



# Assembly & Installation Guide ULTIMAKER 3

The Bondtech QR Extruder for 3.0 mm filament for use as a Bowden or a direct Extruder. The extruder uses high-quality industrial pneumatic push-fit fittings for attaching the bowden tube. It has also thread inserts to have a strong connection of the fasteners. The mount for the hotend is a standard "Groovemount" that makes it possible to use the E3D hotends as well as others following this standard.

This new revolution in design utilizes the **Bondtech Dual Drive Technology** with precision CNC-manufactured parts which gives the markets best performance and reliability.

Thanks for your support making this project a reality!

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## Mechanical & Electrical Installation

This guide shows the installation on a Ultimaker 3.

Start with unload both materials from the printer and remove the spools.



Remove the clip on the bowden connector and disconnect the bowden tube from both extruders.



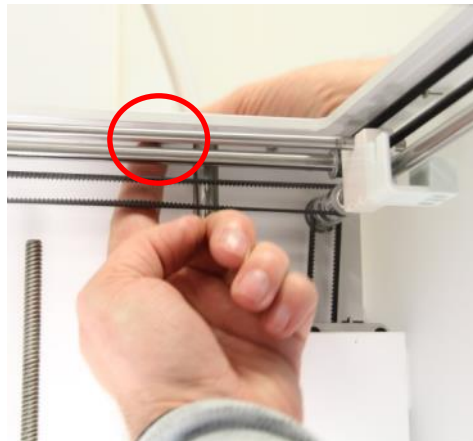
This is the extruders, the mount for right and left side and the M3x20 bolts supplied in the kit.



The new mounts for the extruders are mounted with the top screws holding the rear panel together with the top panel.

Start to unscrew one of the screws with a hex-key.

As there is a square M3 nut inserted into the top plate you will have to prevent it from falling out of the pocket once the screw is removed, place your finger on the inside of the printer and keep the nut secure while removing the screw.



Take the mount for the left extruder and insert one of the supplied M3x20 bolts into the holder and into the hole and use a hex-key to fasten it lightly and at the same time keep your finger to avoid the nut to fall out. Once the screw has started to thread into the nut you can remove your finger. Do not tighten fully yet. When the first screw is installed you can remove the second screw and put your finger on the second nut to avoid it from falling out.



Once both screws are in place tighten them with moderate force until the mount is secure.



Repeat this for the other mount for the right side.



Loosen the screws holding the top clamp and remove the clamps.



Once the top clamps are removed place the extruder into the holder and reattach the top-clamp and tighten the screws.

Make sure the correct extruder is placed on the correct side, the quickrelease levers should be facing out. Make sure the extruder is oriented vertical.



Remove the clip on the pushfit connector and insert the Bowden tubes into the extruders. Make sure that the Bowden tube is pushed into the connector all the way into the extruder.



Place the clip under the collar of the pushfit connector to prevent the Bowden tube to be pushed out and to remove backlash.





## Electrical installation

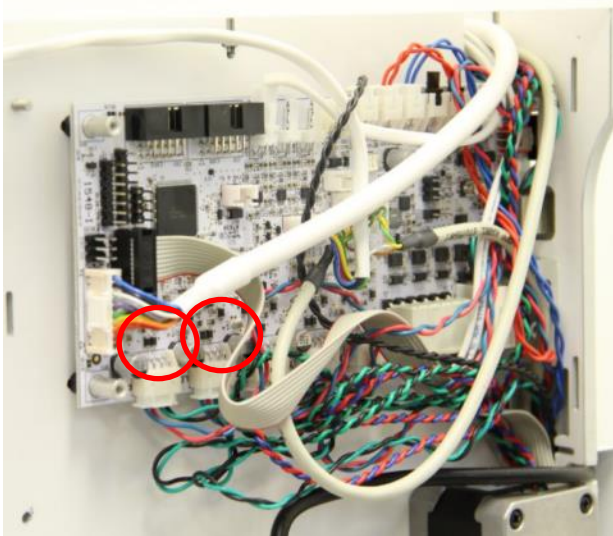
Place the printer on a soft blanket to protect the panels, tilt it down so it lays on the right side.



Loosen the screws holding the white cover for the electronics.

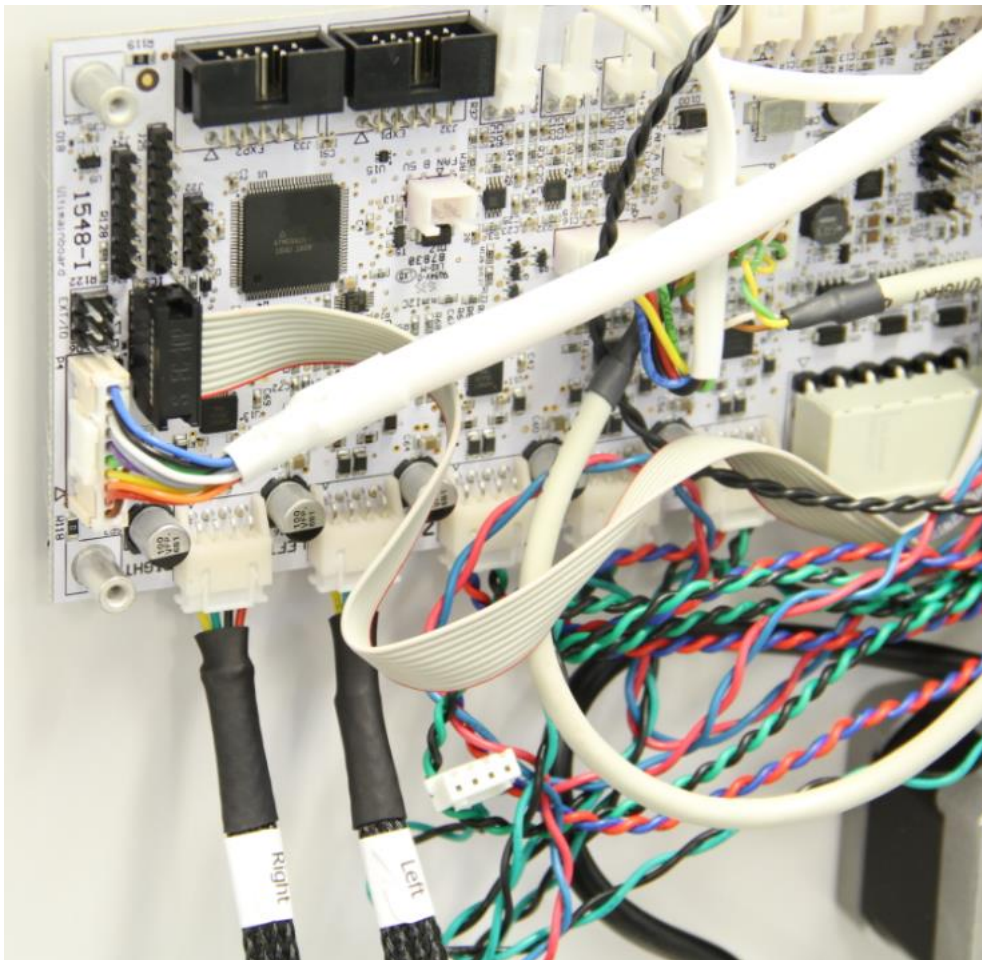


Once the cover is removed locate the cables for the two extruders (Marked RIGHT & LEFT) and gently disconnect the original cables from the board.

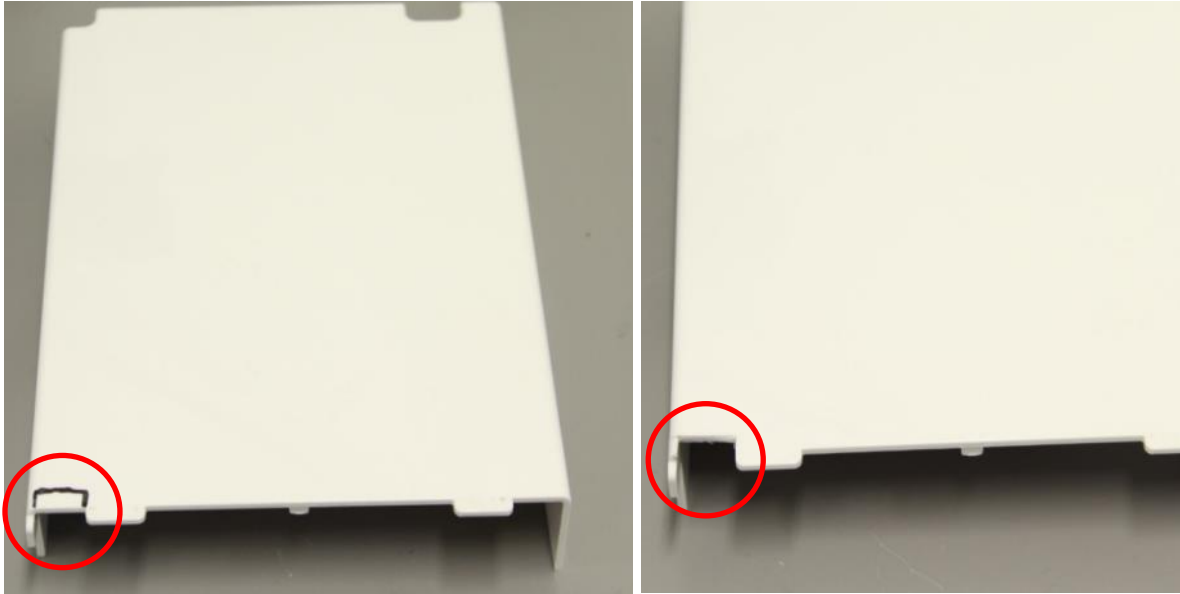




Use the new supplied cables and connect them into the controller, the cable has a marking so make sure that the cable marked with RIGHT goes into the RIGHT connector on the controller and the same for cable marked LEFT.



In order for the new cables to be routed out on the back of the printer a small notch has to be made in the electronics cover. Use a wire cutter or a knife to cut a small opening marked with black below.



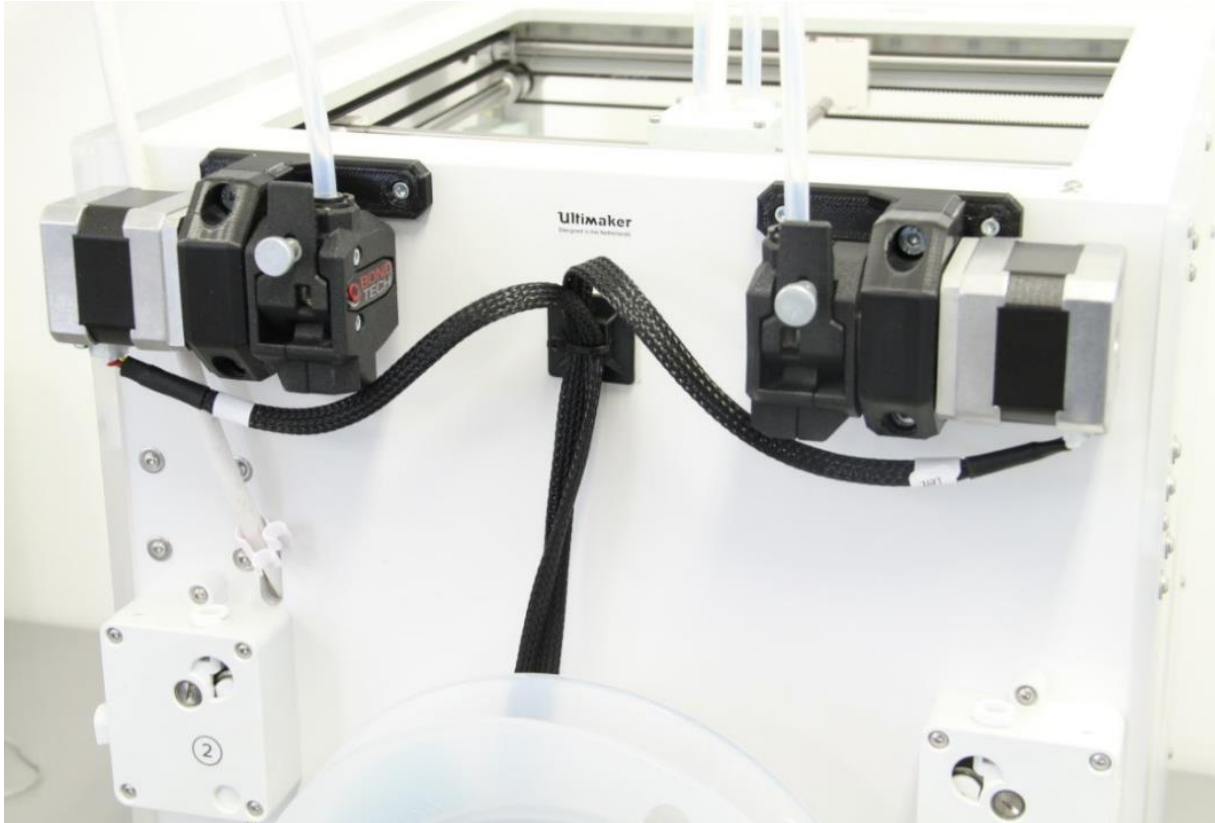
Route the new cables under the electronics cover so it comes out in the small notch just made, take care not to pinch any cables when reattaching the cover.



Reinstall the screws holding the electronics cover from the inside.

Route the cables on the back of the printer and use the supplied self adhesive cable mount and use the cable tie to hold the cables secure on the back panel.

Connect the cables to the motors.



## Software installation

Start the printer

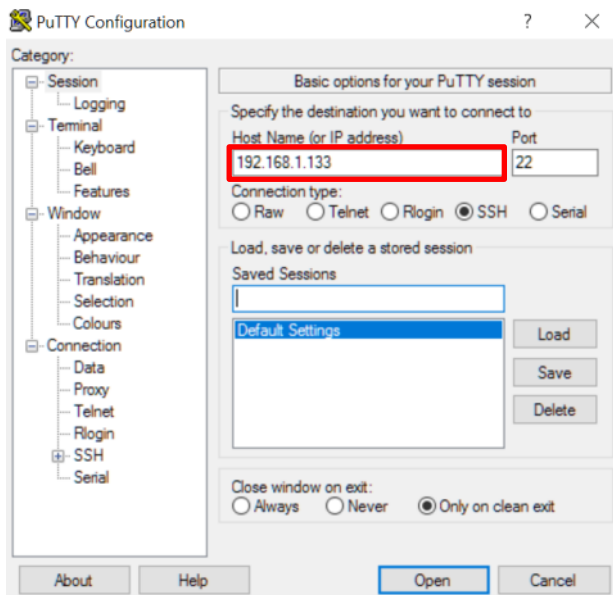
Download and install the latest firmware 3.5.3.20161221

Once firmware is installed navigate with the LCD menu to maintenance and enable dev mode

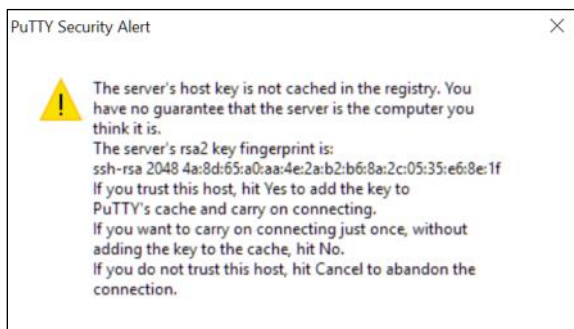
UM3 will then reboot

Download a SSH/Telnet client like Putty [Windows version](#) and install it on your computer. Locate the IP number of your Ultimaker3 by navigating to System/Network where your IP of the printer is shown on the bottom of the display for example 192.168.1.133.

Enter this IP-adress in the Putty window and click on Open



The first time this Alert will pop-up and you need to click OK to accept the connection.



The connection window opens up and enter **root** as the username and **ultimaker** as the password.



```
192.168.1.133 - PuTTY
login as: root
root@192.168.1.133's password:

The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.

Ultimaker
Welcome to our kingdom. Please be responsible.
root@ultimakersystem-ccbdd30007b8:~#
```

Type in “vi /usr/share/griffin/griffin/machines/jedi.json” and press enter

**NOTE! From Firmware 3.7 the file name has been changed to um3.json. So the command to type is “vi /usr/share/griffin/griffin/machines/um3.json”**

```
192.168.1.133 - PuTTY
login as: root
root@192.168.1.133's password:

The programs included with the Debian GNU/Linux system are free software;
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Ultimaker
Welcome to our kingdom. Please be responsible.
root@ultimakersystem-ccbdd30007b8:~# vi /usr/share/griffin/griffin/machines/jedi
.json
```

The editor opens the configuration file, scroll down with the arrows until you find “default\_steps\_per\_mm” row and use the arrow key to move the cursor to the value for the extruder “369.0”, then press the “I” key to go into edit mode and update the value to 492.45.

```
192.168.1.133 - PuTTY
"default_travel_speed": 150,
"nominal_nozzle_z_offset": 1.5,

"hotend_switching_speed": 33,
"nozzle_lifting_filament_movement_amount": 9.0,

"idle_retraction_amount": 15.0,
"deprime_retraction_amount": 26.5,
"deprime_retraction_speed": 10.0,
"hotend_prime_location": [180.0, 6.0],
"prime_amount": 8.5,

"leveling_paper_thickness": 0.15,

"default_hotend_pid": {"Kff": 0.57, "Kp": 9.0, "Ki": 0.2, "Kd": 40.0, "Ki_max":
"default_bed_pid": {"Kff": 0.0, "Kp": 124.55, "Ki": 23.46, "Kd": 165.29, "Ki_max

"default_steps_per_mm": {"X": 80.0, "Y": 80.0, "Z": 400.0, "E": 369.0},
"default_motor_current": {"XY": 1300, "Z": 1300, "E": 1250},
"default_power_budget_management": {
  "max_power_per_hotend_slot": 75,
  "total_power_budget": 221,
  "idle_power_consumption": 46,
  "nominal_bed_resistance": 3.678255,
~/usr/share/griffin/griffin/machines/jedi.json 33/382 8%
```

```
192.168.1.133 - PuTTY
"default_travel_speed": 150,
"nominal_nozzle_z_offset": 1.5,

"hotend_switching_speed": 33,
"nozzle_lifting_filament_movement_amount": 9.0,

"idle_retraction_amount": 15.0,
"deprime_retraction_amount": 26.5,
"deprime_retraction_speed": 10.0,
"hotend_prime_location": [180.0, 6.0],
"prime_amount": 8.5,

"leveling_paper_thickness": 0.15,

"default_hotend_pid": {"Kff": 0.57, "Kp": 9.0, "Ki": 0.2, "Kd": 40.0, "Ki_max":
"default_bed_pid": {"Kff": 0.0, "Kp": 124.55, "Ki": 23.46, "Kd": 165.29, "Ki_max

"default_steps_per_mm": {"X": 80.0, "Y": 80.0, "Z": 400.0, "E": 492.45},
"default_motor_current": {"XY": 1300, "Z": 1300, "E": 1250},
"default_power_budget_management": {
  "max_power_per_hotend_slot": 75,
  "total_power_budget": 221,
  "idle_power_consumption": 46,
  "nominal_bed_resistance": 3.678255,
~/usr/share/griffin/griffin/machines/jedi.json [Modified] 33/382 8%
```

Move to next row “default\_motor\_current” and change the value for the extruder from 1250 to 1000.

```
192.168.1.133 - PuTTY
"nozzle_lifting_filament_movement_amount": 9.0,

"idle_retraction_amount": 15.0,
"deprime_retraction_amount": 26.5,
"deprime_retraction_speed": 10.0,
"hotend_prime_location": [180.0, 6.0],
"prime_amount": 8.5,

"leveling_paper_thickness": 0.15,

"default_hotend_pid": {"Kff": 0.57, "Kp": 9.0, "Ki": 0.2, "Kd": 40.0, "Ki_max": 40, "Kpof": 0.0, "Re": 0.0},
"default_bed_pid": {"Kff": 0.0, "Kp": 124.55, "Ki": 23.46, "Kd": 165.29, "Ki_max": 140, "Kpof": 0.0},

"default_steps_per_mm": {"X": 80.0, "Y": 80.0, "Z": 400.0, "E": 492.45},
"default_motor_current": {"XY": 1300, "Z": 1300, "E": 1000},
"default_power_budget_management": {
  "max_power_per_hotend_slot": 75,
  "total_power_budget": 221,
  "idle_power_consumption": 46,
  "nominal_bed_resistance": 3.678255,
  "bed_resistance_per_degree": 0.012288,
  "bed_voltage": 24.0,
  "hotend_voltage": 24.0
},

"safe_human_touchable_hotend_temperature": 60.0,
"default_minimal_extrusion_temperature": 170
},
"procedures": {
  "PRE_PRINT_SETUP": [{"genericProcedure.GenericProcedure",
    ["DUMMYING", "dummyStep.DummyStep"],
    ["CHECK", "pre and post print.runChecksBeforePrint.RunChecksBeforePrint"],
    ["RESET_OFFSET 1", "queueRawCodeWaitStep.QueueRawCodeWaitStep", "M210 T1 X0 Y0 Z0"],
    ["RESET_OFFSET 0", "queueRawCodeWaitStep.QueueRawCodeWaitStep", "M210 T0 X0 Y0 Z0"],
    ["APPLY_XY_CALIBRATION", "pre and post print.applyXyAlignmentStep.ApplyXyAlignmentStep"],
~/usr/share/griffin/griffin/machines/jedi.json [Modified] 34/382 8%
```

```

192.168.1.133 - PuTTY
*nozzle_lifting_filament_movement_amount*: 9.0,
*idle_retraction_amount*: 15.0,
*deprime_retraction_amount*: 26.5,
*deprime_retraction_speed*: 10.0,
*hotend_prime_location*: [180.0, 6.0],
*prime_amount*: 8.5,
*leveling_paper_thickness*: 0.15,
*default_hotend_pid*: (*Kff*: 0.57, *Kp*: 9.0, *Ki*: 0.2, *Kd*: 40.0, *Ki_max*: 40, *Kpcf*: 0.0, *Ke*: 0.0),
*default_bed_pid*: (*Kff*: 0.0, *Kp*: 124.55, *Ki*: 23.46, *Kd*: 165.29, *Ki_max*: 140, *Kpcf*: 0.0),
*default_steps_per_mm*: (*X*: 80.0, *Y*: 80.0, *Z*: 400.0, *E*: 492.45),
*default_motor_current*: (*XY*: 1300, *Z*: 1300, *E*: 1000),
*default_power_budget_management*: {
  *max_power_per_hotend_slot*: 75,
  *total_power_budget*: 221,
  *idle_power_consumption*: 46,
  *nominal_bed_resistance*: 3.678255,
  *bed_resistance_per_degree*: 0.012285,
  *bed_voltage*: 24.0,
  *hotend_voltage*: 24.0
},
*safe_human_touchable_hotend_temperature*: 60.0,
*default_minimal_extrusion_temperature*: 170
},
*procedures*: {
  *PRE_PRINT_SETUP*: [*GenericProcedure.GenericProcedure*,
    [*DUMMYING*, *DummyStep.DummyStep*],
    [*CHECK*, *pre_and_post_print.runChecksBeforePrint.RunChecksBeforePrint*],
    [*RESET_OFFSET_1*, *queueRawCodeWaitStep.QueueRawCodeWaitStep*, "M218 T1 X0 Y0 Z0"],
    [*RESET_OFFSET_0*, *queueRawCodeWaitStep.QueueRawCodeWaitStep*, "M218 T0 X0 Y0 Z0"],
    [*APPLY_XY_CALIBRATION*, *pre_and_post_print.applyAlignmentStep.ApplyAlignmentStep*],
  ]
}
I /usr/share/griffin/griffin/machines/ledi_1908 [Modified] 34/382 8%

```

Then press the Escape key to go back to command mode and then enter “:x” and press enter to save the file and exit the editor.

If you make a mistake you can use ctrl+z to exit without saving and start again.

Then we need to change the value for the speed used when loading/unloading the material. Type “vi /usr/share/griffin/griffin/printer/procedures/wizard/moveMaterialProcedure.py”

Change the speed on line 16 from 85/u to 60 and save the file.

```

192.168.1.208 - PuTTY
from griffin.printer.controller import Controller
from griffin.printer.procedures.procedure import Procedure
from griffin.printer.procedures.wizard.moveMaterialStep import MoveMaterialStep
from griffin.printer.procedures.waitForQueueEmptyStep import WaitForQueueToBeEmp
from griffin.printer.procedures.steps.setPropertyStep import SetPropertyStep
import math
import time
import logging

log = logging.getLogger(__name__.split(".")[-1])

class MoveMaterialProcedure(Procedure):
    # values roughly chosen to also work with the (old/first) drybox.
    _LONG_MOVE_ACCELERATION = 10 # mm/s^2
    _LONG_MOVE_SPEED = 85 # mm/s
    _LONG_MOVE_MINIMUM_LENGTH = 100 # mm
    _LONG_MOVE_MOTOR_POWER_PERCENTAGE = 66 # 66% of the motor power, this match

    def __init__(self, key, hotend = 0, speed = 25.0, length = 1.0):
        super().__init__(key, Procedure.TYPE_UNKNOWN)
        self._step = MoveMaterialStep("MOVING_MATERIAL")
        self.setFirstStep(self._step)
I moveMaterialProcedure.py 16/131 12%

```

Important notes:

- 1)after changing settings you can disable dev mode
- 2)after a firmware update, you must enable dev mode and change the settings again!
- 3)in vi, there is command mode and type mode. You start in command mode. Move your cursor to where you want to edit, then press “I”. change the value, then use the escape key to go back into command mode. In command mode use “:x” to save and exit. If you make a mistake you can use ctrl+z to exit without saving and start again.



Good luck with your Bondtech Extruder!

If you have any questions please contact us by email or telephone.



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