see "Recalibrating the TEMP CONTROL."

### How to view and change the TEMP CONTROL setpoint



**CAUTION: Never operate Finisher at a temperature in excess of the maximum operating temperature of 204°C (400°F).**





To enter the control setpoint on the TEMP CONTROL panel:

1. Press . The setpoint (**SP**) LED will illuminate.
2. Use ▲ and ▼ to increase or decrease the setpoint. The right decimal point LED will flash indicating that the setpoint is being changed. This will stop flashing when the new value has been entered.
3. Press  to save the new setpoint.
4. Press  again to display **PV**, the actual chamber temperature.



## 0.6.6 Parameter Programming Mode

The control parameters are set through the Operating and Set-up modes. In most applications, it is not necessary to alter the finisher settings. The following instructions describe how to access, view and, if desired, change the parameters. Once the Operating and Set-up modes are accessed, the **SP** LED will start blinking on and off. The CONTROL will not allow the display to be altered improperly. The CONTROL will automatically exit the Parameter Programming mode if no keys are pressed within two (2) minutes.

1. Press  key for three (3) seconds.
2. Press the  key until the desired parameter is displayed. See Operating and Setup Parameter Tables on the following pages.
3. Press the ▲ or ▼ to display value.
4. Use the ▲ or ▼ to move to the desired setting.
5. Press the  key to enter the value.
6. Press and hold the  key for three (3) seconds to return to the display mode.



- Operating Parameters
- Set-Up Parameters

## Operating Parameters



| Code | Name   | Settings     |
|------|--|--------------|
| CtL  | Control Mode   | PID          |
| At   | Auto-tuning  | OFF          |
| P    | Proportional Band                                    | 4 (8 if °F)* |
| I    | Integral Time  | 15           |
| d    | Derivative Time                                      | 0            |
| nr   | Manual Reset (only when I & d are OFF)               | N/A          |
| HyS  | Hysteresis (only when CtL is ONF, change CtL to PID) | N/A          |
| Ct   | Cycle Time   | 1            |
| FL   | Input Filter   | 0            |
| bS   | PV Bias (Offset)                                     | 0            |
| LoC  | Key Lock   | 1            |

\*If P is not displayed the Control Mode (CtL) must be first set to PID.

|            |  |
|------------|--|
| <b>CtL</b> | Control Mode - This parameter determines whether controller functions as a time proportional or an on/off control.   |
| <b>At</b>  | Auto-tuning – OFF for PID tuning, ON for controller to tune process.   |
| <b>P</b>   | Proportional Band - Expressed in degrees. This value determines the band width on both sides of the setpoint within which the control provides proportional control.   |
| <b>I</b>   | Integral Time - Expressed in seconds. This parameter corrects for errors in actual temperature versus the setpoint.  |
| <b>D</b>   | Derivative Time - Expressed in seconds. This effect of the derivative time is in direct proportion to the time setting.  |
| <b>nr</b>  | Manual Reset - Expressed in percent. Controller outputs this value when process variable equals setpoint (Only if I = 0).  |
| <b>HyS</b> | Hysteresis - Expressed in degrees. When CtL = OFF, this value determines the change in temperature needed to turn controller output from full off to full on.  |
| <b>Ct</b>  | Cycle Time - Expressed in seconds. This is the total time for one ON/OFF cycle of the controller output during the proportional action.  |
| <b>FL</b>  | Input Filter – Expressed in seconds. This function should be used when the PV may fluctuate greatly (i.e. input signal contains noise).  |
| <b>bS</b>  | PV Bias - Expressed in degrees, from -199 to 999. This parameter used to set the actual oven temperature to the controller display.  |
| <b>LoC</b> | Key Lock - This provides levels of access to the controller. <ul style="list-style-type: none"> <li>• 0 = No key lock, full access to controller.</li> <li>• 1 = Prevents changing of all parameters except setpoint.</li> <li>• 2 = Prevents all parameters from being changed including the setpoint.</li> <li>• -1 = Set to enter the Setup parameter setting display.</li> </ul> |

The controller is set to **LoC=1** at the factory. This prevents inadvertent changing of control parameters with the exception of setpoint. If it becomes necessary to alter control parameters, change the **LoC=1** to **LoC=0**. Follow the parameter programming mode found earlier in this manual.

When **LoC = -1**, the parameters are displayed in the order shown in the Set-Up Parameters.

**Note:** If you are unable to change the setup parameters, go back out and change the \*LoC = 0. Press the  key until LoC appears again, change LoC = -1 and press the  key.

## Set-Up Parameters

| Code | Name                  | Settings        |
|------|-----------------------|-----------------|
| In   | Input Type            | 5 (35 if °F)    |
| SPH  | Setpoint High         | 204 (400 if °F) |
| SPL  | Setpoint Low          | 0 (32 if °F)    |
| dr   | Direct/Reverse Action | 0               |
| dSP  | PV/SP Display         | 0               |

|            |   |
|------------|---|
| <b>In</b>  | Input Type - This parameter is set for type of input and whether PV is in C or F.   |
| <b>SPH</b> | The maximum setpoint limit for oven. The user cannot set the setpoint above the maximum setpoint.   |
| <b>SPL</b> | The minimum setpoint limit of oven. The user cannot change the setpoint below this lower setpoint limit.  |
| <b>dr</b>  | Direct/Reverse action. This value is set for 0 (reverse action).  |
| <b>dSP</b> | Priority of PV/SP display. This parameter either displays the PV (process variable) or SP (setpoint).<br>0 = process variable,<br>and 1 = setpoint. |

## 0.6.7 Finisher Zone Calibration

The CONTROL instrument has been tested and calibrated at the factory. Under normal operating conditions, recalibration should not be necessary. However, if the user would like to recalibrate the CONTROL for a specific operating condition, then recalibration is easily accomplished.

### Calibration Instructions

\*Required Equipment:\*

- Temperature Measuring Device with a Compatible Temperature Sensor
1. Verify that the **bS** (PV Bias) programmed in the CONTROL is **0**. Refer to Instructions on viewing the parameter in the PARAMETER PROGRAMMING mode.
  2. Locate the temperature sensor of the temperature measuring device at the center of the chamber.
  3. Operate the oven until it reaches the desired operating temperature and the CONTROL is regulating. The user may wish to have a loaded chamber with a standard amount of product to simulate a specific operating condition. It will take several minutes for the unit to stabilize at the controlled temperature. Allow at least 30 minutes of operation at the stabilized temperature before proceeding.
  4. Subtract the average controlled temperature (number appearing on the CONTROL display) from the actual oven temperature (number appearing on the temperature measuring device display). The CONTROL and the device must be in the same scale (°C or °F).  
Actual Oven Temperature - Controlled Temperature = calculated value
  5. Enter the calculated value from Step 4 as the new bS (PV Bias) value in the instrument.

## 0.6.8 HI LIMIT Control Settings

The Finisher has been tested and the HI LIMIT preset at the factory for normal operating conditions. In most applications, it will not be necessary to alter the Finisher's settings, except for the HI LIMIT setpoint (**HSP1**). This section describes how to change the HILIMIT setpoint, access the HILIMIT control's parameter settings, and how to change the HI LIMIT control's display between°C and°F.

### *How to change the HILIMIT setpoint and reset heater*





**CAUTION: Never operate Finisher at a temperature in excess of the maximum operating temperature of 204°C (400°F).**

Enter a HI LIMIT setpoint between 80°C and 89°C (176°F and 192°F) on the HILIMIT control panel.

**NOTE: The HI LIMIT setpoint should be 10°C to 14°C (18°F to 25°F) higher than the TEMP CONTROL setpoint (SP). Since the recommended TEMP CONTROL setpoint for VisiJet parts is between 70°C and 75°C (158°F and 167°F), the HI LIMIT setpoint you enter on the HI LIMIT control panel should be between 80°C and 89°C (176°F and 192°F).**

**NOTE: If the heater shuts down, wait for the chamber temperature to drop 2degrees below the HILIMIT setpoint, then reset the heater by pushing RESET on the HILIMIT control panel. (Also, see Output 1 Hysteresis Value, o1.Hy, in the table of "HILIMIT Control Parameters" on page30. This parameter determines how many degrees the chamber temperature must drop before you can reset the heater. The factory setting is 2 degrees.)**




1. If the **LOCK** on the HI LIMIT control panel is lit, press and hold **RESET** for 4 seconds to enable ▲ and ▼.
2. Press . The **HSP1** LED will illuminate.
3. Use ▲ and ▼ to change the HI LIMIT setpoint.
4. Press **RESET** or  once to save the new setpoint and redisplay the process variable **PV**.
5. If the HI LIMIT setpoint is exceeded, the heater will shut down. Wait for the oven chamber temperature to drop 2 degrees below the HI LIMIT setpoint, then press **RESET** on the HI LIMIT control panel.

- [Changing Display From C To F for Hi-Limit Control](#)

## Changing Display From C To F for Hi-Limit Control

The HI-LIMIT can be configured for either °C or °F.

Use the following steps to change HI-LIMIT from displaying °C to °F (and for changing back to °C).




1. If the on the HI-LIMIT is lit, press and hold the **RESET** for four (4) seconds to enable the ▲ and ▼ keys.
2. Press and hold the  key for four (4) seconds, the setup mode has now been entered.
3. Press the  key until the unit is displayed.
4. Press the ▲ or ▼ to display value.
5. Use the ▲ or ▼ to move to the desired setting.
6. Press the  key, this enters the value and advances to the next parameter.
7. Press the **RESET**, this will return the HI-LIMIT to the normal mode.
8. The HI-LIMIT has been changed, enter the desired setpoint.

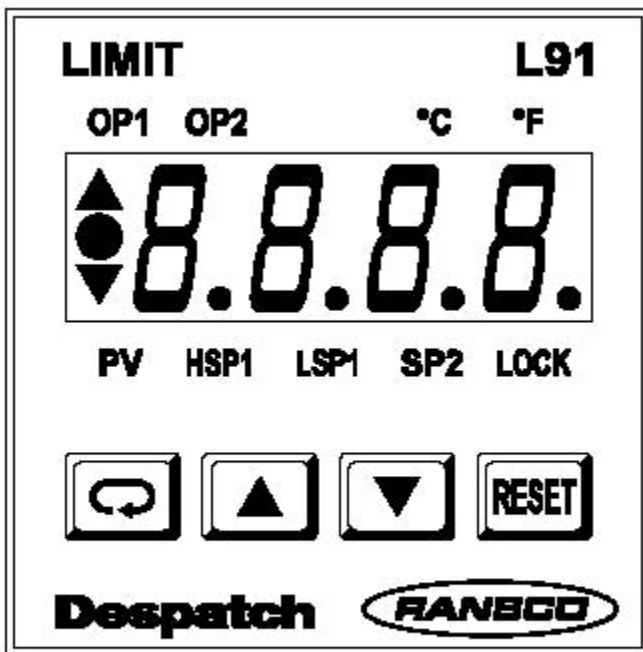


## 0.6.9 Parameter Setup Mode

The HI-LIMIT parameters are set through the Operating and Set-up modes. In most applications, it is not necessary to alter these settings. The following instructions describe how to access, view and, if desired, change the parameters.

If the **LOCK** on the HI-LIMIT is lit, press and hold the **RESET** key for four (4) seconds to enable the ▲ and ▼ keys. The HI-LIMIT will automatically exit the Setup mode if no keys are pressed for about two (2) minutes.

1. Press and hold the  key for four (4) seconds, the setup mode has now been entered.
2. Press the  key until the desired parameter is displayed. See the Setup Parameter Table on the following page.
3. The display will alternate between the parameter name and value.
4. Use the ▲ or ▼ to move to the desired setting.
5. Press the  key, this enters the value and advances to the next parameter.
6. To get out of the setup parameters press the **RESET** key. The HI-LIMIT will automatically exit the Setup mode if no keys are pressed for about two (2) minutes.



## HI-LIMIT Instrument

- [Setup Parameters](#)

## Setup Parameters











**Note: When changing between °C and °F, the setup parameters Filt, o1.Hy, HSP.L, and HSP.H settings convert automatically.**

| Code  | Name  | Settings        |
|-------|---|-----------------|
| inPt  | Input type.   | J_tC            |
| unit  | Process unit.                                       | °C (or °F)      |
| rESo  | Display resolution.                                 | No.dP           |
| SHif  | PV shift value (offset).                            | 0               |
| Filt  | PV filter.  | 0               |
| out1  | Output 1 function.                                  | Hi.             |
| o1.Hy | Output 1 hysteresis value.                          | 2.0             |
| HSP.L | Lower limit of HSP1.                                | 0 (32 if °F)    |
| HSP.H | Upper limit of HSP1.                                | 204 (400 if °F) |
| out2  | Output 2 function. (N/A)                            | None            |
| Addr  | Address assignment for digital communication. (N/A) | 1               |
| bAud  | Baud rate of digital communication. (N/A)           | 4.8             |
| PAri  | Parity bit of digital communication. (N/A)          | EVEEn           |
| disP  | Normal display format.                              | PV              |

|       |   |
|-------|---|
| inPt  | Input type - this selects thermocouple type. Use type J thermocouple.   |
| unit  | Process unit - selects between °C and °F for reading process temperature.   |
| rESo  | Display resolution - selects the location of the decimal point on process related parameters.   |
| SHif  | PV shift value (offset) - this moves the display temperature to the oven temperature.   |
| Filt  | PV filter - if process value is unstable to read, increasing this value will steady the input signal.   |
| out1  | Output 1 function - this the function of the output. This must be set to .Hi for HI-LIMIT control.  |
| o1.Hy | Output 1 hysteresis value - the amount of degrees that the temperature must be below the setpoint temperature before the HI-LIMIT can be reset.                         |
| HSP.L | Lower limit of HSP1 - the minimum temperature that the HI-LIMIT can be set.   |
| HSP.H | Upper limit of HSP1 - the maximum temperature that the HI-LIMIT can be set.   |
| out2  | Output 2 function. (N/A)  |
| Addr  | Address assignment for digital communication. (N/A)   |
| bAud  | Baud rate of digital communication. (N/A)   |
| PAri  | Parity bit of digital communication. (N/A)  |
| out2  | Output 2 function. (N/A)  |
| diSP  | Normal display format - used to select the display in normal condition.<br>PV = Process value.<br>SP1 = HI-LIMIT setpoint.<br>SAFE = the word safe in normal condition. |

## 06.10 Changing Display From °C To °F

The control can be configured for either °C or °F. Use the following steps to change control from displaying °C to °F.

1. Press and hold the  for three (3) seconds.
2. The display will read **CtL**. The **SP** LED will flash indicating that Operating Parameter mode has been entered.
3. Press the  until **LoC** appears on the display. Press the ▼ or ▲ to enter the parameter.
4. Press the  to set the value to -1. The **SP** LED will flash rapidly, indicating that the Set-Up Parameter mode has been entered.
5. Press the  to enter the value. The display will read **In**. Press the ▼ or ▲ to enter the parameter. **Note: If you are unable to change the setup parameters, go back out and change the LoC = 0.** Press the  key until **LoC** appears again, change **LoC** = -1 and press the  key.
6. Enter a value of 35. The right decimal point LED will flash indicating that the setpoint is being changed. This will stop flashing when the new value has been entered.
7. Press the  to enter the value.
8. Press the  until **SPH** is displayed. Press the ▼ or ▲ to enter the parameter.
9. Enter a value of 400.
10. Press the  to enter the value.
11. Repeat steps 12 -14 for SPL; the value is 32.
12. Press and hold the  for three (3) seconds to return to the operation mode. The control now reads °F. Enter the desired setpoint.
13. Refer to Parameter Programming Mode, Operating Parameters section to change tuning parameters, if necessary.

## 06.11 Removing Parts from the Finisher

After shutting down the Finisher, remove the parts from the chamber as follows:

1. Wear gloves!
2. Verify that the chamber is at room temperature on the TEMP CONTROL **PV** display, then open the chamber door.
3. Use the tongs, remove each part. Lift each part up slightly and verify that it is not dripping before you remove it. If it is dripping, either:
  - leave it in on the shelf until it stops dripping.
  - Wrap it (or re-wrap it) in absorbent cloth, then remove it.
  - If any liquid support material drips on the oven chamber floor, liquify it with a hot air blower, then wipe it up.



**DO NOT switch on the Finisher to liquify support material on the chamber floor. Hot liquid material can leak out the bottom door seal.**

4. Check the level of support material in the tray. If it is half full, empty tray. Otherwise, the tray can become very heavy and difficult to empty.

## 06.12 Emptying the Tray

If the level is 2.5 cm (1 in) or less from the top of the tray, empty it as described below.

**Always** check the level of support material in the tray:

- Before you start a Finisher cycle.
- after you remove parts from the Finisher.



**Do not allow the level of support material in the tray to get closer than 2.5cm (1 in) from the top rim of the tray. If the tray gets too full, liquid support material could spill out and onto the floor of the chamber and leak out the bottom door seal.**

1. Allow the Finisher to cool to room temperature, then open the chamber door.



**Never open the chamber door when the Finisher is hot. Wait until it cools to room temperature as shown on the TEMP CONTROL's PV display. Opening the door when the Finisher is hot can damage the Finisher, cause severe burns, and start a fire.**

2. Verify that all the support material in the tray is solid.



**Never attempt to remove the tray if there is liquid support material in it. Wait until the support material in the tray is entirely solid. Liquid support material can spill out of the tray as you are removing it. If it spills on your skin, it can burn you.**

3. Remove the shelf from the top of the tray, lift the tray up and out of the tray bracket, then remove the tray from the oven chamber.

4. Remove the block of solid support material from the tray.

**NOTE: If the block of material is difficult to remove, place the tray in a freezer for several minutes, then try again.**

5. Reinstall the empty tray in the oven chamber and place the shelf securely on top of it.

## 06.13 Finisher Shutdown

After parts have been in the finisher for the required amount of time, shut down the Finisher as described below before removing the parts from the finisher. Finisher cycle time will vary depending on your part geometry and the number of parts in the chamber.



**WARNING:** Never open the chamber door when the Finisher is hot. Wait until it cools to room temperature as shown on the TEMP CONTROL PV display. Opening the door when the Finisher is hot can damage the Finisher, cause severe burns, and start a fire.

1. Turn the HEATER switch (on the Finisher control panel) OFF.
2. Leave the POWER switch on and the chamber door closed until the Finisher chamber cools to room temperature.
3. When the TEMP CONTROL PV display shows room temperature, you can optionally turn off the POWER switch.



**CAUTION:** Do not turn off the POWER switch if the chamber temperature is above 100°C (212°F). Leaving POWER on enables you to view the actual chamber temperature on the TEMP CONTROL, and it keeps the fan running which prolongs the life of the Finisher components.

## 0.6.1 Theory of Operation

The finisher makes removing bulk support material from VisiJet parts efficient and easy. Forced airflow and precision temperature control deliver faster, shorter, and more predictable VisiJet part finishing times.

### Temperature stability

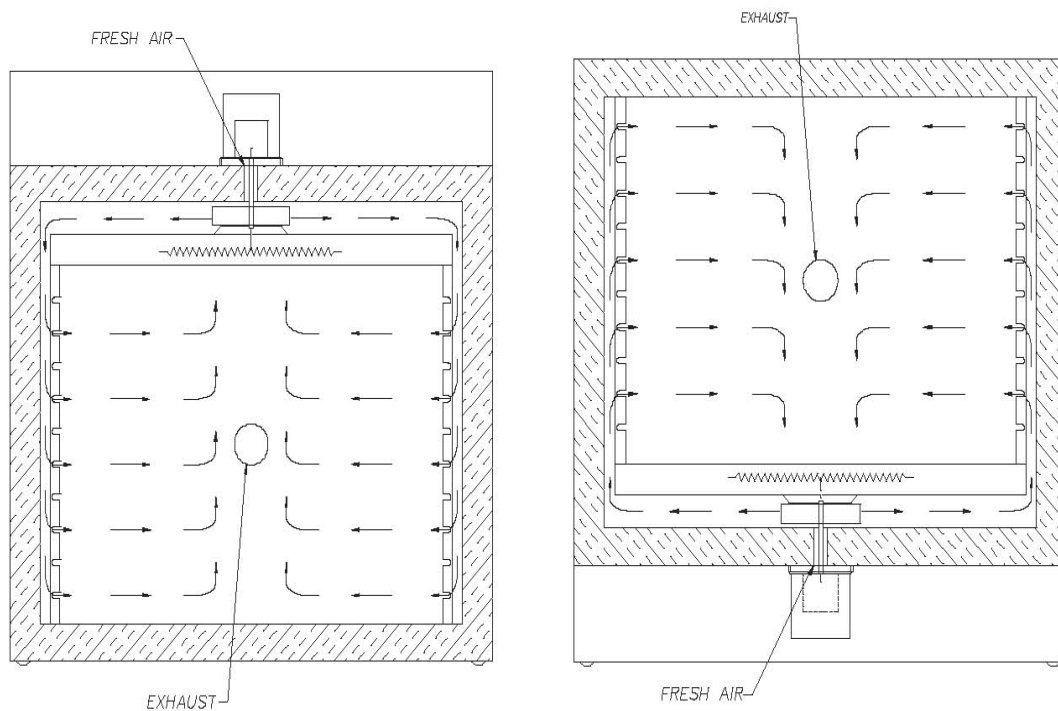
The Finisher design moves convected heat through stainless steel ducts on each side of the oven chamber. A high-volume fan circulates air. The temperature in the chamber is always within  $\pm 1^{\circ}\text{C}$  ( $\pm 2^{\circ}\text{F}$ ) of the control setpoint shown on the TEMP CONTROL display.

### Adjustable warmup/cooldown

A damper on the back of the Finisher lets you adjust the exhaust rate so you can change warmup and cooldown times to suit your part geometry. Open the damper to increase warmup time and decrease cooldown time, or, close it to do the opposite. (The fresh air intake is not adjustable.)

The finisher moves convected heat through stainless steel ducts on each side. The air is circulated with a high volume fan. The chamber can be densely loaded without interfering with the process. For your convenience the fresh air intake is fixed. The exhaust rate is regulated by a damper on the back of the unit.

- [HI-LIMIT Instrument](#)
- [Oven Theory](#)
- [TEMP CONTROL Instrument](#)



## Oven Theory

The oven has an efficient forced circulating oven to 204°C (400°F). A forced circulating oven relies on a circulating motor to move air through the chamber, which is much more efficient and uniform than a gravity convected oven. In addition, it takes a finite amount of time for the oven to soak in at the desired setpoint. The time that it takes the unit to soak in at setpoint is related to such parameters as chamber area, load mass and the ability to absorb heat and exhaust rate. The oven uses an indicating microprocessor based digital control that displays the actual chamber temperature at the sensing point. The CONTROL's temperature sensor optimizes the control action for the entire chamber for various load conditions. The CONTROL display may fluctuate a few degrees around the setpoint, but the overall chamber temperature will remain very stable. The underlying reason for this is that the display is showing temperature fluctuations at the temperature sensor location, not the overall chamber temperature. The strategic location of the sensor compensates for delays in heat convection and enhances the performance and temperature control of the oven.



## HI-LIMIT Instrument

The finisher is equipped with a HI-LIMIT instrument. The purpose of the HI-LIMIT instrument is to provide a protective measure for the product and/or the finisher itself. If the setting on the HI-LIMIT is exceeded, the heating process will discontinue, thus protecting the finisher.

The Finisher's HI LIMIT control switches the heater off automatically if the chamber exceeds the HI LIMIT setpoint. You can view and change the HI LIMIT setpoint on the HI LIMIT control panel when the HSP1 LED is lit.

The HI LIMIT setpoint should be 10°C to 14°C (18°F to 25°F) higher than the TEMP CONTROL setpoint (SP). Since the recommended TEMP CONTROL setpoint for VisiJet parts is between 70°C and 75°C (158°F and 167°F), the HI LIMIT setpoint you enter should be between 80°C and 89°C (176°F and 192°F).

If the Finisher overheats and the HI LIMIT control switches the heater off, let the chamber cool down at least 2 degrees below the HI LIMIT setpoint, then press **RESET** on the HI LIMIT panel. When the OUT LED on the TEMP CONTROL panel lights, the heater will switch on again automatically. HI LIMIT panel with heater **RESET** button on the Finisher control panel.



**CAUTION:** If the heater frequently shuts down, make sure your HI LIMIT setpoint is at least 10°F (18°F) above the TEMP CONTROL setpoint. If it is, and the problem persists, increase the HI LIMIT setpoint in 1-degree increments until the heater stops shutting down. Do not set the HI LIMIT setpoint above 204°C (399°F). If you do, you will damage the Finisher.



| Features   | Description                                       |
|------------|---|
| OP1        | Output 1 status value                             |
| C°F        | Degree indicator                                  |
| PV         | Process value                                     |
| HSP1       | High limit setpoint 1                             |
| SP2        | Setpoint 2 for output 2                           |
| LOCK       | Lock status indicator                             |
|            | Scroll Key, used for advancing available displays |
| Up Key ▲   | Increases a setpoint or mode parameter            |
| Down Key ▼ | Decreases a setpoint or mode parameter            |
| RESET      | Reset the high limit, return to normal display    |

## TEMP CONTROL Instrument


The finisher is equipped with a microprocessor based digital control instrument. The Despatch CONTROL instrument has been configured as a proportional controller and set to its optimum operating values. Initially the CONTROL will allow the heater to operate at full power. However, as the actual oven temperature reaches the setpoint, the Proportional Control will cycle the heater on and off, minimizing process temperature fluctuations.

The job of the Finisher's TEMP CONTROL is mainly to:

- Run the heater at full power during warmup.
- Cycle the heater on and off as the temperature nears the control setpoint to minimize thermal fluctuation.
- View the actual temperature inside the chamber. The actual temperature is displayed when all LEDs on the TEMP CONTROL panel are off.
- View and change the Finisher's TEMP CONTROL setpoint. The setpoint is displayed when the SP LED on the TEMP CONTROL panel is on.
- Monitor when the TEMP CONTROL is switching the heater on or off.

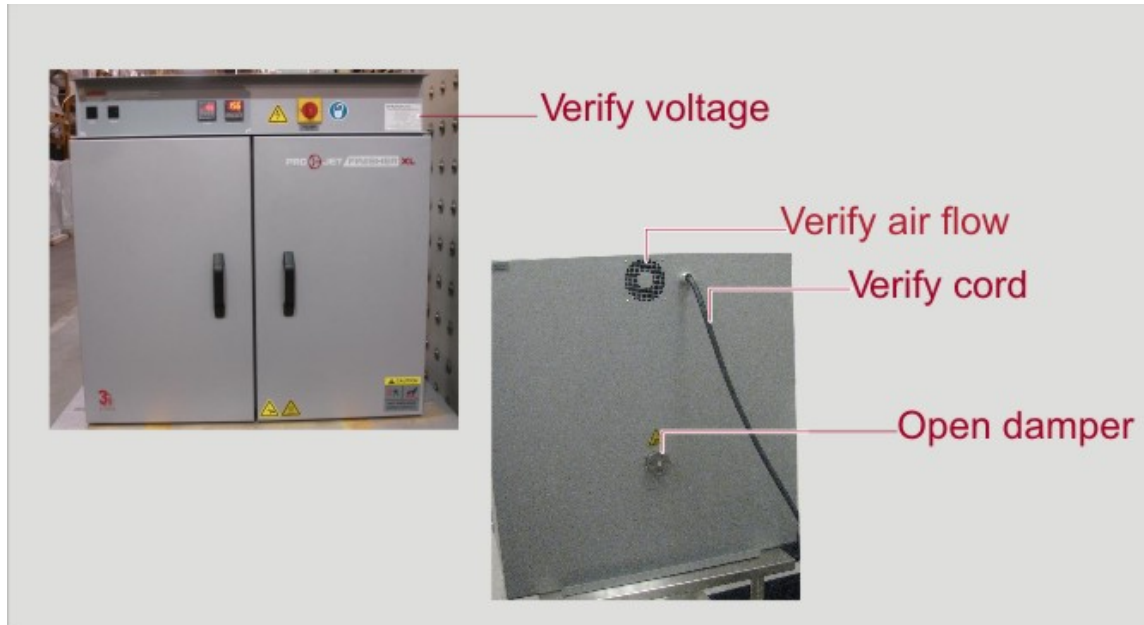
**NOTE: 3D Systems recommends a TEMP CONTROL setpoint between 70°C and 75°C (158°F and 167°F). To ensure good support material liquid flow, this setpoint is above the VisiJet® support material melting point of 55°C to 65°C (131°F to 149°F). However, it is not hot enough to deform the part or cause it to shrink excessively when it cools.**



| Features  | Description   |
|---|---|
| Main (PV) Display   | Displays the actual oven temperature or displays the setpoint when the set key is pressed. Displays parameter code and value. |
|  Key | Switches between PV and SP displays. Enters the data changed by the keys. Switches through parameter displays.                |
| ▼ Down Key  | Decreases a setpoint or mode parameter.   |
| ▲ Up Key  | Increases a setpoint or mode parameter.   |
| LED SP Indicator  | Lights when the setpoint value is displayed.  |
| LED OUT Indicator   | Lights when the control is calling for heat.  |
| LED AL1 --2 Indicator   | N/A   |

## 0.6.2 Before Starting

- Read and follow all guidelines in the Safety section.
- Open exhaust damper for proper operation at VisiJet part finishing setpoint temperature, 70°C to 75°C (158°F to 167°F).
- Verify that exhaust, fan, and vent openings are not obstructed.
- Verify power cord is not damaged.



## Pre-Startup Checklist

Know the system. Read instructions in this guide to gain a full understanding of safe, continuous, satisfactory, trouble-free operation.

- Check line voltage. Voltage must correspond to nameplate requirements of motors and controls. Refer to the section on power requirements in [0.3.1 ProJet™ XL Finisher Physical Specification](#) of this guide.
- Fresh air, exhaust, and electrical cabinet openings. Do not be careless about restrictions in and around the fresh air and exhaust openings. Under no condition permit them to become so filled with dirt that they appreciably reduce the air quantity. Refer to the [Set-up instructions](#) in this guide.
- Ventilation. There is an exhaust opening in the rear of the unit. The exhaust vent may have to be closed to reach the maximum temperature of 204°C, especially if operating on 208 volts. They may need to be opened to operate properly at the lower range of the oven's design.

### Helpful hints

- For drying ovens, open vent to prevent buildup of moisture.
- or sample heating, close the vent when no ventilation is required.

## 0.6.3 Loading Parts in the Finisher



**WARNING:** Never operate oven at a temperature in excess of the maximum operating temperature of 204°C (400°F).

The two shelves are designed to be pulled out about half way without tipping. The support capacity of the shelves is listed in the Capacity Table located in the [Facility Requirements](#) section.

- When loading the Finisher, avoid dripping or spilling material on chamber floor. Place absorbent cloths on the shelf first, and/or wrap the parts in absorbent cloth.

**NOTE:** If material spills on the chamber floor, thoroughly remove the spillage before starting a finisher cycle. Material left on the chamber floor can leak out the bottom door seal when it is hot liquid. It can also puddle under the tray then solidify, making the tray difficult to remove.

- Place the shelf on top of the finisher tray and then arrange unfinished VisiJet parts on the shelf. Position parts on the shelf away from the tray edges to prevent material from dripping on the chamber floor during the finisher cycle.

**NOTE:** Verify that no portion of any part overhangs any tray edge before starting the Finisher cycle. Otherwise, support material can drip on the chamber floor.

- Do not over fill the shelves.
- Distribute the parts evenly so that airflow is not restricted. The parts should not take up more than two-thirds of any dimension of the inside cavity.
- Verify that parts do not overhang any tray edges before you start the finishing cycle.



## 0.6.4 Finisher Start Up

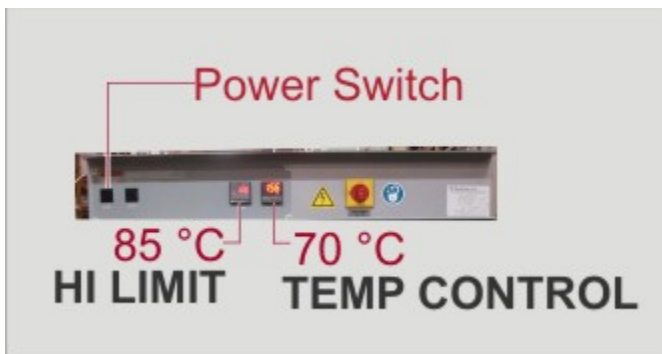


**WARNING:** Do not use flammable solvent or flammable material in this oven. Do not process closed containers of any substance or liquid in finisher. Doing so, may explode when heated.

**NOTE:** For faster warm-up time, close the exhaust vent. After the desired temperature is reached, the vent may be adjusted as needed.

**NOTE:** Check the level of support material in the tray. If it is 2.5 cm (1 in) or less from the top, empty tray.

1. Switch POWER switch to on. The circulating fan will start.
  - a. Set exhaust vent to desired opening. The vent may have to be adjusted to achieve maximum performance at various operating temperatures.
2. Verify TEMP CONTROL setpoint between 70°C and 75°C (158°F and 167°F) on the TEMP CONTROL panel.
  - a. Verify HI LIMIT setpoint between 80°C and 89°C (176°F and 192°F) on the HI LIMIT control panel.
  - b. Verify that exhaust damper on the rear of the Finisher is fully open.








**NOTE:** The HI LIMIT setpoint should be 10°C to 14°C (18°F to 25°F) higher than the TEMP CONTROL setpoint entered on the TEMP CONTROL panel. Since the recommended TEMP CONTROL setpoint for VisiJet parts is between 70°C and 75°C (158°F and 167°F), the HI LIMIT setpoint should be between 80°C and 89°C (176°F and 192°F).

If the heater shuts down, wait for the oven chamber temperature to drop two(2)degrees below the HI LIMIT setpoint, then reset the heater by pushing **RESET** on the HI LIMIT control panel.\*

- If the **LOCK** LED on the HI LIMIT control panel is lit, press and hold the **RESET** button for (four) 4 seconds to enable the up and down keys.
- Press the scroll key. **HSP1** (HI LIMIT setpoint) will be lit.
- Use the up and down keys to change the HI LIMIT setpoint.
- Press **RESET** or arrow key once to save the setpoint, then redisplay the actual chamber temperature (**PV**).

Enter setpoint on the CONTROL instrument.

- Press  key until the **SP** LED is lit.
- Use  and  to set operating temperature.
- Press  key to enter setpoint.
- Press  key again to display process temperature.

Turn HEATER switch to the on position. When process value on the CONTROL reaches setpoint, the OUT LED will cycle on and off to maintain the temperature setpoint. The OUT LED will be lit when the control is calling for heat.

Turn the HEATER switch off after heating cycle is complete. Do not turn the fan off until the oven chamber temperature is below 100°C (212°F).

## 0.7 Maintenance

This section describes how to maintain your ProJet Finisher XL to help ensure longer life and trouble-free operation.

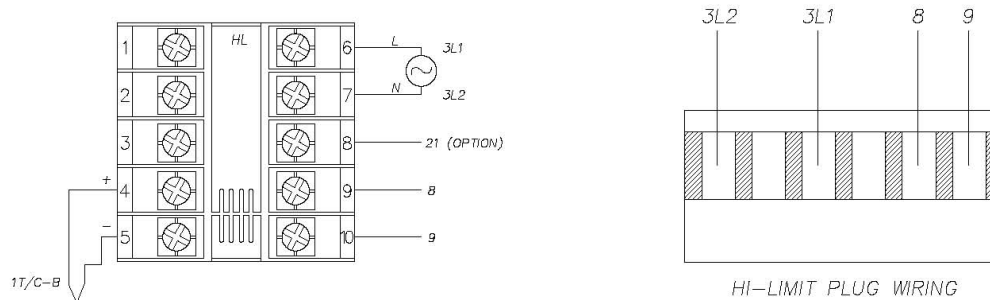
- 0.7.1 Checklist
- 0.7.2 Testing
- 0.7.3 How to Replace the TEMP Control
- 0.7.4 How to Replace the HILIMIT Control
- 0.7.5 How to Replace the Heater
- 0.7.6 How to Replace the Fan Motor
- 0.7.7 Replacement Parts

## 07.4 How to Replace the HILIMIT Control

### Required Tools:

¼-inch socket set; screwdriver

1. Switch circuit breaker off that powers the Finisher before performing attempting any repair or adjustment, or before attempting to remove any Finisher parts.
2. Remove screws from the face of the Finisher control panel and slide it forward.
3. Disconnect HI LIMIT PLUG from circuit board.
4. Disconnect the thermocouple wires.
5. Press and hold down the tabs holding the HI LIMIT control to the Finisher control panel and slide it out.
6. Install new HI LIMIT control into the Finisher control panel.
7. Replace mounting screws.
8. Connect HI LIMIT control plug to the circuit board. Make sure that the wires are connected correctly.
9. Reattach thermocouple wires.
10. Replace control panel.
11. Switch circuit breaker on to run power to the finisher.



Connections to HI-LIMIT Instrument



## 07.5 How to Replace the Heater

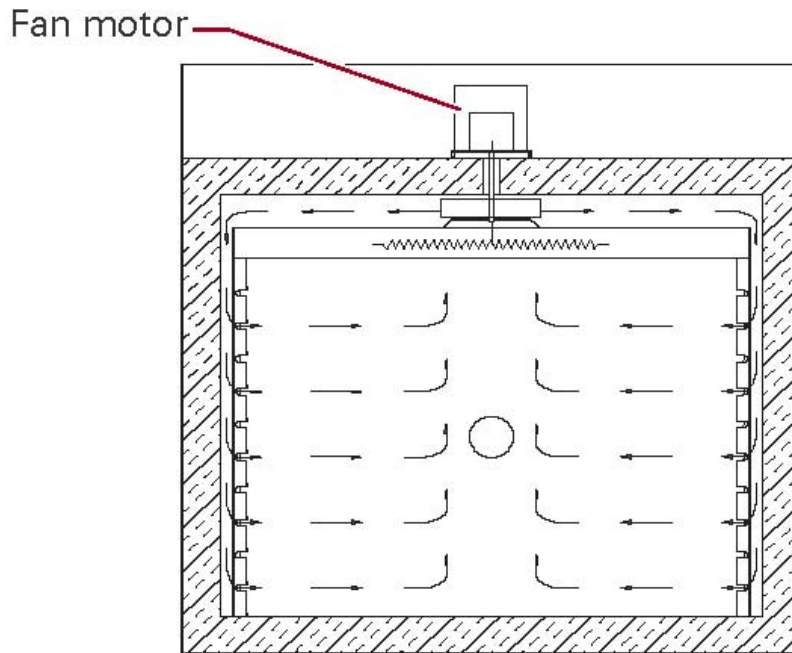
### Required Tools:

- 3/8" wrench
  - Philips screwdriver
  - ¼-inch socket set
1. Switch circuit breaker off that powers the Finisher before performing attempting any repair or adjustment, or before attempting to remove any Finisher parts.
  2. Remove shelves.
  3. Remove side ducts (left and right).
    - a. Remove screws from each duct.
    - b. Remove duct from oven.
  4. Remove heater cover.
    - a. Remove screws from the heater cover.
    - b. Remove heater cover from the oven.
  5. Disconnect heater leads from heater element with wrench. Note which wires go on which terminals.
  6. Remove screws holding the heater frame to the oven body.
  7. Remove heater and discard.
  8. Install new heater frame to oven body.
  9. Attach heater leads to appropriate terminals.
  10. Replace heater cover.
  11. Replace side ducts.
  12. Replace shelves.
  13. Switch circuit breaker on to run power to the finisher.

## 07.6 How to Replace the Fan Motor

### Required Tools:

- 5/32-inch Allen wrench
  - ¼-inch socket set
1. Switch circuit breaker off that powers the Finisher before performing attempting any repair or adjustment, or before attempting to remove any Finisher parts.
  2. Remove shelves.
  3. Remove side ducts (left and right).
    - a. Remove screws from each duct.
    - b. Remove duct from oven.
  4. Remove heater cover.
    - a. Remove screws from the heater cover.
    - b. Remove heater cover from the oven.
  5. Loosen setscrews (2) on fan wheel in middle of oven top. Access the fan wheel through the heater opening or by disconnecting and removing the heater assembly to gain access to the fan.
  6. Remove top cover. This will reveal the fan motor.
  7. Remove fan motor.
    - a. Disconnect motor leads from the circuit board.
    - b. Unscrew screws (4) holding motor mounts to body.
    - c. Lift the fan motor from the oven body.
  8. After running at temperature, the fan wheel will stick to the shaft. Some force may be required to separate the fan wheel from the fan motor shaft.
  9. Take motor mount off old motor.
  10. Put motor mount onto new motor.
  11. Replace fan motor.
    - a. Reattach motor to oven body.
    - b. Reattach motor lead plug to circuit board.
  12. Replace top cover.
  13. Put fan wheel onto shaft from inside of oven.
  14. Switch circuit breaker on to run power to the finisher.



## 07.7 Replacement Parts

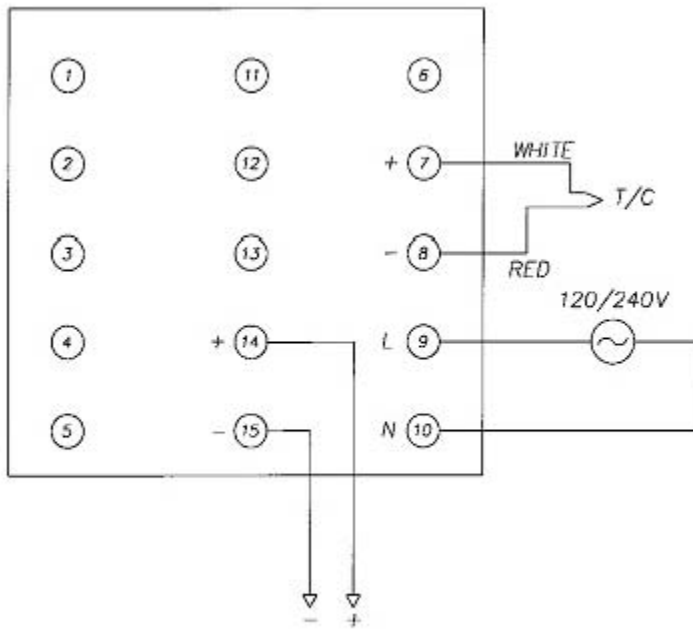
To order or return parts, contact [3D Systems Customer Support](#). When returning parts, our customer service representative will provide you with an RMA (Return Material Authorization) number. The RMA number must be attached to the returned part for identification. When you are ordering parts, be sure to give the model number, serial number and the part number. This will expedite the process of obtaining a replacement part.

## 07.3 How to Replace the TEMP Control

### Required Tools:

¼-inch socket set screwdriver with Torx drive

1. Switch off circuit breaker that powers the Finisher before attempting any repair or adjustment, or before attempting to remove any Finisher parts.
2. Remove screws from the face of the Finisher control panel and slide it forward.
3. Remove wires from the old TEMP CONTROL, noting which wires connect to which terminals.
4. Disconnect the TEMP CONTROL mounting bracket.
5. Remove old TEMP CONTROL from Finisher control panel.
6. Install new TEMP CONTROL into the Finisher control panel.
7. Secure TEMP CONTROL with mounting bracket.
8. Reattach wires to the new TEMP CONTROL. Make sure that the wires are connected correctly.
9. Replace Finisher control panel.
10. Switch circuit breaker on that powers the finisher.



Connections to the TEMP CONTROL

## 0.7.1 Checklist

**Keep equipment clean.** Gradual dirt accumulation retards airflow. A dirty Finisher can result in unsatisfactory operation such as unbalanced temperature in the work chamber, reduced heating capacity, reduced production, overheated components, etc. Keep the walls, floor and ceiling of the oven chamber free of dirt and dust. Floating dust or accumulated dirt may produce unsatisfactory work results. Keep all equipment accessible. Do not permit other materials to be stored or piled against it.

**Prevent overflows and spills in the oven chamber.** Check the support material liquid level in the tray before and after every finishing cycle. Empty the tray if the liquid level is 2.5 cm (1 in) or less from the top.

**Protect controls against excessive heat.** This is particularly true of controls, motors or other equipment containing electronic components. Avoid ambient temperatures above 51.5°C (125°F).

**Establish maintenance and checkup schedules.** Do this promptly and follow the schedules faithfully. Careful operation and maintenance will be more than paid for in continuous, safe and economical operation.

**Maintain equipment in good repair.** Make repairs immediately. Delays may be costly in added expense for labor and materials and in prolonged shut down.

**Practice safety.** Always know what you are doing before you do it. Make CAUTION, PATIENCE, and GOOD JUDGMENT the safety watchwords for the operation of your Finisher.

**Lubrication.** All door latches, hinges, door operating mechanisms, bearing or wear surfaces should be lubricated to ensure easy operation.

## 07.2 Testing



**Warning: Failure to heed warnings in this manual and on the Finisher could result in death, personal injury or property damage.**



**Warning: Switch off power circuit breaker to the Finisher before performing attempting any repair or adjustment.**

Testing should be performed carefully and regularly. The safety of personnel as well as the condition of equipment may depend upon the proper operation of any one of the functions of these controls. Test the TEMP CONTROL every 40 hours. Check that the TEMP CONTROL OUT LED is cycling on and off. Also, verify that the heater is working.

Test the HI LIMIT control every 40 hours as follows: With the Finisher operating at a given temperature, set the HILIMIT setpoint down to the control setpoint. The HI LIMIT control has tripped when OP1 is lit. Push RESET after adjusting the HI LIMIT setpoint back to a higher setting, or letting the oven chamber temperature drop 2 (two) degrees below the HI LIMIT setpoint.

**NOTE: Two (2) degrees is the factory setting for the HILIMIT control's hysteresis parameter. It can be changed. See the description for the Output 1 Hysteresis Value parameter, o1.Hy, in "HI LIMIT Control Parameters."**

## 0.8 Troubleshooting

Equipment which operates for long periods of time, may develop problems. Below are possible problems and suggested solutions. If you have a problem not listed and do not know what to do, contact [3D Systems Technical Support](#).

| Problem  | Cause  | Solution  |
|--|--|---|
| <b>Failure to heat or only heats up to 30 - 50 degrees C</b> | No power<br>Burned out heater(s)<br>CONTROL instrument malfunction<br>Loose wire connections                                       | Check power source and/or oven and wall fuses.<br>Replace element<br>Check control parameters Replace controller if OUT LED on controller does not turn on.<br>Disconnect power and check connections behind control panel.           |
| <b>Slow heat up</b>  | Improperly loaded workload<br>Low line voltage<br>1 or 2 heating elements burned out<br>Fan motor failure<br>Vent is wide open     | Reduce load or redistribute load in chamber.<br>Supply sufficient power and proper connections. Check for circuit overload.<br>Check heater amperage on the nameplate. Replace burned out element<br>Replace fan motor<br>Close vent. |
| <b>Frequent heater element burnout</b>                       | Harmful fumes generated by load<br>Spillage or splattering of material on heater elements<br>Overheating oven<br>Fan motor failure | Increase vent opening or discontinue process.<br>Disconnect power and clean oven chamber and elements.<br>Check the CONTROL and HI-LIMIT instruments.<br>Replace fan motor.   |
| <b>Erratic temperature</b>                                   | CONTROL instrument malfunction   | Check control parameters before replacing the CONTROL instrument.   |
| <b>Inaccurate temperature</b>                                | CONTROL instrument miscalibration  | Check control parameters. Recalibrate CONTROL instrument.   |
| <b>Excess surface or door temperature</b>                    | Door seal deterioration<br>Door closed into top or bottom latch only   | Replace door seal.<br>See specific difficulty below for this problem.   |
| <b>Improper airflow</b>                                      | Fan motor failure<br>Unbalanced fan wheel  | Replace fan motor.<br>Reposition fan wheel within 3/10" from top of housing. Replace fan wheel.   |
| <b>Excessive vibration</b>                                   | Unbalanced fan wheel   | Replace fan wheel.  |
| <b>Grinding noise</b>  | Fan wheel has shifted or fallen.<br>Debris has fallen into fan through shaft collar.   | Inspect the wheel. Reposition fan wheel within 0.25" from top of housing.<br>Inspect the wheel for damage. Remove debris.   |
| <b>Oven will not control at Setpoint</b>                     | HI-LIMIT instrument set too low<br>CONTROL instrument malfunction<br>Air friction of recirculation fan                             | Set the HI-LIMIT higher.<br>Check control parameters before replacing CONTROL instrument.<br>Open exhaust air vent. Unit will not control at minimum operating temperature with vent(s) closed.                                       |

|   |   |   |
|---|---|---|
| <p><b>Heater does not shutdown until temp. reaches the HI-LIMIT setting</b></p> | <p>CONTROL instrument malfunction<br/>SSR Relay malfunction</p> | <p>Verify control parameters. Replace relay if no output exists. Replace CONTROL instrument if 5VDC output exists.<br/>Replace relay if no CONTROL output exists.</p>   |
| <p>*Door closes into top or bottom latch only.</p>                              | <p>Uneven latch tension adjustment</p>                          | <p>Ensure that latch strike is contacting center of latch. Adjust mounting angle as required. Adjust door for even top and bottom latch tension by turning screws on ends of latch. Clockwise increases tension on latch. Counterclockwise decreases tension.</p> |
| <p><b>Door will not stay closed</b></p>   | <p>Inadequate latch tension</p>                                 | <p>Ensure that latch strike is contacting center of latch. Adjust mounting angle to center as required. Increase latch tension by turning screws on end of latch clockwise. Adjust in even increments on all four screws to keep door pull even.</p>              |



## 0.9 Spare Part List

| Part # | Qty. | Description                                |
|--------|------|--|
| 144755 | 1    | Thermocouple                               |
| 140097 | 2    | Switch For Power And Heater                |
| 142861 | 1    | Cord For Muffin Fan                        |
| 057345 | 1    | Relay Heater SSR                           |
| 165051 | 1    | Hi-Limit                                   |
| 144749 | 1    | Control - Des2000                          |
| 007819 | 1    | Heater 2.4kw 120/240v                      |
| 145725 | 1    | Door Seal                                  |
| 008057 | 2    | Center Door Seal                           |
| 148048 | 1    | Door Pull                                  |
| 008199 | 2    | Latch Ay                                   |
| 146010 | 1    | LBB Exhaust Damper Assembly                |
| 146024 | 2    | Standard Shelf                             |
| 094717 | 2    | Reinforced Shelf                           |
| 007281 | 1    | Fan Wheel                                  |
| 008333 | 1    | Motor 00.04hp 110/220v                     |
| 006049 | 1    | Control Compartment Muffin Fan (120V Only) |
| 015229 | 1    | Control Compartment Muffin Fan (240V Only) |
| 150131 | 1    | Circuit Board (120V Only)                  |
| 150132 | 1    | Circuit Board 240V Only                    |
| 123306 | 1    | Fuse Atdr-04.00a Motor (120V Only)         |
| 134923 | 1    | Fuse Atdr-25.00a Heater (120V Only)        |
| 117172 | 2    | Fuse Atdr-03.00a Motor (240V Only)         |
| 125562 | 2    | Fuse Atdr-12.00a Heater (240V Only)        |