IMAGINATION TO REALITY

i2R A Series Assembly

bg precision

CNCdrive motion controls

BG Precision

Version 2.0

July 2025

Agent and Appointed Reseller for Australia and New Zealand

BG Precision PTY LTD

Unit 1/82 Brunel Road

SEAFORD

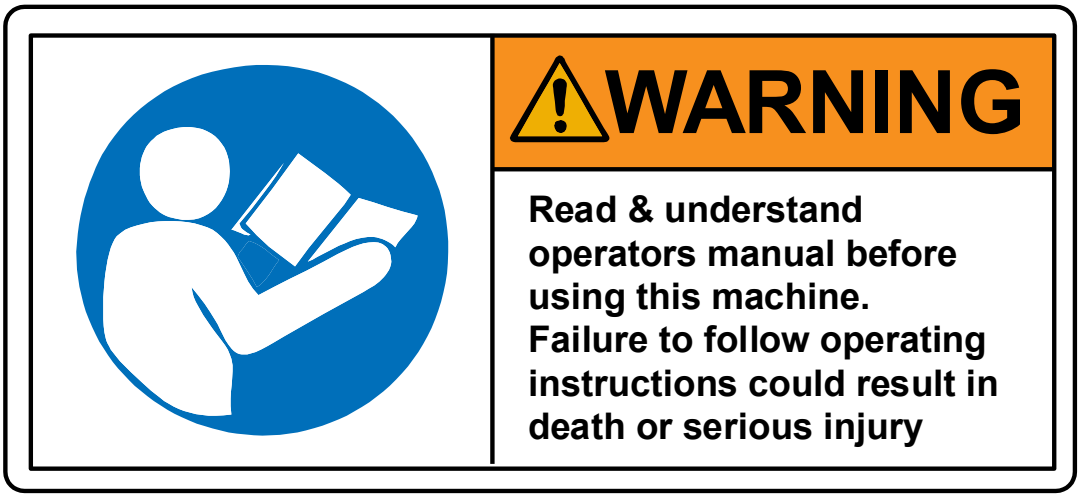
3198 VIC

Australia

Mob: +61 (0)405685515

Email: info@i2rcnc.com.au info@bgprecision.com.au

Website: www.i2rcnc.com.au www.bgprecision.com.au



Before using/powering on the machine, the device should be carefully checked to make sure all connections are secure, and the device is technically sound as highlighted in this user manual.

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

Do NOT Interfere with the machine when under CNC control

NEVER LEAVE THE MACHINE WORKING UNATTENDED

TABLE OF CONTENTS

1 INTRODUCTION

Thank you for purchasing your CNC system from i2R CNC AUSTRALIA / BG Precision PTY LTD. This manual is a general introduction to CNC and specifically how to use the i2R CNC with UCCNC.

Firstly, please inspect the machine and all components after delivery has been received. Please check and ensure all aspects of the machine and associated extra items are in good condition and there is no evidence of damage or wear to any components due to the shipping process.

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

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

- understand what a CNC router/mill/laser is and can do
- read and understood the content of this user manual prior to using the system
- be able to always exercise control of the CNC system
- 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. I2R CNC AUSTRALIA / 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 must 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 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.

If there are any further questions after reading and understanding the manual, or if anything is not clear, please contact us via email, at info@i2rcnc.com.au

2 RECEIVING THE MACHINE

In the case where a machine 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 handle the machines with extreme caution and only use forklifts to move the crated machines on their pallets. Figure 1 shows what a crated A-Series looks like. The steel stand and the toolbox are an optional extra with the machine and will only be packaged together if purchased.

Figure 1: Scope of crated machine delivery

Packaging contents for i2R A-Series CNC machines (A22/A23/A24):

1-Factory Acceptance Test Record

1-Quick Start Guide (Laminated)

1-USB Key containing USER MANUALS and UCCNC Software file

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

1-1/4” ER-20 Collet

1-1/2” ER-20 Collet

4-Rubber bushings

4-Hex Bolts (M10x45)

4-Washers (M10)

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 unpacking process.

- Take care to find all the package contents listed above before disposing of any packaging.
- Do not place any extra load on the machine table during unpacking.
- Do not manually pull or push the machine in any direction.

3.1 SETTING UP THE STAND (OPTIONAL ACCESSORY)

The steel stand and the toolbox are an optional extra with the machine. If you have purchased these then please proceed through the assembly steps if not skip to section 0

Figure 2 i2R CNC Stand Packaging

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

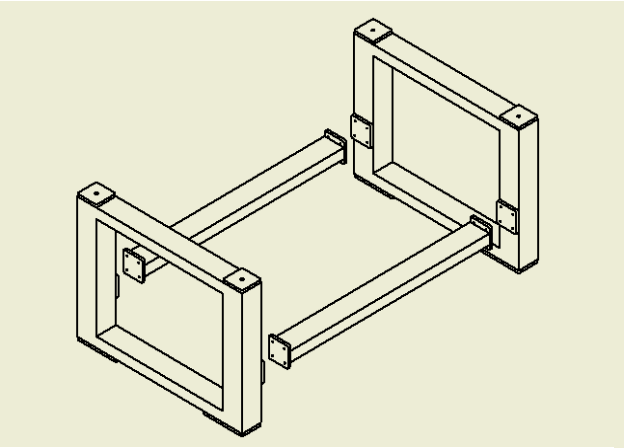


Figure 3: i2R A-Series steel stand assembly overview

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 4 Hardware package contents

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): *(2-person recommended)*

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

1. Thread a loose hex-nut onto each of the levelling feet.

2. Turn the square stand uprights upside down. Do this on top of the cardboard packaging to prevent scratching.

   a. Install the swivel casters using M6 hex bolt, M6 lock washer, and M6 flat washer for each caster. Tighten all the caster hardware securely. Install the levelling feet and drive in until approximately level with the castors. Leave the locknuts finger tight for now as the feet will need adjusting later.

   b. Orientate uprights so the cross-brace mounting plates are facing each other.

   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 do not fully tighten these bolts until the machine is securely fixed on top of the stand** as this makes the machine and stand alignment easier.

Figure 5: Castors and Feet

Figure 6: Bolted connections for stand

As seen in the diagram above (Figure 6 and Figure 7), 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

Figure 7: Bolted connections for stand

- 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 Cross beams of the stand, all the way forward.

   b. The small rubber pads should now be between the flange of the tray and the top surface of the crossbeam. This will help prevent unwanted movement and scratching.

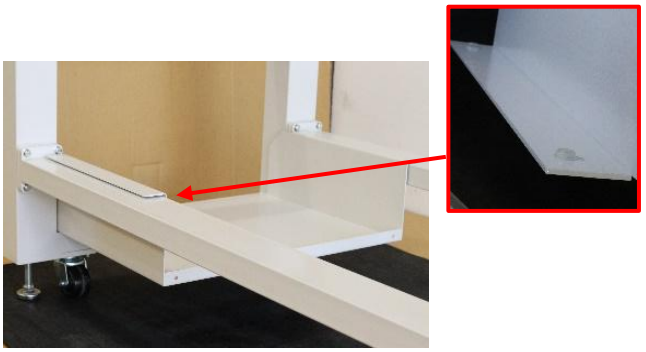


Figure 8: Stand Tray

3.2 TOOLBOX (OPTIONAL ACCESSORY)

This makes the tray supplied with stand redundant which can still remain on the stand as a shelf.

1- This is best done before the machine is place on top of the stand.
2- Turn the tool-box upside down. Install (1) of each hanger on either side of the toolbox using the installed riv-nuts and screws supplied (2 per hanger).
3- Insert the toolbox into the stand, from the top. The hangers will with snugly between the braces on either side of the toolbox.
4- The front can be slid forward to rest within the opening on the stand upright.

Figure 9: Toolbox

Figure 10: Hangers for toolbox

Figure 11: Toolbox in Final Location in stand

3.3 SETTING UP THE MACHINE ONTO THE STAND

To avoid damage, be careful to never lift the router by the gantry. Always lift the i2R CNC machine under the white steel frame. Before any lifting is carried out, you should sight the following components under your i2R CNC Table (Figure 12): the y-axis profile linear rails and y-axis ballscrew. If these precision components are damaged, you must send the CNC machine back to the workshop for replacement at your cost.

Figure 12 Underside of i2R CNC Machine

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. If the machine is being is being lifted by manual handling, you need to assess the number of persons required, and their abilities to carry out this task safely.

Figure 13: Machine setup summary

Damage to the precise alignment of the axes, and possibly other components of the machine is almost guaranteed if any lifting is carried out using the gantry.

Always lift the i2R-A CNC machine under the WHITE STEEL FRAME (BLACK in older models). Best avoided, but if it is necessary to lift using the Aluminium T-Slot Table, you must only lift from close to the white steel frame at the two ends and never any further from it than a hand's-width away. See Figure 14 Lifting the i2R-A CNC.

Figure 14 Lifting the i2R-A CNC

Shown here are two options for lifting the machine safely on to the prepared stand using a forklift. The first method is to lift using the tines directly under the steel frame. The second is using straps. The strap method may also be used as a guide if using a hoist or an 'engine-lifter'.

LIFTING USING FORKLIFT DIRECTLY:

This is the preferred option as it's the most stable and safe one. The tines should never be used in between the T-slot table and the painted steel frame below it. It is almost guaranteed to damage the cable-chain, cables and/or the ball screw.

CAUTION: Examine under the machine table and take extreme care and be aware of the positioning of tines, especially during the initial slide-under phase.

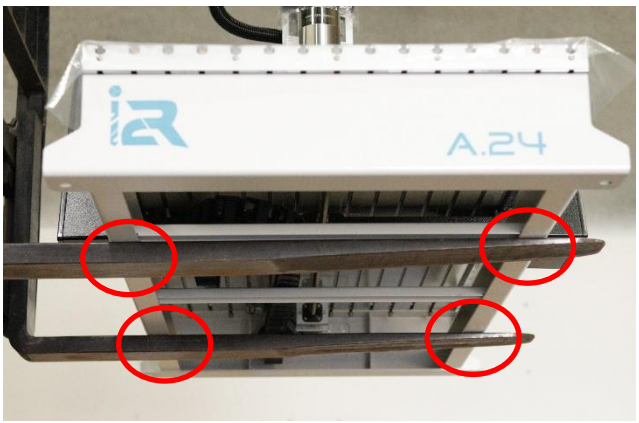


Figure 15 Position of Forklift tines for safe lifting

It is strongly recommended to first manually lift, and place wooden blocks thick enough to permit the tines to pass with clearance under the frame, at each corner of the machine.

LIFTING USING STRAPS:

CAUTION: You must assess the straps and buckles for the loading capacity, and ensure they are fit for purpose and in good condition to lift safely. Strap lifting carries the risk of the machine swinging, sliding and/or shifting unexpectedly. This method should only be carried out only if you are competent in doing so. The points below are not to be considered instructions on doing so. The responsibility for safe lifting practices remains with you. If you need to move the machine, as opposed to just lifting and placing the stand under it, the previous method should be used.

Straps can be easily passed under the frame a short distance away from the frame ends where there is usually a small gap.

Before the straps take load, double-check the routing of the straps to ensure no machine component other than the steel frame is going to engage with the straps.

Carefully lift a short distance, assess that all four corners are lifting evenly. Correct as necessary.

Figure 16 Lifting the i2R with Straps

LOWERING MACHINE ONTO STAND (COMMON FOR BOTH METHODS ABOVE):

Lift slowly until the base of the machine is high enough to just clear the height of the prepared stand. Roll the stand under the machine and gently lower, leaving a small clearance, but allow the M10 bolt to drop through and a hand tighten a few threads into the stand. Fit all four bolts. Now gently lower the machine until it is seated on the stand. If the alignment of the machine to the stand is correct, you should be able to hand-tighten the bolts until it makes contact with the frame.

Do not tighten until all bolts have been threaded. This ensures correct alignment. Observe the rubber bushing, stop tightening just as they start to bulge.

Figure 17: Rubber feet

When the Router Table is securely fixed to the enclosure base and stand assembly you can then proceed to tighten the 4 bolts at each end of the stand cross members.

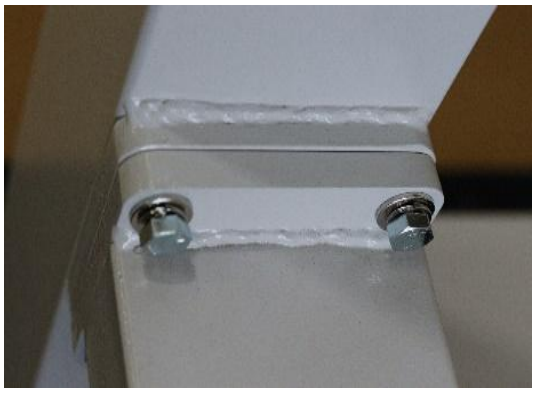


Figure 18: Bolted connections for stand

3.4 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. The Earth wire is bolted to one of these screws
   c. Tighten the two set screws in coupling that attaches stepper motor shaft to the ball-screw.
2- Install plastic cover over stepper motor mount and tighten the two screws.
3- When CNC machine is in final location, lower adjustable feet such that castors are off the ground. Then you can tighten up the locking nut on the adjustable foot to secure it in place and stop if from moving.

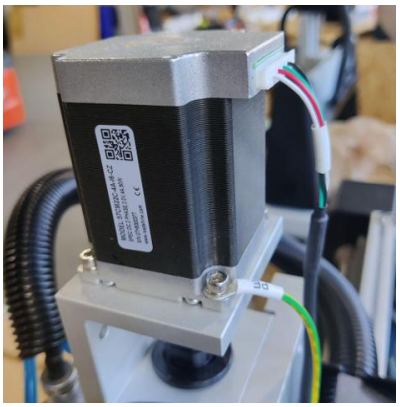


Figure 19: Z axis motor installation

Figure 20: Z axis Coupler

Figure 21: Castors and feet

3.5 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 22)

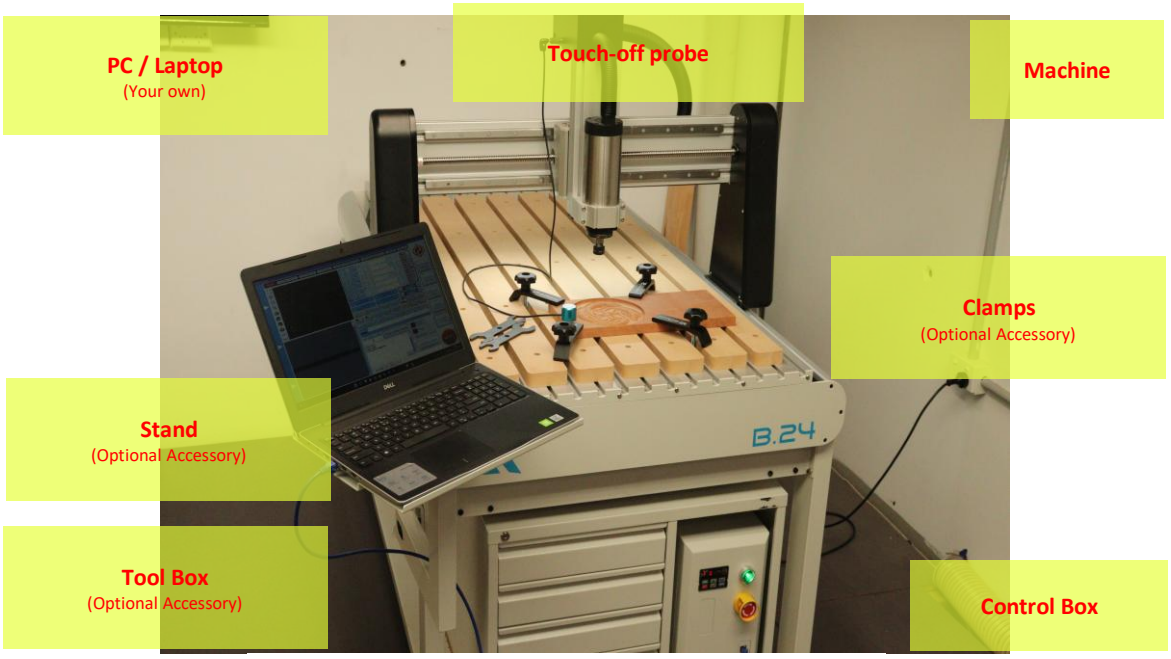


Figure 22: Locate control PC near to machine and control box

3.6 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. For more information on Electrical Connections refer to the main i2R CNC Manual.

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.

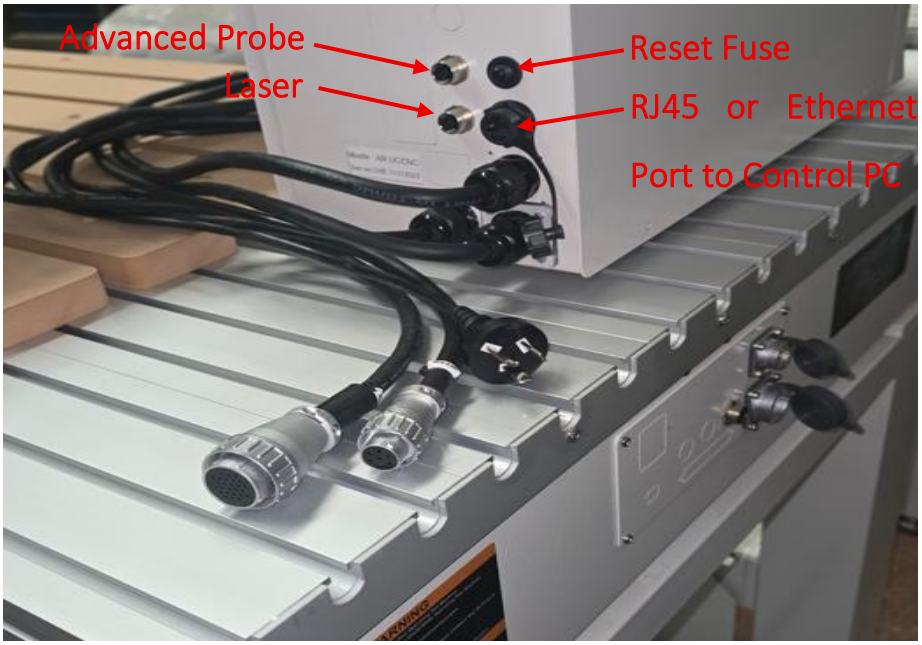


Figure 23: Cable summary out of control box

1) There will be 3 cables coming out of the control box (control box is identified in Figure 23).

- 2 cables will connect to the machine as shown in Figure 22Figure 24
- 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 24: Connections to the back of the machine

WARNING: NEVER CONNECT OR DISCONNECT THESE CABLES WHEN THE CONTROL BOX IS POWERED ON

Figure 25: Green power switch and estop on the controller

2) Check the Green switch (shown in Figure 25) on the front of the controller box

- Switch should be clicked anticlockwise for OFF!
- NOTE Figure 25 shows switch in the OFF position
- Switch OFF before plugging into mains supply

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. (Shown in Figure 25)

- **Error! Reference source not found.**Rotate the green switch clockwise to the ON position
- The switch should light up green (you might hear a small clunk from motors engaging)
- Connect the Ethernet port found on the back of the control box with a RJ45 lead to the control PC (connection sequence not important)
- You are now ready to setup the UCCNC controller and run your CNC router!

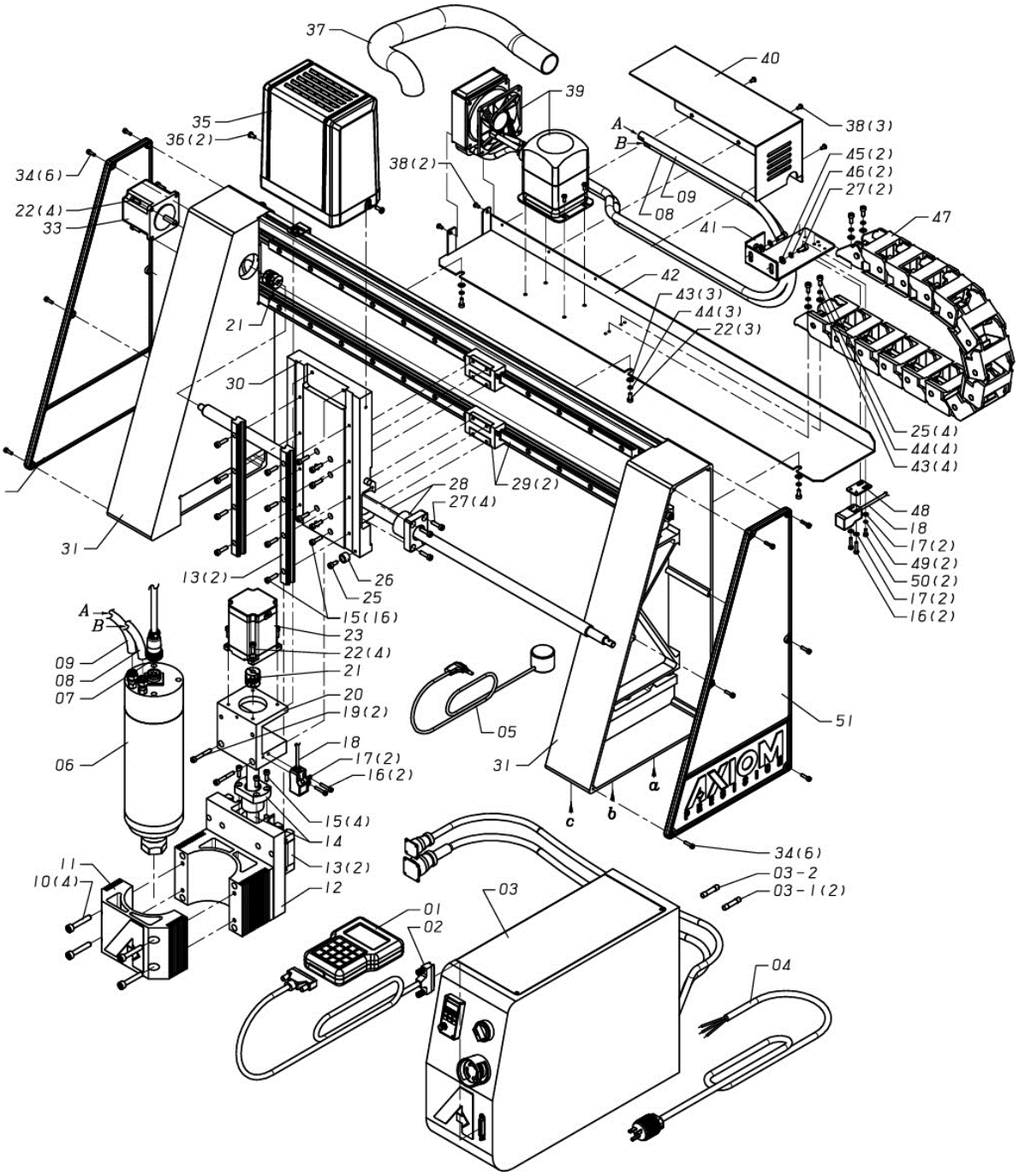
4 TECHNICAL SPECIFICATIONS

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	•	•	•

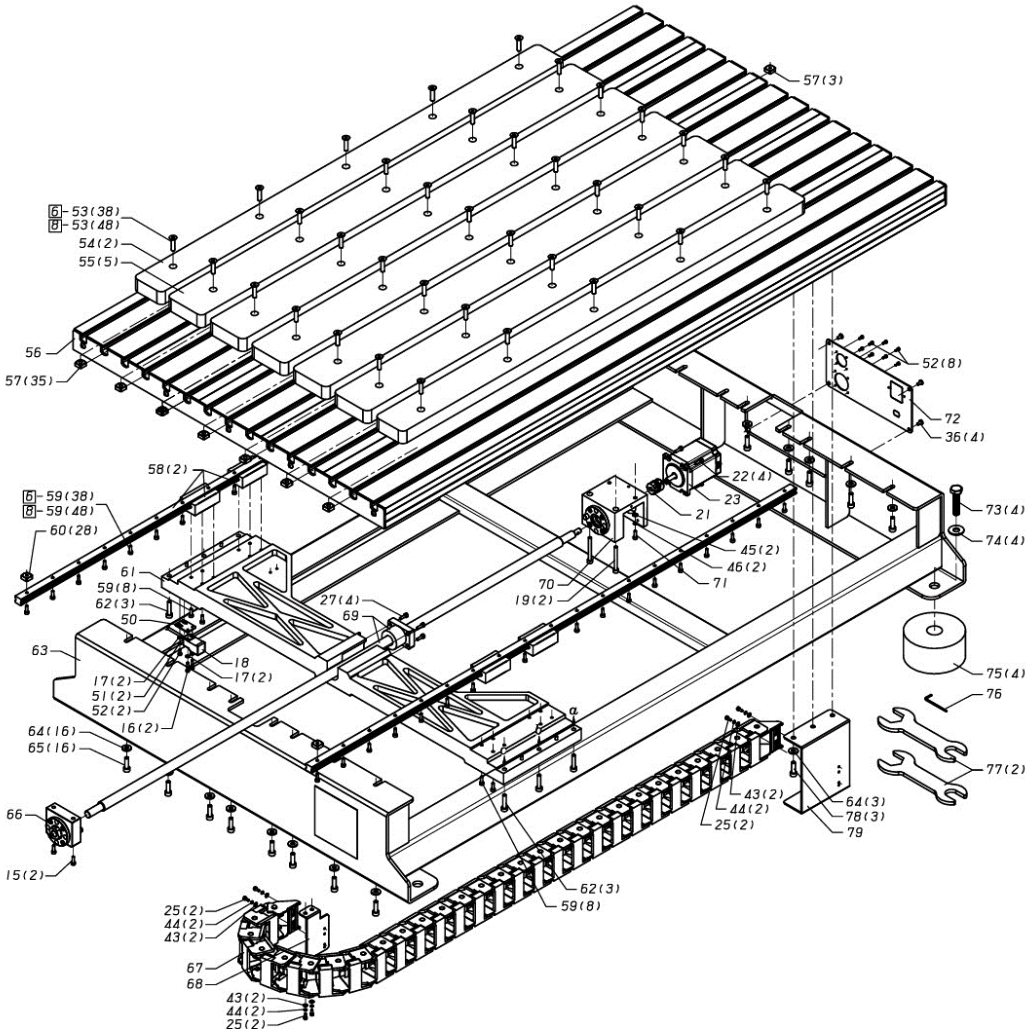
Gantry Bridge	High Rigidity Aluminium Extrusion	•	•	•
Gantry Support	Gravity Cast Aluminium Alloy	•	•	•
Gantry Clearance	165mm	•	•	•
Machine Base	Welded Structural Steel Frame	•	•	•
Machine Footprint	890mm x 770mm	•		
	1197mm x 770mm		•	
	1495mm x 770mm			•
Required Floor Space	995mm x 949mm	•		
	1300mm 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



A-Series 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	AXO1BOO1O	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	GDZ.23-1C@80/2.2	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	AXO1AOO1O	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	M4xPO.7x16L	20	
16	HS-SCW-M3x16	HEX SOC HD SCR	M3xPO.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	M5xPO.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	M4xPO.7x12L	15	
23	TK268D-02A5	STEPPER MOTOR	TK268D-02A5	2	
25	HS-SCW-M4x10	HEX SOC HD SCR	M4xPO.7x10L	7	
26	AX0100750	RUBBER PAD	12x8	1	
27	HS-SCW-M5x12	HEX SOC HD SCR	M5xPO.8x12L	10	
28	AX0100070	X AXIS BALL SCREW	L=795	1	
29	BGXS15BN-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	M3xPO.5x10L	12	
35	AX0100140	TOP HOUSING		1	
36	THP-SCW-M4x10	TRUSS HD PHILLIPS SCR	M4xPO.7x10L	6	
37	CRS-25P	FLEX TUBE	40x500L	1	
38	RHP.SCW.M3x6	ROUND HD PHILLIPS SCR	M3xPO.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	M4xPO.7x20L	44	AR4
59	HS-SCW-M4x20	HEX SOC HD SCR	M4xPO.7x20L	54	AR6
59	HS-SCW-M4x20	HEX SOC HD SCR	M4xPO.7x20L	64	AR8
60	4040M4	SQUARE NUT	M4xPO.7	28	AR4
60	4040M4	SQUARE NUT	M4xPO.7	38	AR6
60	4040M4	SQUARE NUT	M4xPO.7	48	AR8
61	AX0100021	Y AXIS SLIDE SEAT		1	
62	HS-SCW-M6x30	HEX SOC HD SCR	M6xP1.Ox30L	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	M5xPO.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.Ox16L	3	
79	AX0100331	Y AXIS DRAG CHAIN (FIXED PLATE B)		1	
160	AXO1COOOO1	CARTON		1	
161	AX01C00041	OPERATION MANUAL		1	