ASSEMBLY INSTRUCTIONS
INTRODUCTION
INTRODUCTION

• Target :
  Propose a visual assembly instruction guide of the MicroDelta Rework.

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• 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

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MICRODELTA REWORK INTRODUCTION

The MicroDelta Rework 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: Ø150x200mm
- Layer height: [0.1 - 0.4]
- Electronic type: eMotronic (32 bits, 96 MHz)
- Motors: NEMA 17
- Belt type: GT2
- Extrusion Head: Hexagon 0.4
- Dimensions: Height 440mm, Width 250mm, Depth 250mm
- Nominal printing speed: 80mm/s
- Max speed: 200mm/s
- Nominal travel speed: 150mm/s
- Average precision (X, Y): 100 microns
- Average precision (Z): 50 microns
- Operating system: Windows, Linux and Mac OS
- 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: 24V, 150W

STRUCTURE

- Upper and lower plates made of bended stainless steel
- Machined aluminium core
- 10mm rectified Smooth rods
- Plastic injected sliders

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
INTRODUCTION

Documents and guides

User guide

How to use the MicroDelta Rework?
Under Windows and Linux: Windows / Linux User Guide
Under Mac OS X: MAC OS X User Guide

Other resource

Configuration files
Path: MicroDelta Rework > Logiciels-Software > Configuration

3D ressources
Differents 3D printed parts are availables for the MicroDelta Rework.
Path: MicroDelta Rework > Ressources_3D

IN CASE OF TROUBLE

Frequently Asked Questions
Path: «Support» section.
Link: Frequently Asked Questions
In order to upgrade your printer to make its use more pleasant, it is possible to add different elements:

- Heating bed kit up to 110°C
- LCD controller screen to print without a computer

Coming soon:

- Lighting LED designed for the Micro Delta Rework
- Dual extrusion head for bi-color printing
SAFETY INSTRUCTIONS

General safety instructions

NEVER LEAVE THE PRINTER WORKING WITHOUT SUPERVISOR.

The nozzle can reach 270°C, 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 vapors 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

Electrical safety

The power supply provided is labelled CE. The power supply is protected against short-circuit and do not need any modification. The MicroDelta Rework operate at 24V and is not concerned by the low voltage directives.

Further informations

Informations above are not exhaustive.

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

We assume no liability for loses, injuries or damages due to assembly, transporting, storage or removal of the product.
A. Metal parts

1 x Core
1 x Upper plate
1 x Lower plate
6 x Ø 10 x 430 mm smooth rod
1 x Cowling

B. Plastic parts

6 x Connecting rod
3 x Slider
C. Printed parts

1 x Hexagon Holder
1 x Hexagon bracket
2 x Fan duct
1 x Board cover
1 x Leveling sensor holder

D. Mechanical parts

3 x GT2 Pulley
3 x GT2 belt
12 x Plain bearing
12 x Ball joint
1 x thrust roller bearing AXK5070
2 x Pneufit
3 x Idler pulley 623zz kit

E. Hardware

6 x M2.5x8 Screw
2 x M2.5x12 Screw
29 x M3x8 Screw
14 x M3x12 Screw
4 x M3x20 Screw
12 x M6x16 Screw
16 x M3 Washer
2 x M3 Knurled nut
1 x M5x12 Knurled screw
10 x 3mm Spacer
F. Electronic

1 x eMotronic
1 x ON/OFF Switch
3 x Short motor (34 mm)
1 x Reset button
1 x Long motor (48 mm)
1 x Power supply
3 x endstop (color connectors)
1 x Bed leveling sensor
4 x 3 cm fan
1 x Core extension cable
1 x Interfacing board
1 x USB Cable

G. Kit Extruder

1 x Extruder cover
1 x Body extruder
1 x Mobile extruder
1 x Knurled screw M5x12 mm
1 x Driving wheel
1 x 693zz bearing
1 x Spring
H. Kit Hexagon (printhead)

1 x Hexagon hotend
1 x Cartridge heater 100mm
1 x Thermistor
1 x Allen key 3
1 x wrench 4.5
1 x Silicone cap

H. Other

12 x Cable clamp
6 x Rubber foot
1 x PTFE Tube
3 x Elastic band
1 x Threadlock
LIST OF NEEDED TOOLS

• Wrench 8; 9; 10.
• A set of allen key
• Cutting pliers
• WD40 (penetrating oil)
• Methylated spirit
MECHANICAL ASSEMBLY
SLIDERS ASSEMBLY

Needed parts:
- 3 x Slider
- 6 x Rod ball
- 12 x Plain bearing

Target: screw the 6 ball joints (2 per slider) as shown in the following figures.

1

2

Result

3X*

= add some threadlock to the thread

Do not over tighten as this may damage the thread.

* : do the same for all sliders.
Target: insert the plain bearings in their housing as shown below (4 pieces per slider).

3X*

* : do the same for all sliders.
MECHANICAL ASSEMBLY

PRINTHEAD ASSEMBLY

1°) thermistor into the heating block (fold the thermistor’s cables)
2°) silicon sleeve on to the heating block
3°) heater cartridge into the heating block
4°) grub screw in the heating block
5°) Remove the brass insert (not used)

Caution ! If the thermistor goes out of the hot end, your printer could be damaged.
Important: make sure that the red shrink sleeves on the cartridge cables are properly protecting the metal parts and preventing short circuits.
UPPER PLATE ASSEMBLY

Needed parts:
- 1 x Upper plate
- 3 x Idler pulley
- 3 x Endstop
- 3 x Ø 3 mm spacer
- 3 x Ø 3 mm washer
- 3 x M3 x 12 mm screw
- 3 x 623zz bearing
- 6 x M2,5 x 8 mm

Target: mount the pulleys on the upper plate
MECHANICAL ASSEMBLY

Target: mount the endstops on the upper plate

Each endstop connector has a different color:

- Alpha axis endstop: red
- Bêta axis endstop: blue
- Gamma axis endstop: yellow

Be sure to mount each endstop on its dedicated location. Respect the color code.

Pay attention to the direction of mounting.

Endstop's steel blade should be directed outward from the plate.
Make sure the 3 pulleys rotate freely.
If you have the HeatBed option, please go to the page 71 to mount this element!
LOWER PLATE ASSEMBLY

Needed parts:
- 1 x Lower plate
- 3 x Short motor
- 16 x M3 x 8 mm screw
- 12 x Ø 3 mm washer
- 3 x GT2 pulley
- 4 x M3 x 12 mm screw
- 1 x 3 cm fan
- 1 x On/Off switch
- 1 x «Reset» button
- 4 x Ø 3 mm spacer
- 1 x eMotronic board

Target: mount the stepper motors on the lower plate

Repeat the operation on the two other towers & check the motor’s orientation using the connectors as reference.

Allow gravity to drop the motor to the bottom of the notch and pre-tighten a single screw to hold the motor in this position.
Target: mount GT2 pulleys on the motor’s axis

The grub screw must be in contact with the flat side of the axis.
Target: repeat steps 2, 3 and 4 on the other two peaks of the lower plate.
Target: fix the electronic board fan like shown below

Pay attention to the mounting direction of the fan, for proper orientation use the notches as reference.

M3 x 12 mm screw

3 cm fan
Target: mount the On/Off switch and the «Reset» button on the lower plate
Target: install the eMotronic board and its protective cover
Add rubber feet

Result
EXTRUDER ASSEMBLY

Needed parts:
- 1 x Extruder cover
- 1 x Body extruder
- 1 x Extruder mobile
- 1 x Driving wheel
- 1 x M5 x 12 mm Knurled screw
- 1 x Ø 3 mm washer
- 1 x 693zz bearing
- 1 x M3 x 8 mm screw
- 4 x M3 x 20 mm screw
- 1 x Long motor
- 1 x Spring

Target: mount the extruder
Body extruder

Spring

Ø 3 mm Washer
Place «Extruder Mobile» on «Body extruder.»
The spring should remain in its place.

Screw the knurled screw slightly.

Extruder mobile

Body extruder

Result
6

Extruder cover

Result
Check the connector’s orientation

Extruder assembly

Long motor

M3 x 20 mm screw

Result
The grub screw must be in contact with the flat side of the axis.

approximately 0.5 mm

M3 grub screw

Driving wheel

Result
CORE ASSEMBLY

Needed parts:
- 1 x Core
- 6 x ball joints
- 3 x 3 cm fan
- 4 x M3 x 8 mm screw
- 3 x M3 x 12 mm screw
- 5 x M3 x 20 mm screw
- 2 x Fan duct
- 3 x Ø 3 mm spacer
- 1 x Hexagon holder
- 1 x Hexagon bracket

Target: mount the ball joints on the core

= add some threadlock to the thread

Target: mount the prinhead's fan

*: Add a washer between the core and the fan for each fan mounting screw.

Be careful with the orientation of the fan!
Target: mount the 2 other fans

Pay attention to the orientation of the fans.

CAUTION: If you have the LED option, please refer to page 95 of this guide to mount the option now.
Target: mount the interface board on the core

Ø 3 mm spacer

Result
M3 x 8 mm screw

Interface board
**Target**: mount the Hexagon holder on the core

- **Hexagon holder**
- **M3 x 12 mm screw**
- **M3 x 8 mm screw**

**Result**: 

![Result Image]
Target: mount the printhead and the bracket

Printhead cables side (thermistor and heating cartridge). To use as reference for the printhead orientation.

Hexagon printhead

Hexagon bracket

Result

Printhead cables routing
M3 x 20 mm screw

Knurled nut

Result
Target: connect core’s components on the interface board

- Secondary fan 1
- LED Option *
- Secondary fan
- Heating cartridge
- Thermistor
- Secondary fan 2
- Don’t use these connectors
- Printhead fan
- Printhead fan

* If your board does not have the connector, please read the dedicated post on our blog.
**FINAL ASSEMBLY**

**Needed parts:**
- 1 x Lower plate
- 1 x Upper plate
- 1 x Cowling
- 6 x Smooth rod
- 12 x M6 x 16 mm screw
- 7 x M3 x 8 mm screw
- 3 x Slider
- 1 x Extruder
- 1 x Core extension
- 3 x GT2 belt
- 11 x Cable clamp
- 6 x Connecting rod
- 1 x PTFE tube
- 2 x Olive compression fittings
- 3 x Elastic band

**Target:** assemble the machine and each of the pre-assembled elements

1. Do not tighten the screws yet.

= add one drop of threadlocker to each thread
MECHANICAL ASSEMBLY

Result

M6 x 16 mm screw

= add some threadlock to the thread

Do not tighten the screws yet.
Target: tighten the smooth rods and check that sliders slide as free as possible.

Warning: this step is very important. It is imperative for the proper functioning of translations in order to obtain the best printing quality.

Adding WD40 to the rods and plain bearings will greatly assist sliding.

Process description

1) Lay the printer on its side as shown in Figure # 5.

2) Push the slider to the far right and tighten screws on this side.

3) Push the slider to the far left and tighten the screws on the left side.

4) Push the slider again to the far right and check that it slides well. If it is not the case, loosen the right screws and re-tighten.

5) Push the slider again to the left and check that it slides well. If this is not the case, loosen the left screws and re-tighten.

6) Repeat this process as many times as necessary until the slider slide freely. Low resistance on the left side is ok (next to the bottom plate).

Note: if the sliding of a slider forces: you may need to remove one plane bearing of the 4 in the slider.

Repeat this process for each axis.
**Target**: mount the filament driving system on the upper plate

- **M3 x 8 mm screw**
- **Extruder**

**Result**
Target: mount the belts on each sliders

Form a loop as shown in the illustration.

Teeth on this side

GT2 belt

Insert the loop in place

Result
Pulley’s and belt’s teeth aligned

Slider

GT2 belt

GT2 pulley

Idler pulley

Wrap the belt around the idler pulley

Make a loop and insert it into the slot.
Mount a belt on each axis.

1) Loosen the screw holding the motor
2) Press the motor down for tensioning the belt
3) Tighten the four screws
**Target**: clip the connecting rods on the sliders ball joints

**Result**: 3X*

- Clip the connecting rods on the ball joints
- Put the 3 elastic bands around the connecting rods.
Target: clip the connecting rods on the ball joints of the core
MECHANICAL ASSEMBLY

**Target**: stick cable clamps on the cowling

**Result**

**Target**: stick the cable clamps on the upper plate

**Result**
Target: prepare the machine and the cowling before wiring

1°) put the machine on its upper plate
2°) lay down the cowling next to machine as shown below

Be careful at the orientation of the cowling
**Target**: organize the cables from the upper plate through the cowling

The core’s extension must exceed 30 cm from this level.

- **Red**: Alpha axis endstop
- **Blue**: Bêta axis endstop
- **Yellow**: Gamma axis endstop
- **Purple**: core’s extension
- **Green**: extrusion motor wire

The colors are purely indicative. No cables are colored. Only some connectors are to facilitate further assembly.
Stand up the cowling along the Z axis

Route the cables through the two dedicated holes as shown above.
Target: Fix the cowling to the machine
**MECHANICAL ASSEMBLY**

**Target**: install the PTFE tube and pneufits on the 3D printer

1. **Pneufit**
   - Push before insert

2. If you have olive fittings, please follow the documentation v1.1.17 or lower

3. **PTFE tube**
   - Result

---

Version 1.6.30
MECHANICAL ASSEMBLY

1. Pneufit

Result
**Target**: cut the belt to prevent it sticking in the idler pulley

**Result**: Cut the belt as much as you can of the exceeding belt. Maximum 5mm should be left.
BED LEVELING SENSOR ASSEMBLY

Needed parts:
- 1 x Leveling sensor holder
- 1 x Bed Leveling sensor
- 2 x M2.5x12 screw
- 1 x M3x12 screw
- 1 x Knurled nut

Target: assemble the bed leveling sensor to perform the bed calibration operation

Mount the bed leveling sensor on the leveling sensor holder as shown below. Screw the M3x12 screw in its dedicated place.

Pay attention to the sensor’s orientation.

Route the sensor’s cable through its dedicated slots on the leveling sensor holder.

NOTE:
This assembly will subsequently be used to calibrate the printer, more precisely to level the printing surface in order to obtain an identical first layer height over the entire printing plate. Instructions of use of this item will be detailed in the user’s guide.
Target: fixation and orientation of the 3dBedFix (in the case of a printer without heabed)
ELECTRONIC ASSEMBLY
**Target**: connect the stepper motors to the eMotronic

- **Red**: Alpha axis
- **Blue**: Bêta axis
- **Yellow**: Gamma axis
- **Green**: Extrusion

The colors are indicative to facilitate the reading.

Pay attention to the color code when connecting the extruder’s motor.
**Target**: connect the endstops to the eMotronic board

Plug each endstop to its corresponding connector on the board. Respect the color code.

- **Red**: Alpha axis
- **Blue**: Bêta axis
- **Yellow**: Gamma axis
Target: connect the core’s extension cable, the «Reset» button, the On/Off switch and the board fan.
CONGRATULATIONS!
Your 3D printer is now functional!

If you have options > please follow the dedicated section in the annexe.
If not, you can go to the user guide.
ANNEXE
HEATING BED

Needed parts:

- 1 x Lower plate
- 1 x Heating patch
- 1 x Aluminium plate
- 3 x M3 x 8 mm countersunk screw
- 3 x Standoff spacer
- 1 x Adhesive patch «3dBedFix»
Heating patch and the thermistor will be fixed against the lower side of the plate.

Top side = **WITH** countersinks

Bottom side = **WITHOUT** countersinks
**Target**: assemble the aluminium plate, the heating patch and the thermistor (2 cases)

- **Heating patch**
  - Bottom face = **WITHOUT** countersink

- **Thermistor ball**
  - Thermistor ball hole

- **Bed plate**
  - Bottom face = **WITHOUT** chamfer

- **Heat patch with thermistor to add**

- **Heat patch with integrated thermistor**
  - Bottom face = **WITHOUT** chamfer

---

*Version 1.6.30*
Bottom face = **WITHOUT** countersink
**Target**: mount the standoff spacers
**Target**: screw the heated bed on the lower plate

- **Plate bed (Upper Side)**
- **M3 x 8 mm countersunk screw**

**Way for patch’s cables**

- **Lower plate**

**Result**
**Target**: Apply the adhesive patch «3DBedFix» on the heated bed.
Target: plug the heating patch and the thermistor of the heating bed

Note: If your eMotronic board does not have the connector, please cut the one from the patch and strip the ends to fix them in the screw terminal block.
Modifying the configuration file:

1°) Go to the Support section of www.emotion-tech.com. In the «MicroDelta Rework / Software / Software / Configuration» tree you will find all the available versions of the configuration file.

Download the version that corresponds to your printer (depending on your options)

2°) Unzip the downloaded file and copy its content into the SD card of the eMotronic board. Replace existing files if necessary.

3°) Press the Reset button.

Go now to the page 24 for the rest of the assembly!
## LCD SCREEN (plastic support)

**Needed parts:**
- 1 x Right side LCD cover
- 1 x Left side LCD cover
- 1 x Front plate LCD cover
- 1 x LCD screen
- 6 x M3 x 12 mm screw
- 2 x Ribbon cable

**Target:** mount the LCD screen on the 3D printer.

**Pre-requisites:**
The two screen covers (right and left) are to be printed by yourself. To download these two parts, go to the Support section of www.emotion-tech.com, then go to «MicroDelta Rework / Ressources_3D / Option LCD».

![Diagram](image1)

**Diagram:**
- 1 x LCD screen
- 1 x Front plate LCD cover
- 1 x Right side LCD cover
- 1 x Left side LCD cover
- 6 x M3 x 12 mm screw
- 2 x Ribbon cable
Target: preposition the screws in the printed covers

M3x12 screw
Left side
LCD cover

M3x12 screw
Right side
LCD cover

Result
**Target:** Plug the Ribbon cables on the screen

---

Note: The wiring on the eMotronic board side is shown on page 87.
**Target**: preposition the LCD screen between the two covers (right and left)
Target: mount the LCD on the printer

Route the ribbon cables through the rectangular slot

Tighten the two M3x12 screw on the lower plate of the printer

Result
Target: mount the front plate LCD cover
LCD SCREEN (metal support)

Needed parts:
• 1 x LCD cover
• 1 x LCD screen
• 2 x Ribbon cable
• 6 x M3 x 12 mm screw
• 4 x 5 x 3 mm spacer
• 4 x M3 nut

Target: mount the LCD screen on the 3D printer.
**Target**: Fix the screen to the cover

- **M3 x 12 mm screw**
- **5 x 3 mm spacer**
- **M3 nut**

*Tighten without force*
**Target:** Plug ribbon cables on the screen

Note: The wiring on the eMotronic board side is shown on page 87.
**Target**: Fix the «cover + screen» assembly to the lower metal part

1. Positioning the screws to support the screen cover
   - M3 x 12 mm screw
   - Do not screw into abutment

2. Passage of the ribbon cables by the notch
   - Ribbon cables way
Maintaining the screen cover with dedicated screws and notches
Access screw tightening screen cover (Allen wrench)
Target: connect the LCD screen to the eMotronic board

Plug both ribbon cables on the emotronic board
**Target**: modifying the configuration file

**Note**: Without modification of the configuration files, your LCD screen will be preconfigured on a stable version (and therefore plug & play). However, if you want to acquire the latest version of the firmware, you can follow the following tutorial.

1°) Go to the support section of www.emotion-tech.com. In the «MicroDelta Rework / Software / Software / Configuration» tree you will find all the available versions of the configuration file.

You will notice that two versions are available:
- Firmware EN HeatBed: for machines WITH heated option (with LCD screen or not)
- Firmware EN NoHeatBed: for machines WITHOUT heated option (with LCD screen or not)

Download the version that corresponds to your printer (depending on your options)

2°) Unzip the downloaded file and copy its content into the TF card of the eMotronic board. Replace existing files if necessary.

3°) Press the Reset button.

**Target**: contrast adjustment

Only the revision 1.0 of the LCD screen requires a contrast adjustment.

To change the contrast:
1) from the Micro TF card, open the file «config.txt»
2) find the variable named «panel.contrast»
3) change its value from «38» to «19»
4) save the file
5) press the Reset button

**TF/SD card recommendations for the LCD**:
- avoid MLC & TLC type cards
- avoid Transcend & EssentialB Cards
- the cards of class 1 to 10 generally work very well
- SDHC cards from 1 to 32 GB generally work very well
LED Lightning

- Translucent Fan Duct
- M3 x 20 mm Screw
- LED Board

Be careful of the fan orientation!

REMINDER: page 39 to continue assembly
LED wiring: page 44
Thank you for choosing MicroDelta Rework