BMG for Creality CR-10

Assembly and installation manual

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Acknowledgements

Special thanks to Don Stauffner for the help with the design of the housing for the filament sensor.

Introduction

The Bondtech BMG 1.75 mm extruder is the simplest way to increase the performance and reliability of your Creality CR-10 printer in a matter of minutes.

This new revolution in design utilizes the proven **Bondtech Dual Drive Technology** with precision CNC-manufactured parts. This gives the market's best feeder performance and reliability.
The Upgrade allows you to prototype even faster and print with peace of mind.

Compatibility

The upgrade is compatible with the following machines:
- Creality CR-10
- Creality CR-10S

What's in the box?

1x Bondtech BMG Righthand extruder with a filament guide.
1x Motor gear
4x M3 Nuts (installed into bracket if purchased)
4x M3x8 bolts
1x Mounting bracket

As we share the files of the mount you can also buy the kit without the mount and print the part yourself.

Mechanical Installation

What you need

To install the upgrade you are going to need
- M1.5- Hex Wrench
- M2.0- Hex Wrench
- M2.5- Hex Wrench
- Hobby knife with sharp tip or similar.

This guide shows the installation on an Creality CR-10S printer
Start by unloading the material from your printer. After the filament has been removed, turn off the heater, wait for it to cool down, then turn of the printer.
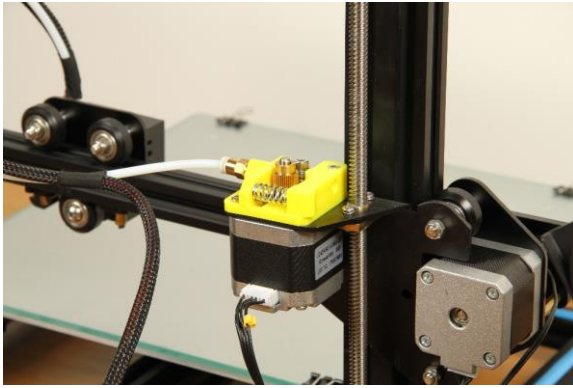
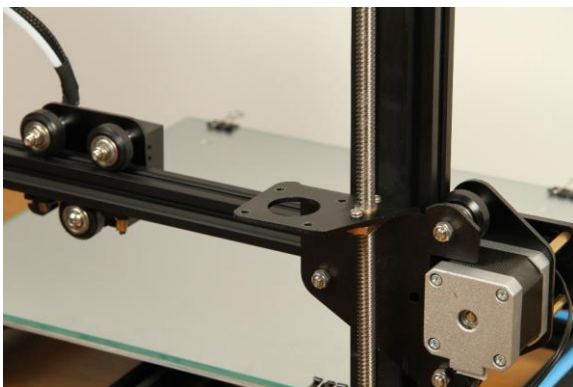- Rotate the printer so you can access the rear side.
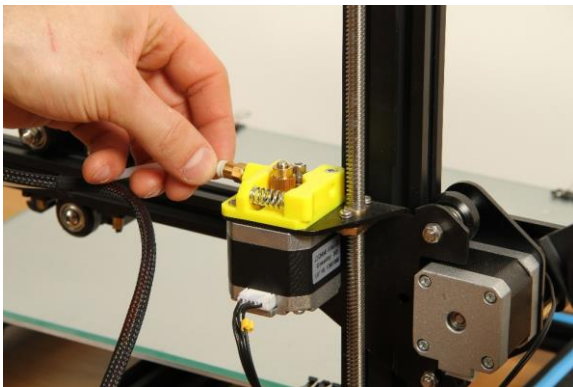
- Disconnect the Bowden tube from the extruder by pressing the top collar down and pulling the tube out at the same time
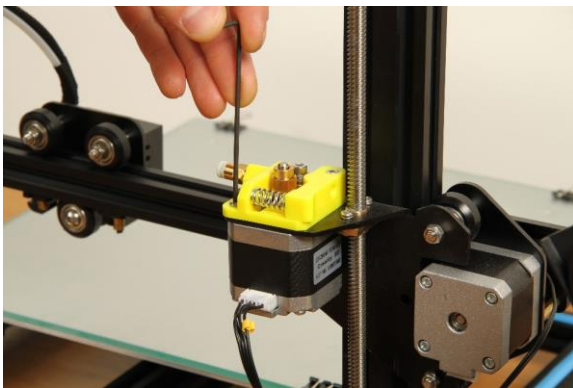
- Loosen and remove the M3 screws that holds the extruder and motor attached to the bracket.

  Also disconnect the stepper motor cable.

- Extruder and motor removed.

- Remove the existing drive gear from the motor using a 1.5 mm hex key.

- This photo shows what is included into the kit if you purchased it with the mount.

  Also the mount shown is the version with filament sensor.

- Use the new gear included in the set and place it onto the motor shaft, make sure the setscrew is aligned with the flat plane on the motor shaft.

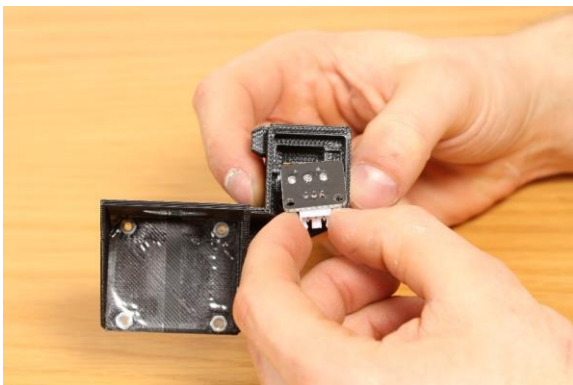 **Important! Please use the orientation shown in the photo!**

- Leave about 1-1.5 mm clearance between the gear and the motor. Tighten the setscrew.
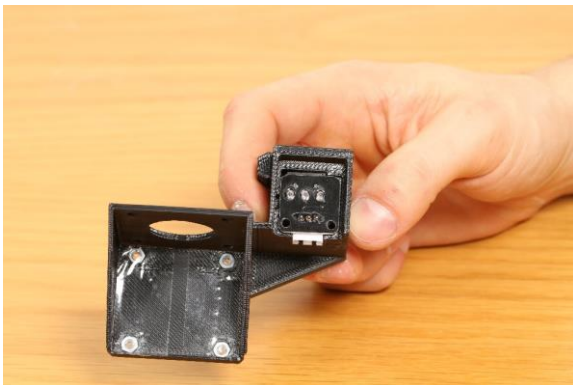
If you have a Creality CR-10S then you have a filament sensor, we have integrated the housing for the sensor into the mount.
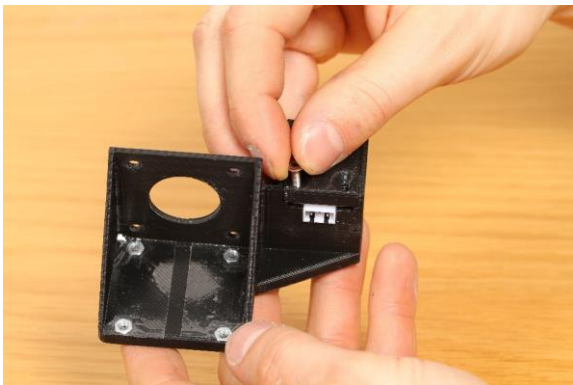
- Unscrew the two M3 screws that holds the lid and the microswitch together and remove the microswitch.

- Place the microswitch into the new mount, please note the orientation and take care that the metal tab moves into position.

- Microswitch correctly positioned into the mount.

- Use the two screws you removed earlier from the original unit and screw them into the housing to secure the cover and the microswitch.

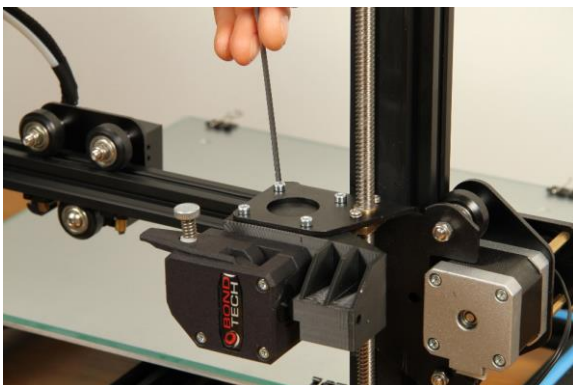- Place the mount onto the motor with the connector facing as in the photo.

- Place the extruder onto the mount, be careful and guide the motor gear into the extruder so it has the correct position for the white gear. Tighten the screws to hold it together.
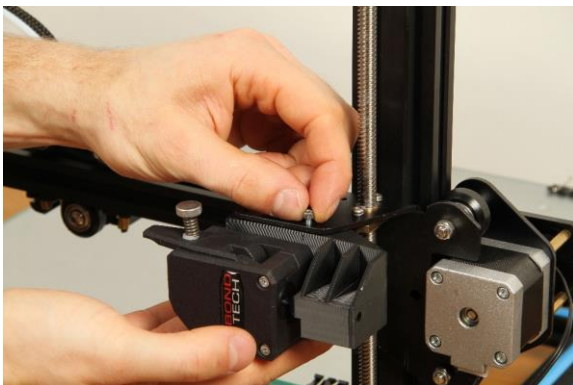
- Place the extruder with the bracket and use the included M3x8 bolts to secure it to the bracket on the printer.
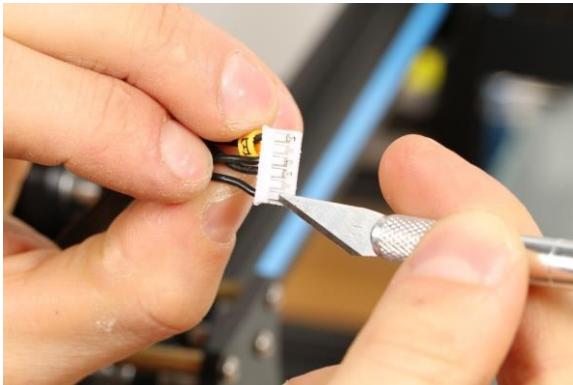

- Tighten all 4 screws.
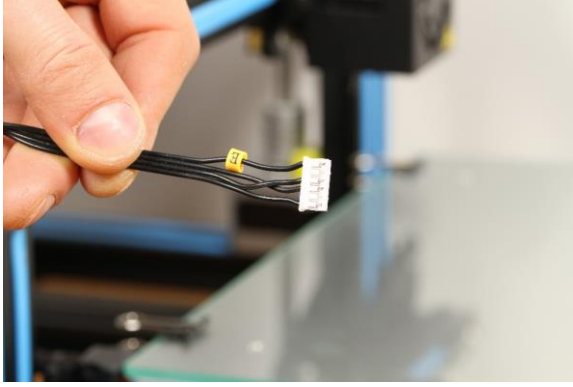
Since the BMG Extruder uses a gearing the rotation direction of the motor needs to be revered.

This photo shows how the cables are arranged in the connector for the extruder as default.

To change the rotation direction of the motor one of the two coils needs to be reversed polarity. We will move two cables in the connector and let them switch position.

- Use a Hobby knife and gently lift the small plastic tab and pull out the cable from the connector from position 1 as in the photo.
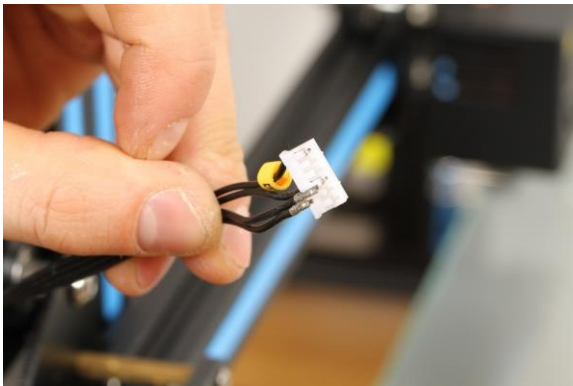
- Repeat this for the cable in position 4 (position 2 is empty) so both cables is loose.
  Now place the cable that was in position 1 to position 4 and the cable that was in position 4 to position 1.
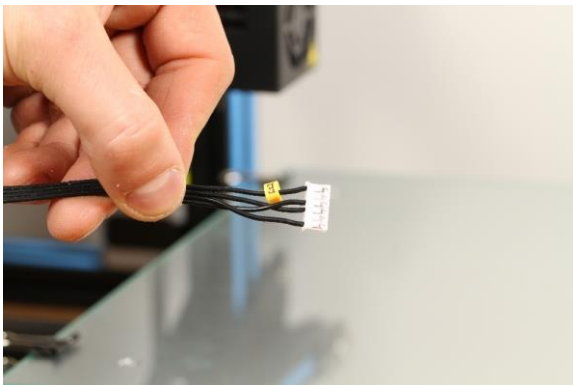
- This is how the cables is connected once they are moved, compare to the photo in the top.

- Now connect the modified cable to the stepper motor.
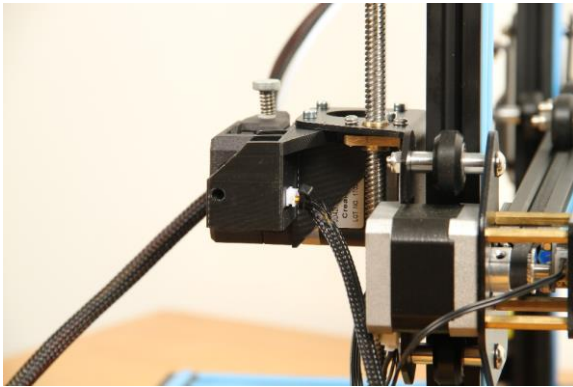
- Connect the cable to the filament sensor
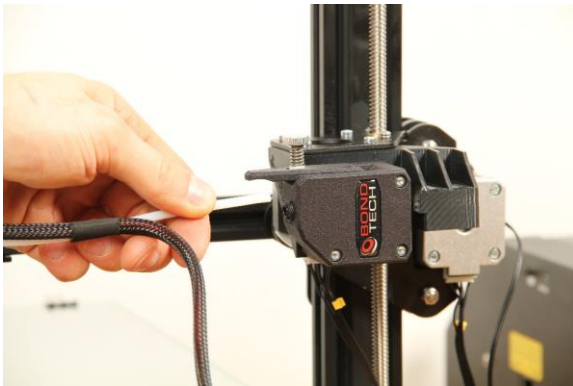
- Connect the Bowden tube to the extruder and place the Bowden clip under the collar of the push fit connector.

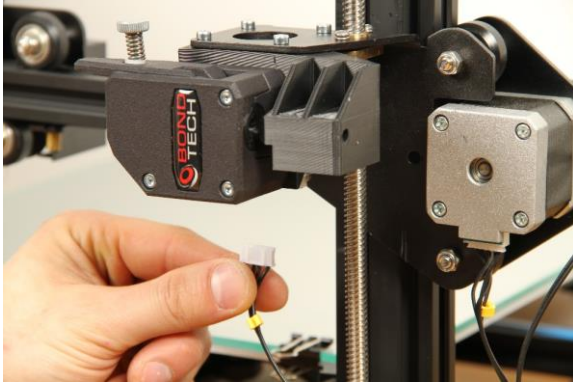 Tip: to reduce the risk of backlash in the Bowden tube pull the black collar of the push fit when you are pressing the tube hard into the extruder.

You successfully upgraded your feeder! Now you just need to configure the software of your 3d printer to start printing again.

Electrical configuration

As the new extruder uses a gear reduction the possible force it an feed the filament with will be very high when using the stepper motor that came with the printer, in order to reduce the risk of pushing the Bowden tube out of the connector if there is a blockage in the hotend it is strongly recommended to lower the current for the motor so it will skip steps instead of pushing the tube out of the pushfit connector.
Identify the stepperdriver for the extruder and use a multimeter set to DC voltage, put the negative sensor probe on the negative terminal and the positive sensor probe to the small screw on the potentiometer, read the value and then turn the potentiometer until the value is reduced with about 50-60% of the original value.

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.

Using original firmware

If you are using the original firmware on your printer you will have to add the following line to the start script so it will set the new E-step value to 415.
M92 E415

This is the standard start script for Creality CR-10 in Simplify3D
G28 ; home all axes
G1 Z5 F3000 ; lift
G1 X5 Y10 F1500 ; move to prime
G1 Z0.2 F3000 ; get ready to prime
G92 E0 ; reset extrusion distance
G1 Y80 E10 F600 ; prime nozzle
G1 Y100 F5000 ; quick wipe

We add the following line.
G28 ; home all axes
M92 E415 ; set new E-step value for Bondtech BMG Extruder
G1 Z5 F3000 ; lift
G1 X5 Y10 F1500 ; move to prime
G1 Z0.2 F3000 ; get ready to prime
G92 E0 ; reset extrusion distance
G1 Y80 E10 F600 ; prime nozzle
G1 Y100 F5000 ; quick wipe

If you are using Cura you will be using the same method.

Using custom firmware

If you have installed a custom firmware in your printer you can change the e-step value directly in the firmware so there will be no need to put the command into the start script.

In the file configuration.h there is a section that contains the step values for the printer.

```
/**
 * Default Axis Steps Per Unit (steps/mm)
 * Override with M92
 *                      X, Y, Z, E0 [, E1[, E2[, E3[, E4]]]]
 */
#define DEFAULT_AXIS_STEPS_PER_UNIT   { 80, 80, 4000, 96 }
```

In order to set the new value of 415 cange the line to this.
#define DEFAULT_AXIS_STEPS_PER_UNIT   { 80, 80, 4000, 415 }

And recompile the firmware and upload it to the printer.

If your printer is a CR-10S then you should be able to upload the new firmware through USB, if your printer is a CR-10 then you first need to install a bootloader, below is a link to the procedure.
http://www.instructables.com/id/Flashing-a-Bootloader-to-the-CR-10/

Note: You are making these modification at your own risk.

General usage advice

As a general setting for the Thumbscrew adjuster we recommend using the following.

Hard filaments like PLA, ABS, PETG
Tighten the thumbscrew fully and then back it off 1.5 turns.

Soft filaments:
Tighten the thumbscrew fully and then back it off 3-4 turns.

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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