INTRODUCTION
INTRODUCTION

- Target:
  Prupose a visual guide of the different steps to build a µDelta printer.

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- Links:
  You can found more informations on the following links :
  RepRap community : http://reprap.org/wiki/reprap
  Repetier-Host software : http://www.repetier.com/
  3D models database : http://www.thingiverse.com/
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**μDELTA INTRODUCTION**

μdelta is developed by eMotion Tech. This new 3D printer is easy to assemble and to operate without loss of performances.

**Data sheet :**

**DATAS**

- Printing surface : Ø110x190mm
- Layer height : [0.1-0.35]
- Electronic type : Teesylu + 4 Stepsticks (integrated firmware)
- Motors : NEMA 17
- Belt type : GT2
- Extrusion Head : Hexagon 0.4
- Dimensions : Height 440mm, Width 250mm, Depth 250mm
- Nominal printing speed : 70mm/s
- Max speed : 200mm/s
- Nominal speed : 130mm/s
- Average precision (X,Y) : 100 microns
- Average precision (Z) : 50 microns
- Operating system Windows XP, Vista, 7,8, Ubuntu 12+
- Consumable : PLA 1.75mm (or ABS and others plastics with heated bed option)
- Provided with Repetier-Host pre-configured for μdelta
- Connectivity : USB
- Power supply provided : 12V, 120W

**STRUCTURE**

- Lasercut Acrylic 5mm
- Extruder core printed in ABS 0.2mm
- Smooth rod 8mm
- Manufactured plate plywood 12mm

**ERGONOMY**

Easy to mount : A 3D printer kit with an intuitive assembly
- Simple electronic, no soldering
- Easy wiring and assembly
- Belt adjustment with ergonomic belt tensioners

Easy to calibrate : A simplified software
- Fully software calibration
- Pre-configured open-source software (no firmware upload required, Repetier Host and Slic3r pre-configured)

Easy to maintain
- Quick height adjustment with the software
- Easy to reload the filament
OPTIMISATION AND UPGRADE (Options and developments available)

You can improve the µdelta by adding the following options:

• Spool holder with fan
• LCD screen controller to print without computer
• Lighting with circular LED
• Heated bed
SAFETY INSTRUCTIONS

General safety instructions

NEVER LEAVE THE PRINTER WORKING WITHOUT SUPERVISOR.

The nozzle can reach 270°C, to avoid burning, do not touch the nozzle while the printer is working.

A supervisor is needed when the printer is used with young people.

KEEP PRINTER AWAY FROM CHILDREN AND ANIMALS

Operate in a ventilated room. Plastic fumes effects are not known. In case of use in a closed room, we recommend the use of an extractor fan.

The addition of protections is your own responsibility. Safety can be improved by:

• An emergency stop button
• Housing protection
• Smoke detector

CE marking

µdelta is a 3D printed kit. It includes all the parts you need for assembling but does not include additional protections.

Electrical safety

The power supply provided is labelled CE. The power supply is protected against short-circuit and do not need any modification. The µdelta operate at voltage of 12V and is not concerned by the low voltage directive.

Further informations

Informations above are not exhaustive.

We used sources of informations we consider as reliable. However, we cannot guarantee that all these informations are true and complete.

We assume no liability for losses, injuries or damages due to assembly, transporting, storage or removal of the product.
ASSEMBLY
BILL OF MATERIALS

A. Printed parts

1x Core

1x Filament Guide

B. Acrylic parts

6x eM1 TENSIONER
6x eM 2

6x eM 3 SLIDER
6x eM 4
6x eM 5

3x eM 14 MOTOR HOLDER

2x eM 8 EXTRUDER
1x eM 9
1x eM 10
2x eM 11
1x eM 12
1x eM 13

Acrylic parts can be covered with protection and it may remain pieces of plastic. Remove it before use.

We provide additional parts.
C. Smooth rods and connecting rods
- 6x Ø8x400 Smooth rod
- 6x Connecting rod

D. Mechanical parts
- 9x Linear bearing
- 1x Spring
- 3x GT2 Pulley
- 3x GT2 Belt
- 3x 624 Bearing
- 1x 604 Bearing
- 1x Drive wheel

E. Screws, nuts and washers
- 6x M2.5x16 screw
- 15x M3x12 screw
- 12x M3x20 screw
- 4x M3x25 screw
- 3x M3x30 screw
- 10x M3x50 screw
- 16x M4x25 screw
- 1x M4x50 screw
- 12x M5x30 screw
- 3x Wood screw
- 6x M2.5 Nut
- 3x M3 Wing Nut
- 32x M3 Nut
- 20x M4 Nut
- 12x M5 Nut
- 1x M3 Nylstop Nut
- 45x Ø3 Washer
- 19x Ø4 Washer
- 4x Ø4 Big washer
- 4x M3x3 Grub Screw (maybe pre-mounted in pulleys, drive wheel and printhead)
F. Electronic

- 1x Teensylu
- 4x Nema 17 motor
- 3x Endstop
- 2x 3x3 Fan
- 4x Stepstick
- 1x Power supply
- 1x USB Link

G. Others

- 1x Superior frame
- 1x Inferior frame
- 1x Print bed
- 1x Ø4xM6 Pneufit
- 1x Ø4x1/8" Pneufit
- 1x PTFE tube
- 3x motor Bracket
- 6x Shaft Support
- 1x Braided sleeve
- 30x Zip tie
- 3x Pad
- 1x Adhesive tape
H. Hexagon Kit

1x Hexagon hot end
1x Cartridge heater
1x Thermistor
1x Allen key 3
1x Wrench 4.5
## I. Options

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NEEDED TOOLS LIST

• Mallet
• Slot screwdriver
• Philips screwdriver
• Wrench 5.5 et 7
• Allen key (fournie)
• Long nose pliers
• Cutting pliers
• Utility knife
• Meter
If you have a heated bed, please read the «Add-On» section to know how to mount and set it.

- Use a mallet to insert completely the rod without exceeding the plate
- Smooth rods must be normal to the inferior frame
- M3 nut tighten against the frame
- Repeat this operation for each corners
**Caution:** for this step, take care of the tensioner's orientation.

Acrylic parts can be covered with protection and it may remains pieces of plastic, remove it before use.
1. Tighten nuts moderately to avoid breaking acrylic parts.

2. Tighten against the washer.

3. M4 Nut

Tighten Lightly
Repeat this operation for the other tensioners.

Inside the µdelta

Outside the µdelta
Caution: Assemble all sliders in the same way.
Note: After tightening screw, eM 3 parts may move, it is not a problem

Repeat this operation for the others sliders
The 4 fixations must be on the **same side** than the 2 linear bearings.

Tighten **lightly**

This bearing **must not exceed** the slider

Insert a zip tie in each holes, tighten the zip ties to fasten the slider.
Shaft Support

Take care of the way of shafts supports

Note: Do not tighten

Note: If shaft supports are equipped with a counter bore, be sure to orient the bore so that it is against the wood.
Assemble the endstop as it's show on the figure

Note: To improve the visibility, endstops wires were not represented

Small side

Big side

eM 14

M2.5 nut
Endstop
M2.5x16 Screw

Visible side

Hidden side
Filament Guide
The side with the big hole is the upper side

Top view

Back

Front

Take care to assemble the frame correctly

Ø4x1/8" pneufit
Must be normal to the frame
Put the endstop wires **before** the motors brackets.
1. Motor pulley
   - Grub screw oriented to the flat side of the axis
   - Take care of the way of the pulley
   - Position the pulley at 3mm from the end of the motor axis
   - Note: Use the Allen key given in the kit to tighten the pulley

2. M3x12 Screw
   - M3 Washer
   - Tighten lightly
   - Motor wire must be on the side
**Caution**: the distance must be the same for each smooth rod.

Distance between the bottom of the bottom frame and the top of the top frame: 39.8 cm.

Tighten.
1. Teeth in the direction of the pulleys

2. Belt

3. Zip tie

Position the zip tie as close as possible to the slider
Make sure the belt is slightly tight when the tensioner is on the top of the screw.
Thighten the nut to tight the belt

The belt doesn't have to be too tight to avoid deformation

Wing nut
Ø3 Washer
1. Position the M4 nut of the M3x50 screw between the two eM8.
2. Position the M3 nut into the eM8 "back".

- Do not tighten the Grub screw.
- Do not tighten the M4x50 Screw.
- M3x25 Screw
- Ø3 Washer
- M3 Nut
- M3 Nylstop Nut
- eM 8
- eM 9
- eM 8
- eM 10
The M3 Screw have to be tighten but the assembly should rotate.

Position the hollow of the drive wheel in front of the eM 9.

* A wrench can be printed to simplify the tightening (available in our support section).
MECHANICAL ASSEMBLY

1. Holes for extruder

2. M3x25 Screw
   - Ø3 Washer
   - M3 Nut
   - M3x20 Screw
   - Tighten lightly

3. Holes for screws

4. M3 Nuts
Use a screwdriver to make it easier

Untighten the central pipe

key provided
1. Use a screwdriver to make it easier.

2. Key provided

   It must not have space between the head and the nozzle

   Tighten the central pipe
Print head: direction of assembly

1°) silicon sleeve on to the heating block
2°) heater cartridge into the heating block
3°) headless screw in the heating block
4°) thermistor through the sleeve, in the heating block, it must be pressed into abutment against the receptacle.

Caution! If the thermistor goes out of the hot end, your printer could be damaged.
Unscrew the filament guide

Ø4xM6mm pneufit
If you have a LED ring, please read the «Add-On» section to know how to mount and set it.

Make sure the core is free of impurities.

Hole for wires

Hole for Zip tie

Put cables through the wire hole.
Position the Hexagon against the core before screwing

M3x20 screw

Tighten
The side with the sticker must be oriented toward the hotend.
Note: Check this nut is tighten

1. M3 Nut
   Tighten firmly

2. M3x50 Screw
   Connecting Rod
Caution: The assembly must not twist the slider.

eM 5 must remain parallel
Repeat the operation with the others sides.
Braided sleeve

Push cables and the PTFE tube through the braided sleeve

Cables

PTFE Tube

Fasten the cables with zip ties if it's needed

PTEF tube length must be 35cm

Braided sleeve

heat the leading end and roll it up inward

Zip Tie
1. PTFE Tube

2. Screw is tighten with a Ø3 washer and M3 Nut to the plate

Holes for zip ties

Cables

PTFE Tube

Holes for M3x50 Screws

Hole for cables
1. Stick three pads under the inferior frame.

2. Zip tie

Braided sleeve

Stick three pads under the inferior frame.
ELECTRONIC ASSEMBLY
Pay attention to the teensylo orientation

M3x25 Screw
Ø3 Washer
M3 Nut
Tighten lightly
Make sure that you have 12 jumpers connected to the teensy

Plug the stepstick according to the illustration

Make sure the flat side is positioned as shown in the image

Stepstick

Be careful: The orientation is very important! (A wrong connection of stepsticks could cause permanent damage)
- Plug endstops

- Endstops can be plugged in only one orientation
- Plug motors

- Motors can be plugged in only one orientation
1. Screw cables of the heater cartridge
   There is no specific way, don’t forget to denude it

2. Plug the thermistor
   There is no specific way

3. Controlled Fan
   Plug fans
   There is no specific way
CONGRATULATION!
You’re printer is now operationnal
ADD-ONS
HEATED BED

1. Hardware update

Kit:

- 1x Adhesive heat patch
- 3x Idler
- 1x Tube
- 1x Tube mount
- 1x Polyimide tape

**Warning:** If your heating patch is not equipped with a pre-mounted thermistor, attach the thermistor with white cable with the glass ball in the center of the patch and use polyimide tape.
1. Remove the adhesive protection

2. Put the patch in the center of the aluminium sheet. Place the wire output close to one hole.
Place the idler and align all holes

Wire pass-through holes

Tube
Heat patch under

Wood screw

Aluminium sheet

Idler

Tube mount

Wood screw

Tube
Thermistor
There is no specific way

Heat patch
There is no specific way
2. Software update

Pre-requisite:

Computer with window 7+ (others OS coming soon)

Download and install the Serial_install.exe from our download center on our website

Where to download:

All files can be found on our support section or on our github

1/ Download the Manual_update_vx_xx.zip

2/ Unzip the file and open the folder

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Choose the Firmware

Choose the firmware n°2, head bed without LCD

Press 2, and enter
Select the programming mode

1. Remove the jumper

2. Press the reset button

Please wait patiently before your computer detects and installs the new COM port.
Press Enter and check your COM port name:

Note: Usually, the COM1 is your internal modem device, COM1 might not be the right port.
Caution: the syntax have to be perfect, ex: COM2

Type your COM port name (COM26 in our case) then press Enter key.
Final screen:

```
avrdude.exe: safmode: fuse reads as 00
avrdude.exe: Send: 0 [51]
avrdude.exe: Recv: 0 [51]
avrdude.exe: safmode read 1, efuse value: 00
avrdude.exe: Send: 0 [51]
avrdude.exe: Recv: 0 [51]
avrdude.exe: safmode read 2, efuse value: 00
avrdude.exe: Send: 0 [51]
avrdude.exe: Recv: 0 [51]
avrdude.exe: safmode: fuse reads as 00
avrdude.exe: Send: L [6c]
avrdude.exe: Recv: 0 [61]
avrdude.exe: Send: E [65]
avrdude.exe: Recv: 0 [61]
avrdude.exe done. Thank you.
081901
PS: Do not forget to restore the jumper and press reset to switch to normal mode
PS: //fr: n’oubliez pas de remettre le cavalier et rappuyer sur reset...
Enjoy! Press any key to continue ...
```

Leave the programming mode:

1/ Set up the jumper back in place

2/ Press the reset button

Your printer is now ready to print with the heated bed!
Applying the polyimide tape on the aluminum surface in order to optimize the grip of the material.
Then perform a «Manual Update» and select choice with your options.

Note: documentation containing explanations for using the «Manual Update» is available on our website reprap-3d-printer.com, in the support section.
SPOOL HOLDER

1. Hardware update

Note: the fan must have the sticker oriented in the opposite side of the acrylic part.
ADD-ONS

M4 x 20 Screw

M4 Washer

624 Bearing

M4 Nut
Fan plug

Fan
LED Ring

1. Mount

- LED Ring with zip ties
- Hole for zip ties

FIX LED ring with zip ties
1. Wiring

Pass wire into the central sleeve.

LED wiring
MAINTENANCE
Maintenance

A monthly maintenance of the 3D printer is recommended.

Below are some recommendations:

with the help of a brush, dust the following elements:
- Teensy board
- stepsticks heatsinks
- all fans and ensure that airflow is not blocked
- coldend of the print head

- clean the print head with the help of the guide dedicated to the Hexagon print head, here is the link: http://data.emotion-tech.com/highlights_en/Hexagon%20-%20Hotend-guide-v1.1.pdf

- clean the drive wheel’s teeth with the aid of a needle, the end of a tweezers or a cutter blade

- check the tightening of each screw equipping the 3D printer

- lubricate all mechanical transmission elements with multi-purpose grease or PTFE based oil spray (avoid WD40 product that has a tendency to be too aggressive for the mechanical elements)

Recommendations

**Shut down the 3D printer:**
After printing, if you want to turn off the machine, wait until the print head has cooled to room temperature to ensure that the print head does not clog.

**Transport:**
If you have to move the machine by car or other means of transport, it is recommended to unplug stepper motors off the Teensy board to avoid damaging components.

**Troubleshooting:**
A FAQ is available for the µDelta on our website in the «Support» section, do not hesitate to consult it if you are having trouble with your machine, most failures are resolved through this tool, do not deprive yourself!
Thank you for choosing the µDelta

www.reprap-3d-printer.com