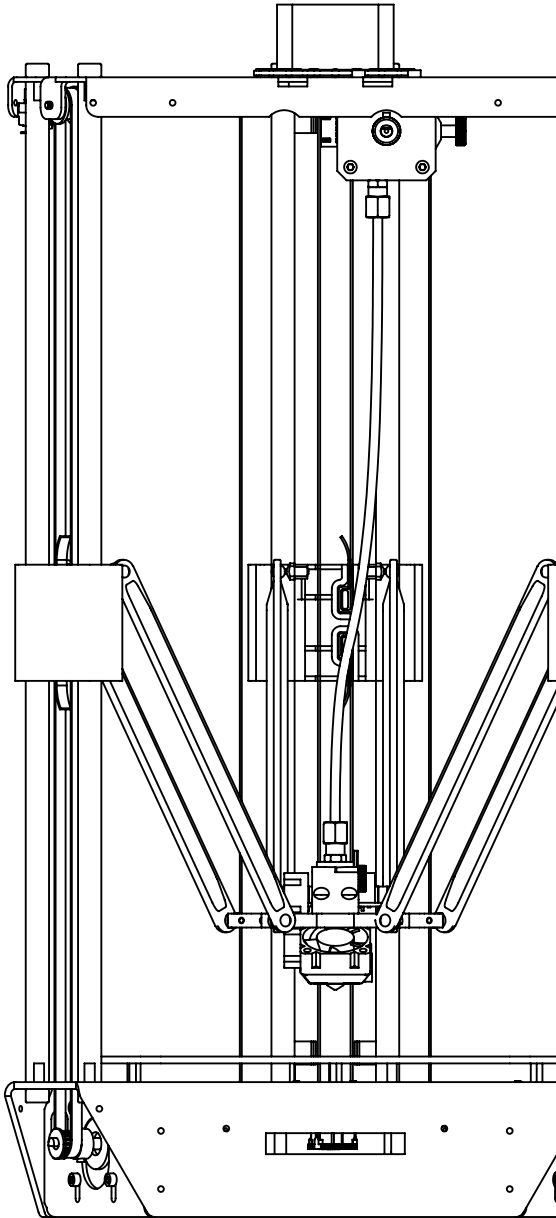# micro delta

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.

- **Authors of this document :**

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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 : 15/03/2018

- **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

SOFTWARE INSTALLATION

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
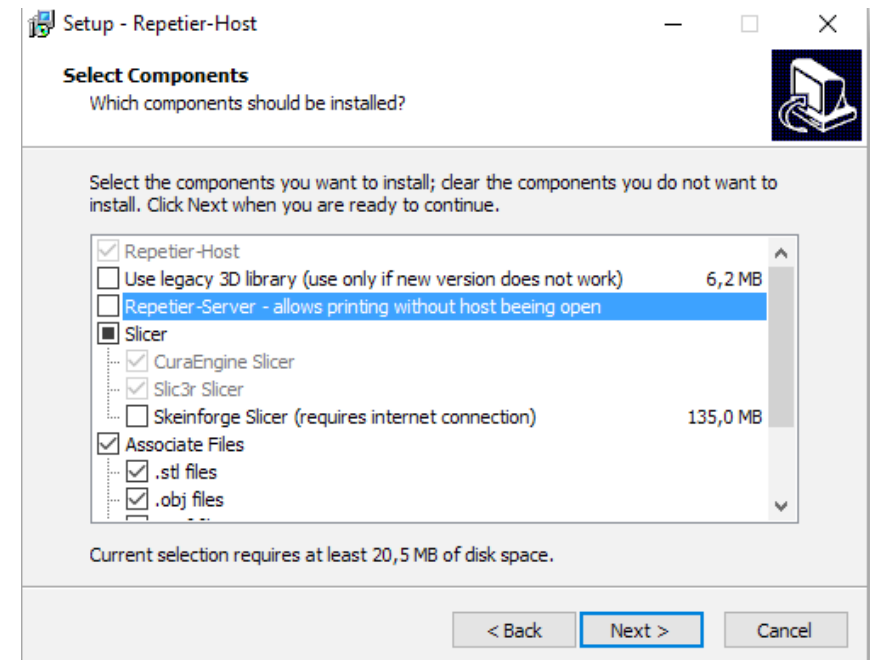
Pre-requisite :

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

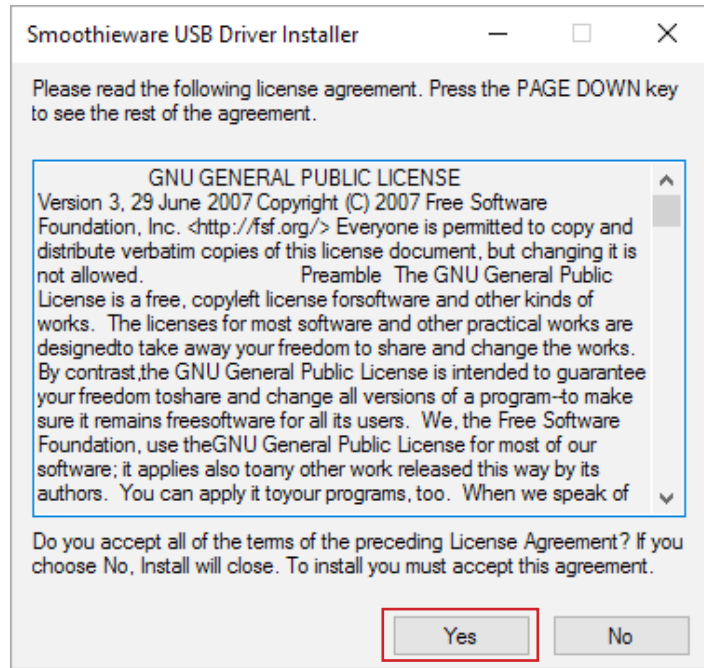WARNING : eMotronic board should be unplugged from the computer.

1°) Run the installer file (.exe) and follow the instructions. (To be downloaded from our website's «Support» section)
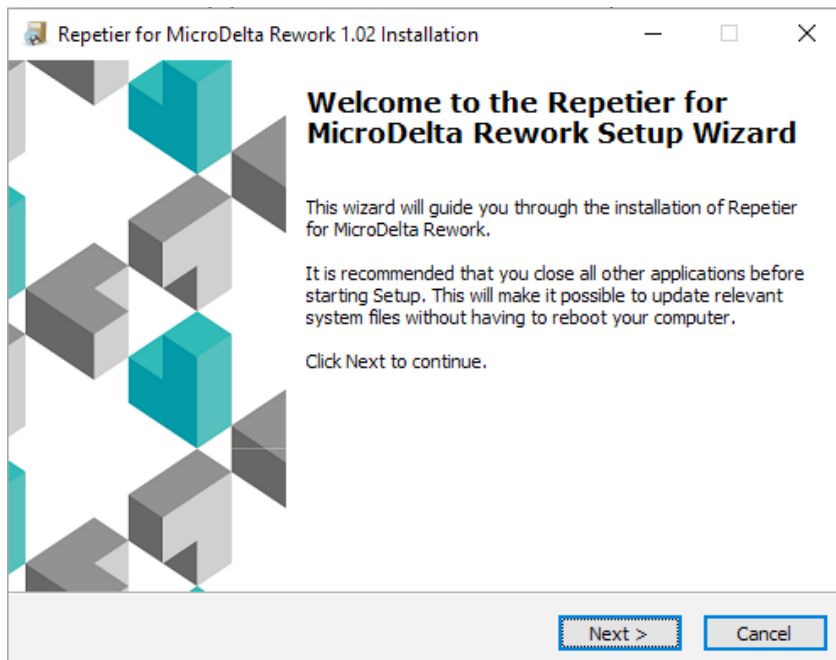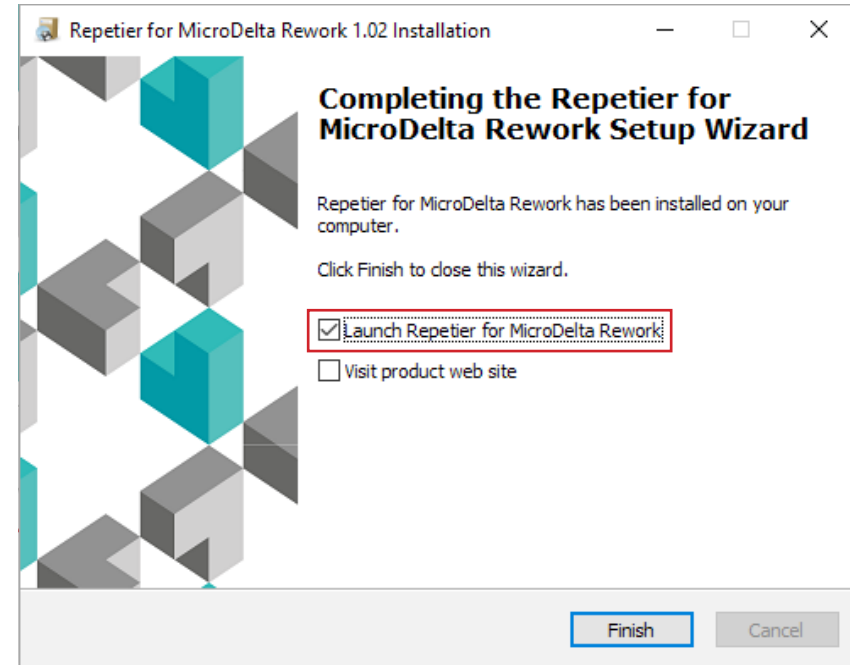
2°) At the stage of Components selection, be sure to uncheck «Repetier-Server».
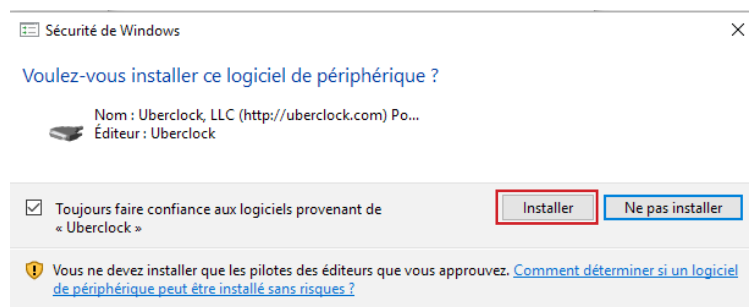
SOFTWARE INSTALLATION

**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
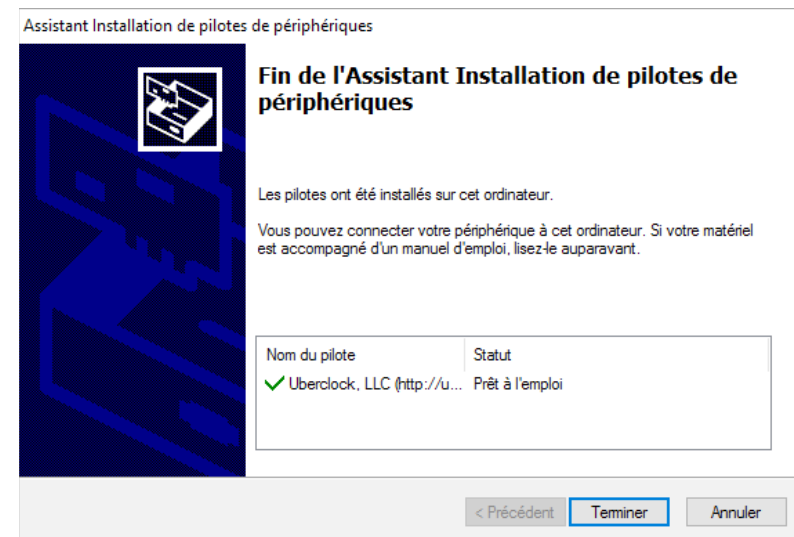
Software installation on Linux

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

<div style="border:1px solid red; text-align:center; color:red;">

Informations in this chapter are meant for Linux users only.

</div>

(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.

PREPARATION

PREPARATION

Files to copy on the SD card

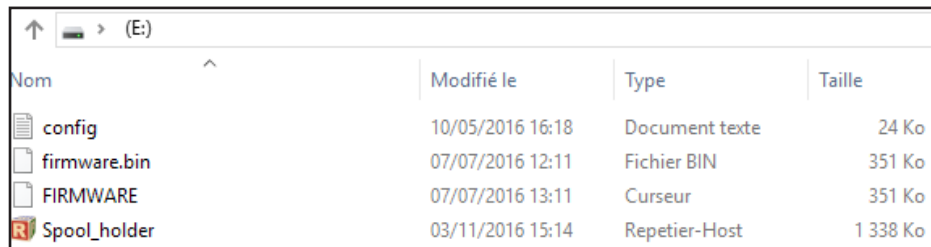**Objective :** copy the configuration files to the eMotronic's SD card.

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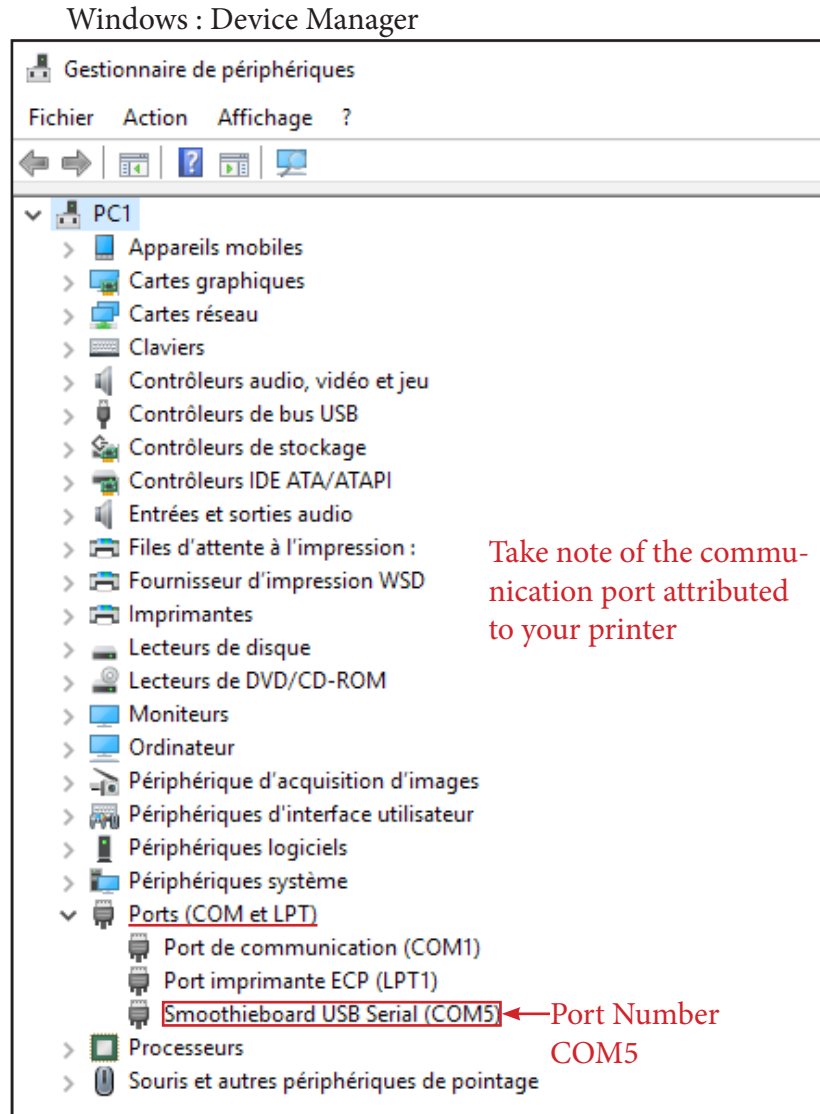
Windows : what you should have on the SD card after this step
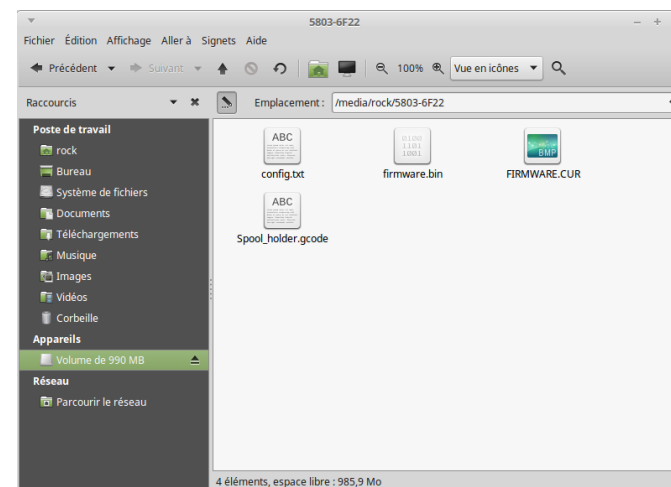
Linux : what you should have on the SD card after this step

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

PREPARATION

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

Windows : Device Manager

Take note of the communication port attributed to your printer

Smoothieboard USB Serial (COM5) ← Port Number COM5

With Linux : Command line terminal

Use the following command : lsusb

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

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

PREPARATION

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

Select the COM port COM assigned to you rmachine

On Linux

Write the COM port assigned to your machine

4°) Click on Connect.

This one should change color, becomes green when connected
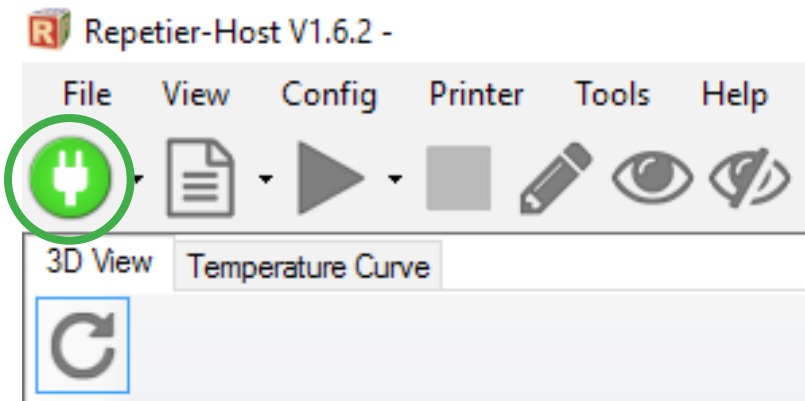
5°) Check that the extruder's temperature is consistent (logical value) and the printer's status is «Idle» as shown below:
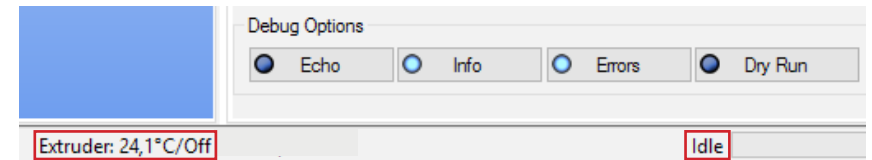
If you have a Heated Bed, its temperature will be displayed next to the extruder's
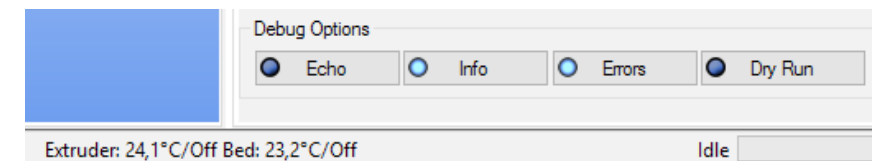
Motion test

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

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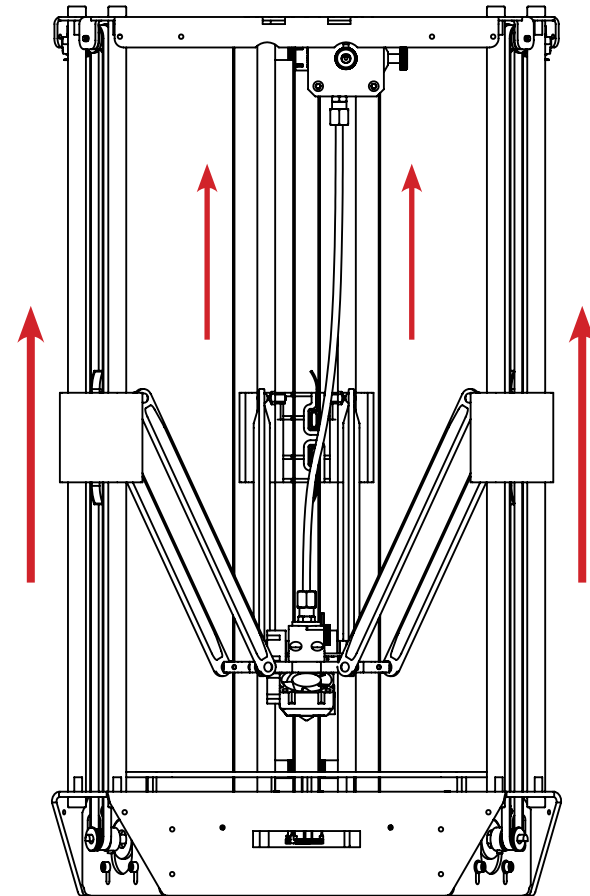
Automated Calibration

> 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.

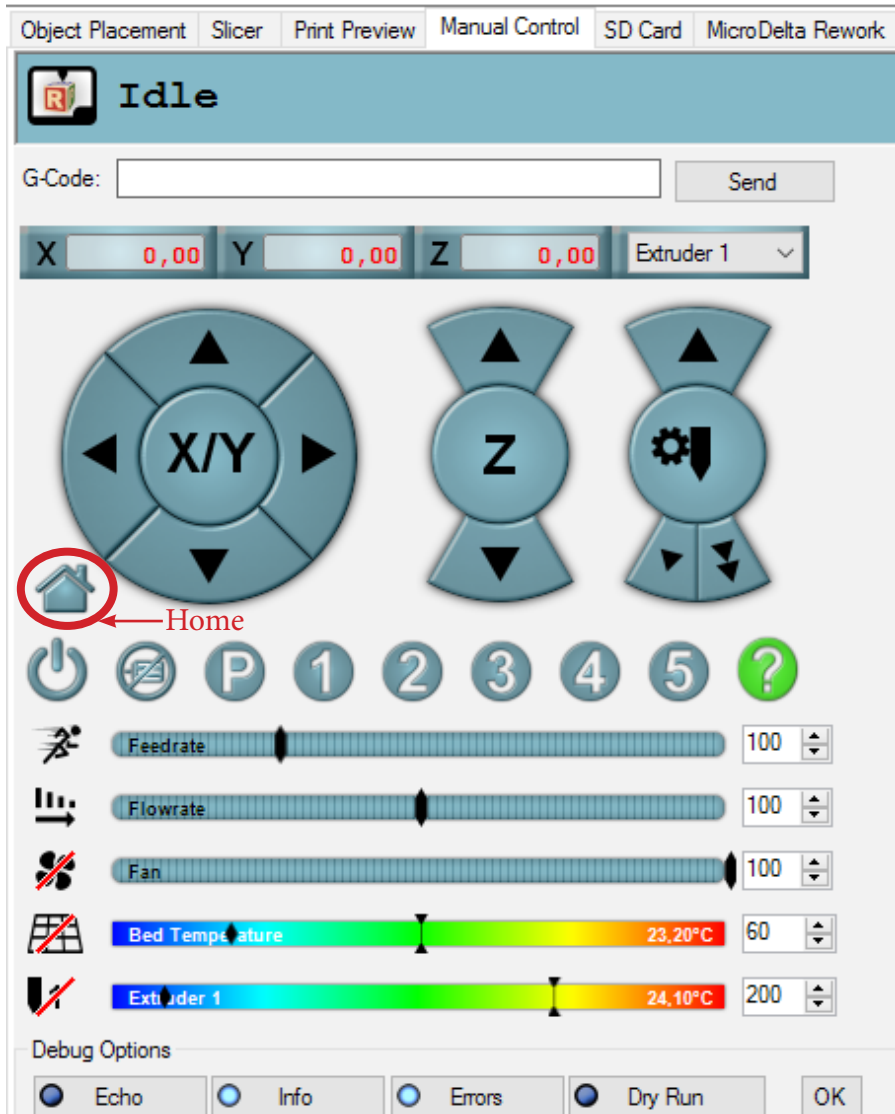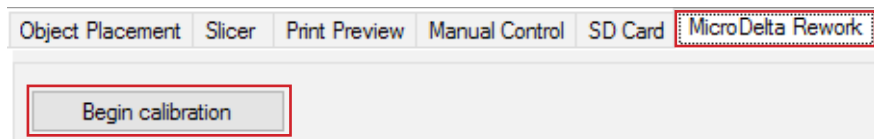

2°) Mount the calibration module on the printer's core, and plug its jack connector on the eMotronic board.
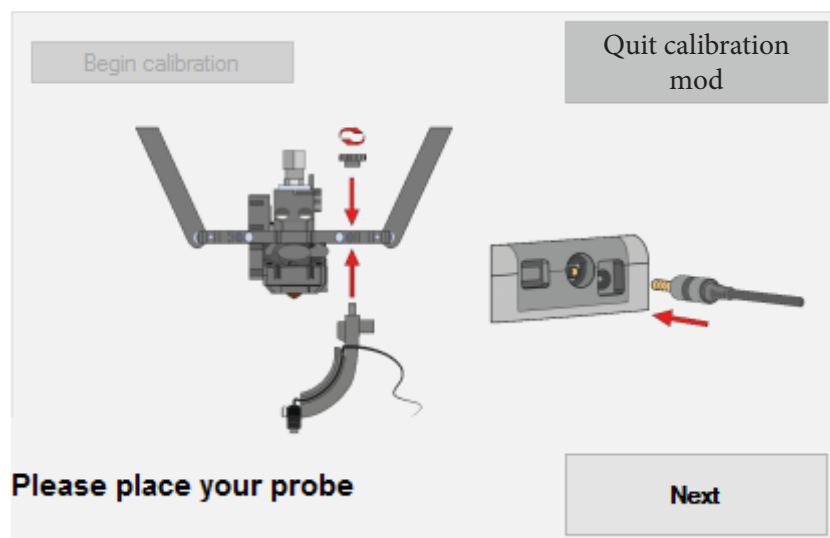
3°) By clicking «Next», the calibration begins and calibration module will start it's multi-point bed probing. This process can take several minutes.
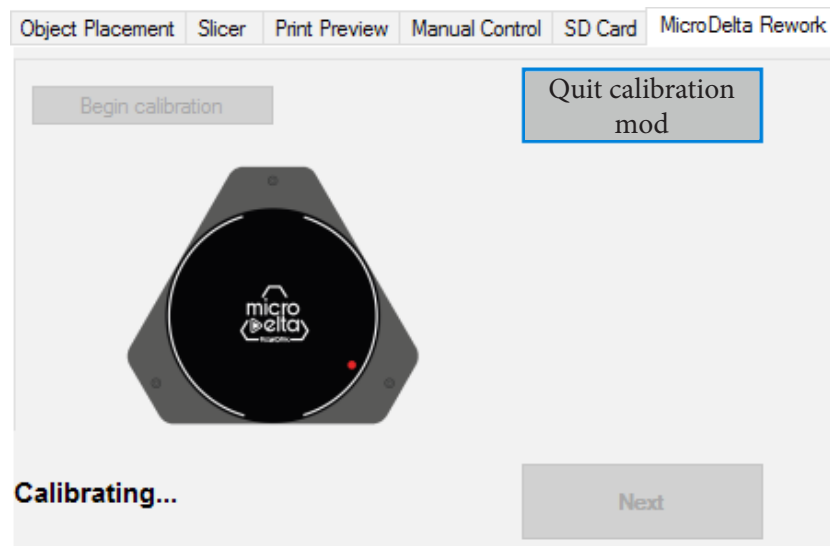
4°) Once the probing is done and the bed plane successfully corrected , you should set the Z maximum height.

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

| Object Placement | Slicer | Print Preview | Manual Control | SD Card | **MicroDelta Rework** |

Begin calibration

Quit calibration mod

Remove your probe and place a sheet of paper in the center of your bed

Next

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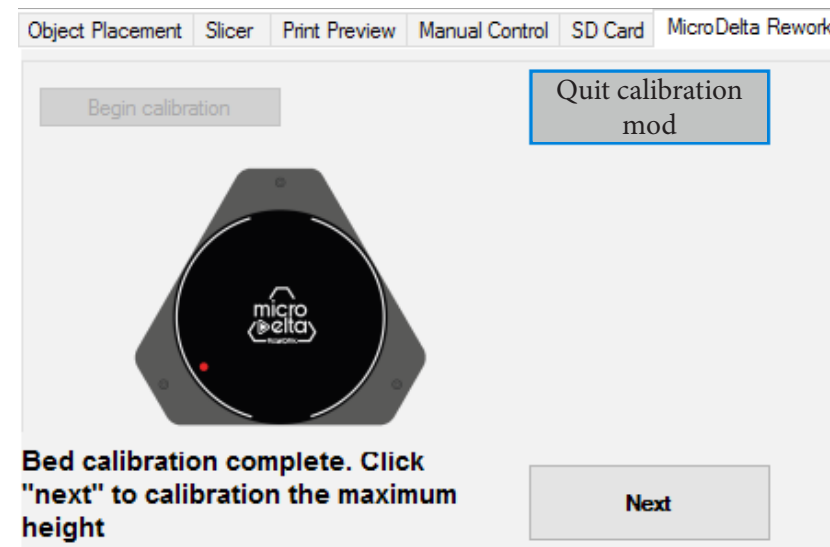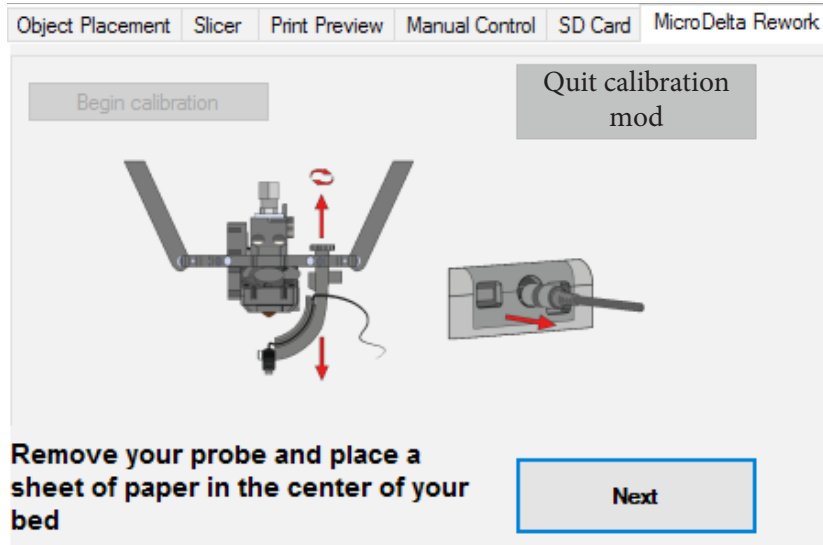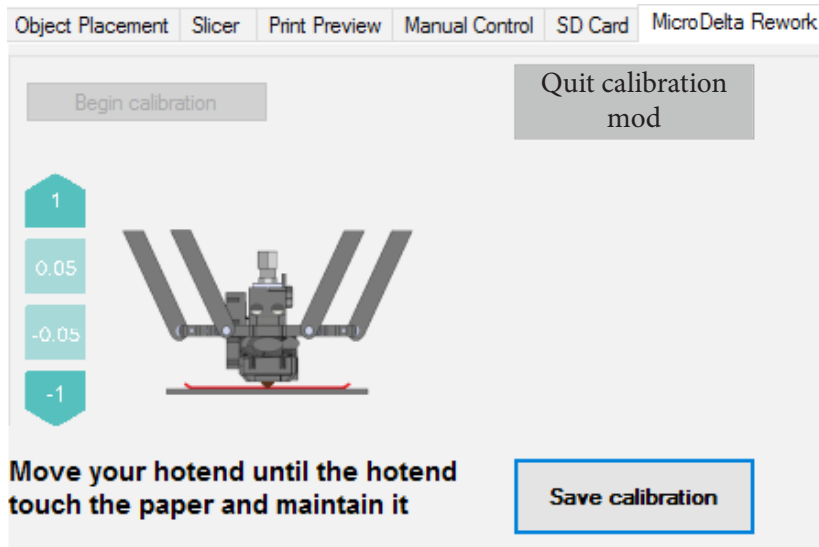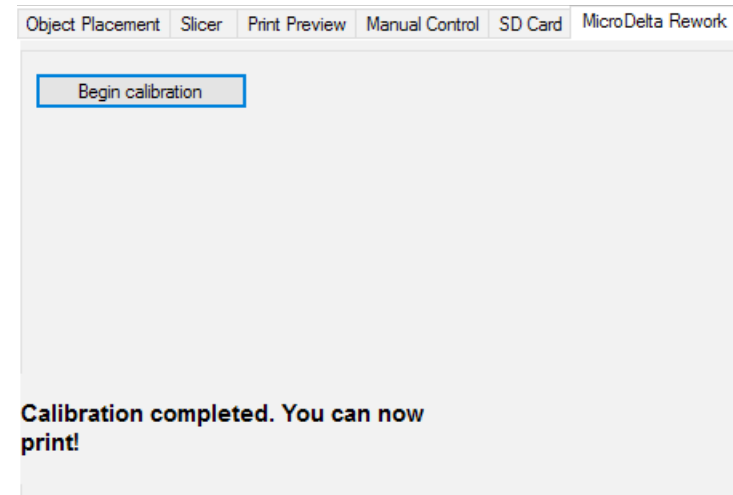

| Object Placement | Slicer | Print Preview | Manual Control | SD Card | **MicroDelta Rework** |

Begin calibration

Quit calibration mod

1
0.05
-0.05
-1

Move your hotend until the hotend touch the paper and maintain it

Save calibration

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

| Object Placement | Slicer | Print Preview | Manual Control | SD Card | **MicroDelta Rework** |

Begin calibration

Calibration completed. You can now print!

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:

Extruder heater Activation
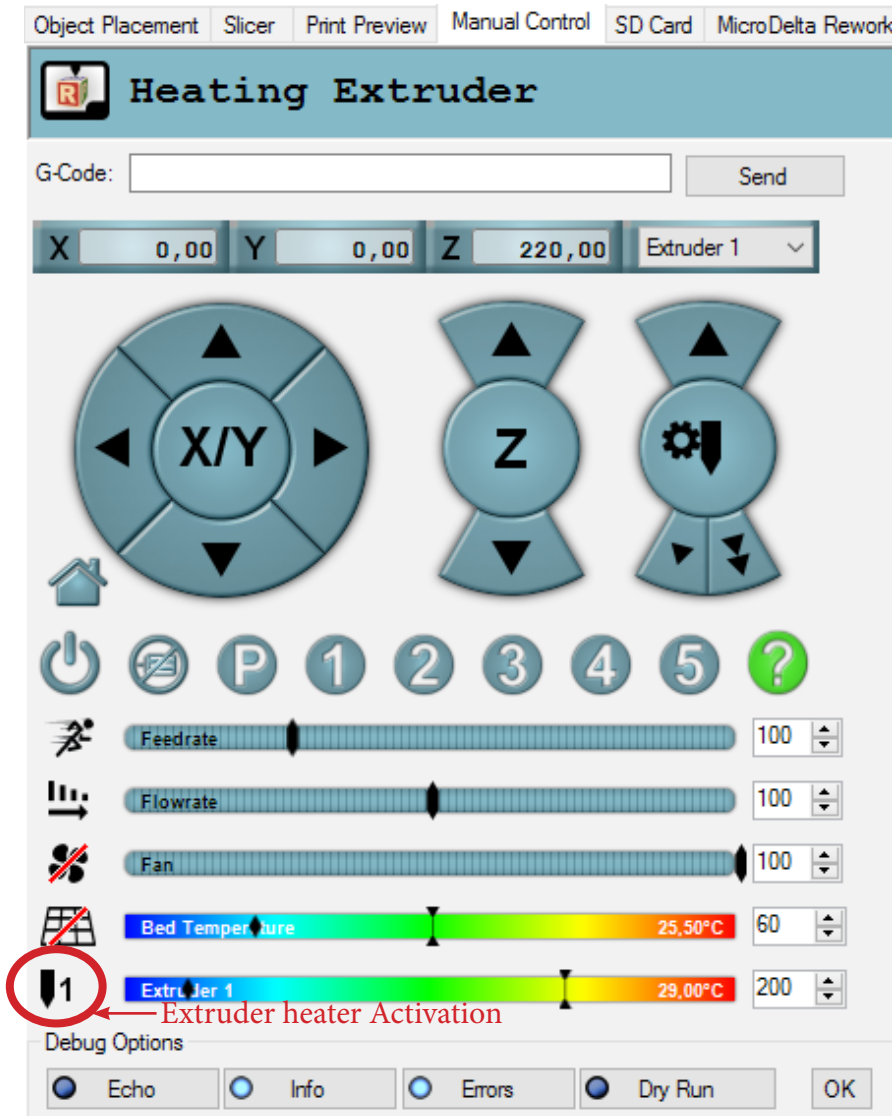
2°) Check that the target temperature is reached :
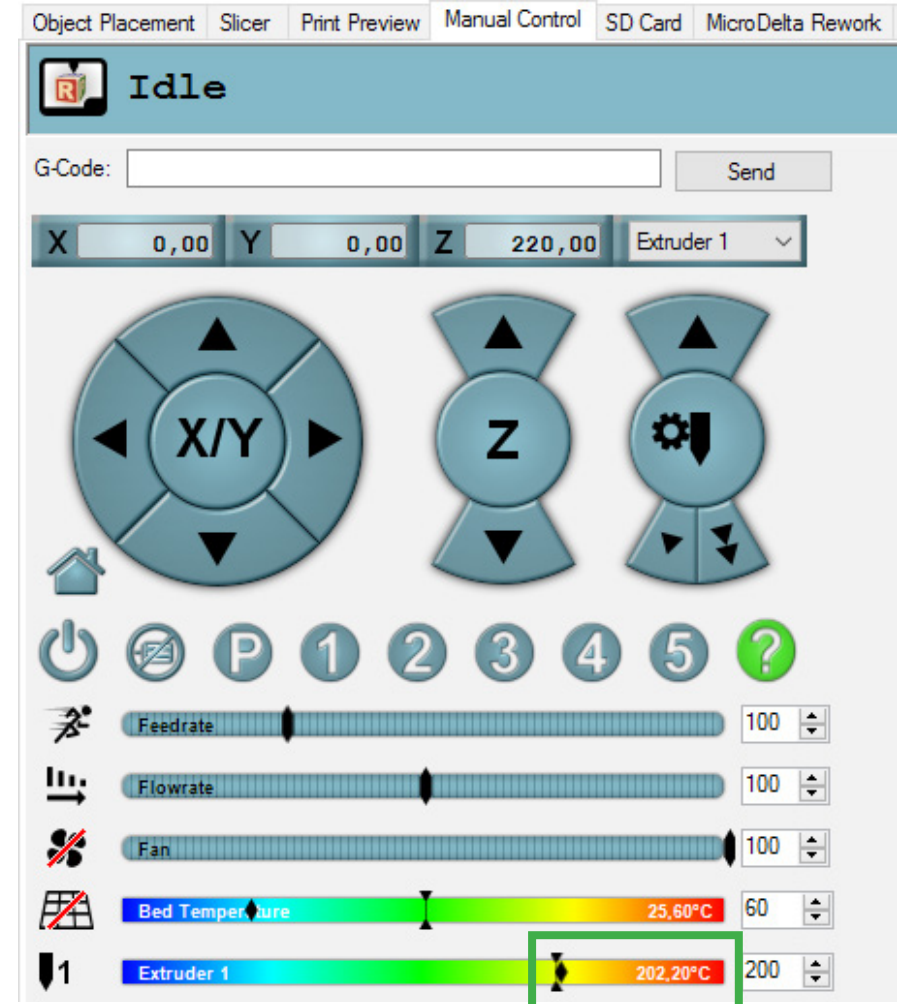
If the target temperature is not reached or the actual temperature varies a lot around the target temperature, perform a PID calculation (see appendix).

PREPARATION
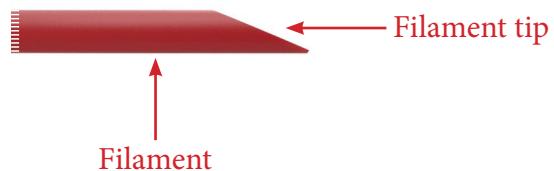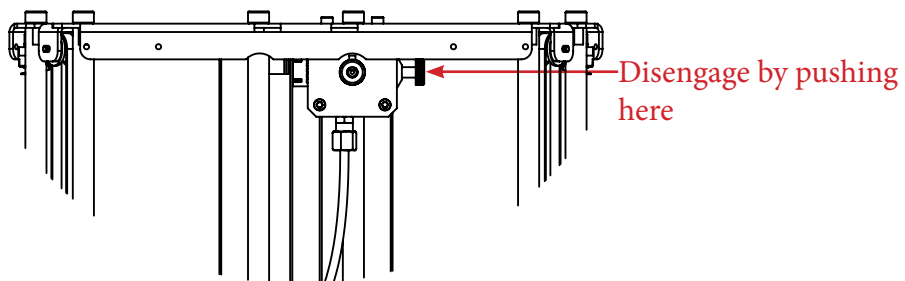
Charging filament

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

Filament tip

Filament

2°) Disengage the extruder

Disengage by pushing here

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

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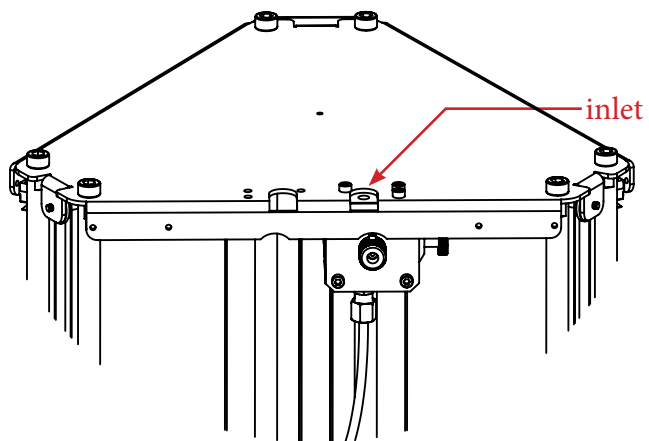
4°) If you encounter a hard point while inserting the filament, engage the extruder and turn the drive wheel until the filament gets to the nozzle, melted filament should start coming out

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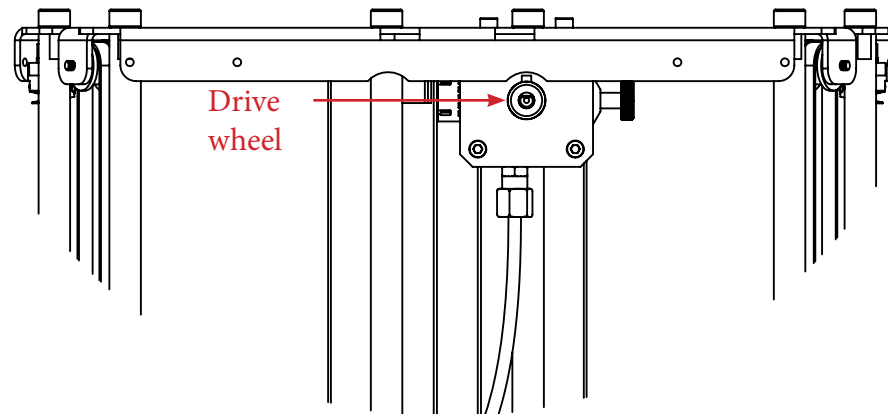
5°) Tighten the spring strongly by turning the knurled screw.
Note: if the thumbwheel is not tight enough, the filament will be badly driven.

Knurled screw

PREPARATION
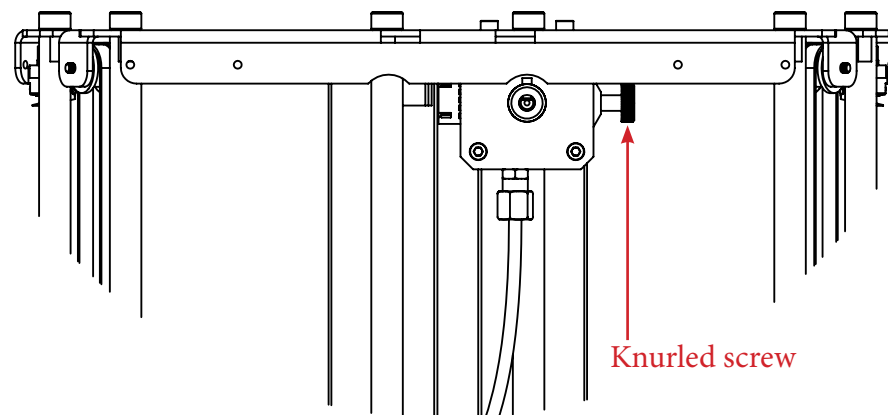
Extrusion test

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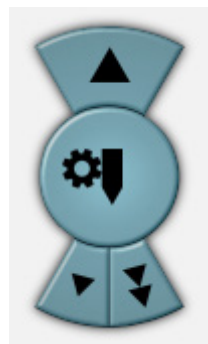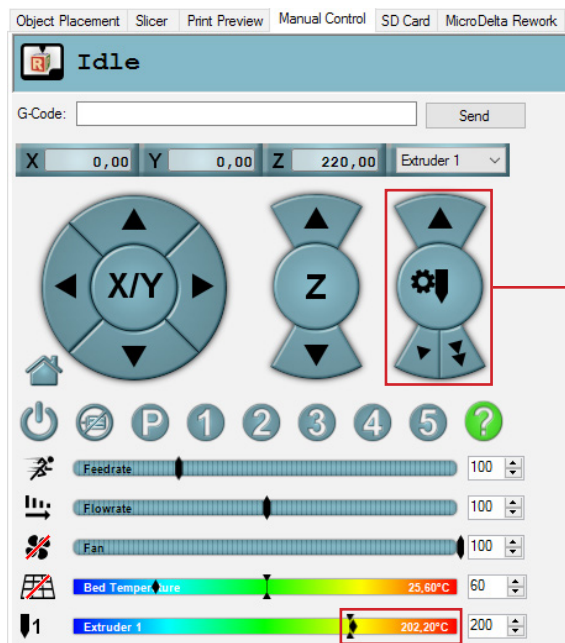
50 mm Extrusion

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.
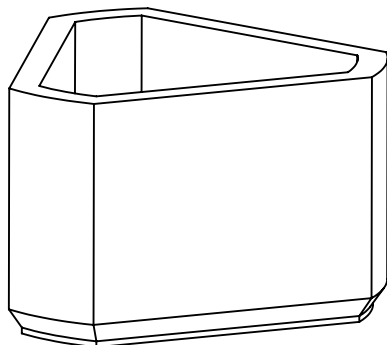
1°) Go to the «SD Card» tab of Repetier-Host. You should see the content of the card:
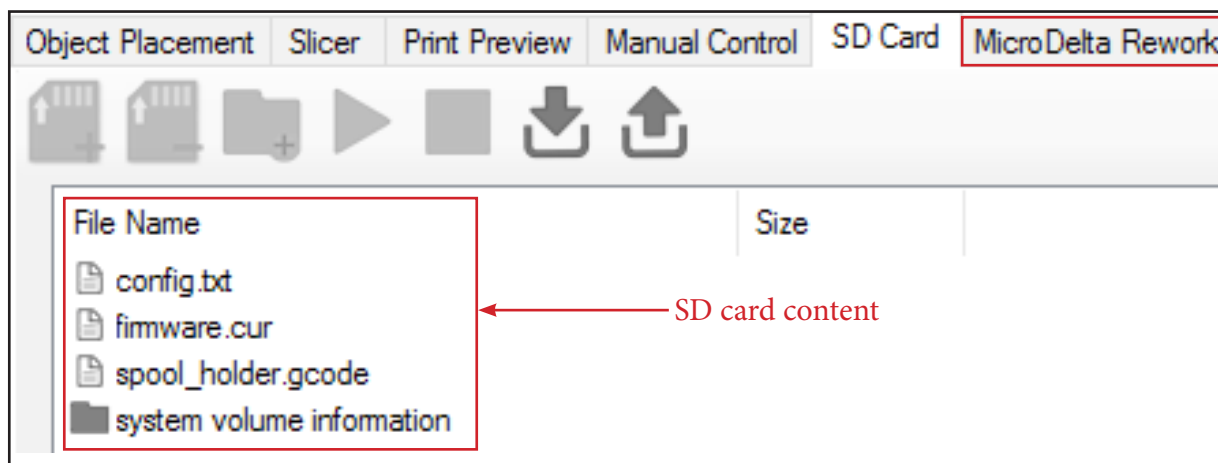
2°) Select the file «spool holder.gcode» then click on the «Print» button («Play» icon button).
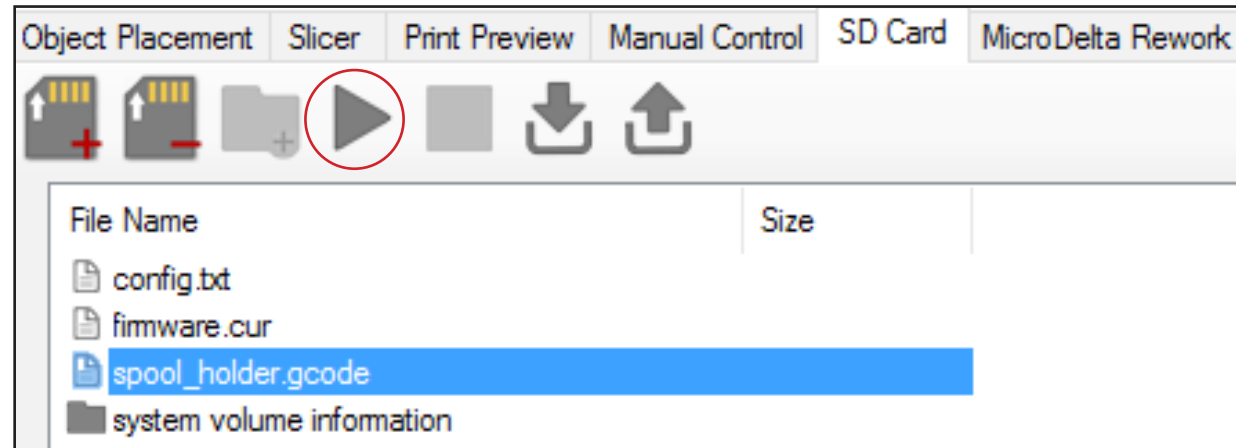
Print will begin, your printer will initialize (homing) and start heating the extruder and eventualy the Heat bed.
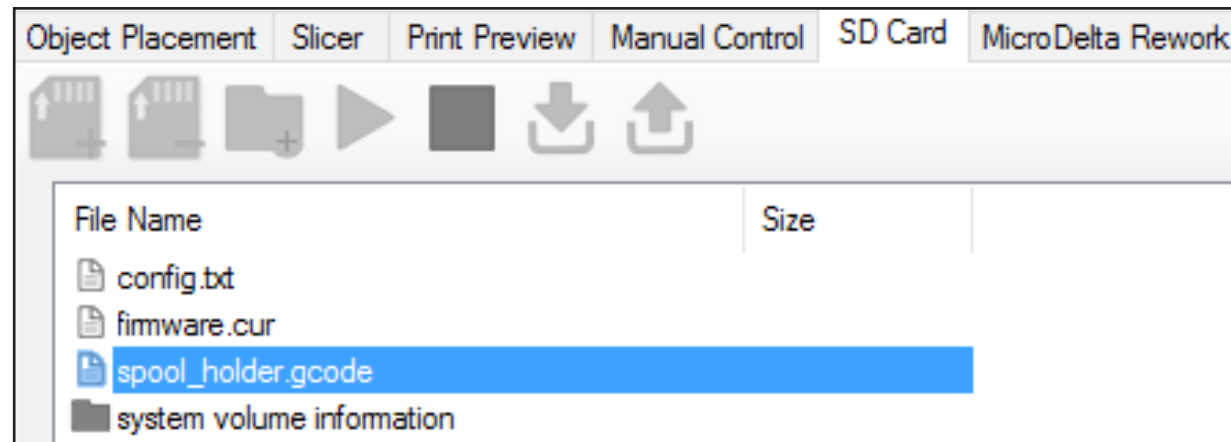
CONGRATULATIONS !
You successfully printed your first object !

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

Appendix

Appendix

Mounting of the spool holder

Objective : mount the spool holder on the top plate

M3x8mm screw

Printed spool holder part

Thrust bearing

Appendix

Result

Appendix
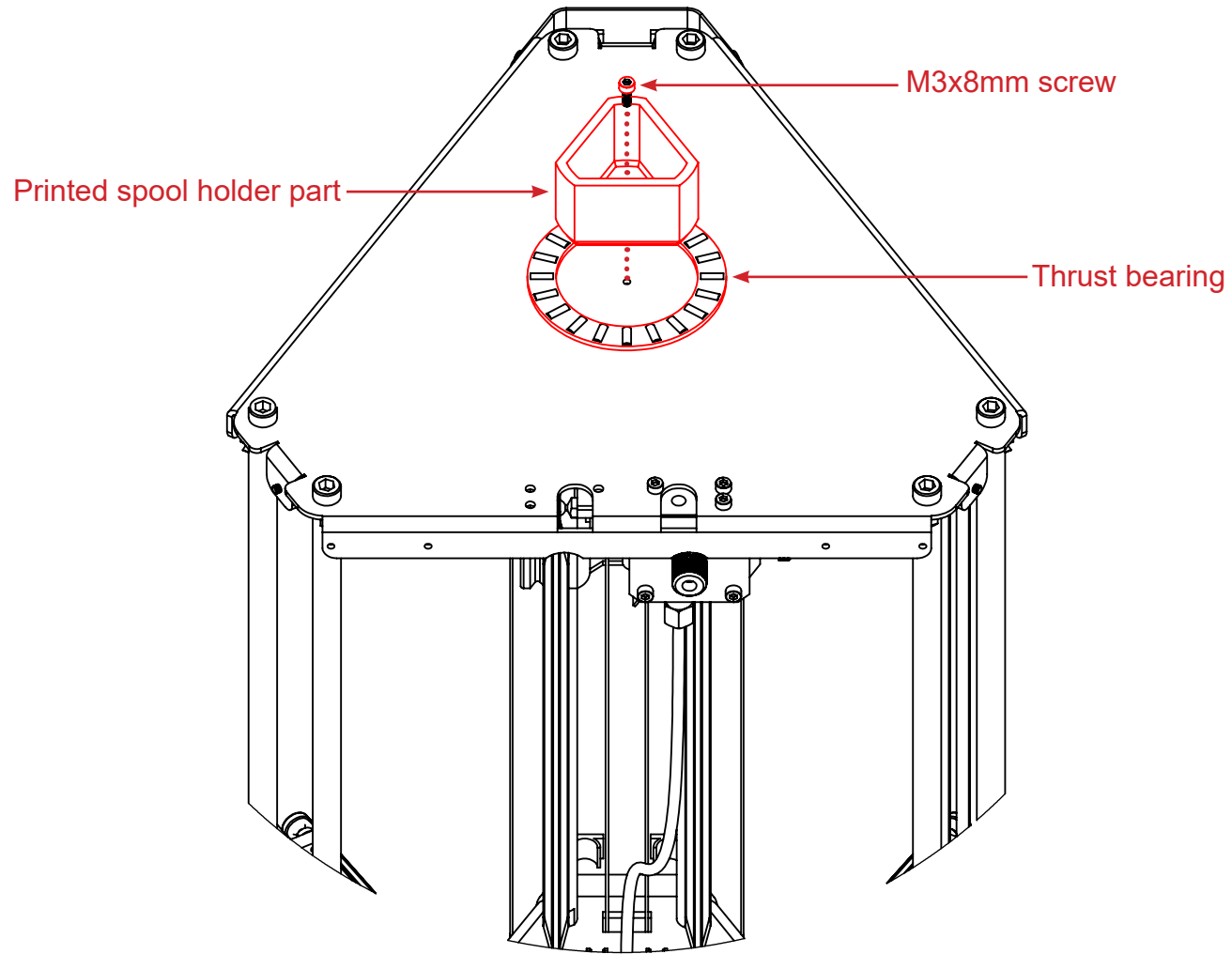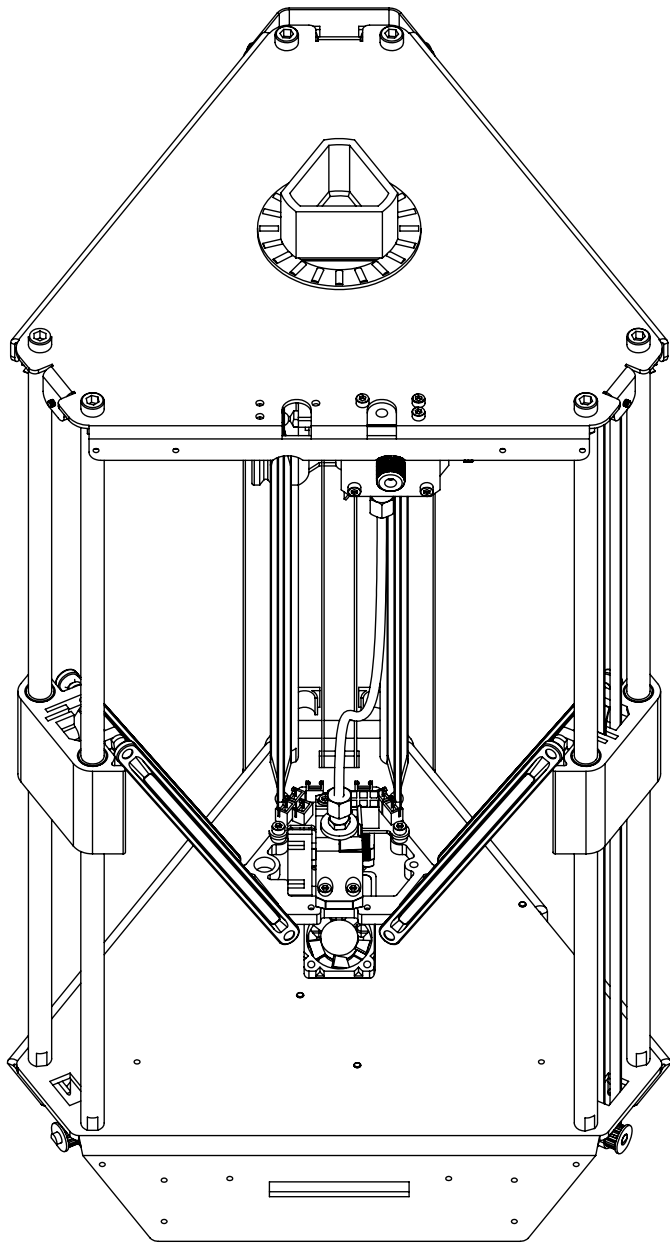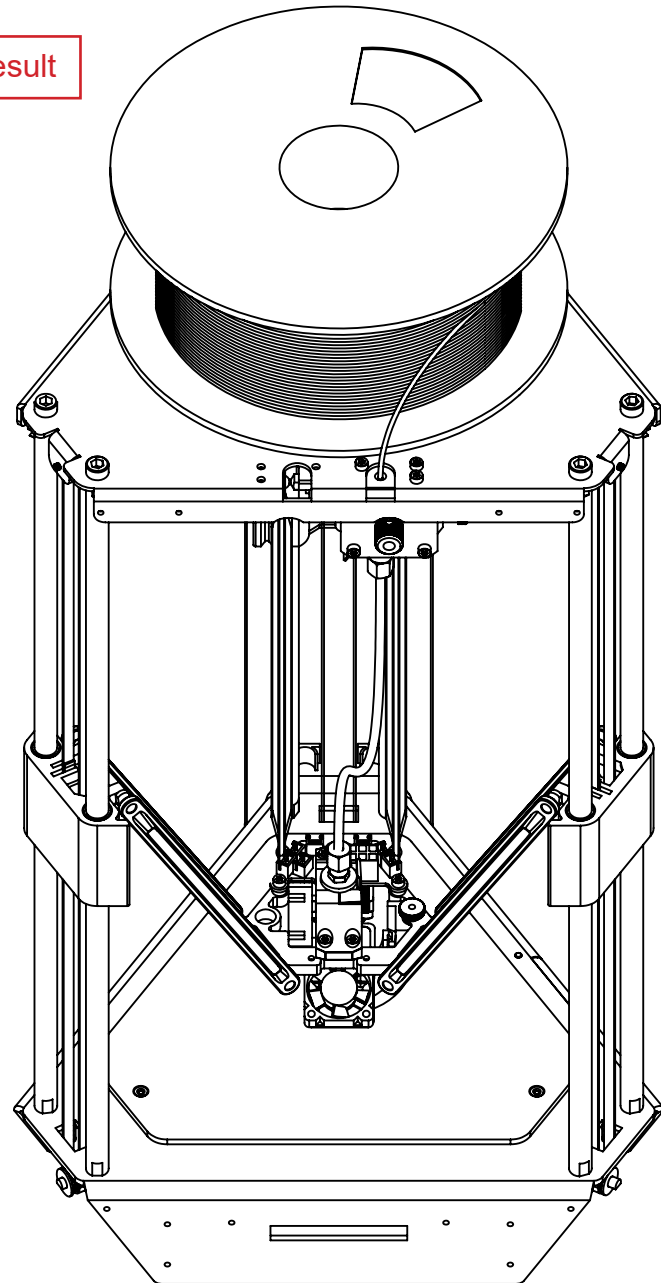
Calibration process using command lines

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

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

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

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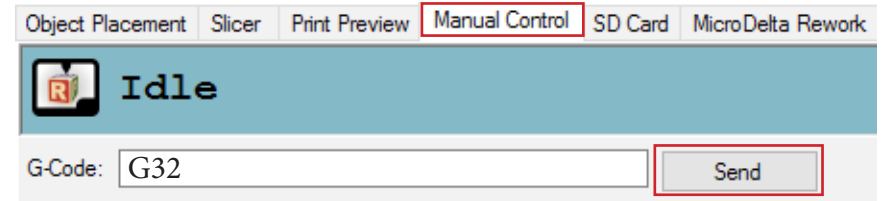
5°) Start the full bed calibration using **G31** command, this will probe multiple points of the bed to optimize the first calibration. This is known as grid compensation strategy.

7°) Remove and unplug the calibration module.
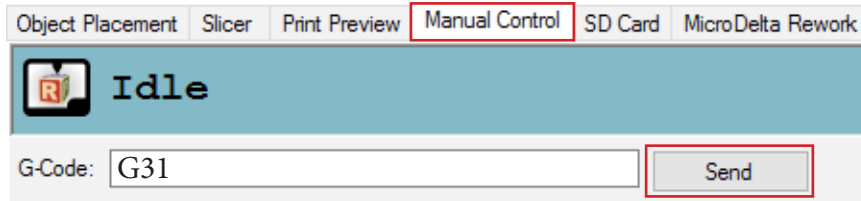
6°) Once done, save the grid values using **M374** command.

Appendix
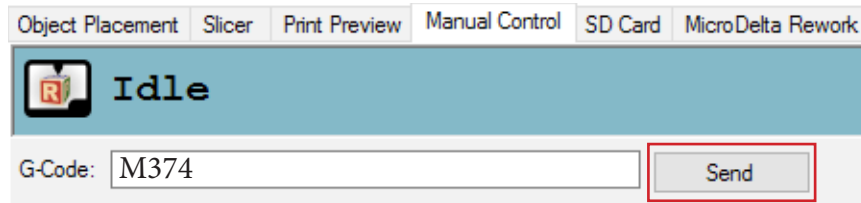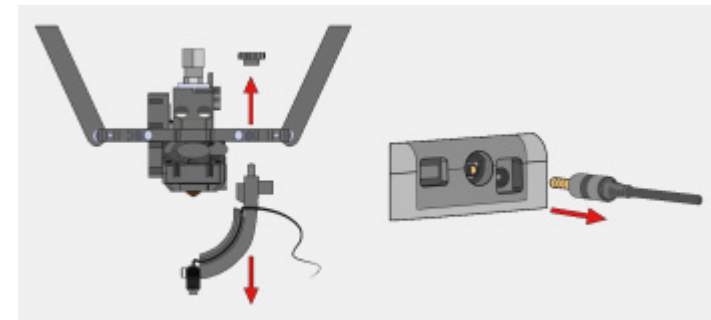
Maximum Z height

8°) Home or initialize your printer

Home
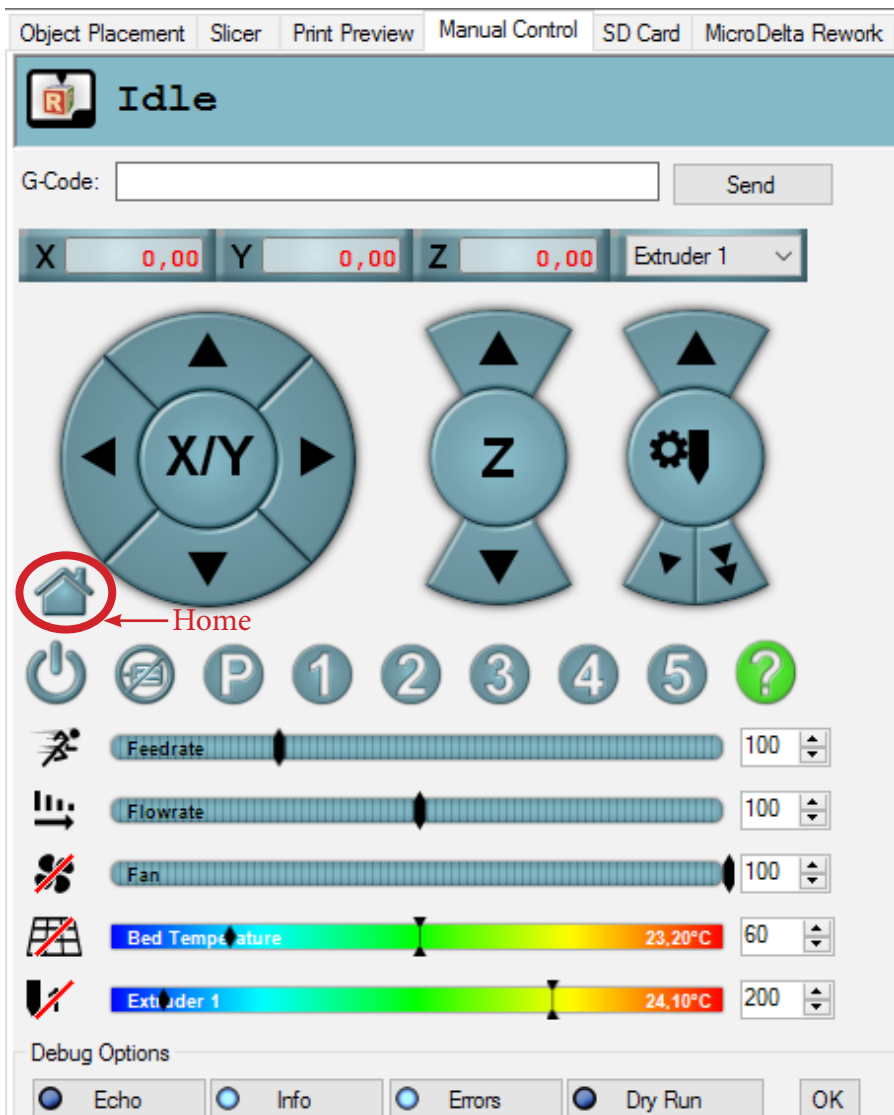
9°) Place a paper on the bed

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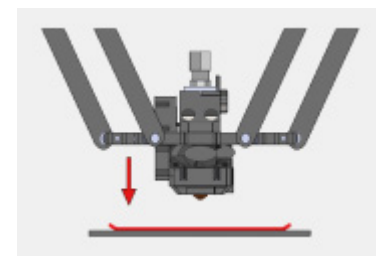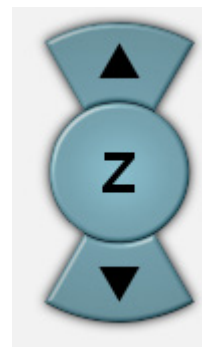
12°) Set the maximum Z height using the **M306 Z0** command

13°) Save using **M500**

Appendix
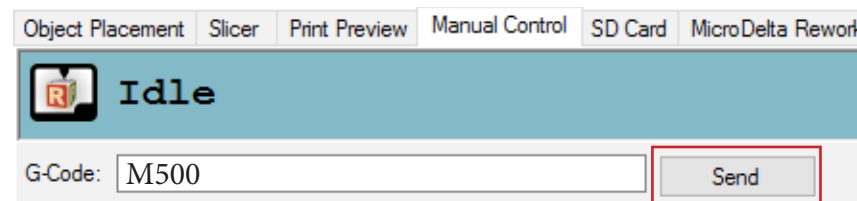
Precise adjustment of the maximum height

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 :

G-Code: [   ]   Send

Input field for sending GCODE command

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

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

```
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)

Appendix

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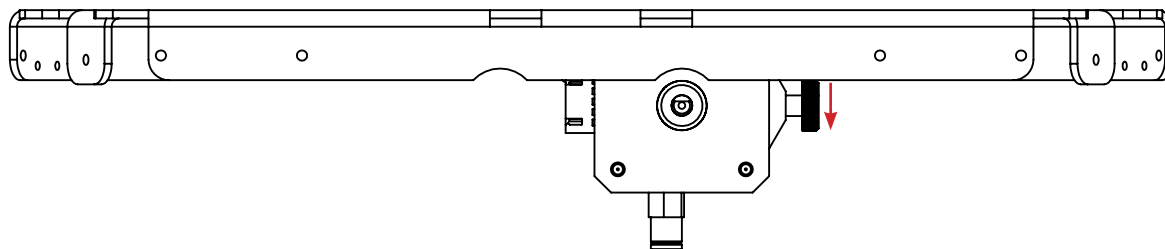
2°) In the Repetier-Host software, with the 3D printer connected and turned on, from the «Manual control» tab, ask for a target temperature dedicated to the used filament and wait until it is reached.

3°) If some filament is already engaged in the machine, remove it and cut it off to an 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)

Appendix
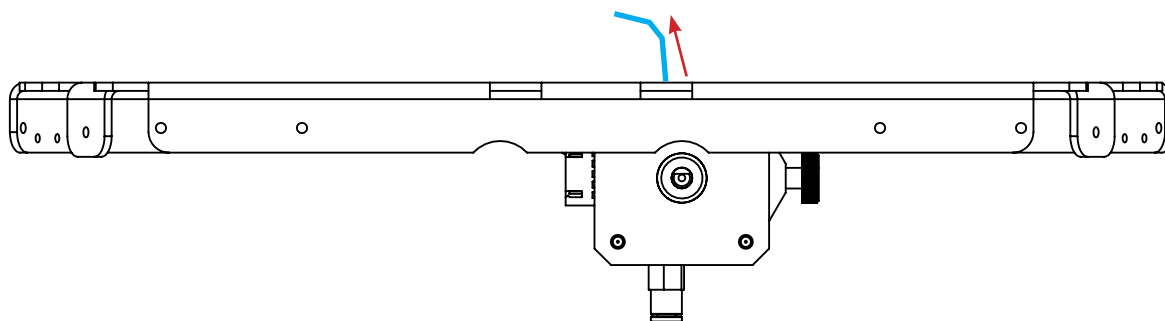
4°) Engage the new unmarked filament **to the nozzle**.
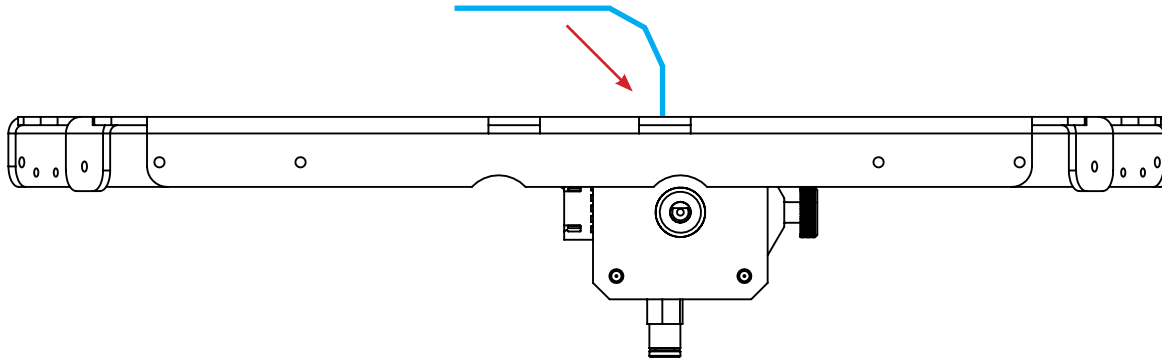
5°) Always in the «Manual Control» tab of Repetier-Host, ask for one or more slow extrusions of 100 mm.

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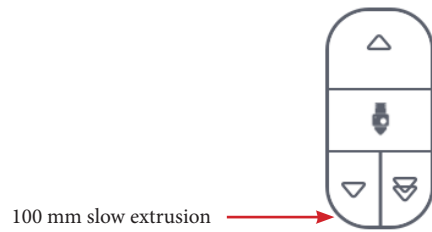
6°) At the same time, observe the filament coming out of the nozzle and check that the extrusion is continuous and homogeneous at a speed corresponding to the speed of the driving wheel.

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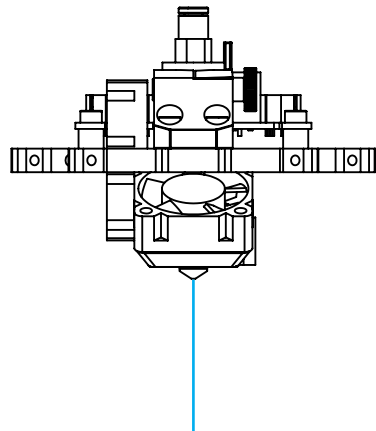
7°) If the filament does not come out of the nozzle: tighten the screw a little more until it is homogeneous.

Appendix
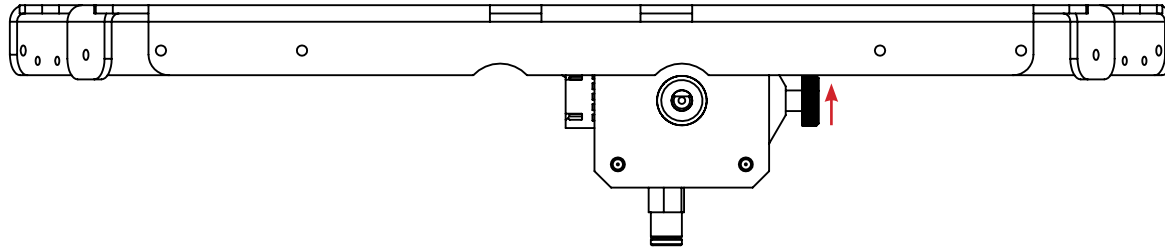
Printing a 3D model

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

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
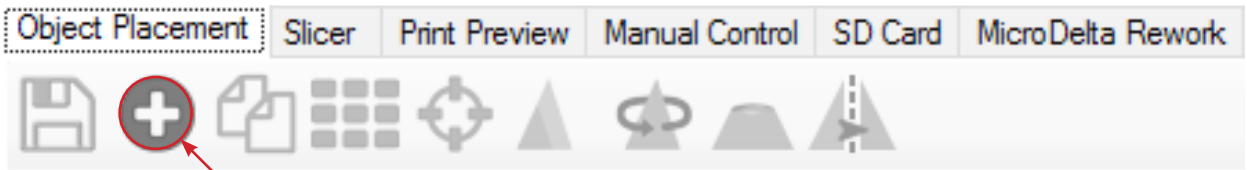
List of the objects your added
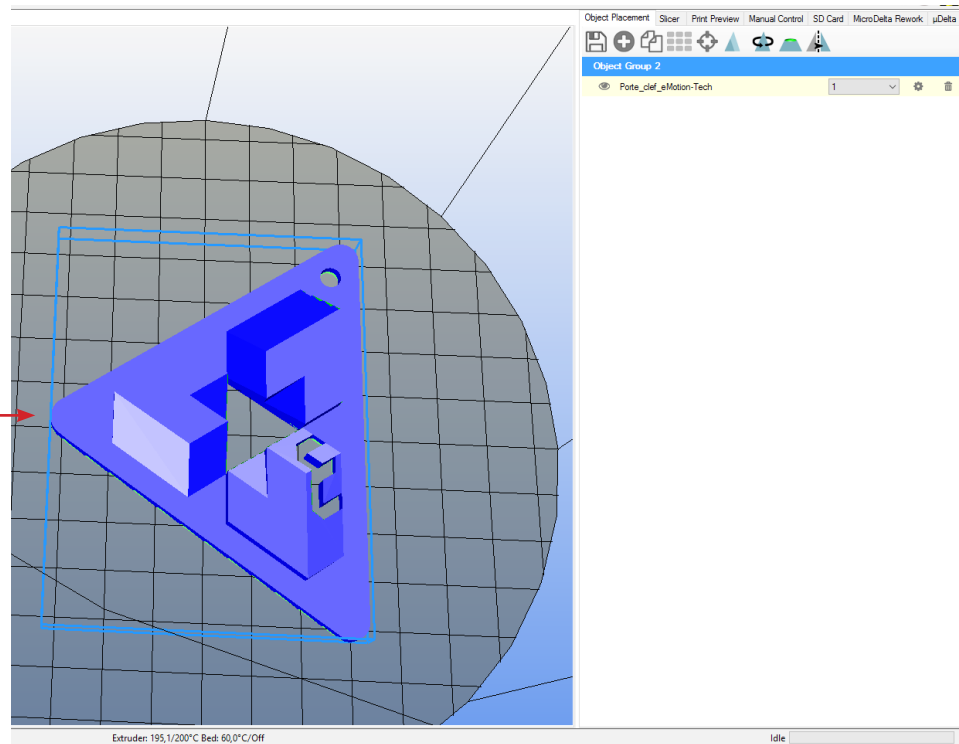
Virtual representation of the objet on the print surface

Appendix

2°) You can edit your object :

Save Duplicate Centrer Rotate Mirror
Auto place Scale Cut
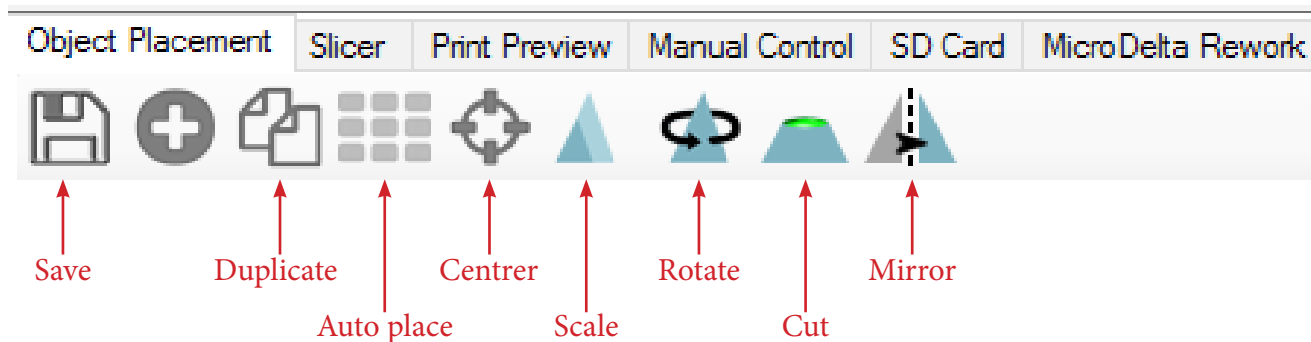
3°) Slice your object with the pre-configured CuraEngine profile:

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

When done click on «Slice with CuraEngine»

Brim and raft for ABS
Resolution
Generate support

Filament type

Appendix

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

Appendix

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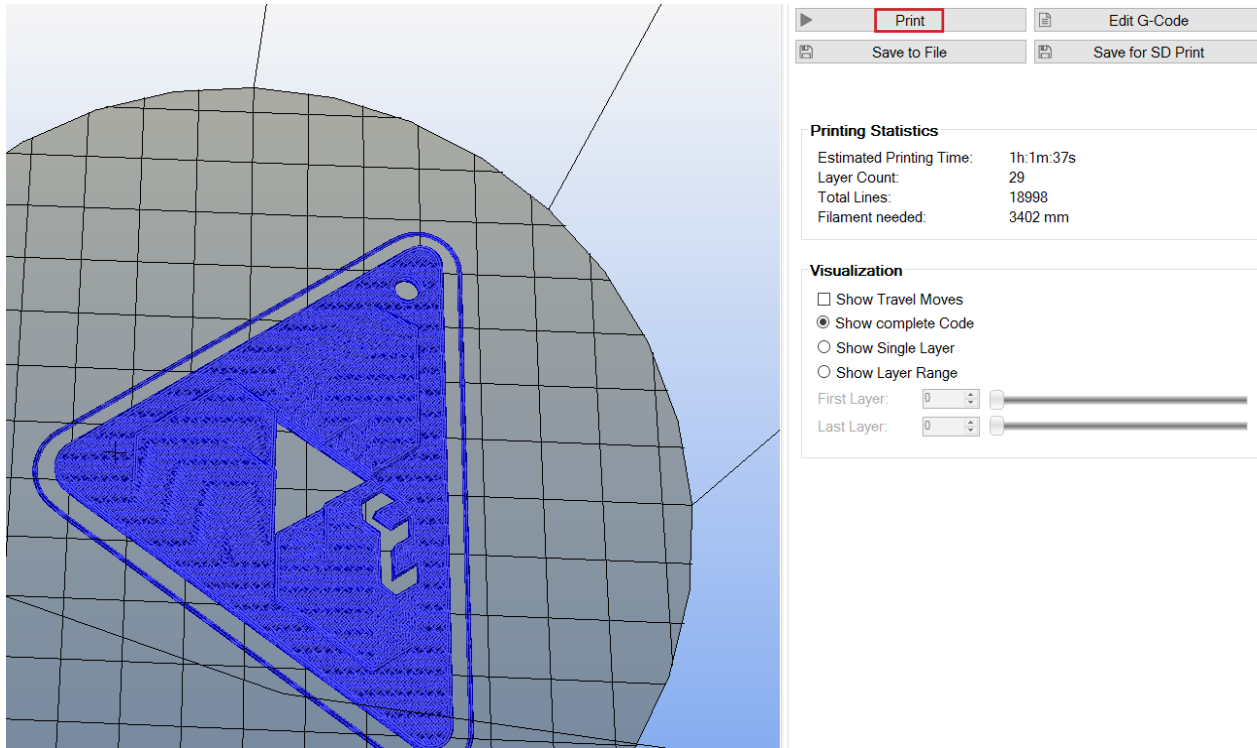
- E0 = extruder number 1
- S250 = target temperature at 250°C
- C8 = 8 cycles of regulations around the target temperature

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

- 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.

Recommandations

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 doesnt get clugged.

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 !

Appendix

Restore the TF card

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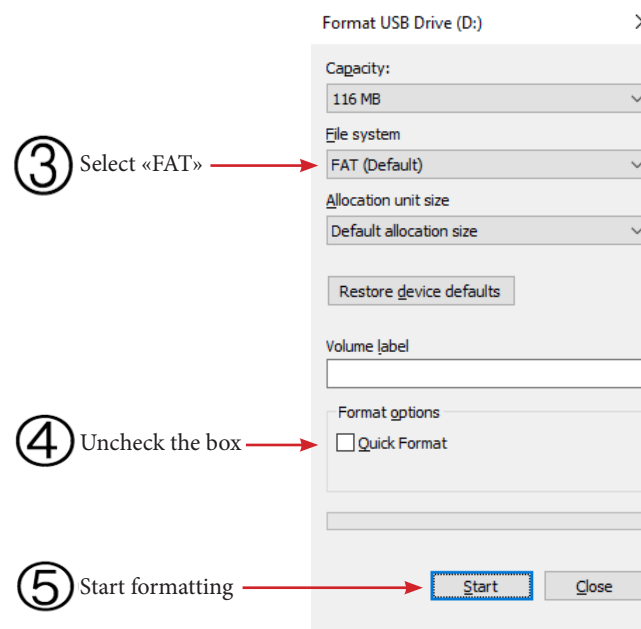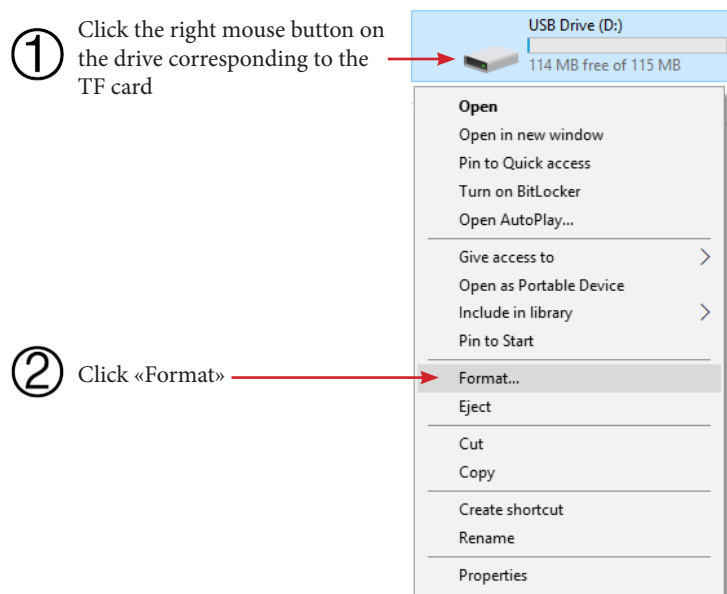
Description : for various reasons, the files present in the TF card and / or the cells of this card can be damaged. You will find through this procedure how to restore the TF card and the necessary files to MicroDelta Rework.

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.**


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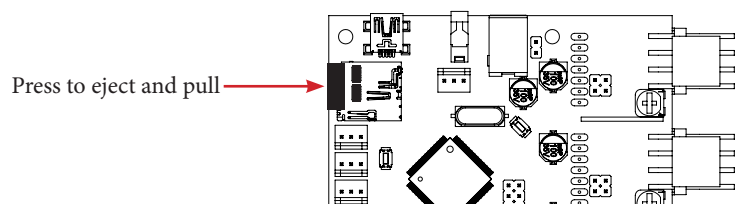
2°) Then read this TF card with an external drive on your computer (very useful because the formatting is too long by USB cable).

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

① Click the right mouse button on the drive corresponding to the TF card

② Click «Format»

③ Select «FAT»

④ Uncheck the box

⑤ Start formatting

Appendix

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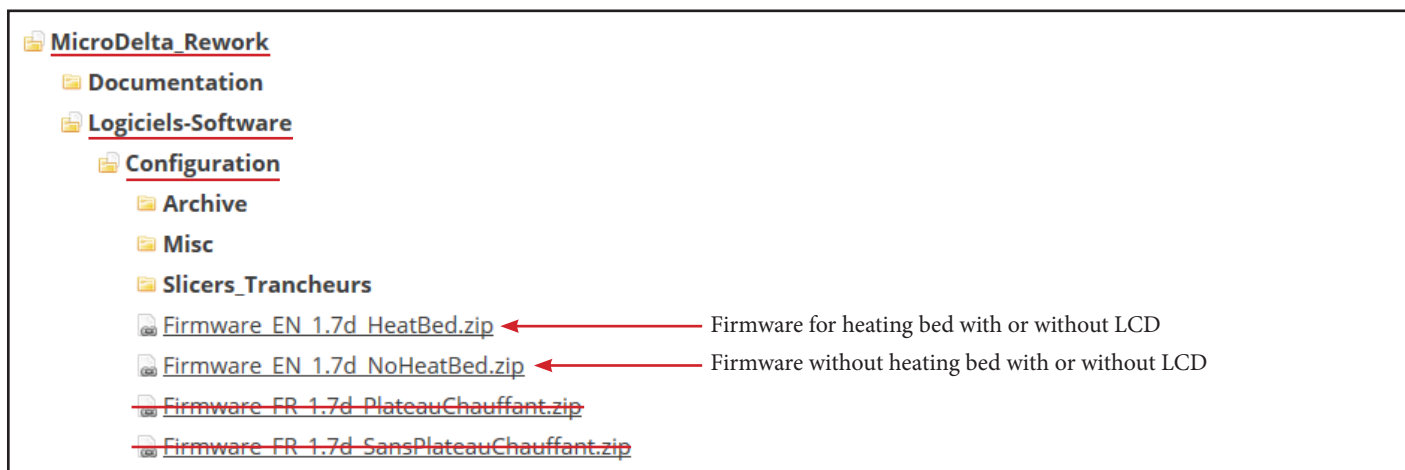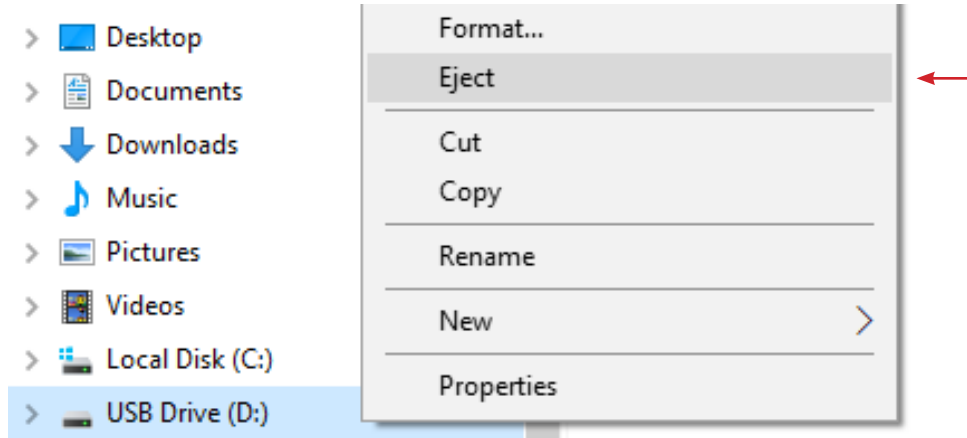

5°) Unzip the newly downloaded folder (right click on the compressed folder and then «Extract everything ...».
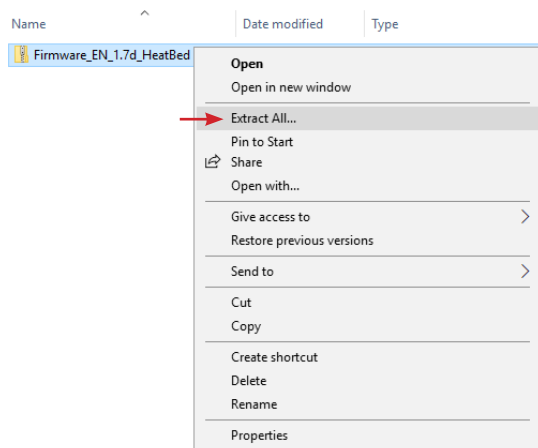
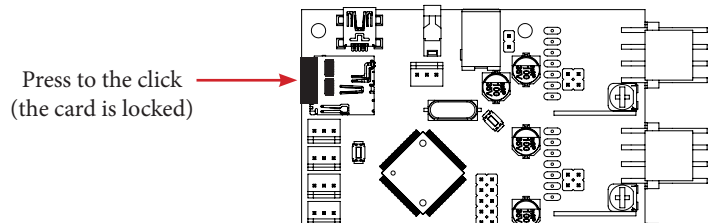6°) Go inside this folder, then select all the files and finally copy them to the root of the TF card.

Appendix

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.

Press to the click
(the card is locked)

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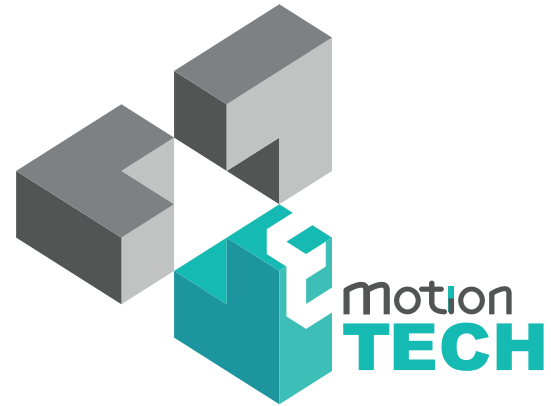   - LED1 remains on
    - LED2 and LED3 flash continuously
    - LED4 remains on

LEDs →
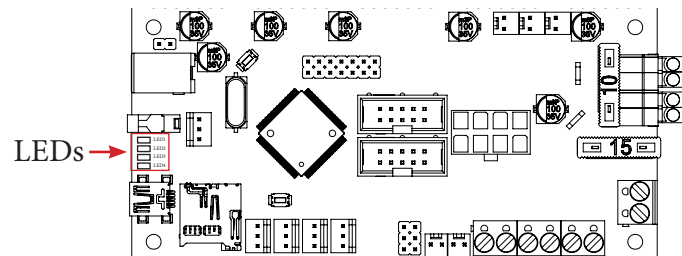
Appendix

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!

www.emotion-tech.com