INTRODUCTION
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• Target :
  Propose a visual guide of the different steps to build and use a µdelta printer

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  Last Update : 03/12/2014

• 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/

http://reprap.org/wiki/reprap
http://www.repetier.com/
SUMMARY

INTRODUCTION
INTRODUCTION
SUMMARY
μDELTA INTRODUCTION
SAFETY INSTRUCTIONS

ASSEMBLY
BILL OF MATERIALS
A. Printed parts
B. Acrylic parts
connecting rods
C. Smooth rods and
D. Mechanical parts
E. Screws, nuts and washers
F. Electronic
G. Others
H. Hexagon Kit
I. Options

TOOLS

MECHANICAL ASSEMBLY
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)
• Motor 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 preset 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 Développements soon 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 modifications. The μdelta operate at voltage of 12V and is not concerned by the low voltage directive.

Further informations

Information above are not exhaustive.

We used sources of informations we consider as reliable. However, we cannot guarantee that all these information 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
F. Electronic

- 1x Teensy
- 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

<table>
<thead>
<tr>
<th>Option</th>
<th>Quantity</th>
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<td>Heated bed and thermistor</td>
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<tr>
<td>Idler</td>
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</tr>
<tr>
<td>Tube</td>
<td>1x</td>
</tr>
<tr>
<td>Tube holder</td>
<td>1x</td>
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<tr>
<td>Polyimide tape</td>
<td>1x</td>
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<td>Spool holder frame</td>
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<tr>
<td>60x60 Fan</td>
<td>1x</td>
</tr>
<tr>
<td>624 Bearing</td>
<td>3x</td>
</tr>
<tr>
<td>M4x20 Screw</td>
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<tr>
<td>M4 Nut</td>
<td>3x</td>
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<tr>
<td>Ø4 Washer</td>
<td>3x</td>
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</table>

**HEATED BED KIT**

**SPOOL HOLDER KIT**

**LED KIT**
TOOLS

• Mallet
• Slot screwdriver
• Philips screwdriver
• Wrench 5.5 et 7
• Allen key (fournie)
• Long nose pliers
• Cutting pliers
• Utility knife
• Meter
1. Use a mallet to insert completely the rod without exceeding the plate.

2. Smooth rods must be normal to the inferior frame.

Wood screw (x3)
- M3 nut tighten against the frame
- Repeat this operation for each corners
Caution: for this step, take care of the orientation of the tensioner

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

Tighten against the washer

Tighten Moderately
Repeat this operation for the others tensioners.
Caution: Assemble all sliders in the same way.
MECHANICAL ASSEMBLY

1. Hole for belt

2. Linear bearings

Note: After tightening screw, eM 3 parts may move, it is not a problem
1. The 4 fixations must be on the same side than the 2 linear bearings.

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

This bearing must not exceed the slider.

Tighten moderately.
Shaft Support

Take care of the way of shafts supports

Note: Do not tighten
Assemble the endstop as it’s shown on the figure.

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

M2.5 nut
Endstop
M2.5x16 Screw
Take care to assemble the frame correctly

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

Ø4x1/8" pneufit
Must be normal to the frame
Put the endstop wires **before** the motors brackets.

1. **Motor Bracket** and **Endstop Wire**

2. **Ø4 Washer** and **M4 Nut**
**MECHANICAL ASSEMBLY**

1. **Motor pulley**
   - Take care of the way of the pulley.
   - Position the pulley at 3mm from the end of the motor axe.

   **Note**: Use the Allen key given in the kit to tighten the pulley.

2. **Motor wire**
   - Motor wire must be on the side.
   - M3x12 Screw
   - M3 Washer
   - Tighten moderately

   **Version 1.4**
1. M5x30 Screw
2. M5 Nut
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 don’t have to be too tight to avoid deformation
- Position the M4 nut of the M3x50 screw between the two eM8

- Position the M3 nut into the eM8 "back"
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 on our download center)
Holes for etruder

Holes for screws

1. M3x25 Screw

Tighten moderately

2. M3 Nut

Ø3 Washer

M3x20 Screw

Ø3 Washer

M3 Nuts

Version 1.4
Use a screwdriver to make it easier

Untighten the central pipe

key provided
1. Use a screwdriver to make it easier

2. It must not have space between the head and the nozzle

Key 7 (not provided)

Key provided

Tighten the nozzle

Tighten the central pipe
1. Hole for thermistor

2. Insert the resistor
   **Wires must be on the same side than the thermistor hole**

   **Tighten with a M3 grub screw**
1. Fasten the cables to the hot end with zip tie. The zip tie must be positioned around the Hexagon. Don’t position it too high on the hexagon.

2. Polymide can be used to maintain the thermistor (optional).

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

* For printing ABS with heated bed option, protect your heater block with polyimide.
Unscrew the filament guide

 Ø4xM6mm pneufit
Make sure the core is free of impurities.

- Hole for wires
- Hole for Zip tie

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

2

M3x20 screw

3

Tighten
The side with the sticker must be oriented toward the hotend.

Fan
Ø3 Washer
M3x20 Screw

Tighten moderately
Note: Check this nut is tighten

1. M3 Nut
   Tighten firmly

2. M3x50 Screw
   Connecting Rod

   Version 1.4
Caution: The assembly must not twist the slider.

eM 5 must remain parallel
MECHANICAL ASSEMBLY

1. Ø3 Washer
   M3 Nut
   Connecting rod
   M3x50 Screw

2. M3 Nut
   Connecting rod
   M3 Nut
   Ø3 Washer

3. Repeat the operation with the others sides
1. Push the cables and the PTFE tube through the braided sleeve.
2. Fasten the cables with zip ties if needed.

PTFE tube length must be 35cm
1. Screw is tighten with a Ø3 washer and M3 Nut to the plate.

2. Cables

PTFE Tube

Hole for Zip ties

Holes for M3x50 Screws

Holes for Zip ties

M3x50 Screw

PTFE Tube

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

Zip tie

Braided sleeve
ELECTRONIC ASSEMBLY
Pay attention to the teensylu orientation

M3x25 Screw  
Ø3 Washer  
M3 Nut  
Tighten moderately
ELECTRONIC ASSEMBLY

- Power supply
- Motor extruder
- Motor 1
- Motor 2
- Motor 3
- Endstop
- USB
- Heated bed (option)
- Cartridge heater
- Thermistor
- Fan
- Ventilateur
- Extruder
- Motor 2
- Motor 1
- Motor 3
Make sure that you have 12 jumpers connected to the teensy

Plug the stepstick according to the illustration

Make sure the flat is positioned as shown the image

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

- The endstops can be plugged in only one orientation
- Plug the motors

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

Plug the fans
There is no specific way

Plug the thermistor
There is no specific way
CONGRATULATION !
You’re printer is now operationnal
ADD-ONS
HEATED BED

1. Hardware update

Kit:

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

Prerequirement, you need an operational 3D printer
1. Remove the adhesif protection

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

Wire pass-trough holes
Thermistor
There is no specific way

Heat patch
There is no specific way
2. Software update

Prerequisite:

Computer with window 7+ (others OS coming soon)

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

Where download:

All files can be found on our download center or on our github

1/ Download the Manual_update_vx_xx.zip

2/ Unzip the file and open the folder

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3/ Run the batch script .bat
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 key and check your COM port name:

Ports are detected here

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.

Your screen will be filled with the hexadecimal data transfer.
Final screen:

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!
Thank you to choose the μdelta