INTRODUCTION
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• Target:
  Provide a visual guide of the various steps required to assemble the «i3 Metal Motion» 3D printer.

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• Useful 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
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SUMMARY

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PRESENTATION OF THE I3 METAL MOTION

SAFETY INSTRUCTIONS

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B. Mechanical parts
C. Plastic parts
D. Hardware
E. Electronic parts
F. Extruder kit
G. Hexagon kit
H. Cables and extensions
I. Other

MECHANICAL ASSEMBLY

MECHANICAL ASSEMBLY

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Electronic board
IEC connector
Reset button
Y axis (part 1)
Stabilized power supply
Y axis (part 2)
Y axis carriage
Y axis belt
Y Axis plate
Z Axis right side carriage
Z Axis left side carriage
Print head
X axis carriage
Z axis assembly
X axis assembly
Auto-leveling probe assembly

ELECTRONIC ASSEMBLY

ELECTRONIC ASSEMBLY
**PRESENTATION OF THE I3 METAL MOTION**

The latest creation of the eMotion Tech company, the I3 Metal Motion promises stability and accuracy.

With all our knowledge and experience acquired with our previous printers, we wanted to propose an elegant and reliable solution to the problems encountered on many 3D printers on the market.

The I3 Metal Motion will seek to become a symbol of durability and robustness, a precision tool at your disposal.

The I3 Metal Motion is, first of all, a solid steel frame that makes it easy to build in compare to any classic I3, with a low number of components. We have searched to develop a heavy and solid structure, including reinforcements in order to minimize vibrations and maximize the stability.

**A sharper and reliable extrusion**

The whole extrusion system is mounted on a steel carriage that avoids the distortions that most of the plastic parts are victims. For a higher ergonomics and quality, we have brought our solutions:

- A disengageable extruder to take off or engage the filament with a simple fingers pressure.

- Manual extrusion of the filament made by a molded wheel to have a very sharp flow.

- No clearances or empty space on the path of the filament, so it's possible to print with every kind of filament available on the market (PLA, ABS, G-fil, G-Carbon, eMotion Flex...)

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Here are the features of the I3 Metal Motion:

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions</td>
<td>Height 440mm, Width 400mm, Depth 430mm</td>
</tr>
<tr>
<td>Print volume</td>
<td>200x200x200mm</td>
</tr>
<tr>
<td>Thickness of the layers</td>
<td>from 100 to 350 microns</td>
</tr>
<tr>
<td>Compatible filaments</td>
<td>1.75mm diameter, PLA, ABS, G-Fil, M-Fil, Flex</td>
</tr>
<tr>
<td>Heating bed</td>
<td>yes, up to 110 °C.</td>
</tr>
<tr>
<td>Rated print speed</td>
<td>&gt; 80mm / s</td>
</tr>
<tr>
<td>Maximum movement speed</td>
<td>200mm / s</td>
</tr>
<tr>
<td>Nominal movement speed</td>
<td>150mm / s</td>
</tr>
<tr>
<td>Average accuracy (X, Y)</td>
<td>100 microns</td>
</tr>
<tr>
<td>Average accuracy (Z)</td>
<td>50 microns</td>
</tr>
<tr>
<td>Electronics type</td>
<td>eMotronic and TF card</td>
</tr>
<tr>
<td>Microcontroller</td>
<td>LPC1768, 32-bit ARM Cortex-M3 at 100MHz</td>
</tr>
<tr>
<td>Print with Hexagon 1.75mm extrusion head</td>
<td>(interchangeable nozzles)</td>
</tr>
<tr>
<td>Nozzle outlet</td>
<td>Ø 0.4 mm by default (modifiable a posteriori)</td>
</tr>
<tr>
<td>Operating System</td>
<td>Win XP, Vista, 7, 8, 10, Ubuntu 12+, Mac OS X</td>
</tr>
<tr>
<td>USB connectivity</td>
<td></td>
</tr>
<tr>
<td>Interfacing</td>
<td>LCD screen with TF card reader</td>
</tr>
<tr>
<td>Power supply</td>
<td>24 Volts / 320 Watts</td>
</tr>
</tbody>
</table>

The kit includes:

All the spare parts of the kit
A spool of 500 grams of PLA
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:

• 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 I3 Metal Motion 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 losses, injuries or damages due to assembly, transporting, storage or removal of the product.
INTRODUCTION

BILL OF MATERIAL

A. Metal parts

1 x Lower part
1 x Frame
2 x Reinforcement
1 x Y axis carriage
1 x Y axis plate
1 x Frame
2 x Reinforcement
1 x Y axis carriage
1 x Y axis plate

1 x Z axis carriage
1 x Z axis carriage
1 x X axis carriage

left side
right side

B. Mechanical parts

4 x Rod Ø 8 x 290 mm
2 x Rod Ø 8 x 360 mm
2 x Ø 8 mm lead screw
2 x Trapezoidal nut drive
2 x Coupling
3 x Linear bearing block
4 x Flanged linear bearing
INTRODUCTION

D. Hardware

- 2 x GT2 pulley
- 2 x GT2 belt
- 2 x Idler pulley kit
- 1 x PTFE tube

C. 3D printed parts

- 1 x Fan duct
- 1 x Y axis belt holder
- 1 x X axis belt holder
- 4 x Y axis rod holder
- 4 x Z axis rod holder
- 4 x X axis rod holder
- 1 x Hexagon bracket
- 1 x Leveling sensor holder
- 1 x Filament guide

D. Hardware

- 10 x M2.5 x 8 mm screw
- 5 x M2.5 x 12 mm screw
- 50 x M3 x 8 mm screw
- 30 x M3 x 12 mm screw
- 25 x M3 x 20 mm screw
- 4 x M3 x 22 mm screw
- 20 x M4 x 6 mm screw
- 15 x M3 nut
- 15 x Ø 3 mm x height 3 mm spacer
- 5 x Ø 3 mm x height 5 mm spacer
- 5 x Ø 3 mm x height 10 mm spacer
- 13 x Ø 3 mm washer
E. Electronic

- 1 x eMotronic
- 1 x TF Card
- 5 x Nema 17 Motor
- 3 x Endstop (colored connector)
- 1 x cm fan
- 1 x EBoard
- 1 x Blower fan
- 1 x IEC connector
- 1 x Heating patch
- 1 x Reset button
- 1 x Power supply
- 1 x Calibration probe
- 1 x Motor driver
- 1 x USB cable
- 1 x LCD screen and TF card reader
- 2 x Ribbon cable

F. Extruder kit

- 1 x Body extruder
- 1 x Mobile extruder
- 1 x M5 x 12 mm knurled screw
- 1 x Driving wheel
- 1 x 693zz bearing
- 1 x Spring
INTRODUCTION

G. Hexagon kit (hotend)

1 x Hexagon hotend  1 x Silicon sleeve  1 x 3 Allen key  1 x 4.5 wrench

H. Cables and extensions

1 x 20 mm motor’s cable  1 x IEC GND cable
2 x 50 mm motor’s cable  1 x IEC EARTH cable
1 x Thermistor  1 x IEC EARTH cable
1 x Heater cartridge  1 x JACK endstop
1 x Blue endstop  1 x Extruder extension
4 x Power supply cable  1 x Z carriage extension
1 x Reset button  2 x endstop
2 x IEC On/Off cable  1 x 220V power supply cable
1 x IEC VCC cable  1 x Mini USB cable

I. Autres

• 1 x bag of grease
• 1 x bag of zip ties
MECHANICAL ASSEMBLY
ASSEMBLY OF THE LCD SCREEN

**Target**: mount the LCD screen on the lower part

**Needed parts**:  
- Lower part  
- LCD screen  
- LCD button  
- 4 x M3 x 12 mm screw  
- 4 x Ø3 x H5 spacer  
- 4 x M3 nut

**Result**

Do not tighten the screws too much, otherwise the LCD screen may be damaged

LCD button  
Lower part  
M3 x 12 mm  
Ø3 x H5 spacer  
LCD screen  
M3 nut
ASSEMBLY OF THE ELECTRONIC BOARD

**Needed parts:**
- Lower part
- eMotronic board
- 4 x M3 x 8 mm screw
- 4 x Ø3 x H3 spacer

**Target:** Mount the electronic board on the lower part

**Result**
ASSEMBLY OF THE IEC CONNECTOR

**Target:** preparation of the two cables of the IEC connector

**Needed parts:**
- Lower part
- IEC connector
- 2 x Short strap cable

**Cable Colors:**
- **Green cable = GND**
- **Red cable = phase**
- **Black cable = neutral**

**Short strap cable:**
- In black on the illustration for visibility but red in IRL
Target: mount the IEC connector on the lower part
ASSEMBLY OF THE RESET BUTTON

Needed parts:
- Lower part
- Reset button

Target: mount the reset button on the lower part

Result: Button nut

Reset button
ASSEMBLY OF THE Y AXIS (part 1)

Target: mount the motor, pulleys and the Y axis endstop on the lower part

Needed parts:
- Lower part
- Nema 17 motor
- Blue endstop
- GT2 pulley
- Idler pulley
- Pulley bearing
- 4 x M3 x 8 mm screw
- 1 x M3 x 12 mm screw
- 2 x M2.5 x 8 mm screw
- 2 x Ø3 x H3 spacer
- 4 x Ø 3 mm washer

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

The NEMA 17 motor should be flat side up and the connector’s orientation should be as shown.

The GT2 pulley should be placed such that the Ø 3 mm washer is between the pulley and the screw.

The M3 x 8 mm screw should not be tightened yet (do not tighten the motor screws for the moment).

The Lamella’s orientation should be as shown.

The Blue endstop should be placed with the printhead facing upwards.

The Idler pulley should be placed with the printhead facing upwards.

The Pulley’s bearing should be placed with the printhead facing upwards.

The Ø3 x H3 spacer should be placed with the printhead facing upwards.
RESULT

The motor must be positioned towards the front of the machine.
ASSEMBLY OF THE POWER SUPPLY

Target: mount the power supply on the lower part

Needed parts:
- Lower part
- Power supply
- 4 x M4 x 6 mm screw

Result

M4 x 6 mm screw

⚠️ Power supply orientation
ASSEMBLY OF THE Y AXIS (part 2)

**Target:** Mount rods, bearing blocks and holders on the lower part.

**Needed parts:**
- Lower part
- 4 x Y axis rod holder
- 2 x 8 x 360 mm rod
- 3 x Linear bearing block
- 8 x M3 X 20 mm screw
M3 X 20 mm screw

⚠️ Block’s orientation

Version 1.1.0
ASSEMBLY OF THE Y AXIS CARRIAGE

**Needed parts:**
- Lower part
- Y axis carriage
- Y axis belt holder
- 3 x M3 spacer
- 2 x M3 X 20 mm screw
- 12 x M4 x 6 mm screw

**Target:** mount the different elements of the Y axis carriage

**Result:**
- Y axis carriage
- M3 spacer
- Y axis belt holder
- M3 X 20 mm screw

**Belt holder orientation**
MECHANICAL ASSEMBLY

Result

M4 x 6 mm screw

Version 1.1.0
ASSEMBLY OF THE BELT OF THE Y AXIS

Target: mount the Y axis belt with the carriage and the lower part

Needed parts:
- Lower part
- GT2 pulley

1. Place the carriage like this:

2. Place the belt around the pulleys like illustrated below:

3. Turn over the machine to access the «belt holder» passage.

4. Make loops to attach the belt
RESULT

Tension the belt by hand without forcing it by pushing the motor outwards and tightening the 4 screws.
ASSEMBLY OF THE Y AXIS PLATE Y

**Target:** mount the heating plate of the Y axis on the machine

**Needed parts:**
- Lower part
- Y axis plate
- Heating patch
- 3dBedFix patch
- 3 x M3 x 8 mm countersunk heah screw

⚠️ Please visually identify both sides of the plate

Chamfer = top face

Nothing = underside
Target: fix the heating patch on the lower side of the Y axis plate

1. Remove the adhesive protection of the heating patch («3M» inscription side)
2. Fix the heating patch on the lower side of the Y axis plate (pay attention to the orientation of the cable)

The cables must be oriented on this side of the aluminum plate.
1. Make 4 loops with 4 zip ties through the eight holes as shown below.

2. Move the board closer to the assembly.
3. Pass the plate’s cables in the zip ties loops

4. Make sure the cable does not exceed from the right-side of the plate

5. Tighten the zip ties to hold the cable
If the 3dBedFix patch is not already fixed to the heating plate, apply it by removing the «3M» adhesive protection first.

Be careful, the adhesive is very strong!
ASSEMBLY OF THE Z AXIS CARRIAGE (RIGHT SIDE)

Target: mount the different parts of the right side Z carriage

Needed parts:
- Z axis carriage right side
- 1 x NEMA 17 motor
- 2 x endstop
- 1 x GT2 pulley
- 1 x LMH bearing
- 5 x M3 x 8 mm screw
- 4 x M2.5 x 8 mm screw
- 3 x Ø 3 mm washer
**MECHANICAL ASSEMBLY**

- **M2.5 x 8 mm screw**

   ![Diagram showing the assembly process]

   - **Endstop with long lamella**
   - **Result**

   ![Diagram showing the result orientation]

   - **Endstop with long lamella**

   **Endstop lamella orientation**
The grub screw must be in contact with the flat part of the axis.

Do not tighten the motor fixing screws for the moment.
ASSEMBLY OF THE Z AXIS CARRIAGE (LEFT SIDE)

Target: mount the different parts of the left side Z carriage

Needed parts:
- Z axis carriage left side
- Idler pulley
- 623 zz bearing
- 1 x LMH bearing
- 2 x M3 x 8 mm screw
- 1 x M3 x 12 mm screw
- Ø3 x H3 spacer

Result
PRINTHEAD ASSEMBLY

Target: mount the different components of the Hexagon printhead.

Needed parts:
- 1 x Hexagon printhead
- 1 x Heater cartridge
- 1 x Thermistor
- 1 x Silicon sleeve

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

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

check that the screw is gently tightened
Important: make sure that the red shrink sleeves on the cartridge cables are properly protecting the metal parts and preventing short circuits.
ASSEMBLY OF THE X AXIS

Target: mount the different parts of the X axis carriage

Needed parts:
- NEMA 17 motor
- EBoard
- 3 cm fan
- Blower fan
- X belt holder
- Fan duct
- Hexagon bracket
- Hexagon printhead
- X axis carriage
- 1 x Extruder body
- 1 x Extruder mobile
- 1 x LMH bearing
- 1 x Driving wheel
- 1 x 693 zz bearing
- 1 x Spring
- 2 x M2.5 x 8 mm screw
- 10 x M3 x 8 mm screw
- 5 x M3 x 12 mm screw
- 4 x M3 x 22 mm screw
- 3 x Ø3 x H3 spacer
- 1 x M5 x 22 mm knurled screw
- 2 x Ø 3 mm washer

Result:
- X axis carriage
- LMH bearing
- M3 x 8 mm screw
- Ø3 x H3 spacer
- EBoard
- M3 x 8 mm screw
- Ø3 x H3 spacer
- EBoard
- M3 x 8 mm screw
X belt holder

M3 x 8 mm

X carriage

3 cm fan

M3 x 12 mm screw

Notch for cable fan passage

Orientation fan cable & fan

Result

Stator face = non visible

Rotor side = visible

Result
**MECHANICAL ASSEMBLY**

1. **Extruder mobile**
   - Ø 3 mm washer supplied in the bag
   - 693 zz bearing
   - M3 x 8 mm screw

2. **Result**
   - M5 x 22 mm knurled screw
3 Extruder body

4 Spring

Ø 3 mm washer supplied in the bag
Place the «Extruder Mobile» on the «Extruder Body».
Warning: the spring and the washer must stay in their place.

Extruder mobile

Extruder body

Result

Lightly screw the knurled screw
The grub screw must be in contact with the flat part of the axis.

Hexagon bracket

M3 x 12 mm screw

Notch cable

Hexagon printhead
M2.5 x 8 mm screw
Blower fan

M3 x 12 mm screw
Fan duct

Result

Result
M3 x 8 mm screw

Filament guide

Result
ASSEMBLY OF THE Z AXIS

**Target:** mount all the elements constituting the Z axis

**Needed parts:**
- 2 x NEMA 17 motor
- 4 x Z axis rod holder
- Frame
- Z axis carriages
- 1 x grease bag
- 2 x 8 x 290 mm rod
- 2 x Lead screw
- 2 x Trapezoidal nut
- 2 x Coupling
- 6 x M3 x 8 mm screw
- 6 x Ø 3 mm washer

![Diagram showing the assembly process](image)

**Result:**
- Motors connectors inward
- Ø 3 mm washer
- M3 x 8 mm screw
- NEMA 17 motor
MECHANICAL ASSEMBLY

- Rod holder
- X axis carriage right side
- X axis carriage left side
- Rod
- M3 X 20 mm screw
Coupling

Grub screw in contact with the flat side of the axis

Flexible part without axis

Tighten the screws

Result
Trapezoidal nut

Lead screw

Tighten the screws

Result
Place the carriages at the top.
ASSEMBLY OF THE X AXIS

Target: mount the X axis with the Z axis

Needed parts:
- 4 x Rod holder axe X
- Frame
- X axis carriage
- 2 x 8 x 290 mm rod
- 1 x LMH bearing
- 1 x GT2 pulley
- 2 x M3 x 8 mm screw
- 8 x M3 x 12 mm screw

⚠️ LMH bearing orientation
Adjust the height of the two carriages by turning the aluminum couplers so that the rod is as parallel as possible to the horizontal edge of the frame.
Keep the X carriage in place.
M3 x 8 mm screw
Rod holder
M3 x 12 mm screw

Result
Place the belt around the pulleys and as shown below:
Place the belt around the pulleys and as shown below:

Cut off the end of the belt

Cut off the end of the belt

Belt tension
next page
Tension the belt by hand without forcing it by pushing the motor outwards and tightening the 3 screws.
M3 x 8 mm

Frame orientation

Result
Place the reinforcements in their notches

Notch n°1

Notch n°2

Notch n°3

Reinforcement

Result
M3 x 12 mm screw

M3 nut

Result
Repeat the fixing operation for each of the reinforcements.
ASSEMBLY OF THE LEVELING SENSOR

Target: mount the leveling sensor

Needed parts:
- Sensor holder
- Leveling sensor
- 2 x M2.5 x 12 mm screw

Make a loop with the sensor cable and insert it into the passage.

Pay attention to the orientation of the sensor on its support!

This element will be mounted on the 3D printer before the automatic calibration phase which will be described in the user’s instructions.
Target: place and stick the thirteen cable ties on the lower part
**Target**: connect the additional motor driver above the first intended for the Z axis
**Target**: pass the Z axis motor cables in their dedicated fasteners

- **Z1 motor connector**: 50 cm cable
- **Z2 motor connector**: 20 cm cable
- **Motor’s connector**: Z1 axis motor
- **Motor’s connector**: Z2 axis motor
Target: connect the X and Y axis motor and endstop sensors

Close the fasteners marked with a *

Pass the cable through the notch

To the outside of the frame

Y motor cable = 50 cm
Target: connect the LCD screen and the reset button to the eMotronic board

Close the fasteners marked with a *
**Target**: connect the heating patch cables to the eMotronic board

- Zip ties
- To the heating plate
**Target**: connect the IEC connector to the power supply
Target: connect the power supply to the eMotronic board

Close the fasteners marked with a *
**Target:** pass the extruder’s cable into its dedicated passage

1. Connect the extruder cable
2. Connect the motor’s cable
3. Place the cable against the frame from this clip

- Through the notch to the outside of the frame
- Close the fasteners marked with a *
Target: fix the cable ties on the frame for the extrusion extension
Target: pass the extrusion extension along the frame, make a loop and go to the EBoard

Close the cable ties to secure the extruder extension
Target: pass the cables of the components of the extrusion block

If excess cable remains, secure it to the inside of the extrusion block with a cable tie.
Target: wire the extrusion block components on the EBoard board
**Target:** pass the X axis cable along the left brace, loop up, fix everything and connect to the components

1 °) Connect the motor cable to the motor
2 °) The yellow cable connector on the Z endstop (long lamella)
3 °) The red cable connector on the X endstop (short lamella)
CONGRATULATIONS!

Your 3D printer is now fully assembled!

You can now apply the white grease on the lead rods and also on the smooth rods without fear of putting the grease everywhere.

Now, please follow the user’s guide!
Thank you for choosing the 3D printer

I3 METAL MOTION!