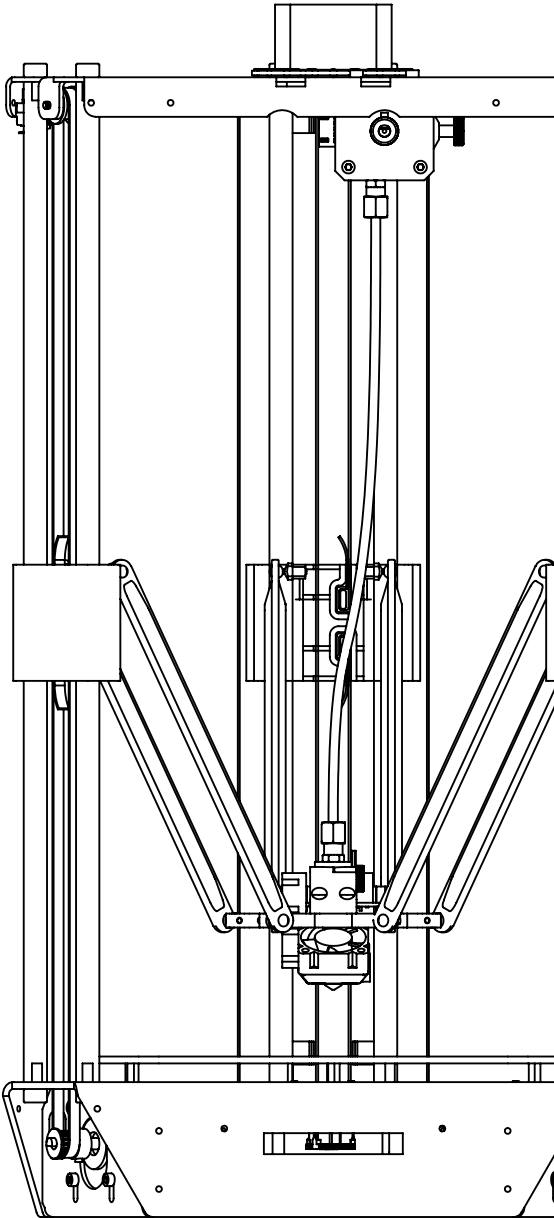


micro  
delta  
REWORK

USER'S GUIDE





---

# INTRODUCTION

---

## INTRODUCTION

- **Objective :**

Provide a visual guide of the different steps to set-up and get started using the MicroDelta Rework 3D printer.

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- **Photographics credits :**

Pictures and 3D representations made by eMotion Tech :  
<http://www.emotion-tech.com>

Responsable images : Anthony BERNA

- **Sources :**

<http://reprap.org/wiki/RepRap>  
<http://www.repetier.com/>

- **Licence :**

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- **Update:**

Last update : 09/10/2017

- **Links :**

You can find more informations on the following links :

eMotion Tech's website : <http://www.emotion-tech.com>  
RepRap community : <http://reprap.org/wiki/reprap>





## Summary

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# SOFTWARE INSTALLATION

---

## Software installation on Windows

**Objective :** install the necessary software to use the MicroDelta Rework on a Windows operating system computer (32 & 64 bits).

**WARNING :** be sure to disable your antivirus and firewall before installing the software in order to not block the installation of the drivers.

### What eMotion Tech's software installer provides :

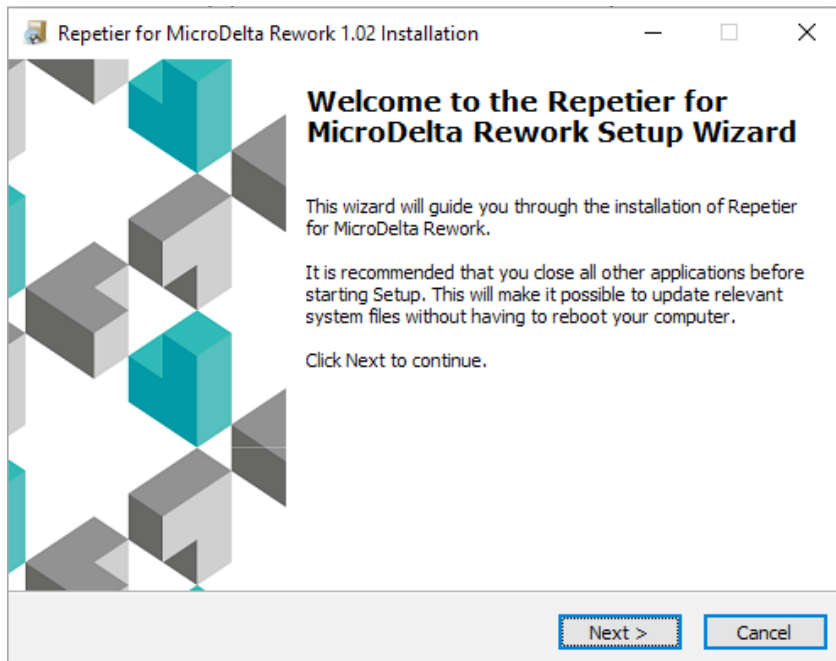
- Drivers for the eMotronic electronic board
- Repetier-Host (3D printer control software)
- Custom pre-configured Repetier-Host profile for the MicroDelta Rework
- A dedicated plugin «MicroDelta Rework»
- Custom slicing profiles for Slic3r & CuraEngine integrated slicers

### Pre-requisite :

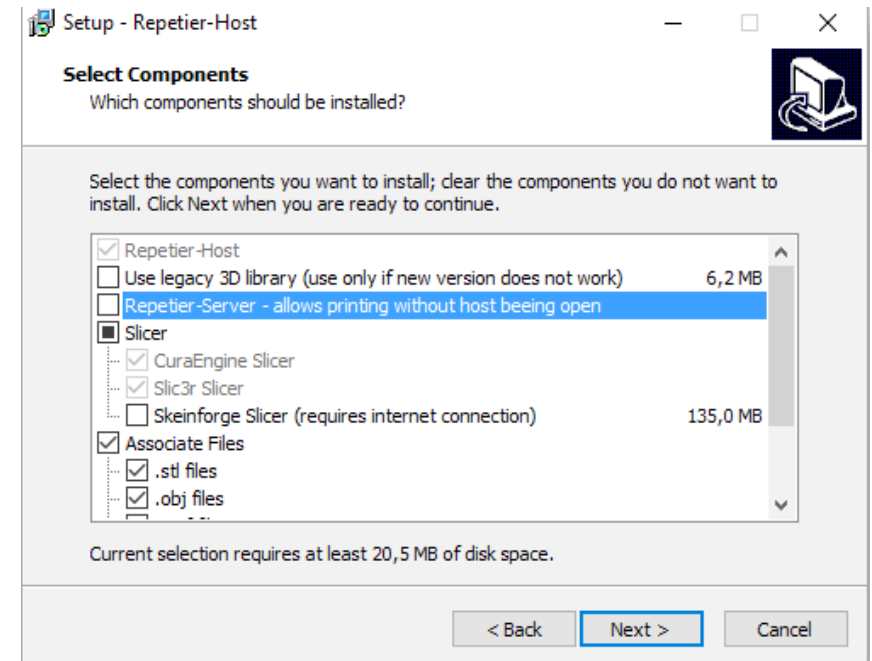
- Up-to-date DirectX Drivers
- Framework .net 4.5

**WARNING :** eMotronic board should be unplugged from the computer.

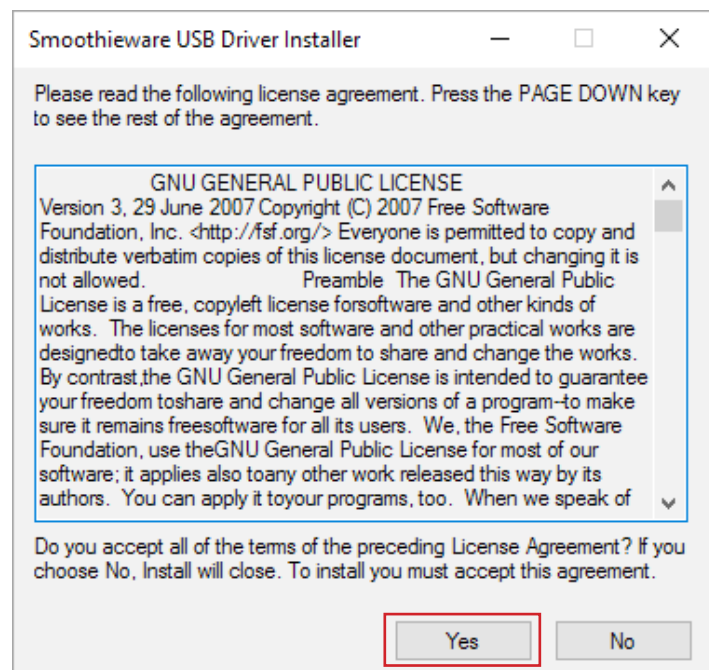
1°) Run the installer file (.exe) and follow the instructions.  
(To be downloaded from our website's «Support» section)



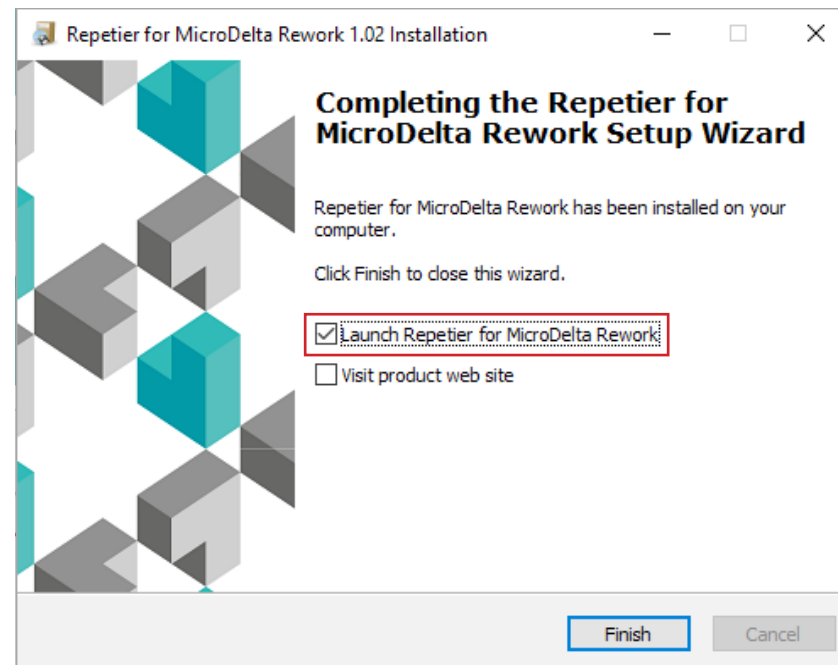
2°) At the stage of Components selection, be sure to uncheck «Repetier-Server».



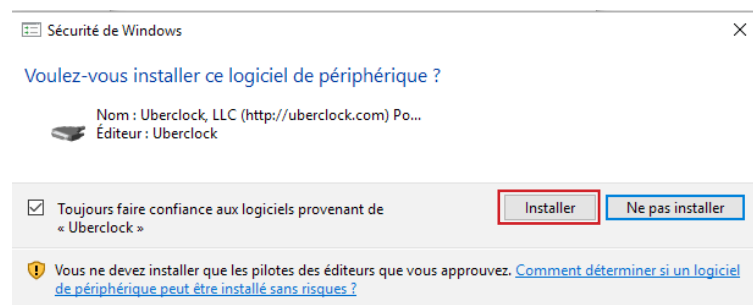
3°) Make sure that eMotronic's drivers are intalled.



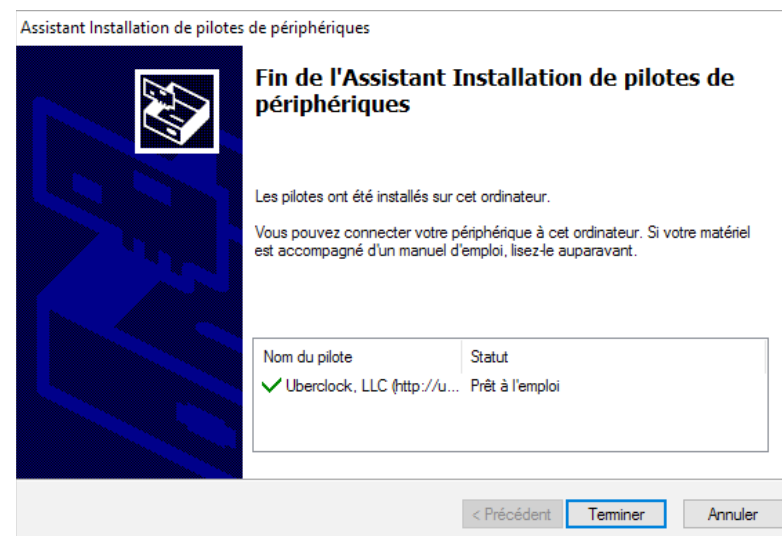
4°) Once the installation is done, check the « launch Repetier-Host » box.



5°) **Connect the MicroDelta Rework to your computer using the USB cable.**  
Your device should be automatically recognized.



Note : if drivers installation fails, continue installing the software. You can then assign the drivers to the board via the Device Manager (drivers are downloadable from our website / Support / Drivers).



## Software installation on Linux

**Objective :** install the necessary software to use the MicroDelta Rework on a Linux based operating system computer.

**Informations in this chapter are meant for Linux users only.**

(Installation tested on Ubuntu 16.04 LTS and Mint based Debian)

### What eMotion Tech's software installer provides :

- Repetier-Host (3D printer control software)
- Custom pre-configured Repetier-Host profile for the MicroDelta Rework
- A dedicated plugin «MicroDelta Rework»
- Custom slicing profiles for Slic3r & CuraEngine integrated slicers

### Pre6requisite :

- Graphics modules installed
- OpenGL installed

1°) Download the «MicroDelta\_Rework\_RepetierHost.tar.gz» file (to be downloaded from our website's «Support» section, «MicroDelta Rework / Logiciel / Linux»)

2°) Decompress it with the following command «tar xzvf MicroDelta\_Rework\_RepetierHost.tar.gz».

3°) Access the folder with the command «cd RepetierHost/».

4°) Use command «sh configureFirst.sh» to install Repetier-Host.

5°) Run Repetier-Host with «./repetierHost» command.





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# PREPARATION

---

## Files to copy on the SD card

**Objective :** copy the configuration files to the eMotronic's SD card.

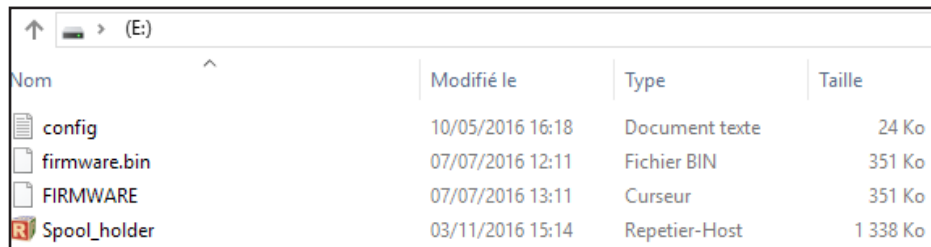
1°) Download the corresponding file to your MicroDelta Rework

- Standard MicroDelta Rework (without option), download this file at : [Configuration MicroDelta Rework.zip](#)
- MicroDelta Rework with heated Bed, download this file: [Configuration MicroDelta Rework heatbed.zip](#)

You can also find these files on our website's «Support» section», MicroDelta\_Rework / Logiciel / Configuration /».

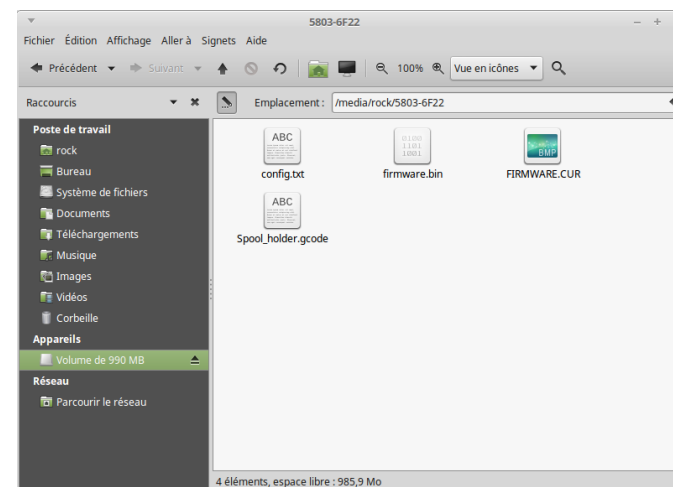
2°) Once downloaded, unzip the file and copy all its content to eMotronic's SD card.

Note: SD card is usually detected automatically and its content displayed once you connect your 3D printer to you computer. The SD card generally appears as drive «E:» or «F:» but it can vary depending on your hardware.



Nom	Modifié le	Type	Taille
config	10/05/2016 16:18	Document texte	24 Ko
firmware.bin	07/07/2016 12:11	Fichier BIN	351 Ko
FIRMWARE	07/07/2016 13:11	Curseur	351 Ko
Spool_holder	03/11/2016 15:14	Repetier-Host	1 338 Ko

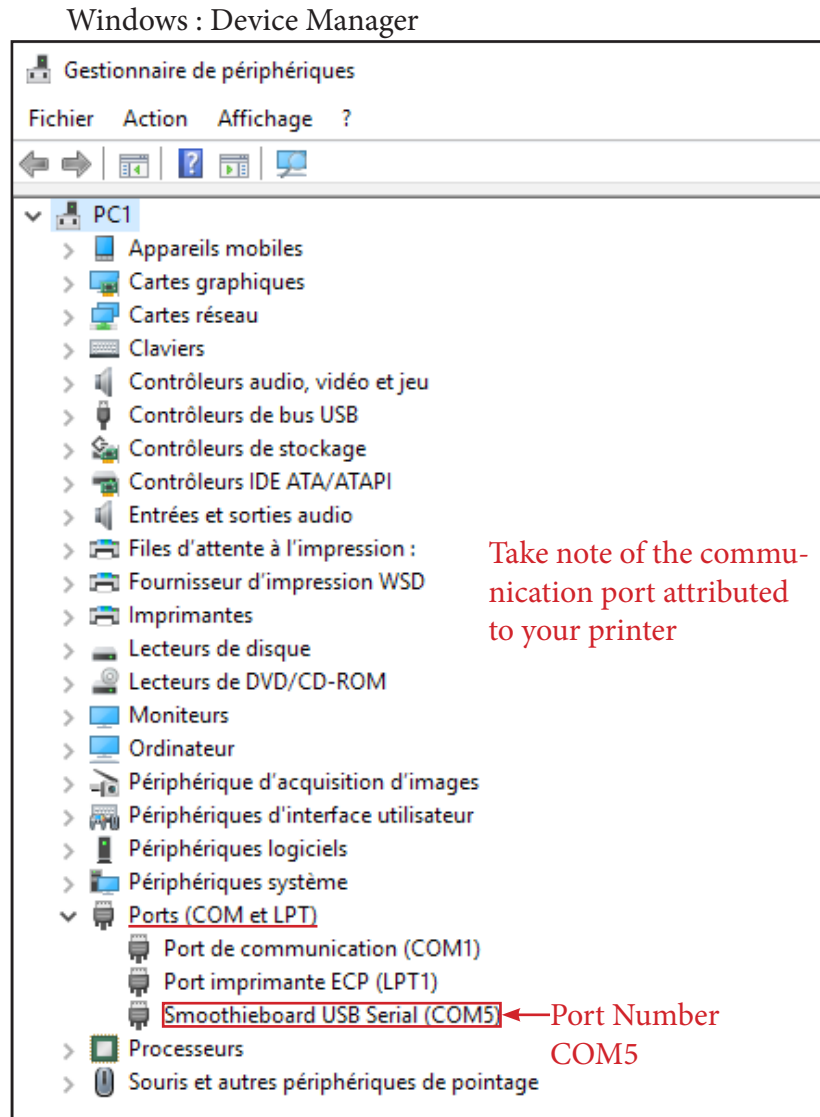
Windows : what you should have on the SD card after this step



Linux : what you should have on the SD card after this step

3°) Press the «Reset» button on the 3D printer (located on one side of the lower plate).

4°) Check in the device manager that the eMotronic is properly recognized.



## With Linux : Command line terminal

Use the following command : `lsusb`

```
Fichier Édition Affichage Rechercher Terminal Aide
rock@vb-rocky ~ $ lsusb
Bus 001 Device 007: ID 1d50:6015 OpenMoko, Inc.
Bus 001 Device 001: ID 1d6b:0001 Linux Foundation 1.1 root hub
rock@vb-rocky ~ $
```

eMotronic board will show as «OpenMoko, Inc».

make sure that a USB port is attributed to the board using the following command : `ls /dev/tty`

```
Fichier Édition Affichage Rechercher Terminal Aide
rock@vb-rocky ~ $ ls /dev/tty
tty      tty21   tty35   tty49   tty62   ttyS16   ttyS3
tty0     tty22   tty36   tty5    tty63   ttyS17   ttyS30
tty1     tty23   tty37   tty50   tty7    ttyS18   ttyS31
tty10    tty24   tty38   tty51   tty8    ttyS19   ttyS4
tty11    tty25   tty39   tty52   tty9    ttyS2    ttyS5
tty12    tty26   tty4    tty53   ttyACM0 ttyS20   ttyS6
tty13    tty27   tty40   tty54   ttyprintk ttyS21   ttyS7
tty14    tty28   tty41   tty55   ttyS0   ttyS22   ttyS8
tty15    tty29   tty42   tty56   ttyS1   ttyS23   ttyS9
tty16    tty3    tty43   tty57   ttyS10  ttyS24
tty17    tty30   tty44   tty58   ttyS11  ttyS25
tty18    tty31   tty45   tty59   ttyS12  ttyS26
tty19    tty32   tty46   tty6    ttyS13  ttyS27
tty2     tty33   tty47   tty60   ttyS14  ttyS28
tty20    tty34   tty48   tty61   ttyS15  ttyS29
```

Usually, the port assigned to the port is «ttyACM0», «ttyACM1» «ttyUSB0» or «ttyUSB1».

## Connecting your printer to Repetier-Host

- 1°) Run Repetier-Host software.
- 2°) Go to «Config» then «Printer Settings».
- 3°) Select the COM port assigned to your MicroDelta Rework.

### On Windows

#### Printer Settings

Printer:
MicroDelta Rework

Connection
Printer
Extruder
Printer Shape
Scripts
Advanced

Connector:
Connection Série
Help

Port:
COM3

Baud Rate:
115200

Transfer Protocol:
Autodetect

Reset on Emergency
Send emergency command + DTR high->low

Receive Cache Size:
63

Communication Timeout:
40
[s]

☒ Use Ping-Pong Communication (Send only after ok)

The printer settings always correspond to the selected printer at the top. They are stored with every OK or apply. To create a new printer, just enter a new printer name and press apply. The new printer starts with the last settings selected.

OK
Apply
Cancel

Select the COM port  
COM assigned to you  
r machine

### On Linux

#### Printer Settings

Printer:
MicroDelta Rework

Connection
Printer
Extruder
Printer Shape
Scripts
Advanced

Connector:
Connection Série
Help

Port:
/dev/ttyACM0

Baud Rate:
115200

Transfer Protocol:
Autodetect

Reset on Emergency
Send emergency command + DTR high->low

Receive Cache Size:
63

Communication Timeout:
40
[s]

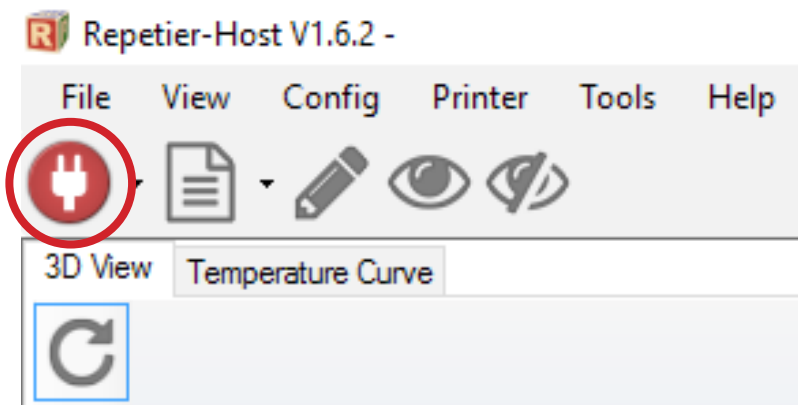
☒ Use Ping-Pong Communication (Send only after ok)

The printer settings always correspond to the selected printer at the top. They are stored with every OK or apply. To create a new printer, just enter a new printer name and press apply. The new printer starts with the last settings selected.

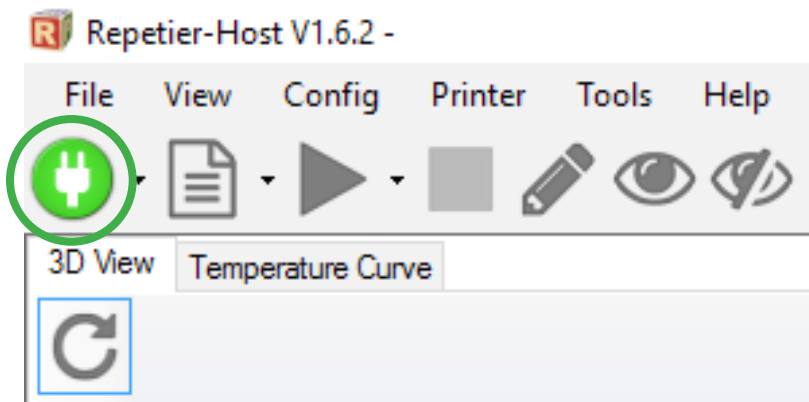
OK
Apply
Cancel

Write the COM port assigned  
to your machine

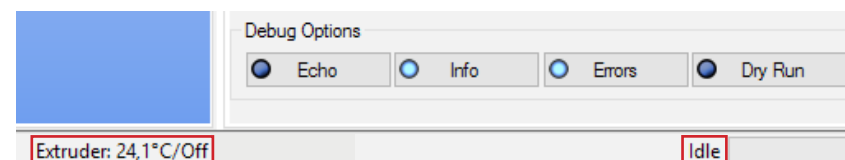
4°) Click on Connect.



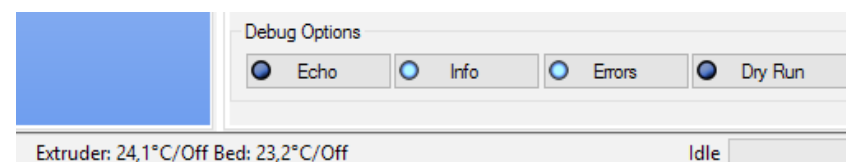
This one should change color, becomes green when connected



5°) Check that the extruder's temperature is consistent (logical value) and the printer's status is «Idle» as shown below:



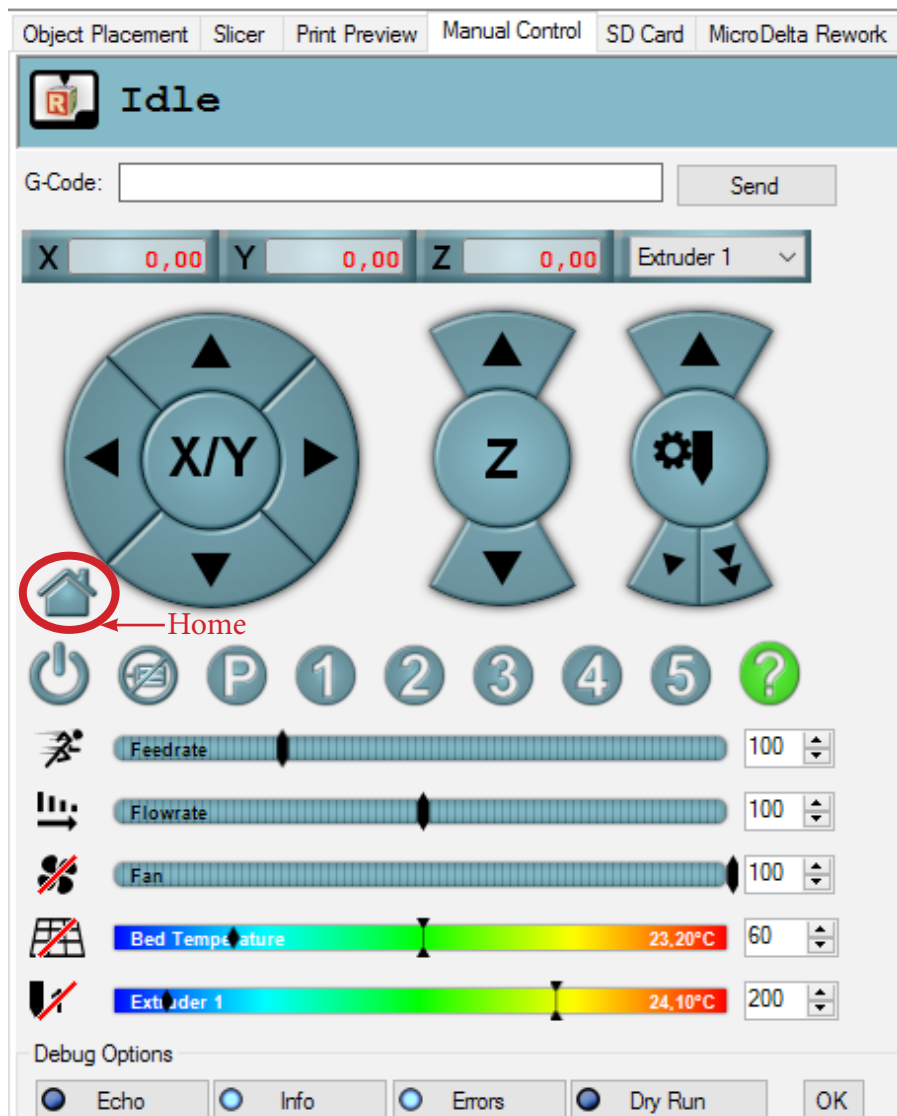
If you have a Heated Bed, its temperature will be displayed next to the extruder's



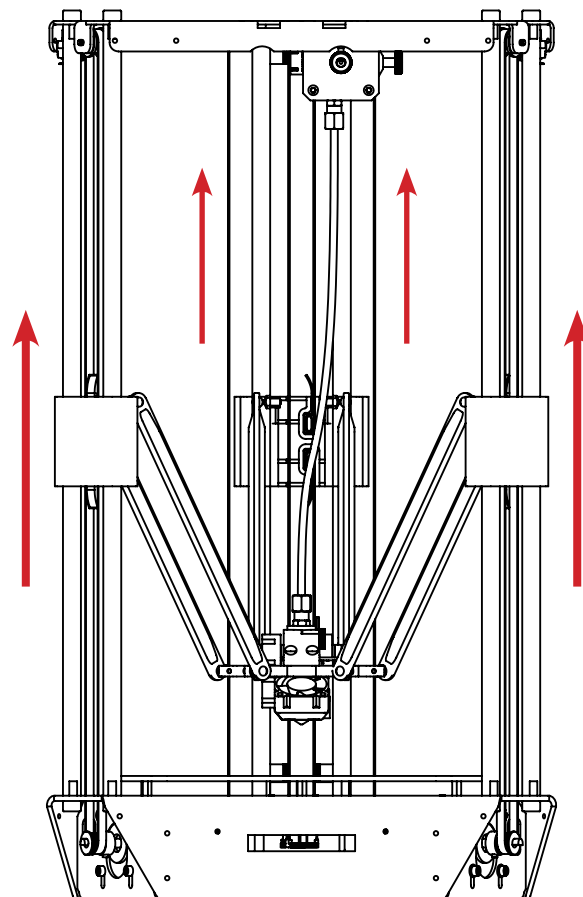
## Motion test

1°) Go to the «Manual Control» tab and click on the Home shaped icon (This should initialize your printer = move all axes to origin).

Keep a finger on the «Reset» button in case of a malfunction



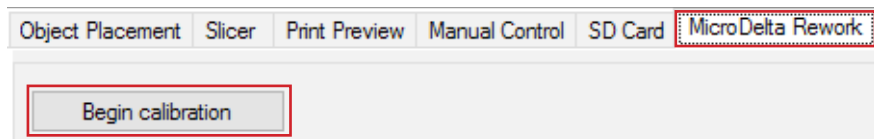
2°) Make sure that EVERY sliders move up till hitting it's corresponding endstop.



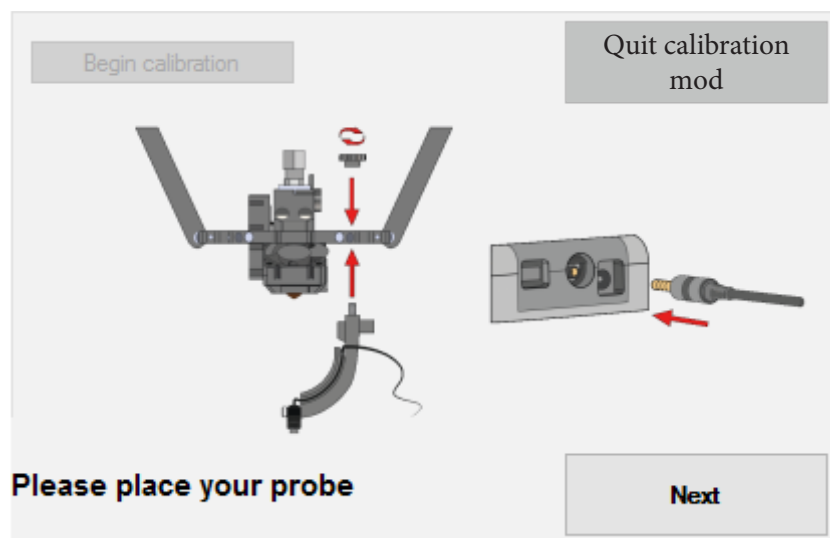
## Automated Calibration

The «MicroDelta Rework» plugin is still not available for Mac OS users, it will be necessary to perform another calibration method explained in appendix.

1°) Go to «MicroDelta Rework» tab, launch the calibration and follow the steps.



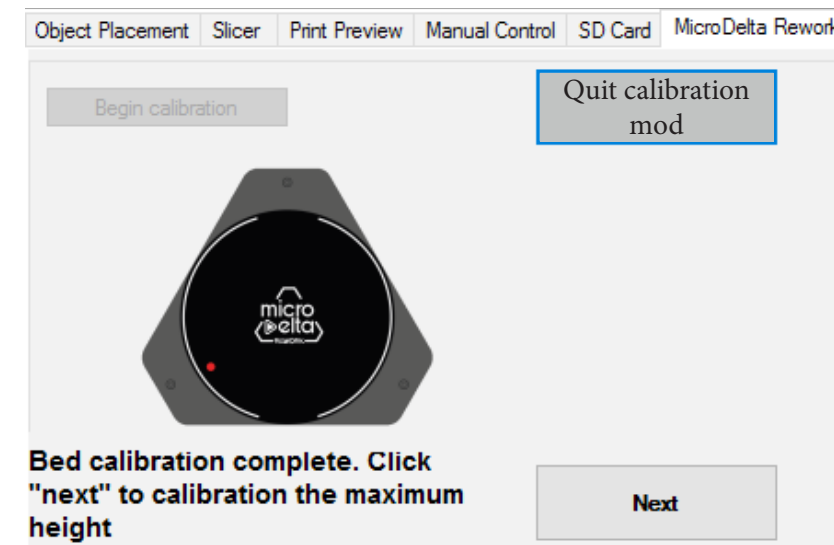
2°) Mount the calibration module on the printer's core, and plug its jack connector on the eMotronic board.



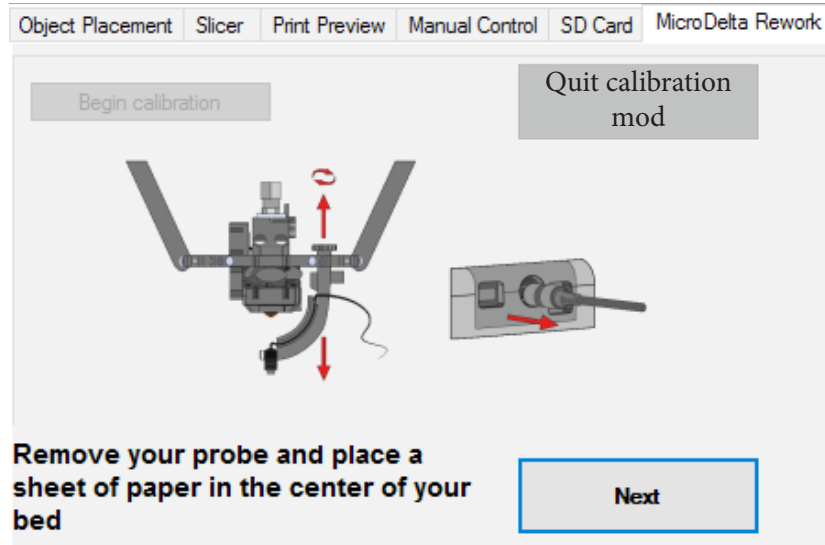
3°) By clicking «Next», the calibration begins and calibration module will start its multi-point bed probing. This process can take several minutes.



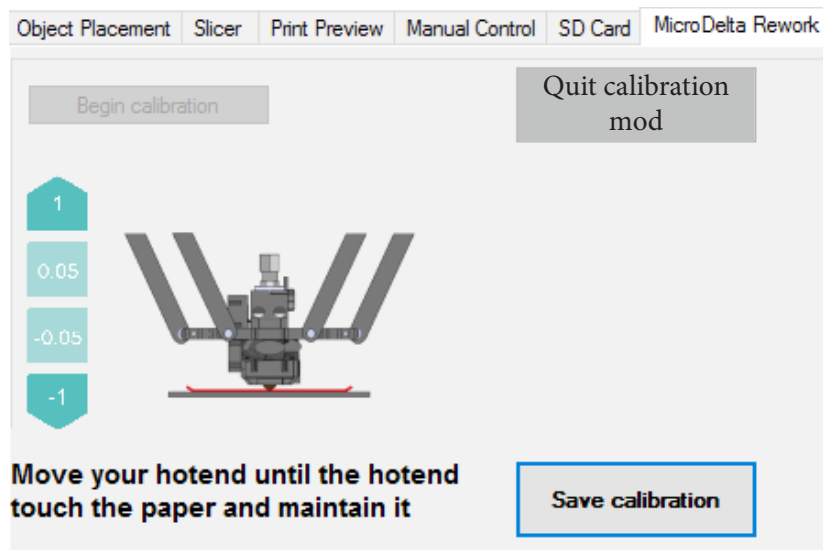
4°) Once the probing is done and the bed plane successfully corrected, you should set the Z maximum height.



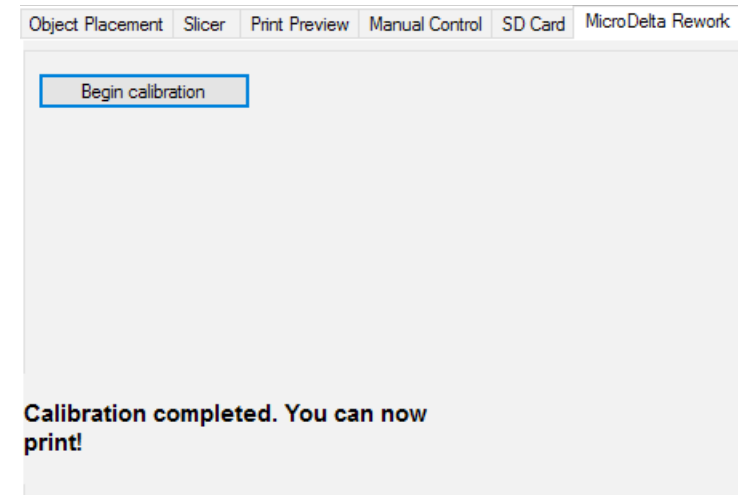
5°) Remove and unplug the calibration module. Place a paper on the center of the bed.



6°) Follow the instruction on the screen to properly set the maximum Z height of your 3D printer.



5°) The calibration process is done ! You can now print the last piece of your 3D printer : the Spool Holder.



The calibration process is meant to be done once and not before every print. In some cases, the calibration could become unaccurate, after disassembling and reassembling structural parts of you printer per example, you should then calibrate again your printer.

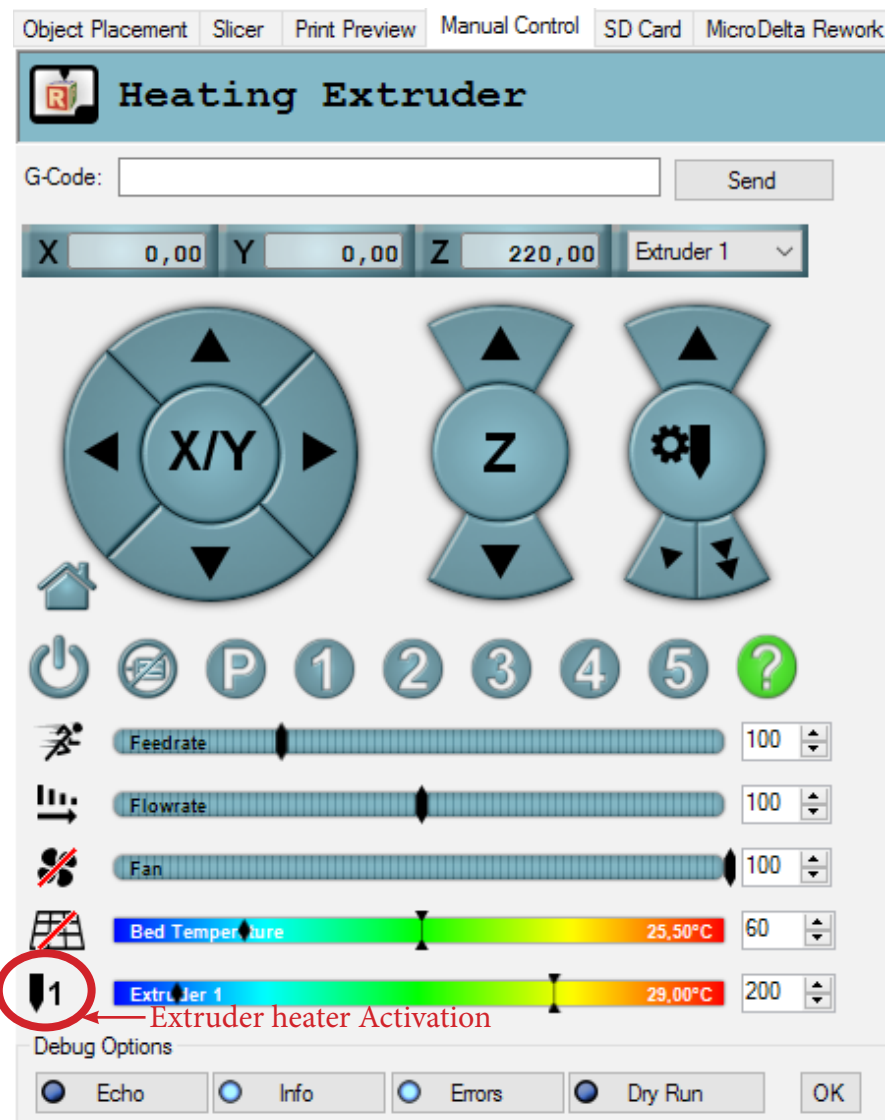
## In case of troubles during the calibration process :

Calibration may not be performed correctly. Usually, this comes from the fact that it resides some mechanicals plays on the machine. It will then be necessary to review the mounting of the printer so as to ensure that everything is tight and without play (smooth rods, ball joints, belts, pulleys, etc.).

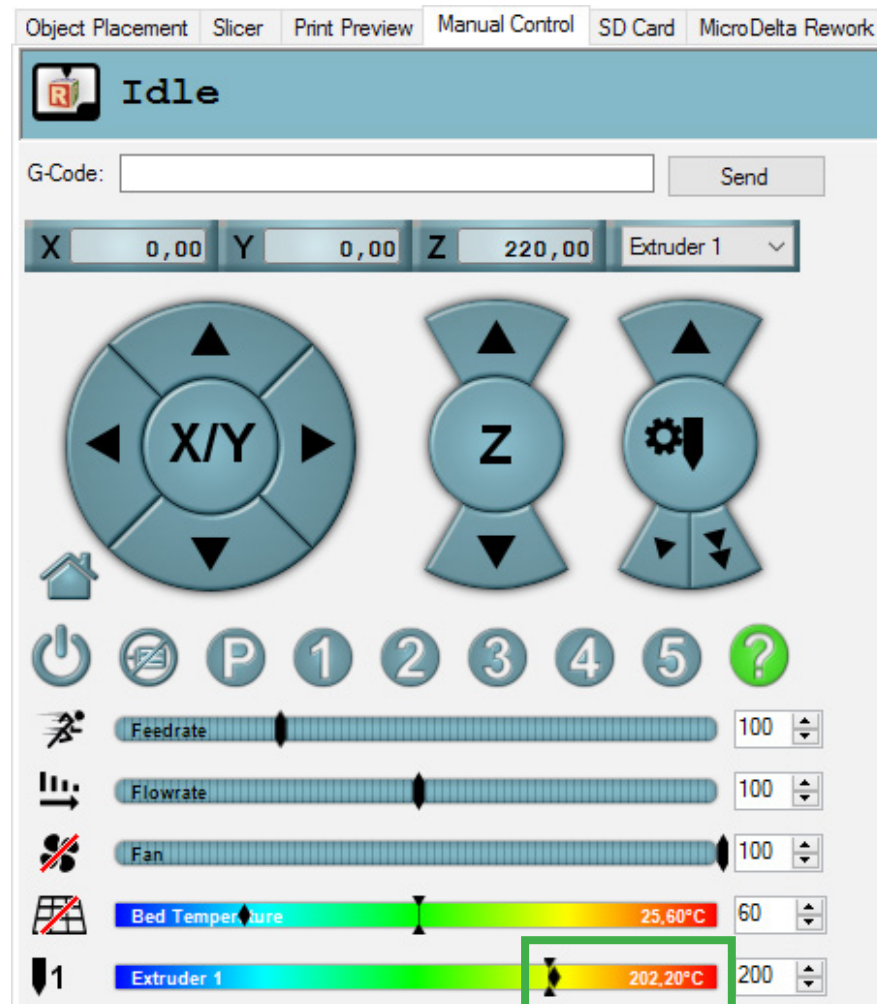


## Heating Test

1°) Go to Manual Control tab, click on Extruder heater activation as shown below:



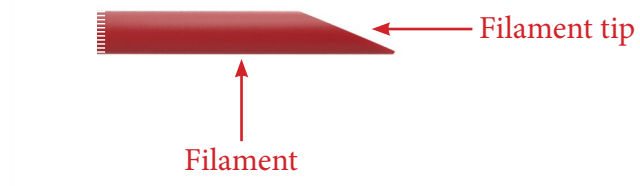
2°) Check that the target temperature is reached :



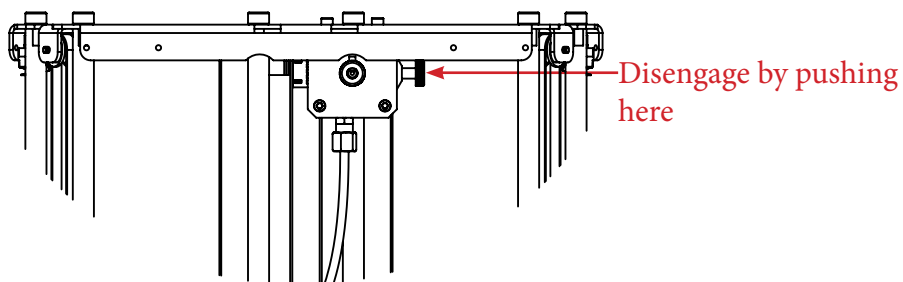
If the target temperature is not reached or the actual temperature varies a lot around the target temperature, perform a PID calculation (see appendix).

## Charging filament

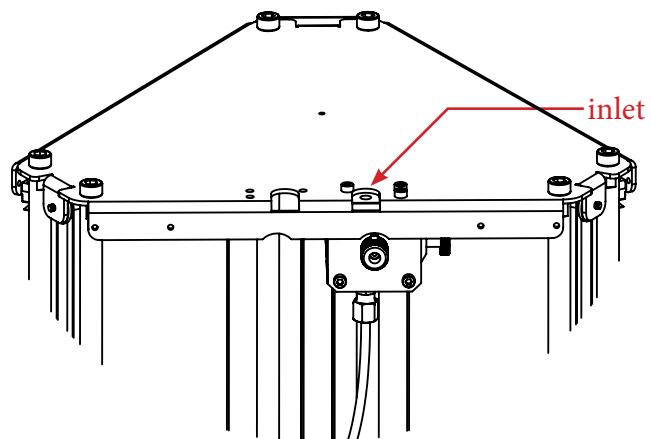
1°) Cut the tip of the filament with a certain angle to make its insertion in the extruder easier



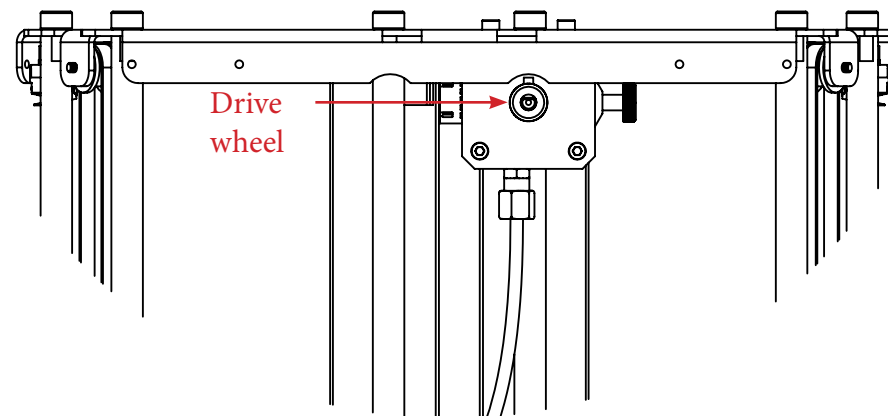
2°) Disengage the extruder



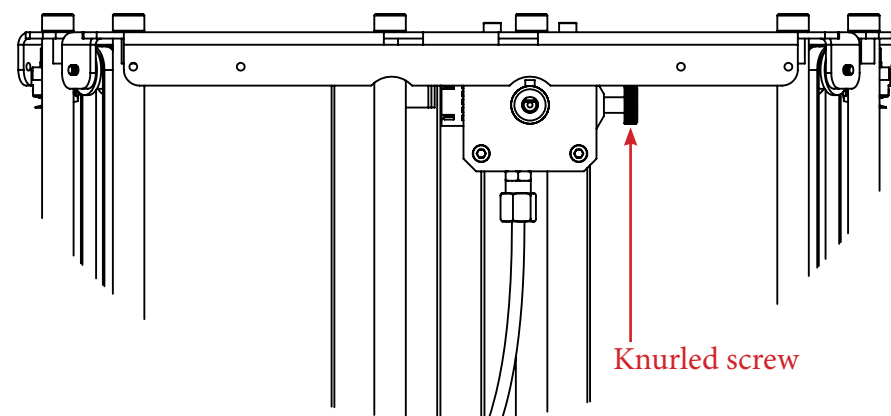
3°) Insert the filament in the extruder's inlet and push it as far as possible



4°) If you encounter a hard point while inserting the filament, engage the extruder and turn the drive wheel until the filament gets to the nozzle, melted filament should start coming out

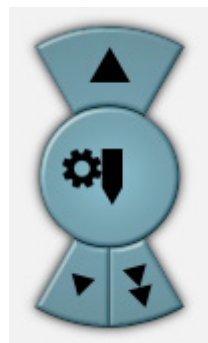
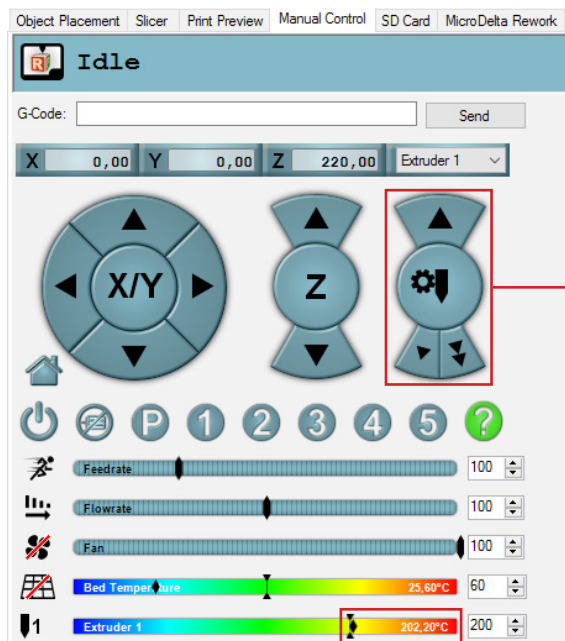


5°) Tighten the spring strongly by turning the knurled screw.  
Note: if the thumbwheel is not tight enough, the filament will be badly driven.



## Extrusion test

1°) In the «Manual Control» tab, perform a slow extrusion of 50mm.



50 mm Extrusion

2°) Verify that melted filament comes out of the nozzle regularly.

If this is not the case, adjust accordingly the pressure exerted on the filament from extruder, and this by turning the knurled screw of the extruder.

---

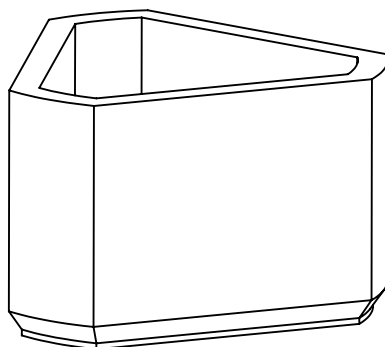
# PRINTING

---

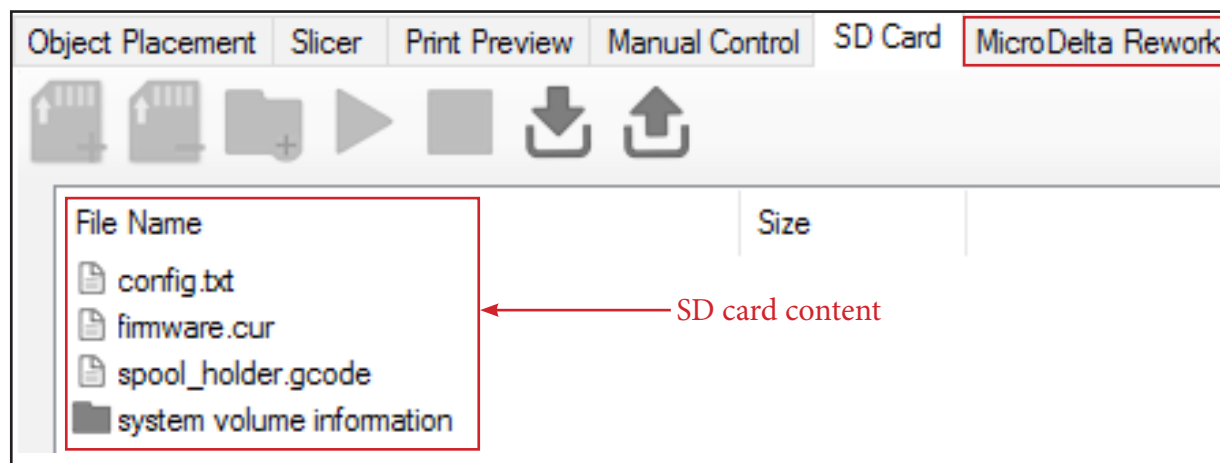
## Spool Holder print

You are about to start your first print.

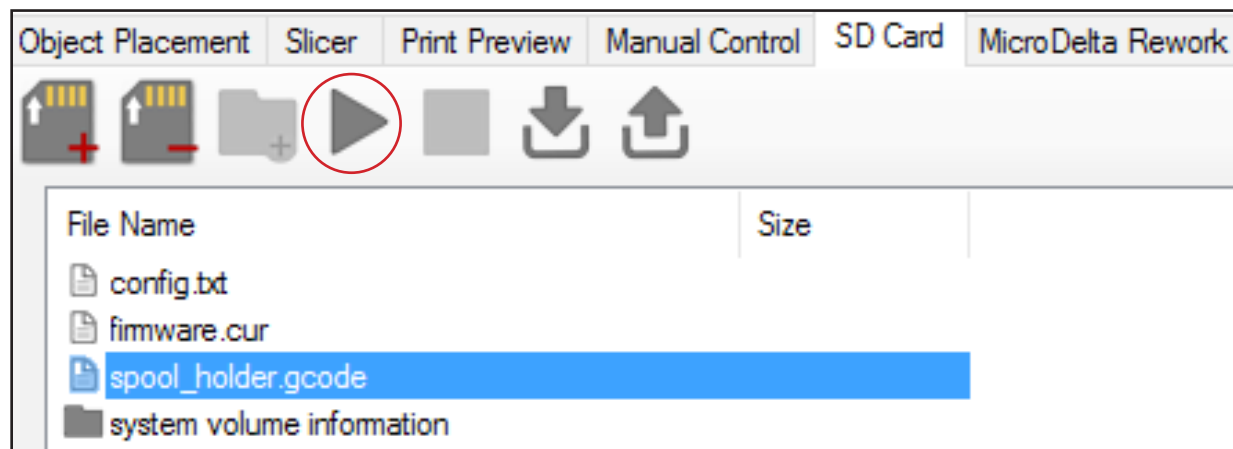
You will be printing the spool holder to be mounted on the top plate of the MicroDelta Rework.



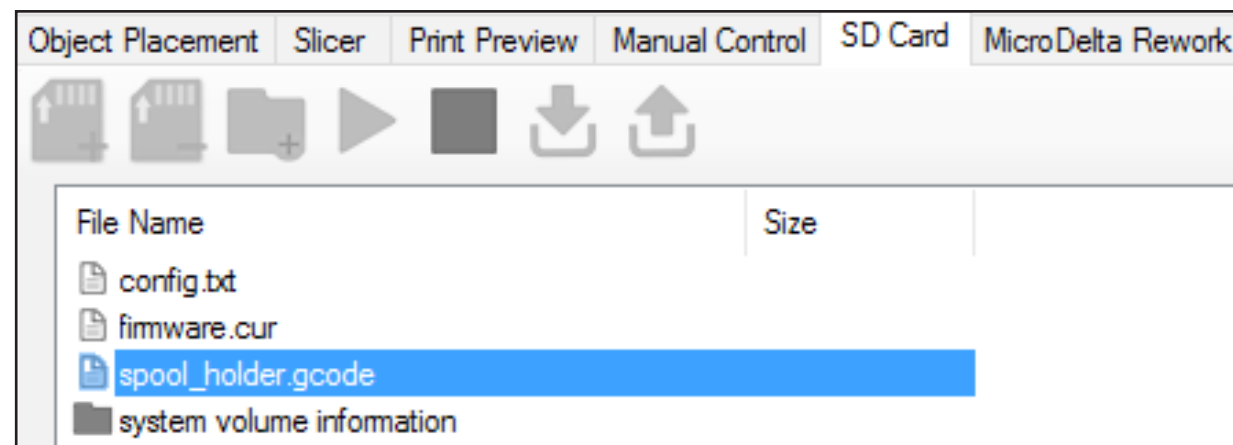
1°) Go to the «SD Card» tab of Repetier-Host. You should see the content of the card:



2°) Select the file «spool holder.gcode» then click on the «Print» button («Play» icon button).



Print will begin, your printer will initialize (homing) and start heating the extruder and eventually the Heat bed.



**CONGRATULATIONS !**  
You successfully printed your first  
object !



**Go to the «Appendix» to find explanations about mounting the  
spool holder.**

---

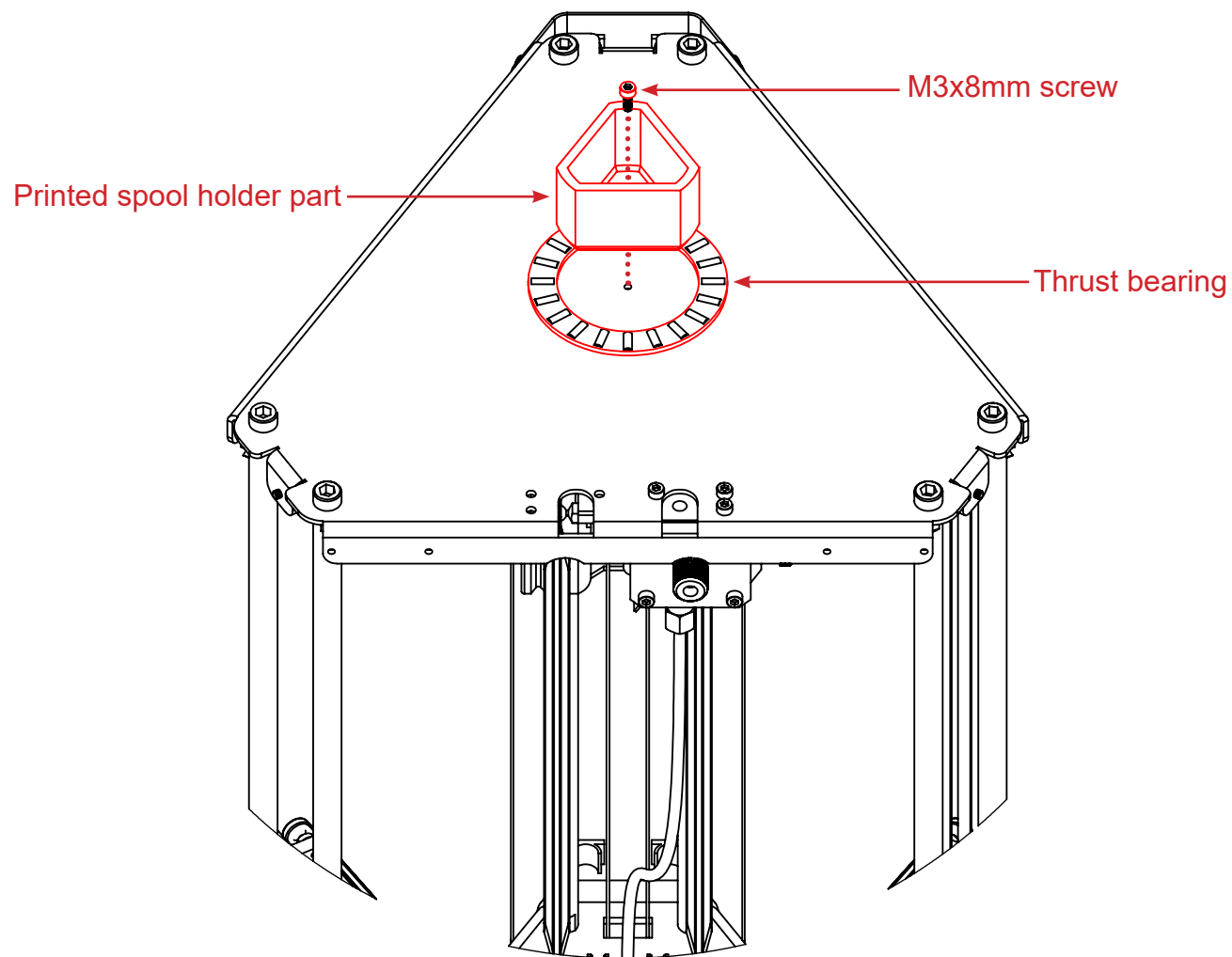
# Appendix

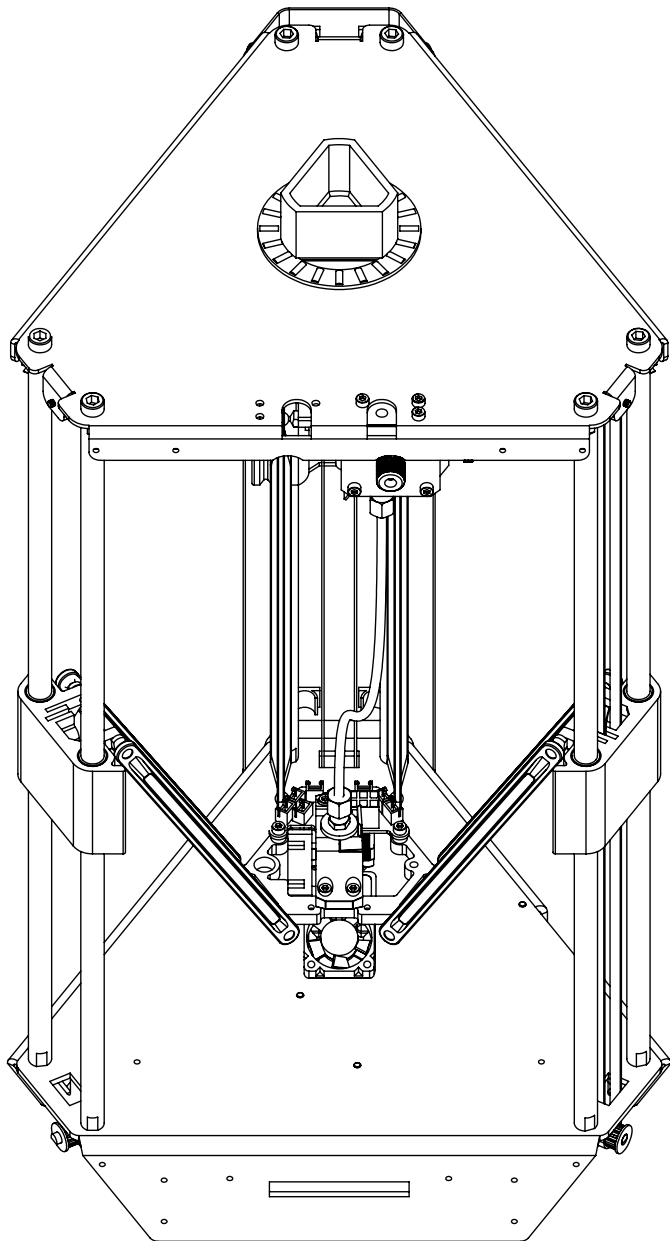
---



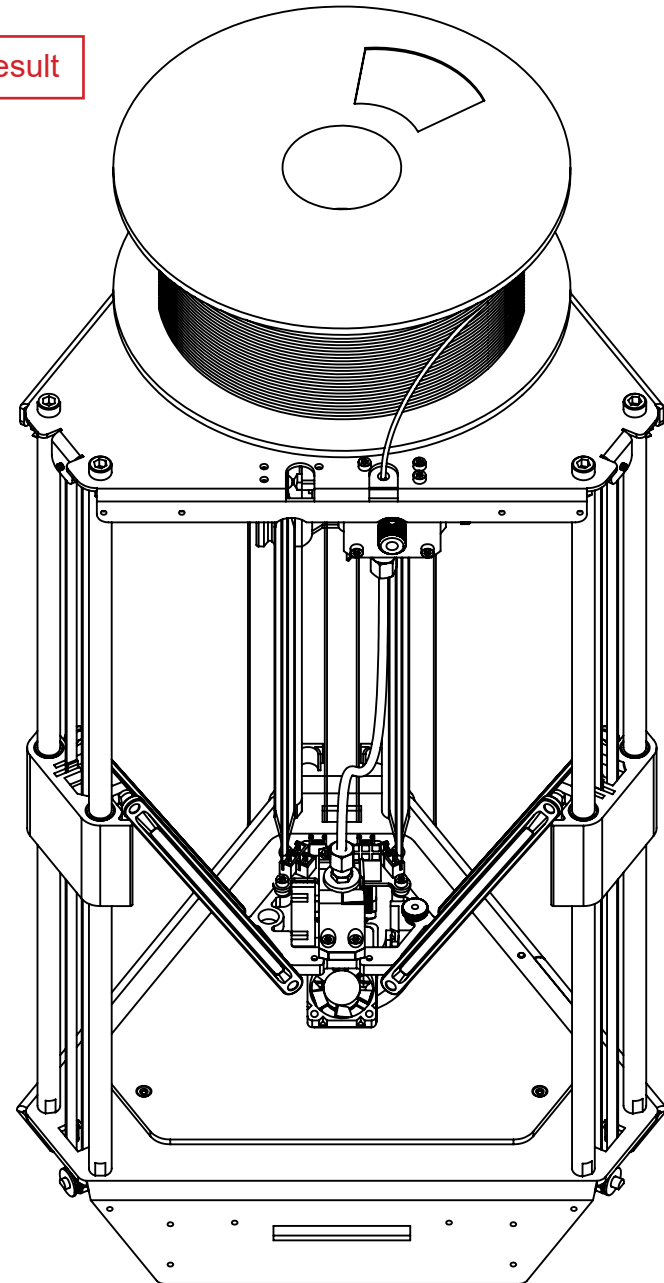
## Mounting of the spool holder

**Objective :** mount the spool holder on the top plate





Result

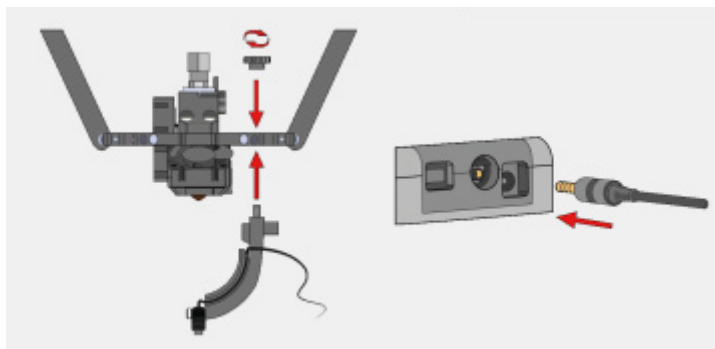


## Calibration process using command lines

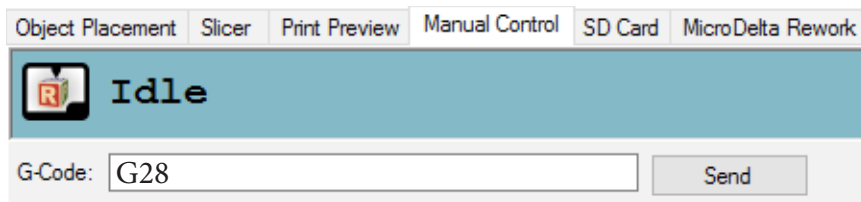
If for one reason or another, you can't or don't want to use the «MicroDelta Rework» plugin to calibrate your 3D printer, you can perform this operation using Gcode commands, here's how to do this:

1°) Make sure the printhead is at room temperature.

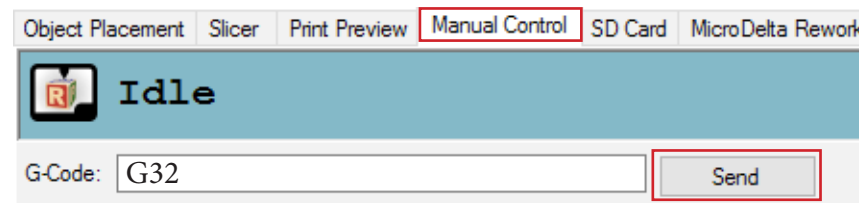
2°) Mount the calibration module on the printer's core and plug the jack connector on the eMotronic board



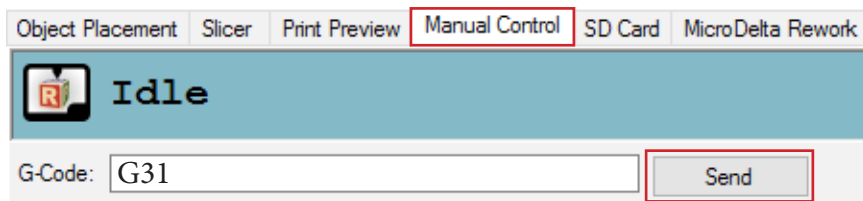
3°) Go to «manual control» tab. Home or initialize your printer using the **G28** command.



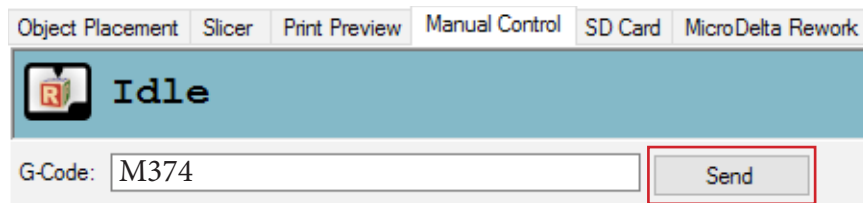
4°) Start the calibration using **G32** command, it will probe 3 points of the bed.



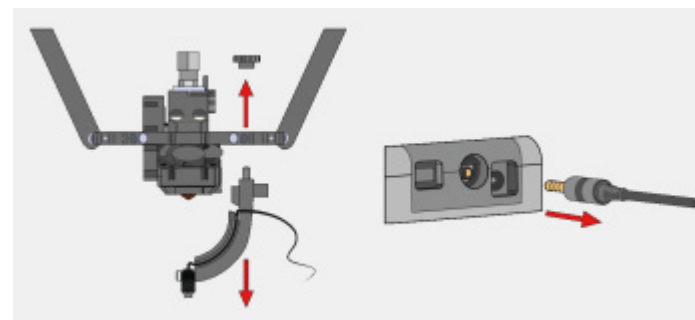
5°) Start the full bed calibration using **G31** command, this will probe multiple points of the bed to optimize the first calibration. This is known as grid compensation strategy.



6°) Once done, save the grid values using **M374** command.

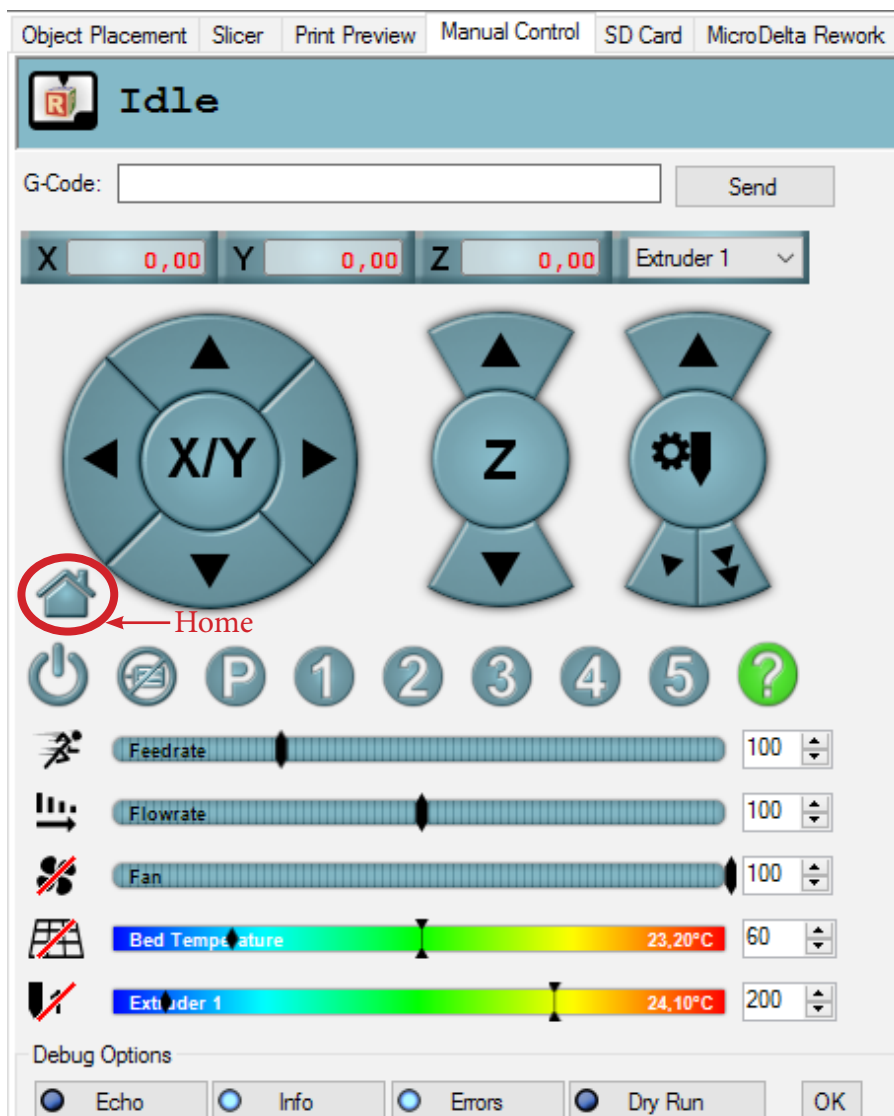


7°) Remove and unplug the calibration module.



## Maximum Z height

8°) Home or initialize your printer

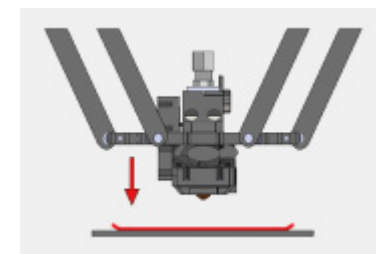
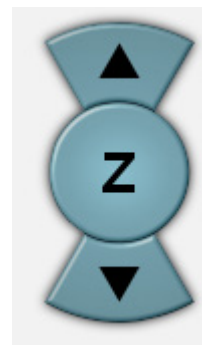


9°) Place a paper on the bed

10°) Activate printhead heating and wait to reach 70°C.

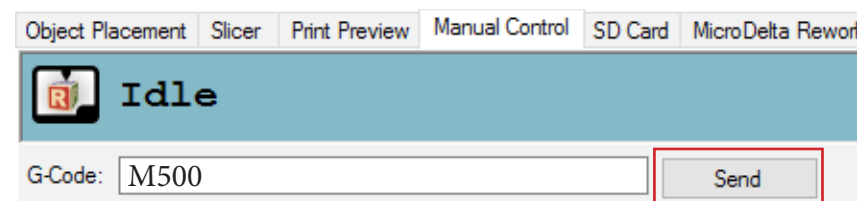
11°) Move the printhead down with the arrow keys as shown below in the manual control tab.

Once the printhead is close enough from the paper move the printhead down slowly by jogging down of 0,1mm at a time, repeat until the printhead touches the paper and holds it from moving.



12°) Set the maximum Z height using the **M306 Z0** command

13°) Save using **M500**



## Precise adjustment of the maximum height

**Objective** : refine the height adjustment of the nozzle relative to the heatbed.

**Description** : if the material hangs too much or not hangs well enough to the 3dBedFix coating, you may need to adjust the nozzle height.

In the case the material doesn't hang well to the coating, please send the following GCODE command lines in the dedicated input field of the «Manual Control» tab **having first checked that the print head is at room temperature and that there is no plastic part on the heatbed** :

G-Code:

Send

Input field for sending GCODE command

```
G28
G1 Z0
M306 Z0.1
M500
```

In the case where the material hangs too much to the coating and is difficult to unhook :

```
G28
G1 Z0.1
M306 Z0
M500
```

In both cases, the value «0.1» can be changed as necessary.

You will then be able to launch an impression and check the following points of details :

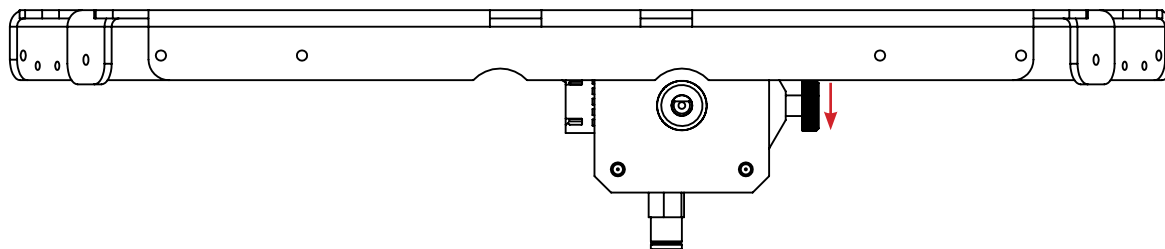
- material that does not hangs well to the 3dBedFix = nozzle too far from the 3dBedFix (adjust height)
- material that hangs too much on the 3dBedFix = nozzle too close to the coating (adjust height)

## Spring filament pressure adjustment (eMostruder)

**Objective :** adjust the pressure exerted by the spring on the filament so that the drive is optimal and does not cause abnormalities.

**Description :** depending on the type of filament used (PLA, G-FIL, ABS, etc.) and especially its hardness, it will be necessary to adjust the spring pressure so that the driving wheel does not mark the filament too much and does not block in its passage to the nozzle. This method ensures that the filament drive is operational while exerting pressure on the filament as low as possible.

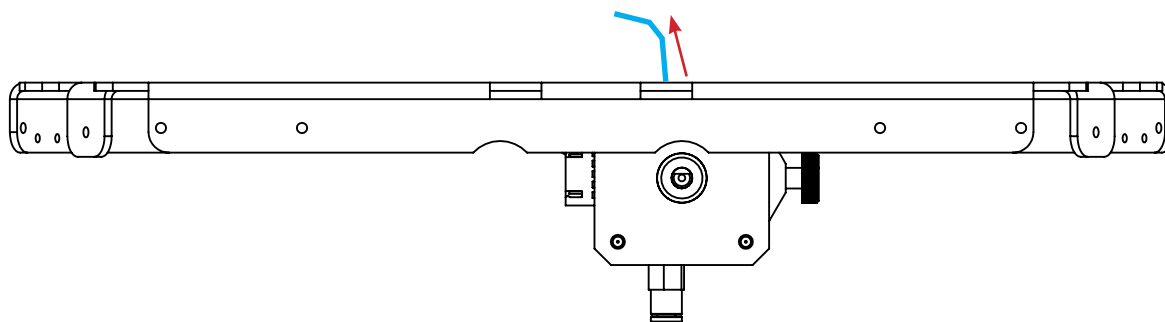
1°) Relieve the spring pressure completely by unscrewing the horizontal knurled screw of the eMostruder



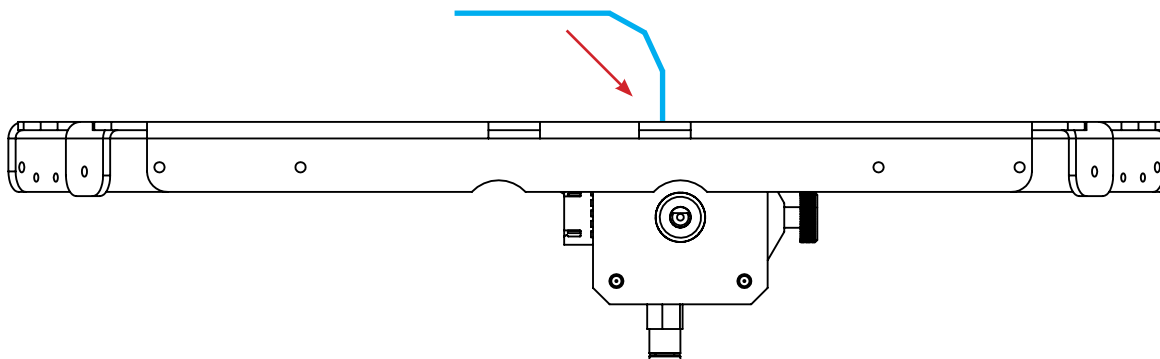
2°) In the Repetier-Host software, with the 3D printer connected and turned on, from the «Manual control» tab, ask for a target temperature dedicated to the used filament and wait until it is reached.



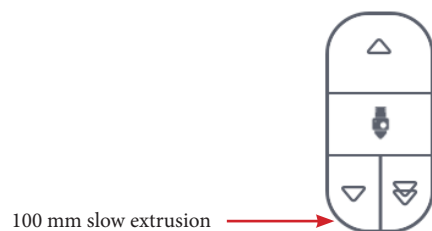
3°) If some filament is already engaged in the machine, remove it and cut it off to a healthy base not marked by the driving wheel.  
(with the end of the new filament bevelled in the winding direction of the spool or sample provided)



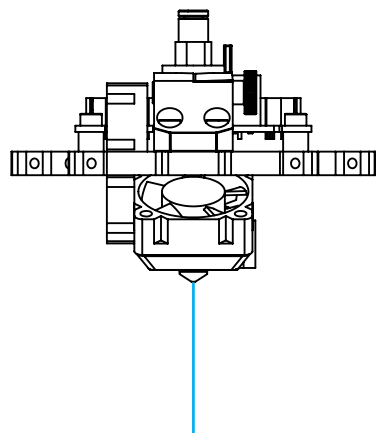
4°) Engage the new unmarked filament **to the nozzle**.



5°) Always in the «Manual Control» tab of Repetier-Host, ask for one or more slow extrusions of 100 mm.

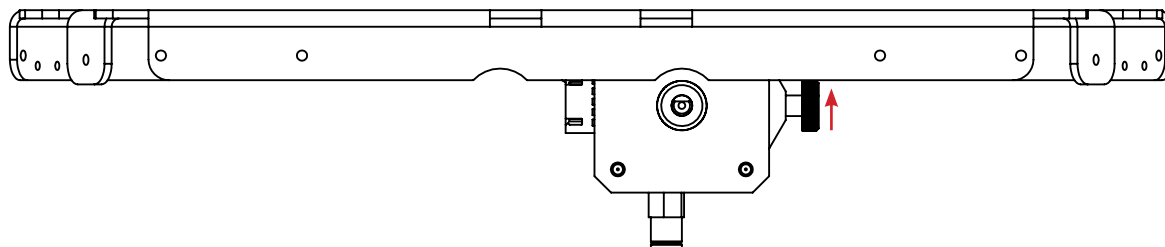


6°) At the same time, observe the filament coming out of the nozzle and check that the extrusion is continuous and homogeneous at a speed corresponding to the speed of the driving wheel.





7°) If the filament does not come out of the nozzle: tighten the screw a little more until it is homogeneous.



## Printing a 3D model

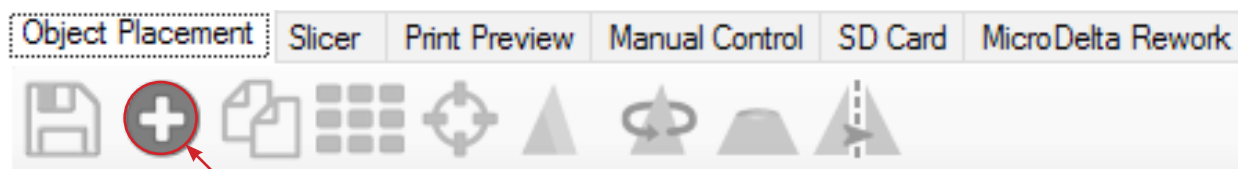
Pre-requisite : Fully calibrated 3D printer

1°) Download a 3D part, we suggest the eMotion Tech's keyring :

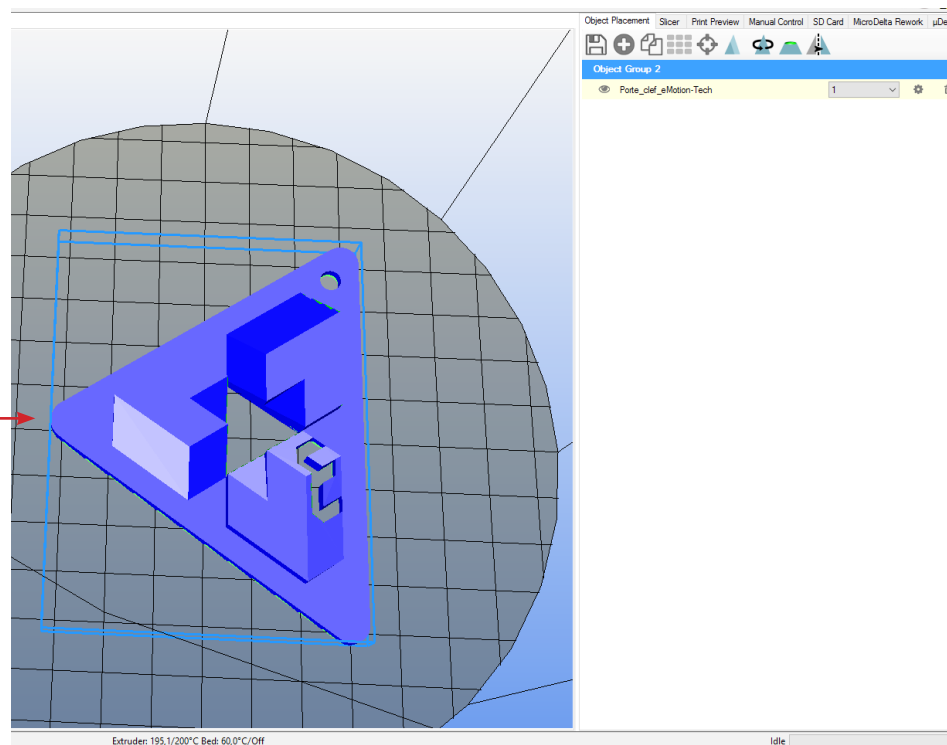
[https://data.emotion-tech.com/ftp/Ressources\\_3D\\_eMotion\\_Tech/Porte\\_clef\\_eMotion-Tech.stl](https://data.emotion-tech.com/ftp/Ressources_3D_eMotion_Tech/Porte_clef_eMotion-Tech.stl)

2°) Import your model on Repetier-Host :

- In the «Object placement» tab, click on «Add object»
- Select your desired 3D model file and open



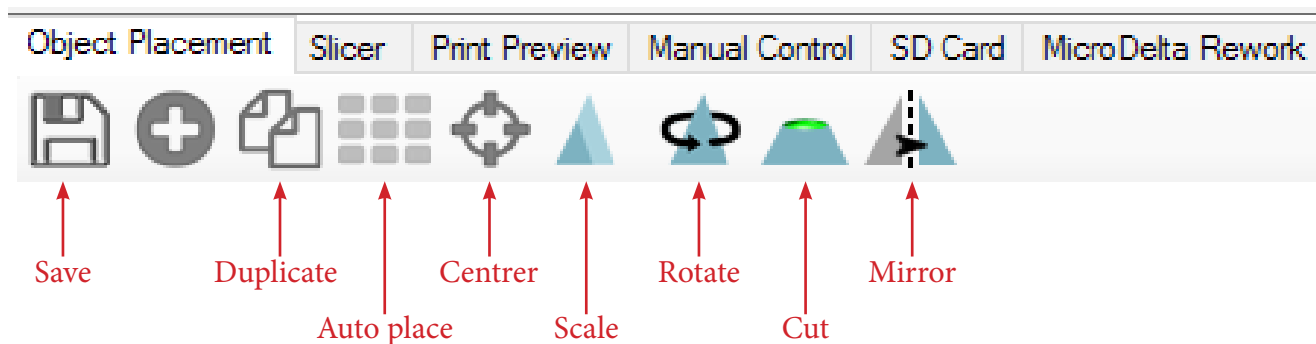
Add object



Virtual representation  
of the object on the print  
surface

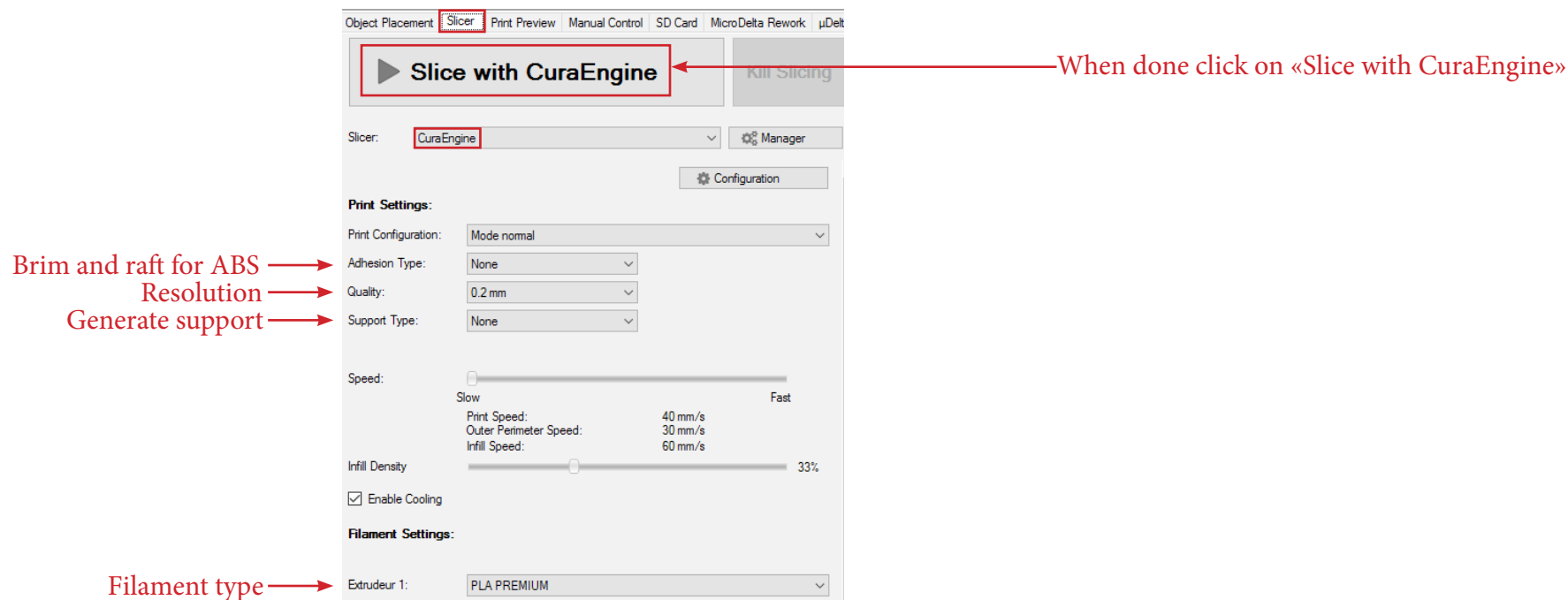
List of the objects your added

2°) You can edit your object :

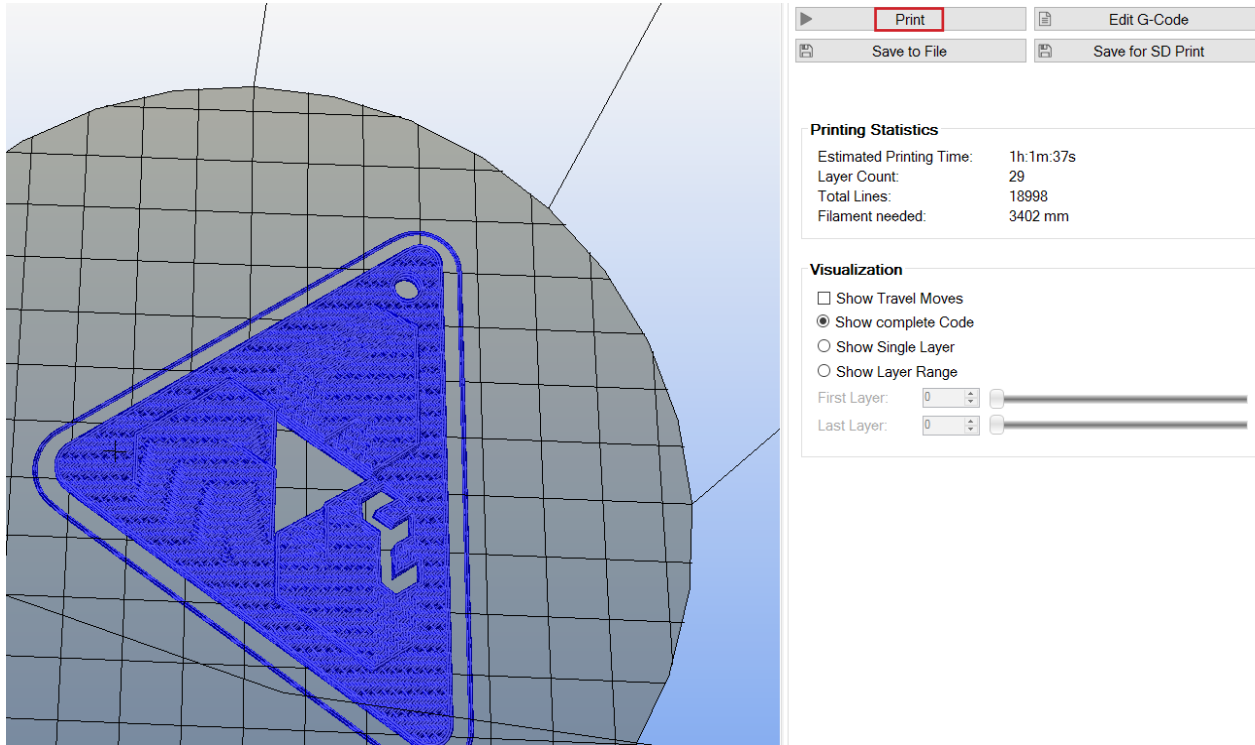


3°) Slice your object with the pre-configured CuraEngine profile:

- On «Slicer» tab, select «CuraEngine».



4°) When slicing is done, a virtualisation of the printed object is generated, only thing left is to click on «Print» button.



## PID calculation

**Preamble :** The PID values are necessary for the temperature control of the heating elements. If you find that the target temperature is difficult to reach or the actual temperature varies a lot around the target temperature, it may be useful to recalculate the PID values.

### By GCODE commands :

1°) Make sure the print head temperature is at room temperature.

2°) Disable the secondary fans.

3°) In the «Manual control» tab, use the input field for sending GCODE commands :

Send the following command : **M303 E0 S250 C8**

#### Details :

- E0 = extruder number 1
- S250 = target temperature at 250°C
- C8 = 8 cycles of regulations around the target temperature

Once the command is sent, Repetier-Host logs will show you the progress of the calculation. When the calculation is finished, the new values P, I and D are indicated in the logs.

4°) Send the following GCODE command to save : **M500**

---

### If you have the LCD screen :

In the menu of the screen is integrated an option to directly calculate the PID.

Just go to the «Calibrate / PID hotend» menu.

### To go further

On regular basis updates for your MicroDelta Rework are uploaded on our website. You can find them in the «Support» section of the site, under «MicroDelta Rework / Ressources\_3D / Ameliorations.»

Do not hesitate to regularly check that folder to keep your printer up-to-date.

## Maintenance

A monthly maintenance of the 3D printer is recommended.

Below are some recommendations:

Using a brush, dedust the following:

- Emotronic board
- All the fans to ensure a good airflow
- Cold part of the printhead

- To clean the printhead follow the guide dedicated to the Hexagon hotend on the following link:

[http://data.emotion-tech.com/highlights\\_fr/Hexagon%20-%20Notice%20montage-debouchage.pdf](http://data.emotion-tech.com/highlights_fr/Hexagon%20-%20Notice%20montage-debouchage.pdf)

- Clean the teeth of the drive wheel using a sharp ended tool like a needle tip, the end of tweezers or a cutter blade.

- Check & tighten the screws of the 3D printer.

- Lubricate the various mechanical transmission elements with multipurpose grease.

## Recommendations

### Turning off your 3D printer :

After printing, if you want to turn off the machine, wait until the print head cools down to room temperature to ensure that the print head doesn't get clogged.

### Transport :

If the printer has to be transported by car or another mean of transport in which it could be subject to vibration, it is recommended to unplug all the motors from the eMotronic board to avoid damaging it.

### Troubleshooting :

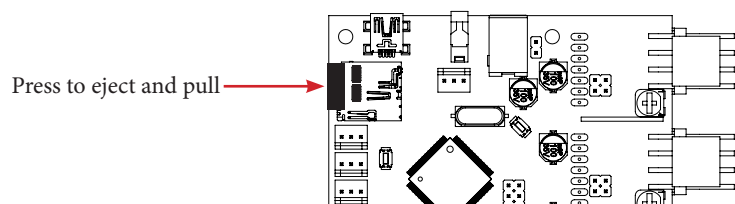
A FAQ on the MicroDelta Rework is available on our website in the «Support» section, please refer to it to troubleshoot your printer, most problems could be solved through this tool !

## Restore the TF card

**Objective :** prepare the files of the TF card again in order to eliminate the corrupted files and defective cells.

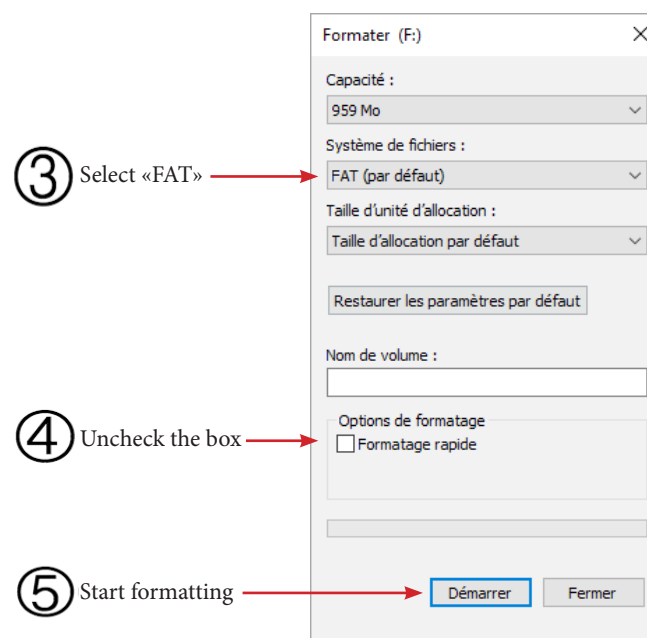
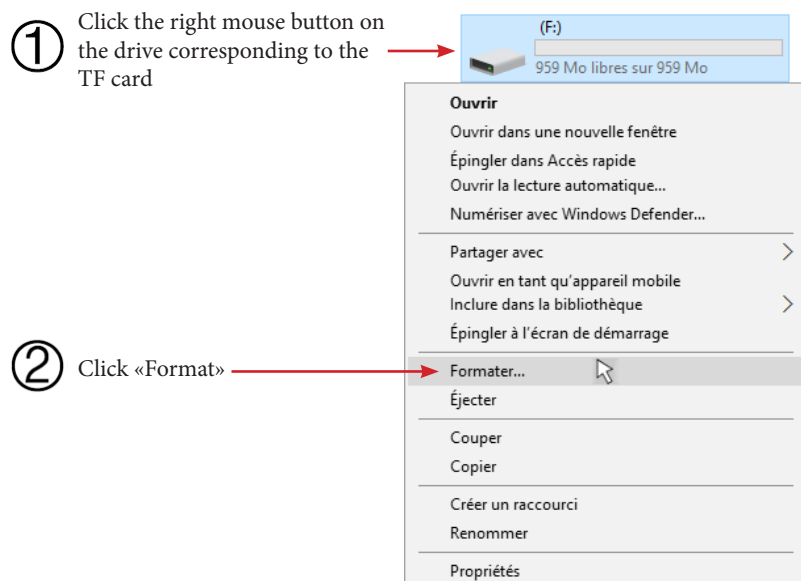
**Description :** for various reasons, the files present in the TF card and / or the cells of this card can be damaged. You will find through this procedure how to restore the TF card and the necessary files to MicroDelta Rework.

1°) **Remove the TF card by pressing it, you will hear a click indicating that the card is no longer locked and can be removed without damage to the reader.**



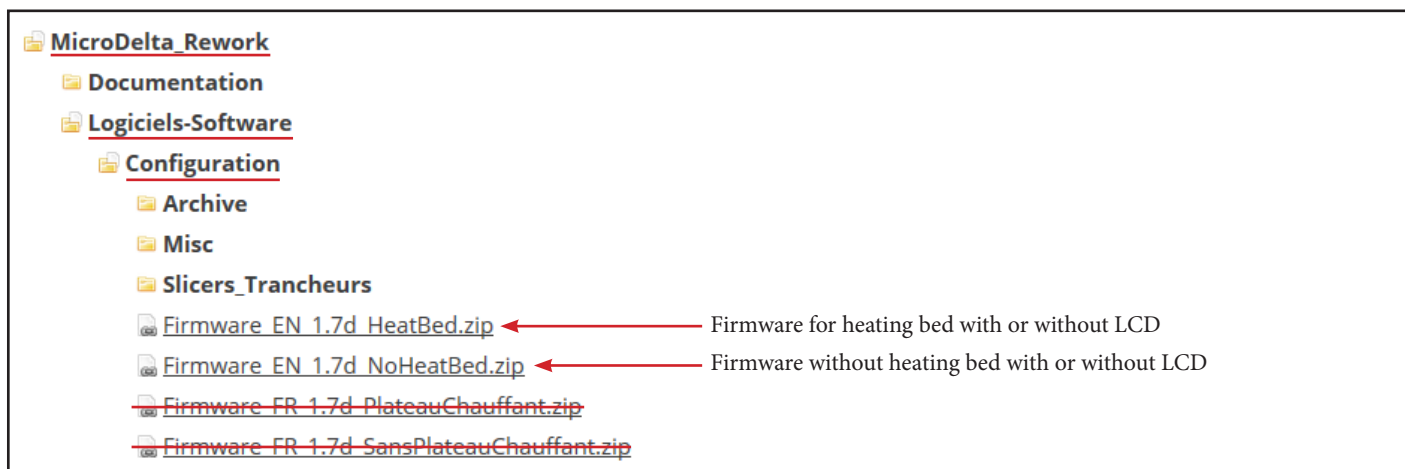
2°) Then read this TF card with an external drive on your computer (very useful because the formatting is too long by USB cable).

3°) Make a long format (uncheck the «fast format» box) of the TF card in FAT format (FAT16 : < 2 GB / FAT32 : > 2 GB)

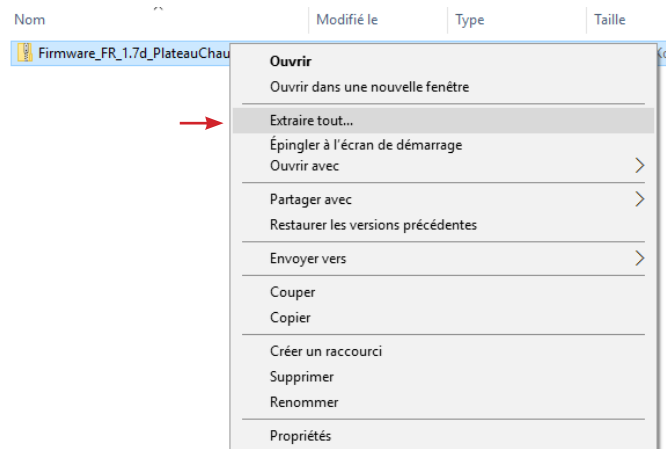




4°) Download the latest firmware on our website «reprap-3d-printer.com» in the support section, in the tree dedicated to your machine.



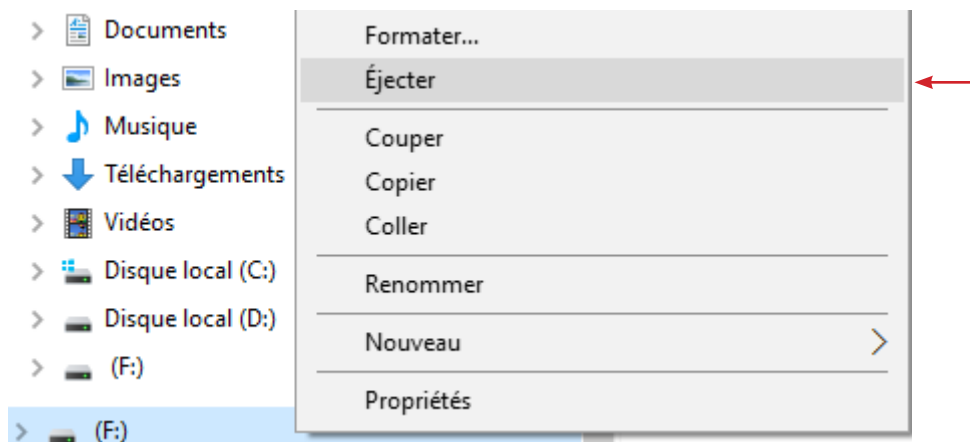
5°) Unzip the newly downloaded folder (right click on the compressed folder and then «Extract everything ...»).



6°) Go inside this folder, then select all the files and finally copy them to the root of the TF card.

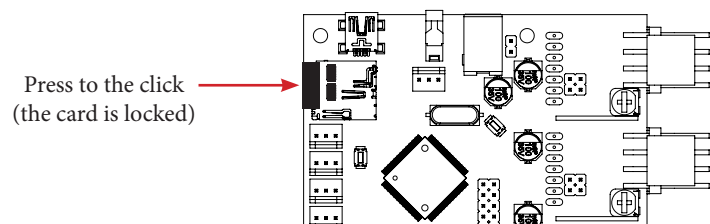
config	05/09/2017 15:13	Document texte	17 Ko
firmware.bin	05/09/2017 15:13	Fichier BIN	371 Ko
Read_Me	05/09/2017 15:13	Document texte	2 Ko
Spoolholder_V2	05/09/2017 15:13	3D Model File	1 204 Ko

7°) Eject the TF card (right click on the TF card then «Eject»).



8°) Disconnect the TF card reader from the computer.

9°) Insert the TF card into the eMotronic drive.

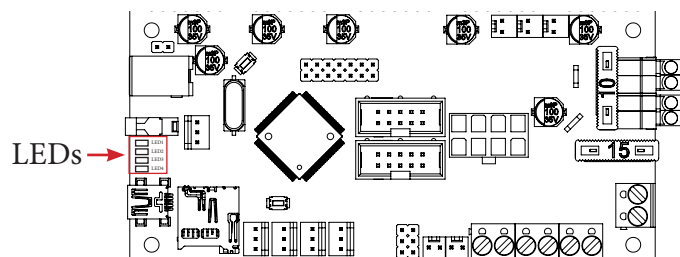


10°) Press the «Reset» button located on the lower metal part to take into account the new firmware.

11°) In the TF card, make sure that the «firmware.bin» file is changed to «firmware.cur».

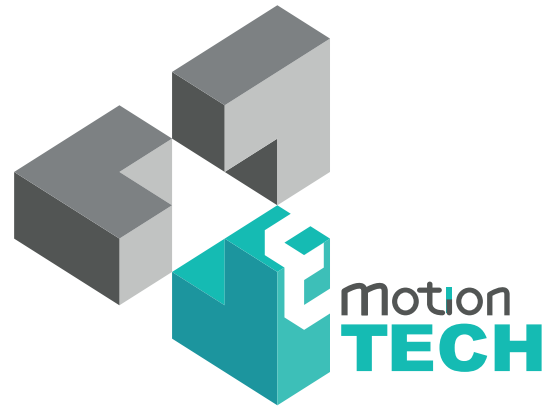
12°) On the eMotronic board, between the USB connector and the auto-leveling sensor connector, make sure that:

- LED1 remains on
- LED2 and LED3 flash continuously
- LED4 remains on



## Appendix

From there, the eMotronic card should be recognized by the Device Manager and the contents of the TF card should be displayed in the Files Explorer. It will then only remain to realize again the calibration of the 3D printer.



Thank you for choosing us!

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[www.emotion-tech.com](http://www.emotion-tech.com)