OX CNC

Electrical Assembly Instructions

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1.0 Getting Started

1.1 About The Kit

This electrical kit is an extension to our OX CNC Mechanical kit. Ideally, this kit should be started straight after completing the mechanical assembly. This kit aims to provide you with what you need to turn our mechanical kit into a working moving machine. To go from this kit to a machine which can begin cutting, you will need a router, router mount and a spoiler board with a system to mount the workpiece that you wish to cut.

Our Ooznest OX (and the OX CNC Machine in general) have a very large community of users, who can mostly be found at http://openbuilds.com. It is free to sign up to this community and it will allow you to share your builds, interact with other members, and download useful community created resources. We have a specific build thread for the Ooznest OX, and we would love to see your machines and what you make with them: http://openbuilds.com/builds/ooznest-ox-cnc-machine.2084.

1.2 Check Product Contents

When you receive your kit, the first thing you should do is to check the contents against the list in Appendix A. The majority of the parts will be separated into boxes that correspond to the subsections in this manual. Additional spare small parts will be included. If anything is missing or damaged (or if you have any other problems) please contact us at sales@ooznest.co.uk and we will aim to resolve the issue as quickly as possible.

1.3 Tools Required

- The list below shows the main tools that will be required to complete this build:
- 2.5mm Allen Key
- 3.0mm Allen Key
- 4.0mm Allen Key
- 5.5mm Spanner
- 7.0mm Spanner
- 8.0mm Spanner
- Hammer
- Selection of Philips Screwdrivers
- Selection of Flathead Screwdrivers
- Tweezers
- Wire Cutters/Strippers

1.4 Notes on Assembly

This manual has been written for the construction of a 500 x 750mm version of our kit. If you have a larger version everything is exactly the same, with the exception of longer V-Slot extrusions.

The assembly has been split into 4 sections: Drag Chains Assembly, Power Supply Assembly, CNC xPro Assembly, Wiring & Commissioning. To make locating parts quicker, leave the parts in the boxes they came in when carrying out the build.

It is recommended that you read through the whole manual before beginning the build in order to get a full picture of the assembly process. Before beginning each step, make sure you have studied the diagram and have the required parts in front of you. A PDF version of the manual is available on our website and this will allow you to zoom in on the diagrams if needed.

Be very careful to not over tighten the nuts and bolts on the plastic parts, otherwise they may crack. Everything should easily fit together, and so if it isn't, take a step back and re-read the instructions.

Assembly of this kit involves the use of electricity and therefore you should take appropriate precautions to ensure you are assembling the kit in a safe manner. When following wiring diagrams, double check that everything is connected correctly. Before carrying out any work on the electrics make sure that the machine is switched off.

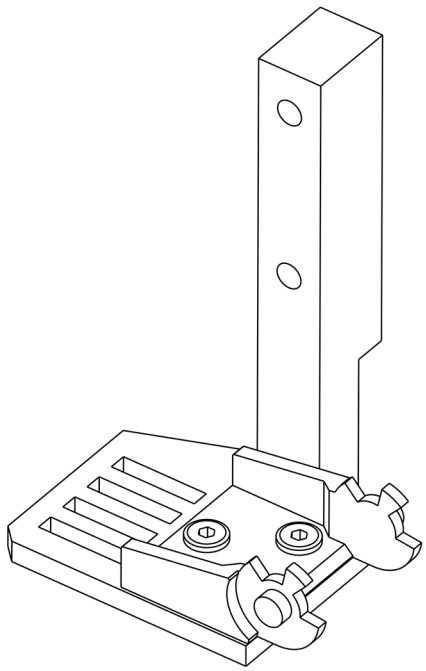
The polarity is indicated by the color of the wire, not by the color of the connectors at each end. For the AC IEC input, the live wire is brown, neutral blue, and earth is green and yellow. For the DC Wiring of the machine a positive wire is red, negative is black, and earth is green and yellow.

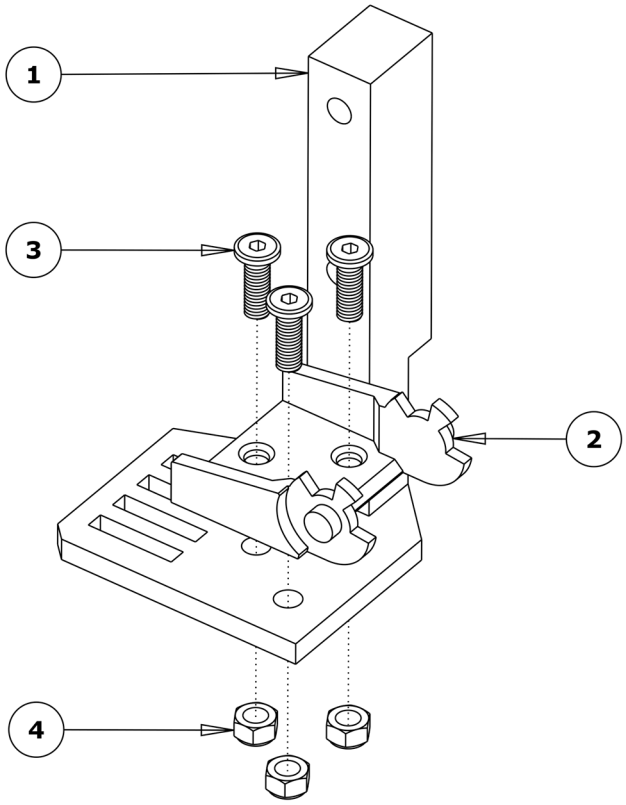
2.0 Drag Chains Assembly

2.1 Y-Axis

2.1.1 Y-Axis Fixed End Assembly

ITEM NO	DESCRIPTION	QTY
1	Y-DRAG-CHAIN-FIXED-END-MOUNT	1
2	DRAG-CHAIN-FIXED-END	1
3	M5-LOW-PROFILE-15MM	3
4	M5-NYLOC-NUT	3

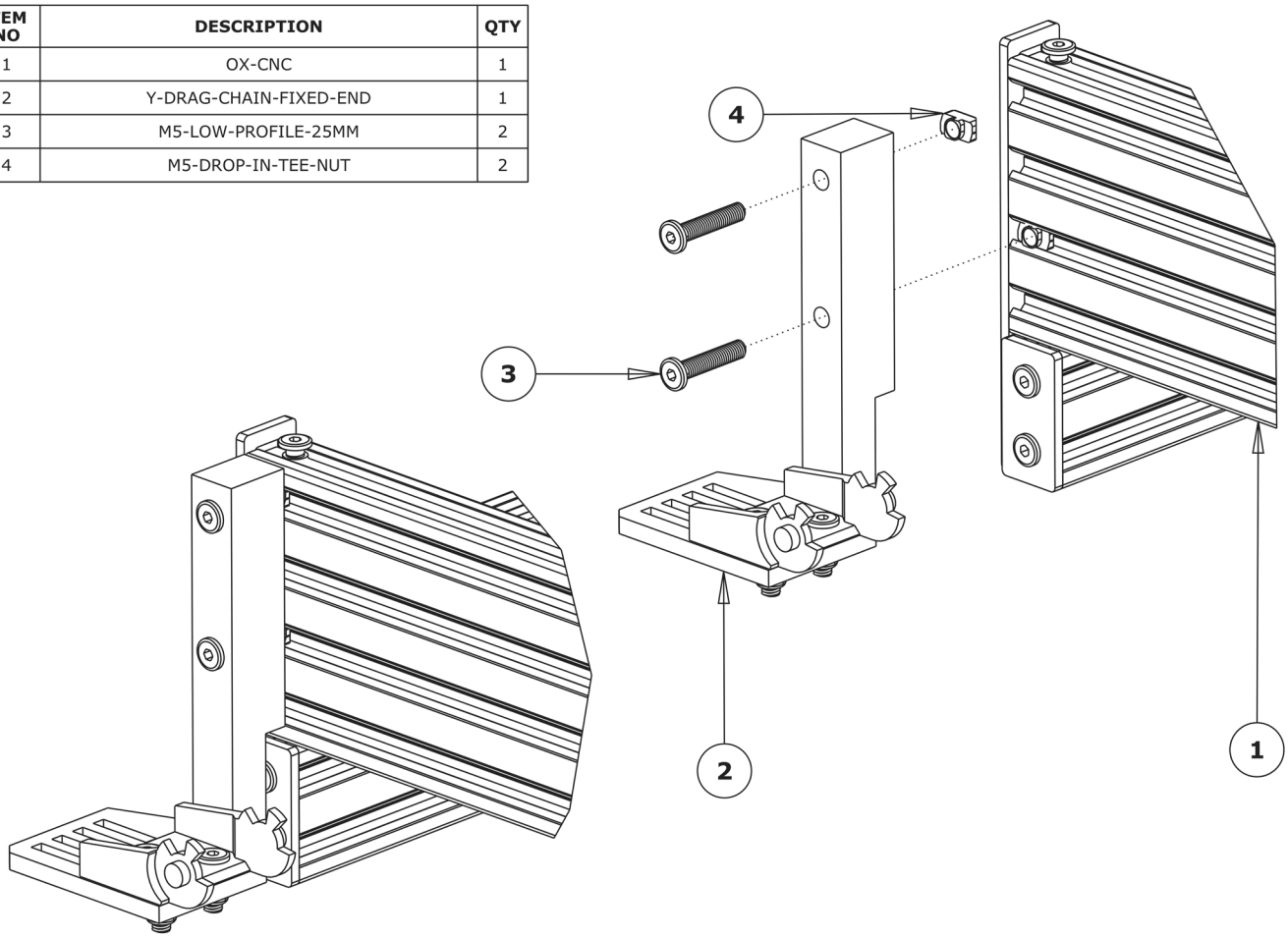




A. Attach a Drag-Chain-Fixed-End to the Y-Drag-Chain-Fixed-End-Mount in the orientation shown above, using 3 x M5-Low-Profile-15mm bolts and 3 x M5-Nyloc-Nut's.

2.1.2 Y-Axis Fixed End Mounting

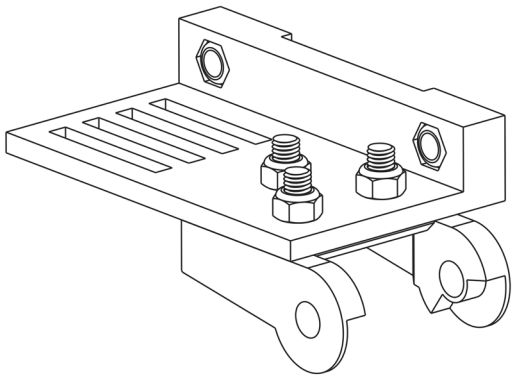
ITEM NO	DESCRIPTION	QTY
1	OX-CNC	1
2	Y-DRAG-CHAIN-FIXED-END	1
3	M5-LOW-PROFILE-25MM	2
4	M5-DROP-IN-TEE-NUT	2

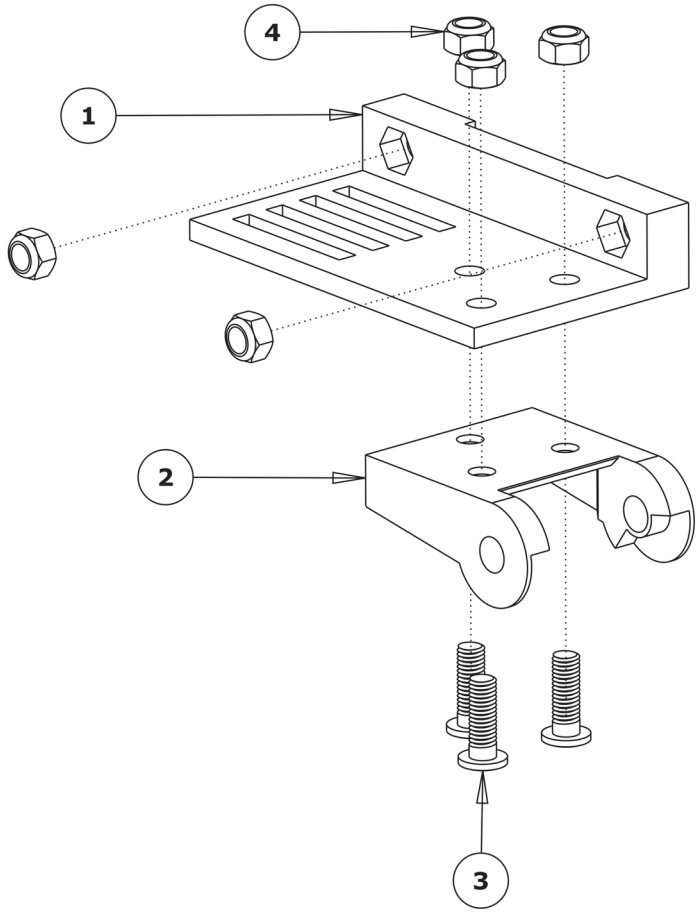


A. Position the Y-Drag-Chain-Fixed-End to the back left corner of the OX-CNC. It should be flush with the end of the V-Slot-2080-750mm. Secure it using 2 x M5-Low-Profile-25mm bolts and 2 x M5-Drop-In-Tee-Nuts.

2.1.3 Y-Axis Moving End Assembly

ITEM NO	DESCRIPTION	QTY
1	Y-DRAG-CHAIN-MOVING-END-MOUNT	1
2	DRAG-CHAIN-MOVING-END	1
3	M5-LOW-PROFILE-15MM	3
4	M5-NYLOC-NUT	5



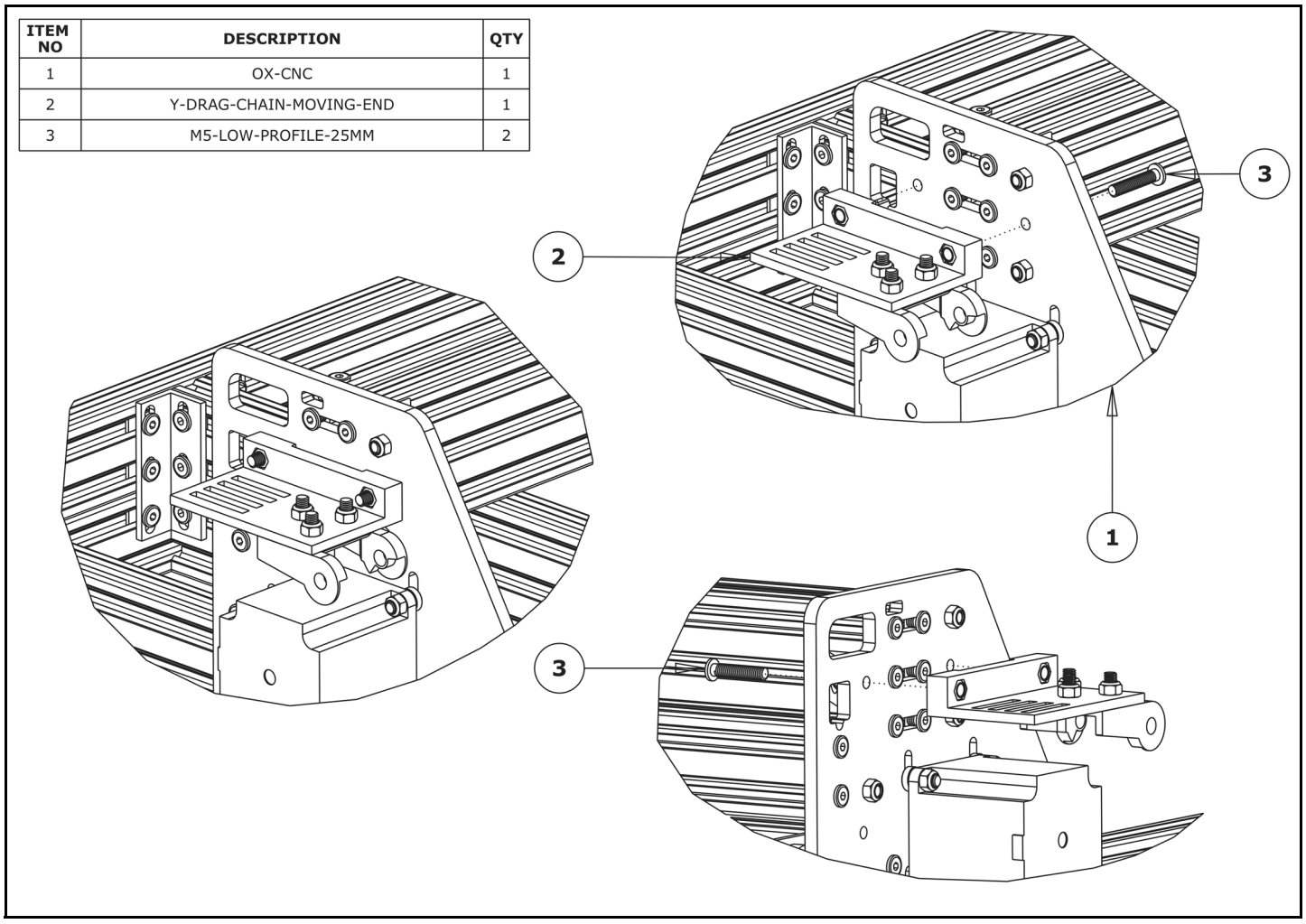


A. Insert 2 x M5-Nyloc-Nuts into the insets on the Y-Drag-Chain-Moving-End-Mount. They are a snug fit, so may require a light tap with a hammer.

B. Attach a Drag-Chain-Moving-End to the Y-Drag-Chain-Moving-End-Mount in the orientation shown above using 3 x M5-Low-Profile-15mm bolts and 3 x M5-Nyloc-Nuts.

2.1.4 Y-Axis Moving End Mounting

ITEM NO	DESCRIPTION	QTY
1	OX-CNC	1
2	Y-DRAG-CHAIN-MOVING-END	1
3	M5-LOW-PROFILE-25MM	2

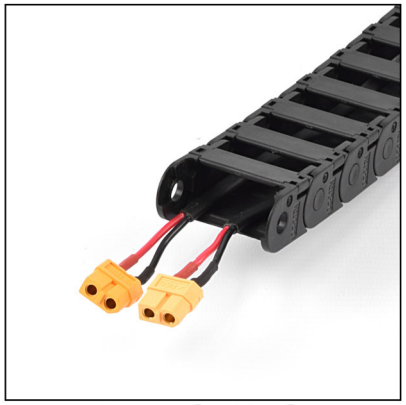


A. To mount the Y-Drag-Chain-Moving-End, some hardware parts from the mechanical assembly need removing. On each side of the 2 x V-Slot-2060-500mm remove the M5-Low-Profile-15mm bolt and M5-Nyloc-Nut from the middle slot Angle-Corner that connects them to the left Y-Plate.

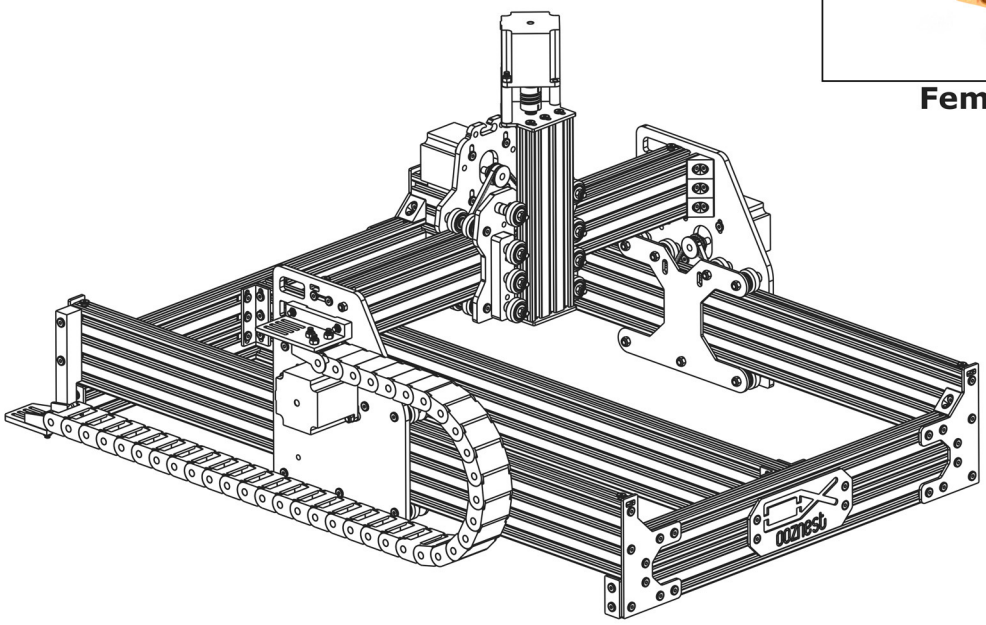
B. Through the same holes on the 2 x Angle-Corners secure the Y-Drag-Chain-Moving-End using 2 x M5-Low-Profile-25mm bolts and the 2 x M5-Nyloc-Nuts already inserted into Y-Drag-Chain-Moving-End.

2.1.5 Y-Drag-Chain

ITEM NO	DESCRIPTION	QTY
1	OX-CNC	1
2	Y-DRAG-CHAIN	1
3	PSU-OUTPUT-POWER-CABLE	2



Female End



A. Lay the Y-Drag-Chain flat on a table. Feed one of the PSU-Output-Power-Cables through the whole length of the Y-Drag-Chain. Ensure that the end with the XT60-Connector, is located at the female end of the Y-Drag-Chain (as shown above in the 'Female End' image). Repeat for a second PSU-Output-Cable. If the PSU-Output-Power-Cable gets snagged inside the Y-Drag-Chain, the tabs on the Y-Drag-Chain flip open for access.

B. Lay the Y-Drag-Chain flat along the left side of the OX-CNC. The female end of the Y-Drag-Chain should be at the back of the machine, and the male end at the front.

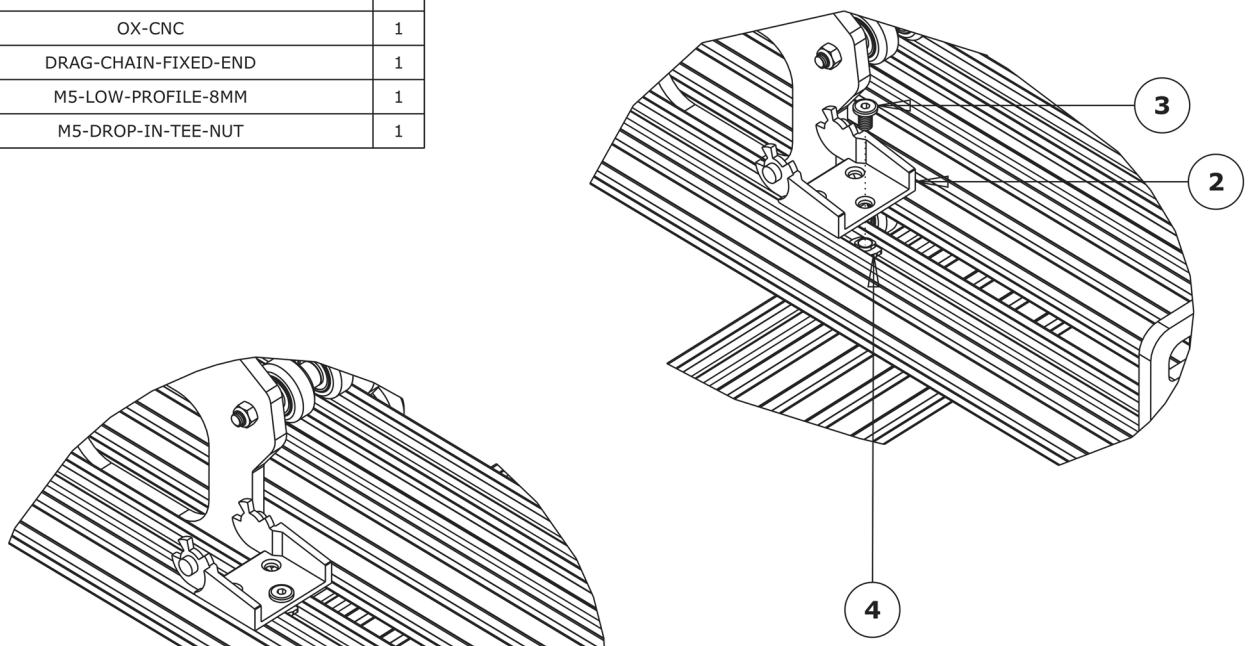
C. Attach the female end of the Y-Drag-Chain to the Drag-Chain-Fixed-End on the Y-Drag-Chain-Fixed-End. It will take some force to click it into the Drag-Chain-Fixed-End.

D. Bring the male end of the Y-Drag-Chain to the Y-Drag-Chain-Moving-End and attach it to the Drag-Chain-Moving-End. It will take some force to click it into the Drag-Chain-Moving-End.

2.2 X-Axis

2.2.1 X-Axis Fixed End Mounting

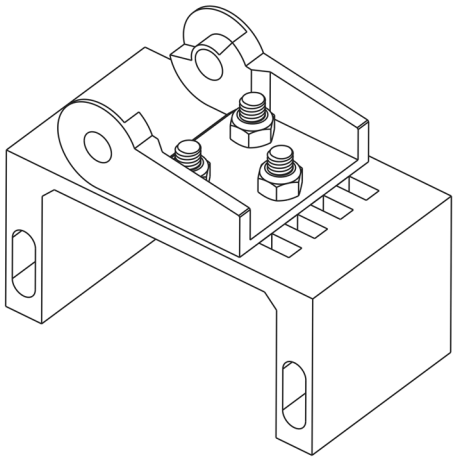
ITEM NO	DESCRIPTION	QTY
1	OX-CNC	1
2	DRAG-CHAIN-FIXED-END	1
3	M5-LOW-PROFILE-8MM	1
4	M5-DROP-IN-TEE-NUT	1

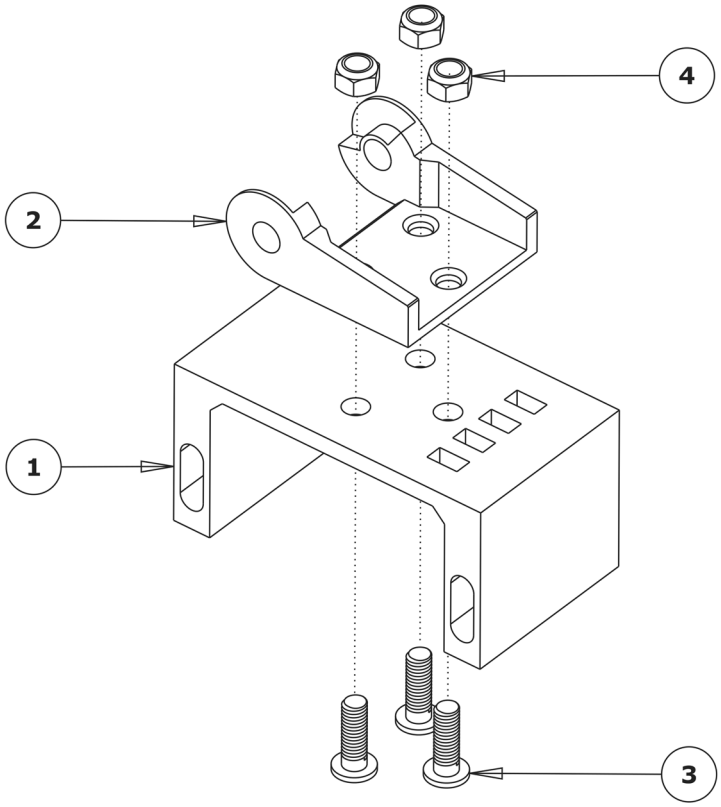


A. Attach a Drag-Chain-Fixed-End to the V-Slot-2040-500mm using an M5-Low-Profile-8mm and an M5-Drop-In-Tee-Nut. Ensure it is orientated as above; it should be located 150mm from right hand end of the V-Slot-2040-500mm if looking from the back. Ensure that it is parallel with the V-Slot-2040-500mm.

2.2.2 X-Axis Moving End Assembly

ITEM NO	DESCRIPTION	QTY
1	X-DRAG-CHAIN-MOVING-END-MOUNT	1
2	DRAG-CHAIN-MOVING-END	1
3	M5-LOW-PROFILE-15MM	3
4	M5-NYLOC-NUT	3

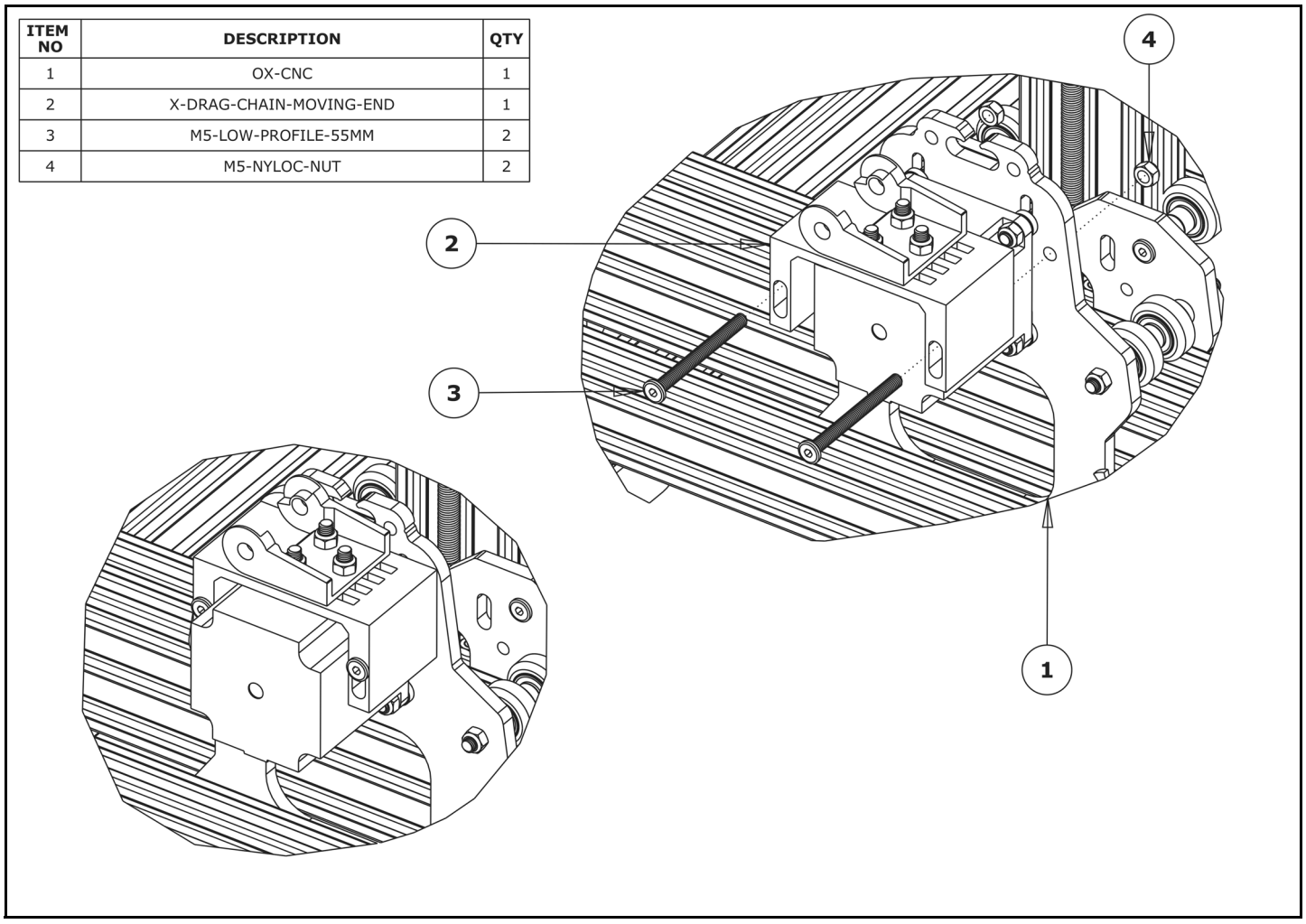




A. Attach a Drag-Chain-Moving-End to the X-Drag-Chain-Moving-End-Mount in the orientation shown above using 3 x M5-Low-Profile-15mm bolts and 3 x M5-Nyloc-Nut's.

2.2.3 X-Axis Moving End Mounting

ITEM NO	DESCRIPTION	QTY
1	OX-CNC	1
2	X-DRAG-CHAIN-MOVING-END	1
3	M5-LOW-PROFILE-55MM	2
4	M5-NYLOC-NUT	2

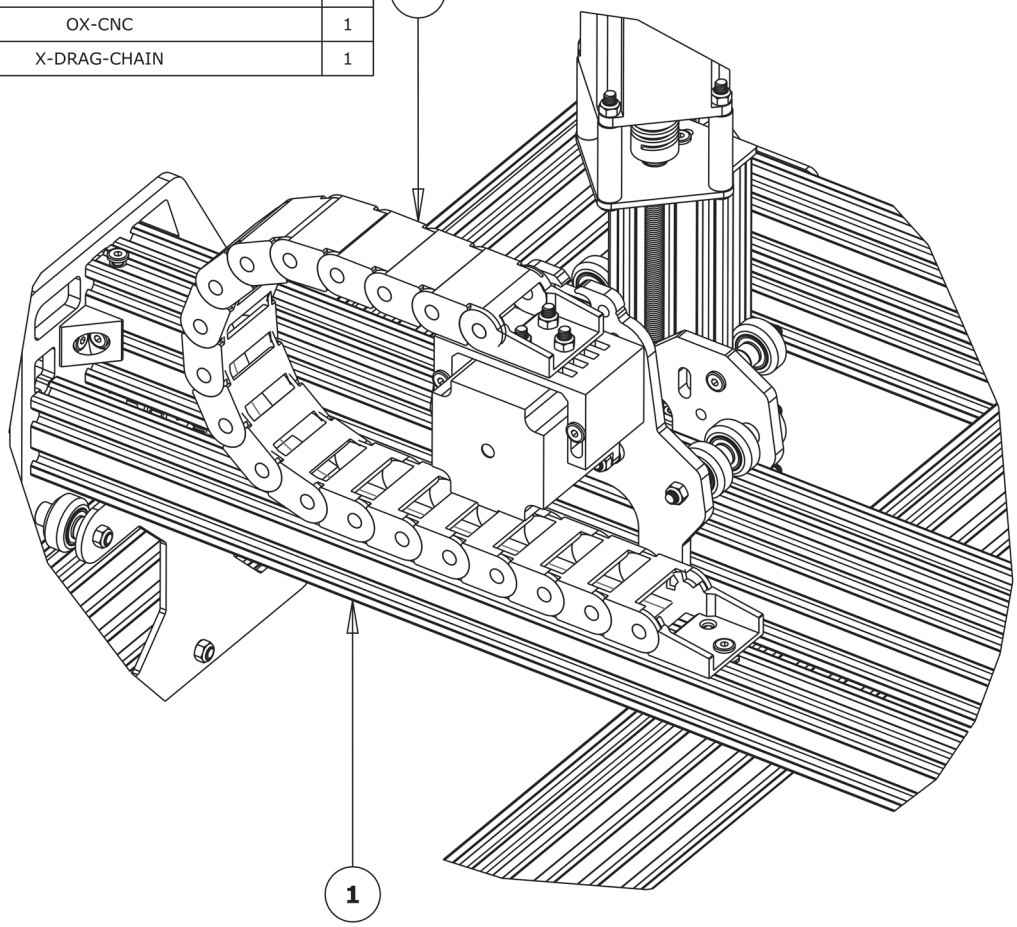


A. Place the X-Drag-Chain-Moving-End over the X-Axis NEMA23-Stepper-Motor in the orientation shown above.

B. Secure the X-Drag-Chain-Moving-End using 2 x M5-Low-Profile-55mm bolts and 2 x M5-Nyloc-Nuts. Make sure the X-Drag-Chain-Moving-End is down towards the NEMA23-Stepper-Motor as far as possible.

2.2.4 X-Drag-Chain

ITEM NO	DESCRIPTION	QTY
1	OX-CNC	1
2	X-DRAG-CHAIN	1



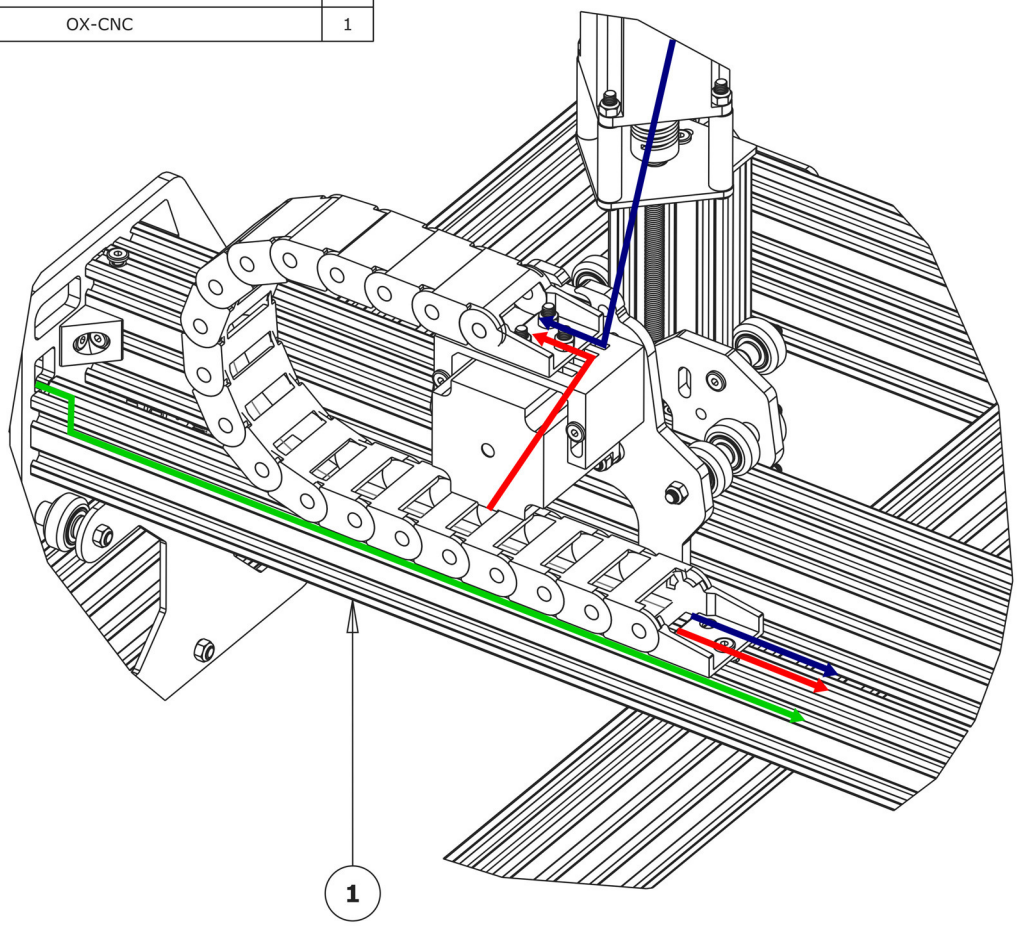
A. Attach the female end of the X-Drag-Chain to the Drag-Chain-Fixed-End on the V-Slot-2040-500mm. It will take some force to click it into the Drag-Chain-Fixed-End.

B. Bring the male end of the X-Drag-Chain up to the X-Drag-Chain-Moving-End and attach it to the Drag-Chain-Moving-End. It will take some force to click it into the Drag-Chain-Moving-End.

2.3 Wire Routing

2.3.1 3 Motor Wires

ITEM NO	DESCRIPTION	QTY
1	OX-CNC	1



A. Bring the X-Axis motor wire (Red) up to the X-Drag-Chain-Moving-End. Bring the Z-Axis motor wire (Blue) down to the X-Drag-Chain-Moving-End. Feed these two wires through the X-Drag-Chain so they come out at the Drag-Chain-Fixed-End on the V-Slot-2040-500mm.

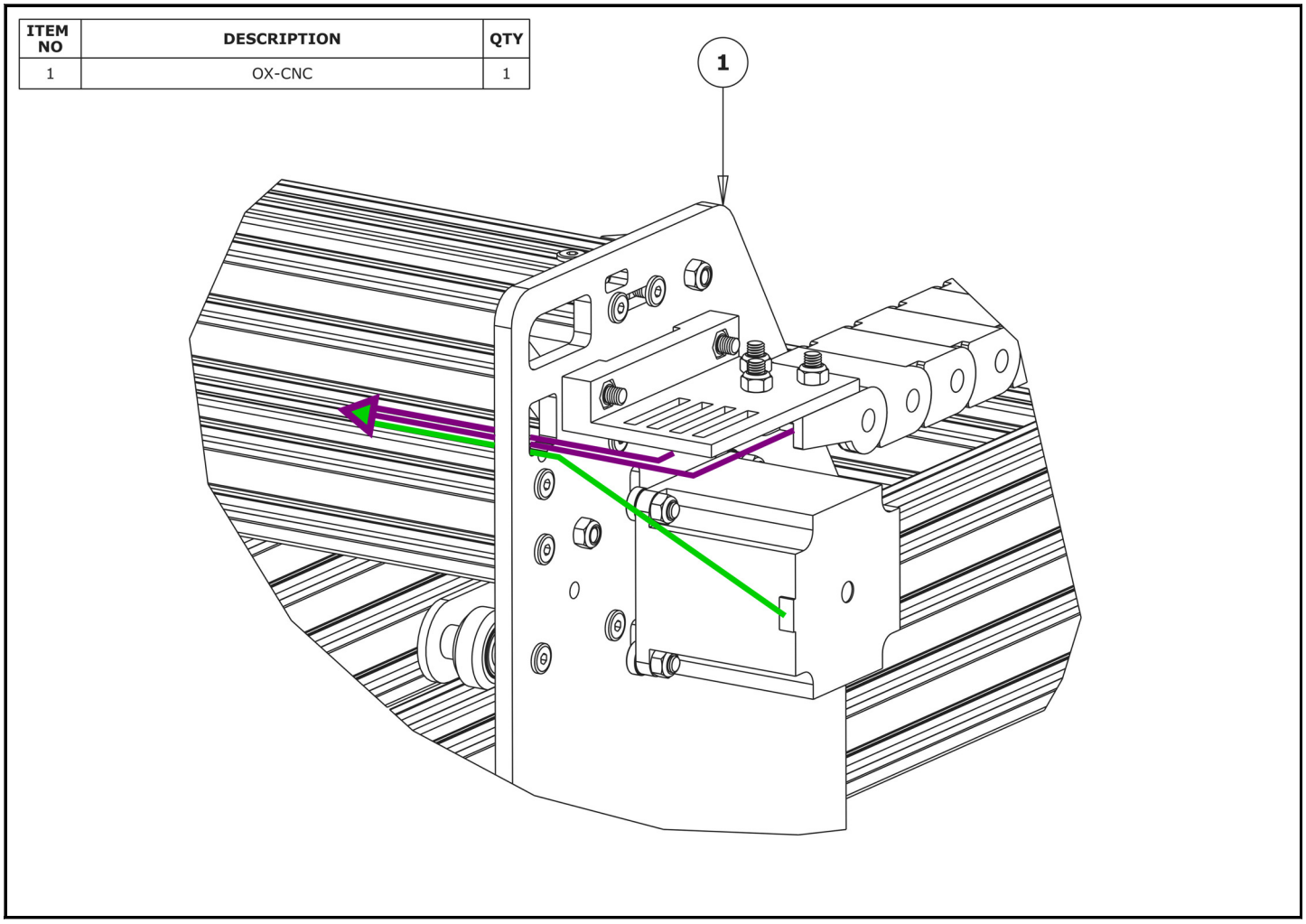
B. Using Cable-Tie-Smalls, secure the X-Axis motor wire and Z-Axis motor wire to the slotted holes on the X-Drag-Chain-Moving-End-Mount. Make sure there is enough slack on the Z-Axis motor wire for the full up and down motion.

C. As looking from the orientation above, bring the left Y-Axis motor wire (Green) through the hole on the Y-Plate just above the V-Slot-2040-500mm. Then, bring it along the top slot on backside of the V-Slot-2040-500mm towards the Drag-Chain-Fixed-End.

D. Using a Cable-Tie-Large, go around the V-Slot-2040-500mm and secure the left Y-Axis motor wire to the V-Slot-2040-500mm as close as possible to the Y-Plate.

2.3.2 1 Motor Wire & PSU-Output-Power-Cables

ITEM NO	DESCRIPTION	QTY
1	OX-CNC	1



A. As looking from the orientation above, bring the right Y-Axis motor wire (Green) up through the hole on the Y-Plate just above the V-Slot-2040-500mm.

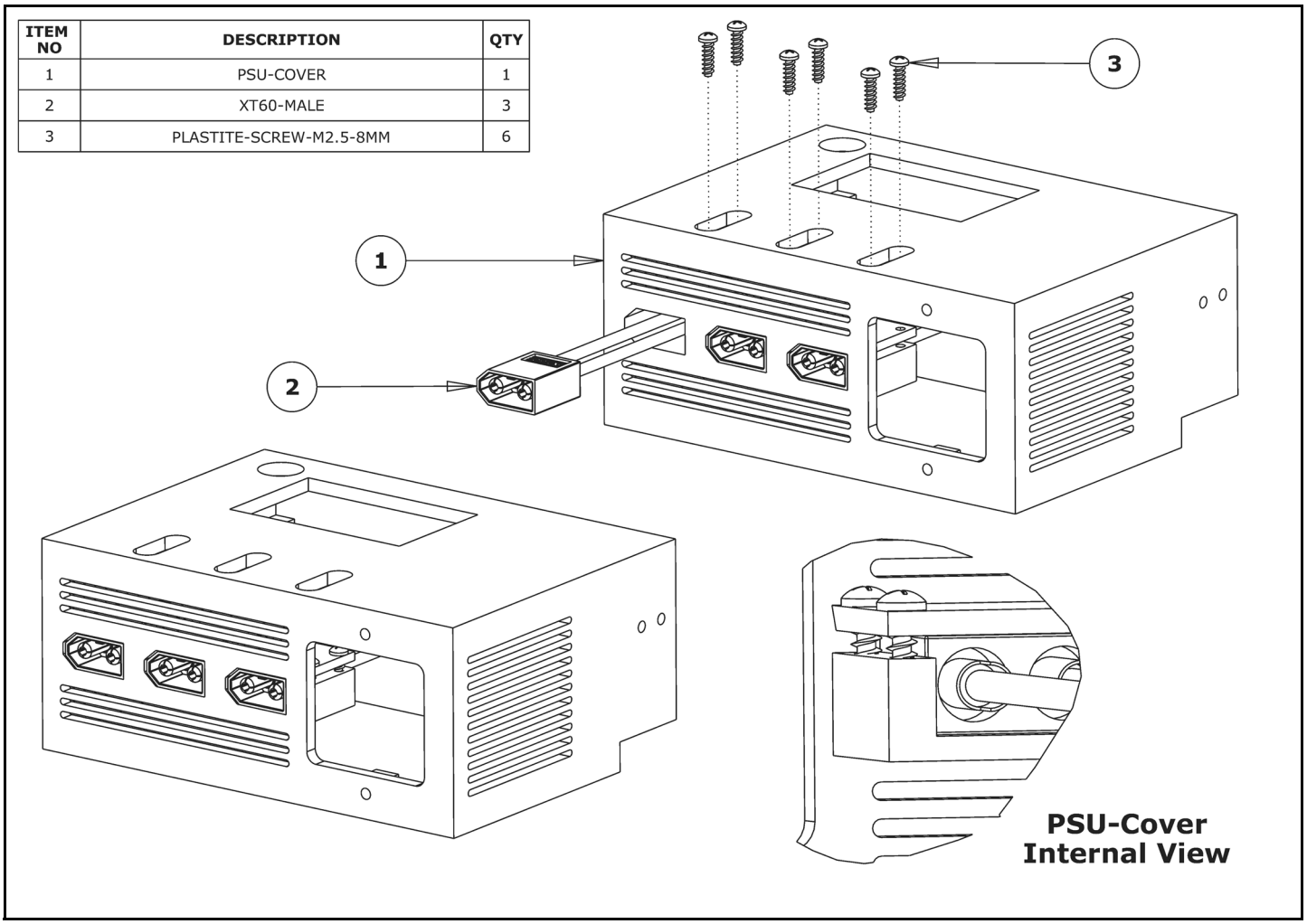
B. Locate the PSU-Output-Power-Cables (Purple) that were already inserted into the Y-Drag-Chain in Step 2.1.5. Bring them along the Y-Drag-Chain-Moving-End-Mount and then through the same hole on the Y-Plate as the motor wire in Step A. The wires in this Step and in Step A will be secured in position at a later date once the wires are connected to the CNC-xPro.

3.0 Power Supply Assembly

3.1 Output

3.1.1 Securing XT60-Male Outputs

ITEM NO	DESCRIPTION	QTY
1	PSU-COVER	1
2	XT60-MALE	3
3	PLASTITE-SCREW-M2.5-8MM	6

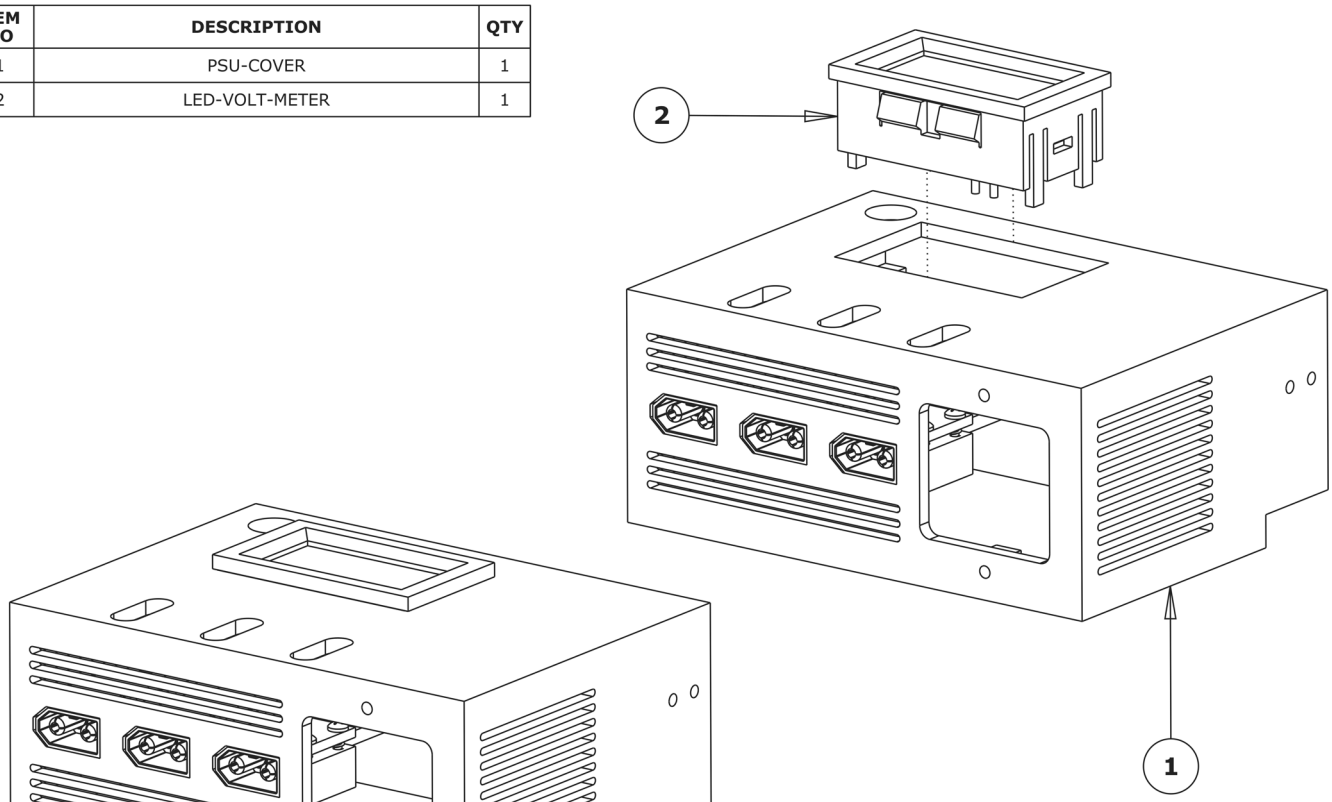


A. Insert the XT60-Male connectors into the provided insets on the PSU-Cover. They should sit flush with the front of the PSU-Cover. Completion of this kit only requires 2 x XT60-Male connectors. The left-most XT60-Male connector is not needed for the operation of this machine, but is included so you have the option to add additional accessories. For safety reasons, if you do not intend to use it, do not attach it to the PSU-Cover, and leave that inset empty.

B. Secure each XT-Male connector using 2 x Plastite-Screw-M2.5-8mm through the holes provided on the securing tab as seen on the internal view. When initially placing the screw, it is helpful to hold each screw in place using tweezers or long nose pliers.

3.1.2 Inserting LED-Volt-Meter

ITEM NO	DESCRIPTION	QTY
1	PSU-COVER	1
2	LED-VOLT-METER	1

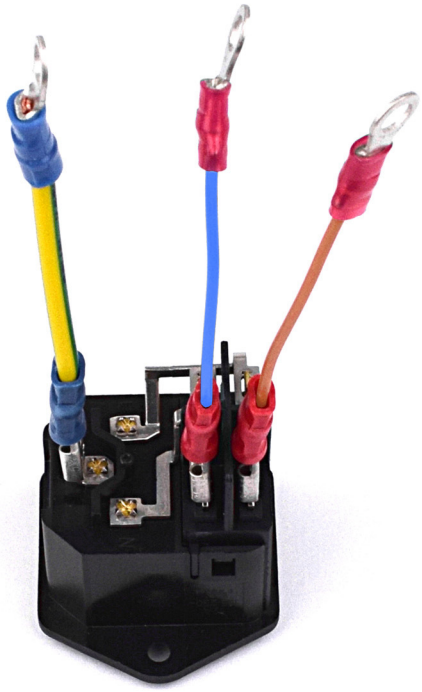


A. Gently push the LED-Volt-Meter into the provided gap on the top of the PSU Cover. The wires on the LED-Volt-Meter should be oriented to the front of the PSU-Cover.

3.2 Input

3.2.1 IEC-Inlet Wires

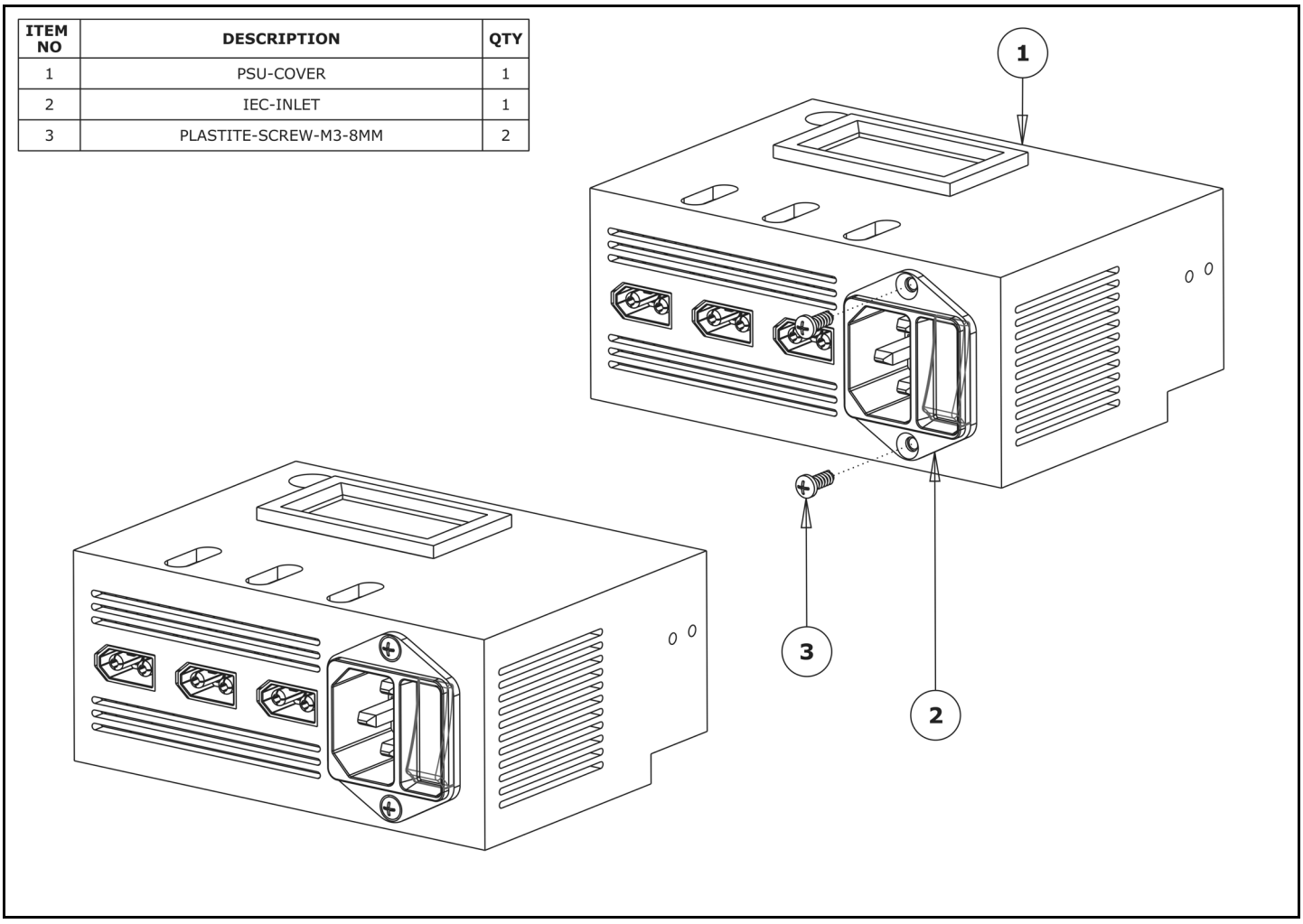
ITEM NO	DESCRIPTION	QTY
1	IEC-INLET	1
2	IEC-INLET-LIVE-WIRE	1
3	IEC-INLET-NEUTRAL-WIRE	1
4	IEC-INLET-EARTH-WIRE	1



A. Attach the receptacle end of the IEC-Inlet-Live-Wire, IEC-Inlet-Neutral-Wire & IEC-Inlet-Earth-Wire to their respective terminal tabs on the IEC-Inlet, as seen in the above image.

3.2.2 Attaching IEC-Inlet

ITEM NO	DESCRIPTION	QTY
1	PSU-COVER	1
2	IEC-INLET	1
3	PLASTITE-SCREW-M3-8MM	2

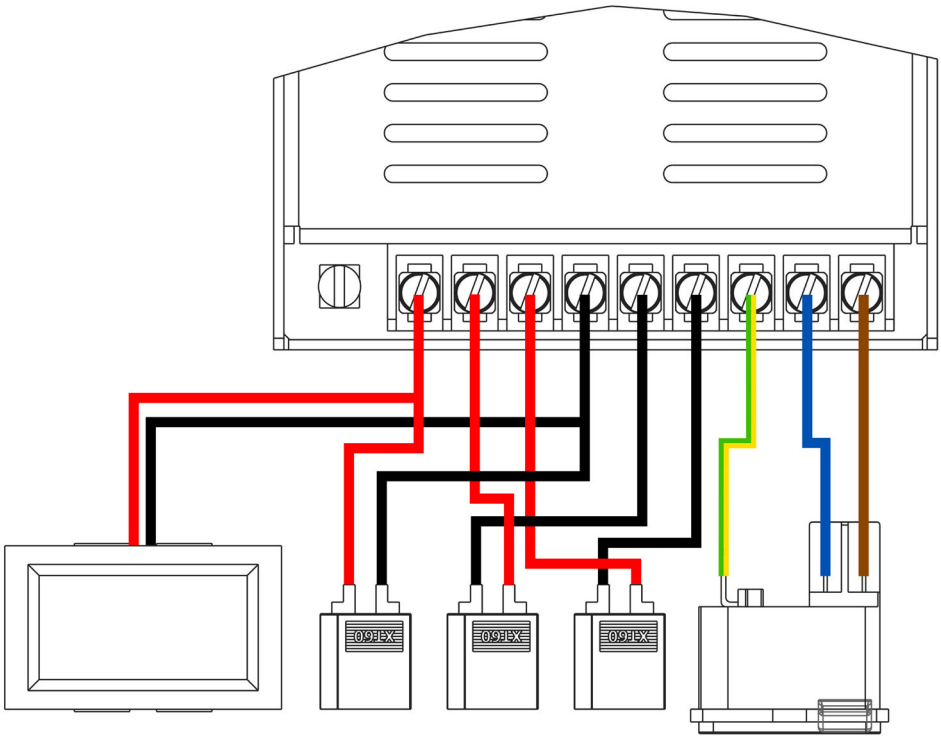


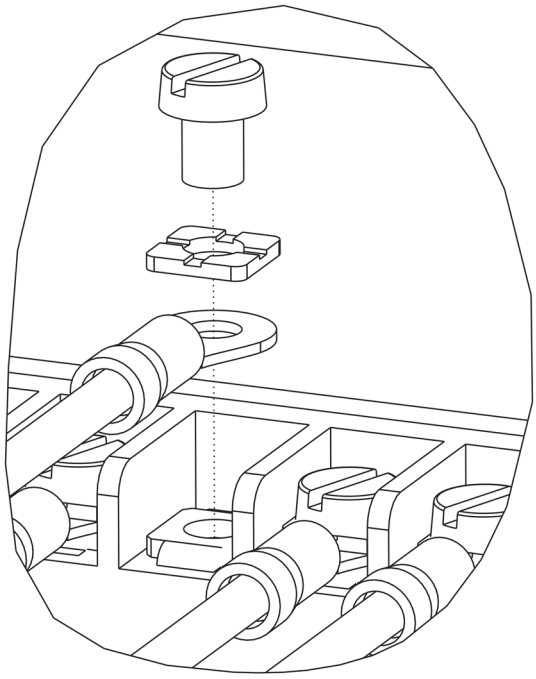
A. Secure the assembled IEC-Inlet to the PSU-Cover using 2 x Plastite-Screw-M3-8mm. Ensure the switch is on the right hand side.

3.3 Connecting PSU-Cover

3.3.1 Connecting Wires

ITEM NO	DESCRIPTION	QTY
1	24V-360W-POWER-SUPPLY	1
2	PSU-COVER	1





Ring Terminal Attachment

A. Bring the front of the 24V-360W-Power-Supply and PSU Cover close together.

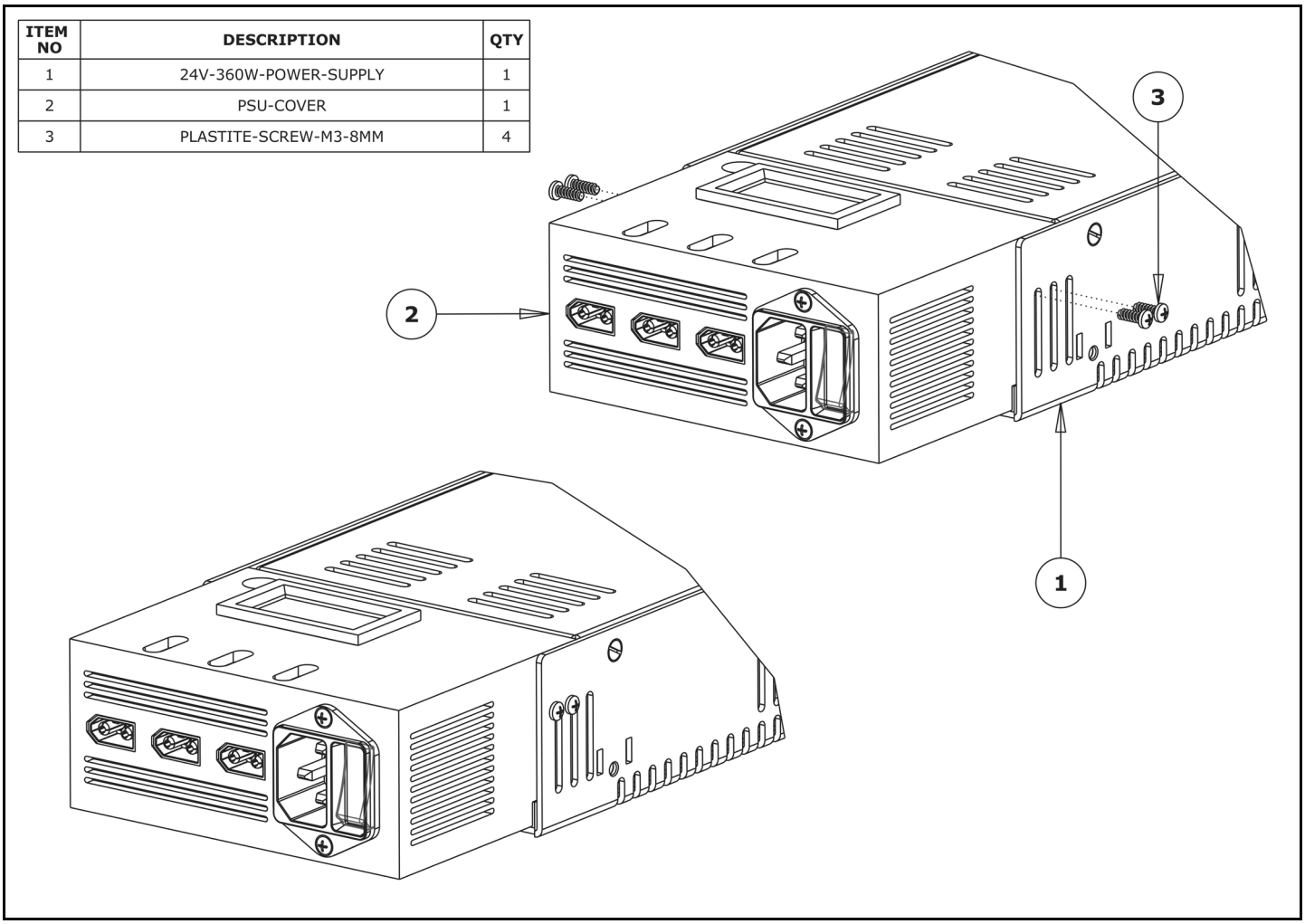
B. Following the wiring diagram, first connect both wires of the right and center XT60-Male connectors to the 24V-360W-Power-Supply. As seen on the ring terminal attachment view, the terminal screws on the 24V-360W-Power-Supply should first go through the terminal plate, then through the ring terminal on the wires, and then into the threaded hole on the 24V-360W-Power-Supply.

C. If you did not attach the left-most XT60-Male connector to the PSU-Cover, then only connect the LED-Volt-Meter to the last empty output terminals. If you intend to use a third XT60-Male connector, then it must also be connected with the LED-Volt-Meter to the same terminal points on the 24V-360W-Power-Supply. This simply involves screwing through two ring terminals (instead of one) and ensuring they are of the same polarity. The top ring terminal will have to be folded up in order to clear the plastic sleeve on the lower one.

D. Finally, connect the three IEC-Inlet wires to the 24V-360W-Power-Supply. The IEC-Inlet-Earth-Wire is very inflexible compared to the previous ones, so this wire may take some force to get into position.

3.3.2 Attaching PSU-Cover

ITEM NO	DESCRIPTION	QTY
1	24V-360W-POWER-SUPPLY	1
2	PSU-COVER	1
3	PLASTITE-SCREW-M3-8MM	4



A. Mate the PSU-Cover to the 24V-360W-Power-Supply. This may be very fiddly to initially get into position, so do take an extra bit of time to do so.

B. On each side, secure the PSU-Cover using two Plastite-Screw-M3-8mms. Go through the slots on the metal casing of the 24V-360W-Power-Supply, and then into the holes on the PSU-Cover.

3.3.3 Testing

ITEM NO	DESCRIPTION	QTY
1	24V-360W-POWER-SUPPLY	1
2	MAINS-CABLE	1

A. Insert the end of the Mains-Cable into the IEC-Inlet on the 24V-360W-Power-Supply.

B. Plug the Mains-Cable into a wall socket and switch it on. If the LED-Volt-Meter comes on, this indicates the 24V-360W-Power-Supply has power. If it doesn't come on, this is most likely because the switch on the IEC-Inlet is turned off; turn this on.

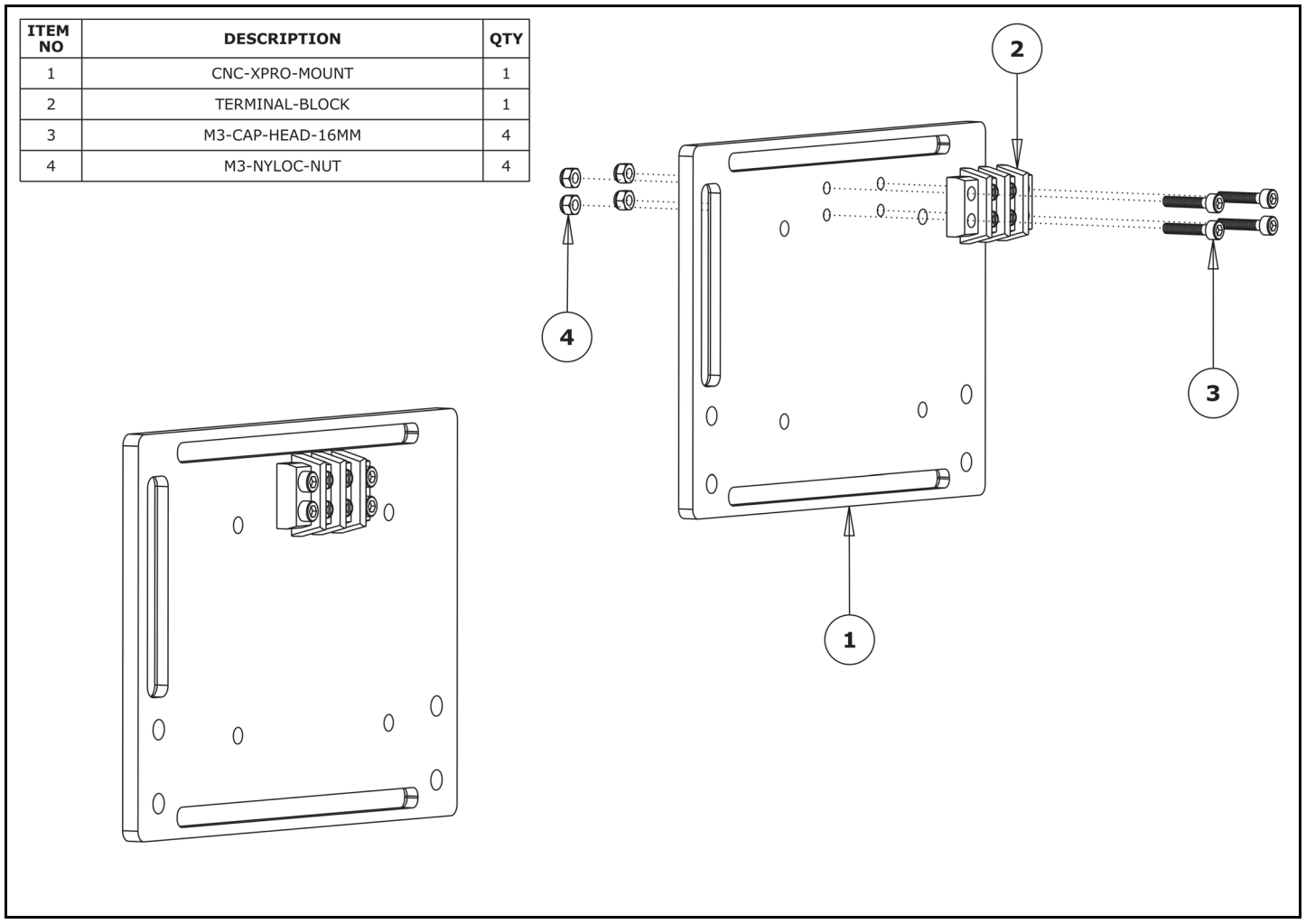
C. Once switched on, the LED-Volt-Meter should read 24.0. If it does not read 24.0, the screw through the hole towards the top left of the LCD can be used to adjust the voltage. Use a screwdriver to adjust the voltage to 24.0, and take caution to not touch any metal parts with the screwdriver.

D. The Power Supply assembly is now complete and can be turned off and placed towards the back left of the machine near, the Y-Axis-Fixed-End.

4.0 CNC xPro Assembly

4.0.1 Terminal-Block Attachment

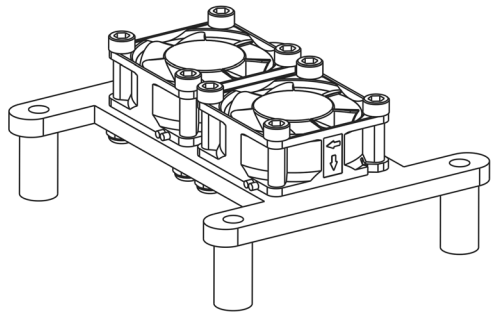
ITEM NO	DESCRIPTION	QTY
1	CNC-XPRO-MOUNT	1
2	TERMINAL-BLOCK	1
3	M3-CAP-HEAD-16MM	4
4	M3-NYLOC-NUT	4

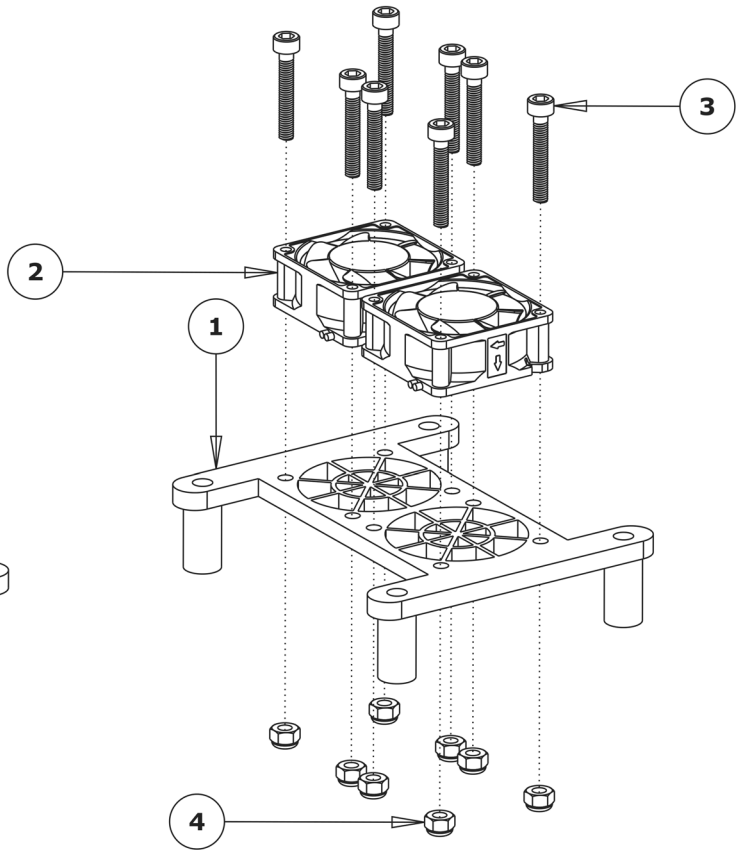


A. Attach the Terminal-Block to the CNC-xPro-Mount using 4 x M3-Cap-Head-16mm Bolts. Tighten the M3-Cap-Head-16mm Bolts to M3-Nyloc-Nuts on the other side of the CNC-xPro-Mount. Double check that the Terminal-Block is mounted to the correct side of the CNC-xPro-Mount.

4.0.2 Fan Mount Assembly

ITEM NO	DESCRIPTION	QTY
1	CNC-XPRO-FAN-MOUNT	1
2	30MM-24V-DC-FAN	2
3	M3-CAP-HEAD-20MM	8
4	M3-NYLOC-NUT	8

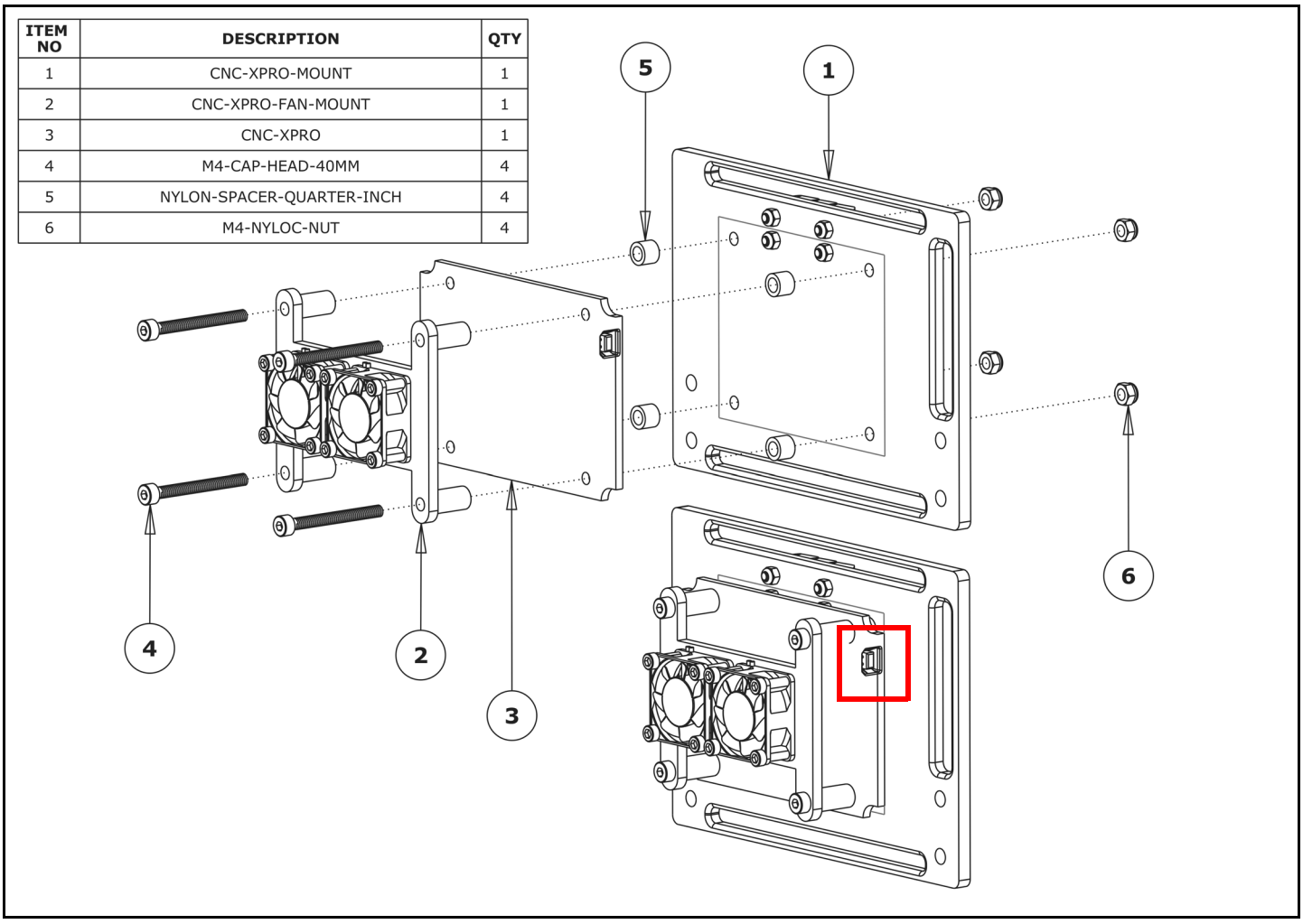




A. Attach 2 x 30mm-24V-DC-Fans to the CNC-xPro-Fan-Mount using 8 x M3-Cap-Head-20mm bolts and 8 x M3-Nyloc-Nuts. Ensure that the 30mm-24V-DC-Fans are blowing downward by ensuring that the side of the fan which the wires sit on is against the CNC-xPro-Fan-Mount. Make sure that the power wires on the 30mm-24V-DC-Fans are both on the same side of the CNC-xPro-Fan-Mount.

4.0.3 Attaching The CNC-xPro

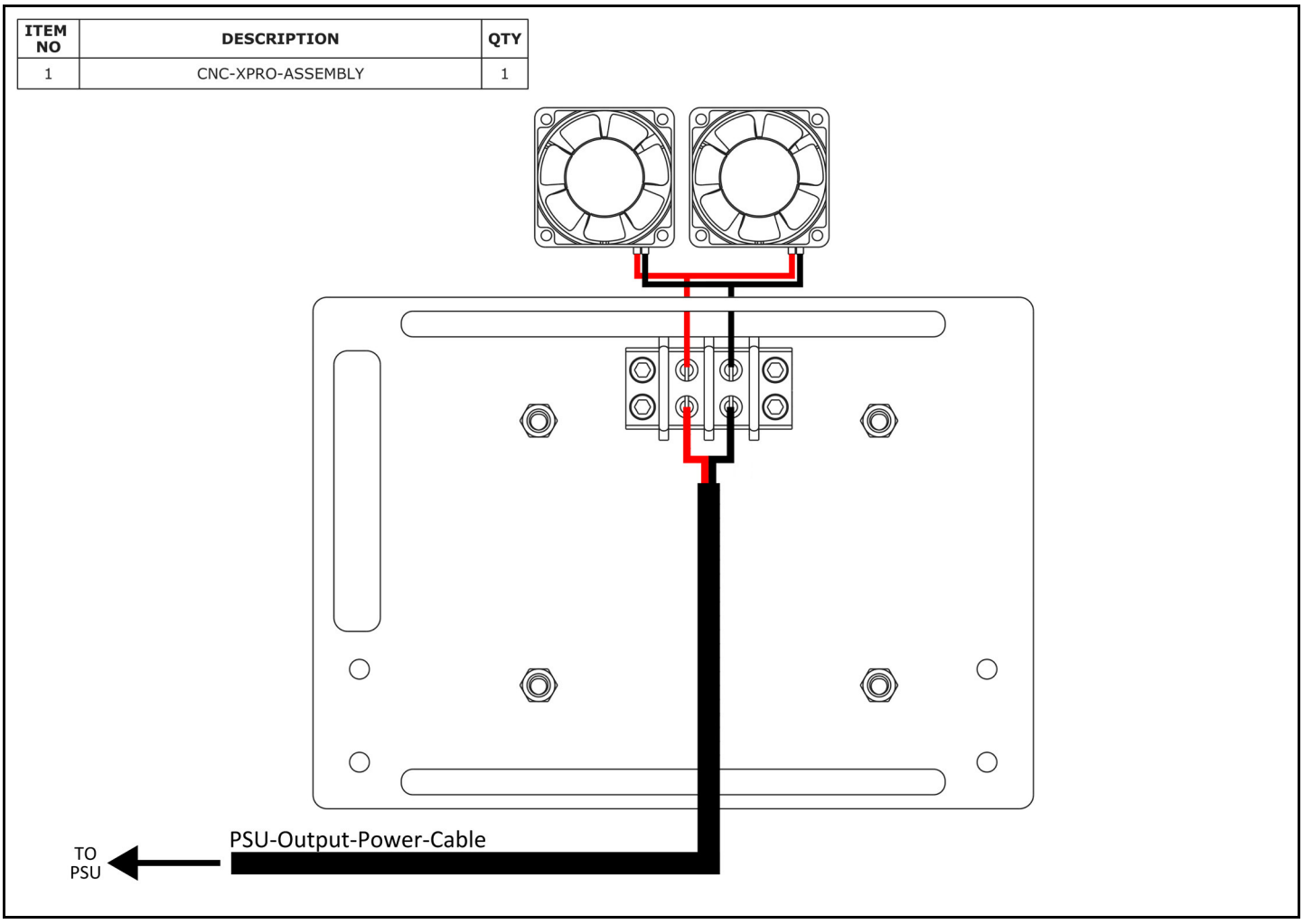
ITEM NO	DESCRIPTION	QTY
1	CNC-XPRO-MOUNT	1
2	CNC-XPRO-FAN-MOUNT	1
3	CNC-XPRO	1
4	M4-CAP-HEAD-40MM	4
5	NYLON-SPACER-QUARTER-INCH	4
6	M4-NYLOC-NUT	4



A. Insert 4 x M4-Cap-Head-40mm bolts through the previously assembled CNC-xPro-Fan-Mount, and then through the CNC-xPro and each through a Nylon-Spacer-Quarter-Inch. Finally, go through the CNC-xPro-Mount and tighten each bolt into a M4-Nyloc-Nut. The CNC-xPro-Fan-Mount should be orientated so the power wires are on the same side as the Terminal-Block. The CNC-xPro should be orientated so the USB terminal is in the same position as shown by the red square above.

4.0.4 Fans Wiring

ITEM NO	DESCRIPTION	QTY
1	CNC-XPRO-ASSEMBLY	1



A. Locate both red wires coming from the two 30mm-24V-DC-30mm-Fans, and strip approximately 20mm of sheaving. Twist the two exposed copper cores together to form one.

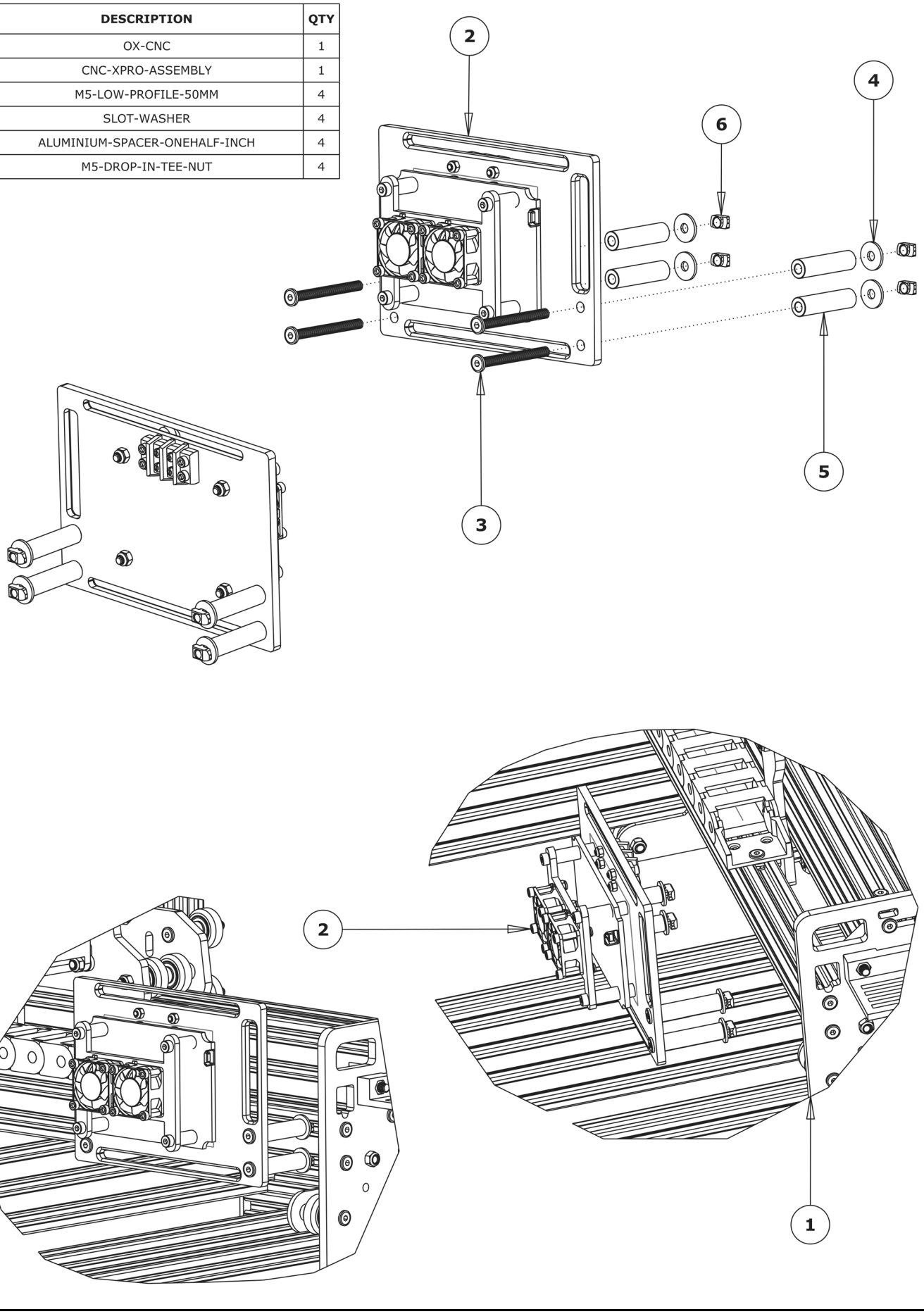
B. Connect the red wires from the 30mm-24V-DC-30mm-Fans to the Terminal-Block, as shown above. To connect a wire, unscrew the respective screw from the Terminal-Block. Bend the exposed copper core of the wire around the screw. Screw the screw back into the Terminal-Block.

C. Repeat Step A & B for the two black wires of the 30mm-24V-DC-30mm-Fans.

D. With one of the PSU-Output-Power-Cables that was put into position in Step 2.3.2, strip back approximately 50mm of the black sheaving from the bare end to expose the red and black wires underneath. Strip back approximately 20mm of the sheaving from the red and black wires to expose the copper core underneath. Connect these wires to the Terminal-Block as in Step B.

4.0.5 Mounting the CNC-xPro Assembly

ITEM NO	DESCRIPTION	QTY
1	OX-CNC	1
2	CNC-XPRO-ASSEMBLY	1
3	M5-LOW-PROFILE-50MM	4
4	SLOT-WASHER	4
5	ALUMINIUM-SPACER-ONEHALF-INCH	4
6	M5-DROP-IN-TEE-NUT	4



A. Insert 4 x M5-Low-Profile-50mm bolts through each mounting hole on the CNC-xPro-Mount.

B. On to each M5-Low-Profile-50mm bolt slide an Aluminium-Spacer-40mm and a Slot-Washer. The rounded face of the Slot-Washer should be flush against the Aluminium-Spacer-40mm.

C. On to the end of each M5-Low-Profile-50mm bolt, slightly thread a M5-Drop-In-Tee-Nut.

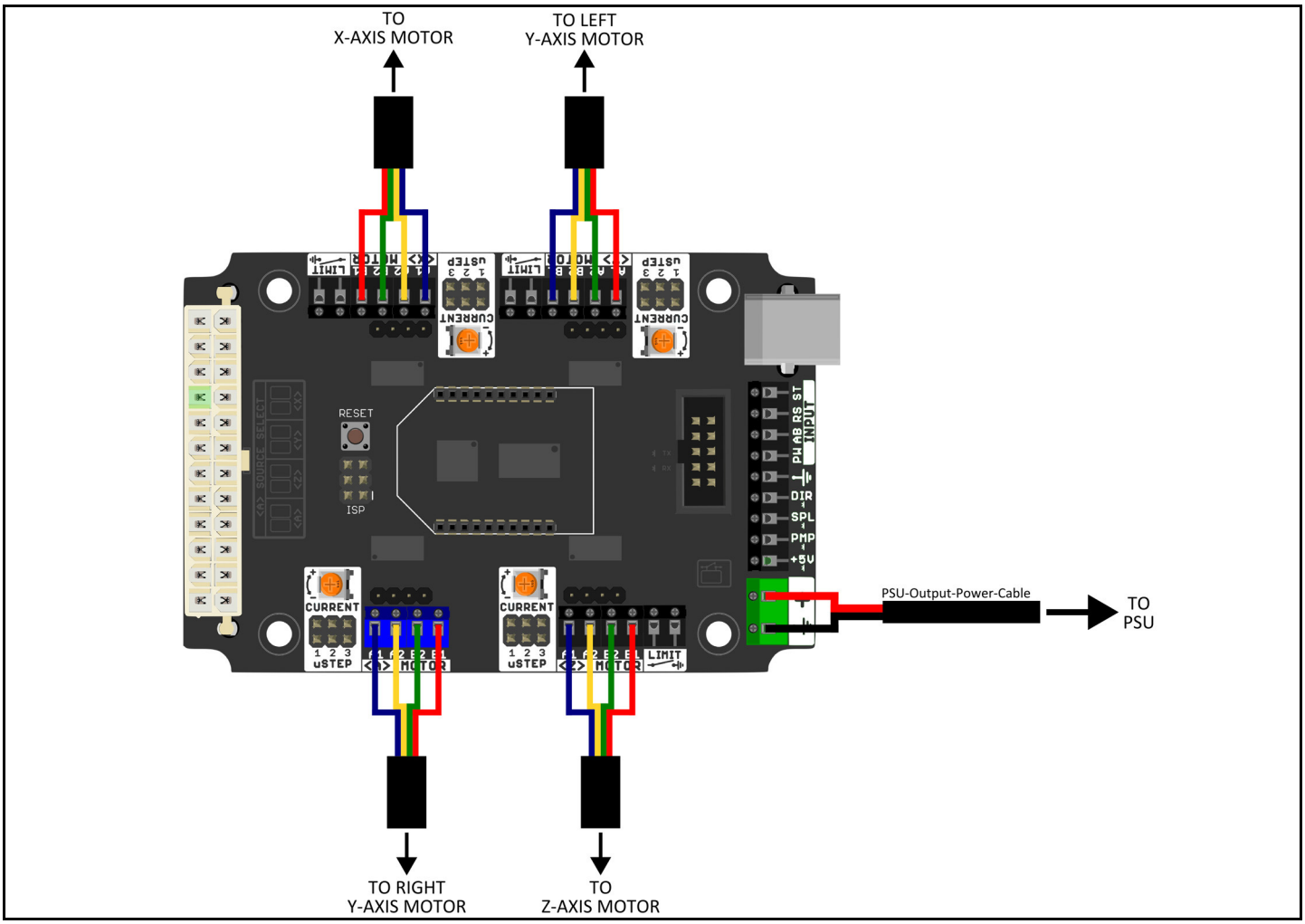
D. Bring the CNC-xPro-Assembly to the back of the OX-CNC X-Gantry, and align the M5-Low-Profile-50mm bolt assemblies from Step A/B/C with the backward facing top and bottom slots on the V-Slot-2040-500mm. Some of the wires positioned in Step 2.3.1 & 2.3.2 may have to be temporarily moved.

E. With the M5-Low-Profile-50mm bolt assemblies aligned, mate the CNC-xPro-Assembly with the V-Slot-2040-500mm slots. It should be roughly 10mm from the end of V-Slot-2040-500mm, as seen in the images above.

F. Screw each M5-Low-Profile-50mm bolt to engage the M5-Drop-In-Tee-Nut with the slot. Fully tighten each M5-Low-Profile-50mm bolt.

5.0 Wiring & Commissioning

5.1 CNC-xPro Wiring



A. Following the wiring diagram above, strip and connect the second PSU-Output-Power-Cable to the power input terminal on the CNC-xPro.

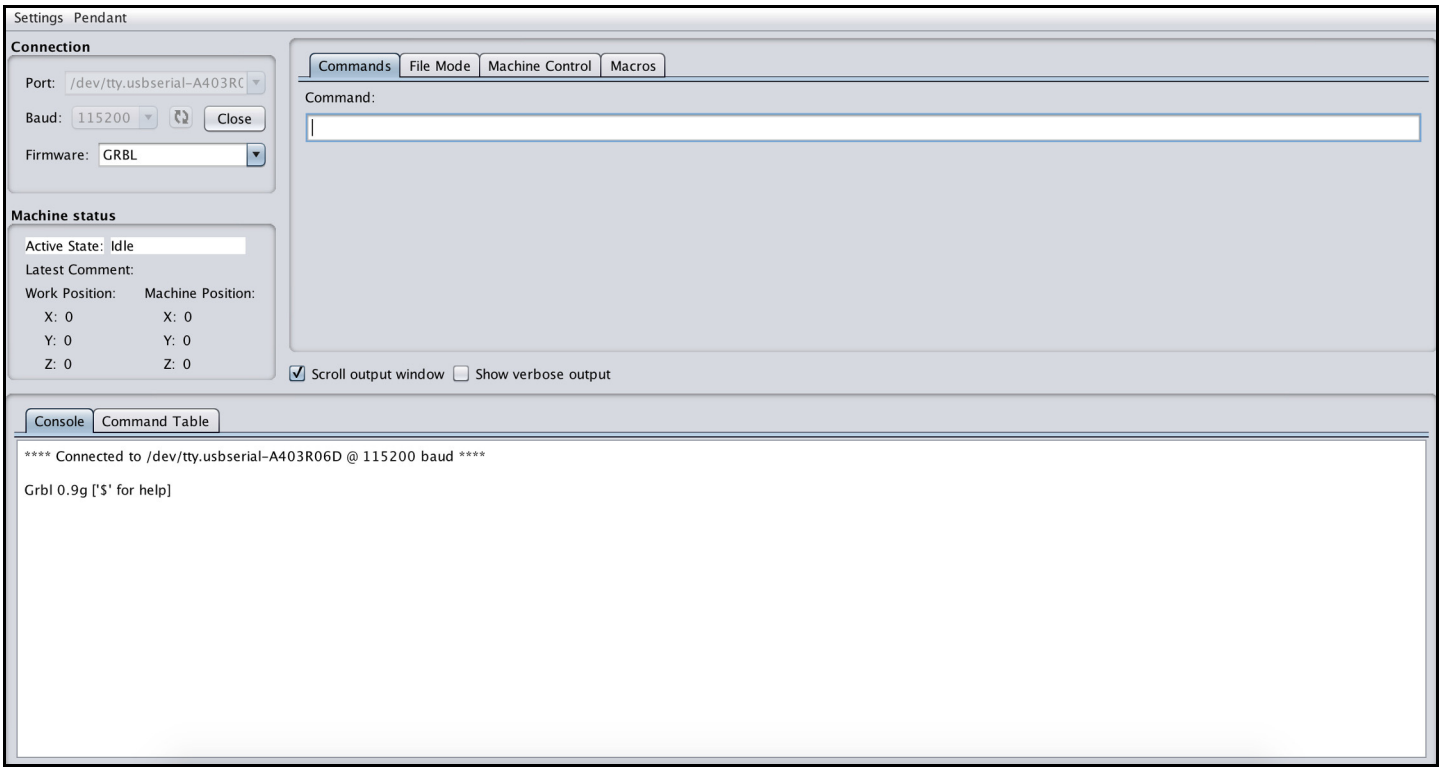
B. Connect the 4 x NEMA23-Stepper-Motors to the CNC-xPro as shown above. Take note of the order of the wire colours.

C. Plug both PSU-Output-Power-Cables into the XT60-Male Outputs on the assembled 24V-360W-Power-Supply. Do not tidy up the wiring just yet, as this is best left until the machine has been fully checked to ensure that it is operating correctly.

D. If interested, it is a good idea to read the CNC-xPro Wiki for more in-depth information: https://github.com/Spark-Concepts/xPRO/wiki

5.2 Software & Machine Settings

5.2.1 Installing Universal G-Code Sender (UGS)



A. Universal G-Code Sender (UGS) is a simple Java-based cross platform G-Code sender. Download the latest build from: https://github.com/winder/Universal-G-Code-Sender

B. Unzip the folder to a location of your choosing.

C. Run the file named 'UniversalGcodeSender.jar' and UGS should open and look similar to the above image.

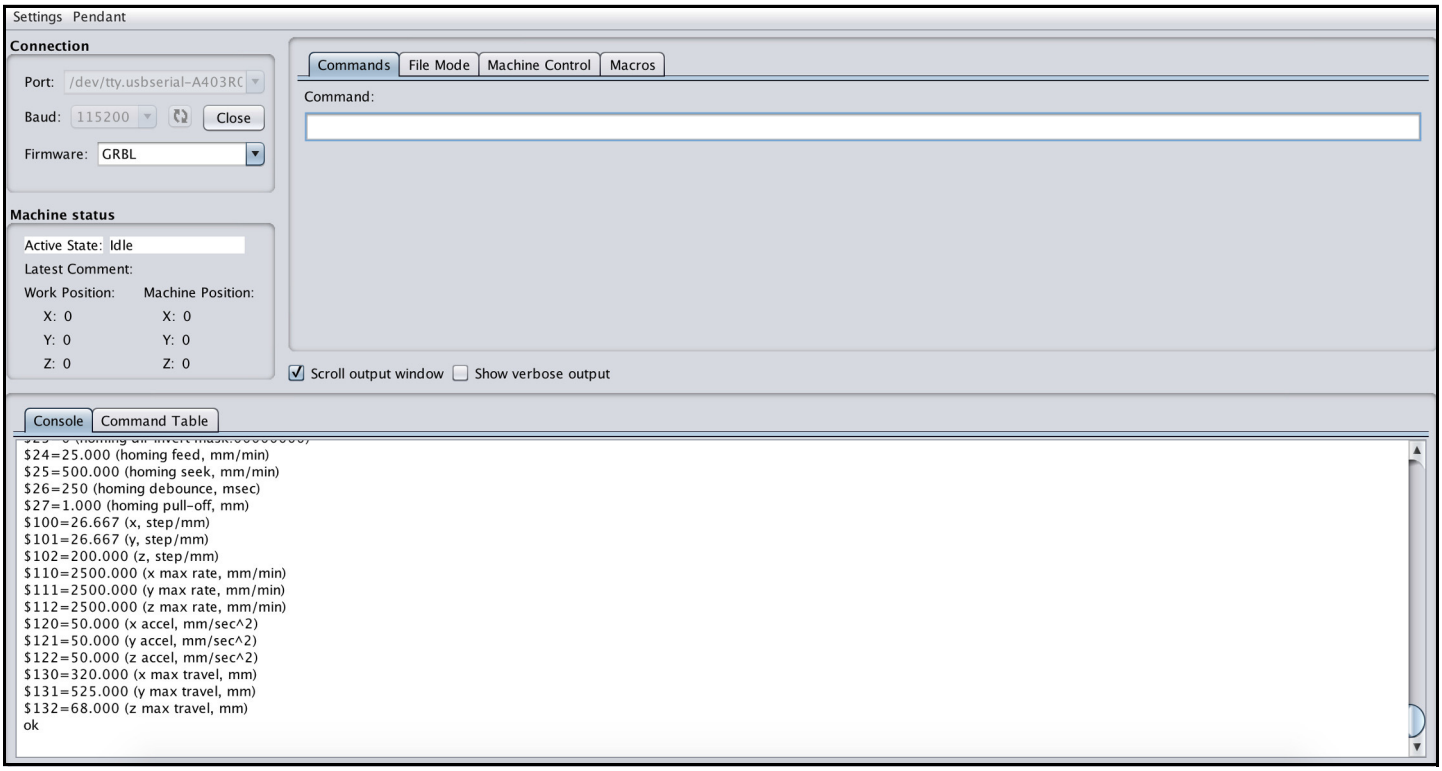
D. Download and install the appropriate drivers for the chip used on the CNC-xPro from: http://www.ftdichip.com/Drivers/VCP.htm. For Windows, under the comments section there is a link to an executable setup file.

E. Using the supplied USB-Cable, connect the CNC-xPro to your computer.

F. In UGS set the 'Baud' to '115200' and 'Firmware' to 'GRBL'. Press the refresh symbol.

G. On the 'Port' drop down list find the CNC-xPro, it should look similar to what is selected in the image above. Once found click 'Open' and UGS should successfully connect to the CNC-xPro. The Console output will show information similar to the above.

5.2.2 Configuring The Firmware



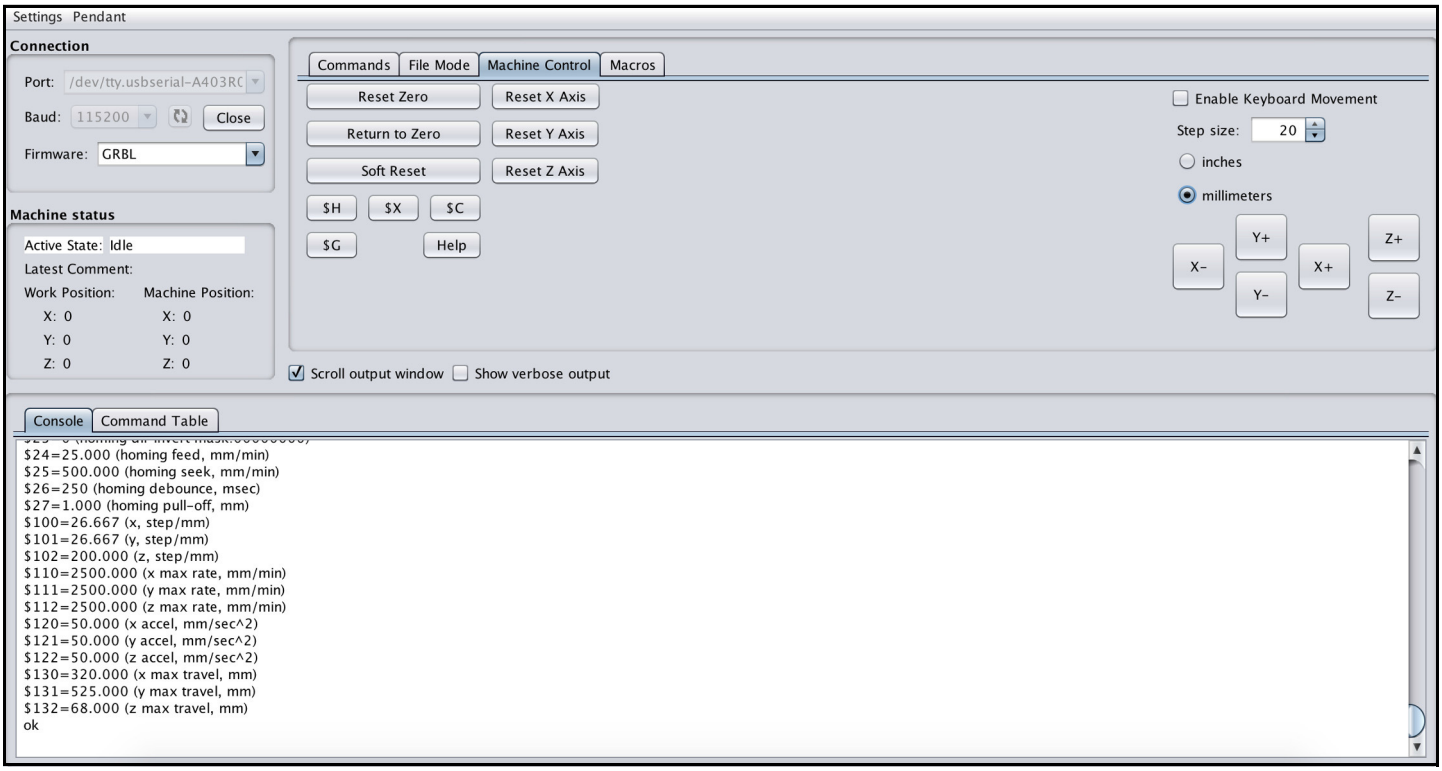
A. Under the Command heading there is a text input field where G-Code commands can be sent to the CNC-xPro. To bring up the current firmware settings type '$$' and press enter.

B. In Appendix B we have provided a set of recommended settings. As can be seen, the default settings do not match what we recommend. Each setting has an id number and a value, and in order to change a setting to a new value, enter $id = new value. For instance, setting number 100 is incorrect when compared to Appendix B, correct it by entering $100 = 26.667. Do this for all the settings in Appendix B.

C. Setting number 130 and 131 will depend on the size of the machine you have. The values to enter here should be 180mm less than your X-Axis size and 225mm less than your Y-Axis size. For instance, on a 500x750mm machine the values for 130 and 131 should be 320 and 530 respectively.

D. If interested, it is a good idea to read the GRBL Firmware Wiki for more in-depth information: https://github.com/grbl/grbl/wiki

5.3 Testing



A. To begin testing, disconnect from the CNC-xPro, and move the machine by hand so that it is in the middle of it's max travel on all axes.

B. Switch on the 24V-360W-Power-Supply, and the 2 x 30mm-24V-DC-Fan's should activate. If they do not activate, check the wiring in Step 4.0.4.

C. Reconnect to the CNC-xPro in UGS. Next to each driver on the CNC-xPro, there is a current control pot, and these can be adjusted using the Ceramic-Screwdriver. Rotate clockwise to increase the current, and anti-clockwise to decrease. The default positions should work fine, but they can be adjusted to increase/decrease motor torque or quiet motor motion. If in Step D below the motors don't move, first check the wiring in Step 5.1. If that isn't the issue, then slightly increase the motor current in 1/8th turns.

D. Looking from the front of the machine, the correct axes machine motion is: X-Axis positive to the right, Y-Axis positive going away, Z-Axis positive going up. To test this in UGS, click on the 'Machine Control' tab on the top bar. On the right hand side there are jog controls. Set the 'Step size' to 20 and select 'millimeters'. Press the 'X+' button to jog the machine in the positive X direction, and the carriage should move to the right. Press 'Y+' and the gantry should move away. Press 'Z+' the Z-Axis should go up.

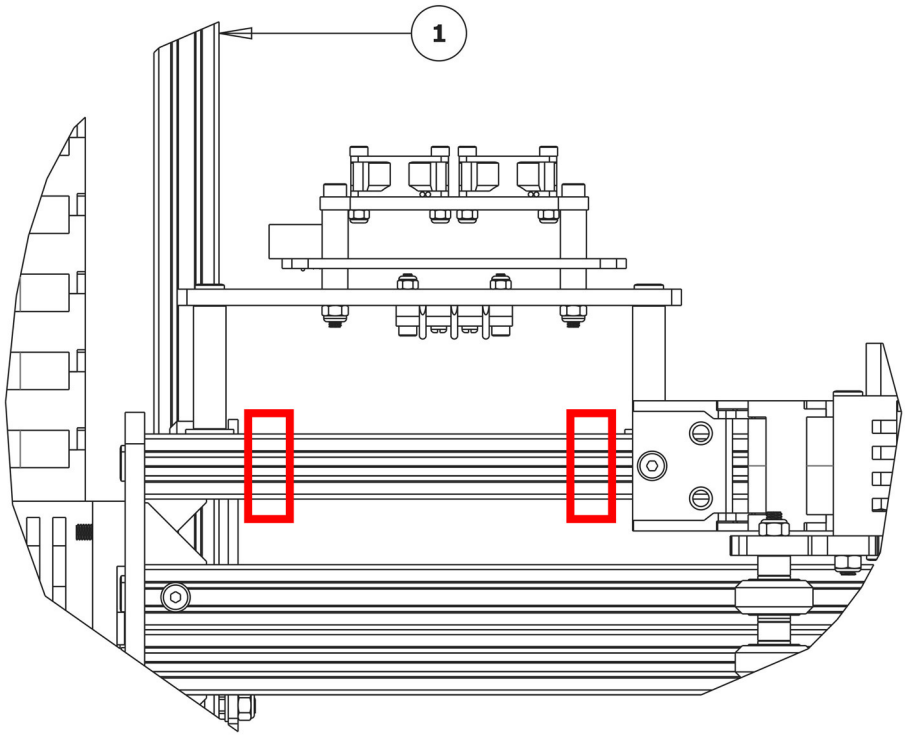
E. If in Step C any of the axes have moved in the opposite directions than should be expected, turn off machine and disconnect from the CNC-xPro. To correct this issue, locate the motor wire for the axis that is incorrect and flip the wire colour order on the CNC-xPro. If the Y-Axis moved in the incorrect direction, remember to flip it for both Y & A driver outputs. Repeat Steps B, C & D to retest the machine.

F. Once the motor directions are correct, use the jog controls in UGS to check that the machine can move through the whole distance of its travels on all axes. If this is unsuccessful, first check that the GT3-Timing-Belt's are attached correctly, aligned, and not binding; the same applies for the ACME-Lead-Screw. If the assembly is correct, it may be that the drivers on the CNC-xPro are overheating, so try decreasing the current in 1/8th turns.

G. Testing of the machine is now complete.

5.4 Wire Tidying

ITEM NO	DESCRIPTION	QTY
1	OX-CNC	1

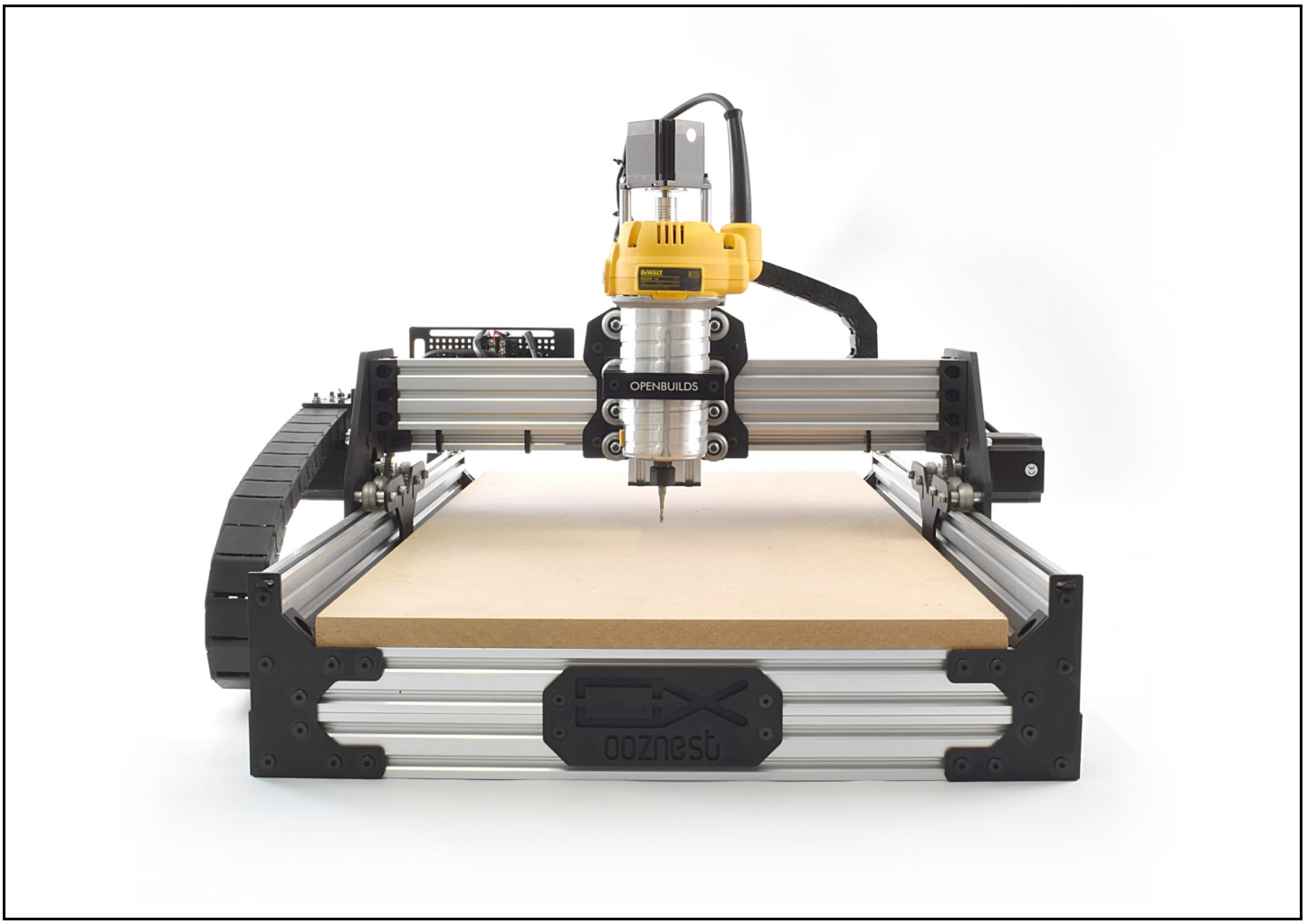


A. Using a Cable-Tie-Large going around the V-Slot-2040-500mm at the position of the right red rectangle shown above, secure the 3 wires in Step 2.3.1 to the V-Slot-2040-500mm, pulling out any excess length in the wires. Excess length can either be bundled up behind the CNC-xPro-Mount using a Cable-Tie-Large, or disconnect the wires from the CNC-xPro, trim to the correct length and reconnect.

B. Any excess wire in the PSU-Output-Power-Cables can either be pulled out at the 24V-360W-Power-Supply end and bundled using a Cable-Tie-Large, or pulled out at the CNC-xPro end and then trimmed the same way as in Step A. Which ever way you decide, once done, use Cable-Tie-Smalls to secure the PSU-Output-Power-Cables to the slotted holes on the Y-Drag-Chain-Moving-End-Mount. Secure the PSU-Output-Power-Cables in the same fashion to the slotted holes on the Y-Drag-Chain-Fixed-End-Mount.

C. Using a Cable-Tie-Large going around the V-Slot-2040-500mm at the position of the left red rectangle shown above, secure the 3 wires in Step 2.3.2 to the V-Slot-2040-500mm, pulling out any excess length in the Y-Axis motor wire. Excess length can either be bundled up behind the CNC-xPro-Mount using a Cable-Tie-Large, or disconnect the wires from the CNC-xPro, trim to the correct length and reconnect.

5.5 Complete



Congratulations! You have completed the Electrical Assembly of the Ooznest OX, and we hope you have enjoyed the build. Below are some general pointers meant to guide you in the correct direction when using the machine with UGS.

A. With this electronic kit we have decided not to include end-stops. This means that when creating your G-Code files in your CAM package it is recommended that you set the working area to the same size as your intended work piece, and set the zero position to the upper front left corner of the work piece. Export the G-Code file with a GRBL post processor. If a GRBL post processor isn't available, select a standard G-Code file with no post processor and no arcs.

B. In UGS position the machine to the same upper front left corner set in the CAM package.

C. In the 'Machine Control' tab press 'Reset Zero'. This is a crucial step, and must not be forgotten when not using end-stops.

D. Load your G-Code file in the 'File-Mode' tab. Press 'Send' to begin the file.

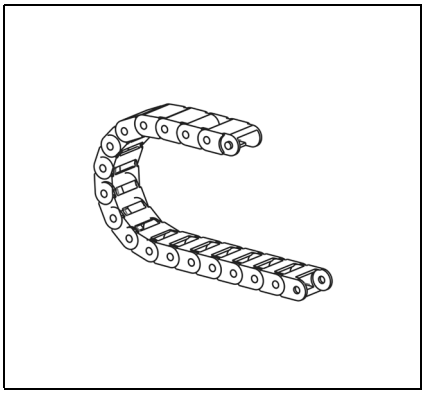
E. It is highly recommended that you use a pen in place of a spindle when first using the machine, and have a piece of paper as the work piece. This allows you to get used to the machine in a safe manor. To prevent crushing the pen, work on only one plane in your CAM package and have no negative Z Movements.

6.0 Appendix

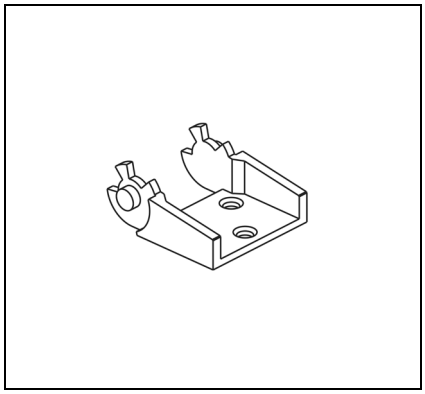
6.1 Appendix A - Kit Contents

Drag Chains Assembly

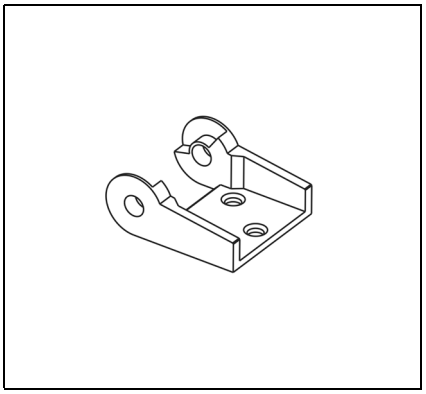
1 x X-Drag-Chain
1 x Y-Drag-Chain



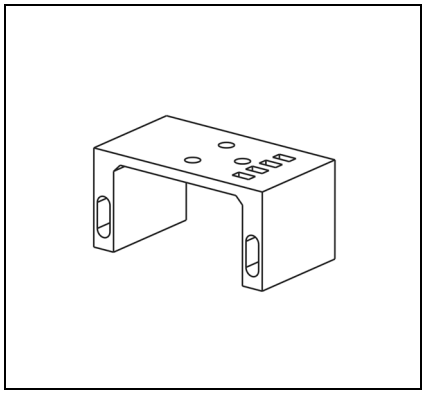
2 x Drag-Chain-Fixed-End



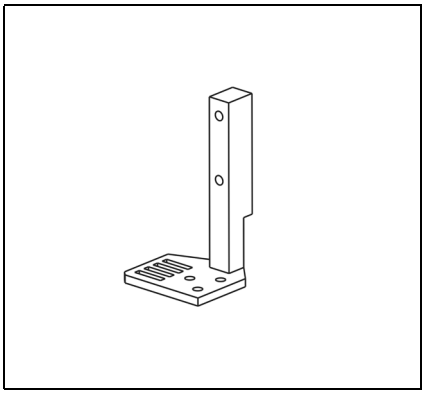
2 x Drag-Chain-Moving-End



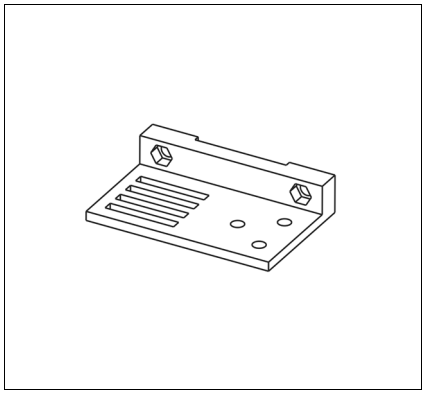
1 x X-Drag-Chain-Moving-End-Mount



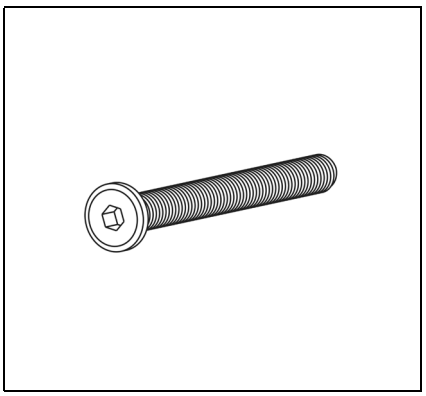
1 x Y-Drag-Chain-Fixed-End-Mount



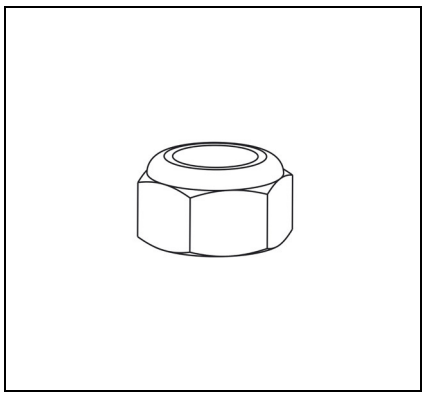
1 x Y-Drag-Chain-Moving-End-Mount



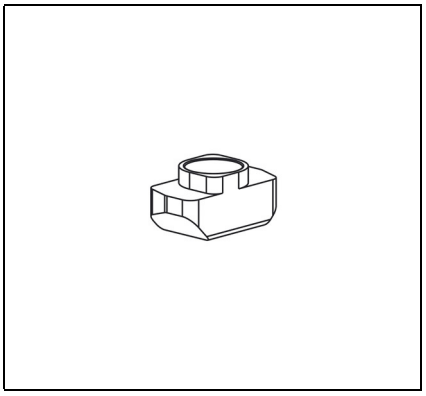
M5-Low-Profile:
1 x 8mm
9 x 15mm
4 x 25mm
2 x 55mm



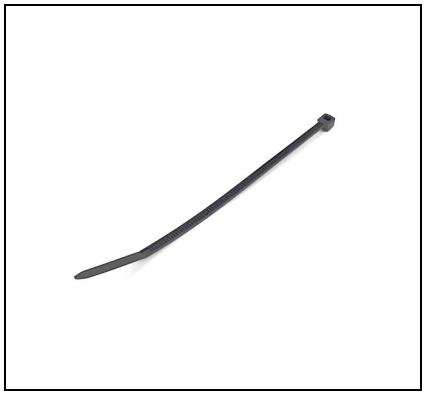
13 x M5-Nyloc-Nut



3 x M5-Drop-In-Tee-Nut

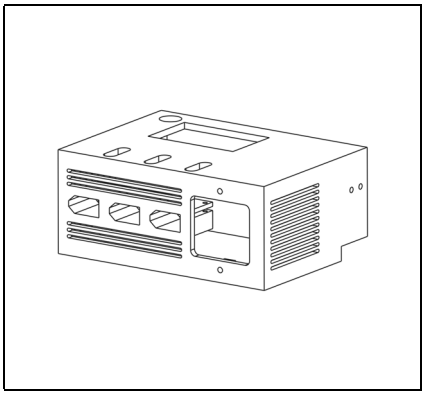


Cable-Ties:
25 x Small
25 x Large

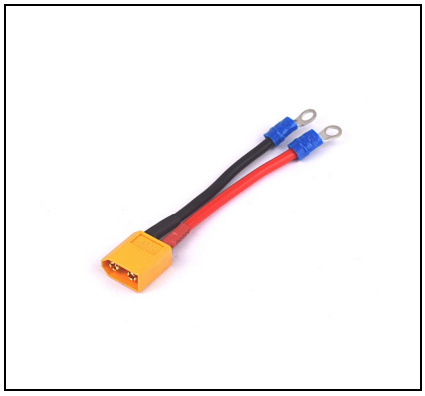


Power Supply Assembly

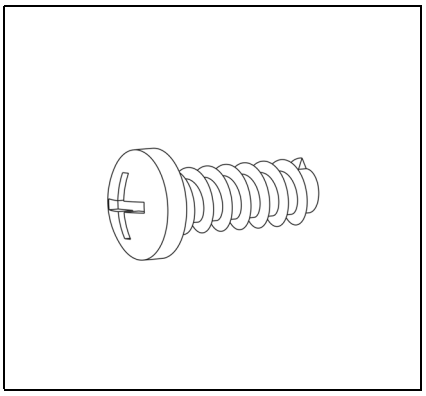
1 x PSU-Cover



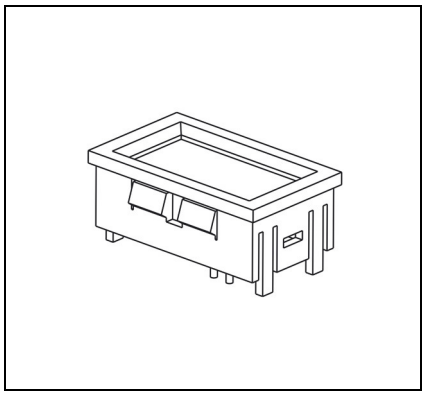
3 x XT60-Male



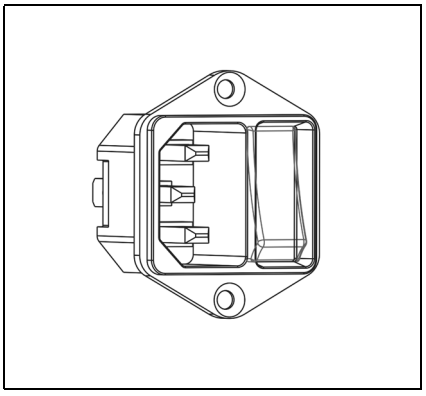
Plastite-Screws:
6 x M3-8mm
6 x M2.5 x 8mm



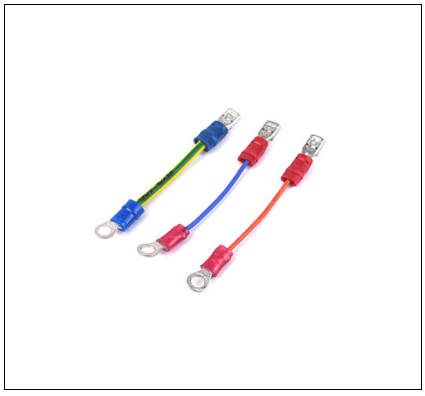
1 x LED-Volt-Meter



1 x IEC-Inlet



IEC-Inlet-Wires:
1 x Live
1 x Neutral
1 x Earth



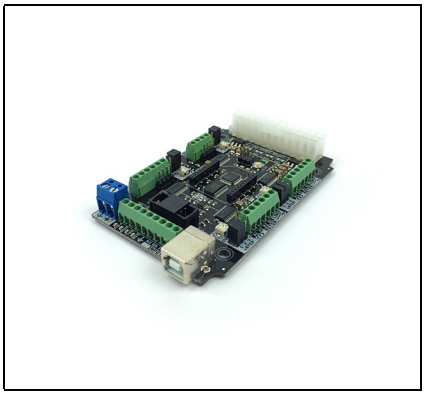
1 x 24V-360W-Power-Supply

1 x Mains-Cable

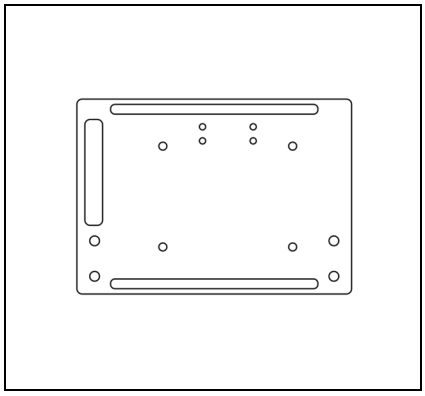
3 x PSU-Output-Power-Cable

CNC-xPro Assembly

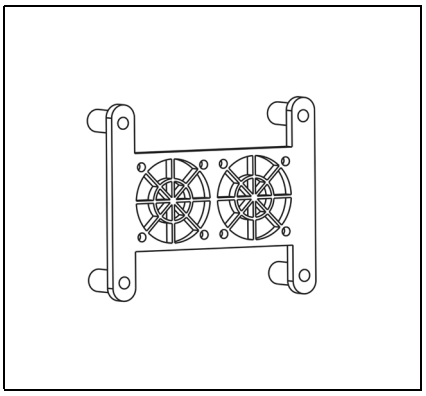
1 x CNC-xPro



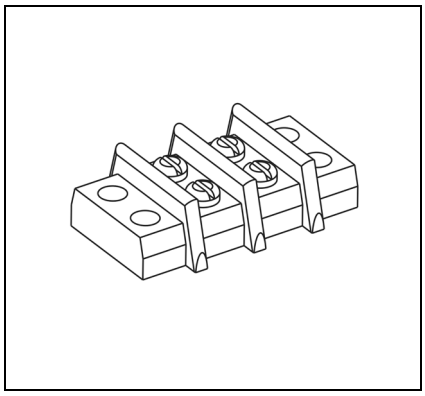
1 x CNC-xPro-Mount



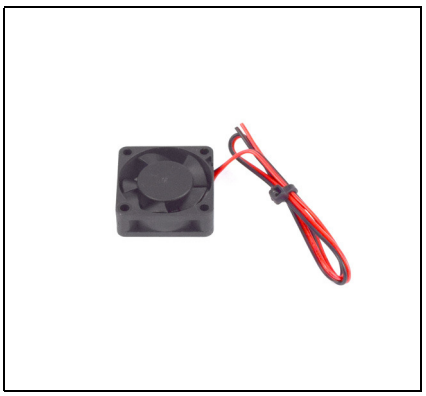
1 x CNC-xPro-Fan-Mount



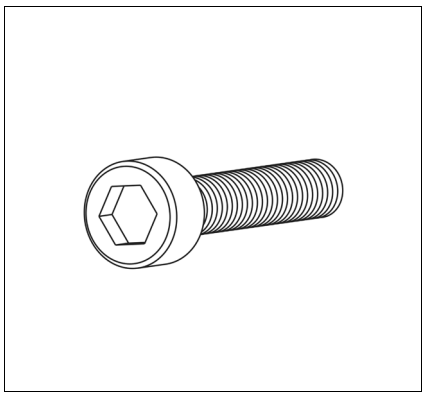
1 x Terminal-Block



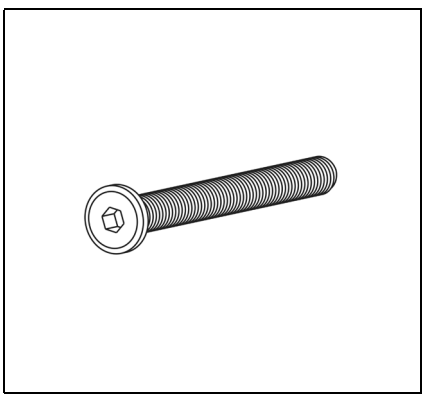
2 x 30mm-24V-DC-Fan



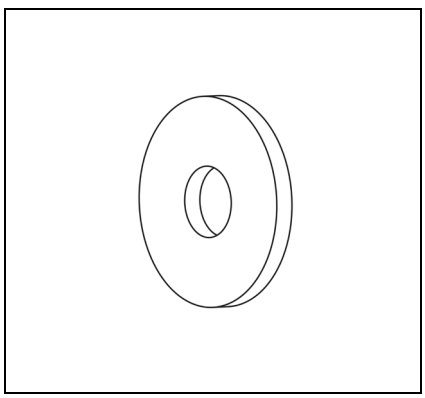
Cap-Head:
4 x M3-16mm
8 x M3-20mm
4 x M4-40mm



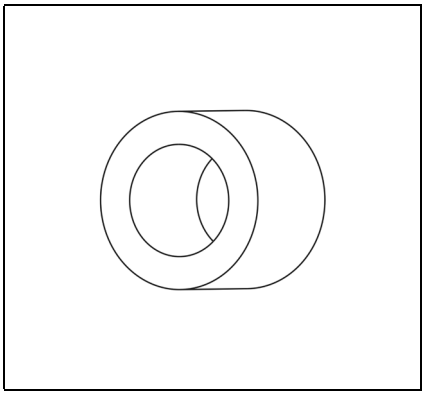
4 x M5-Low-Profile-50mm



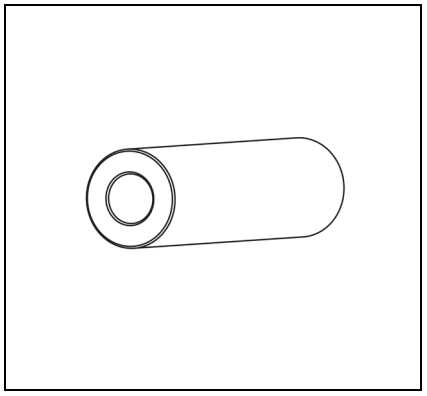
4 x Slot-Washer



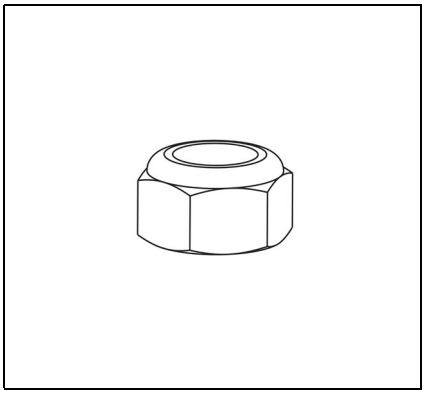
4 x Nylon-Spacer-Quarter-Inch



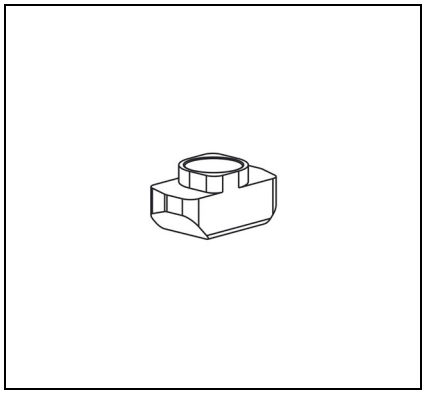
4 x Aluminium-Spacer-OneHalf-Ince



Nyloc-Nuts:
12 x M3
4 x M4

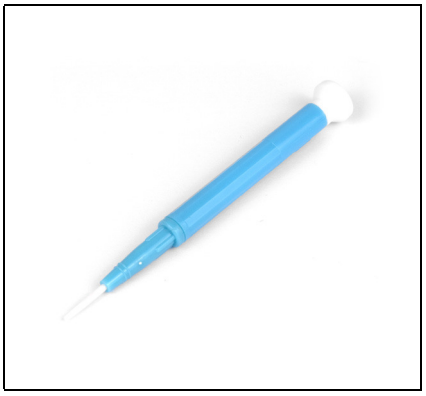


4 x M5-Drop-In-Tee-Nut



Misc

1 x Ceramic-Screw-Driver



1 x USB-Cable

7.0 Appendix B

7.1 Recommended GRBL Settings

The settings below are for a CNC-xPro set at 1/8 micro stepping.

```
$0=10 (step pulse, usec)
$1=255 (step idle delay, msec)
$2=0 (step port invert mask:00000000)
$3=6 (dir port invert mask:00000110)
$4=1 (step enable invert, bool)
$5=0 (limit pins invert, bool)
$6=0 (probe pin invert, bool)
$10=1 (status report mask:00000011)
$11=0.020 (junction deviation, mm)
$12=0.002 (arc tolerance, mm)
$13=0 (report inches, bool)
$20=0 (soft limits, bool)
$21=0 (hard limits, bool)
$22=0 (homing cycle, bool)
$23=1 (homing dir invert mask:00000001)
$24=25.000 (homing feed, mm/min)
$25=500.000 (homing seek, mm/min)
$26=250 (homing debounce, msec)
$27=1.000 (homing pull-off, mm)
$100=26.667 (x, step/mm)
$101=26.667 (y, step/mm)
$102=200 (z, step/mm)
$110=2500 (x max rate, mm/min) (Go upto 7500)
$111=2500 (y max rate, mm/min) (Go upto 7500)
$112=2500 (z max rate, mm/min) (Go upto 1500)
$120=50.000 (x accel, mm/sec^2)
$121=50.000 (y accel, mm/sec^2)
$122=50.000 (z accel, mm/sec^2)
$130=320.000 (x max travel, mm)
$131=525.000 (y max travel, mm)
$132=68.000 (z max travel, mm)
```