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

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http://www.repetier.com/

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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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1. Material update

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Version 1.62
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 opton)
• 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

3x SHF8P

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 remains pieces of plastic. Remove it before use.

We provide additionnal 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

12x Ball joint

3x 624 Bearing

1x 604 Bearing

1x Drive wheel

3x M3 x 16 screw
15x M3 x 12 screw
12x M3 x 20 screw
4x M3 x 25 screw
3x M3 x 30 screw
10x M3 x 50 screw
16x M4 x 25 screw
1x M4 x 50 screw
12x M5 x 30 screw
3x Wood screw

6x M2.5 x 16 screw
3x M3 Wing Nut
32x M3 Nut
20x M4 Nut
12x M5 Nut

45x Ø3 Washer
19x Ø4 Washer
4x Ø4 Big washer

4x M3 x 3 Grub Screw

(maybe pre-mounted in pulleys, drive wheel and printhead)

E. Screws, nuts and washers

6x M2.5 Nut
1x M3 Nylstop Nut
F. Electronic

1x Teensylu
4x Nema 17 motor (3 shorts: 34 mm 1 long: 48 mm)
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
1x Braided sleeve Ø 20 mm
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 blocks
- 1x 60x60 Fan
- 3x 624 Bearing
- 3x M4x20 Screw
- 3x M4 Nut
- 3x Ø4 Washer

**LED KIT**

- 1x LED ring
NEEDED TOOLS LIST

- Mallet
- Slot screwdriver
- Philips screwdriver
- Wrench 5.5 et 7
- Allen key (fournie)
- Long nose pliers
- Cutting pliers
- Utility knife
- Meter
MECHANICAL ASSEMBLY

MECHANICAL ASSEMBLY
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 remain pieces of plastic, remove it before use.
Tighten nuts moderately to avoid breaking acrylic parts

Tighten against the washer

Tighten Lightly
Repeat this operation for the other tensioners

Inside the µdelta

Outside the µdelta
**Caution**: Assemble all sliders in the same way.
Repeat this operation for the others sliders.

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

Shaft Support

Take care of the way of shafts supports

Note: Do not tighten

Note: If the smooth rods are struggling to enter the shaft support, don’t drill those elements but help insertion by applying leverage with a flat screwdriver.
Assemble the endstop as it’s show on the figure

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

eM 14

Small side Big side

M2.5 nut Endstop M2.5x16 Screw

Hiden side Visible side
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.
MECHANICAL ASSEMBLY

1. Motor pulley
   - Grub screw oriented to the flat side of the axis
   - Short motor (34 mm) *

   *: 2 motor models are supplied in the kit:
   - 3 x 34 mm motor (axis)
   - 1 x 48 mm motor (extrusion)

   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
1

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

2

M4 x 25 mm

M4 nut

Tighten
1. Teeth in the direction of the pulleys

2. Position the zip tie as close as possible to the slider

Belt
Zip tie
Make sure the belt is slightly tight when the tensioner is on the top of the screw.

- **M3x50 Screw**
- **Tensioner**
- **Zip tie**
- **Belt**
Thigten the nut to tight the belt

The belt doesn't have to be too tight to avoid deformation
1. Grub screw

- Position the M4 nut of the M3x50 screw between the two eM8

2. M4x50 Screw

- Position the M3 nut into the eM8 "back"
- 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 in our support section)
1. Holes for extruder

2. Tighten lightly
Use a screwdriver to make it easier

Untighten the central pipe

key provided
1. Tighten the nozzle

2. Tighten the central pipe

Key 7 (not provided)

Key provided

Use a screwdriver to make it easier

It must not have space between the head and the nozzle
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

1. M3x20 screw

2. Tighten

3.
The side with the sticker must be oriented toward the hotend

Tighten lightly

Fan
Ø3 Washer
M3x20 Screw
Assembly of ball joint with diagonal rods

Place the ball on a sturdy work plan and press the rod above to clip the two elements together.

Mounting direction

PRESS TO CLIP

Diagonal rod

Ball joint

Plan de travail

Result
Note: Check this nut is tighten

The shape of the rods may change following the revisions but the mounting principle remains the same.
Caution: The assembly must not twist the slider.

eM 5 must remain parallel
Repeat the operation with the others sides.
Push 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
PTFE Tube

Holes for zip ties

Holes for M3x50 Screws

Hole for cables

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

Cables

Zip ties

M3x50 Screw

PTFE Tube
1. Stick three pads under the inferior frame.

2. Zip tie

Braided sleeve

Stick three pads under the inferior frame.
Pay attention to the teensy6u orientation

- M3x25 Screw
- Ø3 Washer
- M3 Nut
  - Tighten lightly
Power supply

Motor extruder

Motor 1

Motor 2

Motor 3

Endstop

1 2 3

USB

Heated bed (option)

Heater cartridge

Thermistor

Fan

GND

VCC

Ventilateur

Extruder

Motor

Motor 1

Motor 2

Motor 3
Make sure that you have 12 jumpers connected to the teensy.

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

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

Plug the stepstick according to the illustration.

Stepstick
- 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
HEATED BED

1. Hardware update

Kit:

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

1. Fix the thermistor using polyimide tape as shown below (near the cable)

2. Check the thermistor’s connector is located after the wood plate (needed for next steps)
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

Tube

Wire pass-through holes
Add-Ons

1. Heat patch under
   - Wood screw
   - Aluminium sheet
   - Idler

2. Tube mount
   - Wood screw
   - Tube
Thermistor
There is no specific way

Heat patch
There is no specific way
if needed : insulate cables
2. Software update

Pre-requrement:

- 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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3/ Run the batch script .bat
ADD-ONS

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 you computer detect and install 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:

Your printer is now ready to print with the heated bed!

Leave the programming mode:

1/ Set up the jumper back in place

2/ Press the reset button
Applying the polyimide tape on the aluminum surface in order to optimize the grip of the material.
LCD Screen

Plug LCD’s adapter here

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.
Fan plug
LED Ring

1. Mount

Fix LED ring with zip ties

Hole for zip ties
1. Wiring

Pass wire into the central sleeve.

LED wiring
Maintenance

A monthly maintenance of the 3D printer is recommended.

Below are some recommendations:

with the help of a brush, dust the following elements:

• Teensylu board
• stepsticks heatsinks
• all fans and ensure that airflow is not blocked
• coldend of the print head


- 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 Teensylu 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