INTRODUCTION

• Target :

Propose a visual guide of the different steps to build and use 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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B. Acrylic parts

connecting rods

C. Smooth rods and

D. Mechanical parts

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1. Assembly

2. Connection

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1. Assembly

2. Connection

Version 1.41
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 loses, 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
ASSEMBLY

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

HEATED BED KIT
- 1x Heated bed and thermistor
- 3x Idler
- 1x Tube
- 1x tube holder
- 1x Polyimide tape

SPOOL HOLDER KIT
- 1x Spool holder frame
- 3x Spool block
- 1x 60x60 Fan
- 3x 624 Bearing
- 7x M4x20 Screw
- 7x M4 Nut
- 7x Ø4 Washer

LED KIT
- 1x LED ring
TOOLS

- Mallet
- Slot screwdriver
- Philips screwdriver
- Wrench 5.5
- Wrench 7
- Allen key (provided)
- Long nose pliers
- Cutting pliers
- Utility knife
- Meter
- Use a mallet to insert completely the rod without exceeding the plate
- Smooth rods must be normal to the inferior frame

Wood screw (x3)
- M3 nut tighten against the frame
- Repeat this operation for each corners
MECHANICAL ASSEMBLY

Inside the µdelta

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

M4 Nut

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

Hole for belt

Holes for belt

Note: After tightening screw, eM 3 parts may move, it is not a problem

Linear bearings
The 4 fixations must be on the **same side** than the 2 linear bearings.

Tighten moderately.

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
Assemble the endstop as it's shown on the figure.

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

- M2.5 nut
- Endstop
- M2.5x16 Screw
Back

Top view

Front

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

Take care to assemble the frame correctly

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

1. **Motor pulley**
   - **Motor**
   - **Grub screw**
   - 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**
   - **M3x12 Screw**
   - **M3 Washer**
   - **Tighten moderately**
   - **Motor wire must be on the side**

Version 1.41
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

Tighten
Teeth in the direction of the pulleys

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.

1. Belt Tensioner
2. M3x50 Screw

Zip tie

Belt

Tensioner
Thigten the nut to tight the belt

The belt don’t have to be too tight to avoid deformation

Wing nut

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

2. M4x50 Screw
   - M3 Nut
   - M3 Nylstop Nut

   - Ø3 Washer
   - M3x25 Screw

   - 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)
1. Holes for extruder

2. Holes for screws

- M3x25 Screw
- M3 Nut
- Ø3 Washer

Tighten moderately

- M3 Nuts
- Ø3 Washer
- M3x20 Screw

Version 1.41
Untighten the central pipe

Use a screwdriver to make it easier

key provided
1. Use a screwdriver to make it easier

2. Key provided

It must not have space between the head and the nozzle

Key 7 (not provided)

Tighten the nozzle

Key provided

Tighten the central pipe

It must not have space between the head and the nozzle
1. Hole for thermistor
2. Insert the resistor
   - **Wires must be on the same side than the thermistor hole**
3. Tighten with a M3 grub screw
**MECHANICAL ASSEMBLY**

1. **Zip ties**
   - Fasten the cables to the hot end with zip tie.
   - The zip tie must be positioned around the Hexagon.
   - Don’t position it to high on the hexagon.

2. **Thermistor**
   - Polymide can be used to maintain the thermistor (optional).
   - * For printing ABS with heated bed option, protect your heater block with polyimide.

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

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.
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
Push the cables and the PTFE tube through the braided sleeve.

Fasten the cables with zip ties if it's needed.

PTFE tube length must be 35cm
MECHANICAL ASSEMBLY

1. PTFE Tube

2. Hole for cables

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

M3x50 Screw
Cables
Zip ties
PTFE Tube

Holes for Zip ties
Holes for M3x50 Screws
1. Stick the three pads under the inferior frame.

2. Zip tie

   Braided sleeve

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

- M3x25 Screw
- Ø3 Washer
- M3 Nut
  - Tighten moderately
Power supply
Motor extruder
Motor 1
Motor 2
Motor 3
USB
Heated bed (option)
Cartridge heater
Thermistor
Fan
Endstop
Ventilateur
Extruder
Motor 1
Motor 2
Motor 3
1. Make sure that you have 12 jumpers connected to the teensy.

2. Plug the stepstick according to the illustration.

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

Make sure the flat is positioned as shown the image.
Endstops

1 2 3

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

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

2. Plug the thermistor
   There is no specific way

3. Plug the fans
   the red cable show the way
CONGRATULATION!
You’re printer is now operationnal
HEATED BED

1. Hardware update

Kit:

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

Prerequisite, 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
1. Heat patch under

2. 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

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:

![Image of command prompt window with ports listed]

Ports are detected here

Note: Usually, the COM1 is your internal modem device, COM1 might not be the right port.
Your screen will be filled with the hexadecimal data transfer

Type your COM port name (COM26 in our case) then press Enter key

Caution: the syntax have to be perfect, ex: COM2
Final screen:

```
C:\Windows\system32\cmd.exe
avrdude.exe: safemode: hFuse reads as 0B
avrdude.exe: Send: Q [51]
avrdude.exe: Recv: - [00]
avrdude.exe: safemode read 1, efuse value: f0
avrdude.exe: Send: Q [51]
avrdude.exe: Recv: - [00]
avrdude.exe: safemode read 2, efuse value: f0
avrdude.exe: Send: Q [51]
avrdude.exe: Recv: - [00]
avrdude.exe: safemode: efuse reads as F0
avrdude.exe: Send: L [4C]
avrdude.exe: Recv: - [01]
avrdude.exe: Send: E [55]
avrdude.exe: Recv: - [0E]
avrdude.exe done. Thank you.
001001!
PS: Do not forget to restore the jumper and press reset to switch to normal mode
PS: //fr: ne pas oublier de remettre la carte et rayer 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!
SPOOL HOLDER

1. Assembly

Kit:

1x Spool holder frame
3x Spool block
1x 60x60 Fan
3x 624 Bearing
7x M4x20 Screw
7x M4 Nut
7x Ø4 Washer
Sticker on the bottom

M4x20 Screw
Ø4 Washer
60x60 Fan (sticker on the bottom)
M4 Nut
1. Insert and rotate the spool block to fix it.

2. Repeat the operation for the others parts.

- **M4x20 Screw**
- **624 Bearing**
- **Ø4 Washer**
- **Spool block**
- **M4 Nut**

The slider allows the spool block to move according to the size of the spool.
2. Connection

1. Fan
   The red cable show the way

2. Put your spool holder on the printer, it’s finish!
LED RING

1. Assembly

- Tighten the zip tie while centering the LED ring.
- Holes for zip tie.

Put your spool holder on the printer, it's finish!
2. Connection

Put the cable into the Braided sleeve to finish

LEDs
The red cable show the way
Thank you to choose the µdelta