

STACKER[®]

HYBRID Owner's Manual

Thank you purchasing the HYBRID hot end! This hot end kit is for 3D printers using FFF technology. It is designed for commonly available 1.75mm diameter filament. Max temperature for the HYBRID hot end is 300 degrees Celsius. Important: temperatures from 270C to 300C require our high temp nozzles.

Please read this manual and also follow common sense when using your 3D printer. Like any new and experimental device that gets hot, the utmost care should be taken to ensure the safety of you and your property. This means, among many things, never leaving your printer running unattended or exceeding the max rated temperatures. Also, always use your 3D printer in well ventilated spaces.

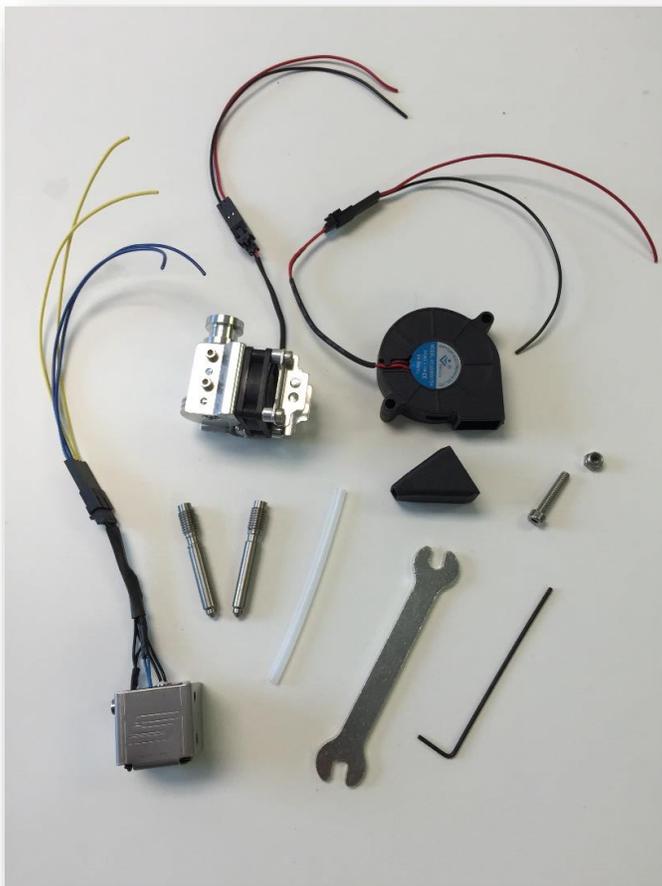
You are responsible for mounting this hot end to your printer. This may require extensive modifications to your printer. STACKER will not provide custom mounting brackets or engineering advice, as this is your responsibility. STACKER will not be held responsible for damages caused by use, misuse, or abuse of this product.

WARNINGS – Please take these seriously.

1. By their very nature, hot ends get HOT! Although the HYBRID hot end comes with a stainless steel shield around the heater block assembly, a small portion of the nozzle is still exposed and can severely burn you. Moreover, the entire heater block assembly still gets very hot and can burn you if you touch it.
2. Although 3D printers are amazing, they are experimental devices that get really hot. This means that they are fire hazards. Furthermore, not all 3D printers are built to the same safety standards as commercial grade 3D printers and may not have proper safety certifications or even basic failsafe mechanisms. It is your responsibility to operate your printer in a safe manner, and to ensure that it is safe to use in the first place. You must incorporate the use of fire and smoke alarms and proper fire suppression technology, such as fire extinguishers.
3. Please ensure you have correctly wired the hot end prior to use. This means not mixing up the heater block wires with the thermistor wires, or switching the polarity on the fans, or supplying the wrong voltages, etc. This is your responsibility. STACKER will not be responsible for replacing components that are shorted out because of improper wiring. As for the heater block assembly: the two yellow wires are for the heater cartridge, and the two blue wires are for the thermistor. As for the fan and blower: The black wires are DC negative, and the red wires are DC positive.
4. Be sure you have received the proper voltage hot end kit to match your 3D printer. The HYBRID hot end comes in either 12v or 24v versions. For example, on the 12v version the heater cartridge, cooling fan, and blower fan are all 12v. On the 24v version all of these devices are 24v.

5. The HYBRID hot end is capable of easily reaching temperatures beyond 300 degrees C. The thermal fuse is designed to cut off the power to the heater cartridge at around 350 degrees C, but this is only intended as another backup measure, and must not be solely relied upon. You must take steps to limit the temperature of your hot end to 300 degrees Celsius MAX. You can do this in a number of ways. One way is to set your "Max_PWM" to something lower than 255, say 175. This will limit the power to your heater cartridge. This variable can be found in your "configuration.h" file in most firmwares.
6. The cooling fan that cools the heat sink is an essential component to this hot end, and must not be disabled or fed a voltage that does not match the voltage listed on the manufacturer's label.

What is Included?

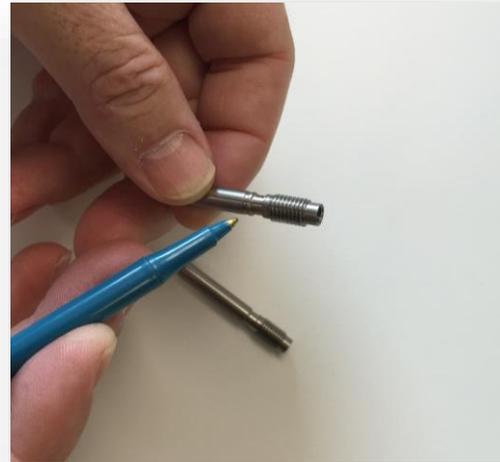


- Heater block assembly, which includes a 100k Semitec 104GT2 NTC thermistor and 40watt Watlow heater cartridge.
- Heat sink assembly with integrated cooling fan
- 0.50mm MID temp nozzle
- 0.50mm HIGH temp nozzle
- 50x15 blower fan with duct and mounting bolt.
- 1.5mm hex wrench
- 5mm open end wrench
- short section of 4mm tubing

WARNING: Make sure you hook the two yellow wires to your heater cartridge supply and the two blue wires to your thermistor supply. If you mix these up you will burn out your thermistor!

NOZZLE IDENTIFICATION

How to determine the difference between MID temp nozzles and HIGH temp nozzles. Please see the photo to the right. As you can see, we have machined a special “band” on the HIGH TEMP nozzle only. Use HIGH temp nozzles for temperatures between 270 and 300C. For all other temperatures use the MID temp nozzles. **IMPORTANT: for most filaments you will use the MID temp nozzles. This includes: PLA, ABS, Copolyester, HIPS, and special filaments like carbon fiber XT-CF20 and BronzeFill, etc.**



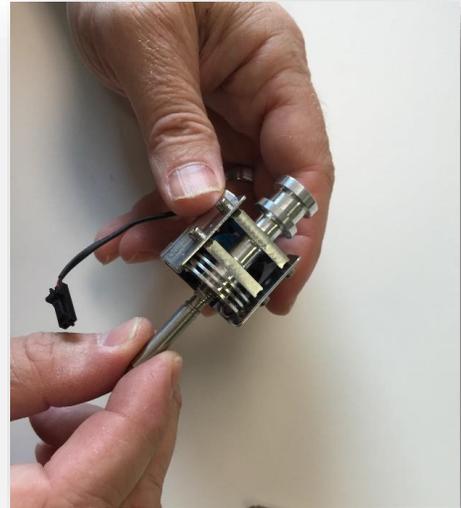
What Tools and Supplies do You Need?

1. For Bowden fed hot ends you will need Bowden tubing. STACKER only recommends using STACKER brand filament guide tube, available here: <http://stacker3d.com/product/filament-guide-tube/> Our filament guide tubing is custom sized to fit our nozzles better than typical 2mm ID/4MM OD tubing, and can be purchased on our website. The tubing comes in lengths of 800mm. It is also manufactured in the USA to high standards.
2. 7mm wrench or pliers for attaching the blower fan to the bracket on the heat sink.
3. 2.5mm hex wrench for attaching the blower fan to the bracket on the heat sink.
4. Any other tools, supplies, or brackets for attaching the hot end to your printer.
5. Wire crimps/connectors/solder/etc. for connecting the wire harness to your printer.

BASIC ASSEMBLY OF HYBRID Hot End

Your HYBRID hot end comes mostly assembled. Let's begin with installing the nozzles.

STEP 1. Install the nozzle. After you screw the nozzle into the heat sink, reverse the nozzle **TWO COMPLETE REVOLUTIONS**. This is very important as this will tighten the guide tube into the nozzle in STEP 2, and also takes up the "slop" in the small tube fitting on top of the heat sink.



STEP 2. Install the guide tube. **IMPORTANT: a guide tube must always be used, even with direct drive extruders!** This is why we ship every HYBRID kit with a short section of tubing. Trim the tubing to fit your printer. Now is also the time to install the bowden tube if your printer uses one.



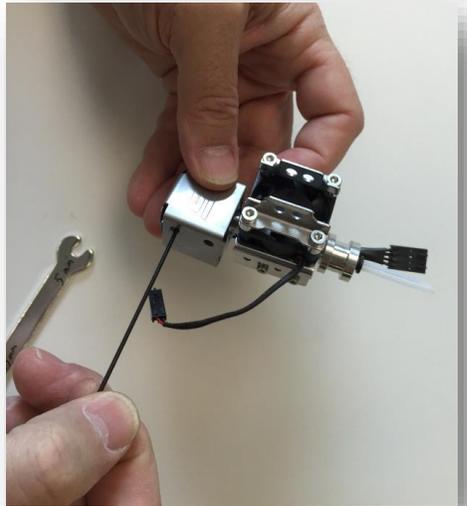
STEP 3 Tighten the nozzles. As you will see this forces the tube upward and tightens the tube into the fitting on top of the heat sink. It also seats the tubing deep into the nozzle. Your HYBRID will not work properly unless you follow this step.



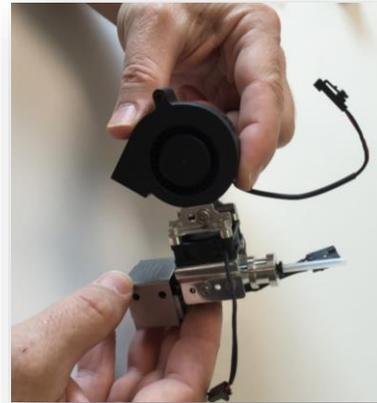
STEP 4. Install the heater block over the nozzle. Be sure the small set screws are unscrewed enough to allow the nozzle to pass through the heater block. Use the supplied 1.5mm hex wrench if necessary. **DO NOT FORCE THE HEATER BLOCK OVER THE NOZZLE!**



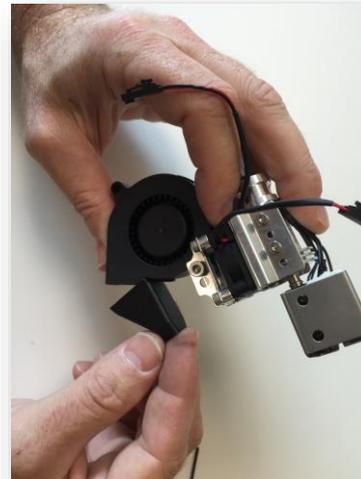
STEP 5. Tighten the heater block to the nozzles. **DO NOT OVER TIGHTEN THE SCREWS!** Only a small amount of tension is required to keep the heater block in place. Use the supplied 1.5mm hex wrench.



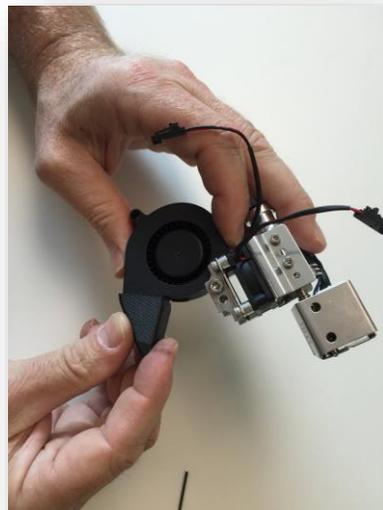
STEP 6. Installation of the blower fan is optional. For some filaments, such as PLA, the use of the blower fan is essential. For other materials, the blower fan can cause weak layer bonding. Use the supplied bolt and nut. You will need a 3mm hex wrench and 7mm wrench or socket. Use the upper holes, as shown!



STEP 7. Installation of the fan duct is also optional. For some types of printing it is better if you direct the stream of air directly at the tip of the nozzle. For other printing, all that may be necessary is to generally cool the area proximate to the nozzle tip area. The top of the duct has a small indentation. Position this as shown. You will then “rock” the duct downward and into position, as shown in the next photo. The duct attaches to the blower with a friction fit. You can use tape or glue to make the attachment permanent, or design and print your own duct to fit your needs.



STEP 8. Rock the duct into position until it fits.



ATTACH HOT END TO YOUR PRINTER

It is now your responsibility to properly secure this hot end to your 3D printer. Take your time to ensure the mounting brackets are safe and secure. Be sure that no component of your printer is in close proximity to your new hot end. Be sure to test the homing of your z-axis to ensure there are no interferences. Be sure to connect all the wires correctly! **Make sure you hook the two yellow wires to your heater cartridge supply and the two blue wires to your thermistor supply. If you mix these up you will burn out your thermistor! Also, be sure to hook up the fan and blower correctly. The black wires are DC negative. The red wires are DC positive.**

RECONFIGURE FIRMWARE (IF NECESSARY)

Most popular firmwares like Repetier and Marlin have recent safety enhancements that help protect against thermal runaway. It is strongly recommended that you implement these firmware improvements to your printer. If you have questions about firmware please refer to the excellent resources on the internet. There, you will find copious amount of information that will answer all your questions. The following is simply a rough guide to steer you in the right direction.

MARLIN firmware

Change your firmware for use with the Semitec 104GT2 thermistor.

- #define TEMP_SENSOR_05

We also recommend that you limit the maximum power to the heater (PID_MAX xxx in configuration.h), as well as set the minimum temperature to detect bad wiring (HEATER_0_MINTEMP 5 in configuration.h)

Check with reprap.org and github for even more information on the latest Marlin firmware changes.

REPETIER firmware

Change your firmware for use with the Semitec 104GT2 thermistor.

- #define EXT0_TEMPSSENSOR_TYPE 8

We strongly recommend that you use the V.92 firmware version and use the online configuration tool. Also, like Marlin, limit the power to your heater (EXT0_PID_MAX xxx in the configuration file).

SMOOTHIEWARE

Change your firmware for use with the Semitec 104GT2 thermistor.

- temperature_control.hotend.thermistor Semitec