Step Number	Step Title	Parts list		Tools list		Remarks
		Quantity	Part name	Quantity	Tool name	
01.1	Electronic Box Frame - Top and Bottom	8	Profile 20-400	1	Square	Not necessary to be absolutely precise.
		8	Bracket 20	1	Allen key	
		16	Hammer Nut M5			
		16	C-screw M5-8			
01.2	Electronic Box - Bottom Panel	1	Box Bottom Panel	1	Allen key	Remove protective foils.
		6	Hammer Nut M5			Pay attention to top and bottom of the panel.
		6	C-screw M5-8			Mark the front with the Red Dot Sticker
		1	Red Dot Sticker			
		1	Prepared Bottom Frame (Step1.1)			
01.3	Electronic Box - Drivers and Power Supply	3	Motor Driver	1	Allen key	Pay attention to position of motor drivers and motor power supply
		1	Motor Power Supply	1	wrench or small plier	
		6	C-screw M4-12			
		4	C-screw M4-8			
		6	Lock Nut M4			
01.4	Electronic Box Frame - vertical profiles	4	Profile 20-150	1	Allen key	Attach brackets first to the vertical profiles, then to the top and bottom
		8	Bracket 20			The final tightening of the screws should be all together at the end.
		16	Hammer Nut M5			
		16	C-screw M5-8			
		1	Prepared Top Frame (Step1.1)			

Step Number	Step Title	Parts list		Tools list		Remarks
		Quantity	Part name	Quantity	Tool name	
01.5	Electronic Box - PCBs	14	Standoff	1	Small screwdriver Phillips	
		1	Controller PCB	1	Allen Key	
		28	Plastic Screw M3-8			
		1	Router PCB			
		1	Relay			
		1	Sensor PCB			
02.1	Prepare Left Panel	1	USB Cable Inside	1	Small screwdriver Phillips	Remove protective foil from panel
		2	Plastic Screw M3-8			
		1	Box Left Panel			
02.2	Prepare Back Panel	1	Box Back Panel	1	Allen key	Remove protective foil from panel
		5	Cable Gland	1	Wrench or small plier	
		1	Power Socket + Mains Cable			
		2	C-screw M3-10			
		2	Lock Nut M3			
		2	Washer M3			
02.3	Attaching Sides, Front and Back Panels	1	Prepared Left Panel (Step 2)	1	Allen key	Remove protective foil from panels
		1	Prepared Back Panel (Step 3)			
		1	Box Right Panel			
		1	Box Front Panel			
		34	B-screw M5-8			
		34	Hammer Nut M5			

Step Number	Step Title	Parts list		Tools list		Remarks
		Quantity	Part name	Quantity	Tool name	
03.1	Preparing Ball Screw Y	6	C-screw M5-16	1	Allen key	
		1	Ball Screw Y			
		1	Screw Block Y			
03.2	Preparing Ball Screw X	1	Ball Screw X			
		6	C-screw M5-16			
		1	Screw Block X			
03.3	Preparing Ball Screw Z	6	C-screw M4-16	1	Allen key	
		1	Ball Screw Z			
		1	Screw Block Z			
04.1	Preparing the Y-axis - linear guides	2	Linear Guide Y	1	Allen key	Arrows should be pointing outside
		1	Base Plate			Flip the base upsidedown
		28	C-screw M4-16			Push the linear guides outwards to align.
04.2	Preparing the Y-axis - Carriages	4	Carriage			Insert the carriages to the same direction as the writings of the linear guide.
04.3	Preparing the Y-axis - Sides	2	Base side protection	1	Allen key	
		18	C-screw M5-20			
04.4	Preparing the Y-axis - front	1	Base front	1	Allen key	
		8	C-screw M5-20			

Step Number	Step Title	Parts list		Tools list		Remarks
		Quantity	Part name	Quantity	Tool name	
04.5	Attaching Y Back Bearing Holder	1	Prepared Ball Screw Y	1	Rubber Hammer	Insert the Ball Screw Y in the Y Back Bearing in the right direction.
		2	C-screw M8-30	1	Allen key	Insert the other end of the Ball Screw Y in the Y Front Bearing with a rubber hammer.
		1	Y Back Bearing Holder	1	Wrench	The Ball Spindle Y housing should have the filleted side facing the Base Plate
		1	Locknut pitch1mm			
		4	Washer M12			
05.1	Completing the base - Back	1	Base back	1	Allen key	
		7	C-screw M5-20			
		1	C-screw M5-25			
		1	Wire Fixer Small			
		1	Air Splitter Holder			
05.2	Completing the base - Profiles	2	Profile 40-800	1	Allen key	Make sure to align the T-nuts to the Base Plate holes
		4	C-screw M8-25			
		12	T-nut 8 M6			
		2	C-screw M6-16			
		2	Washer M8 Big			
05.3	Completing the base - shoulders support	1	Shoulder Support Left	1	Allen key	
		1	Shoulder Support Right			
		1	Shoulder Support Connector			
		4	C-screw M5-16			
		16	C-screw M4-30			

Step Number	Step Title	Parts list		Tools list		Remarks
		Quantity	Part name	Quantity	Tool name	
		4	C-screw M8-25			
05.4	Attaching the bed to the base	12	B-screw M6-20	1	Allen key	Flip the Base Plate.
		1	Bed			
06.1	Preparing the X-axis - linear guides	2	Linear Guide X	1	Allen key	All arrows of the linear guides should be pointing down.
		1	X-axis Plate			To ensure a good alignment, force the linear guide inwards while tightening the screws
		20	C-screw M4-16			
06.2	Preparing the X-axis - carriages	4	Carriage			Insert the carriages to the same direction as the writings of the linear guide.
06.3	Attaching the X-axis - left shoulder	1	Left Shoulder	1	Allen key	
		6	C-screw M8-40			
06.4	Preparing the X-axis - X bearing holders	1	Prepared Ball Screw X	1	Rubber Hammer	Insert the ends of the Ball Screw X in the bearing with a rubber hammer [1]
		1	X Bearing Holder Right	1	Allen key	The Ball Screw X housing should have the filleted side facing the X-axis Plate. [2]
		1	Locknut M12 pitch1mm	1	Wrench	
06.5	Preparing the X-axis - right shoulder	1	Right Shoulder	1	Allen key	
		6	C-screw M8-35			
		2	C-screw M6-35			
07	Attach X-axis to Shoulder Supports	16	C-screw M8-35	1	Rubber Hammer	Tighten the screws all at the same time incrementally
		1	Prepared X-axis (Step 06)			

Step Number	Step Title	Parts list		Tools list		Remarks
		Quantity	Part name	Quantity	Tool name	
08.1	Preparing the Z-axis - linear guides	2	Linear Guide Z	1	Allen key	Carefully remove the carriages from the linear guides, using the plastic ones as substitution.
		1	Z-axis Front Plate			Don't tighten the screws yet for a later alignment of the linear guides.
		2	Plastic linear guide			
		32	C-screw M3-12			
08.2	Preparing the Z-axis - Top Plate	1	Z Top Plate	1	Allen key	
		6	C-screw M6-25			
08.3	Preparing the Z-axis - Ball Screw Z	1	Z-axis bottom bearing Holder	1	Rubber Hammer	Hammer the Z Ball Screw into the bearings and then screw the bottom bearing holder
		2	C-screw M6-16	1	Allen key	
		1	Prepared Ball Screw Z			
		4	Washer M10			
08.4	Preparing the Z-axis - Top Bearing cover	1	Z Top Bearing Cover	1	Allen key	
		2	C-screw M5-20	1	Wrench	
		1	Lock Nut pitch1mm			
08.5	Preparing the Z-axis - Middle Plate	1	Middle Plate	1	Allen key	Don't tighten the screws of the carriages. Carefully slide the Middle Plate with the carriages onto the linear guides. Then tighten all the screws.
		4	Carriages (Step 8.1)			Carefully remove the Middle Plate with carriages, substituting the linear guides for the plastic ones again.
		16	C-screw M3-25			Tape the plastic linear guides around the carriages to avoid they coming out.
09.1	Attach Middle Plate to X Linear Guides	14	C-screw M4-25	1	Short Allen Key	
		2	C-screw M4-12	1	Allen key	

Step Number	Step Title	Parts list		Tools list		Remarks
		Quantity	Part name	Quantity	Tool name	
		4	B-screw M5-20			
09.2	Attaching Z-axis	1	Prepared Z-axis	1	Allen key	Untighten the carriages and carefully slide the Prepared Z-axis back to the Z Linear guide carriages, removing the plastic linear guides.
		4	C-screw M5-16			Fix the Z Ball Screw housing to the Middle Plate
10	Attach the Z-motor	1	Z-motor	1	Allen key	Tighten the set screws of the coupler. Fo facilitate, the coupler parts can be separated.
		1	Z Coupler			
		1	Z-motor Adapter			
		4	C-screw M5-80			
11.1	Attach Z-axis Router Holder	12	C-screw M5-20	1	Allen key	
		1	Router Holder			
11.2	Attach the Router	1	Router	1	Allen key	
		1	B-screw M8-70			
11.3	Attach Coolant System (optional)	1	Coolant System	1	Allen key	
		1	Cooler System Holder			
		2	B-screw M5-20			
		2	C-screw M4-35			
		2	Lock Nut M4			
		4	Washer M4			
11.4	Attach cooling pipes (optional)	2	Cooling pipes			

Step Number	Step Title	Parts list		Tools list		Remarks
		Quantity	Part name	Quantity	Tool name	
		2	Cable Tie			
12.1	Attach Z-endstop Sensor	1	Z-endstop Sensor			
12.2	Attach Z-endstop Sensor screw	1	Hexagon Screw M6-16	1	Wrench or small plier	
		1	Lock Nut M6	1	Allen key	
		4	Washer M5			
		1	Washer M6			
		1	Z-screw Holder			
		4	Screw Holder Spacer			
		4	C-screw M5-35			
13.1	Attach the X-chain Top Support	1	X-chain Top Support	1	Allen key	Tie de cables and pipes together with Cable Ties before fixing the Wire Fixer Big
		1	Wire Fixer Big			Pass the motor, router cables and pipe through the Top Chain Top Support hole.
		1	B-screw M6-16			
		1	B-screw M6-30			
		3	Cable Ties			
13.2	Fix Top Chain Bottom Support	1	X-chain Bottom Support	1	Allen key	
		3	C-screw M6-12			

Step Number	Step Title	Parts list		Tools list		Remarks
		Quantity	Part name	Quantity	Tool name	
13.3	Fix the Top Chain	4	C-screw M3-12	1	Allen key	Insert in the chain the following cables: Router Communication, Router Power, Z-endstop Sensor, Z-motor
		1	X-chain			
		4	Lock Nut M3			
		4	Washer M3			
		6	Cable Tie			
14	Fix X-motor and X-endstop Sensor	1	X-motor	1	Allen key	Tighten the set screws of the coupler. Fo facilitate, the coupler parts can be
		1	X-motor Adapter			
		1	XY Coupler			
		4	C-screw M5-70			
		2	B-screw M5-20			
		1	X-endstop Sensor			
		1	X-endstop Sensor Holder			
15.1	Y-chain Top support	2	Y-chain Top Support	1	Allen key	
		2	B-screw M8-12			
15.2	Y-chain Bottom support	1	Y-endstop Sensor	1	Allen key	
		1	Y-endstop Sensor Holder	1	Wrench	
		2	Y-chain Bottom Support Front and Back			
		2	C-screw M5-10			
		2	C-screw M5-20			
		2	Washer M5			
		2	Lock Nut M5			

Step Number	Step Title	Parts list		Tools list		Remarks
		Quantity	Part name	Quantity	Tool name	
15.3	Fix the Y-chain	1	Y-chain	1	Allen key	Insert in the chain the following cables: all inserted in Top Chain + X-motor + X-endstop Sensor
		1	Y-chain Bottom Support Side			
		6	B-screw M5-12			
		4	Washer M5			
		6	Lock Nut M5			
		4	Cable Tie			
16	Fix Y-motor	1	Y-motor	1	Allen key	Tighten the set screws of the coupler. Fo facilitate, the coupler parts can be separated.
		1	Y-motor Adapter			
		4	C-screw M5-35			
		1	XY Coupler			
17	Attach Vaccuum control system	4	Vaccuum Valve	1	Allen key	Fit the Air Tubes in the Fit Connectors and label them accordingly
		1	Vaccuum Splitter			
		5	Fit Connector			
		1	Angle Connector			
		4	O Ring			
		1	Teflon Tape			
		3	Flat screw			
		4	Vaccuum Valve Label			
18	Attach Z-axis Side panels	1	Z Side Panel Right	1	Allen key	
		6	B-screw M5-8			
		1	Z Side Panel Left			
19.1	Wiring Logic	3	Motor Driver Logic Cable	1	Screwdriver	
		1	Z height Sensor	1	Screwdriver slotted small	
		1	X-endstop Sensor Cable			

Step Number	Step Title	Parts list		Tools list		Remarks
		Quantity	Part name	Quantity	Tool name	
		1	Y-endstop Sensor Cable			
		1	Z-endstop Sensor Cable			
		2	Router PCB Jumper			
		1	Router Control Cable			
		3	Relay Jumper F-F			
		1	Relay Jumper M-M			
		1	Sensor Logic Cable			
19.2	Wiring Power	3	Motor Driver Power Cable	1	Screwdriver Phillips	Fix the Earth Cable Outside to the right screw on the Base
		1	Controller PCB Power Cable	1	Screwdriver slotted small	
		1	Router PCB Power Cable			
		1	Sensor PCB Power Cable			
		1	B-screw M5-8			
		2	Washer M5			
		1	Hammer Nut M5			
		1	Earth Cable Inside + Outside			
		1	Emergency Button Cable			
		1	Cable Connector			
20.1	Emergency Button	1	Emergency Button	1	Screwdriver Philips	Remove the foils from the panel
		1	Top Panel			
20.2	Checking and testing the electronics			1	Multimeter	Check with a multimeter is the connections are correct.
						Check if the motion of the motors is smooth and to the correct direction.

Step Number	Step Title	Parts list		Tools list		Remarks
		Quantity	Part name	Quantity	Tool name	
20.3	Adjusting the Endstops					Check if endstops are working by setting a small motion and placing metal on the sensor to see if it stops.
						Adjust the position of the endstops according to the limits of the motion range.
						Test the homing of the machine.
20.4	Cable management	1	Cable Wrapper Bottom	1	Cutter	Tighten the Cable Gands
		1	Cable Wrapper Top			Try to separate logic and power.
			Cable Tie			Fix the Y-motor Cable and Z-height Sensor Cable to the wire fixer on the back.
20.5	Closing the electronic Box	8	B-screw M5-8	1	Allen key	
		8	Hammer Nut M5			
		1	Prepared Top Panel			
21	Inserting linear guides caps	20	Linear Guide Cap			
22	Installing Coolant System (optional)	1	Air Compressor			
		1	Coolant Pipes			
		1	Coolant System			
23	Milling the bed					Mill the bed to flatten, then mill vacuum channels.
24.1	Installing vacuum system - Vacuum channels	4	Air Cap		Threading Tools	Thread the vaccuum channels
24.2	Installing vacuum system - air pipes	4	Angle Connector			Pass the air tube through the base back holes
			Teflon Tape			Lift the machine carefully to attach the Angle connectors

Step Number	Step Title	Parts list		Tools list		Remarks
		Quantity	Part name	Quantity	Tool name	
		4	Fit Connector			
		4	Air Tube			
24.3	Installing vacuum system - external devices	1	Vacuum Pump			
		1	Vaccum Chamber			
		1	Foot Switch			
25	Safety Stickers		Safety Stickers			
		1				
		1				
		1				
		1				
		1				

[1] There are three Bearings involved here...should all 3 be attached to the spindle?

[2] The Spindle X Block is not listed in Step 8.3 !!!
I guesss that first the Block should be attached on the the spindle and then the spindle ends should be hamered in the bearings?