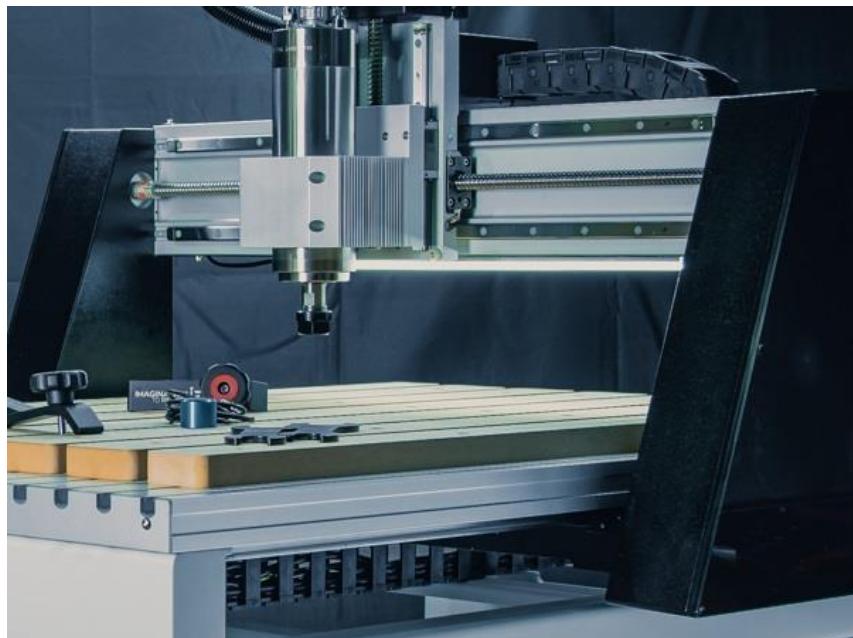




Section 3 - i2R A Series



4.0 ROBOTICS



BG Precision
Version 1.0
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BG Precision PTY LTD

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SEAFORD

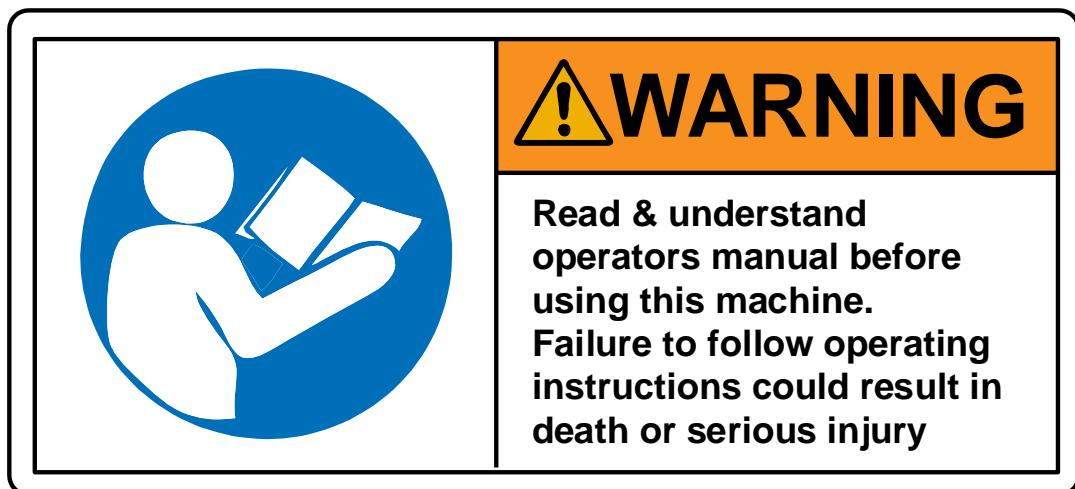
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Before using/turning on the machine, the device should be carefully checked to make sure all connections are secure and the device is technically sound.



**Ensure You understand
the safety considerations
of a machine provided
in the open configuration
without a safety
enclsoure**



**Do NOT Interfere
with the machine
when under CNC
control**



**NEVER LEAVE
THE MACHINE
WORKING
UNATTENDED**

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1 INTRODUCTION

Thank you for purchasing your CNC system from BG Precision. This section of the manual is specific to your machine purchase. Supplementary material will be provided in regard to all the common features and practice of BG Precision CNC systems.

Please ensure you read all the operational manuals for this CNC machine prior to attempting to use the system. Through-out this manual there are references to "A Trained Operator" or "Trained and Experienced personnel". These are defined as follows:

All persons that uses, or comes into contact with, the CNC router system MUST:

- understand what a CNC router is and can do
- read and understood the content of this user manual prior to using the system
- be able to exercise control of the router system at all times
- follow all the guidelines presented including the use of appropriate PPE
- seek further instruction if anything is unclear
- be sure that you have understood these instructions completely

Responsibility of use or misuse belongs to the end user. BG Precision PTY LTD and its affiliates accept no responsibility for use or misuse by the user. If you may not be able to use this product properly, we recommend that you do not begin use or cease use immediately.

This manual was not intended to cover every facet of machine operation. This manual serves to provide the information needed to safely operate and maintain the CNC router system. This manual has been designed to be used as an instruction tool as well as a reference tool for everyday work. Step by step instructions are provided where possible to help all levels of users understand the machine.

NOTE: Important aspects of machine use and best practice are highlighted and should be adopted where possible to maximise the machine tool life and performance. It is VERY IMPORTANT that all personnel read and understand the safety chapter BEFORE operating the machine. All Warning and Caution notices must be noted before interacting with the machine. Please refer Section 1 – READ ME for all safety considerations.

Some of the images used in this manual may represent older/obsolete variants of the machine but the context of the instruction is updated at time of purchase.

If there are any further questions or if anything is not clear, please contact us at info@bgprecision.com.au

2 MACHINE INSTALLATION

2.1 MACHINE INSTALLATION BY BG PRECISION DELIVERY VEHICLE

In the case where a machine is delivered by BG Precision directly to the customer then the following aspects must be taken into account

- Prior to delivery BG Precision must be notified of any narrow or difficult access areas to the position where the machine will be finally installed
- If any access points / hallways / gates etc are narrower / smaller / lower than normal and the machine has to go in at difficult / awkward angles, then BG Precision should be notified of such issues prior to delivery.
- It is important that sufficient man power / forklift is provided to allow easy movement of the machine into place
- If manually lifted, then 4 able bodied persons. 1 on each corner of the machine and the machine should be lifted without any cardboard underneath it.



Figure 1: i2R A-Series with box cover removed and ready for lifting

2.2 MACHINE INSTALLATION BY FREIGHT

In the case where a machine is not delivered by BG Precision but is delivered by a third party then EXTRA care is needed to ensure the machine is handled correctly.



The machines are crated in cardboard covering and then in timber crates.

Please manage the machines with extreme caution and only use forklifts to move the crated machines on their pallets. Figure 2 shows what a crated A-Series looks like.



Figure 2: Scope of crated machine delivery

2.3 MACHINE ASSEMBLY ONCE DELIVERED

Failure to read and understand all the assembly and setup instructions before attempting assembly may result in serious injury.



Once you have verified the machine and their contents are 100% okay and damage free after transport then you can begin the setup process.

NOTE: in the case where BG Precision will visit and install machine, some (or all) of these tasks will be carried out by one of our installation engineers.

2.3.1 SETTING UP THE STAND

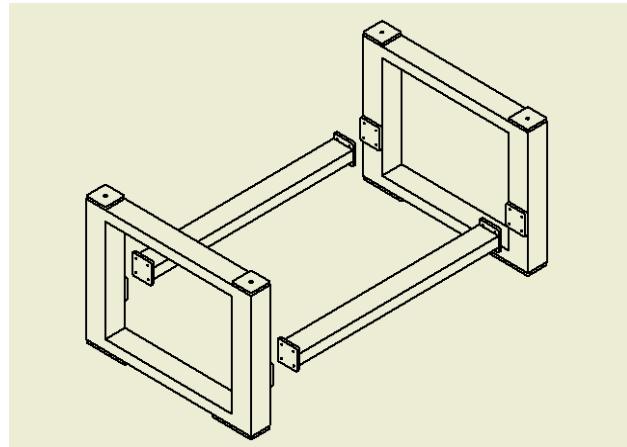
The steel stand and the toolbox are an optional extra with the machine. If you have purchased this part then please proceed through the assembly steps if not skip to section 2.3.3

Packaging contents for the A-Series Stand (ARS400/600/800):

- 2-Stand upright (front & back)
- 2-Cross braces
- 1-Lower shelf plate
- 1-Stand hardware package

Hardware package contains:

- 4-Swivel casters
- 4-Leveling Feet
- 4-hex nuts
- 16-Hex bolts (M8x25)
- 16-Lock washers (M8)
- 16-Flat washer (M8)
- 16-Hex bolts (M6x12)
- 16-Lock washer (M6)
- 16-Flat washer (M6)
- 1-Controller hook
- 2-Machine screws (M4x6)
- 4-Small rubber pads

**Figure 3: i2R A-Series steel stand assembly overview**

Remove all contents from shipping boxes. Do not discard carton or packing material until assembly is complete. Accessories commonly ship inside machine or stand packaging and can be easily overlooked.

Tools required for assembly:

- #2 Philips-Screwdriver
- 10mm, 13mm and 17mm sockets and socket wrench
- 24mm open-end wrench
- 2mm and 3mm Allen key
- Spirit Level

Assembling Stand (all models):

Assembly of the stand is the same for all models, only difference is the length of the cross braces.

- Thread a loose hex-nut onto each of the levelling feet.
- Turn the square stand uprights upside down. Do this on top of the cardboard packaging to prevent scratching.
 - a. Install the levelling feet and swivel casters using M6 hex bolt, M6 lock washer, and M6 flat washer for each caster. Tighten all the caster hardware securely. The levelling feet can be adjusted later.
 - b. Rotate uprights so the cross-brace mounting plates are facing each other. Separate the uprights far enough that the braces can fit between them.
 - c. Align the cross-braces between the uprights and bolt the mounting flanges to the plates using (4) M8 hex bolt, (4) lock washers and (4) flat washers for each side. We recommend that you secure these bolts by ensuring you get a number of threads engaged on the bolt but leave them loose enough so that it will aid with machine alignment onto the stand. After you have bolted the machine to the stand then you can proceed to tighten these bolts up securely.



Figure 5: Bolted connections for stand

As seen in the diagram above (Figure 6), the braces should be rotated correctly for the tool-box and shelf to sit at the correct height. Braces should be mounted so that the top and bottom are the larger flat surfaces

- With assistance, the stand can now be flipped over onto the casters and levelling feet.
- Flip the shelf upside down and stick of the rubber pads on each corner of the shelf flange.
 - a. Install shelf between the braces on the stand, all the way forward.
 - b. The small rubber pads should now be between the flange and the top surface of the brace. This will help prevent unwanted movement and scratching.
- If the optional tool-box has been purchased, the shelf can be slide to the far back of the stand (AR6 and AR8 models only, AR4 models, will no longer have room for the shelf).
 - a. Turn the tool-box upside down. Install (1) of each hanger on either side of the toolbox using the installed rivnuts and (2) 3mm cap-screw each.



Figure 6: Toolbox

- b. Insert the tool-box into the stand, from the top. The hangers will fit snugly between the braces on either side of the tool-box.
- c. The front can be slid forward to rest within the opening on the stand upright.
- Install the hook on the front right-hand side of the stand using the included hardware.

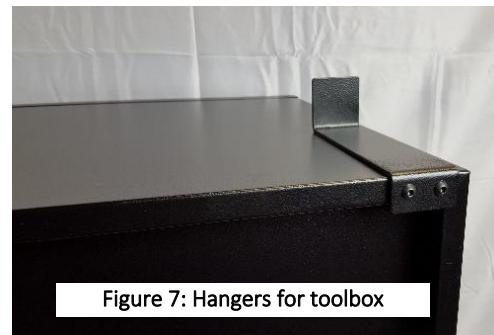


Figure 7: Hangers for toolbox



Figure 8: Hanger for option UCR201 Wireless pendant

2.3.2 SETTING UP THE MACHINE ONTO THE STAND

Packaging contents for i2R A-Series CNC machines

(A22/A23/A24):

- 1-Router table assembly
- 1-Electrical control box
- 1-Ethernet controller cable
- 1-Tool touch-off puck
- 1-Stepper Motor
- 1-Top stepper motor cover
- 2-Collet wrenches (Pro Model Only)
- 1-1/4" ER-20 Collet (Pro Model Only)
- 1-1/2" ER-20 Collet (Pro Model Only)
- 4-Rubber bushings
- 4-Hex Bolts (M17x45)
- 4-Washers (M17)



Figure 9: Machine setup summary

Installing the router table on the Stand:

The CNC router table assembly is heavy. Please use a secure means and use caution when lifting onto the stand. At least 3-4 able bodies persons are needed to lift the machine onto the stand.

**To avoid damage, be careful to never lift the router by the gantry or the T-slot table.**

Always lift the router under the steel frame or as close to steel frame as practically possible.

- 1- If using a forklift, keep forks under the steel frame to avoid damaging the wiring and mechanics of the machine.
 - a. Place a scrap piece of lumber beneath the router assembly and carefully slide forks beneath the steel base.

Make sure the forks extend through to the other side of the machine for safe lifting.

See Figure 10 for more detailed info. It's IMPERATIVE you lift only from the steel frame.



Figure 10: Ensure forks extent the entire way across the machine

- 2- Position router over the stand and align holes on router mounting flanges and stand uprights. Being careful to make sure the stand is properly oriented with the machine front.
- 3- Place rubber bushing over the holes in the stand. Lower the machine to sit on the bushings.



Figure 11: Rubber feet

- a. Attach the machine to the stand using M10 Hex bolt, washer at each corner.
 - b. Insert the bolt/washer through the machine mounting flange and the rubber bushing.
 - c. Thread the bolt loosely into the stand mounting holes. **Do not tighten until all bolts have been threaded.**
 - d. Remove fork lift and tighten bolts evenly.
- 4- Place level on the router table, then level the assembled machine by adjusting the levelling feet. Be sure to level the machine in all directions.



Figure 12: Castors and feet

2.3.3 FINISHING MACHINE ASSEMBLY:

With the machine mounted on the stand, or safely on a secure work surface if a stand was not acquired, now it's time to begin finishing the setup.

- 1- Locate and install the stepper motor to the top of the Z-axis motor seat, on the gantry tower.
 - a. Use the existing 4 cap-screws found on the motor seat to secure the stepper motor
 - b. Tighten the two set screws in coupling that attaches stepper motor shaft to the ball-screw.
 - c. Install plastic cover over stepper motor mount and tighten the two screws.

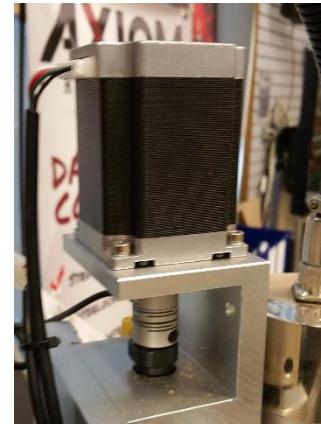


Figure 13: Z axis motor installation

2.3.4 FINAL MECHANICAL SETUP PREPARATION

Once you have unpackaged your CNC router and located it on a bench you have chosen or the Steel bench as per the above steps, it is time to connect the machine and control system together in preparation for first steps.

- 1) Locate it on a stable bench (as per the above steps)

- 2) Put the controller near the machine on the same bench (or under machine on stand)
- 3) Locate and turn on laptop / PC to control machine next to the controller (see Figure 14)

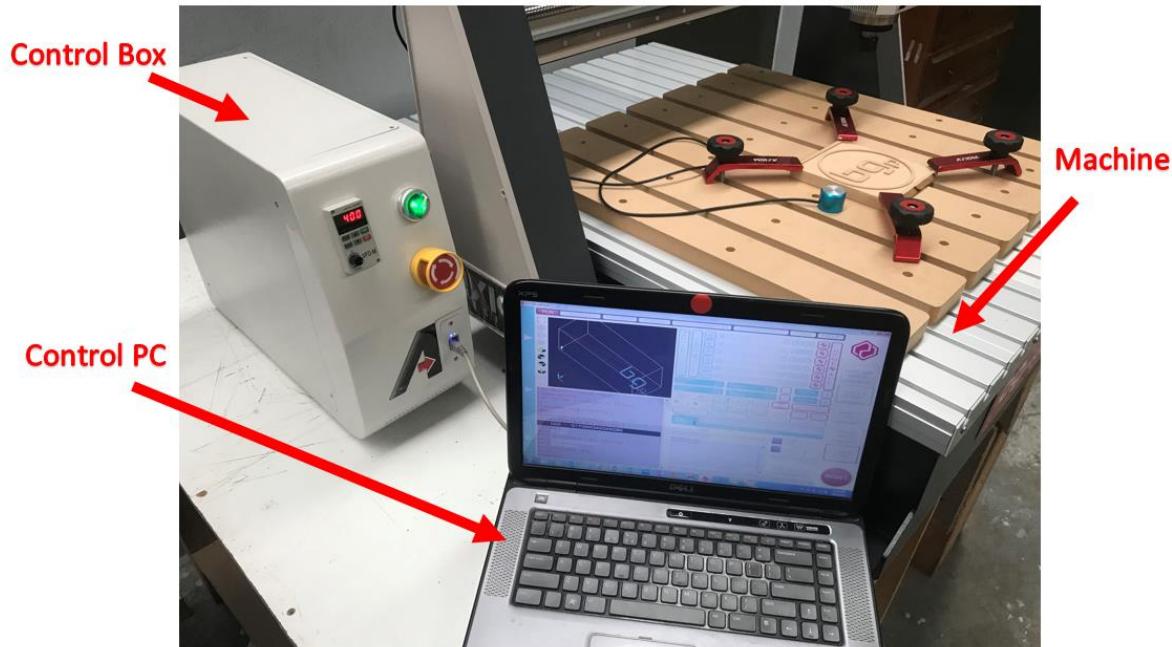


Figure 14: Locate control PC near to machine and control box

2.3.5 FIRST CONNECTION STEPS

The following steps should be carried out to ensure safe setup and operation of the machine. At all times inspect all connectors and anything you are handling for damage or any sign of mishandling.

Be sure to position the electrical cord through the back of the stand safely, so it will not be ran over by the castors and to prevent tripping hazards.





Figure 15: Cable summary out of control box

- 1) There will be 3 cables coming out of the control box (control box is identified in Figure 15).
 - 2 cables will connect to the machine as shown in Figure 16
 - Carefully seat these cables (there is only one correct way to seat connectors)
 - Carefully tighten the connectors and careful not to cross thread the locking part of the connectors.



Figure 16: Connections to the back of the machine

- 2) Check the Green switch (shown in Figure 17) on the front of the controller box

- Switch should be clicked anticlockwise for OFF!
- NOTE Figure 17 shows switch in the OFF position
- Switch OFF before plugging into mains supply

Main controller power Switch

Position clockwise = on (switch will go green)

Position anticlockwise = off (no light in switch)



Figure 17: Green power switch and estop on the controller

- 3) Plug in the 3-pin plug powering the control box into the AC wall socket outlet.

- Ensure the connection has RCD and standard domestic electrical protection installed
- Inspect the plug for any sign of damage
- Do not plug into a live socket
- Turn on AC power at the plug



- 4) Turn on the mains controller switch

- Figure 18 shows the green switch in the ON position
- The switch should light up green (you might hear a small clunk from motors engaging)
- You should see the Ethernet connector on the front of the white control box blink green.
- Connect the Ethernet port to the control PC (connection sequence not important)
- You are now ready to setup the UCCNC controller and run your CNC router!

Connect Ethernet cable between control PC and the machine controller

Turn ON Main Green Switch
(Lights up green when ON)

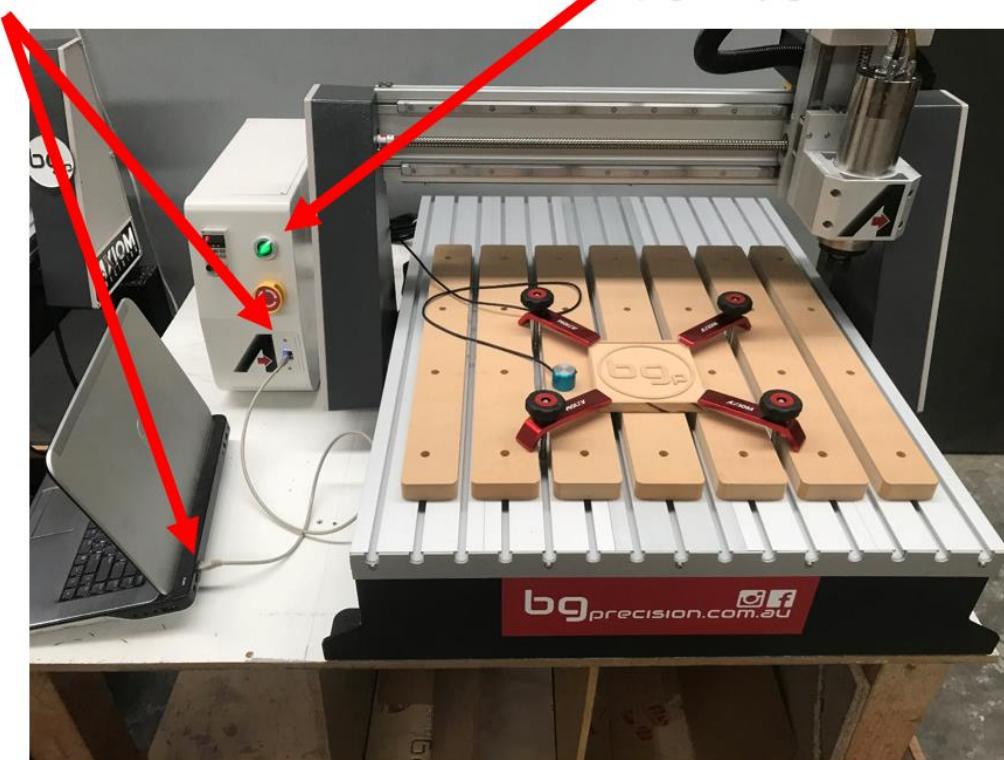


Figure 18: Turn on mains green power switch and plug in Ethernet connector into PC and controller

3 CNC FIRST CONNECTION STEPS

This section of the manual is intended to show you how to prepare your CNC ROUTER machine to be controlled by UCCNC software. The UCCNC software is a full Gcode based machine controller and is therefore compatible with Gcode based CAM packages.

We support the UCCNC in conjunction with Vectric products. Cut2D and VcarvePro are the two most popular CAM packages we support. The combination of Cut2D/VcarvePro and the UCCNC is a very user friendly and powerful machine control package, whilst remaining easy to use.

Visit www.vectric.com where you can download Vectric CAM packages and run them in demo mode where you can test them out.

Please read this manual completely before using your CNC ROUTER system with the UCCNC software.

To minimise the risk of injury and/or to prevent property damage, please only operate the machine and the associated control unit when you are sure that you have understood these instructions completely!



Should questions arise, please contact us.

Email: info@bgprecision.com.au

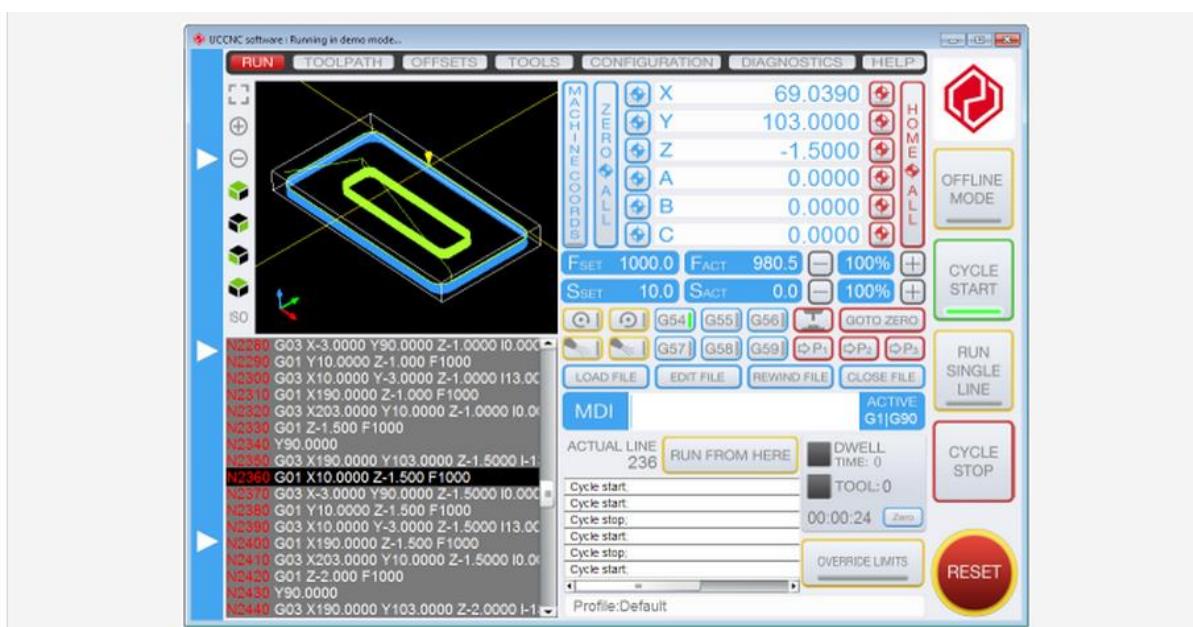


Figure 19: UCCNC controller main GUI

3.1 INITIAL MACHINE SETUP FOR UCCNC OPERATION

3.1.1 ITEMS REQUIRED FOR UCCNC OPERATION

You need to make sure you have the following items for using your CNC machine with UCCNC.

- CNC router
- UCCNC compatible controller
- Control PC with Ethernet port
- Control PC connected to the machine
- Machine controller on and powered up.

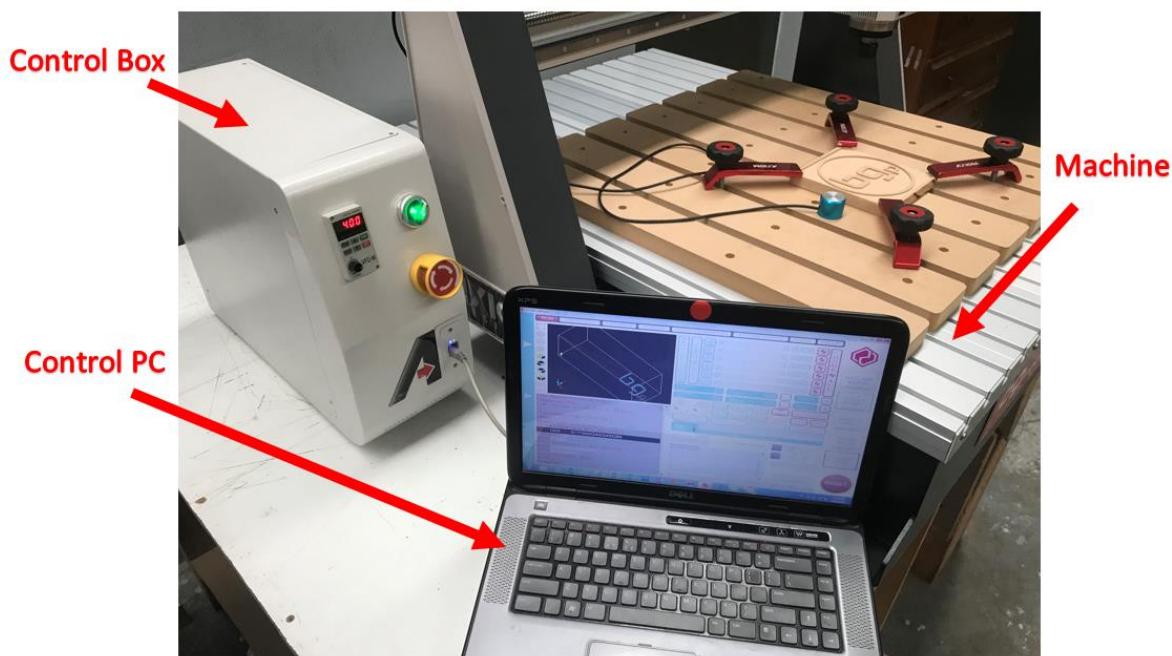


Figure 20: CNC router sitting next to controller and PC

3.1.2 UCCNC SETUP PRECHECKS

This section assumes you have done the following

- 1) Securely located your machine on your workbench or supplied stand
- 2) You have successfully connected your controller to your CNC machine outlined in Section 2
- 3) You have turned on the controller
- 4) You have a windows based laptop running beside the machine
- 5) You have connected the machine to the control computer using CAT5 Ethernet cable

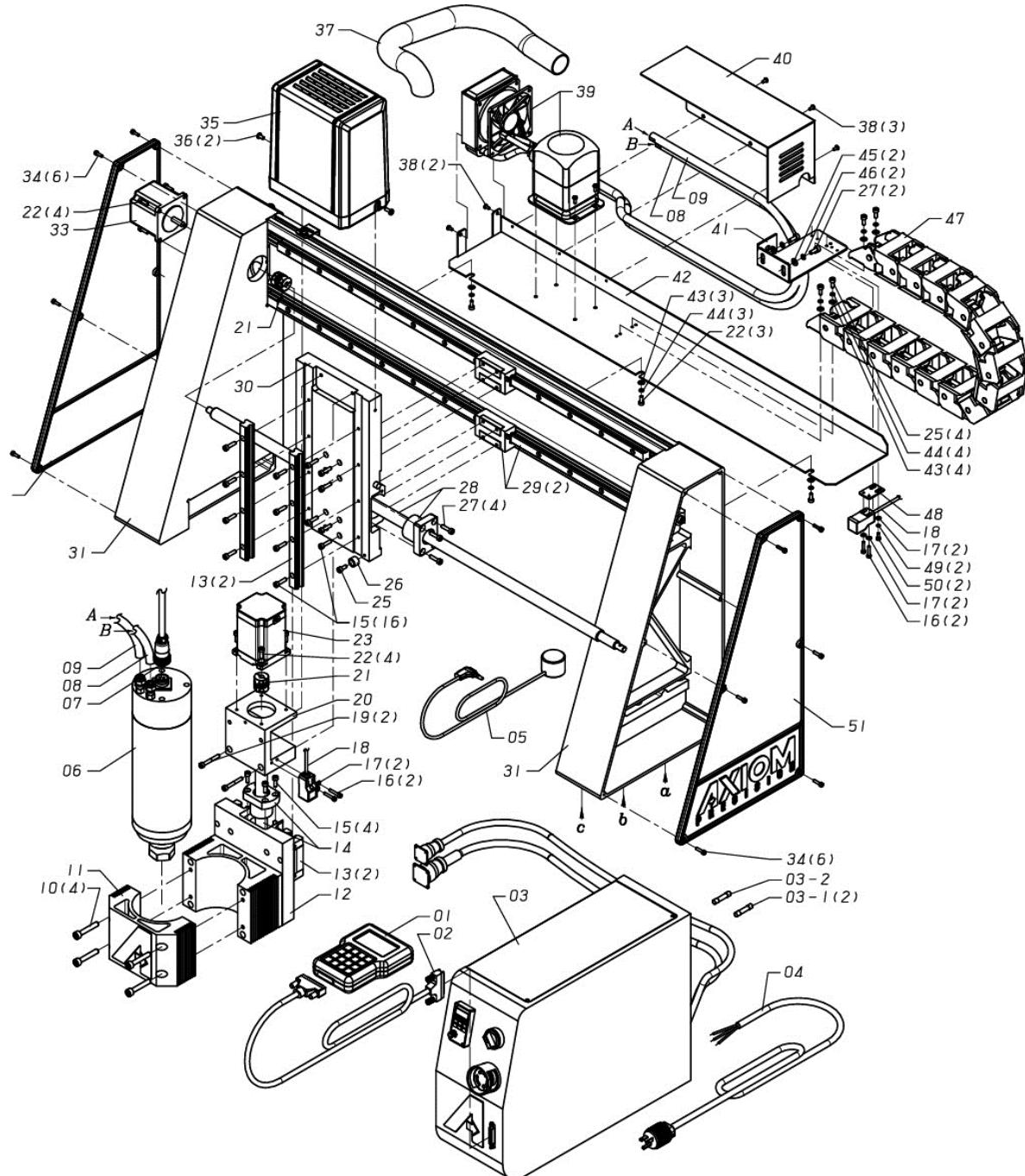
You should have a set of files on a USB stick with all the installation steps. If not, please contact us and we will send you an installer package.

4 TECHNICAL SPECIFICATIONS

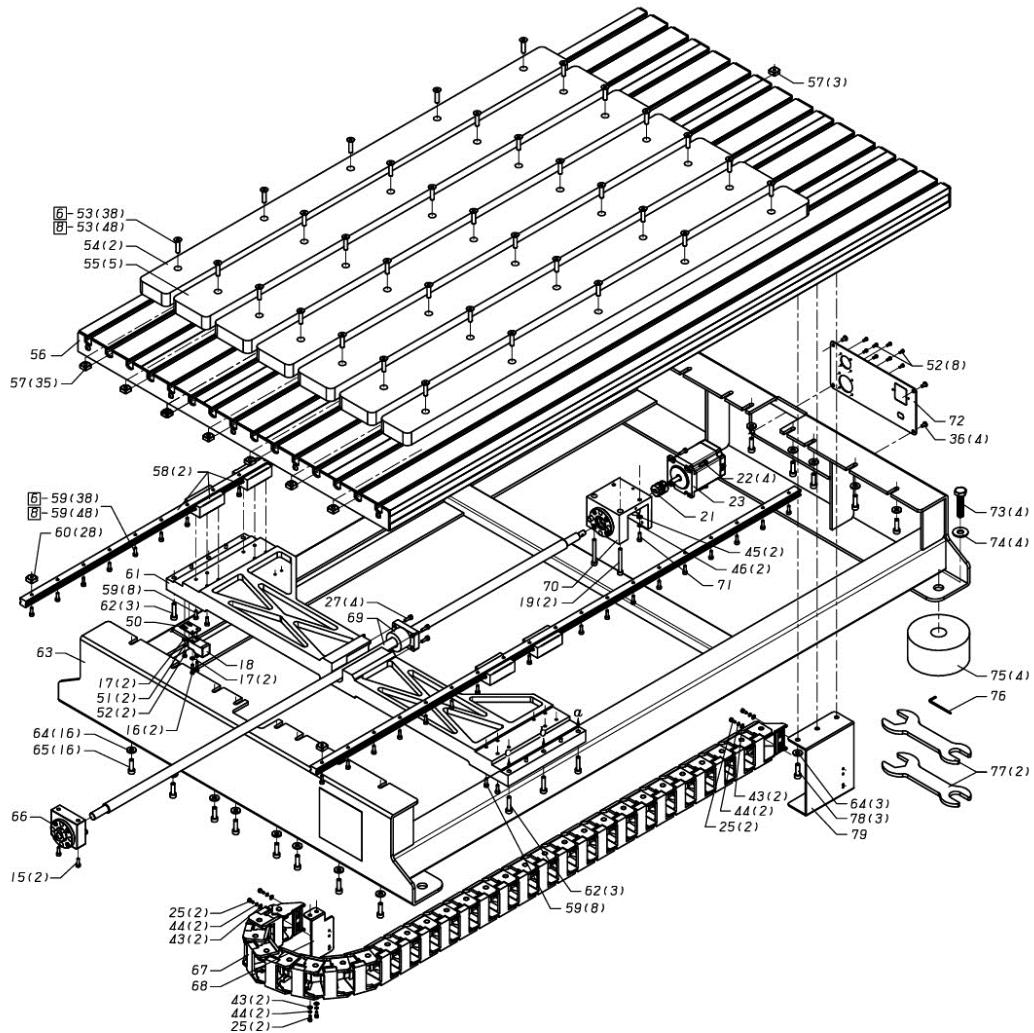
I2R: Imagination to Reality A-Series CNC		A22	A23	A24
X Axis Travel	610mm	•	•	•
Y Axis Travel	610mm	•		
	915mm		•	
	1220mm			•
Z Axis Travel	153mm)	•	•	•
Table Work Area	995mm x 721mm	•		
	1300mm x 721mm		•	
	1600mm x 721mm			•
Collet	ER-20	•	•	•
Collet Chuck	1/8" & 1/2" Included	•	•	•
High Speed Spindle	3 HP 2.2kW/7.5A Electro Spindle	•	•	•
Spindle Speed	0~24000 RPM	•	•	•
Rapid Feed Rate	6000mm/min on X and Y axis 1800mm/min on Z-axis	•	•	•
Precision Linear Guide Rails	X/Y/Z Axis	•	•	•
Precision Ball Screw	X/Y/Z Axis	•	•	•
Power Requirements	220V, 50~60 Hz, 10A Single Phase	•	•	•
Working Table	High Rigidity Interlocking Aluminium	•	•	•
	Integrated MDF Spoil Board	•	•	•
Gantry Bridge	High Rigidity Aluminium Extrusion	•	•	•
Gantry Support	Gravity Cast Aluminium Alloy	•	•	•
Gantry Clearance	165mm	•	•	•
Machine Base	Welded Structural Steel Frame	•	•	•
Machine Footprint	890mm x 770mm	•		
	1197mm x 770mm		•	
	1495mm x 770mm			•
Required Floor Space	995mm x 949mm	•		
	1300mm x 949mm		•	
	1600mm x 949mm			•
Max. Machine Height	769mm	•	•	•
Machine Weight	70kg	•		
	90kg		•	
	110kg			•
Tool Touch Off Puck	Standard Accessory	•	•	•
Integrated Liquid Cooling System	Standard Accessory	•	•	•
Controller	UCCNC controller as standard	•	•	•

5 DOCUMENTATION

A-Series Exploded View #1



Pro Model Exploded View #2



	Parts No.	Description.	Size.	Qty.	Remark.
1	RichAuto-A11E	HANDHELD CNC CONTROLLER		1	
2	AX01C00050	HANDHELD CNC CONTROLLER CABLE	VW-I /30V/80C	1	
3	AX01B0010	ELECTRIC CABINET ASSY.		1	AR4/6/8 PRO
3	AX01B0020	ELECTRIC CABINET ASSY.		1	AR4/6/8 BASIC
3.1	FU-10A	FUSE	10A	3	
3.2	FU-5A	FUSE	5A	1	
4	AX01C00040	POWER CORD	15AWGx3Cx2100L PLUG: LK7620P	1	
5	AX0100530	MILLING FROM ZERO GAUGE		1	
6	<u>GDZ_23-1C@80/2.2</u>	ELECTRO SPINDLE		1	
7	AX01C00030	MOTOR CABLE	FTI .17AWGx4C	1	
8	CW TUBE-IO	COOLING TUBE (IN)	5MMx8MMx1350L	1	
9	CW TUBE-IO	COOLING TUBE (OUT)	5MMx8MMx1350L	1	
10	HS-SCW-M6x35	HEX SOC HD SCR	M6xP1.0x35L	4	
11	AX0100421	FRONT MOTOR HOLDER		1	
12	AX01AO010	REAR MOTOR HOLDER ASSY.		1	
13	BGXSI 5BN-1-220-NZO-20-20	Z AXIS LINEAR GUIDE		2	
14	AX0100110	Z AXIS BALL SCREW		1	
15	HS-SCW-M4x16	HEX SOC HD SCR	M4xP0.7x16L	20	
16	HS-SCW-M3x16	HEX SOC HD SCR	M3xP0.5x16L	6	
17	W-M3	FLAT WASHER	3.2x7x0.5T	10	
18	DA-1805NO	SENSOR	DA-1805NO	3	
19	HS-SCW-M5x45	HEX SOC HD SCR	M5xP0.8x45L	4	
20	AX01A0020	Z AXIS MOTOR SEAT		1	
21	SFC20C-8X6.35	COUPLING	SCT-20C	3	
22	HS-SCW-M4x12	HEX SOC HD SCR	M4xP0.7x12L	15	
23	TK268D-02A5	STEPPER MOTOR	TK268D-02A5	2	
25	HS-SCW-M4x10	HEX SOC HD SCR	M4xP0.7x10L	7	
26	AX0100750	RUBBER PAD	12x8	1	
27	HS-SCW-M5x12	HEX SOC HD SCR	M5xP0.8x12L	10	
28	AX0100070	X AXIS BALL SCREW	L=795	1	
29	BGXSI 1BN-1-700-NZO-20-20	X AXIS LINEAR GUIDE		2	
30	AX0100061	X AXIS SLIDE SEAT		1	
31	AX01A0030	X AXIS MOVING GANTRY		1	
32	AX01A0040	LEFT SIDE COVER		1	
33	TK266D-02A5	STEPPER MOTOR	TK266D-02A5	1	
34	HS-SCW-M3x10	HEX SOC HD SCR	M3xP0.5x10L	12	
35	AX0100140	TOP HOUSING		1	
36	THP-SCW-M4x10	TRUSS HD PHILLIPS SCR	M4xP0.7x10L	6	
37	CRS-25P	FLEX TUBE	40x500L	1	
38	RHP.SCW.M3x6	ROUND HD PHILLIPS SCR	M3xP0.5x6L	5	
39	AX01A0050	LIQUID COOLING SYSTEM		1	
40	AX0100470	COOLING SYSTEM COVER		1	
41	AX0100251	X AXIS DRAG CHAIN SEAT UPPER		1	
42	AX0100183	X AXIS DRAG CHAIN SEAT LOWER		1	
43	W-M4	FLAT WASHER	4.2x10x0.8T	13	
44	SW-M4	SPRING WASHER	M4	13	
45	W-M5	FLAT WASHER	5.2x12x1.0T	4	
46	SW-M5	SPRING WASHER	M5	4	
47	A0450.21 KR52	X AXIS DRAG CHAIN	A0450.21 KR52-658MM	1	
48	AX0100220	SENSOR FIXED PLATE		2	
49	SW-M3	SPRING WASHER		4	

	Parts No.	Description.	Size.	Qty.	Remark.
51	AX01A0060	RIGHT SIDE COVER		1	
53	FH-SCW-M6x25	HEX SOC FLAT HD CAP SCR	M6xP1.0x25L	28	AR4
53	FH-SCW-M6x25	HEX SOC FLAT HD CAP SCR	M6xP1.0x25L	35	AR6/8
54	AX0100540	WOOD PLATE (2 SIDE)	630x65x25.4	2	AR4
54	AX0100550	WOOD PLATE (2 SIDE)	935x65x25.4	2	AR6/8
54	AX0100590	WOOD PLATE (2 SIDE)	1235x65x25.4	2	AR8
55	AX0100562	WOOD PLATE (MIDDLE)	630x80x25.4	5	AR4
55	AX0100572	WOOD PLATE (MIDDLE)	935x80x25.4	5	AR6
55	AX0100582	WOOD PLATE (MIDDLE)	1235x80x25.4	5	AR8
56	AX01A0070A	TABLE ASSY.	989x145.3x40	1	AR4
56	AX01A0070B	TABLE ASSY.	1294x145.3x40	1	AR6
56	AX01A0070C	TABLE ASSY.	1594x145.3x40	1	AR8
57	4040M6	SQUARE NUT	M6xP1.0	31	AR4
57	4040M6	SQUARE NUT	M6xP1.0	38	AR6/8
58	BGXS15BN-2-820-NZO-20-20	Y AXIS LINEAR GUIDE	RAIL SIZE: 15x13x820L	2	AR4
58	BGXS15BN-2-1120-NZO-20-20	Y AXIS LINEAR GUIDE	RAIL SIZE: 5x13x1120L	2	AR6
58	BGXS15BN-2-1420-NZO-20-20	Y AXIS LINEAR GUIDE	RAIL SIZE: 5x13x1420L	2	AR8
59	HS-SCW-M4x20	HEX SOC HD SCR	M4xP0.7x20L	44	AR4
59	HS-SCW-M4x20	HEX SOC HD SCR	M4xP0.7x20L	54	AR6
59	HS-SCW-M4x20	HEX SOC HD SCR	M4xP0.7x20L	64	AR8
60	4040M4	SQUARE NUT	M4xP0.7	28	AR4
60	4040M4	SQUARE NUT	M4xP0.7	38	AR6
60	4040M4	SQUARE NUT	M4xP0.7	48	AR8
61	AX0100021	Y AXIS SLIDE SEAT		1	
62	HS-SCW-M6x30	HEX SOC HD SCR	M6xP1.0x30L	6	
63	AX0100031	BASE		1	AR4
63	AX0100351	BASE		1	AR6
63	AX0100381	BASE		1	AR8
64	W-M6	FLAT WASHER	6.5x15x2T	19	
65	HS-SCW-M6x20	HEX SOC HD SCR	M6xP1.0x20L	16	
66	AX01A0080A	Y AXIS BEARING SEAT		1	AR4
66	AX01A0080B	Y AXIS BEARING SEAT		1	AR6/8
67	A0450.21 KR52-987	Y AXIS DRAG CHAIN	L=987	1	AR4
67	A0450.21 KR52-1269	Y AXIS DRAG CHAIN	L=1269	1	AR6
67	A0450.21 KR52-1551	Y AXIS DRAG CHAIN	L=1551	1	AR8
68	AX0100241	Y AXIS DRAG CHAIN (FIXED PLATE A)		1	
69	AX0100201	Y AXIS BALL SCREW		1	AR4
69	AX0100372	Y AXIS BALL SCREW		1	AR6
69	AX0100392	Y AXIS BALL SCREW		1	AR8
70	AX01A0090	Y AXIS MOTOR SEAT		1	
71	HS-SCW-M5x20	HEX SOC HD SCR	M5xP0.8x20L	2	
72	AX0100281	BASE REAR PLATE		1	
73	HH-SCW-M1Ox45	HEX HD SCR	M1OxP1.5x45L	4	
74	W-M10	WASHER	10.2x25x2T	4	
75	AX01C00044	TABLE FOOT		4	
76	HW-2x60	HEX WRENCH	2x60L	1	
77	AX0100671	OPEN WRENCH	30x21	2	
78	HS-SCW-M6x16	HEX SOC HD SCR	M6xP1.0x16L	3	
79	AX0100331	Y AXIS DRAG CHAIN (FIXED PLATE B)		1	
160	AX01COOOO1	CARTON		1	
161	AX01C00041	OPERATION MANUAL		1	