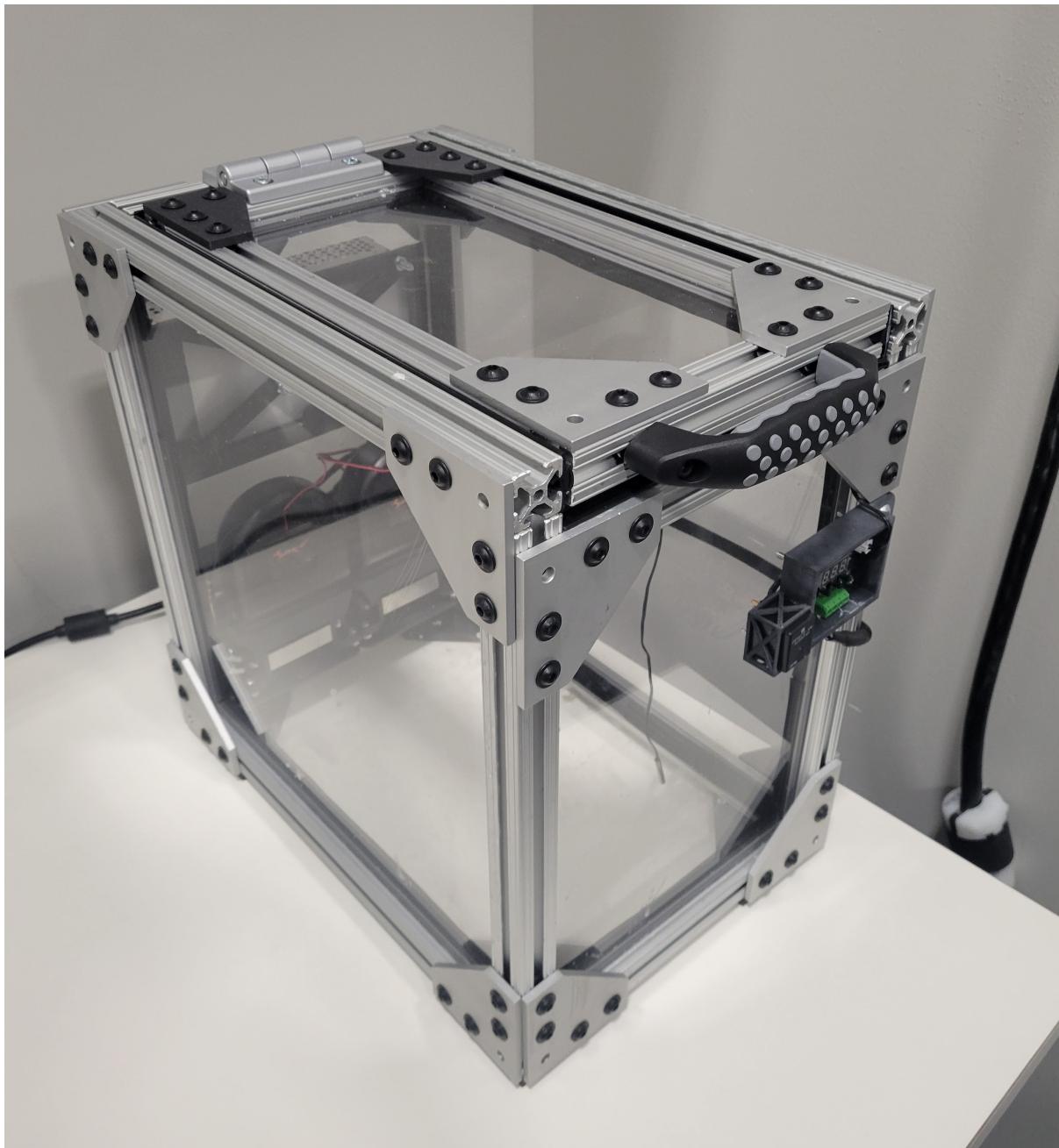


Filament Dryer User Manual



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1 Safety Precautions

- **Do not exceed recommended temperatures** for the filament you are drying (see Section 3 for details).
- **Only dry one type of material at a time**
- Always ensure the lid is securely closed before operating the dryer.
- Keep the dryer away from flammable materials.
- Ensure proper ventilation for the power supply.
- Avoid touching internal components while the dryer is in operation or immediately after use to prevent burns.
- This dryer is not a suitable long term storage container for 3D printer filaments.

2 Features and Design

2.1 Physical Design

- **Box Design:** Made from t-slotted aluminum for the frame and acrylic sheets for the sides.
 - Inner Dimensions: 9" x 14" x 14"
- **Hinged Lid:** The lid is gasket-sealed for an airtight fit, improving drying efficiency.
 - Note there are holes in the lid, this provides a way for moisture to escape the enclosure.
- **Neoprene Foam:** Lines the exposed t-slotted aluminum inside the box to enhance insulation and efficiency.

2.2 Heating System

- Two 12V heaters provide a combined heating capacity of up to 160W.
- Two 12V Fox-2 cooling fans ensure consistent airflow and even temperature distribution.

2.3 Power Supply

- An external 12V power supply delivers up to 180W to the system.

2.4 Temperature Control

- Controlled via an XH-W1219 thermostat module.
- Adjustable temperature settings with built-in hysteresis and safety alarms.

3 Recommended Drying Temperatures

Filament Type	Temperature Range (°C)	Drying Time
PLA	40–50	> 4h
PETG	60–65	> 2h
ABS	65–75	> 2h
Nylon	75–90	> 24h
Polycarbonate (PC)	80–90	> 6h
ASA	80–85	> 4h
TPU	40–50	> 4h

- Note: Drying times may vary depending on how long the material has been left in open air.
- It is recommended to do a test print after drying to ensure print quality.

4 Operating Instructions

4.1 Setup

1. Place the filament spool inside the box.
2. Close the lid and ensure the gaskets form a tight seal.

4.2 Powering On

1. Ensure the power supply is connected to the thermostat module.
2. Plug the power supply into an outlet. The thermostat and cooling fans will activate automatically.

4.3 Setting Temperature

1. Use the thermostat to set the desired drying temperature:
 - Press **SET** to enter temperature setting mode.
 - Use the + or - buttons to adjust the temperature.
 - Press **SET** again to save the setting.
 - See thermostat layout below

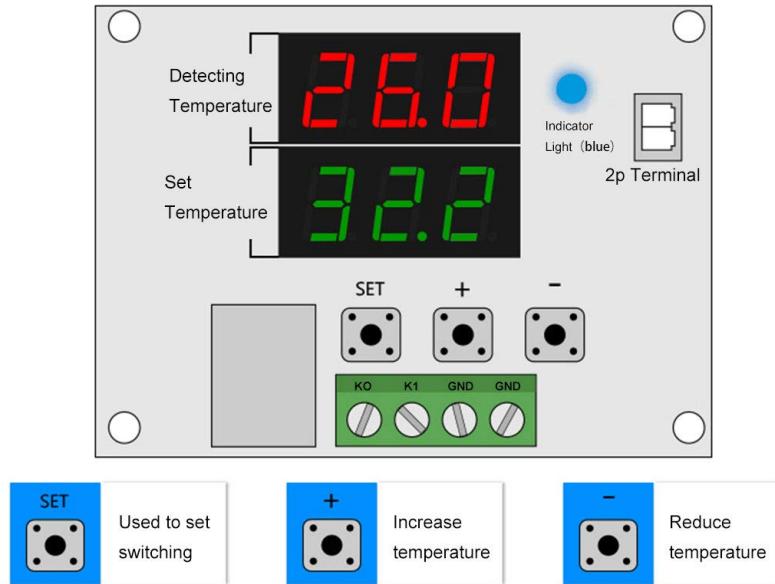


Figure 1: Layout of Thermostat

4.4 Monitoring Operation

- The thermostat displays the current temperature (top display) and the target temperature (bottom display).
 - See above figure for thermostat layout above
- The relay activates the heaters when the temperature falls below the set point and deactivates them when the set point is reached.

4.5 Turning Off

1. Turn off the system by unplugging the power supply from its power outlet.
2. Do not touch the heating system until you are sure it has cooled off.

5 Maintenance

5.1 Cleaning

- Wipe down the acrylic sides and aluminum frame with a damp cloth as needed.
- Do not use abrasive cleaners or solvents.

5.2 Replacing Components

1. Relay Replacement:

- Desolder the damaged relay's jumper wires and power terminals.
- Solder the new relay to the same connections.
 - see figure below for correct wiring to relay.

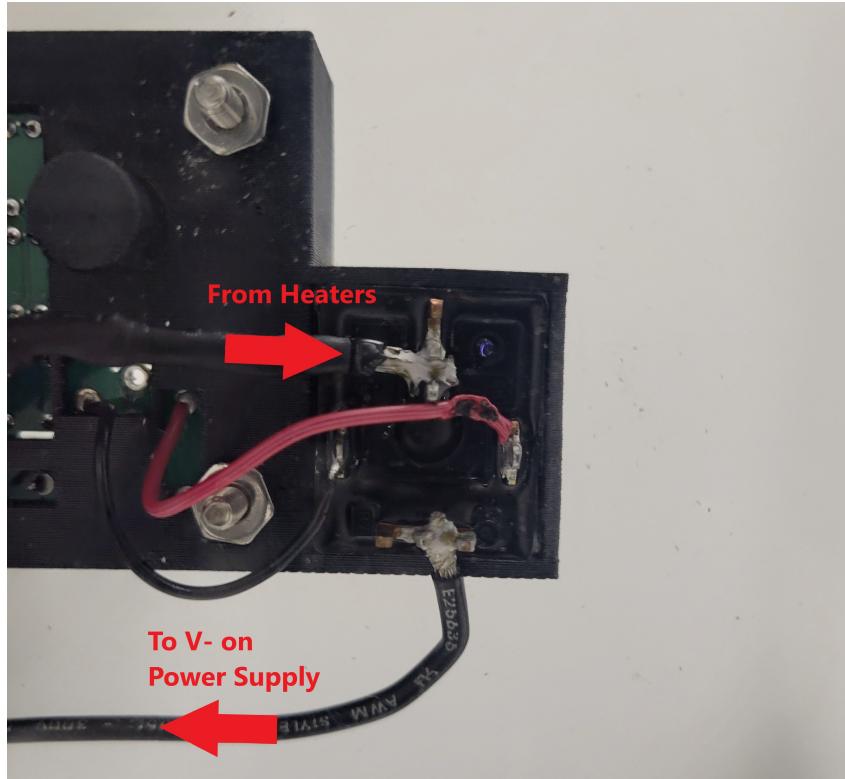


Figure 2: Back of Relay for Wiring purposes

2. Thermostat Replacement:

- Disconnect power leads from power connectors on the bottom of the board.
- Disconnect temperature probe from the connector on the board.
- Desolder jumper wires from relay to faulty thermostat.
- Desolder original relay from new thermostat and solder the relay jumper wires in its place.
 - See figure above for wire jumper wire placement on back of thermostat as seen through the thermostat housing.
- Connect temperature probe to the connector on the new board.
- Connect power leads to the power connectors on the bottom of the board.

3. Fan or Heater Replacement:

- Disconnect the faulty component.
- Install the replacement and reconnect wiring securely.

5.3 Sensor Calibration

- Use the thermostat's P4 parameter to correct temperature readings as needed.
 - Note: this document should be packaged with the data-sheet for the thermostat. If not you can find the data-sheet by searching "XH-W1219 Temperature Controller Module" on google.

6 Troubleshooting

Issue	Possible Cause	Solution
Fans not running	Power supply issue	Check connections and power output.
Temperature not increasing	Heater or relay malfunction	Inspect and replace components.
Incorrect temperature	Miscalibrated sensor	Adjust P4 parameter on the thermostat.

7 Bill of Materials

Component	Description	Link
12V Heaters (x2)	High-efficiency heaters	Amazon
12V Cooling Fans (x2)	Fox-2 Quiet chassis cooling fans	Amazon
Power Supply	12V, 180W power supply	Amazon
High-Power Relay	Panasonic CB1AH-P-12V	DigiKey
Thermostat	XH-W1219 temperature controller module	Amazon
Neoprene Insulation	Neoprene foam for insulation	Amazon

8 Technical Specifications

- **Temperature Range:** 30°C to 110°C
- **Power Supply:** 12V DC, 180W max
 - **Heater Power Consumption:** 157W
 - **Cooling Fan Power Consumption:** 11W
 - **Thermostat Power Consumption:** 1W
 - **Total Power Consumption:** 169W
- **Temperature Accuracy:** ±0.1°C
- **Relay Capacity:** 14VDC @ 40A

9 Parts List Illustrated

9.1 12V Heaters

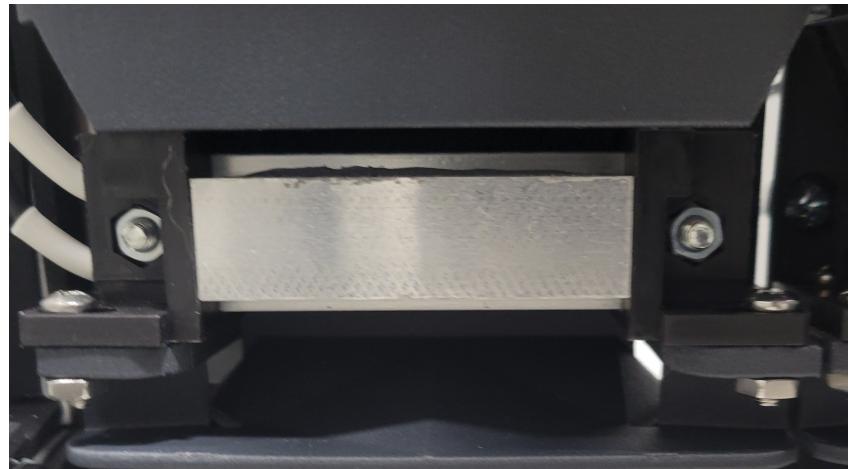


Figure 3: 12V, 75W Heater
<https://amazon.com/gp/product/B081NZ6KLW>

9.2 Cooling Fan



Figure 4: Fox 2 Quiet Chassis Cooling Fan
<https://www.amazon.com/CCBAA-Computer-Chassis-Exhaust-Cooling/dp/B09BM2MSDF>

9.3 Power Supply

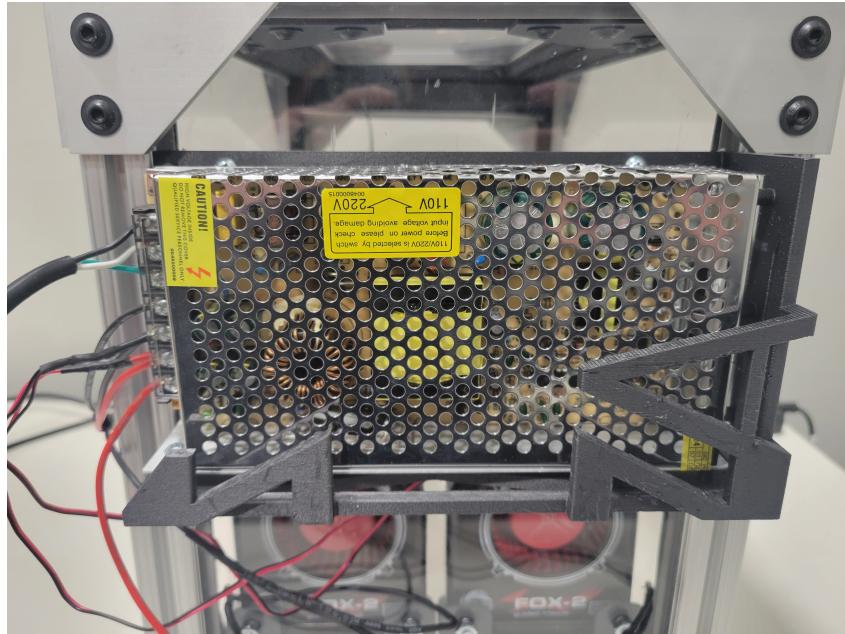


Figure 5: 12V DC, 180W Power Supply

<https://www.amazon.com/ALITOVE-Transformer-Switching-Converter-Security/dp/B078RZ6C3N?th=1>

9.4 High-Power Relay



Figure 6: Panasonic CB1AH-P-12V

<https://www.digikey.com/en/products/detail/panasonic-electric-works/CB1AH-P-12V/1473541>

9.5 Thermostat



Figure 7: XH-W1219 temperature controller module
<https://www.amazon.com/gp/product/B07WLTR1R4?th=1>

10 Resources

- Find additional files and 3D models at
https://github.com/BryceK111/MARS_Filament_Dryer