Installing the HMG5 / Hero Me Gen 5 on the Ender 5 PLUS (Hotend in original build OEM format) 3dpmarkr / aftershox (Github)

This is my guide to installing the Hero Me Gen 5 onto a Creality Ender 5 PLUS – that has not been modified. e.g. Original Hot End housing and fans, as shipped (with no frame modifications). It uses the most compact parts for the smallest footprint, and DUAL 4020 Radial Blowers for maximum CFM / reduced noise overhead as the dual fans can be run as low as 50% without compromising air flow.

TOTAL 3D PRINTED PARTS 7 + 1 OPTIONAL.

GANTRY PARTS
Ender_OEM-MS_Gantry_Adapter_4A

BASE
Hero_Me_Gen5_Base_1

DUCTS
4020_Left_Fan_Mount_Spacer
4020_Lightweight_Duct_Standard_Left

4020_Lightweight_Duct_Standard_Right

ABL – BL TOUCH v.3.1.
BLTouch_Wing_Compact
with the BLTouch_Slider_Compact
X -38, Y+6

OEM 4010 AXIAL FAN COVER (OPTIONAL)
HMG5_Turbine_Fan_Guard

NOTE : The following parts have been chosen to take up the MINIMUM AMOUNT of space. Some of the HMG5 DUCT options protrude too far forward, so with an Ender 5 PLUS – these are the most COMPACT parts. IF you have moved your front TOP extrusion down (for Nozzle visibility) then you may be able to use a different DUCT. If, however, your printer is in the original OEM frame format – then please use the parts list (shown above) to prevent your Hotend crashing into the frame etc.

B.O.M - FANS

2 x 4020 Radial Blower – 24V – Dual Ball Bearing type

B.O.M. - Electronics / Connectors / Wire etc.

1 x T shape QUICK-Splice Connector.

1 x 100mm length Silcone Wire (YELLOW)
- 24 AWG Electrical Wire Kit,0.20mm² Flexible Silicone Wire - rated 300V Hookup Wire High Temperature Resistance

1 x 100mm length Silicone Wire (BLUE)
- 24 AWG Electrical Wire Kit,0.20mm² Flexible Silicone Wire - rated 300V Hookup Wire High Temperature Resistance

2 x JST.SM 2.54 connectors (2 pin) MALE / FEMALE

1 x Tube of Superglue (for securing your nuts!)

2 x Small 10mm lengths of heat shrink tubing YELLOW (***OPTIONAL***)

B.O.M - Screws, bolts & fixings

			SOCKET / CAP HEAD	SOCKET / CAP HEAD	SOCKET / CAP HEAD	SOCKET / CAP HEAD	BUTTON HEAD	SOCKET / CAP HEAD	BUTTON HEAD
			SC	SC	SC	SC	BH	SC	BH
	M3*HEX NUTS	M3*NYLOC NUTS	M3*30	M3*25	M3*18	M3*10	M3*10	M3*8	M3*8
Ender_OEM-MS_Gantry_Adapter_4A	2		2 (THROUGH HEATSINK)					4	2
Ender_Gantry_Clip_4									
Hero_Me_Gen5_Base_1	12								
4020_Left_Fan_Mount_Spacer									
4020_Lightweight_Duct_Standard_Left	1	1		1			2		
4020_Lightweight_Duct_Standard_Right	1	1			1		2		
BLTouch_Wing_Compact	1								2
BLTouch_Slider_Compact	1					1			2
HMG5_Turbine_Fan_Guard					4				
	18	2	0	1	5	1	4	4	6

TOOLS / SUNDRIES

IWISS SN-01BM Ratchet Wire Cable Crimping Pliers Tool 0.08-0.5mm² or SIMILAR
Wire Cutters
Hex Keys / Hex Drivers (supplied with printer)
Spanners (in particular, the Nozzle spanner)
3mm drill bit / Cable Ties

Installation – Notes

Wiring – Preparation

To upgrade from a single 4010 Radial Fan Blower (OEM Parts Fan) to DUAL 2 x 4020 Radial Fan Blower, you'll need to split the wiring to allow you to run two fans from one original set of wires.

Normally, the 4010 parts fan uses a wiring colour scheme of :-

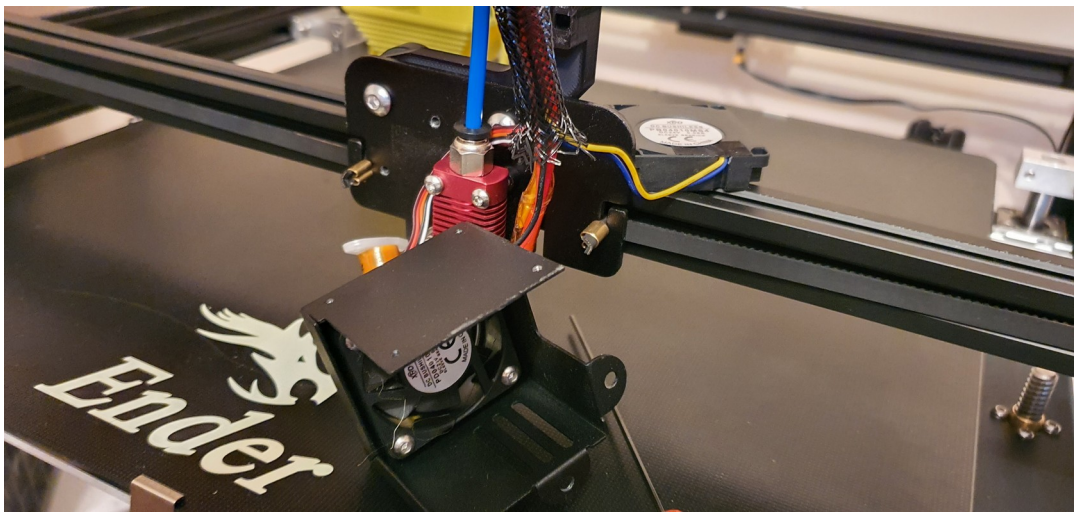
YELLOW
&
BLUE

New Parts Fans will usually have RED & BLACK wiring, and for consistency purposes – you should always match the following wiring colours.

OEM Fan		New 4020 Radial Blower
YELLOW	→	RED
BLUE	→	BLACK

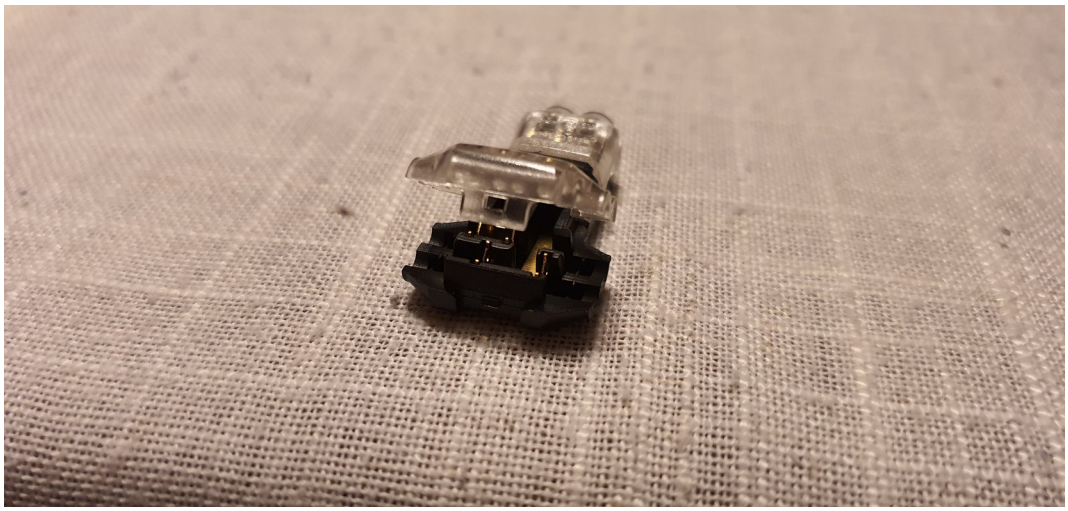
STAGE 1 – Disassemble your OEM Hotend

With the printer unplugged, remove all of the screws for the BL Touch Mount, Fan Cover, Fans, and the screws that go through the HEATSINK.



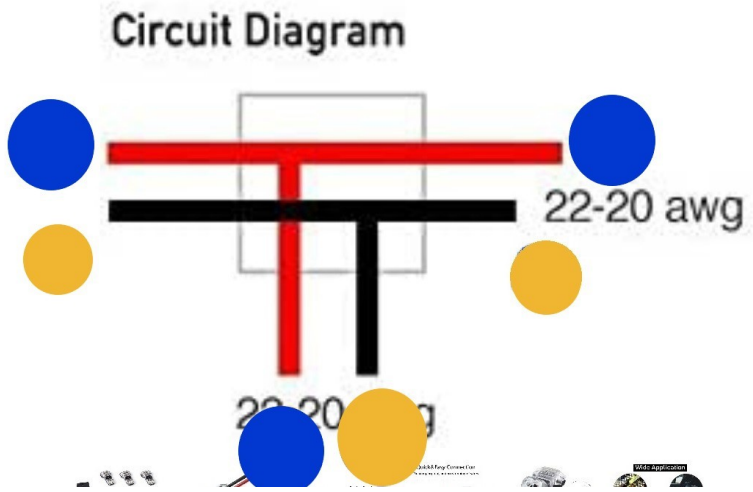
Using your SNIPS – cut off the 4010 Parts Cooling RADIAL Fan – leave as much wire as possible for the remaining wiring loom. e.g. Leave only around 10mm of wire on the 4010 fan you cut off.

Locate your T shape QUICK-Splice Connector, open BOTH ends in readiness.



PREPARE YOUR PRINTER WIRING LOOM

The circuit diagram (below) shows how the BLUE and YELLOW wires should be laid into the connector. **IGNORE the RED / BLACK** – this just shows you how the circuit path is wired.



NOTE : Lay your 100mm lengths of BLUE / YELLOW Wire across the T shape QUICK-Splice (ENSURE THE WIRES ARE CENTRED – 50mm each side of the connetor), BLUE on top and YELLOW directly underneath. You do not need to prepare the wire, just lay it in the tracks and CLAMP the connector FIRMLY shut..

For the other connector end which will join into your ***existing wiring***, you will need to open the connector end, insert the wires through the small round holes and CLAMP the connector shut FIRMLY. **MAKE SURE YOU MATCH THE COLOURS CORRECTLY.**

If you have done this correctly, you should now have a T shaped wiring loom connected to your existing printer wiring.

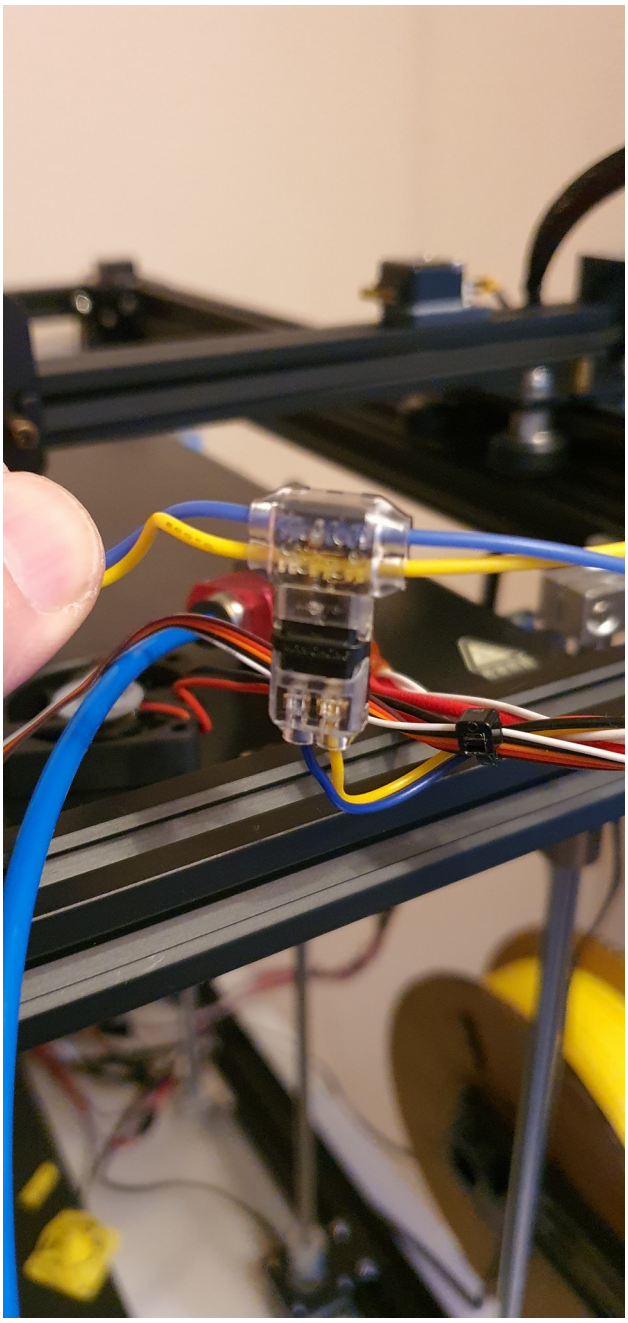
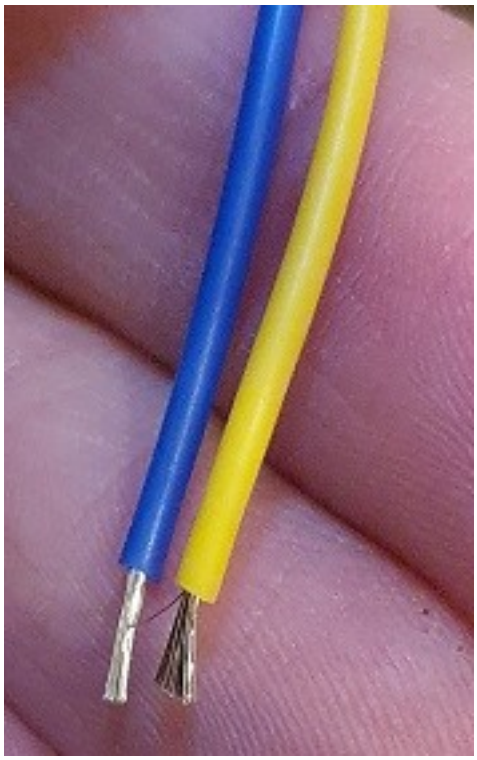


*Figure 1: NOTE : the wire colour on the LEFT at the BOTTOM of the connector should MATCH the TOP wire colour **AS PER THE CIRCUIT DIAGRAM**.*

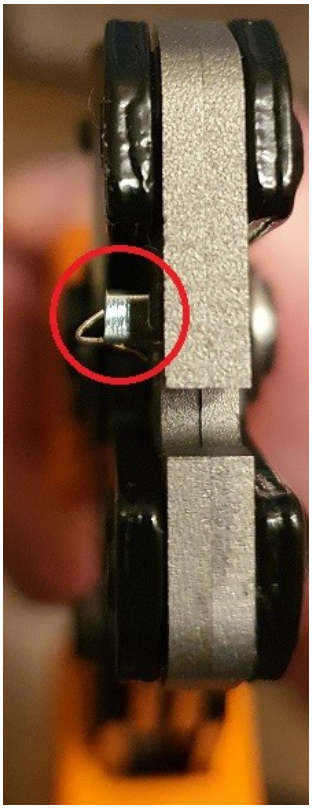
Using your wire cutters, or strippers – remove around 2-3mm of the cable sheaths (BLUE and YELLOW) from one end of the T splice (LOOM 1).



Locate BOTH of your JST.SM 2.54 pitch connectors, plus 4 x FEMALE (socket) wire ends.

SNAP OFF and LOAD one of the FEMALE (socket) connectors into your CRIMPING TOOL (IWISS). Two ratchets is usually sufficient holding force.

Here is another view from the FRONT.



Insert the YELLOW wire into the FEMALE (socket) wire end INCLUDING around 1mm of the cable with SHEATH (not stripped) – this allows the connector to GRAB on to the wire, and RATCHET CLAMP it down. If you've done it correctly, the wire should be nicely secured within the connector. (REPEAT THE PROCESS FOR THE BLUE WIRE).

NOTE : Examine the connectors for any loose strands of wire, if necessary – fold the loose strands back, and snip off with the cutters.

Next – locate the **FEMALE PLUG** end of the JST.SM (as per the picture below)

Each of the FEMALE (socket) wire connectors has a small locking tab (TANG) which sticks up, the wires should be inserted into the FEMALE PLUG with the TANG up. See image below.

Figure 2: Picture shows MALE connector - TANG UP orientation. For the T loom end (NOT THE FAN Connector wires)

If you get it wrong, the connector will likely fall out. If you get it correct, it should hold the wire into the connector with a SATISFYING CLICK.

Remember that the LOOM END should ALWAYS use the FEMALE PLUG !

(REPEAT THIS PROCESS FOR THE OTHER FAN LOOM SIDE – for LOOM 2)

PREPARE THE FANS WIRING

Remove one of your new fans (4020 Radial Blower) from the box, it will have RED / BLACK wiring and a small white connector on the end (this is NOT needed).

Take your snippers and CUT OFF the white connector (leaving as MUCH WIRE as POSSIBLE) on the fan/s. Split the wires Red / Black away from each other – for around 50mm.

(OPTIONAL) – add a small 10mm length of YELLOW heat shrink tubing to the **RED** cable sheath (helps you to identify which wire is Yellow later on!). Heat the tubing about half way down the wire until it no longer slides up and down the wire.

Locate BOTH of your **remaining** MALE parts from the JST.SM 2.54 pitch connectors, plus 4 x MALE (PINS) wire ends.

Figure 3: JST MALE Crimp pins

Using your wire cutters, or strippers – remove around 2-3mm of the cable sheaths (RED and BLACK) from one end of FAN 1.

As before, LOAD the JST MALE Crimp Pin into your IWISS Ratchet crimping tool (2 clicks of the ratchet is usually sufficient holding force)

Insert the RED fan wire into the MALE (crimp pin) INCLUDING around 1mm of the cable with SHEATH (not stripped) – this allows the connector to GRAB on to the wire, and RATCHET CLAMP it down. If you've done it correctly, the wire should be nicely secured within the connector. **(REPEAT THE PROCESS FOR THE BLACK WIRE).**

NOTE : Examine the connectors for any loose strands of wire, if necessary – fold the loose strands back, and snip off with the cutters.

You should now have a FAN with two MALE pins crimped on.

NEXT STEP (VERY IMPORTANT)

Take the MALE end of the JST SM plastic housing and CLIP IT into the FEMALE plastic housing so it locks into place.

Now take your **first** MALE JST Crimp Pin wire – ENSURING THE TAB / TANG is the correct way up, and MOST IMPORTANTLY – ensure the WIRE COLOURS *MATCH* with the other end. e.g. Your **FAN RED WIRE** wire should match up with the **YELLOW** wire on the LOOM END.

Now insert the BLACK wire so it matches up with the BLUE wire on the LOOM END.

(REPEAT THE STEPS ABOVE FOR FAN 2). Strip, crimp, insert housings together, and match up wires.

If all is done correctly, the FANS will now be connected using their JST SM connectors into the WIRING LOOM.

TEST THE FANS

With ALL cables and fans dangling **(ENSURE NOTHING IS TOUCHING)** – power up your printer.

In Marlin Mode, go into the Temperature menu and set the Parts FAN to come on – around 50% or higher (remember to CLICK on the new value, and exit the menu for the fans to come on).

BOTH new fans should BLOW as expected, set the speed back to 0% and the fans should STOP. If all is working OK – then proceed to install the HMG5.

If you have a touch screen display TFT35 or original OEM display – find the appropriate menu for the PARTS fan, and test as per the onscreen menus.

POWER OFF / UNPLUG YOUR PRINTER before proceeding. If you have a problem, then go back and check your wiring / connections before moving to the next stage.

!!! DISCONNECT YOUR * NEW * FANS !!!

INSTALLING THE HMG5

Find the Gantry Plate - **Ender_OEM-MS_Gantry_Adapter_4A**

From the REAR of the plate, insert the 4 x M3*8mm SC through the plate; back to front.

Insert the 2 x M3*Hex Nuts into the rear of the plate – as shown on the right. If the nuts are loose, use a small DAB of superglue.

Find your BASE - **Hero_Me_Gen5_Base_1**

In the Base – find all of the 12 x locations for the M3*Hex Nuts (and ***use a dab of glue to secure them*** into Gen5_Base_1)
- There are 6 on the inside the base (3 each side for the sliding duct channel)
- 4 on the bottom of the base (quite difficult to find – these are the ones that connect the Base to the Gantry Plate)
- 2 at the rear

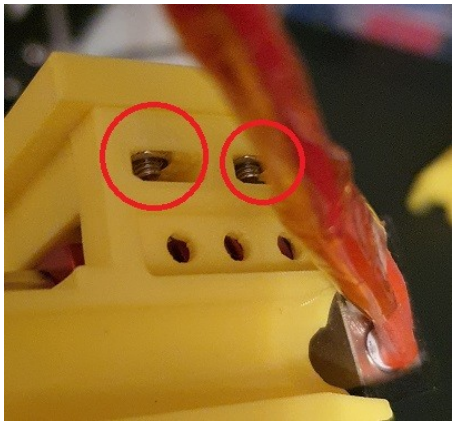


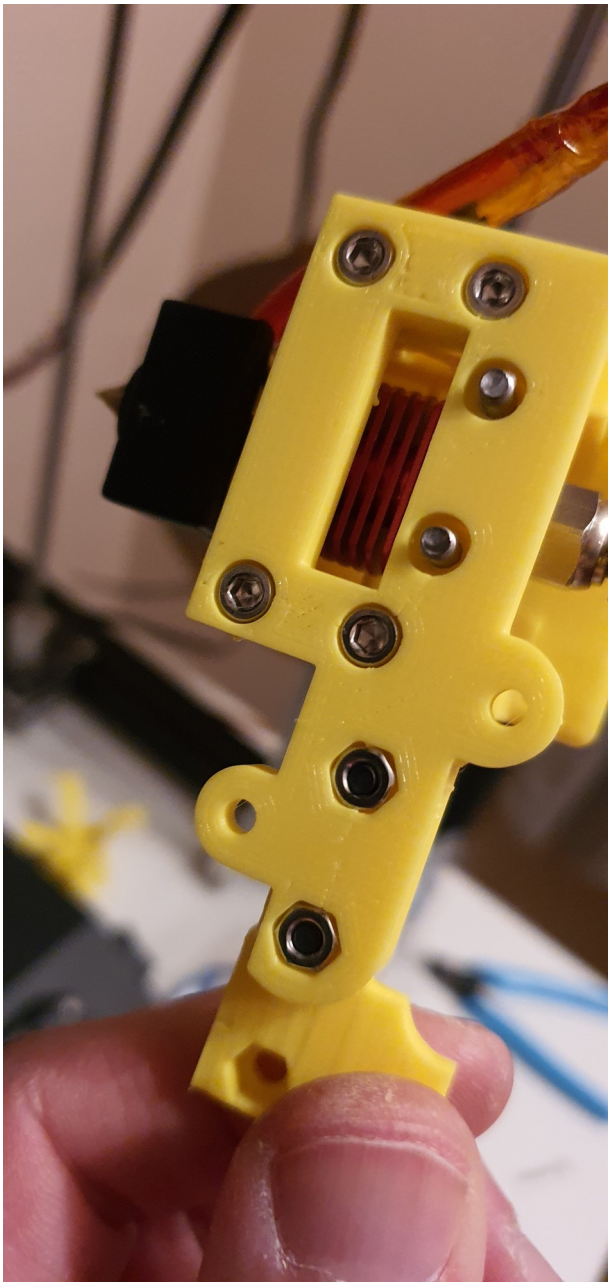
Figure 4: 4 x screws at bottom of base

Using your 2 x M3*30mm SC – loosely secure your original Creality Hotend HEATSINK – to the Ender_OEM-MS_Gantry_Adapter_4A. Loose is OK at the moment, as they will tightened later to the standoffs on the metal plate on the X Gantry.

Now secure the **Ender_OEM-MS_Gantry_Adapter_4A** to the **Hero_Me_Gen5_Base_1** by tightening the four 4 x M3*8mm SC

from the back / through the plate. THIS CAN BE A LITTLE FIDDLY, but once you get it started – you'll end up the the Base / Gantry adapter connected together.

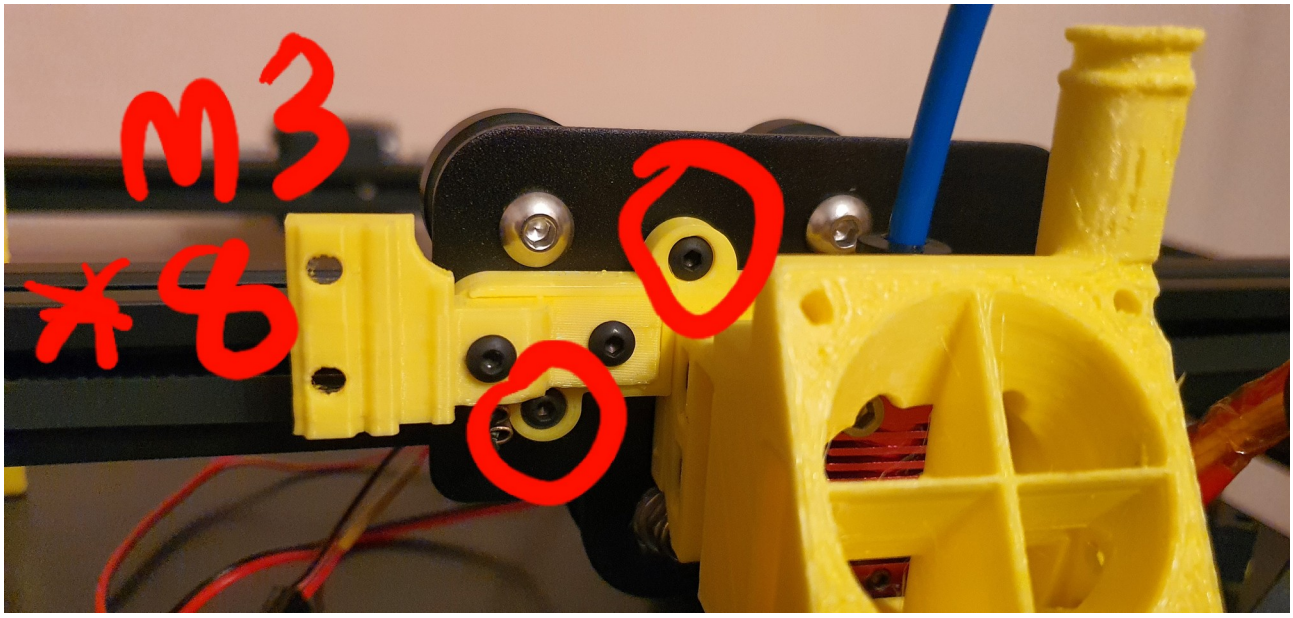
You can also attach the BLTouch_Wing_Compact using 2 x M3*8mm BH – as per the photo below.



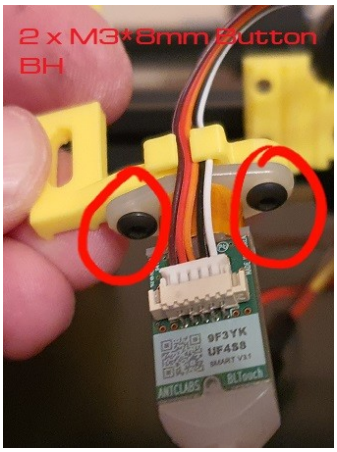
Offer up the newly joined parts to the metal X Gantry Plate – ensure it is **flush** with the original gantry plate.

Secure / tighten down the HEATSINK to the standoffs through the holes at the front of the base.

Add 2 x additional M3*8 BH as per the image below. These align with the original holes in the metal backplate.



Next, we'll put attach the BL Touch to it's compact bracket. Uses 2 x M3*8mm BH

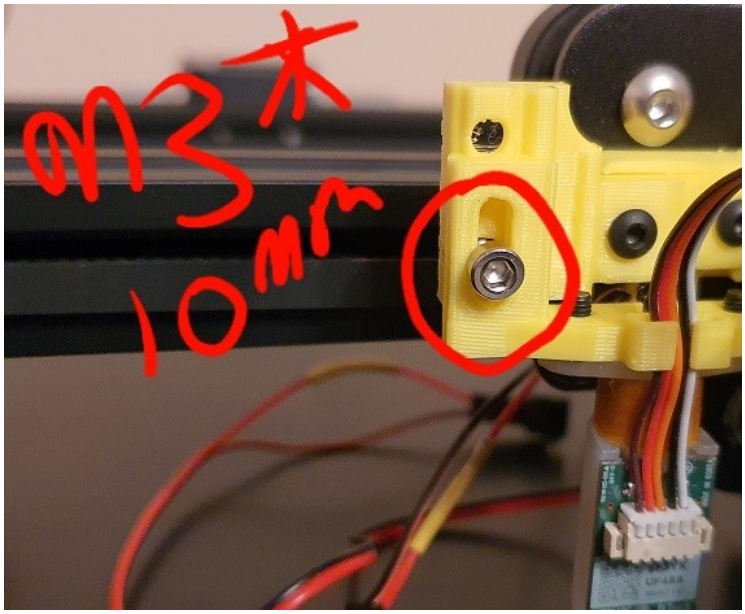


NOTE the orientation of the BL Touch and wiring loom (it should **face backwards** when mounted) BEHIND the LEFT DUCT part. It is a tight fit when the LEFT DUCT is installed, but can slide up/ down when setting the height. There is a little cable guide built into the BLTouch_Slider_Compact.

To secure it – you will need

1 x M3*HEX Nut (behind the **BLTouch_Wing_Compact**)
*hold it in place whilst tightening

1 x M3*10mm SC to secure the BL Touch mount (**BLTouch_Slider_Compact**) to the wing.



NEXT – we need the DUCT parts (LEFT and RIGHT)

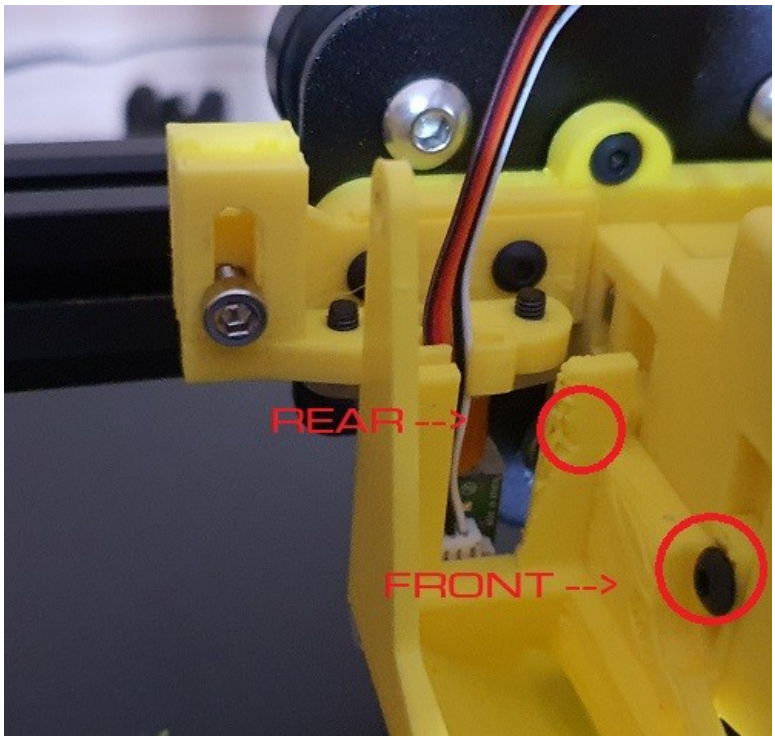
4020_Lightweight_Duct_Standard_Left

4020_Lightweight_Duct_Standard_Right

Starting with the **4020_Lightweight_Duct_Standard_Left** DUCT – align the duct with the main BASE body, and slide it up until the bottom of the duct is approx 15mm above the nozzle.

You will require 2 x M3*10mm BH and 1 x M3*Hex Nut for the LEFT DUCT FRONT fastening,

Loosely tighten the **REAR screw** of the duct into one of the three M3*nuts that are behind inside the Base.



For the FRONT M3*10mm, and M3*Hex Nut – you need to access the lower **LEFT QUARTER** hole of the HMG Base part. THIS IS QUITE TRICKY TO FASTEN; The Nut is on the inside, and the M3*10mm screws through the side. Again, fasten loosely at this stage.

(REPEAT THE STEPS ABOVE FOR THE RIGHT SIDE DUCT)

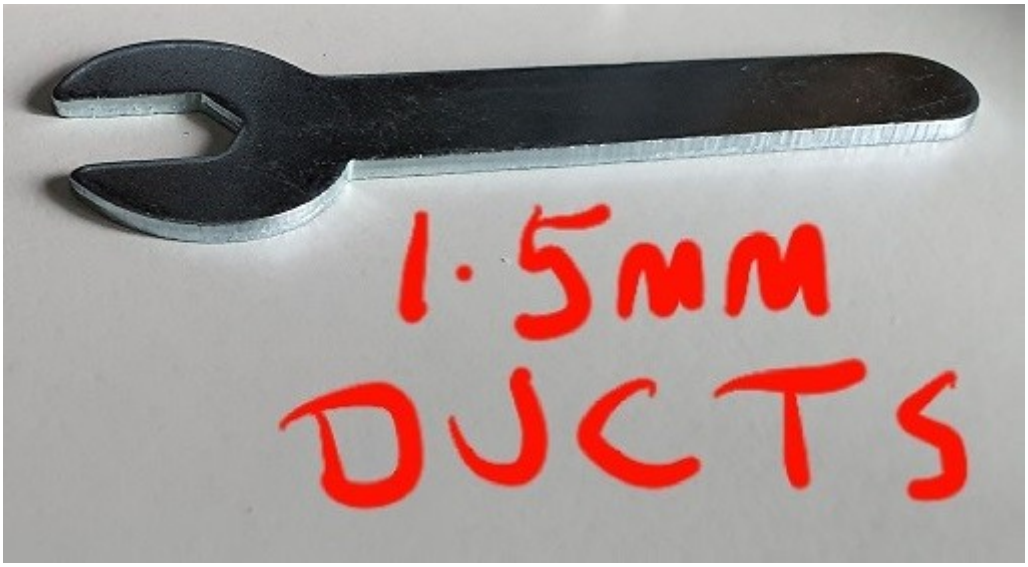
Again, you will need 2 x M3*10mm BH and 1 x M3*Hex Nut for the RIGHT DUCT FRONT fastening.

Repeat the process, align the RIGHT duct with the main BASE body, and slide it up until the bottom of the duct is approx 15mm above the nozzle.

Fasten the REAR fixing.

Using the lower **RIGHT QUARTER** hole of the HMG Base part. THIS IS QUITE TRICKY TO FASTEN; The Nut is on the inside, and the M3*10mm screws through the side. Again, fasten loosely at this stage.

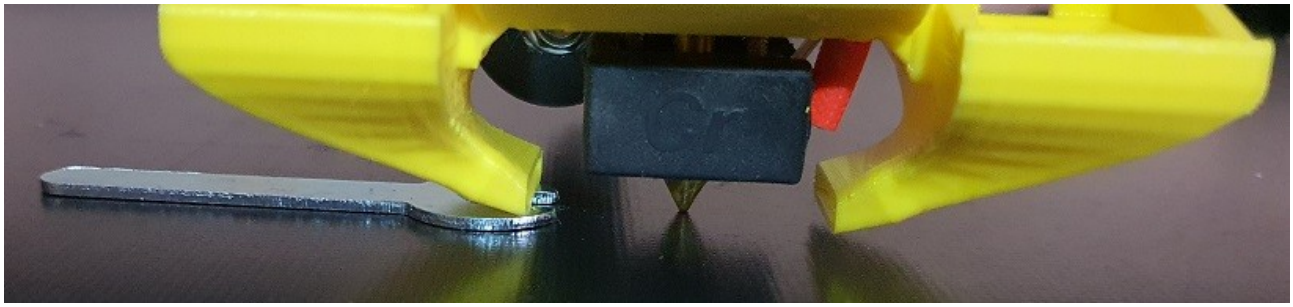
Locate the NOZZLE spanner that came with your printer. This is approx 1.5mm thickness, and ideal for setting the DUCT heights. The manual suggests between 1.4mm – 1.8mm



Move your HOTEND assembly to the centre of the bed.

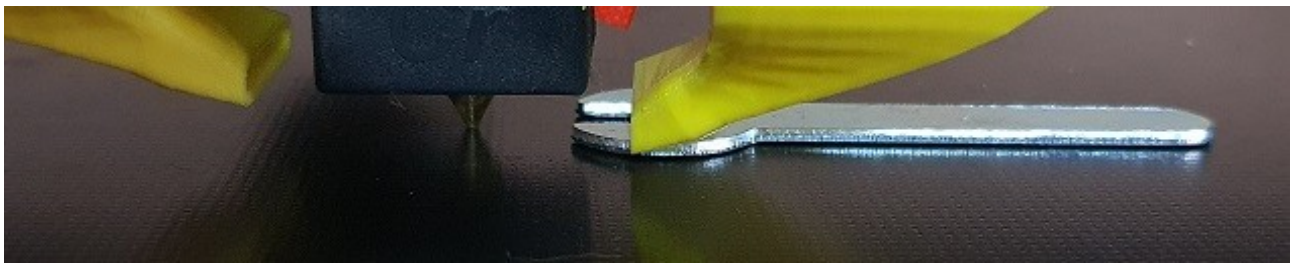
WITH THE PRINTER OFF - manually RAISE Both Z Axis, by rotating the lead screws until the nozzle is lightly touching the bed.

Put your Nozzle Spanner underneath the LEFT DUCT – this sets the height at 15mm above nozzle.



TIGHTEN the REAR and FRONT retaining screws for the **LEFT** DUCT.

Move the spanner to the RIGHT HAND DUCT.



TIGHTEN the REAR and FRONT retaining screws for the **RIGHT** DUCT.

Set the BL Touch Height

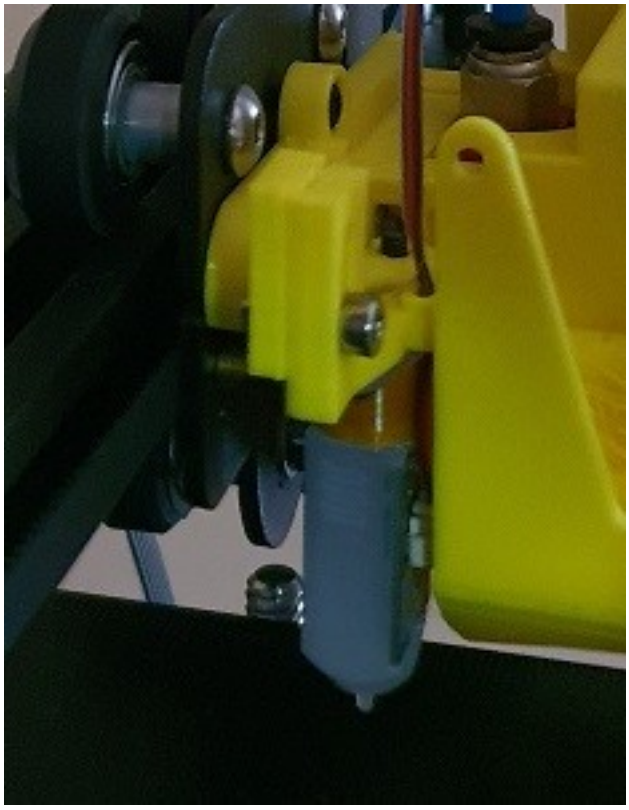
Now we have finished setting the DUCT heights, we can also set the BL Touch height as well. The BL Touch v.3.1. should be approx 4mm from the bottom of the stored probe to where the nozzle meets the bed.

Luckily, we have just the tool for the job. It is the 4mm HEX Key that came with your printer.

Slide the 4mm Hex Key underneath the BL Touch probe, and slide it up/down until the BL Touch nozzle is just touching the top of the Hex Key (as per the photo below)

Once you are satisified with the height, tighten the M3*10 screw holding the **BLTouch_Slider_Compact.**

Your BL Touch is now mounted, and set at the correct height; it should like the photo below.



Install front axial fan 4010 and OPTIONAL fan cover

The next step is to install is the front fan, and OPTIONAL fan guard.

IMPORTANT : Ensure all Hotend wires are out of the way before you start !

For this, you will need 4 x M3*18 SC screws; the screws will cut their own thread as you screw them in to the base. **CAUTION** :- be aware, that the front / upper right fan screw can slightly **protrude** through into the cable restraint channel. See image below.

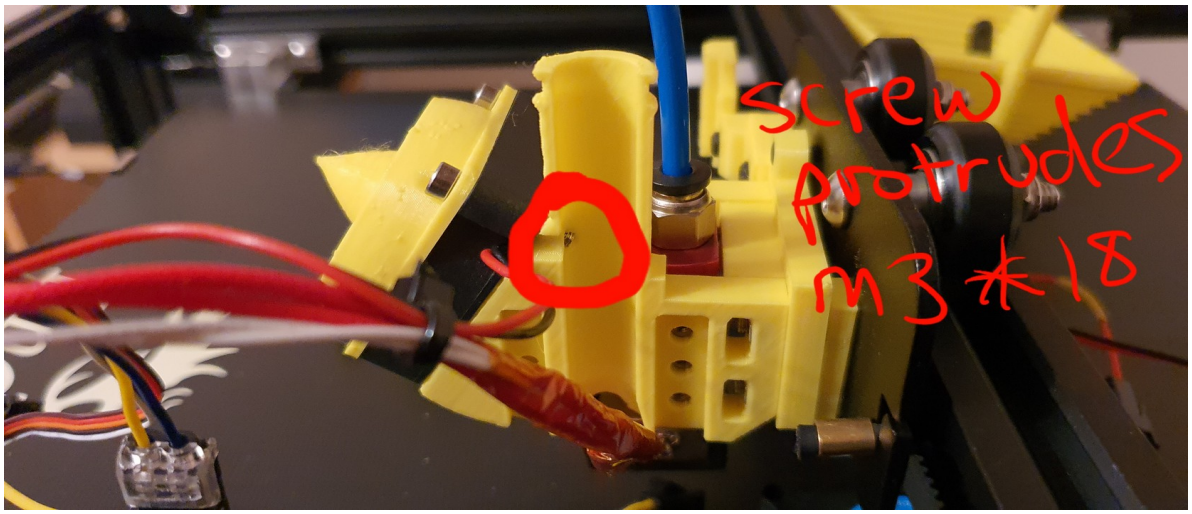


Figure 5: I removed the RIGHT SIDE DUCT here, to show the protruding screw problem.

Take care NOT to damage any cables. If in doubt, you can always swap the front, upper right screw for a shorter one. e.g. M3*16

Install the LEFT SIDE 4020 Radial Blower Fan

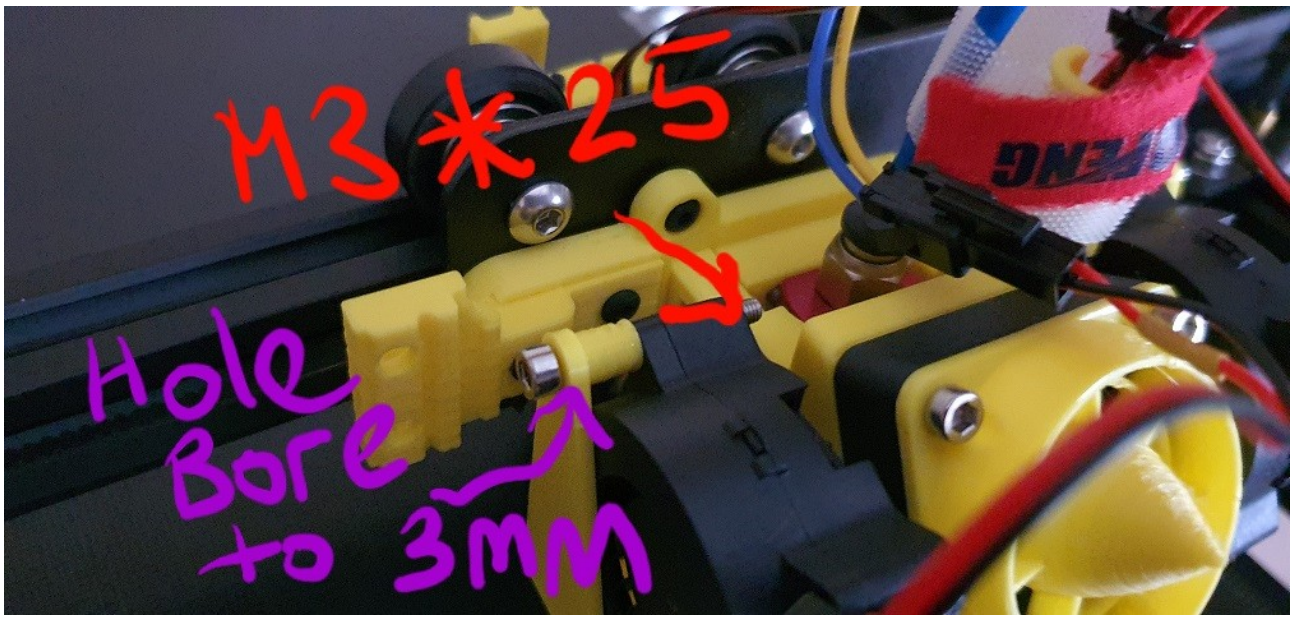
To make installing this fan easier, you may wish to use a 3mm drill bit / hand drill to slightly enlargen the hole in the LEFT DUCT (used for the retaining fan bolt, spacer & nyloc nut).

Drill / enlarge this hole out to 3mm.

Place the new fan into the LEFT DUCT, and route the wires accordingly.

For installing this fan, you will need :-

1	x	M3*25mm SC
1	x	4020 Blower Spacer (3D printed) - **4020_Left_Fan_Mount_Spacer**
1	x	M3*NYLOC Nut



Push the M3*25 through the LEFT DUCT, FAN SPACER and Fan Housing until through the assembly. Using a pair of pliers, hold the M3*NYLOC nut in place, while tightening the screw. Don't overtighten, just enough to hold the fan in place.

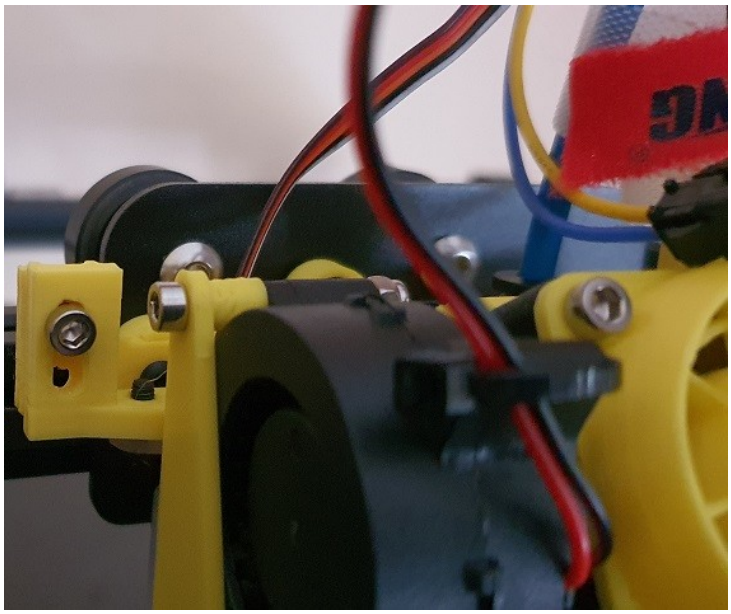


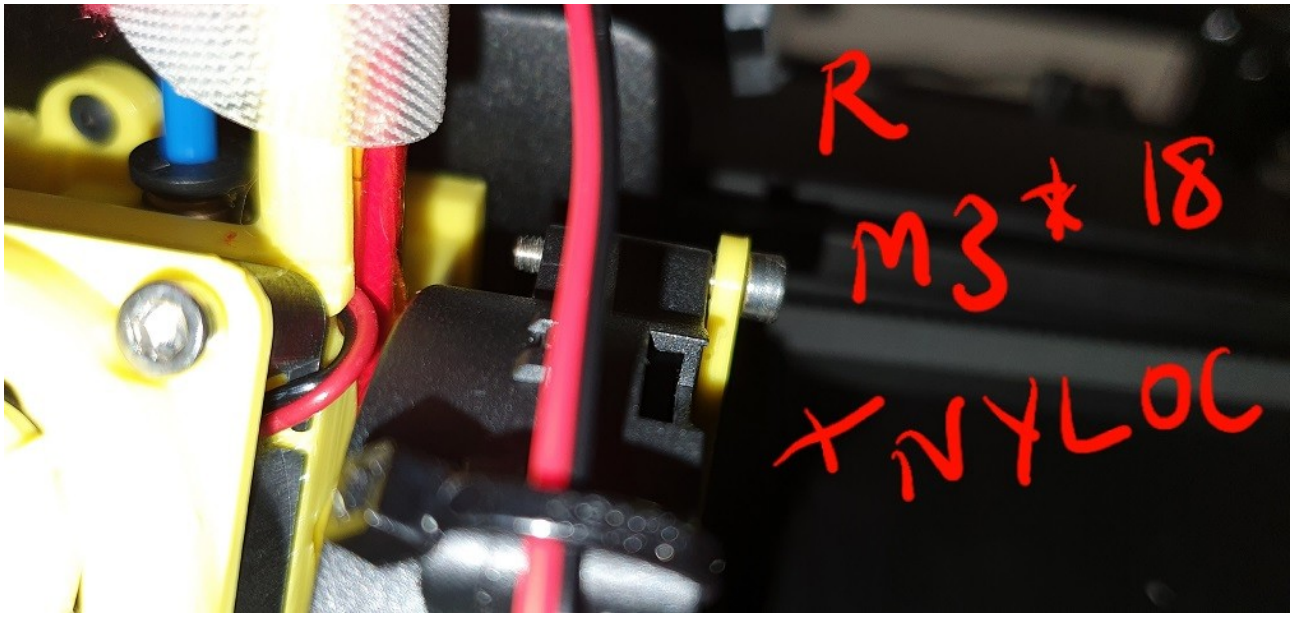
Figure 6: LEFT side 4020 FAN Installed

Connect your FAN plug to the LEFT hand side of the FAN Loom. If required, add a cable-tie to route the wires accordingly.

Install the right hand side 4020 Fan Blower

The right hand side fan is easier, again – enlarge the hole in the RIGHT DUCT to 3mm.

Drop the blower into the DUCT,



For this FAN, you will need :-

1	x	M3*18mm SC
1	x	M3*NYLOC Nut

Using a pair of pliers, hold the M3*NYLOC nut in place, while tightening the screw. Don't overtighten, just enough to hold the fan in place.

Connect your FAN plug to the RIGHT hand side of the FAN Loom. If required, add a cable-tie to route the wires accordingly.

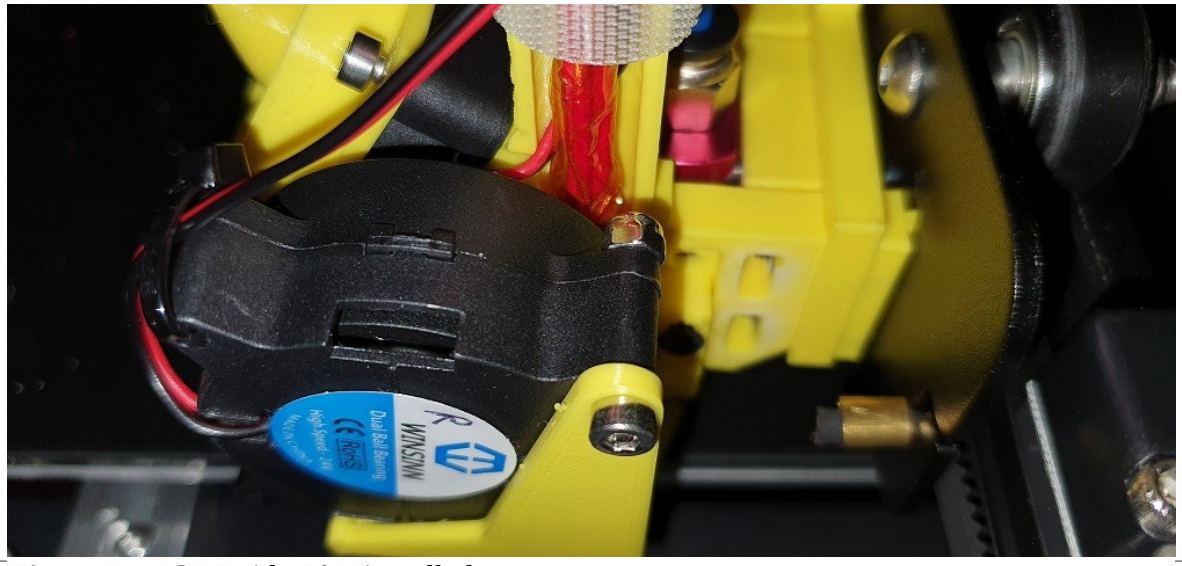


Figure 7: RIGHT side FAN installed

TIDY UP THE CABLES

Using cable-ties – tidy up, and route your wiring accordingly.

POWER-UP AND TEST FANS (AGAIN!)

BEFORE we make the final changes to our offsets, it is worthwhile checking the fans are still working correctly.

In Marlin Mode, go into the Temperature menu and set the Parts FAN to come on – around 50% or higher (remember to CLICK on the new value, and exit the menu for the fans to come on).

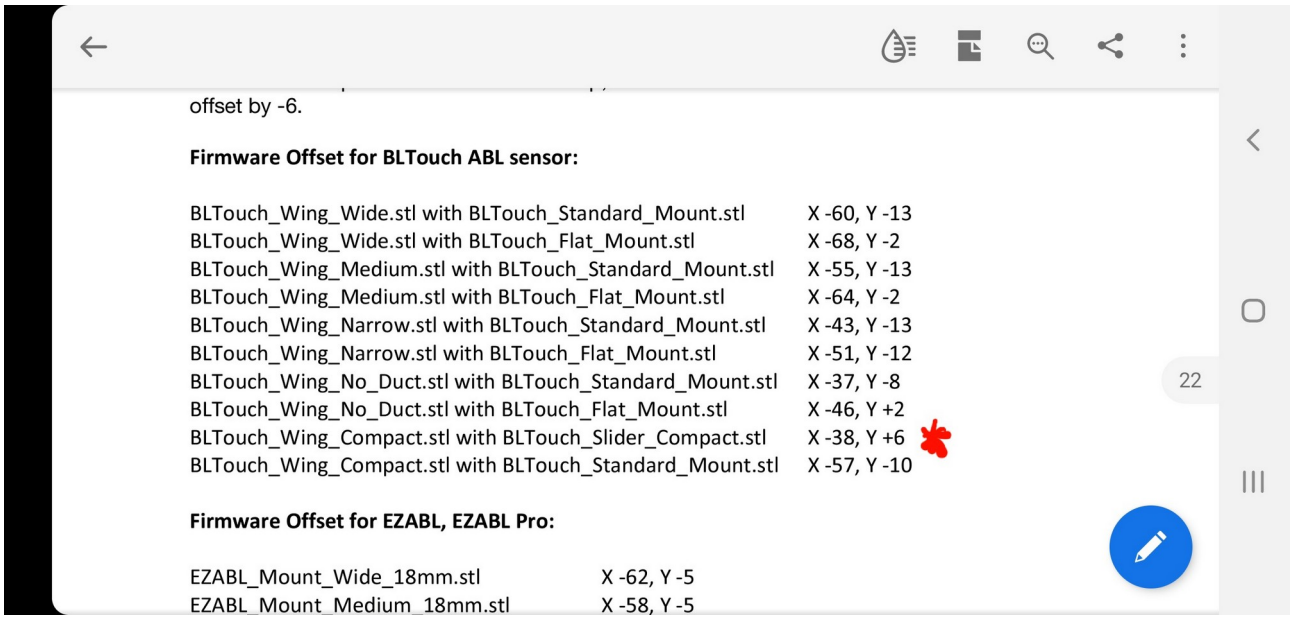
BOTH new fans should BLOW as expected, set the speed back to 0% and the fans should STOP. If all is working OK – then proceed to install the HMG5.

If you have a touch screen display TFT35 or original OEM display – find the appropriate menu for the PARTS fan, and test as per the onscreen menus.

YOU CAN LEAVE YOUR PRINTER POWERED ON, AS WE WILL NOW NEED TO MAKE CHANGES TO THE OFFSETS FOR THE NEW HOTEND COOLING / BLOWER SYSTEM.

MODIFY THE PROBE OFFSETS FOR THE HMG5

The HMG5 user manual contains the Offsets needed:-


offset by -6.

Firmware Offset for BLTouch ABL sensor:

BLTouch_Wing_Wide.stl with BLTouch_Standard_Mount.stl	X -60, Y -13
BLTouch_Wing_Wide.stl with BLTouch_Flat_Mount.stl	X -68, Y -2
BLTouch_Wing_Medium.stl with BLTouch_Standard_Mount.stl	X -55, Y -13
BLTouch_Wing_Medium.stl with BLTouch_Flat_Mount.stl	X -64, Y -2
BLTouch_Wing_Narrow.stl with BLTouch_Standard_Mount.stl	X -43, Y -13
BLTouch_Wing_Narrow.stl with BLTouch_Flat_Mount.stl	X -51, Y -12
BLTouch_Wing_No_Duct.stl with BLTouch_Standard_Mount.stl	X -37, Y -8
BLTouch_Wing_No_Duct.stl with BLTouch_Flat_Mount.stl	X -46, Y +2
BLTouch_Wing_Compact.stl with BLTouch_Slider_Compact.stl	X -38, Y +6
BLTouch_Wing_Compact.stl with BLTouch_Standard_Mount.stl	X -57, Y -10

Firmware Offset for EZABL, EZABL Pro:

EZABL_Mount_Wide_18mm.stl	X -62, Y -5
EZABL_Mount_Medium_18mm.stl	X -58, Y -5

22

In our example, we have used the following parts:-

BLTouch_Wing_Compact ***with the*** BLTouch_Slider_Compact

This gives us a proposed NEW OFFSET values of X -38, Y+6 which need to be SET and STORED in the printer firmware.

Using PRONTERFACE or a similar G CODE Terminal – enter the following TWO commands :-

M851 X-38 Y6

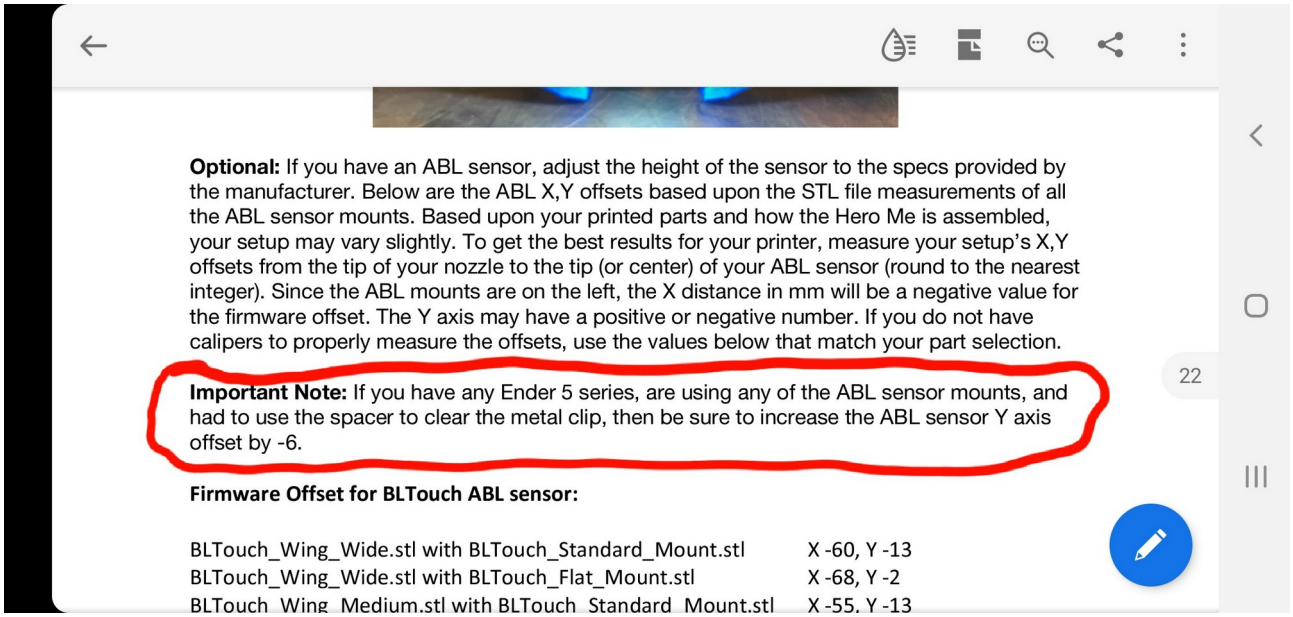
M500

NOTE : M851 sets the PROBE offsets for X, and Y – followed by M500 to STORE the new settings into firmware.

<u>NOZZLE not in correct place after HOMING?</u>

As the gantry adapter pushes the Hotend assembly FORWARD a few mm, it maybe necessary to make some additional changes to the HOMING values.

You can set the Home setting via your slicer software. Based upon the Gantry Adapter you are using, you may need to adjust the Y axis offset.



IF REQUIRED – enter the following TWO commands using your G CODE terminal.

M206 Y-6

M500

Note : This adjusts your Y axis offset M206, and stores it using M500. **IMPORTANT :** Power OFF / ON – and AUTO HOME to check if the NEW Y Offset has been stored.

In case these values do not place the hotend's nozzle just inside the edge of the build plate when homing the Y axis, you can adjust the Y offset value up or down to work for your setup.

The Marlin firmware detailed instructions on setting the printer's Home offset are here:
https://marlinfw.org/docs/gcode/M206.html

BEFORE RUNNING A COMPARISON PRINT

As we've made changes to the Hotend system, and have been moving the Z Axis around – some things may have moved from our previous setup.

BEFORE running a comparison print – you'll likely need to reset / change / set ONE or MORE of the following :-

- Probe Z Offset
- G34 Auto Alignment
- Bed Levelling

We suggest the following order :-

G34 Auto Z Alignment (ONLY if you have dual Z / dual steppers and G34 enabled in firmware)

Pre-heat your machine to an appropriate temperature - i.e. 200 nozzle / 60 bed
From the "Motion" menu, choose "Auto Z Align"
wait until the LCD display reports "Accuracy Achieved" (If this fails - Level your bed, and re-try)

Level your bed (All printers)

Pre-heat your machine to an appropriate temperature - i.e. 200 nozzle / 60 bed

From the "Motion" menu, choose "Level Corners"

Follow the procedure for levelling your bed corners / centre
- Once complete, select "Level Bed" from the menu (Your bed levelling procedure will now measure n/25 points)

- Once complete, choose "STORE SETTINGS" to store the G34 / Mesh Data from the bed levelling procedures.

AUTO-HOME your printer

Z Probe Offset Wizard (All printers with this Marlin feature ENABLED)
Under "Temperature" - lower the temperature of your hot-end to 150 degrees C (it needs to be WARM, but not oozing filament!)

Wait until the Hotend reaches the new lower temperature

Clean your NOZZLE (a dirty nozzle can interfere with Z Probe offset measurements in next step)

Run the "Probe Offset Wizard" from the LCD menu - "Probe Offsets" menu - to correctly set your Z Probe Offset

Follow the on-screen instructions.

Remember to "Store Settings" once complete.

COOLDOWN
From the "Temperature" menu, select "Cooldown"

TEST PRINT
FINALLY - load up, and print a bed tramming / 1st layer test gCode - to ensure your printer is dialled in (especially your Z Offset)

While it is printing - you can DOUBLE-CLICK the knob / selector wheel to access the Probe Z Offset values, and rotate left / right to "fine-tune" the value (includes Babystepping Z)

CONGRATULATIONS - YOUR ENDER 5 PLUS IS NOW READY TO USE.

Don't forget to "tune" your printer.

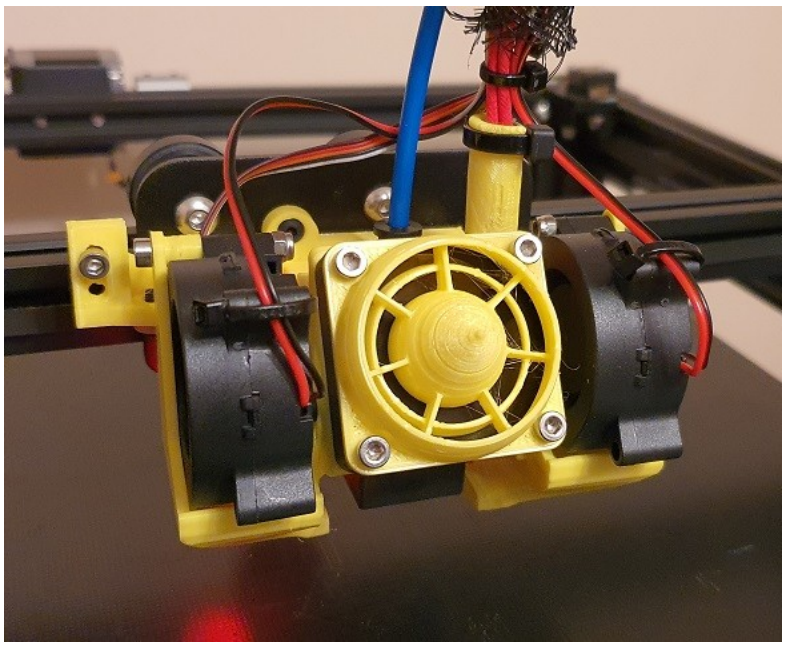
Advantages to DUAL BLOWERS

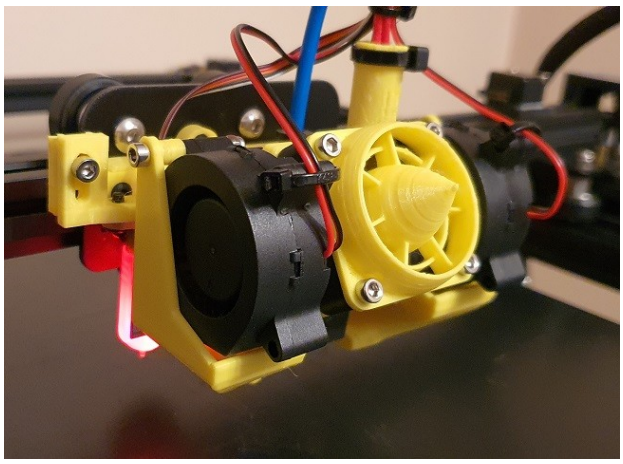
One advantage of running twin blowers is the ability to run them on a lower speed / power WITHOUT compromising airflow / CFM.

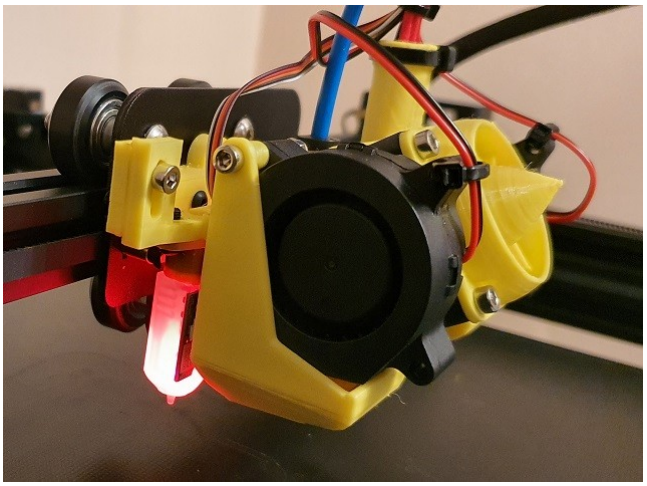
In your slicer programme - setting your PARTS COOLING (for Dual 4020) to 50% can often run MUCH quieter than running a single 4010 radial blower on full power / speed 100%.

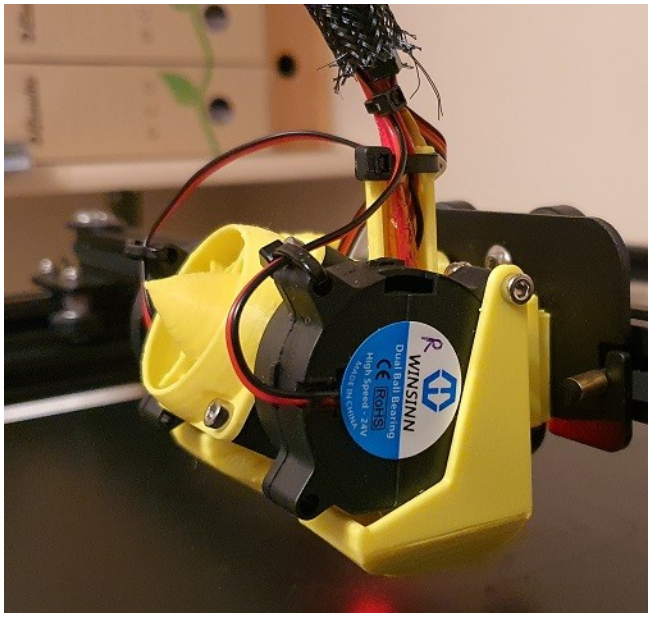
Better cooling, lower noise output. If you need the extra cooling, then of course you can increase the values 50%+ to improve your bridging, and overhangs etc.

- - finished - -








WINSINN
Dual Ball Bearing
High Speed - 24V