

D3D Pro 3D Printer Assembly Instructions

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1. Assemble Universal Frame Top

1.1. Tools

Name	Description	Notes
5mm Allen Wrench	5mm Allen Wrench	
Hobby Knife	Hobby Knife	

1.2. Materials

Quantity	ID	Name	Description	Notes
4 part(s)	rebar-stake	Rebar Stake	12.7mm x 450mm Rebar Stake v1.0.0	
12 part(s)	m6-20mm-screw	M6 x 20mm Screw	M6 x 20mm Socket Head Cap Screw v1.0.0	
12 part(s)	m6-thin-nut	M6 Thin Nut	M6 Thin Nut v1.0.0	
2 part(s)	corner-connector- left	Left Corner Connector	Universal Frame Corner Connector Left v1.0.0	
2 part(s)	corner-connector- right	Right Corner Connector	Universal Frame Corner Connector Right v1.0.0	

1.3. Procedure

1.3.1. Clean 3D Printed Parts

Required Tools

- Hobby Knife

Required Parts

- Left Corner Connector
- Right Corner Connector

Instructions

1. Use the **Hobby Knife** to clean any extra plastic off of the **Left Corner Connector** part(s) and

Right Corner Connector part(s).

1.3.2. Prepare Left Corner Connector part(s) and Right Corner Connector part(s) for Rebar Stake part(s)

Required Tools

- 5mm Allen Wrench

Required Parts

- Left Corner Connector
- Right Corner Connector
- M6 x 20mm Screw
- M6 Thin Nut

Instructions

1. Insert an **M6 Thin Nut** into the slot of the **Left Corner Connector** so that the hole of the **M6 Thin Nut** aligns with the hole in the **Left Corner Connector**.
2. While holding the **M6 Thin Nut** in place with a finger, insert an **M6 x 20mm Screw** into the hole of the **Left Corner Connector**.
3. Using the **5mm Allen Wrench**, screw in the **M6 x 20mm Screw** enough to hold the **M6 x 20mm Screw** and **M6 Thin Nut** in place. Leave room for the **Rebar Stake** to be inserted later.
4. Repeat the above steps for each of the three slots on the **Left Corner Connector**.
5. Repeat each of the above steps for the **Left Corner Connector** part(s), and **Right Corner Connector** part(s).

1.3.3. Assemble Universal Frame Top

Required Tools

- 5mm Allen Wrench

Required Parts

- Left Corner Connector
- Right Corner Connector
- Rebar Stake

Instructions

1. Insert one **Rebar Stake** into a slot on a **Left Corner Connector**.
2. Press the **Rebar Stake** down hard into the slot so that the part(s) are flush with the bottom of the slot. This step is important to ensure squareness in the frame.
3. Using the **5mm Allen Wrench**, screw down the **M6 x 20mm Screw** in against the **Rebar Stake**

until it is tight. If the plastic of the **Left Corner Connector** begins to strain or crack, unscrew the **M6 x 20mm Screw** slightly to reduce the pressure.

4. Insert the other end of the **Rebar Stake** into a **Right Corner Connector** and repeat the above steps to press and tighten down the **Right Corner Connector**.
5. Repeat the above steps so that there are two completed **Rebar Stake** part(s) with **Left Corner Connector** part(s) and **Right Corner Connector** part(s) on the ends.
6. Insert two **Rebar Stake** part(s) into the completed **Rebar Stake** part(s) from the previous step so that a square is formed.
7. Press the square together hard to seat the **Left Corner Connector** part(s) and **Right Corner Connector** part(s) onto the **Rebar Stake** part(s).
8. Tighten the four loose **M6 x 20mm Screw** part(s) down onto the **Rebar Stake** part(s) to complete the **Universal Frame Top Top**. As above, if the plastic of the **Left Corner Connector** part(s) or **Right Corner Connector** part(s) begins to strain or crack, unscrew the **M6 x 20mm Screw** slightly to reduce the pressure.

2. Assemble Universal Frame Base

2.1. Tools

Name	Description	Notes
5mm Allen Wrench	5mm Allen Wrench	
Hobby Knife	Hobby Knife	

2.2. Materials

Quantity	ID	Name	Description	Notes
4 part(s)	rebar-stake	Rebar Stake	12.7mm x 450mm Rebar Stake v1.0.0	
12 part(s)	m6-20mm-screw	M6 x 20mm Screw	M6 x 20mm Socket Head Cap Screw v1.0.0	
12 part(s)	m6-thin-nut	M6 Thin Nut	M6 Thin Nut v1.0.0	
4 part(s)	corner-connector	Corner Connector	Universal Frame Corner Connector v1.0.0	

2.3. Procedure

2.3.1. Clean 3D Printed Parts

Required Tools

- Hobby Knife

Required Parts

- Corner Connector

Instructions

1. Use the **Hobby Knife** to clean any extra plastic off of the **Corner Connector** part(s).

2.3.2. Prepare Corner Connector part(s) for Rebar Stake part(s)

Required Tools

- 5mm Allen Wrench

Required Parts

- Corner Connector
- M6 x 20mm Screw
- M6 Thin Nut

Instructions

1. Insert an **M6 Thin Nut** into the slot of the **Corner Connector** so that the hole of the **M6 Thin Nut** aligns with the hole in the **Corner Connector**.
2. While holding the **M6 Thin Nut** in place with a finger, insert an **M6 x 20mm Screw** into the hole of the **Corner Connector**.
3. Using the **5mm Allen Wrench**, screw in the **M6 x 20mm Screw** enough to hold the **M6 x 20mm Screw** and **M6 Thin Nut** in place. Leave room for the **Rebar Stake** to be inserted later.
4. Repeat the above steps for each of the three slots on the **Corner Connector**.
5. Repeat each of the above steps for the **Corner Connector** part(s).

2.3.3. Assemble Universal Frame Base

Required Tools

- 5mm Allen Wrench

Required Parts

- Corner Connector
- Rebar Stake

Instructions

1. Insert one **Rebar Stake** into a slot on the **Corner Connector**.
2. Press the **Rebar Stake** down hard into the slot so that the part(s) are flush with the bottom of

the slot. This step is important to ensure squareness in the frame.

3. Using the **5mm Allen Wrench**, screw down the **M6 x 20mm Screw** in against the **Rebar Stake** until it is tight. If the plastic of the **Corner Connector** begins to strain or crack, unscrew the **M6 x 20mm Screw** slightly to reduce the pressure.
4. Insert the other end of the **Rebar Stake** into another **Corner Connector** and repeat the above steps to press and tighten down the **Corner Connector**.
5. Repeat the above steps so that there are two completed **Rebar Stake** part(s) with **Corner Connector** part(s) on the ends.
6. Insert two **Rebar Stake** part(s) into the completed **Rebar Stake** part(s) from the previous step so that a square is formed.
7. Press the square together hard to seat the **Corner Connector** part(s) onto the **Rebar Stake** part(s).
8. Tighten the four loose **M6 x 20mm Screw** part(s) down onto the **Rebar Stake** part(s) to complete the **Universal Frame Base**. As above, if the plastic of the **Corner Connector** part(s) begins to strain or crack, unscrew the **M6 x 20mm Screw** slightly to reduce the pressure.

3. Assemble Universal Frame Module

3.1. Tools

Name	Description	Notes
5mm Allen Wrench	5mm Allen Wrench	

3.2. Materials

Quantity	ID	Name	Description	Notes
4 part(s)	rebar-stake	Rebar Stake	12.7mm x 450mm Rebar Stake v1.0.0	
1 module	universal-frame-base	Universal Frame Base	Universal Frame Base v1.0.0	
1 module	universal-frame-top	Universal Frame Top	Universal Frame Top v1.0.0	

3.3. Procedure

3.3.1. Assemble Universal Frame Module

Required Tools

- 5mm Allen Wrench

Required Parts

- Rebar Stake
- Universal Frame Top
- Universal Frame Base

Instructions

1. Orient the **Universal Frame Top** so that the open slots point upward.
2. Insert the four **Rebar Stake** part(s) into the slots of the **Universal Frame Top**.
3. Firmly press each **Rebar Stake** part(s) into the **Universal Frame Top** so that they are flush with the bottom of the slots in the **Universal Frame Top**.
4. Tighten down all of the remaining fasteners on the **Universal Frame Top** to secure the **Rebar Stake** part(s) in place. If the plastic of the **Universal Frame Top** begins to strain or crack, unscrew the fastener slightly to reduce the pressure.
5. Orient the **Universal Frame Base** so that the open slots point upward.
6. Insert the four **Rebar Stake** part(s) that are connected to the **Universal Frame Top** into the slots of the **Universal Frame Base**.
7. Firmly press the **Universal Frame Top** down onto the **Universal Frame Base** so that the **Rebar Stake** part(s) are properly seated.
8. Tighten down all of the remaining fasteners on the **Universal Frame Base** to secure the **Rebar Stake** part(s) in place. If the plastic of the **Universal Frame Base** begins to strain or crack, unscrew the fastener slightly to reduce the pressure.
9. The **Universal Frame Module** is complete.

4. Assemble Fast Heated Bed Top Plate

4.1. Tools

Name	Description	Notes
Plate Jig	Fast Heated Bed Plate Jig	
Permanent Marker	Permanent Marker	
Vise Grip Pliers	Vise Grip Pliers	
Welder	Welder	
Welding Brush	Wire Welding Brush	

4.2. Materials

Quantity	ID	Name	Description	Notes
1 part	steel-sheet	Steel Sheet	16 Gauge 300mm x 300mm Steel Sheet v1.0.0	

Quantity	ID	Name	Description	Notes
4 part(s)	m6-25mm-screw	M6 x 25mm Screw	M6 x 25mm Socket Head Cap Screw v1.0.0	

4.3. Precautions

- **Welder:** DO NOT ATTEMPT TO WELD WITHOUT PROPER PERSONAL PROTECTIVE EQUIPMENT AND PROPER TRAINING. If necessary, have this part fabricated by someone who can safely perform the work.
- **Welder:** Welding is an operation that can be harmful or FATAL if done improperly. Follow all instructions and precautions included with the welder and use common sense!

4.4. Procedure

4.4.1. Prepare the Steel Sheet for Welding

Required Tools

- Plate Jig
- Welding Brush
- Permanent Marker

Required Parts

- Steel Sheet

Instructions

1. Use the **Welding Brush** on the **Steel Sheet** to scrape off any surface impurities near the corners where the welds will occur.
2. Align the **Plate Jig** to one of the corners of the **Steel Sheet**.
3. In each of the holes on the **Plate Jig**, mark a circle the size of the hole using the **Permanent Marker**.

4.4.2. Weld the M6 x 25mm Screw part(s) to the Steel Sheet

Required Tools

- Welder
- Vise Grip Pliers

Required Parts

- Steel Sheet

- M6 x 25mm Screw

Instructions

1. Using **Vise Grip Pliers**, secure a **M6 x 25mm Screw** over one of the **Plate Jig** circles drawn previously.
2. While wearing proper safety equipment, spot weld the **M6 x 25mm Screw** to the **Steel Sheet** using the **Welder**.
3. Repeat the above steps for the remaining **Plate Jig** marks until there are a total of four **M6 x 25mm Screw** part(s) in the locations indicated by the **Plate Jig**.
4. Clean off the welding marks on both sides of the **Steel Sheet** using the **Welding Brush**.

5. Assemble Fast Heated Bed Halogen Lightbulb Assembly

5.1. Materials

Quantity	ID	Name	Description	Notes
3 part(s)	halogen-lightbulb	Halogen Lightbulb	R7S 118mm Halogen Lightbulb v1.0.0	
3 part(s)	halogen-lightbulb-holder	Halogen Lightbulb Holder	R7S 118mm Halogen Lightbulb Holder v1.0.0	

5.2. Procedure

5.2.1. Assemble Fast Heated Bed Halogen Lightbulb Assembly

Instructions

.

6. Assemble 0.5 Inch Trade Size 250mm Long Metal Conduit

6.1. Tools

Name	Description	Notes
Circular Saw	Circular Saw	

Name	Description	Notes
Cutoff Wheel	Metal Cutoff Wheel	Make sure that the cutoff wheel that you purchase is compatible with your cutting tool!
Vise	Metal Jaw Vise	
Measuring Tape	Measuring Tape	
Permanent Marker	Permanent Marker	

6.2. Materials

Quantity	ID	Name	Description	Notes
1 part	conduit-stock-length	Stock Length Metal Conduit	0.5 Inch Trade Size Stock Length Metal Conduit v1.0.0	

6.3. Precautions

- **Circular Saw:** Circular saws can cause permanent injury or death! Follow all manufacturer recommended safety precautions!

6.4. Procedure

6.4.1. Cut 0.5 Inch Trade Size 250mm Long Metal Conduit to Length

Required Tools

- Circular Saw
- Cutoff Wheel
- Vise
- Measuring Tape
- Permanent Marker

Required Parts

- Stock Length Metal Conduit

Instructions

1. While following the **Circular Saw** manufacturer's instructions, install the **Cutoff Wheel** into the **Circular Saw**.
2. Affix the **Stock Length Metal Conduit** into the **Vise**, leaving enough **Stock Length Metal Conduit** sticking out to make the cut.

3. Mark the 250mm length on the **Stock Length Metal Conduit** using the **Measuring Tape** and **Permanent Marker**. Make sure that there is enough space marked for the width of the cutting blade!
4. Using the **Circular Saw**, make the cut on the **Stock Length Metal Conduit** where previously marked.
5. Repeat the above steps for all of the needed lengths of **0.5 Inch Trade Size 250mm Long Metal Conduit**.

7. Assemble Fast Heated Bed Bottom Plate

7.1. Tools

Name	Description	Notes
Plate Jig	Fast Heated Bed Plate Jig	
Permanent Marker	Permanent Marker	
Drill Press	Drill Press	
7mm Drill Bit	7mm Sheet Metal Drill Bit	
Metal File	Metal File	

7.2. Materials

Quantity	ID	Name	Description	Notes
1 part	steel-sheet	Steel Sheet	16 Gauge 300mm x 300mm Steel Sheet v1.0.0	

7.3. Precautions

- **Drill Press:** Drill presses can cause permanent injury or possibly death! Do not wear loose fitting clothing, put your hair up, and wear proper PPE including (but not limited to) safety glasses when operating the machine.

7.4. Procedure

7.4.1. Drill the Fast Heated Bed Bottom Plate

Required Tools

- Plate Jig
- Permanent Marker
- Drill Press

- 7mm Drill Bit
- Metal File

Required Parts

- Steel Sheet

Instructions

1. Align the **Plate Jig** to one of the corners of the **Steel Sheet**.
2. In each of the holes on the **Plate Jig**, mark a circle the size of the hole using the **Permanent Marker**.
3. Insert the **7mm Drill Bit** into the chuck of the **Drill Press** and secure it tightly per the manufacturer's instructions.
4. Turn on the drill press and drill holes through each of the marks made on the **Steel Sheet** in the earlier steps.
5. Using the **Metal File**, file down any metal burrs created by the **Drill Press** on the **Steel Sheet**.

8. Assemble Fast Heated Bed Module

8.1. Materials

Quantity	ID	Name	Description	Notes
2 part(s)	8mm-rod	8mm Rod	8mm x 600mm Smooth Rod v1.0.0	
2 part(s)	autoparallel	Autoparallel	Autoparallel Part v1.0.0	
1 part	bottom-plate	Fast Heated Bed Bottom Plate	Fast Heated Bed Bottom Plate v1.0.0	
2 part(s)	clamp	Fast Heated Bed Clamp	Fast Heated Bed Clamp v1.0.0	
4 part(s)	conduit	Metal Conduit	0.5 Inch Trade Size 250mm Long Metal Conduit v1.0.0	
2 part(s)	corner-brace	Corner Brace	2 inch x 5/8 Inch Corner Brace (Four Holes) v1.0.0	
1 part	lightbulb-assembly	Halogen Lightbulb Assembly	Fast Heated Bed Halogen Lightbulb Assembly v1.0.0	

Quantity	ID	Name	Description	Notes
4 part(s)	m6-20mm-screw	M6 x 20mm Screw	M6 x 20mm Socket Head Cap Screw v1.0.0	
8 part(s)	m6-nut	M6 Nut	M6 Nut v1.0.0	
1 part	pei-sheet	PEI Sheet	300mm x 300mm PEI Sheet v1.0.0	
4 part(s)	sleeve	Carbon Fiber Blanket Sleeve	Carbon Fiber Blanket Sleeve v1.0.0	
1 part	thermistor	Thermistor	NTC 100K ohm B3950 Thermistor Cartridge v1.0.0	
1 part	top-plate	Fast Heated Bed Top Plate	Fast Heated Bed Top Plate v1.0.0	

8.2. Procedure

8.2.1. Assemble Fast Heated Bed Module

Instructions

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9. Assemble Universal Axis Motor Side Module

9.1. Procedure

9.1.1. Assemble Universal Axis Motor Side Module

Instructions

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10. Assemble Universal Axis Idler Side Module

10.1. Materials

Quantity	ID	Name	Description	Notes
1 part	universal-axis-idler-side	Universal Axis Idler Side	Universal Axis Idler Side Part v1.0.0	

10.2. Procedure

10.2.1. Assemble Universal Axis Idler Side Module

Instructions

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11. Assemble Universal Z Axis Module

11.1. Materials

Quantity	ID	Name	Description	Notes
1 module	universal-axis-idler-side-assembly	Universal Axis Idler Side	Universal Axis Idler Side Module v1.0.0	
1 module	universal-axis-motor-side-assembly	Universal Axis Motor Side	Universal Axis Motor Side Module v1.0.0	

11.2. Procedure

11.2.1. Assemble Universal Z Axis Module

Instructions

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12. Assemble Universal Axis Motor Side Module

12.1. Procedure

12.1.1. Assemble Universal Axis Motor Side Module

Instructions

13. Assemble Universal Axis Idler Side Module

13.1. Materials

Quantity	ID	Name	Description	Notes
1 part	universal-axis-idler-side	Universal Axis Idler Side	Universal Axis Idler Side Part v1.0.0	

13.2. Procedure

13.2.1. Assemble Universal Axis Idler Side Module

Instructions

14. Assemble Universal Y2 Axis Module

14.1. Materials

Quantity	ID	Name	Description	Notes
1 module	universal-axis-idler-side-assembly	Universal Axis Idler Side	Universal Axis Idler Side Module v1.0.0	
1 module	universal-axis-motor-side-assembly	Universal Axis Motor Side	Universal Axis Motor Side Module v1.0.0	

14.2. Procedure

14.2.1. Assemble Universal Y2 Axis Module

Instructions

15. Assemble Universal Axis Motor Side Module

15.1. Procedure

15.1.1. Assemble Universal Axis Motor Side Module

Instructions

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16. Assemble Universal Axis Idler Side Module

16.1. Materials

Quantity	ID	Name	Description	Notes
1 part	universal-axis-idler-side	Universal Axis Idler Side	Universal Axis Idler Side Part v1.0.0	

16.2. Procedure

16.2.1. Assemble Universal Axis Idler Side Module

Instructions

.

17. Assemble Universal Y1 Axis Module

17.1. Materials

Quantity	ID	Name	Description	Notes
1 module	universal-axis-idler-side-assembly	Universal Axis Idler Side	Universal Axis Idler Side Module v1.0.0	
1 module	universal-axis-motor-side-assembly	Universal Axis Motor Side	Universal Axis Motor Side Module v1.0.0	

17.2. Procedure

17.2.1. Assemble Universal Y1 Axis Module

Instructions

.

18. Assemble Universal Axis Motor Side Module

18.1. Procedure

18.1.1. Assemble Universal Axis Motor Side Module

Instructions

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19. Assemble Universal Axis Idler Side Module

19.1. Materials

Quantity	ID	Name	Description	Notes
1 part	universal-axis-idler-side	Universal Axis Idler Side	Universal Axis Idler Side Part v1.0.0	

19.2. Procedure

19.2.1. Assemble Universal Axis Idler Side Module

Instructions

.

20. Assemble Universal X Axis Module

20.1. Materials

Quantity	ID	Name	Description	Notes
1 module	universal-axis-idler-side-assembly	Universal Axis Idler Side	Universal Axis Idler Side Module v1.0.0	
1 module	universal-axis-motor-side-assembly	Universal Axis Motor Side	Universal Axis Motor Side Module v1.0.0	

20.2. Procedure

20.2.1. Assemble Universal X Axis Module

Instructions

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21. Assemble Hot End Assembly

21.1. Tools

Name	Description	Notes
1mm Allen Wrench	1mm Allen Wrench	
24v Power Supply	24V Industrial Power Supply Module	
2mm Allen Wrench	2mm Allen Wrench	
7mm Socket Wrench	7mm Socket Wrench	
Needle Nose Pliers	Needle Nose Pliers	
Slip Joint Pliers	Slip Joint Pliers	
Metal Jaw Vise	Metal Jaw Vise	The jaws of the vise must be metal for heat resistance.

21.2. Materials

Quantity	ID	Name	Description	Notes
1 part	heat-break	Heat Break	1.75mm Heat Break v1.0.0	

Quantity	ID	Name	Description	Notes
1 part	heater-cartridge	Heater Cartridge	24V 70W 6mm Diameter Ceramic Heater Cartridge v1.0.0	
1 part	heatsink-block	Heatsink Block	Universal Gearless Extruder Heatsink Block v1.0.0	
2 parts	m3-10mm-screw	M3 x 10mm Cap Screw	M3 x 10mm Cap Screw v1.0.0	
1 part	m3-4mm-grub-screw	M3 x 4mm Grub Screw	M3 x 4mm Grub Screw v1.0.0	
1 part	m6-thin-nut	M6 Thin Nut	M6 Thin Nut v1.0.0	
1 part	nozzle	Volcano Nozzle	1.75mm Volcano Style Filament Extrusion Nozzle (0.4mm) v1.0.0	
2 drop(s)	thermal-paste	Thermal Paste	Thermal Paste v1.0.0	
1 part	thermistor	Thermistor Cartridge	NTC 100K ohm B3950 Thermistor Cartridge v1.0.0	
1 part	volcano-heater-block	Volcano Style Heater Block	Volcano Style Heater Block v1.0.0	

21.3. Precautions

- **Heater Cartridge:** The Heater Cartridge gets very hot when powered! Use caution when handling.

21.4. Procedure

21.4.1. Assemble the Volcano Style Heater Block

Required Tools

- 1mm Allen Wrench
- 2mm Allen Wrench

Required Parts

- M3 x 4mm Grub Screw

- M3 x 10mm Cap Screw
- Volcano Style Heater Block

Instructions

1. Unpack required parts from bag.
2. Using the **2mm Allen Wrench**, lightly screw the **M3 x 10mm Cap Screw** parts into the two threaded holes on the side of the **Volcano Style Heater Block**.
3. Using the **1mm Allen Wrench**, lightly screw the **M3 x 4mm Grub Screw** into the single threaded hole on the side of the **Volcano Style Heater Block**. Be sure to leave enough room for the **Thermistor Cartridge** to be inserted later.
4. Insert the **Heater Cartridge** into the **Volcano Style Heater Block** with the wires coming out of the end with an indent.
5. Insert the **Thermistor Cartridge** with the wires coming out of the same side as the previous step.
6. Screw down the **M3 x 4mm Grub Screw** part lightly using a **1mm Allen Wrench** to fasten the **Thermistor Cartridge**, but very lightly as the part can go right through the **Thermistor Cartridge**.
7. Screw down the **M3 x 10mm Cap Screw** parts using a **2mm Allen Wrench**, so that the **Volcano Style Heater Block** is secured. Do this evenly by screwing down one **M3 x 10mm Cap Screw** then the other and alternating four times.
8. Screw the **Volcano Nozzle** into the end of the **Volcano Style Heater Block** that does not have wires, until there is 1/2 of a thread exposed.
9. Screw the short end of the **Heat Break** into the other side of the **Volcano Style Heater Block** until it bottoms out against the **Volcano Nozzle**.

21.4.2. Hot tighten the Volcano Nozzle and Heat Break

Required Tools

- 24v Power Supply
- 7mm Socket Wrench
- Needle Nose Pliers

Required Parts

- M6 Thin Nut
- Volcano Style Heater Block
- Heater Cartridge
- Thermistor Cartridge

Instructions

1. Gently secure the **Volcano Style Heater Block** in the **Metal Jaw Vise**, leaving enough clearance

to tighten down the **Volcano Nozzle**.

2. Attach the **Heater Cartridge** wires onto the output of the **24v Power Supply** and power on the **24v Power Supply**.
3. Wait two minutes for the **Volcano Style Heater Block** to get hot.
4. Using **Needle Nose Pliers**, hold the **Heat Break** in place while tightening down the **Volcano Nozzle** using the **7mm Socket Wrench**. Make sure that the **Volcano Nozzle** bottoms out against the **Heat Break**, not against the **Volcano Style Heater Block** - the goal is to close the filament flow gap between the **Volcano Nozzle** and **Heat Break**.
5. Once tightened, disconnect the **Heater Cartridge** from the **24v Power Supply**.

21.4.3. Attach the Heatsink Block

Required Tools

- Slip Joint Pliers

Required Parts

- M6 Thin Nut
- Volcano Style Heater Block
- Thermal Paste
- Heatsink Block

Instructions

1. Wait at least five minutes for the **Volcano Style Heater Block** to cool down to a temperature that is safe to touch.
2. Reposition the **Volcano Style Heater Block** in the **Metal Jaw Vise** so that the long end of the **Heat Break** is accessible to tools.
3. Screw the **M6 Thin Nut** onto the **Heat Break** until the **M6 Thin Nut** is near the gap on the **Heat Break**.
4. Apply one drop(s) of **Thermal Paste** to the threads of the **Heat Break** and spread the **Thermal Paste** evenly across the threads.
5. Bend the **Heater Cartridge** wires out of the way so you can screw on the heat sink. Hold the bottom of the **Heater Cartridge** wire with **Needle Nose Pliers** so that when the wires are bent down they won't break from the **Heater Cartridge**.
6. Screw the **Heatsink Block** onto the **Heat Break** so that the **Heat Break** sticks out 2mm above the **Heatsink Block**.
7. Line up the wider sides of the **Heatsink Block** and the **Volcano Style Heater Block**.
8. Tighten the **M6 Thin Nut** against the **Heatsink Block** using **Slip Joint Pliers**.
9. Remove the completed **Hot End Assembly** from the **Metal Jaw Vise**.

22. Assemble Universal Gearless Extruder Module

22.1. Tools

Name	Description	Notes
1.75mm Filament	1.75mm 3D Printer Filament	
1mm Allen Wrench	1mm Allen Wrench	
2.5mm Allen Wrench	2.5mm Allen Wrench	
5mm Allen Wrench	5mm Allen Wrench	
Hobby Knife	Hobby Knife	

22.2. Materials

Quantity	ID	Name	Description	Notes
1 part	40mm-fan	40mm Fan	24v 40mm x 40mm x 10mm Fan v1.0.0	
1 part	40mm-heatsink	40mm Heatsink Fins	Mk7/Mk8 40mm Heatsink v1.0.0	
1 part	608-bearing	608 ZZ Bearing	608 ZZ Bearing v1.0.0	
1 part	active-cooling-height-sensor-plotter	Secondary Extruder Part	Universal Gearless Extruder Active Cooling Height Sensor Plotter Part v1.0.0	3D Printed Part
1 part	blower-fan	Blower Fan	24V 5015 Blower Fan v1.0.0	
1 part	extruder-gear	Filament Drive Gear	Mk7 Extruder Drive Gear v1.0.0	
1 part	extruder-spring	Extruder Spring	10mm Outer Diameter 35mm Long 1.2mm Thick Compression Spring v1.0.0	
1 part	height-sensor	Height Sensor	LJ18A3-8-Z-BY-5V Proximity Switch v1.0.0	

Quantity	ID	Name	Description	Notes
1 part	hot-end-assembly	Hot End Assembly	Hot End Assembly v1.0.0	
4 part(s)	m3-20mm-screw	M3 x 20mm Screw	M3 x 20mm Socket Head Cap Screw v1.0.0	
2 part(s)	m3-30mm-screw	M3 x 30mm Screw	M3 x 30mm Socket Head Cap Screw v1.0.0	
4 part(s)	m3-8mm-screw	M3 x 8mm Screw	M3 x 8mm Socket Head Cap Screw v1.0.0	
1 part(s)	m6-25mm-screw	M6 x 25mm Screw	M6 x 25mm Socket Head Cap Screw v1.0.0	
1 part	m6-nut	M6 Nut	M6 Nut v1.0.0	
1 part	motor-mount	Motor Mount	Universal Gearless Extruder Motor Mount Part v1.0.0	3D Printed Part
1 part	split-wire-loom	2 Meter Split Wire Loom	1/2 Inch Flame Retardant Split Wire Loom v1.0.0	
1 part	spring-tensioner	Spring Tensioner Arm	Universal Gearless Extruder Spring Tensioner Arm v1.0.0	3D printed part
1 part	stepper-motor	Nema 17 Stepper Motor	Nema 17 0.5Nm Stepper Motor v1.0.0	
1 part	stepper-motor-cable	2 Meter Stepper Motor Cable	Stepper Motor Wire 4 Pin Dupont to 6 Pin XH2.54 v1.0.0	
2 drop(s)	thermal-paste	Thermal Paste	Thermal Paste v1.0.0	
1 part	zip-tie-small	Small Zip Tie	4 Inch Zip Tie v1.0.0	

22.3. Procedure

22.3.1. Assemble the Motor Mount

Required Tools

- 2.5mm Allen Wrench
- Hobby Knife

Required Parts

- Motor Mount
- Nema 17 Stepper Motor
- M3 x 8mm Screw
- M6 Nut

Instructions

1. Clean off any extra plastic on the **Motor Mount** using a **Hobby Knife**.
2. Insert the **M6 Nut** into the slot in the middle of the **Motor Mount**.
3. Insert the **Nema 17 Stepper Motor** into the **Motor Mount** with the mounting holes lined up.
4. In the top right corner, use the **2.5mm Allen Wrench** to screw an **M3 x 8mm Screw** through the **Motor Mount** and into the mounting hole on the **Nema 17 Stepper Motor**.

22.3.2. Add the Secondary Extruder Part

Required Tools

- 2.5mm Allen Wrench
- Hobby Knife

Required Parts

- Secondary Extruder Part
- Blower Fan
- M3 x 8mm Screw
- M3 x 20mm Screw

Instructions

1. Clean off any extra plastic on the **Secondary Extruder Part** using a **Hobby Knife**.
2. Line up the **Secondary Extruder Part** with the mounting holes on the left side of the **Motor Mount**.
3. Using the **2.5mm Allen Wrench**, screw an **M3 x 8mm Screw** into the furthest back mounting hole.
4. Insert the open end of the **Blower Fan** into the fan duct on the **Secondary Extruder Part**.
5. Using the **2.5mm Allen Wrench**, screw two **M3 x 20mm Screw** part(s) into the mounting holes

of the **Blower Fan** to mount it to the **Secondary Extruder Part**.

6. Use the **2.5mm Allen Wrench** to screw **M3 x 8mm Screw** part(s) into the remaining open mounting holes in the **Secondary Extruder Part**.

22.3.3. Install Hot End Assembly

Required Tools

- 2.5mm Allen Wrench

Required Parts

- Secondary Extruder Part
- Hot End Assembly
- 40mm Heatsink Fins
- M3 x 30mm Screw
- Thermal Paste

Instructions

1. Apply one drop(s) of **Thermal Paste** to the flat area between the mounting holes on the **40mm Heatsink Fins**.
2. Place two **M3 x 30mm Screw** part(s) into the mounting holes of the **40mm Heatsink Fins** with the threads of the **M3 x 30mm Screw** part(s) sticking out of the flat side of the **40mm Heatsink Fins**.
3. Orient the **Hot End Assembly** with the longer side on the right.
4. Insert the **M3 x 30mm Screw** part(s) through the mounting holes of the **Hot End Assembly**. This should squish the **Thermal Paste** between the **Hot End Assembly** and the **40mm Heatsink Fins**.
5. Position the **Hot End Assembly** mounting holes against the bottom mounting holes of the **Nema 17 Stepper Motor** in the **Motor Mount**.
6. Lightly screw down the **M3 x 30mm Screw** part(s) using the **2.5mm Allen Wrench** to hold the **Hot End Assembly** against the **Nema 17 Stepper Motor** in the **Motor Mount**, but not too hard as the position of the **Hot End Assembly** will be adjusted later.

22.3.4. Install and adjust Filament Drive Gear / Adjust Hot End Assembly

Required Tools

- 1.75mm Filament
- 1mm Allen Wrench
- 2.5mm Allen Wrench

Required Parts

- Filament Drive Gear
- Hot End Assembly
- Motor Mount

Instructions

1. Put the **Filament Drive Gear** on the shaft of the **Nema 17 Stepper Motor** in the **Motor Mount**. Do not tighten it down yet.
2. Insert the **1.75mm Filament** into the top of the **Hot End Assembly** and align the **Filament Drive Gear** teeth with the **1.75mm Filament**.
3. Tighten down the screw on the **Filament Drive Gear** using the **1mm Allen Wrench**.
4. Using the **1.75mm Filament** as a guide, tighten down the **M3 x 30mm Screw** part(s) on the **Hot End Assembly** using a **2.5mm Allen Wrench**. Make sure that the **1.75mm Filament** is coming *straight* out of the top of the **Hot End Assembly** before tightening.

22.3.5. Install Spring Tensioner Arm

Required Tools

- 2.5mm Allen Wrench
- Hobby Knife

Required Parts

- Motor Mount
- Spring Tensioner Arm
- Extruder Spring
- 608 ZZ Bearing
- M3 x 20mm Screw

Instructions

1. Clean off any extra plastic on the **Spring Tensioner Arm** using a **Hobby Knife**.
2. Press the **608 ZZ Bearing** onto the peg on the **Spring Tensioner Arm**.
3. With the arm of the **Spring Tensioner Arm** pointing right, screw the **Spring Tensioner Arm** onto the top left mounting hole on the front of the **Motor Mount** using a **M3 x 20mm Screw** and a **2.5mm Allen Wrench**.
4. Insert the **Extruder Spring** between the arm of the **Spring Tensioner Arm** and the mounting slot on the **Motor Mount**.

22.3.6. Install Height Sensor

Required Tools

- 5mm Allen Wrench

Required Parts

- Secondary Extruder Part
- Height Sensor
- M6 x 25mm Screw

Instructions

1. Insert the **Height Sensor** into the slot on the left side of the **Secondary Extruder Part**.
2. Adjust the height of the **Height Sensor** so the bottom is 2mm above the bottom of the **Secondary Extruder Part**.
3. Using the **5mm Allen Wrench**, screw the **M6 x 25mm Screw** into the hole at the back of the slot. Tighten the **M6 x 25mm Screw** only enough to hold the **Secondary Extruder Part** in place and not damage it.

22.3.7. Install 40mm Fan

Required Tools

- 2.5mm Allen Wrench

Required Parts

- 40mm Heatsink Fins
- 40mm Fan
- M3 x 20mm Screw

Instructions

1. Orient the **40mm Fan** over the **40mm Heatsink Fins** so that the fan will blow air toward the **40mm Heatsink Fins**.
2. Place the **40mm Fan** directly over the front of the **40mm Heatsink Fins** and screw it into place using two **M3 x 20mm Screw** part(s) and the **2.5mm Allen Wrench** in the bottom mounting holes of the **40mm Fan**. The screws will be held in the **40mm Heatsink Fins**.

22.3.8. Install and manage cables

Required Parts

- 2 Meter Stepper Motor Cable
- 2 Meter Split Wire Loom
- Small Zip Tie

Instructions

1. Connect the **2 Meter Stepper Motor Cable** to the **Nema 17 Stepper Motor** in the **Motor Mount**. There should only be one cable orientation that fits in the **Nema 17 Stepper Motor**.

2. Bundle the **Universal Gearless Extruder Module** wires such that when looking at the front of the Universal Gearless Extruder Module, the wires are sent to the right hand side.
3. Use a **Small Zip Tie** to hold the wires together.
4. Take all 15 **Universal Gearless Extruder Module** wires and pull them through the **2 Meter Split Wire Loom**.

23. Assemble D3D Pro 3D Printer

23.1. Materials

Quantity	ID	Name	Description	Notes
1 module	universal-controller	Universal Controller	Universal Controller Assembly v1.0.0	
1 module	universal-gearless-extruder	Universal Gearless Extruder	Universal Gearless Extruder Module v1.0.0	
1 module	universal-axis-x	Universal X Axis	Universal X Axis Module v1.0.0	
1 module	universal-axis-y1	Universal Y1 Axis	Universal Y1 Axis Module v1.0.0	
1 module	universal-axis-y2	Universal Y2 Axis	Universal Y2 Axis Module v1.0.0	
2 module	universal-axis-z	Universal Z Axis	Universal Z Axis Module v1.0.0	
1 module	fast-heated-bed	Fast Heated Bed	Fast Heated Bed Module v1.0.0	
1 module	universal-frame	Universal Frame	Universal Frame Module v1.0.0	

23.2. Procedure

23.2.1. Throw Universal Gearless Extruder out the window

Required Parts

- Universal Gearless Extruder

Instructions

1. Hello World!