



## Bondtech for Prusa i3



## Assembly and installation manual

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## Acknowledgements

This is a co-development work with awesome guys in the Prusa Community like Chris Warkocki, Grégoire Saunier (Bear Upgrades), Olof Ogland, Erik Bjorgan, Josh Jones, Kyle Wiehe, Marc Evertz, Matt Harrison, Ocie Ward, Sando Bendig, Vecko Kojchevski (Vecko Extruder), Steven Mölby that have provided excellent feedback and suggestions of how to develop the "perfect" extruder setup for the Prusa series printer. A lot of work has been spent in this project and we have tried to listen to all the inputs in order to find a solution that can be fitted to a Prusa I3 MK2, MK2S, MK2.5 and MK3.

## Introduction

This kit contains the necessary parts to convert to our freshly designed extruder that uses 3:1 gearing ratio for improved precision and resolution, optimized geometry for the heat-sink cooling and many other improved features.

It also reduces the moving weight to reduce vibrations and ghosting.

## Compatibility

The upgrade is compatible with the following machines:

- Prusa i3 MK2
- Prusa i3 MK2s
- Prusa i3 MK2,5
- Prusa i3 MK3

## What's in the box?

### All customers

1x Bondtech extruder for Prusa i3.  
1x PTFE tube (80mm).  
1x SLS printed Extruder front.  
1x SLS printed Extruder rear.  
1x Bag with screws and bolts.  
1x Fan shroud.  
1x Mounting bracket.

### MK2, MK2s, MK2.5 and MK3 without BMG

1x Nema17 Pancake stepper motor.  
1x Stepper motor cable.  
1x Shaft with 50T gear.  
1x Thumbscrew.  
2x Ball bearings.  
1x 3x32mm shaft.  
1x Sensor cover

### MK2 and Mk2s

2x Needle bearing.  
1x 3x20mm shaft.  
1x Primary drive wheel (direct).  
1x Secondary drive wheel (direct).  
1x Sensor cover

# Mechanical Installation

## What you need

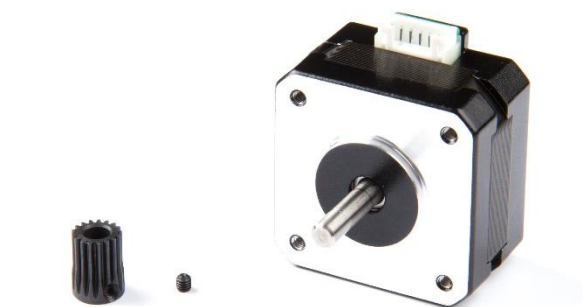
To install the upgrade you will need.

- M1.5- Hex Wrench
- M2.5- Hex Wrench
- Hobby knife with sharp tip or similar.

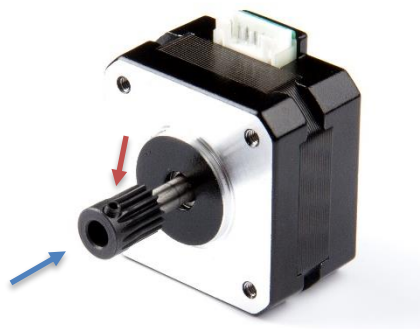
Recommended: Download and print out Bondtech's PTFE fixture for precise measurement of the tube length. STL-file available at [https://github.com/BondtechAB/Bondtech\\_Prusa\\_i3/tree/master/CAD-Files](https://github.com/BondtechAB/Bondtech_Prusa_i3/tree/master/CAD-Files)

## Preparation

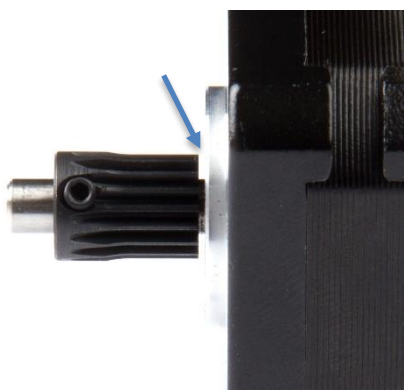
Remove your old extruder. Use Prusa's extruder assembly guide to reverse the steps if you need to. This kit will use a different motor, so you can unwrap the cables, remove your current motor to prepare for a new one.



- **Preparing your motor.**



- Insert the M2x3 setscrew and slide the motor gear onto the shaft as oriented in the picture.

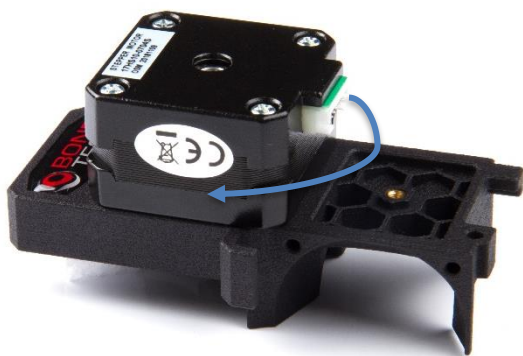


- Leave a 1-1,5 mm gap between the gear and the motor and tighten it using your 1,5mm Allen key.

Recommended: Use Loctite to secure the screw.

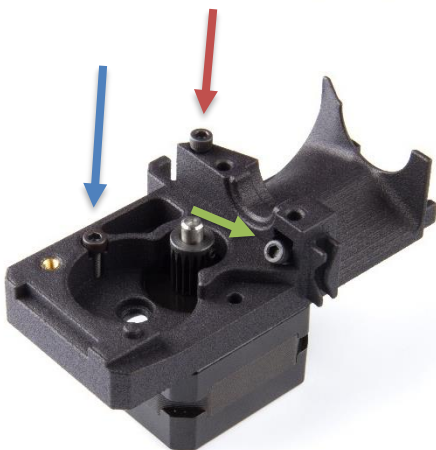


- **Assembly the extruder front.** Make sure the pre-assembled M3 Hex nut is mounted and fixed in the front piece of the extruder body.



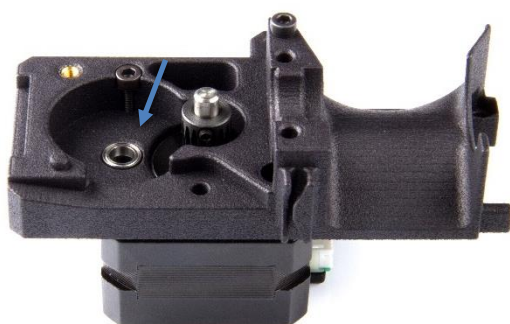
- Place the motor on the extruder front and orient the cable connection as you choose. (Downwards or to the left.)

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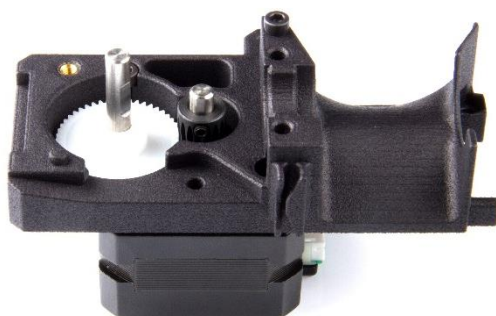


- Insert three M3 screws and loosely tighten them using a 2.5mm Allen key.

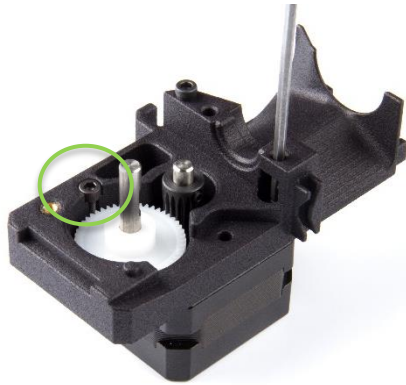
- M3x8
- M3x12
- M3x25



- Insert a ball bearing. Ensure it is fully pressed down into the slot.



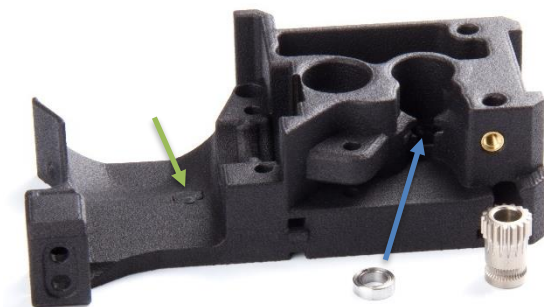
- Insert the shaft with the white plastic gear into the bearing. Rotate the shaft to ensure correct alignment of the gears.



- Tighten the screws with reasonable force.
- **Important: Be careful when tighten the M3x12 screw to avoid damaging the pocket!**



- Insert a square nut into the pocket.

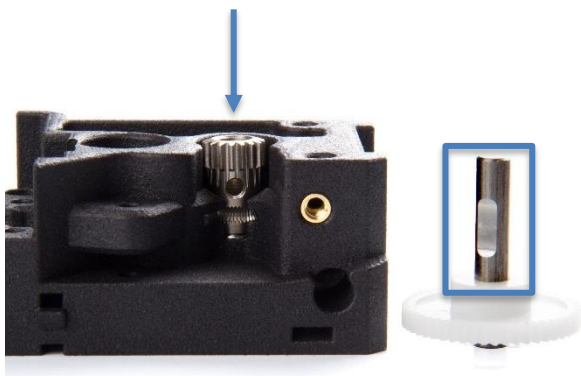


- **Prepare the extruder rear.**  
Insert a ball bearing and press it down using a primary drive gear.
- If you are using the bear X-carriage remove hex cover plug by pushing it from the rear side. This hole is for a M3 nut.

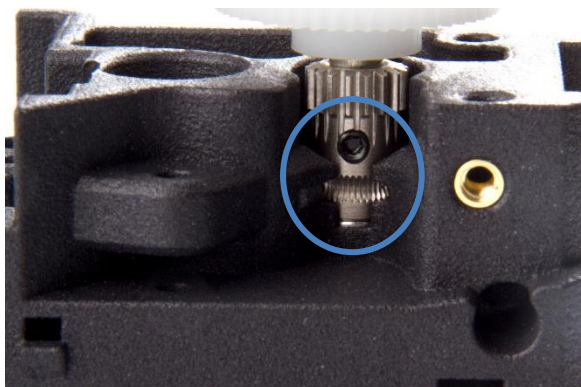


- Press the primary drive gear down until the grooves align with the filament path.





- Slide the shaft inside the drive gear. Note the orientation of the parts. The hole and the flat surface on the shaft must align.



- Insert the M3x2 setscrew and tighten it with your 1,5 Allen key.

**Important: Ensure the grooves align with the filament path!**

Recommended: Use Loctite to secure the screw.



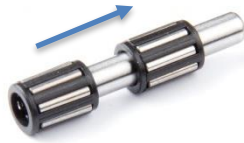
**Important: If the setscrew is not properly aligned with the flat surface it will stick out and start grinding on the secondary drive gear when you start printing!**



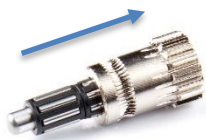
- Assemble the hinge.



- Slide the two needle bearings onto the 3x20 mm shaft.
- Use a small dab of lithium based grease to lubricate the bearings



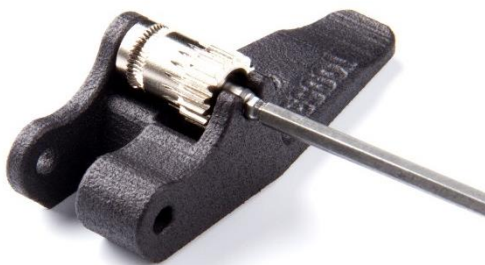
- Slide the shaft with the bearings through the secondary drive gear.



- Align the gear with the hinge as shown in the photo and press the shaft down until you hear the click.

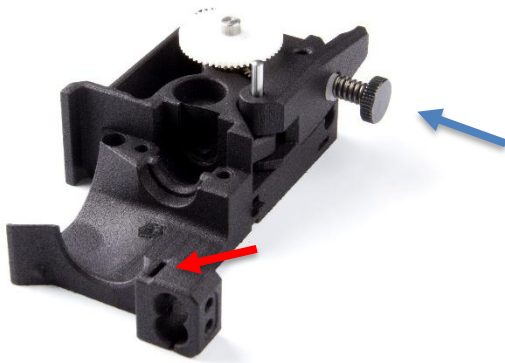


- Carefully press the shaft in place using your 2.5mm Allen key.
- Put a small dab of lithium based grease on the gear section to reduce friction. Make sure that you do not get it on the drive section of the gear.

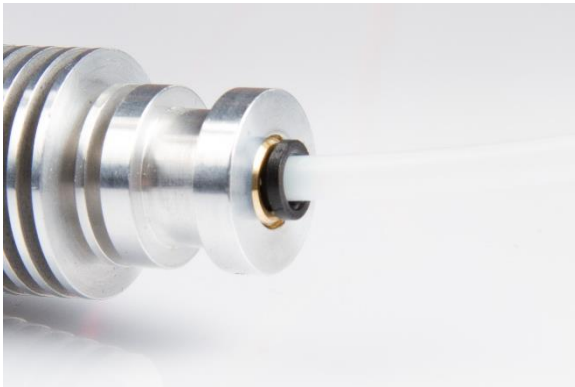




- Install the hinge to the extruder rear using the 3x32mm shaft.



- Install the thumbscrew.
  - If you are a MK2/s user insert a square nut in the front pocket for the Pinda Probe.



- **Prepare the HotEnd.** Take the new supplied PTFE tube. Cut one of the ends according to Prusas recommendation, using a knife or a razor. Using this [fixture](#) will help. (Credits to Olof Ogland)

- Insert the newly cut end of the tube into the HotEnd.



- Cut the tube 6.3 mm from the top of the HotEnd. Save the remaining piece for the sensor cover.



- Recommended: Use Bondtech's cutting fixture for precise measurement. STL-file is available at: [https://github.com/BondtechAB/Bondtech\\_Prusa\\_i3/tree/master/CAD-Files](https://github.com/BondtechAB/Bondtech_Prusa_i3/tree/master/CAD-Files)



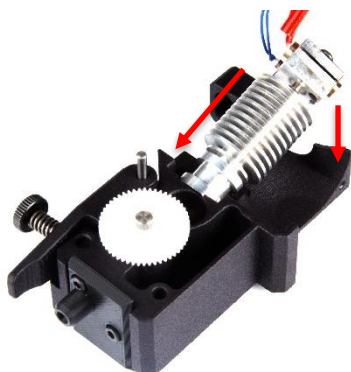
- Use a knife or razor to chamfer the inside of the tube for better filament guidance.

**Important: Do not let any left over from the tube fall into the HotEnd we recommend you remove the tube before chamfer the inside!**

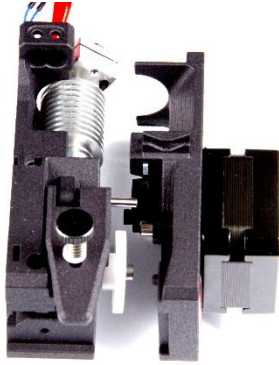
- Insert a push fit clip between the HotEnd and the collet.



- Recommended: Add a small piece of tape, 5x20mm on the inner ring. The low friction between the parts may cause the HotEnd to rotate to easily when installed.

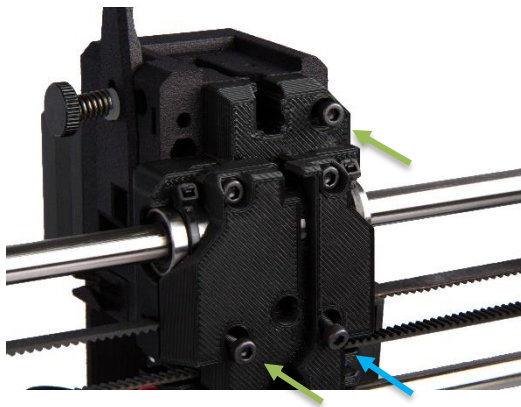


- Install the HotEnd into the extruder rear, angled as shown in the photo. And push it in place.



- Attach the front onto the rear part. Push the HotEnd upwards to align the neck correctly.
- Ensure everything is aligned and carefully clamp the parts together.

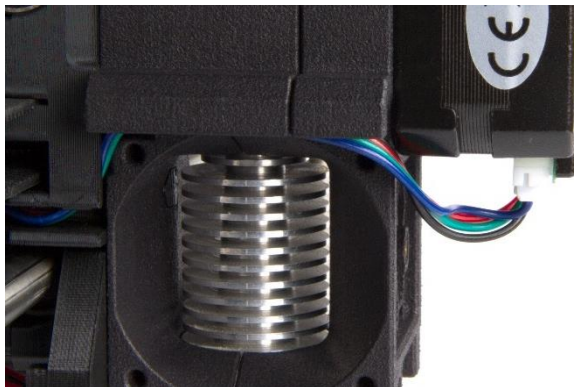
**Important: The parts should fit together easy. Do not use any excessive force!**



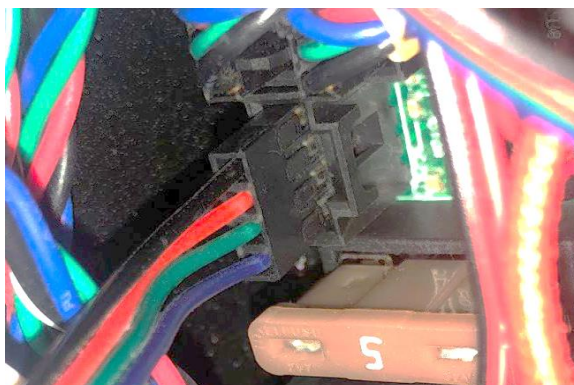
- Install the extruder to your X-Carriage using three M3 screws.

- M3x40
- M3x45

**Important: These screws are sized to use on your stock MK2,5/MK3 carriage or the modified MK2/s carriage. If you have another carriage different screw length could be necessary!**

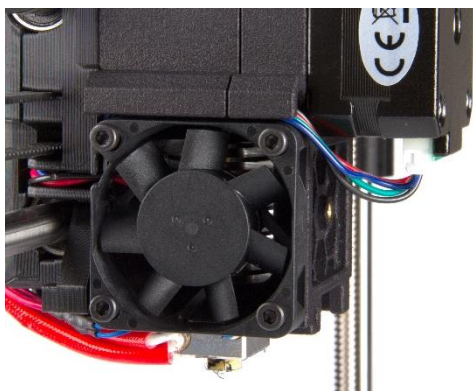


- Connect the cable to the motor and use the cable path to the left of the extruder for guidance.

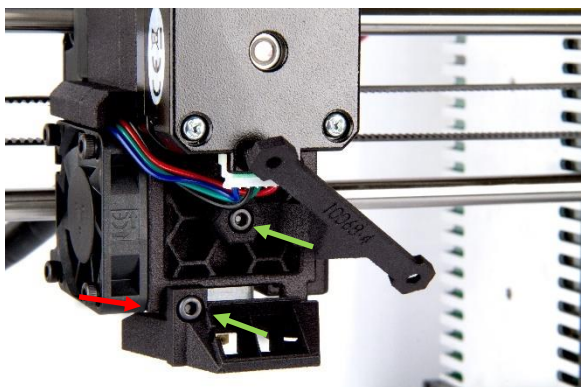


- When connecting the cable to you board ensure the black cable is the top most cable or the motor will rotate the wrong way!



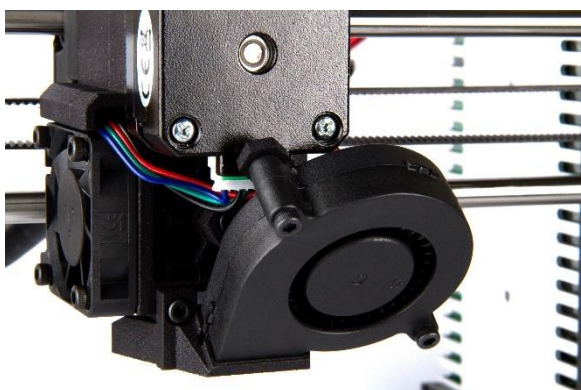


- Install your 40x40 fan using four M3x12 screws.

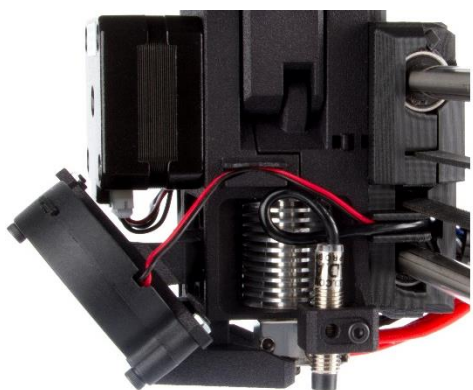


- Install the mounting bracket using a M3x10 screw. Place a M3 hex nut in the pocket and tightened the fan shroud using a M3x10 screw.

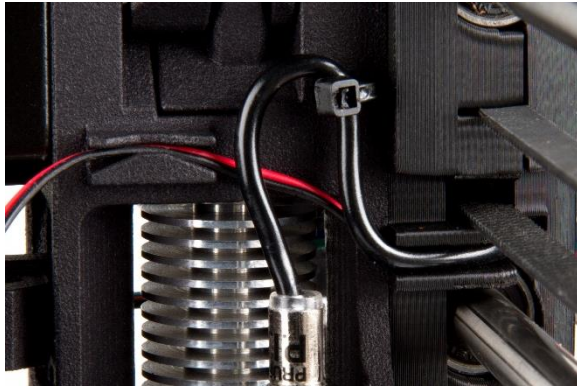
- M3x10
- M3 hex nut



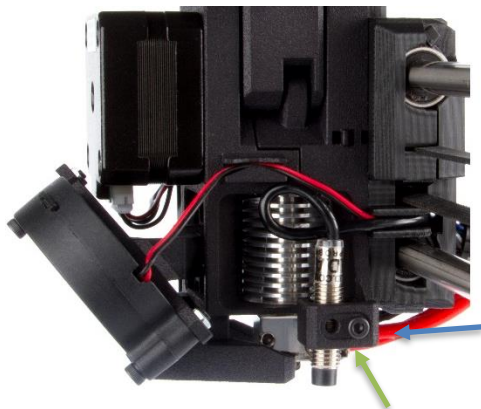
- Place two hex nuts into the slots on the mounting bracket and slide your 5015-blower fan down the fan shroud and mount it using two M3x20 screws.
- Place the cable in the channel on the right side of the extruder to help guide the way.



- The position of the P.I.N.D.A probe depends on your version of the printer. MK2/s users place the probe to right (Closer to the X-axis) MK2.5 and MK3 users place the probe to the left (furthest away from the X-axis).



- Optional P.I.N.D.A cable position. This technique is developed by Grégoire Saunier, creator of the Bear Extruder, to improve air flow and reduce turbulence. Check out his work [here](#):



- MK2.5, MK3 users insert a square nut into the right slot (MK2s in the left as shown earlier). Secure the P.I.N.D.A using a M3x16 screw.

- Square nut
- M3x16

Reminder: Adjust the height of the probe according to Prusa's instructions.

- Cut a 14.5mm long piece of the left-over PTFE Tube and insert it into the filament path on top of the extruder.

Recommended: Before inserting the tube use a knife or razor to chamfer the inside of the tube for better filament guidance.



- If you have a filament sensor install it according to Prusa's instructions.
- Place the sensor cover on top and fasten it using two M3x8 screws.







## Software Configuration

As the new extruder uses a gear reduction to create a high extrusion resolution and high torque the E-step value needs to be changed. The E-step value tells the printer how many steps to send to the motor for each mm of filament.

### Set new E-step value

The E-step value is set using a G-code file that you can download [here](#):  
These files are used to set the new E-step value on the printer. On MK2, MK2S and MK2.5 the E-step value should be 415 as it uses 16-bit microstepping, on MK3 it shall be 830 as it uses 32-bit microstepping, this is valid for standard 1.8 degree stepper motors, if a 0.9 degree motor is used the E-step needs to be doubled, so 830 and 1660.

Copy the file to the SD-card and put it in the printer, select to print the file and the new e-step value will be set and saved to the controller.

Good luck with your Bondtech feeder!

If you have any questions please first read the FAQ (<http://www.bondtech.se/en/faq/>). If the question still hasn't been answered feel free to contact us by email or our online chat.



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