

Prusa i3 Hephestos

English • العربية • български • català • čeština • Deutsch • Ελληνικά • español • فارسی • français • hrvatski • magyar • italiano • română • 日本語 • 한국어 • lietuvių • Nederlands • norsk • polski • português • русский • Türkçe • українська • 中文 (中国大陆) • 中文 (台灣) • עברית • azərbaycanca •

Prusa 3D printer Hephestos is an open source 3D printer **designed and developed by the bq Department of Innovation and Robotics**. Hephestos is based on the Prusa i3 and adds several improvements to other printers like PowerCode. Parts were developed by the RepRap community with modifications and new parts added by bq.

This project has sought to offer a robust printer design, addressing many of the shortcomings of earlier designs such as end-stop positioning and wiring routing. We have placed particular emphasis on providing good documentation to facilitate its assembly.



Prusa i3 Hephestos

Release status: working



Description

License	GPL
Author	bq
Contributors	
Based-on	Prusa i3
Categories	bq Prusa i3 Derivate, Prusa i3 Derivate
CAD Models	none
External Link	github: bq: Code (https://github.com/bq/prusa-i3-hephesto/)



Where to buy

- 3DEspaña.com (<http://www.3despana.com/kit-de-impresora-3d/435-kit-completo-prusa-i3-sunhokey-hephestos-.html>) From Spain Worldwide Shipping kit 299€
- RepRap.me (<http://reprap.me/bq-prusa-i3-hephestos-kit.html>) ships worldwide (pickup in Denmark), worldwide kit shipping
- Orballo Printing (<http://orballoprinting.com/en/home/35-kit-prusa-i3-steel.html>) (Prusa Steel)
- bq (<http://www.bqreaders.com/productos/prusa-hephestos.html>) Spanien - (Autor) - kostenloser Versand
- IBEROBOTICS Shop (http://www.iberobotics.com/shop/product_info.php?cPath=94&products_id=397&language=de) Optional Montageservice

- Leds & Chips (<http://ledsandchips.com/3D-Printer/Printers/427>) Vormontiert - Portugal
- Leds & Chips (<http://ledsandchips.com/3D-Printer/Printers/304>) Portugal
- Iniciativas 3D (<http://www.iniciativas3d.com/Iniciativas3D/prusa-i3-hephestos>) Spanien
- wi3D Print (<http://www.wi3dprint.com/Prusa-i3-Hepehestos>) Spanien
- 3D Proditive Shop (http://3dproditive.com/market_place/78/impresoras-3d/prusa-i3-hephestos) Spanien
- Simac (<http://www.simac.es/index.php/tienda/impresion-3d/impresoras-3d/kit-prusa-i3-hephestos-detail>) Spanien
- Crea3D (<http://www.crea3dstore.com/index.php?route=product/category&path=83>) Italien
- 3DPrinter Store (<http://www.3d-printerstore.ch/3D-Printer/bq-withbox/PRUSA-i3-Hepehestos-red:509.html?language=en>) Schweiz
- 3Dinvasion.com (<http://3dinvasion.com/impresoras-3d/155-impresora-3d-prusa-i3-hephestos.html>) From Spain & Canary Islands, free shipping, Free Online Course

Building Instructions Video (YouTube):

<videoflash type="youtube">nvTeJvRi8Bo</videoflash>

Prusa i3: Unboxing video (YouTube):

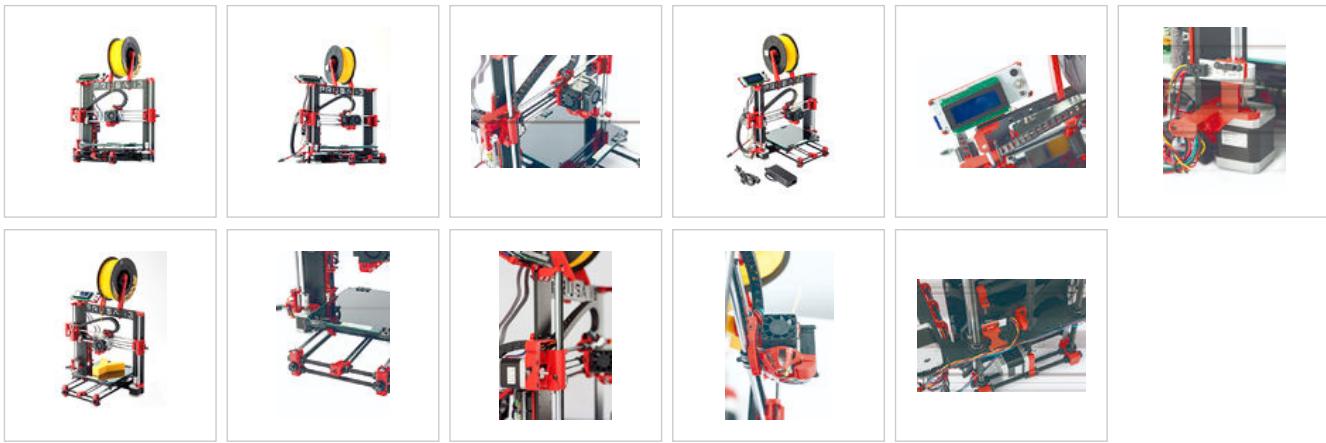
<videoflash type="youtube">c_TUTrBQ2XU</videoflash>

Contents

- 1 Gallery
 - 1.1 Technical specifications
 - 1.1.1 Dimensions
 - 1.1.2 Mechanical Construction
 - 1.1.3 Print resolution
 - 1.1.4 Extruder Mechanics
 - 1.1.5 Print speed
 - 1.1.6 Electronics
 - 1.1.7 Software
 - 1.1.8 Communications
 - 1.1.9 Materials
 - 1.2 Changes with respect to other models Prusa i3
- 2 Printed Parts
 - 2.1 Own designs
 - 2.1.1 X Axis cable carrier coupling
 - 2.1.2 Mechanical Endstop clamping X axis
 - 2.1.3 Mechanical Endstop clamping Y axis
 - 2.1.4 Mechanical Endstop clamping Z axis
 - 2.1.5 Hot End security
 - 2.1.6 Tools
 - 2.1.7 LCD support
 - 2.1.8 Fan support
 - 2.1.9 Filament holder
 - 2.2 Modified
 - 2.2.1 X Axis carriage
 - 2.2.2 Left side motor mounting for Z-Axis
 - 2.2.3 End of the X Axis motor
 - 2.2.4 RAMPS support
 - 2.3 Complete Kit
- 3 Bill of Materials
 - 3.1 Tools
 - 3.2 Electronics
 - 3.3 Extruder
 - 3.4 X Axis
 - 3.5 Y Axis
 - 3.6 Z Axis
- 4 Assembly Guide
 - 4.1 Required tools not included in the BOM
 - 4.2 Preparation before assembly
 - 4.2.1 Prepare pulleys
 - 4.2.2 Preparation of the motors
 - 4.2.3 Embed nuts
 - 4.2.4 Preparation of motor cables
 - 4.2.5 Power supply cable preparation
 - 4.3 Axis assembly
 - 4.3.1 X Axis
 - 4.3.1.1 Bearing Assembly
 - 4.3.1.2 Prepare the X Axis tensioner
 - 4.3.1.3 Enter the X Axis tensioner
 - 4.3.1.4 Assembly of bearings on smooth rods
 - 4.3.1.5 Prepare the X Axis Endstop sensor
 - 4.3.1.6 Fit the X Axis Endstop sensor to the smooth rod
 - 4.3.1.7 Assemble the smooth rod into the side parts
 - 4.3.1.8 Mount the X Axis motor
 - 4.3.1.9 Assemble the adjustment screw for the X Axis Endstop
 - 4.3.1.10 Assemble the pulley onto the X Axis motor
 - 4.3.2 Z Axis
 - 4.3.2.1 Attach the motor support to the frame
 - 4.3.2.2 Attach the Z axis motors
 - 4.3.2.3 Attach the Z axis supports to the top of the frame
 - 4.3.2.4 Prepare the Z Axis Endstop
 - 4.3.2.5 Join X Axis with Z Axis: Insert threaded rods

- 4.3.2.6 UJoin X Axis with Z Axis: Insert smooth rod
- 4.3.2.7 Join X Axis with Z Axis: Assembly to X axis:
- 4.3.2.8 Join X Axis with Z Axis: Flexible coupling
- 4.3.2.9 Union X Axis with Z Axis: Z Axis Endstop sensor
- 4.3.3 Y Axis
 - 4.3.3.1 Preparation of M10 threaded rod
 - 4.3.3.2 Preparation of smooth rods
 - 4.3.3.3 Assembly of smooth rods with threaded rods
 - 4.3.3.4 Secure with nuts
 - 4.3.3.5 Secure with cable ties
 - 4.3.3.6 Preparation of Y Axis tensioner
 - 4.3.3.7 Preparation of Y Axis motor
 - 4.3.3.8 Preparation of the M8 threaded rods - Part 1
 - 4.3.3.9 Preparation of the M8 threaded rods - Part 2
 - 4.3.3.10 Assembly of the rods
 - 4.3.3.11 Secure the structure with nuts
 - 4.3.3.12 Preparation of the aluminum base
 - 4.3.3.13 Secure the aluminium base with cable ties
 - 4.3.3.14 Prepare the Endstop of the base
 - 4.3.3.15 Secure the Endstop to the base
 - 4.3.3.16 Attach the belt of the Axis Y
 - 4.3.3.17 Tighten all nuts
 - 4.3.3.18 Attach the acrylic base
 - 4.3.3.19 Prepare the Y Axis Endstop
 - 4.3.3.20 Secure the Y Axis Endstop to the frame
 - 4.3.3.21 join Y Axis with the X and Z axes: Attach axes
 - 4.3.3.22 join Y Axis with the X and Z axes: Fit and tighten nuts
- 4.3.4 Extruder
 - 4.3.4.1 Prepare the carriage
 - 4.3.4.2 Attach the carriage to the X axis
 - 4.3.4.3 Secure the carriage with a cable tie
 - 4.3.4.4 Fit the belt to the X Axis
 - 4.3.4.5 Mount the Extruder support
 - 4.3.4.6 Mount the extruder
 - 4.3.4.7 Fit the blower nozzle and Hot end safety guard
 - 4.3.4.8 Place the glass on the base
- 4.3.5 Electronic
 - 4.3.5.1 Place the RAMPS 1.4
 - 4.3.5.2 Prepare the LCD control panel
 - 4.3.5.3 Mount the LCD control panel on the frame
- 4.3.6 Tuck the wires into the X Axis cable carrier
 - 4.3.6.1 Place the X Axis cable carrier
 - 4.3.6.2 Introduce the Z Axis wires in to the Z Axis cable carrier.
 - 4.3.6.3 Prepare the fan
 - 4.3.6.4 Wiring and cable routing
 - 4.3.6.4.1 Cable connection diagram
 - 4.3.6.4.2 Extruder wiring
 - 4.3.6.4.3 Motors cable routing
 - 4.3.6.4.4 Endstop cable routing
 - 4.3.6.4.5 RAMPS Wiring and cable routing
 - 4.3.6.5 Attach the fan
 - 4.3.6.6 Mount the filament holder to the frame
- 4.4 Printer adjustments
 - 4.4.1 Z Axis adjustment
 - 4.4.2 Levelling the plate
 - 4.4.3 Hot End obstruction
- 4.5 Hello world: Your first print
- 4.6 Annex
 - 4.6.1 Firmware
 - 4.6.2 Drivers calibration
 - 4.6.2.1 Wiring
 - 4.6.2.2 Multimeter preparation
 - 4.6.2.3 Multimeter adjustment

Gallery



Technical specifications

Dimensions

- Printer Dimensions: 460(X) x 370(Y) x 510 mm(Z without roll) or 583 mm(Z with roll)
- Print Area Dimensions: 215(X) x 210(Y) x 180 mm(Z)
- Box Dimensions: 400(X) x 400(Y) x 250 mm(Z)

Mechanical Construction

- Powder coated aluminium frame & base
- Smooth chrome rods for bearing carriages X, Y, Z
- Linear ball bearing LM8UU for X, Y, Z
- Axial ball bearing pulleys B623ZZ for X, Y
- Igus cable carrier chain
- Flexible aluminium coupling for threaded rods of Z Axis
- Four-point print base levelling system with cushioning
- Quick change system for print base with clips
- Brushless fans with axial ball bearings.

Print resolution

- Very high: 60 microns
- High 100 microns
- Medium 200 microns
- Low 300 microns

Extruder Mechanics

- Custom extruder design (Witbox)
- 0.4 mm nozzle
- Fin heatsinks with axial fan
- Part cooling nozzle

Print speed

- Recommended speed: 50 mm / s
- Maximum recommended speed: 80 mm / s

Electronics

- Any RepRap electronics conforming to RepRap Interface Standard RIS 1.
- LCD with rotary encoder and push-button navigation
- Cold glass base (size:220 x 220 x 3 mm)
- Power supply: 220 AC 12 DC 100W
- Thermistor 100k extruder
- Heating element: 12V 40W

Software

- Firmware derivative Marlin
- Recommended environment: Cura Software
- Supported Files: Gcode
- OS supported:
 - Windows XP and above
 - Mac OS X and above
 - GNU/Linux

Communications

- Standard SD card reader
- USB Port Type B

Materials

- PLA Filament 1.75-mm

Changes with respect to other models Prusa i3

Limit switch clamping:

Designed by the department specifically for this model.

Belt tensioners

Tensioner X axis identical to the Power Code. Tensioner Axis Ydownloaded from Thingiverse.
<http://www.thingiverse.com/thing:68185>

Support for RAMPS

Designed by the department specifically for this model. Includes three anchors to collect the wires on one side through the use of a cable tie. Guiding the cables ensures the Driver heatsinks are not covered.

Support LCD

Designed by the department specifically for this model. The design has been inspired by <http://www.thingiverse.com/thing:121640>

Support Fan

Designed by the department specifically for this model.

Cable Carrier

Parts modified to include the cable carrier on all axis, avoiding pinching, cuts and catching the cable during axis movement.

Power supply

Laptop power supply

Extruder

Witbox extruder.

Frame

Official Prusa design modified. A recess has been added to the Y axis area to prevent friction which previously existed during the levelling of the base plate caused by the screw protruding. File:Frame&base Hephestos.dxf.zip

Printing volume

215x210x180 mm

Printed Parts

Thingiverse page: <http://www.thingiverse.com/thing:371842>

Own designs

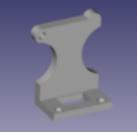
X Axis cable carrier coupling

Part	Downloads
	File:Acople cadeneta Eje X.zip

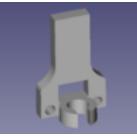
Mechanical Endstop clamping X axis

Part	Downloads
	File:EjeY final carrera.zip

Mechanical Endstop clamping Y axis

Parts	Downloads
	File:EjeY final carrera marco.zip
	File:EjeY final carrera base.zip

Mechanical Endstop clamping Z axis

Part	Downloads
	File:Eje Z final carrera.zip

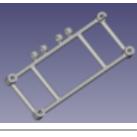
Hot End security

Part	Downloads
	File:Seguridad Hot end.zip

Tools

Part	Downloads
	File:Llave fija impresa archivos.zip

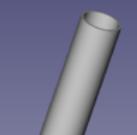
LCD support

Part	Downloads
	File:Soporte lcd.stl
	File:Bisagra lcd.stl

Fan support

Part	Downloads
	File:Soporte ventilador archivos.zip

Filament holder

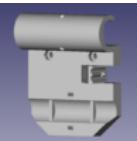
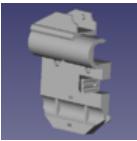
Part	Downloads
	File:Soporte filamento derecha archivos.zip
	File:Soporte filamento izquierda archivos.zip
	File:Soporte filamento union archivos.zip

Modified

X Axis carriage

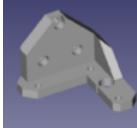
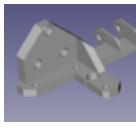
The following changes have been made to the original carriage:

- Attachment to rewind Igus cable carrier at the top (above the bearings).
- Addition of a small cap to ensure contact with the limit of X axis (on the side, next to the linear bearing carriage below)

Original	Modified
X Axis carriage (PowerCode)	X Axis carriage (Hephestos)
	
File:Eje X carro A archcivos.zip	

Left side motor mounting for Z-Axis

- Incorporated coupling for cable carrier.

Original	Modified
Left side motor mounting for Z-Axis (PowerCode)	Left side motor mounting for Z-Axis (Hephestos)
	
File:I3-zbottom izq.stl	
File:Eje Z soporte inferior izquierda archivos.zip	

End of the X Axis motor

Added support material to the screw which adjusts the Z axis height.

- The base has been elongated to reduced the clearance of the nut thereby preventing the screw from moving.
- The screw hole has been shifted outwards to improve accuracy in the mechanical Endstop activation.

Original	Modified
X Axis left (PowerCode)	X Axis left (Hephestos)
	
File:EjeX izquierda.zip	

RAMPS support

Added three hooks. Each hook works by using cable ties to hold and collect all the cables connected to the RAMPS. By guiding the cables through the side and into the plate at the top left corner it facilitates cooling of drivers by not having cables directly above the heat sinks.

Original	Modified
RAMPS support (Witbox)	RAMPS support (Hephestos)
	
File:Suplemento RAMPS(original).stl	File:Soporte RAMPS archivos.zip

Complete Kit

Complete Part Kit for Hephestos:

File:Piezas Hephestos.zip

Bill of Materials

Tools

Part	Name	Quantity	Description
	Allen key s/long Ø 2 UNIOR Ø 2 mm	1	-
	Allen key s/long Ø 2.5 mm	1	-
	Ceramic screw driver trimmer for electronics.	1	Screwdriver for adjusting the current of the motor drivers step by step, bipolar Nema 17 and extruder.
	Precision needle 0.4 mm diameter	2	Required for maintaining the Hotend and removing blockages.
	Printed spanner 10 (M6) - 13 (M8) - 17 (M10)	1	Printed spanner for nuts M6, M8 & M10 (corresponds to spanner size 10, 13, & 17)

Electronics

Part	Name	Quantity	Description
	Ramps 1.4	1	Freaduino Mega 2560 v1.2. Design based on Arduino Mega 2560 + Ramps 1.4, with heatsink on the MOSFET of the hot bed.
	Stepstick Drivers A4988	4	Stepstick Drivers A4988 with 4 layers and improved heat dissipation to avoid overheating & heatsinks for attached drivers.
	Endstop	3	Endstop mounted on PCB with LED indicator.
	LCD control panel	1	LCD control panel with card reader for automatic printing (SD card not included) and 30 cm cables.
	USB cable (type B), 1.8 m.	1	Standard USB cable with male connectors (type A & B) 1.8 meters long.
	Motor wire Nema 17	4	4 strand cable for bipolar stepping motor Nema 17 (2.5A 1.8deg/step) with female connector.
	Endstop wire 40 cm	2	3 strand cable for Endstop with female click connector (3pins) 40 cm long.
	Endstop wire 85 cm	1	3 strand cable for Endstop with female click connector (3pins) 85 cm long.
	Motor Nema 17	4	Bipolar stepping motor Nema 17 (2.5A 1.8deg/step)
	Wiring kit for extruder (Motor wire Nema (with connector) + Thermistor wire with connector + Fan and blower wire + Heater cartridge)	1	Wiring kit for extruder (4 strand cable for bipolar stepping motor Nema 17 (2.5A 1.8deg/step) with connector JST XHP-6 & female 4 pin connector + 2 strand cable for extruder thermistor with female 2 pin connector + Crimped fan and blower wire with terminal sleeve + Cartridge heater cable with terminal sleeve).
	150 mm of flexible wire with two bicolor strands with cross section of 1 mm²	1	150 mm of flexible wire with two bicolor strands with cross section of 1 mm².
	Power supply 220 AC 12 DC 100W	1	Power supply with 1.10m cable, 100 W with 2.1mm connector Jack INPUT: 100-240VAC 1,8A 50-60Hz & OUTPUT: 12 VDC 8.0A).
	Power Supply Cable (European)	1	Cable of 1,10m for 220V AC with Schuko connector (Male) & IEC-60320-C13 connector (Female).
	Printed support for lcd	1	Support to locate the LCD on the top part of the aluminium frame. Custom design.
	Printed hinge for lcd support	1	Hinge for the LCD support located on the top part of the aluminium frame. Custom design.
	Printed support for ramps	1	Support for isolating the electronics from the aluminium frame. Used in conjunction with 3 cable ties to organise the wiring. Custom design.

Part	Name	Quantity	Description
	Printed fan support	1	Support for 50x50mm fan. Located above the electronics to prevent overheating. Custom design.
	M3x10 Screw - DIN-912 Class 8.8 Black	4	-
	M3x12 Screw - DIN-912 Class 8.8 Black	2	-
	M3x16 Screw - DIN-912 Class 8.8 Black	2	-
	M3x20 Screw - DIN-912 Class 8.8 Black	4	-
	M3 Nut - DIN 934 Class 8 Black	12	-
	Heat shrink tube 2.5 x 500 mm	1	-
	Black cable tie 100 x 2.5 mm	10	-
	Brushless DC Cooling Fan - RD5010B12H with 20cm wire without connector	1	-
	Adapter/connector Jack-Ramps	1	Adaptor/connector Jack, 2.1mm, female with Ramps 1.4 2 terminal header.
	Plastic cable carrier chain link Igus	52	Link for constructing Igus cable carrier 045.10.018 (external measurements: 15 x 10mm)

Extruder

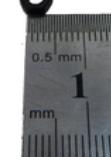
Part	Name	Quantity	Description
	Witbox Extruder	1	Direct extruder for 1.75 mm filament with 0.4mm nozzle.
	Extruder support	1	-
	Hot End safety guard (Hephestos)	1	User protection to avoid direct contact with hot extruder and prevent burns.
	M4 x 6mm Screw DIN-912 8.8 Class (with head for Allen 2.5mm)	2	-
	M3x10 Screw - DIN-912 8.8 Class Black	2	-
	M3 x16 Screw - DIN-912 8.8 Class Black	1	-
	M3 Nut - DIN 934 Class 8 Black	1	-

X Axis

Part	Name	Quantity	Description
	Chromed smooth rod 8 mm x 370 mm	2	-
	M3x10 Screw - DIN-912 8.8 Class Black	4	-
	M3x16 Screw - DIN-912 8.8 Class Black	2	-
	M3x20 Screw - DIN-912 8.8 Class Black	2	-
	M3x25 Screw - DIN-912 8.8 Class Black	1	-
	M6x40 Screw - DIN-912 8.8 Class Black	1	-
	M3 Nut - DIN 934 Class 8 Black	7	-
	M5 Nut - DIN 934 Class 8 Black	2	-
	M6 Nut - DIN 934 Class 8 Black	3	-
	X Axis Carriage A	1	X axis carriage to which the extruder attaches, adapted for use with chains. PowerCode modified.
	X Axis Carriage B	1	Component for fixing the chain to the X axis carriage. Powercode
	X Axis B623ZZ bearing Pulley	2	X axis pulley where the radial ball bearing B623ZZ is attached. PowerCode

Part	Name	Quantity	Description
	X Axis Right	1	Far right component of the X axis where the cable carrier tensioner is attached. PowerCode
	X Axis tensioner B623ZZ bearing	1	Chain tensioner for the X axis which is joined together with the pulley and axial ball bearing B623ZZ. PowerCode
	X Axis left	1	Far left component of X axis which is attached to motor Nema17 of said axis. PowerCode Modified.
	X Axis left chain coupling	1	Coupling for attaching the cable carrier to the far left component of the X axis. PowerCode
	X Axis Endstop (Hephestos)	1	Support part for the fixing of the Endstop to the smooth bar of the X axis. Custom Design.
	B623ZZ axial ball bearing	1	-
	GT2 pulley (20 teeth)	1	-
	LM8UU Linear ball bearing	1	-
	Black cable tie 100x2.5mm	1	-

Y Axis

Part	Name	Quantity	Description
	Chromed smooth rod 8mm x 340mm	2	-
	Black threaded rod M10x370mm	2	-
	Black threaded rod M8 x 205mm	4	-
	M3 x10 Screw - DIN-912 8.8 Class Black	7	-
	M3 x16 Screw - DIN-912 8.8 Class Black	1	-
	M3 x20 Screw - DIN-912 8.8 Class Black	1	-
	M3 x25 Screw - DIN-912 8.8 Class Black	6	-
	M3 Nut - DIN 934 Class 8 Black	7	-
	M8 Nut - DIN 934 Class 8 Black	22	-
	M10 Nut - DIN 934 Class 8 Black	8	-
	M8 Washer - DIN-125 Class 6 Black	22	-
	M10 Washer - DIN-125 Class 6 Black	8	-
	M10 serrated Nut - DIN 6923 Class 8 Black	4	-

Part	Name	Quantity	Description
	M10 Washer - DIN-125 Class 6 Black	4	-
	Y Axis B623ZZ bearing Pulley	2	Y axis pulley where the radial ball bearing B623ZZ is attached. PowerCode
	Y Axis belt holder	1	Component for attaching the GT2 chain to Y axis. Prusa
	Y Axis tensioner B623ZZ bearing http://www.thingiverse.com/thing:68185	1	Chain tensioner for the Y axis which is joined together with the pulley and axial ball bearing B623ZZ. PowerCode
	Y Axis motor PowerCode	1	Component reinforced with 3 screws for attaching the Y axis Nema17 motor to the threaded rods. PowerCode
	Y Axis Corner	1	Corner component for constructing the base and Y axis structure. PowerCode
	Y Axis base Endstop (Hephestos)	1	Component attached to the base of the Y axis which includes an M3 screw & nut for regulating the total shaft travel. It works in conjunction with the part that holds the Endstop to the frame. Custom Design.
	Y Axis frame Endstop (Hephestos)	1	Component for attaching the Y axis Endstop to the frame. Works in conjunction with the Y axis base Endstop. Custom Design.
	GT2 pulley (20 teeth)	1	-
	LM8UU Linear bearing	3	-
	Black cable tie 100x2.5mm	11	-
	GT2 belt 6mmx1m	1	-
	Aluminium Base	1	Black powder coated aluminium base for mounting glass and acrylic.
	Acrylic base	1	Acrylic base 220x220x8mm in black with 3.5mm holes

Part	Name	Quantity	Description
	B623ZZ axial ball bearing	1	-
	Spring	4	Spring (length: 30,5mm ; Outside diameter: 4,5mm; Wire thickness: 0.45mm)
	Glass Plate 220x220x3mm	1	-
	Black Binder Clip (35x10mm)	4	-
	Black cable tie 100x2.5mm	11	-

Z Axis

Part	Name	Quantity	Description
	Chromed smooth rod 8mm x 320mm	2	-
	Black threaded rod M5x300mm	2	-
	M3x10 Screw - DIN-912 8.8 Class Black	16	-
	M3 x18 Screw - DIN-912 8.8 Class Black	2	-
	M3 Nut - DIN 934 Class 8 Black	2	-
	Z Axis top support PowerCode	1	Component for attaching the Ø8mm x 320mm smooth rods of the Z axis to the top part of the frame.
	Z Axis bottom right support	1	Component for fixing the right hand Nema17 motor to the frame. Includes sleeve for the Ø8mm x 320mm smooth rod. PowerCode
	Z Axis Endstop (Hephestos)	1	Component for the attachment of the Endstop to the smooth rods of the Z axis.
	Z Axis bottom left support PowerCode modified	1	Component for fixing the left hand Nema17 motor to the frame. Includes sleeve for the Ø8mm x 320mm smooth rod and attachment for the cable carrier. PowerCode Modified
	Flexible coupling	2	Flexible coupling for aluminium 5 to 5mm with 4 grub screws for adjusting the rods via a 2mm allen key.
	Black aluminium frame	1	Black powder coated aluminium frame with "Prusa i3" Machined into the top part. Includes recess area in the bottom part near the Y axis to stop possible interference once the base levelling process has been completed.

Assembly Guide

Required tools not included in the BOM

Part	Picture
	Solder Iron and Solder
	Vice
	Metal file
	Scissors

Preparation before assembly

Prepare pulleys

Materials Needed:

Part	Name	Quantity
	LM8UU Linear bearing	1
	X and Y Axis Pulley bearing B623ZZ	2

Assembly:



Step A

Step B

Step C

Step D

Preparation of the motors

Materials Needed:

Part	Name	Quantity
	Motor Nema 17	4
	Metal file	1
	Vice	1

Assembly:



Step A



Step B



Step C

Embed nuts

Materials Needed:

Picure	Name
	Solder Iron
	Part
-	Nut

Assembly:



Step A



Step B



Step C



Step D

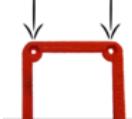
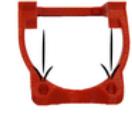


Step E



Step F

Parts to be embed with nut:

Picture	Detail Picture	Name	Description	Nut	Quantity
		X Axis Right	Far right component of X axis which holds chain tensioner for X axis.	M5 Nut - DIN 934 Class 8 Black	1
		X Axis left	Far left component of X axis used to attach the Nema17 motor to the X axis.	M3 Nut - DIN 934 Class 8 Black	1
		X Axis left	Far left component of X axis used to attach the Nema17 motor to the X axis.	M5 Nut - DIN 934 Class 8 Black	1
		X Axis tensioner	Chain tensioner for the X axis which is joined together with the pulley and axial ball bearing B623ZZ. PowerCode	M3 Nut - DIN 934 Class 8 Black	1
		Y Axis tensioner	Chain tensioner for the Y axis which is joined together with the pulley and axial ball bearing B623ZZ. PowerCode	M3 Nut - DIN 934 Class 8 Black	1
		X Axis Carriage A	X axis carriage to which the extruder attaches, adapted for use with chains. PowerCode modified.	M3 Nut - DIN 934 Class 8 Black	2
		Fan support	Support for 50x50mm fan. Located above the electronics to prevent overheating. Custom design.	M3 Nut - DIN 934 Class 8 Black	2
		Fan support	Support for 50x50mm fan. Located above the electronics to prevent overheating. Custom design.	M3 Nut - DIN 934 Class 8 Black	2
		Y Axis base Endstop	Component attached to the base of the Y axis which includes an M3 screw & nut for regulating the total shaft travel. It works in conjunction with the part that holds the Endstop to the frame. Custom Design.	M3 Nut - DIN 934 Class 8 Black	1
		Hot End Safety Guard	User protection to avoid direct contact with hot extruder and prevent burns.	M3 Nut - DIN 934 Class 8 Black	1

Preparation of motor cables

Materials Needed:

Picture	Name	Quantity
	Motor Nema 17	4
	Motor Nema wire 17	4
	Solder Iron and Solder	1
	Heat shrink tube 2.5 x 500 mm	1

Cable length (from base of engine to end of connector)

Motor	Total length (cm)	Motor length (cm)	Extesnion lenght(cm)
X	85	30	55
Y	50	20	30
Z Right	45	15	30
Z Left	65	30	35

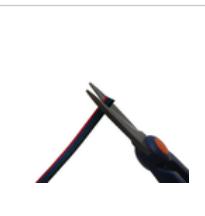
Note: Cut four parts of the heat shrink tubing for the Motor wire to 2cm long.

Note: Prepare motors of X and Y axis before mounting the engines, and the Prusa Z Axis, after mounting.

Assembly:



Step A



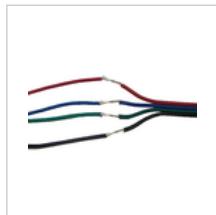
Step B



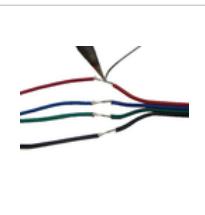
Step C



Step D



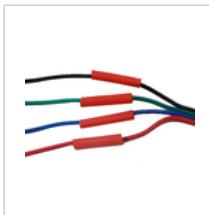
Step E



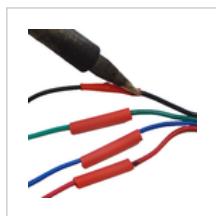
Step F



Step G



Step H



Step I



Step J

Note: Before soldering the cables of Z axis motors, pass the bare wire through the motor hole.

Assembly:



Step A



Step B

Power supply cable preparation

Materials Needed:

Picture	Name	Quantity
	Scissors	1
	Adapter/connector Jack-Ramps	1
	Power supply 220 AC 12 DC 100W	1
	150 mm flexible 2 colour wire (1 mm ²)	1

Assembly:



Step A



Step B



Step C



Step D



Step E



Step F



Step G

Axis assembly

X Axis

Bearing Assembly

Materials Needed:

Part	Name	Description	Quantity
	LM8UU Linear ball bearing	-	4
	X Axis left	Far left component of X axis which is attached to motor Nema17 of said axis. PowerCode Modified.	1
	X Axis Right	Far right component of the X axis where the cable carrier tensioner is attached. PowerCode	1

Assembly:

Step A

Step B

Step C

Prepare the X Axis tensioner**Materials Needed:**

Part	Name	Description	Quantity
	X Axis tensioner B623ZZ bearing	Chain tensioner for the X axis which is joined together with the pulley and axial ball bearing B623ZZ. PowerCode	1
	Pulley	Previously prepared bearing pulley	1
	M3x20 Screw - DIN-912 8.8 Class Black	-	1
	M6x40 Screw - DIN-912 8.8 Class Black	-	1

Assembly:

Step A

Step B

Step C

Step D

Enter the X Axis tensioner

Materials Needed:

Part	Name	Quantity
	Assembly step 1	1
	Assembly step 2	1
	M6 Nut - DIN 934 Class 8 Black	3

The objective of the tensioner is to load or unload the chain easily once installed.

Note: It is necessary to sand/file the parts. The tensioner should slide perfectly into the part that holds it.

Assembly:

Step A

Step B

Step C

Note: The two nuts at the end are to be tightened together. Use a nut wrench on the adjacent nut to assist. This way you can ensure that the nuts are securely fitted to the screw. Now by using the wrench as shown in the picture, crank the tensioner to the side to achieve the required tension when fitting the belt.



Step D

Step E

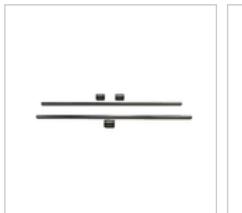
Step F

Note: Use the nut wrench when fitting and tightening the nuts on the screw.

Assembly of bearings on smooth rods**Materials Needed:**

Part	Name	Quantity
	Chromed smooth rod Ø 8mm x 370mm	2
	LM8UU Linear bearing	3

Assembly:



Step A



Step B

Prepare the X Axis Endstop sensor**Materials Needed:**

Part	Name	Quantity
	X Axis Endstop	1
	Endstop	1
	M3 Nut - DIN 934 Class 8 Black	2
	M3x10 Screw - DIN-912 8.8 Class Black	2

Assembly:

Step A



Step B

Fit the X Axis Endstop sensor to the smooth rod**Materials Needed:**

Part	Name	Quantity
	Assembly step 4	1
	Assembly step 5	1

Assembly:



Step A



Step B

Assemble the smooth rod into the side parts

Materials Needed:

Part	Name	Quantity
	Assembly step 1	1
	Assembly step 3	1
	Assembly step 6	2

Assembly:

The length of the rod between the side parts (when assembled) should be approximately 31 cm.



Step A



Step B

Mount the X Axis motor

Materials Needed:

Part	Name	Quantity
	Motor Nema 17	1
	M3x10 Screw - DIN-912 8.8 Class Black	2
	M3x16 Screw - DIN-912 8.8 Class Black	2
	Assembly step 7	1
	X Axis left thread chain coupling	1

Assembly:

Note: Mount the motor with the cable at the top.



Step A



Step B



Step C

Assemble the adjustment screw for the X Axis Endstop

Materials Needed:

Part	Name	Quantity
	Assembly step 8	8
	M3x25 Screw - DIN-912 8.8 Class Black	1

Assembly:



Step A



Step B

Assemble the pulley onto the X Axis motor

Materials Needed:

Part	Name	Quantity
	Motor Nema 17	1
	GT2 pulley (20 teeth)	1

Assembly:

Note: Use the 2mm Allen wrench to tighten the pulley to the motor axis via the chamfered area.



Step A



Step B



Step C

Z Axis**Attach the motor support to the frame****Materials Needed:**

Part	Name	Quantity
	Z Axis right bottom support	1
	Z Axis left bottom support	1
	Black aluminum frame	1
	M3x10 Screw - DIN-912 8.8 Class Black	6

Note: Make sure to check that the smooth rods fit into the holes on the brackets and file the holes if necessary.

Assembly:

Step A



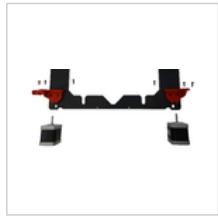
Step B

Attach the Z axis motors**Materials Needed:**

Part	Name	Quantity
	Motor Nema 17	2
	Assembly step 1	1
	M3x10 Screw - DIN-912 8.8 Class Black	6

Assembly:

Note: Align the motor cable towards the frame



Step A



Step B

Attach the Z axis supports to the top of the frame

Materials Needed:

Part	Name	Quantity
	Black aluminum frame	1
	Z Axis top support	2
	M3x10 Screw - DIN-912 8.8 Class Black	2
	M3x18 Screw - DIN-912 8.8 Class Black	2

Assembly:

Note: The support holes will need to be lightly sanded. The longer screws go into the left side and will be used to also attach the LCD mount later.



Step A



Step B

Prepare the Z Axis Endstop

Materials Needed:

Part	Name	Quantity
	Endstop	1
	Z Axis Endstop	1
	M3x10 Screw - DIN-912 8.8 Class Black	2
	M3 Nut - DIN 934 Class 8 Black	2

Assembly:

Step A

Step B

Step C

Join X Axis with Z Axis: Insert threaded rods**Materials Needed:**

Part	Name	Quantity
	X Axis	1
	Black threaded rod M5x300mm	2

Assembly:

Step A

Step B

Join X Axis with Z Axis: Insert smooth rod**Materials Needed:**

Part	Name	Quantity
	Assembly step 2 and 3	1
	Chromed smooth rod 8mm x 320mm	2

Assembly:

Step A



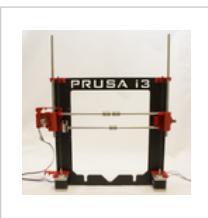
Step B

Join X Axis with Z Axis: Assembly to X axis:**Materials Needed:**

Part	Name	Quantity
	Assembly step 6	1
	Assembly step 5	1

Assembly:

Step A



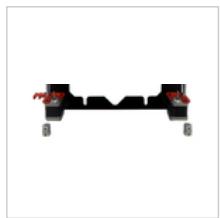
Step B



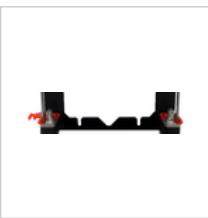
Step C

Join X Axis with Z Axis: Flexible coupling**Materials Needed:**

Part	Name	Quantity
	Assembly step 7	1
	Flexible coupling aluminum 5 to 5 mm	2

Assembly:

Step A



Step B



Step C



Step D

Union X Axis with Z Axis: Z Axis Endstop sensor**Materials Needed:**

Part	Name	Quantity
	Assembly step 8	1
	Assembly step 4	1

Assembly:

Note: Using glue for plastics join the the assembly in Step 4 to the motor bracket.



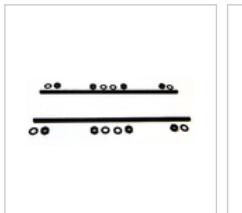
Step A

Step B

Y Axis**Preparation of M10 threaded rod****Materials Needed:**

Part	Name	Quantity
	Black threaded rod M10x370mm	2
	M10 Nut - DIN 934 Class 8 Black	4
	M10 Washer - DIN-125 Class 6 Black	4
	M10 Washer -(Ø 30 mm) DIN-9021 Black	4
	M10 Nut - DIN 934 Class 8 Black	4

Assembly:



Step A



Step B

Preparation of smooth rods**Materials Needed:**

Part	Name	Quantity
	Chromed smooth rod Ø 8mm x 340mm	2
	LM8UU Linear bearing	3

Assembly:

Step A



Step B

Assembly of smooth rods with threaded rods**Materials Needed:**

Part	Name	Quantity
	Y Axis Corner	4
	Assembly step 1	1
	Assembly step 2	1

Assembly:

Step A



Step B

Secure with nuts**Materials Needed:**

Part	Name	Quantity
	M10 Nut - DIN 934 Class 8 Black	4
	M10 Washer - DIN-125 Class 6 Black	4

Assembly:

Step A

Step B

Step C

Secure with cable ties**Materials Needed:**

Part	Name	Quantity
	Black cable tie 100x2.5mm	4

Assembly:

Step A

Step B

Step C

Preparation of Y Axis tensioner**Materials Needed:**

Part	Name	Quantity
	Pulley	1
	Y Axis tensor B623ZZ bearing	1
	M3 x20 Screw - DIN-912 8.8 Class Black	1
	M3 x25 Screw - DIN-912 8.8 Class Black	1
	M3 Nut - DIN 934 Class 8 Black	2

Assembly:

Note: The 25 mm screw is used as shaft for the pulley and the 20mm screw for the tensioner.



Step A



Step B

Preparation of Y Axis motor**Materials Needed:**

Part	Name	Quantity
	Motor Nema 17	1
	Y Axis motor mount	1
	M3 x10 Screw - DIN-912 8.8 Class Black	3

Assembly:



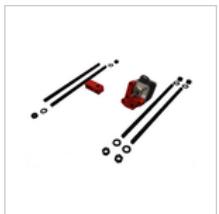
Step A



Step B

Preparation of the M8 threaded rods - Part 1**Materials Needed:**

Part	Name	Quantity
	Black threaded rod M8 x 205mm	4
	M8 Washer - DIN-125 Class 6 Black	6
	M8 Nut - DIN 934 Class 8 Black	6
	Assembly step 6	1
	Assembly step 7	1

Assembly:

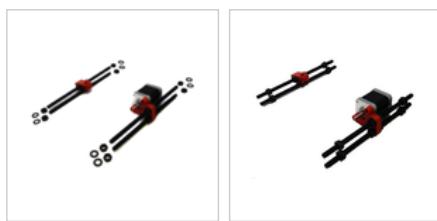
Step A



Step B

Preparation of the M8 threaded rods - Part 2**Materials Needed:**

Part	Name	Quantity
	M8 Washer - DIN-125 Class 6 Black	8
	M8 Nut - DIN 934 Class 8 Black	8
	Assembly step 8	1

Assembly:

Step A

Step B

Assembly of the rods**Materials Needed:**

Part	Name	Quantity
	Assembly step 5	1
	Assembly step 9	1

Assembly:

Step A

Step B

Secure the structure with nuts**Materials Needed:**

Part	Name	Quantity
	M8 Nut - DIN 934 Class 8 Black	8
	M8 Washer - DIN-125 Class 6 Black	8
	Assembly step 10	1

Assembly:

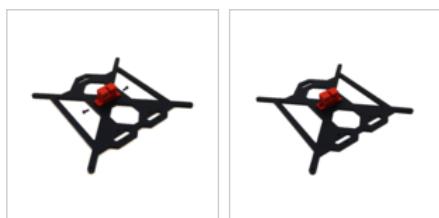
Step A

Step B

Step C

Preparation of the aluminum base**Materials Needed:**

Part	Name	Quantity
	Aluminum base	1
	Y Axis belt holder	1
	M3 x10 Screw - DIN-912 8.8 Class Black	2

Assembly:

Step A

Step B

Secure the aluminium base with cable ties**Materials Needed:**

Part	Name	Quantity
	Assembly step 11	1
	Assembly step 12	1
	Black cable tie 100x2.5mm	3

Assembly:

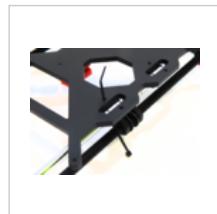
Step A



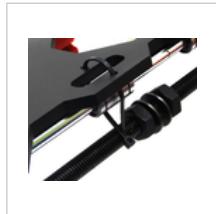
Step B



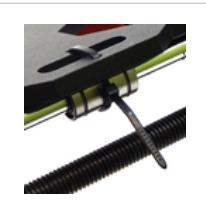
Step C



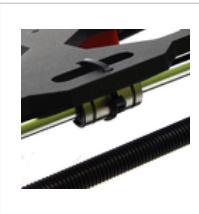
Step D



Step E



Step F



Step G



Step H

Prepare the Endstop of the base**Materials Needed:**

Part	Name	Quantity
	Y Axis Endstop	1
	M3 x25 Screw - DIN-912 8.8 Class Black	1

Assembly:

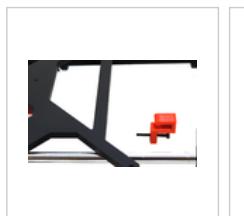
Step A



Step B

Secure the Endstop to the base**Materials Needed:**

Part	Name	Quantity
	Assembly step 13	1
	Assembly step 14	1

Assembly:

Step A



Step B



Step C



Step D

Attach the belt of the Axis Y**Materials Needed:**

Part	Name	Quantity
	GT2 belt 6mmx1m	1
	GT2 pulley (20 teeth)	1
	Black cable tie 100 x 2.5 mm	4

Assembly:**Note: Rotate the assembly****Note: Tighten the pulley using the 2mm Allen key**

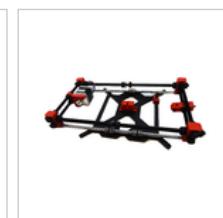
Step A



Step B



Step C



Step D

Note: Turn screw anticlockwise to slacken the tensioner

Step E



Step F



Step G



Step H



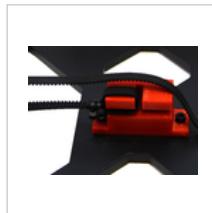
Step I



Step J



Step K



Step L

Note: Align belt



Step M



Step N



Step N



Step O

Note: Tighten the belt by turning the screw clockwise.

Tighten all nuts

Materials Needed:

Part	Name	Quantity
	Printed spanner 10 (M6) - 13 (M8) - 17 (M10)	1

Assembly:

Note: It may be necessary to file the burrs slightly so the spanner works easily.



Step A

Attach the acrylic base

Materials Needed:

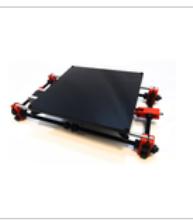
Part	Name	Quantity
	Acrylic base 220x220x8mm holes 3.5mm	1
	M3 x25 Screw - DIN-912 8.8 Class Black	4
	Spring (long: 30,5mm ; Outside diameter: 4,5mm; Wire thickness: 0.45mm)	4

Assembly:

Note: It may be necessary to file the burrs slightly.



Step A



Step B

Prepare the Y Axis Endstop**Materials Needed:**

Part	Name	Quantity
	Y Axis Endstop	1
	Endstop	1
	M3x10 Screw - DIN-912 8.8 Class Black	2
	M3 Nut - DIN 934 Class 8 Black	2

Assembly:



Step A



Step B

Secure the Y Axis Endstop to the frame**Materials Needed:**

Part	Name	Quantity
	Assembly step 19	1
	Black aluminum frame	1
	M3x16 Screw - DIN-912 Class 8.8 Black	1
	M3 Nut - DIN 934 Class 8 Black	1

Assembly:

Step A



Step B



Step C



Step D



Step E

join Y Axis with the X and Z axes: Attach axes**Materials Needed:**

Part	Name	Quantity
	Y Axis	1
	XZ Axis	1

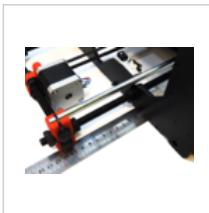
Assembly:



Step A



Step B



Step C

join Y Axis with the X and Z axes: Fit and tighten nuts

Materials Needed:

Part	Name	Quantity
A photograph showing the Prusa i3 Hephestos frame with the Y-axis assembly attached, ready for further assembly.	Assembly step21	1
A photograph of a printed spanner tool used for tightening nuts.	Printed spanner 10 (M6) - 13 (M8) - 17 (M10)	1

Assembly:



Step A

Extruder

Prepare the carriage

Materials Needed:

Part	Name	Quantity
A photograph of the X-axis carriage component.	X Axis Carriage A	1
A photograph of the X-axis carriage component.	X Axis Carriage B	1
A photograph of an M3x20 screw next to a ruler.	M3x20 Screw - DIN-912 8.8 Class Black	1
A photograph of an M3 nut next to a ruler.	M3 Nut - DIN 934 Class 8 Black	1

Assembly:



Step A



Step B

Attach the carriage to the X axis**Materials Needed:**

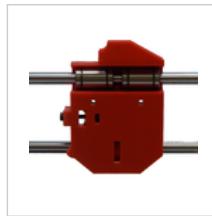
Part	Name	Quantity
	Assembly step 1	1
	Prusa	1

Assembly:

Step A



Step B



Step C



Step D

Secure the carriage with a cable tie**Materials Needed:**

Part	Name	Quantity
	Assembly step 2	1
	Black cable tie 100 x 2.5 mm	1

Assembly:

Step A



Step B



Step C



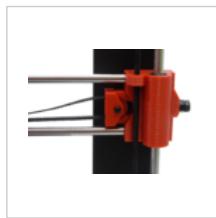
Step D



Step E

Fit the belt to the X Axis**Materials Needed:**

Part	Name	Quantity
	GT2 belt 6mmx1m	1
	Assembly step 3	1
	Black cable tie 100 x 2.5 mm	4

Assembly:

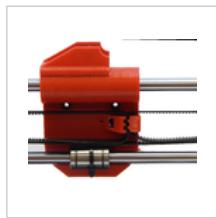
Step A



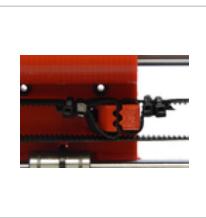
Step B



Step C



Step D



Step E

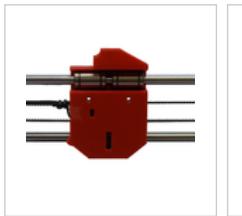


Step F

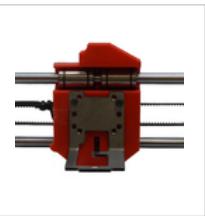
Mount the Extruder support**Materials Needed:**

Part	Name	Quantity
	Extruder support	1
	M3x10 Screw - DIN-912 8.8 Class Black	2

Assembly:



Step A



Step B

Mount the extruder**Materials Needed:**

Part	Name	Quantity
	Witbox Extruder	1
	M4 x 6mm Screw DIN-912 8.8 Class (with head for Allen 2.5mm)	2

Assembly:

Note: During this step it is necessary to remove the nozzle of the blower.
Note: Secure the extruder with screws.



Step A



Step B



Step C

Fit the blower nozzle and Hot end safety guard**Materials Needed:**

Part	Name	Quantity
	M3x20 Screw - DIN-912 8.8 Class Black	1
	Blower nozzle of the Witbox extruder	1
	Hot End security guard	1

Assembly:

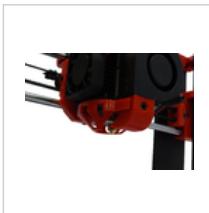
Note: The Hot end security guard is an optional part and not necessary for the printer to work correctly, but its use is highly recommended to avoid burns.



Step A



Step B



Step C

Place the glass on the base

Materials Needed:

Part	Name	Quantity
	Glass plate 220x220x3mm	1
	Black Binder Clip (35x10mm)	4

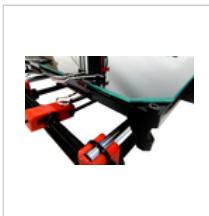
Assembly:



Step A



Step B



Step C

Electronic

Place the RAMPS 1.4

Materials Needed:

Part	Name	Quantity
	RAMPS 1.4	1
	M3x20 Screw - DIN-912 Class 8.8 Black	2
	Printed support for ramps	1

Assembly:



Step A



Step B



Step C

Prepare the LCD control panel

Materials Needed:

Part	Name	Quantity
A small electronic board with a green LCD screen and various components.	LCD control panel	1
A red plastic L-shaped bracket.	Printed support for lcd	2
A red plastic hinge component.	Printed hinge for lcd	1
A ruler showing two screws labeled 1 and 2. The first screw is 10mm long. The second screw is 20mm long.	M3x10 Screw - DIN-912 Class 8.8 Black	4
A ruler showing three screws labeled 1, 2, and 3. The first screw is 10mm long. The second screw is 20mm long. The third screw is 30mm long.	M3x20 Screw - DIN-912 Class 8.8 Black	2

Assembly:



Step A



Step B



Step C



Step D

Mount the LCD control panel on the frame

Materials Needed:

Part	Name	Quantity
	Assembly step 2	1
	M3 Nut - DIN 934 Class 8 Black	2

Assembly:

Step A

Step B

Step C

Tuck the wires into the X Axis cable carrier**Materials Needed:**

Part	Name	Quantity
	25 link cable carrier	1
	27 link cable carrier	1
	Wiring kit for extruder (Motor wire Nema (with connector) + Thermistor wire with connector + Fan and blower wire + Heater cartridge)	1

Assembly:**Note: Introduce the wires individually**

Step A

Step B

Step C

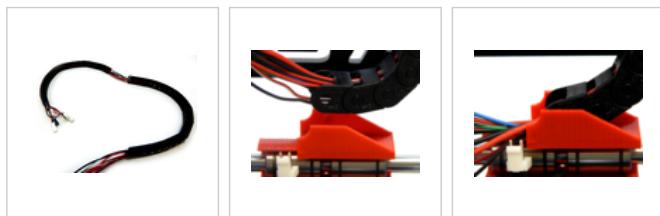
Step D

Place the X Axis cable carrier**Materials Needed:**

Part	Name	Quantity
	X Axis cable carrier chain with wires	1

Assembly:

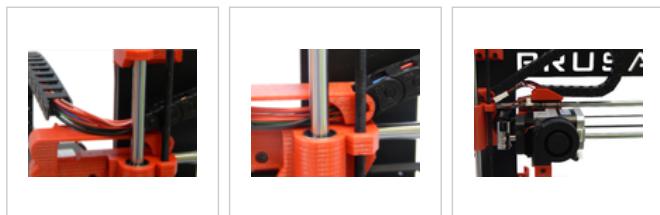
Note: The 25 link cable carrier joins the X Axis carriage at the far left of the X Axis.



Step A

Step B

Step C



Step D

Step E

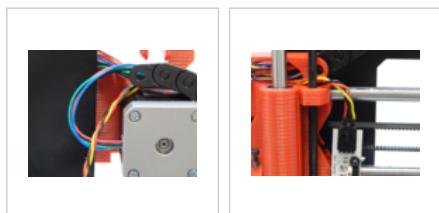
Step F

Introduce the Z Axis wires in to the Z Axis cable carrier.**Materials Needed:**

Part	Name	Quantity
	Assembly step 5	1
	EndStop wire with click and female connector 85 cm	1

Assembly:

Note: Tuck the wires for the X axis motor and Endstop into the Z axis cable carrier.



Step A

Step B

Note: The 27 link cable carrier joins the left hand X Axis to the Z Axis bottom left support.



Step C



Step D



Step E

Prepare the fan**Materials Needed:**

Part	Name	Quantity
	Fan 50 x 50 mm	1
	Printed support for fan	1
	M3 x16 Screw - DIN-912 8.8 Class Black	2

Assembly:

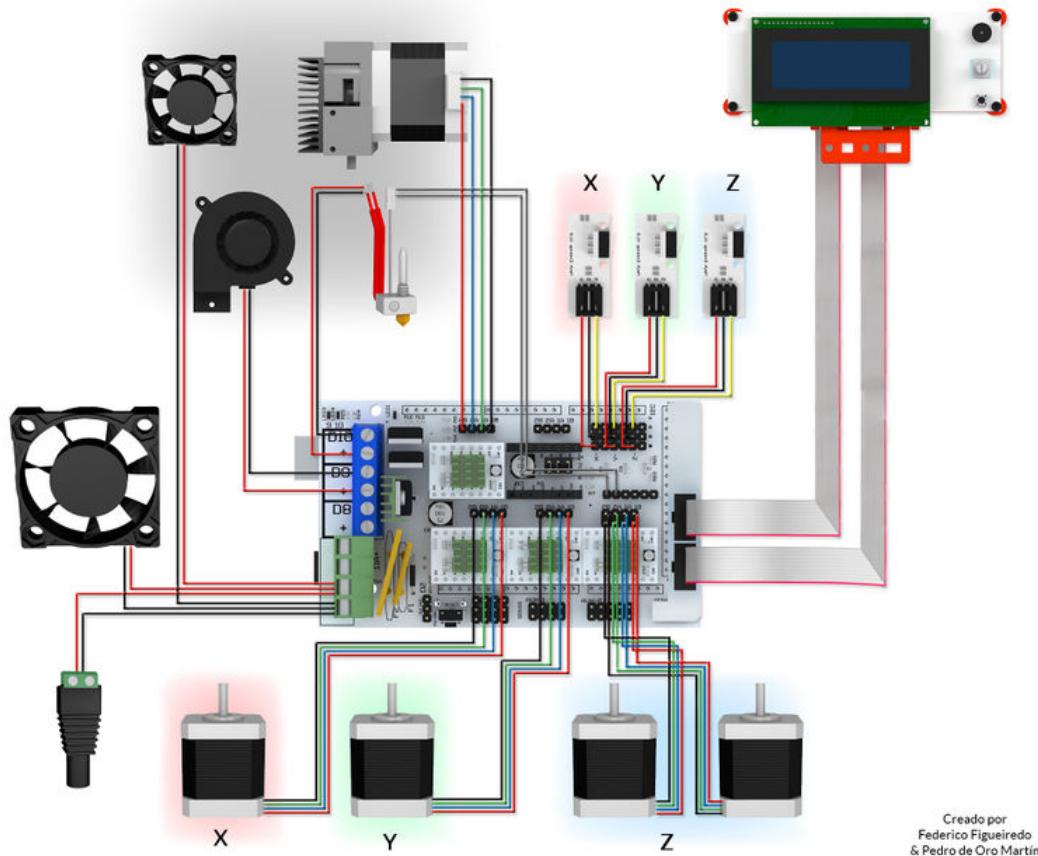
Step A



Step B

Wiring and cable routing**Cable connection diagram**

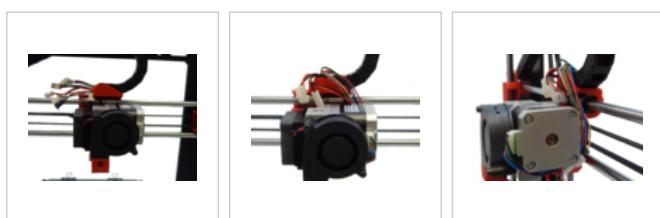
Diagrama de conexionado Ramps 1.4 para Prusa i3 Hephestos



Materials Needed:

Part	Name	Quantity
	Black cable tie 100 x 2.5 mm	11
	Power supply wire	1
	EndStop wire with click and female connector 40 cm	2

Extruder wiring



Step A

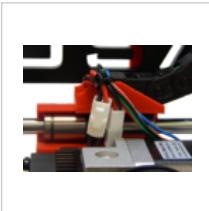
Step B

Step C

Note: Use a cable tie with the extruder wires.



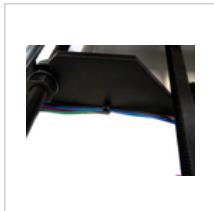
Step D



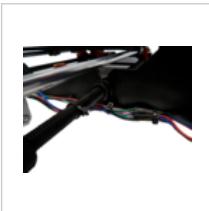
Step E

Motors cable routing

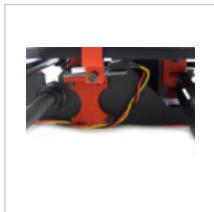
Note: Use a cable tie with the motors wires.



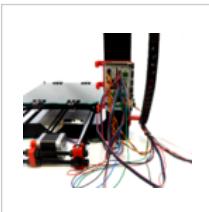
Step A



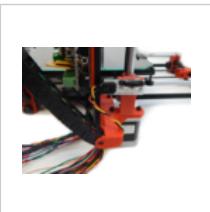
Step B

Endstop cable routing

Step A



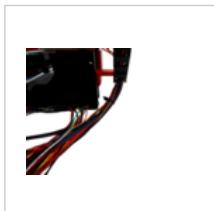
Step B



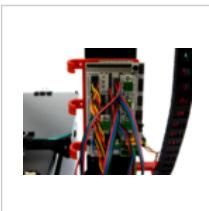
Step C

RAMPS Wiring and cable routing

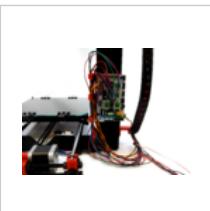
Note: Use the cable ties with the wires.



Step A

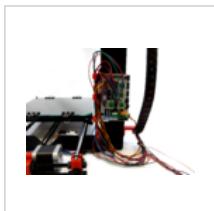


Step B



Step C

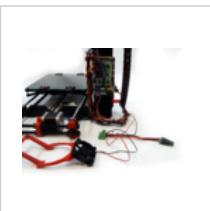
Note: Guide the cables through the printed part that holds the RAMPS and secure them with the cable ties.
Note: Connect the clamp plate, fan cables and power supply.



Step D



Step E



Step F

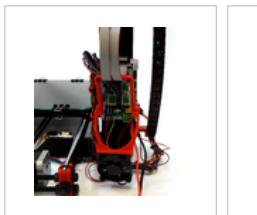
Attach the fan

Materials Needed:

Part	Name	Quantity
	Assembly step 8	1
	M3x12 Screw - DIN-912 Class 8.8 Black	2

Assembly:

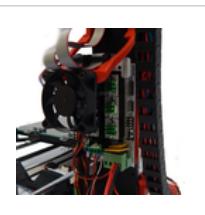
Note: Disconnect the Ramps LCD control panel before securing the fan and pull it through the hole in the work piece.



Step A



Step B



Step C

Mount the filament holder to the frame**Materials Needed:**

Part	Name	Quantity
	Filament holder	1

Assembly:

Step A



Step B

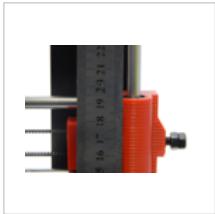


Step C

Printer adjustments**Z Axis adjustment**

Before printing with your printer you must calibrate the screw that adjusts the height of the Z axis so that the extruder is at the correct height relative to the base. To do this, follow these steps:

- Level the ends of the X Axis to the same height. Thread each axis manually until both are at the same height.



Step A

-Tighten the set screw as much as possible without excess force to the printed parts.



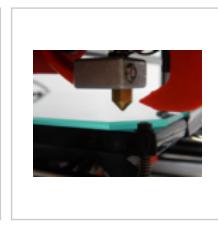
Step B

-Using the LCD control panel bring the extruder to the home position.

Control > Move Axis > Auto home



Step C



Step D

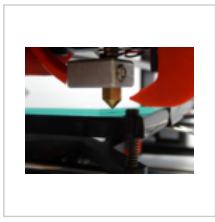
Note: Make sure that the Endstop sensors are being activated correctly by their respective axes.

-Set the position of the endstop sensor adjustment screws and repeat the previous step (bringing the Z axis to home position).



Step E

-If the adjustment isn't correct, repeat the previous step.



Step F

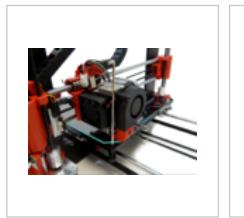
Levelling the plate

Once Z Axis is adjusted, it is necessary to level the plate.

Using the LCD control panel, start the levelling program.

Control > Level plate

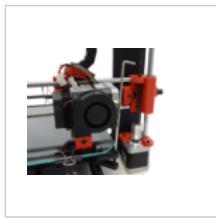
The program moves the extruder to four points of the base, where you must adjust the screws on each corner, so that you can just pass a sheet of paper between the extruder nozzle and glass. There should be a slight feeling of resistance produced by the extruder pressing the paper down onto the glass plate.



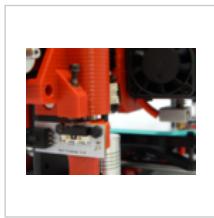
Step A



Step B



Step C

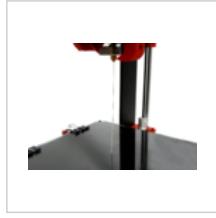


Step D

Hot End obstruction

If a blockage occurs in the Hot-End, follow the next step:

You must heat the Hot End to 220 °C and insert the 0.4 mm needle into the nozzle until you see it come out the other end. Afterwards you must clean the needle of any plastic which may have stuck to it.



Step A

Hello world: Your first print

If you followed all steps of this manual, you should have your Prusa i3 Hephestos ready to do its first print!

First you need to find a 3D design in .stl format for printing. Then you need to slice the chosen 3D design. For this, you can follow our guides of the most common used programs.

Slic3r guide: https://www-cdn.bq.com/file/Witbox/Manual_Slic3r_EN.pdf

Repetier-Host guide: https://www-cdn.bq.com/file/Witbox/Manual_Repetier_EN.pdf

Cura 3D guide: https://www-cdn.bq.com/file/Witbox/Manual_Cura_EN.pdf

Note: Remember that Prusa i3 Hephestos printing area is 215x210x180 mm.

Once you have the g-code file, save the file on an SD card. Insert the SD card into the LCD control panel slot. In the main menu select "Print from SD". Now select your g-code file. The printer will start automatically. You can view the progress of the part and the extrusion temperature on the LCD panel of the printer. When printing is completed, remove the glass base by removing the clamps. With the base resting on a table, remove the parts by pulling on them firmly.

You need to apply hairspray to the glass for better adhesion of parts!

Annex**Firmware**

Follow the next steps to update the firmware:

1. Download the firmware. In the RepRap wiki you can find a entire list of available firmwares:

Link: http://reprap.org/wiki/List_of_Firmware

2. Here are some of the most popular firmwares and our modification of Marlin:

Marlin: <http://reprap.org/wiki/Marlin>
 Sprinter: <http://reprap.org/wiki/Sprinter>
 Marlin Hephestos: [File:Marlin Hephestos.zip](#)

3. Download and install the Arduino software from their main site:

Link: <http://www.arduino.cc/en/Main/Software>

4. Inside of the firmware folder, you must open the .ino file with the Arduino IDE.

5. Once open, a tab called "configuration.h" will appear. In this file you can configure the parameters of your printer.

6. When you complete configuration, upload the program by selecting "Arduino Mega" from the list of boards and clicking the upload button.

Drivers calibration

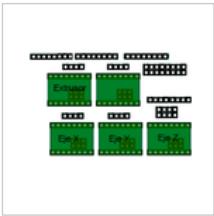
Materials Needed:

Part	Name	Quantity
	Motor Nema 17	2
	Endstop	1
	Witbox Extruder	1
	Ramps 1.4	1
	Power supply 220 AC 12 DC 100W	1
	Multimeter	1
	Ceramic screw trimmer f	1
	Clema	1
	Cable USB tipy B de 1.8 meters	1
-	Computer with Pronterface	1

This step must be repeated with all drivers, you will need two motors for Z Axis driver calibration.

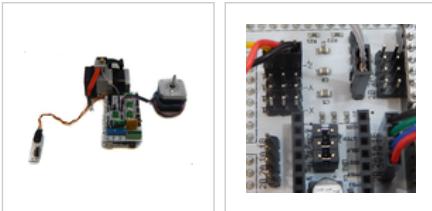
Intensity for each Driver:

Driver	Intensity (mA)
X Axis	250
Y Axis	250
Z Axis	450
Extruder	680
Arduino with RAMPS	aprox. 74 (not regulable)



Wiring

It is necessary to connect one endstop sensor and thermistor, because of firmware firewalls.

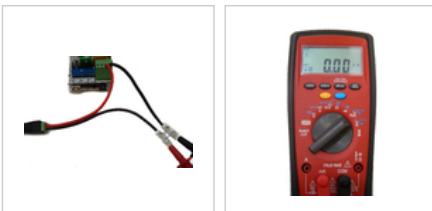


Step A

Step B

Multimeter preparation

Connect the multimeter in serial connection between Arduino and power supply. Put multimeter in intensity measurement mode.



Step A

Step B

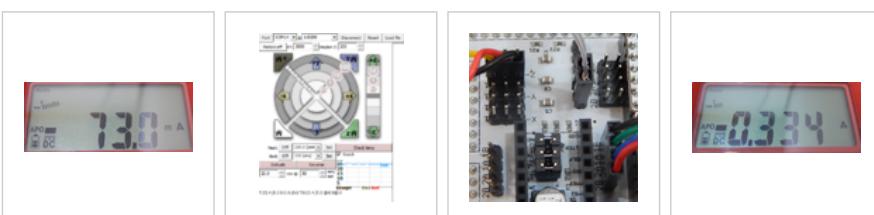
Multimeter adjustment

Connect the Arduino Mega to the computer. The flowing current is 74 mA approximately (this may differ between plates). Open Pronterface, select the correct port and connect to Arduino.

You must move the motor using Pronterface interface. Measure the current and regulate this using the Ceramic screw trimmer together with the multimeter. The current should be set to the sum of the current circulating in the PCBA and the current in the motor. For example, in X Axis current must be $74 \text{ mA} + 250 \text{ mA} = 324 \text{ mA}$.

Pre-heat or send the M302 command for completing the extruder calibration.

Arduino needs to be reset before calibrating the next driver.



Step A

Step B

Step C

Step D

Pronterface download link: <http://reprap.org/wiki/Printron>

Retrieved from "https://reprap.orgmediawiki/index.php?title=Prusa_i3_Hephestos&oldid=177663"

- This page was last edited on 8 December 2016, at 08:03.
- Content is available under GNU Free Documentation License unless otherwise noted.