

Step Number	Step Title	Parts list		Tools list		Remarks
		Quantity	Part name	Quantity	Tool name	
01	Bottom Panel	1	Bottom Panel	1	Allen Key 5.0	Do not tighten the screws yet for further alignment.
		6	B-screw M8-10	1	Allen Key 4.0	On the right profile, insert T-nuts M5 and attach it to the Bottom Panel, with the cable duct on top.
		3	B-screw M5-12	1	Ruler	Position the cable duct starting about 45 mm from the front of the machine.
		3	Profile 30-800			
		1	Cable Duct			
		8	T-nut M8			
		4	T-nut M5			
02	Attach Electronics	2	Motor Driver	1	Allen Key 2.5	All motor drivers should have the terminals pointing outwards.
		1	Laser Power Supply			
		1	Controller PCB			
		4	Plastic Screw M3-8			
		4	Standoff M3 MF			
		8	B-screw M4-10			
03.1	Inner Right Panel	1	Inner Right Panel	1	Allen Key 3.0	Attach the parts before inserting the panel in the Bottom Panel.
		1	Logic Power Supply			The Cable Glands should be turned to the inside
		1	Motor Power Supply			
		3	C-screw M3-6			
		10	B-screw M4-10			
		2	Cable Glands			
		6	Wire Fixers			
03.2	Y-motor	1	Cable Duct	1	Allen Key 3.0	Fix the pulley on the motor shaft aligning it to the edge, with the setscrews towards the outer side.

Step Number	Step Title	Parts list		Tools list		Remarks
		Quantity	Part name	Quantity	Tool name	
		5	C-screw M4-10	1	Wrench 5.5	Tighten the set screws of the pulley to the flat part of the motor shaft.
		4	Lock Nut M5			Insert the belt before fixing the motor on Y-motor Holder.
		1	Y-motor Belt			Fix the cable duct after attaching the motor. They should not be touching each other.
		1	Y-motor Pulley			The cables of the motor should be pointing inside or down
		1	Y-motor			
		1	Y-motor Holder			
		2	B-screw M8-16			
		4	C-screw M5-30			
04	Inner Left Panel and Middle Panel	1	Inner Left Panel	1	Allen Key 5.0	The side hole of the Middle Panel needs to point to the left of the machine (from the front view).
		1	Middle Panel			
		2	Hinge Support			
		4	B-screw M8-30			
		4	Lock Nut M8			
05	Laser Panel	1	Laser Panel	1	Allen Key 3.0	The base of the First Mirror Holder should be fixed upside-down on the bottom of the Laser Panel.
		1	First Mirror Holder	1	Allen Key 4.0	Use loctite to fix the rod of the First Mirror Holder
		2	Laser Tube Holder			
		8	C-screw M5-16			
		2	B-screw M4-10			

Step Number	Step Title	Parts list		Tools list		Remarks
		Quantity	Part name	Quantity	Tool name	
06	Pistons	2	Piston	1	Wrench 13	The pistons rod should point up.
		2	Piston Support	1	Allen Key 5.0	Insert the washers between the screw and the piston.
		8	Lock Nut M8			
		2	Washer M8			
		4	B-screw M8-20			
		2	B-screw M8-55			
07	Sensor Holders	1	Window Sensor	1	Allen Key 2.5	
		1	Window Sensor Holder	1	Wrench 5.5	
		4	C-screw M3-12			
		2	C-screw M3-8			
		4	Lock Nut M3			
		1	Y-endstop Sensor Holder			
		1	Y-endstop Sensor			
08	Back Panel	1	Back Panel	1	Allen Key 3.0	To fit the panel, move the machine slightly out of the table. Use a rubber hammner if necessary.
		2	Water Connector	1	Allen Key 5.0	Fix the Air connector in the left hole and the Chiller Sensor Connector in the right hole.
		1	Air Connector	1	Wrench 13	The threads of the water connectors should be inside
		1	Chiller Sensor Connector	1	Rubber Hammer	
		1	Power Socket	1	Wrench 19	
		1	Fuse			

Step Number	Step Title	Parts list		Tools list		Remarks
		Quantity	Part name	Quantity	Tool name	
		6	B-screw M4-10			
		1	Exhaust Adaptor			
		5	B-screw M8-10			
09.1	Bed Frame	2	Angle Profile	1	Allen Key 5.0	
		2	Profile 40-500			
		4	B-screw M8-20			
09.2	Bed Legs	4	C-screw M8-130	1	Wrench 13	
		4	Lock Nut M8			
09.3	Bed Lamella	15	Bed Lamella	1	Paper Cutter or Scissors	The Angle Profiles should be placed with the larger side down.
		1	Double-sided Tape			For the last Angle Profile, place it pointing backwards if needed.
09.4	Inserting the Bed	4	Washer M8 Large			
10	Front Panel	1	Front Panel	1	Allen Key 5.0	After fixing the Front Panel, tighten all the Bottom Panel screws.
		6	T-nut M8			Insert the T-nut in the outer side of the profiles, 3 units in each.
		3	B-screw M8-10			
		2	Pipe Holder			
		2	B-screw M6-16			
		2	Lock Nut M6			
11	Y-axis Guide	2	Y-linear Shaft	1	Allen Key 6.0	Insert the Y-guide Blocks in the guide before fixing it.
		1	Y-bearing Block Left	1	Wrench 10	Work with 2 people.
		1	Y-bearing Block Right			Insert the Hex Screw in the Y-bearing Block Right.
		4	B-screw M12-20			

Step Number	Step Title	Parts list		Tools list		Remarks
		Quantity	Part name	Quantity	Tool name	
		1	Hex Screw M6-12			
12.1	Y-axis Motion Back 1	4	Bearing Unit	1	Allen Key 6.0	The Bearing units need to be fixed with the setscrews pointing left (right side of the machine looking from the front).
		8	B-screw M10-12			
12.2	Y-axis Motion Back 2	1	Y-shaft 1000	1	Lubricant	For inserting the shaft, the bearings of the Bearing Units can tilt. Use some force and lubricant.
		2	Y-pulley 26-5M-15	1	Rubber Hammer	Pulleys need to be inserted while inserting the shaft, with setscrews pointing left (right side of the machine looking from the front).
		4	Setscrew (check if inserted in pulleys)			Y Pulley 26-5M-15
		1	Y-pulley 26-5M-09			Start inserting the shaft from the left side of the machine.
12.3	Y-axis Motion Front	4	Bearing Unit	1	Allen Key 6.0	
		2	Y Pulley 26-5M-15			
		2	Setscrew (check if inserted in pulleys)			
		1	Y-shaft Left 100			
		1	Y-shaft Right 150			
		8	B-screw M10-12			
13.1	Wiring DC	1	Controller Power Cable	1	Screwdriver slotted small	Connect the Window Sensor, Chiller Sensor and Y-endstop Sensor
		2	Motor Driver Power Cable	1	Screwdriver Phillips	
		1	Laser Logic Cable			
		2	Driver Logic Cable			

Step Number	Step Title	Parts list		Tools list		Remarks
		Quantity	Part name	Quantity	Tool name	
		1	Resistor 1K			
		2	Jumper Cable M-M			
		2	Connector 2 slots			
		1	Connector 5 slots			
13.2	Wiring AC	5	Connector 3 slots	1	Screwdriver Phillips	
		1	Connector 2 slots			
		1	Connector 5 slots			
		1	Emergency Button Cable			
		1	Laser Power Supply Cable			
		1	Logic Power Supply Cable			
		1	Motor Power Supply Cable			
		1	AC Connecting Cable			
		1	Earth Cable			
14.1	Preparing the X-axis 1	1	X-plate	1	Allen Key 4.0	Push the Linear Guide to the outside to align and tighten the screws all at the same time.
		1	Linear Guide			
		13	C-screw M5-12			
14.2	Preparing the X-axis 2	2	C-screw M3-8	1	Allen Key 2.5	Hammer the shaft inside the X-axis Support.
		1	X-shaft	1	Allen Key 5.0	Fix the X-endstop Sensor Holder in the correct position.
		1	X-shaft Pulley	1	Hammer	Do not tighten the Belt attachers yet.
		2	Setscrew (check if inserted in pulleys)	1	Lubricant	
		4	Belt Attacher			
		8	C-screw M6-16			
		1	X-endstop Sensor Holder			

Step Number	Step Title	Parts list		Tools list		Remarks
		Quantity	Part name	Quantity	Tool name	
14.3	Preparing the X-axis 3	1	Second Mirror Holder	1	Allen Key 4.0	Insert the linear guide carriage carefully while removing the plastic one.
		1	Mirror Spacer			
		2	C-screw M4-16			
		1	Linear Guide Carriage			
15	Attaching the X-axis	1	Cable Tie	1	Allen Key 5.0	Pass the X-axis through the bottom slot of the Inner left Panel.
		8	B-screw M8-20			Tighten the cable of the X-endstop sensor on the body of the sensor
		1	X-endstop Sensor			
16	Attaching the X-motor	1	X-motor	1	Allen Key 3.0	The wires of the motor should point outwards [1]
		4	B-screw M5-25	1	Wrench 8	[2]
		4	Lock Nut M5			
		1	X-motor Pulley			
		2	Setscrew (check if inserted in pulleys)			
17	Install LEDs	2	LED Strip	1	Allen Key 3.0	The cables of the LED strip should point to the holes in the Inner side panels.
		2	Cable Ties			Pass the left LED cable through the holes on the Middle and Laser Panel
18	Top Profiles	2	Profile 3060-800	1	Allen Key 6.0	Insert the T-nut in the outer side of the profiles, 3 units in each.
		6	B-screw M8-10			
		6	T-nut M8			

Step Number	Step Title	Parts list		Tools list		Remarks
		Quantity	Part name	Quantity	Tool name	
19	Y-belts	2	Y-belt	1	Large Pliers	To tighten the Y-belts, loosen the front Bearing Units first. Then fix one end of the belt with the Belt attacher gripping the belt teeth. Pass the belt around the pulley and fix the other end of the belt. Then tighten the Bearing units again to tension the belts.
20	Install Laser Head	1	Laser Head Support	1	Allen Key 2.5	The side hole of the laser head should point to the second mirror
		1	Laser Head			
		4	C-screw M4-12			
		4	C-screw M4-10			
21	Install X-chain	1	Head Air tube			Pass the Head Air Tube through the X-chain before fixing it
		1	X-chain			Fix the chain in the right position. If needed, invert the ending piece.
		3	C-screw M4-35			Fix the chain to the X-axis with cable ties, together with the X-endstop Sensor. Position it under the X-axis.
		1	Chain Spacer			
		3	Cable Tie			
		1	X Cable Holder			
		3	C-screw M4-12			
		2	C-screw M3-8			
22	Align X-axis			2	Template or two identical objects	Align the X-axis using the templates as reference to set an equal distance from the Front Panel. Then tighten all the pulley of the Y-axis.
23	Insert X-belt	1	X-belt	1	Allen Key 3.0	After inserting the belt around the pulleys, tighten it by unscrewing the Hex-screw in the Y-bearing Block Right.

Step Number	Step Title	Parts list		Tools list		Remarks
		Quantity	Part name	Quantity	Tool name	
		1	X-belt Fixer			
		2	C-screw M4-16			
		2	Washer M4			
24	Installing the Y-chain	1	Y-chain	1	Allen Key 3.0	Make sure the chain has the correct length.
		6	C-screw M5-12			Insert the Head Air Tube, the X-endstop Sensor Cable and the X-motor cables in the Y-chain. The segments can be opened with a flat screwdriver.
25	Water Pipes	1	Water Tube Inlet Inside			
		1	Water Tube Outlet Inside			
		2	Water Tube Outside			
		2	Cable Tie			
26	Laser Tube	1	Laser Tube	1	Cutter	Remove the top part of the laser tube holder to insert the laser tube.
		2	Cable Tie			Connect the Water Tube Inlet Inside to the Laser Tube Inlet and the Water Tube Outlet Inside to the Laser Tube Outlet. Fix the connections with Cable Ties.
27.1	Wiring DC 2	2	Laser Attachment	1	Screwdriver slotted small	Connect the motors, X-endstop Sensor and LEDs.
		1	Laser (-) Cable			Connect the Laser (+) and Laser (-) Cable and cover the terminals with shrinking tube. Make sure the laser attachment is well fixed.
27.2	Cable Management		Cable Tie			
28.1	Sub and Spacer Sides Panels	1	Subpanel Right			
		1	Subpanel Left			
		1	Spacer Panel Right			
		1	Spacer Panel Left			

Step Number	Step Title	Parts list		Tools list		Remarks
		Quantity	Part name	Quantity	Tool name	
28.2	Top Panel	1	Top Panel	1	Screwdriver Phillips	Insert the T-nuts before placing the Top Panel.
		6	B-screw M8-10			Connect the Emergency Button Cable to the Emergency Button
		6	T-nut M8			
		1	Emergency Button			
28.3	Sub and Spacer Back Panels	1	Subpanel Back	1	Allen Key 5.0	Fit the Subpanel back and the Spacer Panel Back under the Top Panel with the holes aligned.
		1	Spacer Panel Back	1	Wrench 13	
28.4	Subpanel Front	1	Subpanel Front	1	Allen Key 5.0	
		6	B-screw M8-20	1	Wrench 13	
		6	Lock Nut M8			
29.1	Prepare the Fillet Profile	1	Fillet Profile	1	Wrench 13	Fix the Front Panel Holder and the Front Subpanel Holder to the Fillet Profile before fixing it to the Front Panel.
		1	Front Subpanel Holder			
		2	C-screw M4-14			
		2	Washer M4			
		2	T-nut M4			
29.2	Attach Fillet Profile	2	B-screw M8-20			Do not tighten the screws yet for further alignment.

Step Number	Step Title	Parts list		Tools list		Remarks
		Quantity	Part name	Quantity	Tool name	
		1	Front Panel Holder	1	Allen Key 5.0	
		2	T-nut M8			
		2	B-screw M8-10			
		2	Lock Nut M8			
30.1	Prepare Window 1	1	Window	1	Allen Key 4.0	Window holes are not symmetric! The profiles holes should be matched before inserting the corner connectors
		1	Window Profile Front	1	Wrench 10	
		1	Window Profile Back	1		
		1	Window Profile Left	1	Allen Key 3.0	
		1	Window Profile Right			
		4	Corner Connector			
30.2	Prepare the Window 2	9	B-screw M6-35	1	Allen Key 2.5	
		9	Lock Nut M6			
		2	C-screw M4-35			
		1	Handle			
		1	Window Magnet			
		2	C-screw M3-6			
		2	Hinges			
		4	Countersink Screw M8-25			
		4	Lock Nut M8			
31	Install Window	1	Prepared Window	1	Allen Key 5.0	Insert the washer between the piston and the lock nut
		4	Countersink Screw M8-50	1	Allen Key 6.0	Do not touch the surface of the mirrors.
		2	Standoff M8 M-F	1	Wrench 13	

Step Number	Step Title	Parts list		Tools list		Remarks
		Quantity	Part name	Quantity	Tool name	
		2	B-screw M8-30			
		2	Washer M8			
		4	Lock Nut M8			
32	Insert Mirrors	3	Mirror			
33	Prepare for Calibration	1	Air Compressor	1	Digital Level meter	Semi-tighten the screws of the laser tube holder and first mirror.
		1	Chiller	1	Caliper	Test the water.
		1	5L Distilled Water			Align the laser tube holders with the caliper
		2	Water Tube Outside			Make sure the tube is parallel to the frame and horizontally levelled.
		2	Clamps			Pre-align visually first mirror, second mirror and laser tube.
		1	Water Flow Sensor Cable			
		1	Air Tube Outside			
		1	Air Compressor Adapter			
34	Laser Calibration	1	Power Cable			Always use 2 layers tape on the mirror, and one layer to align
		1	Masking tape			
35	Insert Lens	1	Lens			Place it with the flat surface down.
		2	Rubber Ring			Do not touch the surface of the lens.
		1	Hot Glue			
36	Fix Top Back Panel	1	Top Back Panel	1	Allen Key 2.5	

Step Number	Step Title	Parts list		Tools list		Remarks
		Quantity	Part name	Quantity	Tool name	
		6	B-screw M4-10			
37	Insert Side Panels	1	Left Panel	1	Allen Key 5.0	Tighten the screws of the Front Panel Holder and the Front Subpanel Holder.
		1	Right Panel			To fix the Side Panels, insert them in the slot of the Front Panel first.
		14	B-screw M8-10			
		1	USB Cable Inside			
		2	Plastic Screw M3-8			
38	Install Air Filter / Radial Fan	1	Air Filter / Radial Fan			
		1 or 2	Exhaust Hose			
		2 or 3	Clamps			
		1	Foot Switch			