

# IQ HHC CNC Router Manual



LAGUNA TOOLS  
17101 Murphy Ave.  
Irvine, California 92614  
Ph: 800.234.1976  
[www.lagunatools.com](http://www.lagunatools.com)

Part No. MCNC IQ HHC 24" x 36" CNC  
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## Dear Woodworker

Thank you for your purchase and welcome to the Laguna Tools group of discriminating woodworkers. I understand that you have a choice of where to purchase your machines and appreciate the confidence you have in our products.

Every machine sold by Laguna Tools has been carefully designed and well thought through from a woodworkers perspective. I cut on our bandsaws, lathes, tablesaws, combination machines, and CNC Routers. Through my hands-on experience, I work hard to make our machines better. I strive to give you machines that inspire you to create works of art. Machines that are a joy to run and work on. Machines that encourage your performance.

Today, we offer high-performance machines with innovative solutions that meet the needs of woodworkers and their ever-evolving craft.

I started Laguna Tools as a woodworker, I still am.

Thank you again for becoming a Laguna Tools customer.

Torben Helshoj  
President and Founder - Laguna Tools  
Imagination, Innovation and Invention at work.

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# Safety Rules

As with all machinery, there are certain hazards involved with the operation and use of your machine. Using it with caution will considerably lessen the possibility of personal injury. However, if normal safety precautions are overlooked or ignored, personal injury to the operator may result. If you have any questions relating to the installation and operation, do not use the equipment until you have contacted your supplying distributor.

Read the following carefully and fully before operating the machine.

1. Keep the working area clean and ensure adequate lighting is available.
2. Do not wear loose clothing, gloves, bracelets, necklaces or ornaments.
3. Do wear face, eye, respiratory and body protection devices as indicated for the operation or environment.
4. Ensure that the power is disconnected from the machine before tools are serviced or any attachment is to be fitted or removed.
5. Never leave the machine with the power on.
6. Do not use dull, gummy or cracked cutting tools.
7. Ensure that the keys and adjusting wrenches have been removed and all the nuts and bolts are secured.



## Limited Warranty

New woodworking machines sold by Laguna Tools carry a one-year warranty effective from the date of shipping. Machines sold through dealers must be registered with Laguna Tools within 30 days of purchase to be covered by this warranty. Laguna Tools guarantees all new machine sold to be free of manufacturers' defective workmanship, parts and materials. We will repair or replace, without charge, any parts determined by Laguna Tools, Inc. to be a manufacturer's defect. We require that the defective item/part be returned to Laguna Tools with the complaint. In the event the item/part is determined to be damaged due to lack of maintenance, cleaning or misuse/abuse, the customer will be responsible for the cost to replace the item/part, plus all related shipping charges. This limited warranty does not apply to natural disasters, acts of terrorism, normal wear and tear, product failure due to lack of maintenance or cleaning, damage caused by accident, neglect, lack of or inadequate dust collection, misuse/abuse or damage caused where repair or alterations have been made or attempted by others.

Laguna Tools, Inc. is not responsible for additional tools or modifications sold or performed (other than from/by Laguna Tools, Inc.) on any Laguna Tools, Inc. woodworking machine. Warranty maybe voided upon the addition of such described tools and/or modifications, determined on a case-by-case basis.

Normal user alignment, adjustment, tuning and machine settings are not covered by this warranty. It is the responsibility of the user to understand basic woodworking machinery settings and procedures and to properly maintain the equipment in accordance with the standards provided by the manufacturer.

Parts, under warranty, are shipped at Laguna Tools, Inc.'s cost either by common carrier, FEDEX ground service or a similar method. Technical support to install replacement parts is primarily provided by phone, fax, e-mail or Laguna Tools Customer Support Website. The labor required to install replacement parts is the responsibility of the user.

Laguna Tools is not responsible for damage or loss caused by a freight company or other circumstances not in our control. All claims for loss or damaged goods must be notified to Laguna Tools within twenty-four hours of delivery. Please contact our Customer Service Department for more information.

Only **new** machines sold to the original owner are covered by this warranty. For warranty repair information, call **1-800-332-4094**

## Noise Emission

### Notes concerning noise emission:

Given that there exists a relationship between noise level and exposure times, it is not precise enough to determine the need for supplementary precautions. The factors affecting the true level of exposure to operators are clearly the amount of time exposed, the characteristics of working environment, other sources of dust and noise, etc. For example, adjacent machines may impact the level of ambient noise. It is also possible that exposure level limits will vary from country to country.

## Specification Sheet

<b>Spindle</b>	3HP Industrial Induction Spindle, Liquid Cooled
<b>Spindle RPM</b>	6,000 – 24,000 RPM
<b>Controller</b>	Laguna Hand-held controller
<b>Ball Screw</b>	On all axes
<b>Voltage</b>	220V / 30 amp single phase
<b>Gantry Clearance</b>	6 inches (152mm)
<b>Machine Work Table</b>	24 inches x 36 inches (610mm x 914mm)
<b>Machine Foot Print</b>	50 1/2 inches x 32 inches (1283mm x 813mm)
<b>Work Envelope</b>	24 inches x 36 inches (609mm x 914mm)
<b>Weight</b>	425lb (193kg)

## Receiving Your Machine

### Note:

It is probable that your machine will be delivered by a third party. Before you unpack your machine, you will first need to inspect the packing, invoice, and shipping documents supplied by the driver.

Ensure that there is no visible damage to the packing or the machine. You must do this prior to the driver leaving. All damage must be noted on the delivery documents and signed by you and the delivery driver. You must then contact the seller, Laguna Tools, within 24 hours. It is advisable to photograph any shipping damage to support an insurance claim.

**Note:** Laguna Tools, Inc. endeavors to test each machine prior to shipping, and you may find sawdust in or on your machine.

# Glossary of Terms

**Ball End Milling Cutter** - A milling cutter that has a rounded cutting diameter at its end that is equal to the cutting diameter.

**DXF file** - Drawing exchange format file that was created as a standard to freely exchange 2- and 3-dimensional drawings between different CAD programs. It basically represents a shape as a wire frame mesh of x, y, and z coordinates (vectors).

**Encoder** - Typically an optical device that consists of a disk with 100 to 1000 holes on its periphery. The most common is the incremental encoder that has a small LED light source on one side of the disk with a diode detector on the other to allow the disk rotation to be monitored in discrete incremental steps. Hence, a full revolution can be broken up into hundreds or even thousands of position steps.

**G-Code** - The standard machine tool language around the world. It generally consists of specifying the x, y, or z (and a, b or c) coordinates that the machine is to move to. Such movement can be linear, circular or even special drilling operations. It is the universal language of all modern machine tools (mills, lathes, EDM machines, etc.).

**M-code** - The standard machine tool codes that are normally used to switch on the spindle, coolant or auxiliary devices. They can also be used for G-code program control such as repeating the program or ending it.

**Servo Motor** - A motor that is typically a brush or brushless DC type with an optical encoder attached to it. It is used in what is called a Servo Loop system where positioning information is constantly tracked by minimizing the error between the commanded and real position.

**Step Motor** - A motor that derives its motion by receiving input signals (pulses) in a very specific sequence. The most common type is one that rotates 1.8 degrees for each input pulse. This provides a very simple way of controlling motion very precisely with the use of common digital logic circuitry.

**STL file** - Stereo lithography file format that has traditionally been associated with stereo lithography prototyping machines, but is now also being used to represent 3D surfaces for CNC tool path generating programs.

**Tool Path** - A series of vector coordinate positions that define a cutting path. This cutting path can be a simple 2D or sophisticated 3D (even 4D or more) path used to machine out the shape of a desired part.

**Vector** - A line that has both length and direction. It is usually specified by a starting x, y, or z coordinate position and ending x, y, or z coordinate position.

**DRO** – Digital read-outs, shows the axis positions in the interface.

**MDI** – Manual data entry, used for entering commands manually, line by line.

**CAD** – Computer-aided design, the using of computers to assist and develop design.

**CAM** – Computer-aided manufacturing, the use of computers to assist in manufacturing.

**CNC** – Computer numerical control.

**Command** – A signal or series of signals that initiates one step or series of steps in the execution of a program.

**Feed Rate** – A multi character code containing the letter F followed by digits that determine the machines rate of movement.

**H.M.I** - Human machine interface.

**O.I.T** – Operator interface terminal.

**H.P.** -- Home point.

**O.P.** -- Origin point also known as zero point offset. This is the point where the program starts at on the spoil board.

# Introduction to IQ Machines

The IQ is designed to give you years of safe service. Read this owner's manual in its entirety before assembly or use.

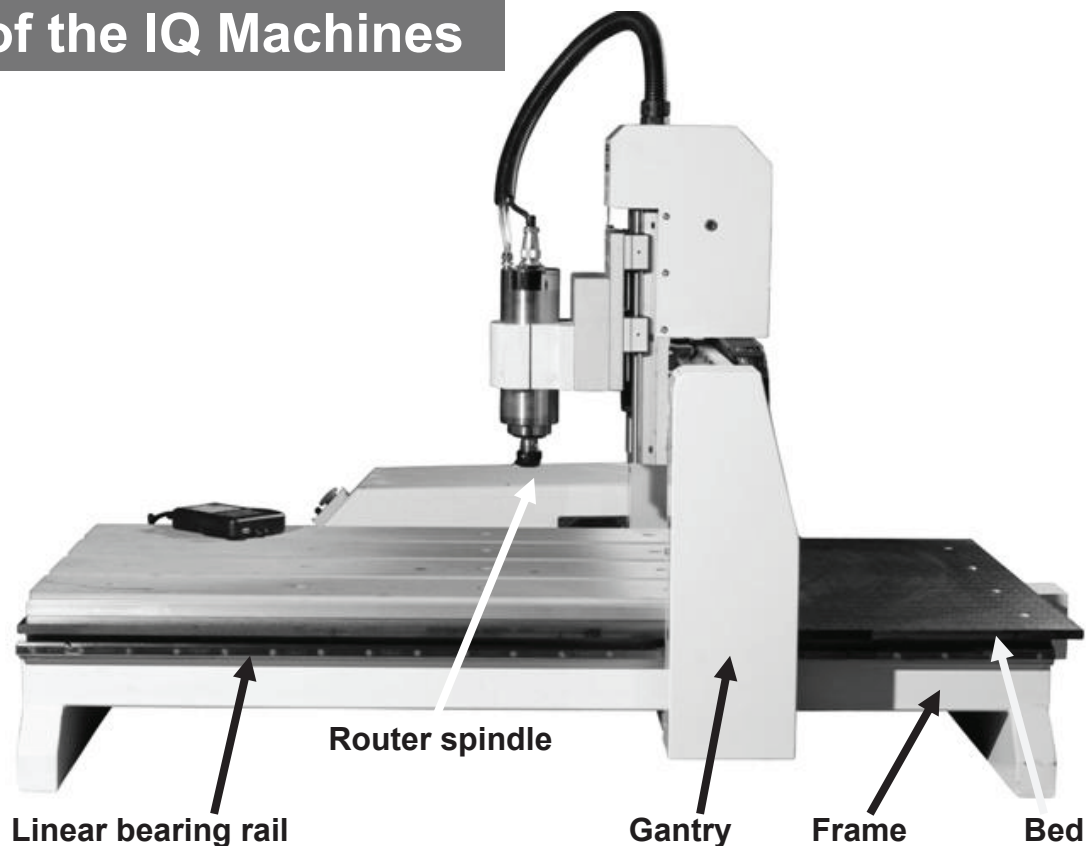
The advantage of the IQ machine is that it can, in most cases, fully machine the complete job without it being removed from the table so that you have finished parts of high accuracy that are totally repeatable.

It can, with the purchase of the relevant software, also produce intricate carvings.

Nesting is also a valuable feature of IQ machining that saves on waste and cost.

It is possible to reduce the number of different machines in the shop, as the IQ will perform multiple functions and is a must for serious woodworkers.

## Parts of the IQ Machines



### Bed

The bed of the machine consists of a sheet of HDPE that is supported by the heavyduty steel frame. The bed supports the spoil boards and T-slots. The spoil board is used to allow the cutter to cut past the protect and not become damaged. The spoil boards have to be refaced periodically and eventually will have to be replaced. The T slots can be used to clamp the job to the spoil board.

### Linear bearing rails

There is a bearing rail on both sides of the frame. The bearing rails guide the gantry as it travels along the frame of the machine.

## Router Spindle

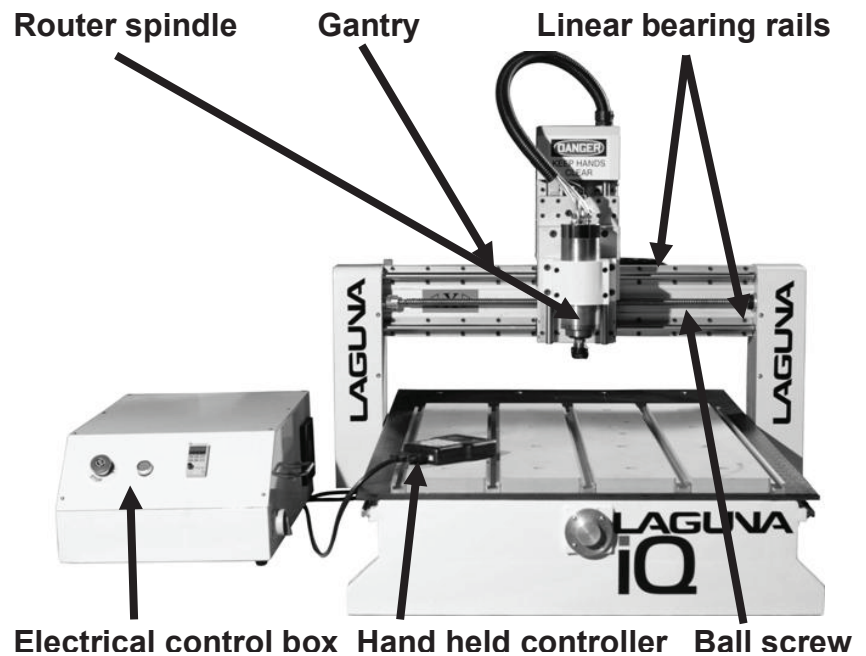
The router spindle is very high precision and water-cooled. The router spindle is moved in the three axes by precision ball screw system that are controlled by the machine controller.

## Frame

The frame is a welded heavy steel tubular construction that supports all the other parts of the machine.

## Gantry

The gantry straddles the bed and carries the router spindle motion system. It is moved along the length of the bed by the ball screw and is guided by the linear bearing rails. The gantry is controlled by the machine controller.

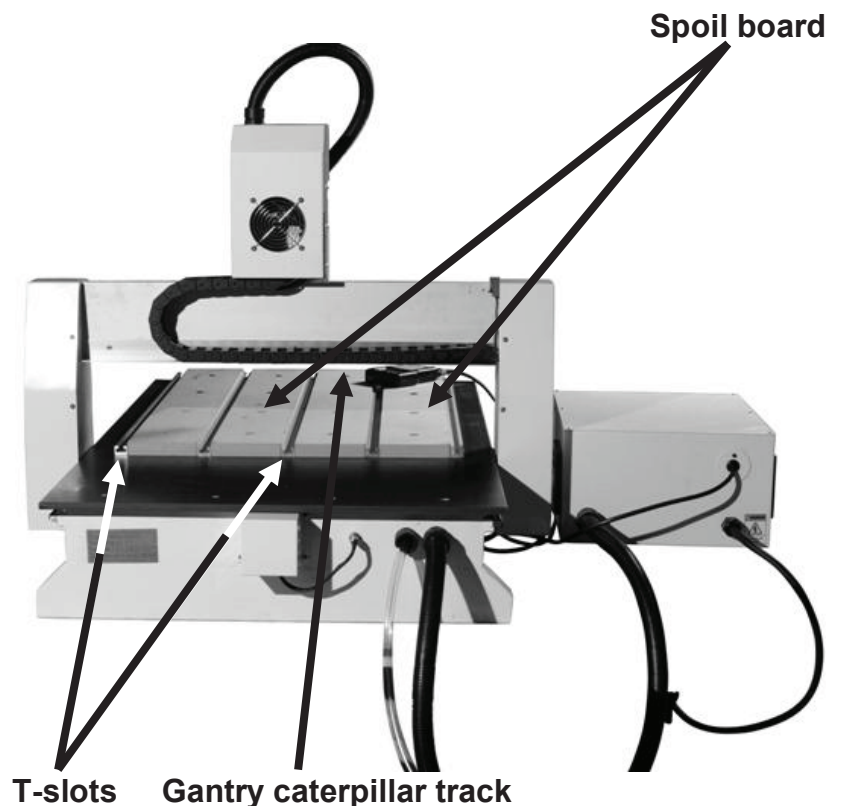


## Ball screw

There are three ball screws, one for each axis. Each ball screw is driven by a stepper motor and moves the router spindle in the X, Y and Z directions.

## Gantry caterpillar track

The caterpillar track runs along the side of the machine in a trough and carries all the electrical cables and the spindle cooling tubes. There is a second caterpillar track under the bed of the machine that carries the electrical cables for the longitudinal movement.





### Water pump

The water pump provides coolant for the router spindle motor. Running the router spindle without the cooling pump running can lead to spindle bearing failure. The pipe connector is push fit and is used for connection of the spindle water pipe. The water pump is 110 v.

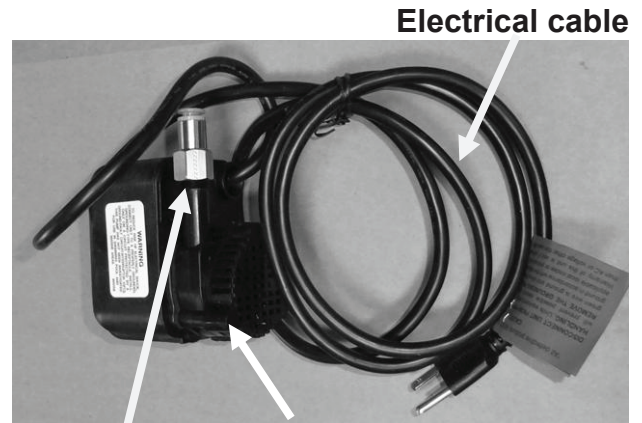
### Hand-held controller

The hand held controller controls all the functions of the IQ.

**For assembly and use of the hand held controller see hand held controller manual.**

### Electrical control box

The electrical control box is attached to the machine by a flexible conduit and can be located close to the machine (preferably on a shelf under the machine). The electrical control box houses all of the electrical components. There is an emergency stop switch, on/off switch, main electrical isolation switch and spindle controller/display. There are carry handles on the sides of the box. The mains power cable is located at the back of the box.



Electrical cable

Pipe connector Water pump



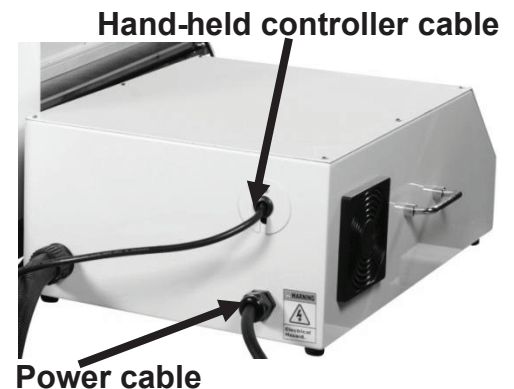
Hand-held controller

On/off switch Spindle controller/display



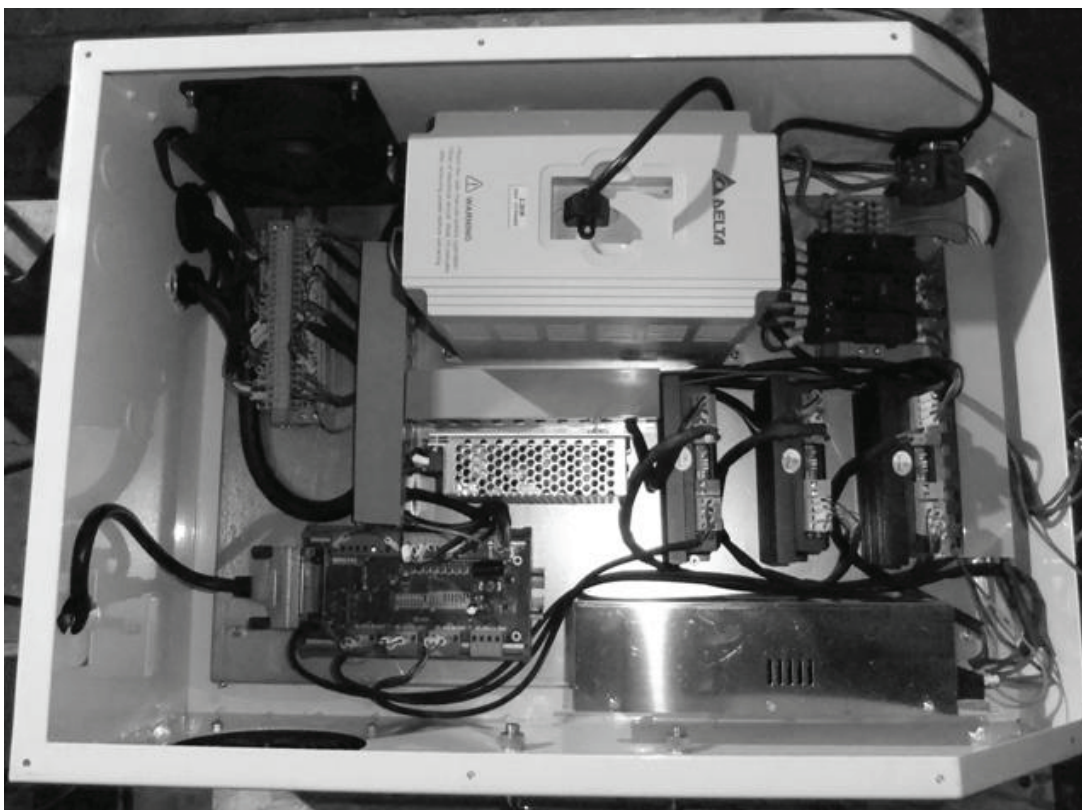
Emergency stop switch

Isolation switch

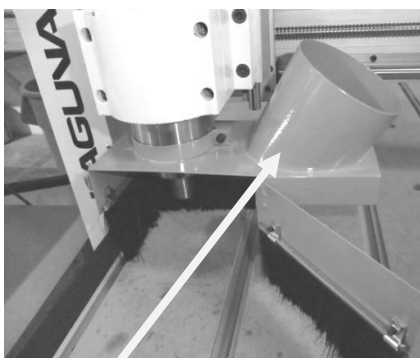


Hand-held controller cable

Power cable



**Electrical control box with the lid removed**



**Dust hood**

### **Dust hood (optional)**

The optional dust hood fits onto the router spindle and takes a 4-inch dust hose. It has a hinge side panel for easy access to the router spindle.



# Additional instructions for the use of the IQ

Like all machines, there is danger associated with the machine. Injury is frequently caused by lack of knowledge or familiarity. Use this machine with respect. If normal safety precautions are overlooked or ignored, serious personal injury may occur.

**As the IQ is under the control of the onboard machine controller, it is important that you are clear of the cutter and moving parts when operating the machine.**

## Where to Locate Your Machine

The IQ is table mounted (**TABLE NOT SUPPLIED**). The table must be of a robust construction, as the IQ is heavy and need to be adequately supported. The table should have a shelf to support the electrical control box. Before you unpack your machine, select the area where you will use your machine. There are no hard-and-fast rules for its location, but here are a few guidelines:

1. There should be an area around the machine suitable for the length of wood that you will be machining.
2. Adequate lighting: the better the lighting, the more accurately and safely you will be able to work.
3. Solid floor: you should select a solid flat floor, preferably concrete or something similar.
4. Situate the machine close to the power source and dust collection.

## Unpacking the Machine

To unpack your machine, you will need tin snips, a knife and a wrench.

1. Using the tin snips, cut the banding that is securing the machine to the pallet (if fitted).

**WARNING: EXTREME CAUTION MUST BE USED, AS THE BANDING WILL SPRING AND COULD CAUSE INJURY.**

2. Remove the box from the IQ machine (if fitted) and any other packaging material. The parts ordered with the machine will be packed on or inside the machine.

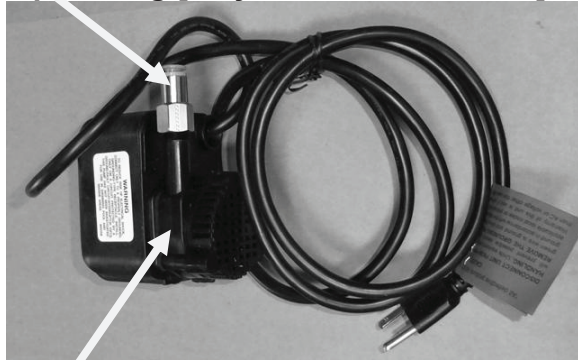
**Note:** The machine is heavy, and if you have any doubt about the described procedure, seek professional assistance. Do not attempt any procedure that you feel is unsafe or that you do not have the physical capability of achieving.

3. Use a forklift with sufficient lifting capacity and forks that are long enough to reach the complete width of the machine.
4. Remove the securing bolts that attach the machine to the pallet (if fitted).
5. Approaching the machine from the side, lift the machine on the frame, taking care that there are no cables or pipes in the area of the forks.
6. Move the machine to the required position and lower it gently onto the support table (not supplied).
7. Level the machine so that the machine is level in both directions. The weight of the machine must be taken on each corner and no rocking is taking place.

## Cleaning the IQ

Clean off any protection grease with WD40 or something similar. Re-lubricate the IQ with a Teflon-based lubricant or wax. The machine has steel parts that if not protected will rust. Teflon has a tendency to dry and has fewer tendencies to accumulate dust and dirt. Use 30w oil or lithium white grease lubricant or equivalent to lubricate the ball screws. Wipe off any excess to reduce dirt and dust accumulation.

Pipe fitting [may be loose not fitted]

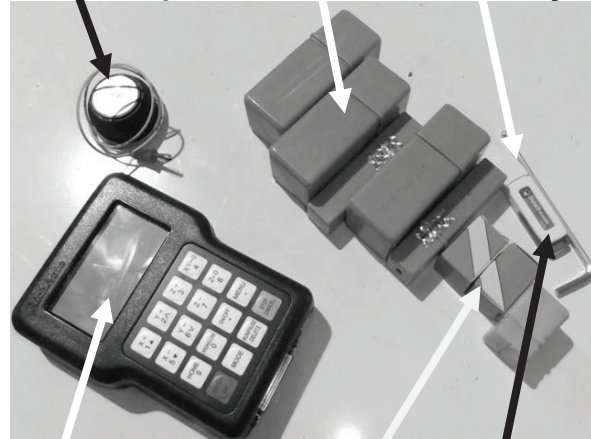


Water pump

Touch off puck

Cutters

Allen key



Hand held controller

Collets

Memory stick

Tools



Tool box



Spare drive belt



Clamps

## Assembling your Machine

The IQ comes almost fully assembled with the exception of the water pump (optional), hand held controller, dust hood (optional), touch-off puck and connecting the electrical supply.

## Levelling the IQ

It is suggested that the machine is mounted on a strong table. You might find that it is an advantage to mount the IQ on rubber pads (not supplied) to act as antivibration mounts. This will be dependent on your setup. It is suggested the table has a shelf to accommodate the water container and the electrical control box.

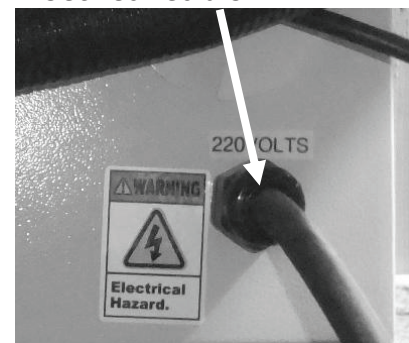
# Electrical Connections for the Machine

The main power cable may not have a plug fitted, as it will be dependent on your installation. Ensure that when installing the electrical supply to the machine, 220v single phase is supplied. It is recommended that you use a 30-amp breaker.

**Note:** When wiring the machine to your electrical system, keep your cable as short as possible. The cable should not be allowed to run along the floor, as this will cause a trip hazard.

**Note:** A qualified electrician must carry out the electrical installation, and all local electrical codes must be adhered to.

Electrical cable



View at the back of the electrical cabinet

## Water-cooled Spindles

Water-cooled spindles will be provided with a 110-volt spindle cooling pump. It is suggested that you power the submersible pump with a GFI protected cord or outlet. The submersible pump needs to be submerged in a minimum 5-gallon reservoir of water (the bigger the water tank the better). The pump **MUST** be running prior to switching on the spindle. Never run the spindle without cooling, or the spindle will be damaged or destroyed. **(WITHOUT WATER FLOWING THROUGH THE SPINDLE THE SPINDLE WILL OVERHEAT AND FAIL.)**

## Connecting the Water Pipes to the Machine

There are two water tubes that come out of the front of the IQ. These are used to provide cooling for the liquid-cooled router spindle.

**Note:** Never run the motor without the cooling being connected, or the motor could be damaged.

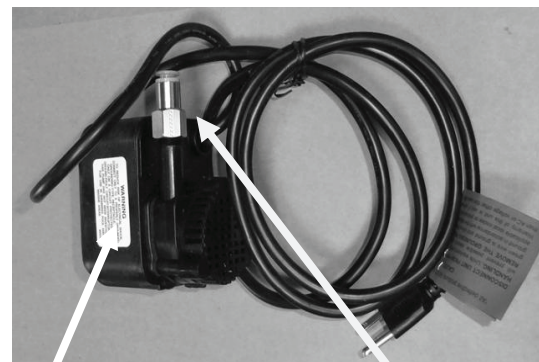
You will connect one tube to the water pump, and the other will be placed in the water container for the return water. It is not important which pipe is used as the return.

Fit the pipe fitting to the pump.

Connect one of the coolant pipes to the water pump by pushing it into the connector.

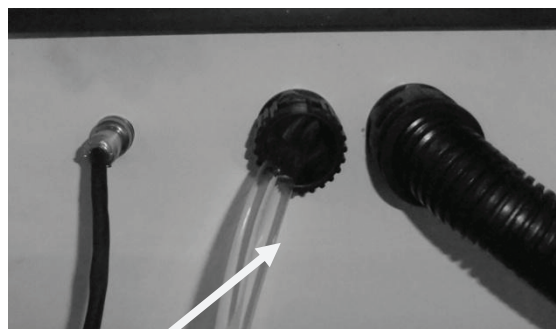
Lightly pull on the pipe to ensure that it is connected correctly.

Note the water pump design may vary to the one shown

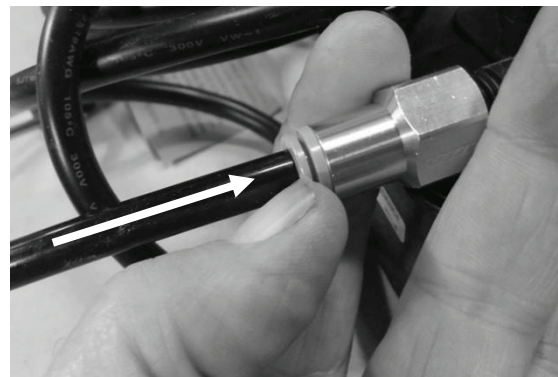


Water pump

Pipe fitting



Coolant pipes



Fitting the water pipe



Fill a container about 3/4 full with clean water.

If the pipe needs to be removed from the pump, press the outer ring into the fitting and gently pull the pipe out of the fitting.

**Note:** You will need to provide a coolant tank with a minimum capacity of 5 gallons. If the shop temperature is high, the tank size will need to be larger. If your shop is likely to be subject to freezing temperatures, antifreeze must be added to the cooling water.

Lower the water pump into the container ensuring that it is the correct way up (water inlet lowest) and place the water return pipe into the container.

The logical position for the water container is close to the IQ, as the water pipes exit the machine at the front. It is suggested that the water container is located under the machine at the front on a shelf. This will keep the container off the floor and avoid it being kicked over.

Once the assembly is complete and the water pump electrical connection has been made, lift the water return pipe up and check that the water is flowing.

Place the lid onto the container to keep dust and dirt out of the container.

Check the container periodically as the water will evaporate.

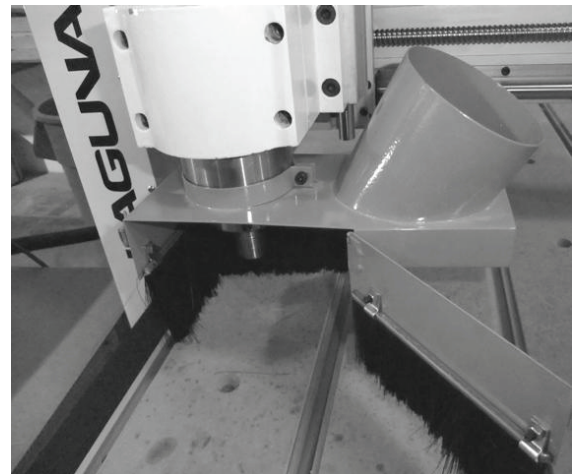
**Note:** If the spindle is run without cooling, it could be damaged and fail. It is strongly suggested that the water pump is run for at least 5 minutes after the spindle is switched off to remove residual heat.

## Fitting the Optional Dust Hood

Connect the dust hood to the spindle and tighten the clamping screw.

Connect the dust extraction hose to the dust hood. Ensure that the hose is tightly connected to the dust hood; you do not want it to fall off while you are using the machine.

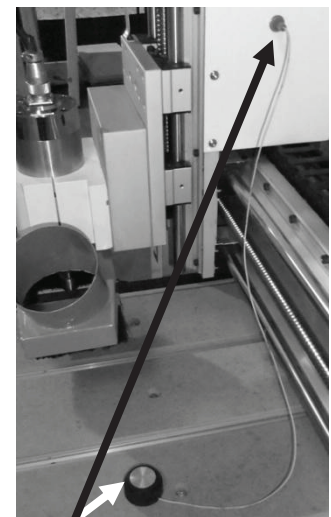
**Note:** The dust hood has a door at the side to allow access to the spindle collet.



Dust hood

## Fitting the Touch-off Puck

The touch-off puck is plugged into the socket on the side of the router head. Only plug the touch-off puck into the socket when in use. Never have the touch-off puck plugged in while machining, or it could become damaged.



Touch-off puck

# Fitting the Router Bit into the Router Head

**Note:** Before changing or fitting the router bit, always disconnect the power to the machine.

**Note:** Collets and spindle collet holes must be cleaned regularly. Ensure that the slots in the collet are free of sawdust, as sawdust builds up and will stop the collet from compressing. If the collets or spindle holes are not clean, the router bit may not run true, and this will affect the performance of your machine.

1. Select a router bit and its relevant collet.
2. Fit the collet into the spindle nut. Press the collet into the spindle nut until it snaps into place.

**Note:** The router bit must not be fitted into the collet until the collet has been fitted into the spindle nut.

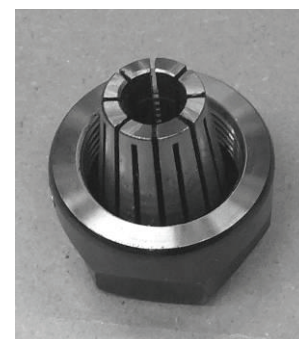
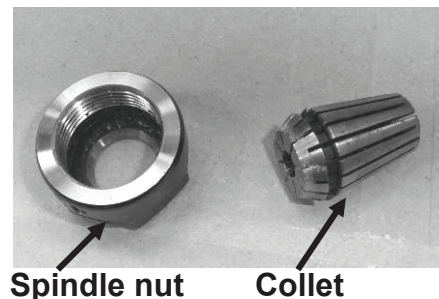
With the router bit fitted into the collet, the collet cannot compress and snap into the spindle nut.

The face of the collet and the face of the spindle nut will be close to flush.

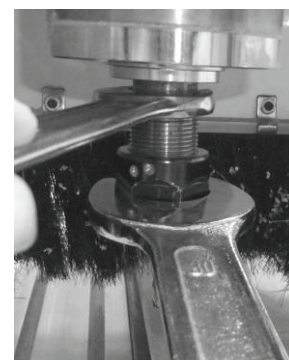
**Note:** To remove the collet, hold the spindle nut and press the collet on the side. The collet will compress and pop out. Do not try to remove the collet while a cutter is fitted, as the collet will not compress and pop out.

3. Fit the spindle nut and collet assembly onto the spindle thread by hand.
4. Press the bit into the collet, but note that the flute of the router bit must not be inside the collet and should be a minimum of 1/16" outside the collet. Hold the router spindle with the supplied wrench and tighten the collet with a second wrench. Do not over-tighten.

**Note:** Use this process for all other router bits that you need to fit, but note that you will have to change the collet if the shank of the router bit is a different size.



**Collet fitted to spindle nut**



**Tightening the spindle nut**

## Types of Router Bits

There are five basic types of router bits: straight, up shear, down shear, combination (also called compression), and form tools (round over, ogee, etc.).

### 1. Straight Router Bits

These are the standard router bits that are commonly used with handheld routers and are readily available at home centers.

### 2. Up Shear Router Bits

These bits have flutes that are spiraled upward (a standard twist drill is an example of this type of bit). This bit design removes the chips from the kerf but has a tendency to chip the top surface, especially veneers or melamine surfaces.

Ball Nose Router Bits are a variation of the up shear bit design but have a radiused end. These bits are typically used for 3D surfacing applications.



**Router Bits**

### 3. Down Shear Router Bits

These bits are similar to the up shear but with an opposite spiral that tends to pack the chips into the kerf. These bits prevent chipping the material surface, especially with veneers or melamine surfaces.

### 4. Combination (Compression) Router Bits

These bits combine the advantages of both up shear and down shear designs. The top section of the tool is down shear to prevent chipping the top surface of the material, and the lower part of the bit is up shear to prevent chipping the bottom surface of the material.

Combination Router Bits are the preferred configuration for machining veneered plywood as well as melamine-surfaced products. A variation of the bit is called the "Mortising Compression" router bit. With this bit, the up shear portion of the bit is less than 1/4" in length so that the bit can be used on 1/4" veneered plywood and for dados.

### 5. Form Router Bits

Form Router Bits typically are available in standard profiles such as round over, ogee, etc. Router bits that have a shape associated with them would be classified with this group.

## Spindle Speed Control

Only three buttons are operator accessible, ARROW UP, ARROW DOWN and STOP KEY. ARROW UP button is used to raise the spindle speed.

ARROW DOWN button is used to lower the spindle speed.

**Note:** Do not set the hertz lower than 100, as this will labor the motor and could cause motor failure. The stop key is available to stop spindle during a program activation.

**Note:** It is strongly recommended that the stop button is not used and the spindle is stopped using the hand held controller.

Display reads in hertz, 200hz = 12,000RPM, 300hz = 18,000RPM, 400hz = 24,000RPM.

**Note:** 1hz = 60 RPM.

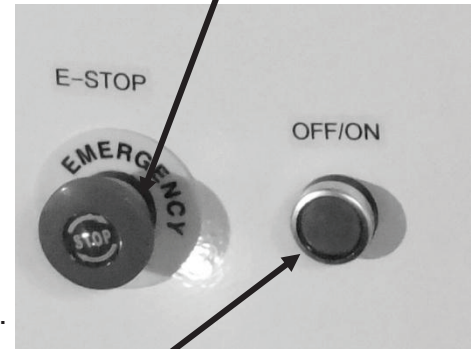


Display Hertz	R.P.M.
100	6000
150	9000
200	12000
250	15000
300	18000
350	21000
400	24000

## DO'S AND DON'TS

1. **DO** verify water level in the spindle reservoir.
2. **DO** lubricate all ball screws every 8 hours of run. Use 30w oil or lithium white grease lubricant or equivalent to lubricate the ball screws. Wipe off any excess to reduce dirt and dust accumulation.
3. **DO** keep your collets clean, as fine dust builds up and they get tight.
4. When doing carving work, it is necessary to use a much larger volume of water for the spindle-cooling reservoir.
5. **DO NOT** ever, under any circumstances, reach over the table or obstruct the movement of the gantry while the machine is powered or running a program.
6. **ALWAYS** press in the E-STOP button on the control box and turn off main power prior to changing tooling or working on the spindle. Remember to clear alarms caused by the e-stop button on the alarm pages after the e-stop has been removed.
7. **ALWAYS** remove main power prior to working on or servicing the spindles water pump and or reservoir.
8. The E-STOP button **MUST** be out before turning on the main power (twist and it will pop out).

Emergency stop button



Start button

## Turning on the Machine

**Note:** Some of the photographs in the following section of the manual are not the IQ machine, but the principle that they show is the same for all IQ/CNC machines.

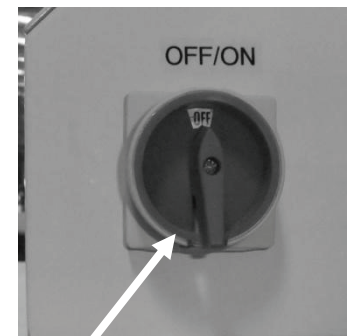
## Getting Started

**Note:** Before you turn on the machine, remove all tools and other objects from the machine table.

**Release the emergency stop by twisting clockwise, and it will pop out.**

1. Have 220volts, 30 amps, of 1-phase power wired to the machine.
2. Make sure the water reservoir is full and the submersible pump is circulating water through the spindle.
3. Make sure the E-STOP button is released (twist to release) before turning the power on.
4. Power machine.
5. After the HHC has fully booted, it is required that the machine be homed before any other function is allowed.

**Note:** All measurements and actions are based on the home switch locations. Homing gives the machine a starting point reference



Main Isolation switch



## Precautions Regarding Spoil Boards

The spoil board is porous when the melamine has been cut through and will absorb moisture. As moisture is absorbed, the dimensions of the board will change. In general this will not be a problem, as the changes from day to day are not significant. Also the changes will, in general, be over the complete board. There are, however, exceptions. Your morning coffee can do a great deal of damage if spilled. If water or another liquid is spilled, it will be absorbed into the board and make the board grow in that area. Do not allow the board to become wet. If an accident should happen, remove the board from the machine and allow to dry. This may take several days. Replace the board with a new board. Once the board has completely dried, it may be possible to skim the board and re-use it, but the likelihood is that it is scrap.

## Spoil Board

The machine is supplied with spoil strips on the bed. The strips are designed so that they will not damage the cutter should it come in contact.

The spoil strips have been machined, but some movement may take place during shipping. The strips may have slight dents and marks, but this is not important, as they will be removed when you fly cut the surface. Only cut 1/6" of an inch should you decide to fly cut the sacrificial board.

**Note:** When cleaning the table and the spoil board, do not brush, but only use a vacuum or a blower. Between the spoil boards there are T-slots that are used to clamp jobs to the IQ.

## Fitting a Job to the Spoil Board

The machine is supplied with spoil strips on the bed.

The strips are designed so that

they will not damage the cutter should it come in contact.

The spoil strips have been machined, but some movement may take place during

shipping. The strips may have slight dents and marks, but this is not important, as they will be removed when you fly cut the surface.

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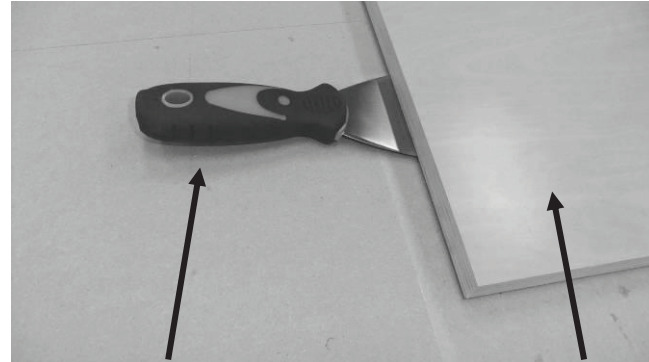


**Double-sided tape  
inside job outline**



## Removing the Job from the Spoil

If you use double-sided tape to attach the job to the spoil board, lever the job off the spoil board with a wide-blade putty knife or something similar.



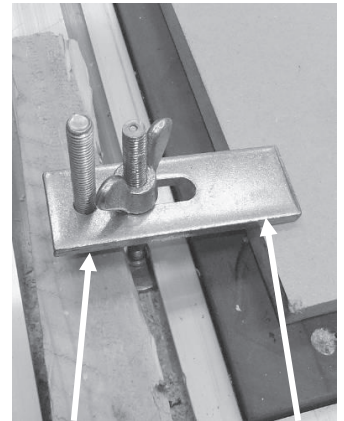
Wide blade putty knife

Job

## Fitting the Job to the Table using the T-slots

You may find it convenient to clamp the job to the spoil board with the table clamps. This attachment method can only be used if the outside edges are not being machined.

When using the clamps, place a piece of packing under the jacking bolt to protect the bed of the machine.



Packing

Clamp

## Maintenance

As with any machine, to ensure optimal performance, you must conduct regular maintenance.

### Lubrication

You must regularly (minimum every 12 hours) lubricate the bearing surfaces and the ball screws. Use a thin lithium spray or a 30wt oil lubricant. Spray daily and wipe off the excess.

### Daily checks

1. Clean the machine and lubricate unpainted surfaces with a 30wt oil lubricant. Wipe off any excess and buff with a dry polishing cloth. This will reduce the likelihood of rust forming.
2. Check cutter teeth for chips and dullness.
3. Generally inspect the machine for damage and loose or worn parts.
4. Collets and spindle collet holes must be cleaned regularly. Ensure that the slots in the collets are free of sawdust, as sawdust builds up and will stop the collet compressing. If the collet or spindle holes are not clean, the router bit may not run true, and this will affect the performance of your machine.

### Weekly checks

1. Clean the cutters.
2. Check cutter teeth for chips and dullness.
3. Generally inspect the machine for damage and loose or worn parts.
4. Check the dust extraction for blockages, as any large bits could cause blockages.
5. Replace the water every week.
6. Rotate the water pipes every week. (Inlet to out let and reverse for the other pipe.) This will clean out any dirt or other debris that is accumulating inside the cooling system.
7. Check that all the electrical connectors are fitted correctly and are not loose.
8. Check that all the motor couplers are connected and that the screws are tight.



Collet fitted to spindle nut

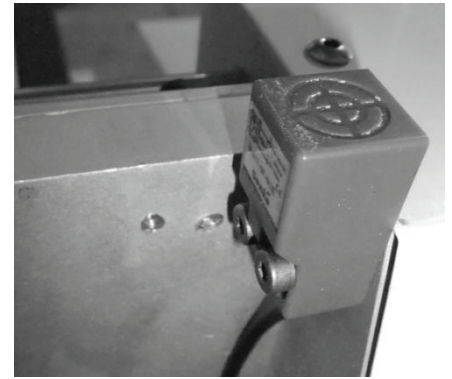
### Position of stop switches

The stop switches are activated by proximity to steel items and can be tested by placing a screwdriver or something similar on the activation face (top). When activated, a LED should light. If the LED does not come on, the switch or wiring is faulty.

**X** axis is activated by the vertical axis cover

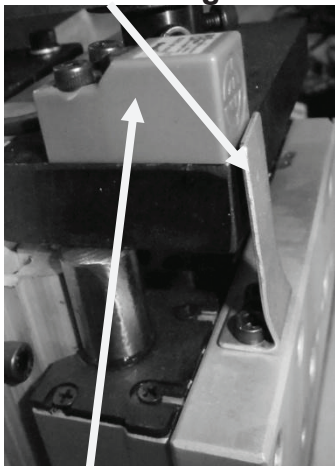
**Y** axis is activated by a steel flag located on the end of the frame (under the bed).

**Z** axis is activated by a steel flag located on the router support plate.

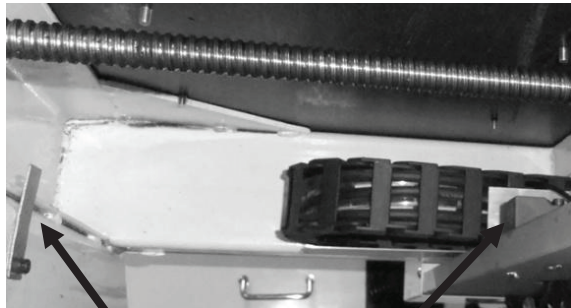


**"X axis" proximity switch**

### Activation flag



**"Z axis" proximity switch**



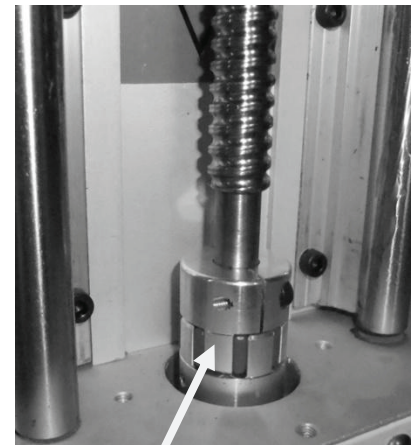
**"Y axis" proximity switch**

### Universal joints

The ball screws are coupled to the motor shafts with a universal joint. The joints should be checked periodically to check that they are tight and not damaged.

If loose, tighten the clamping screws.

If damaged, replace.



**Z axis universal joint**

### Ball screw adjustment

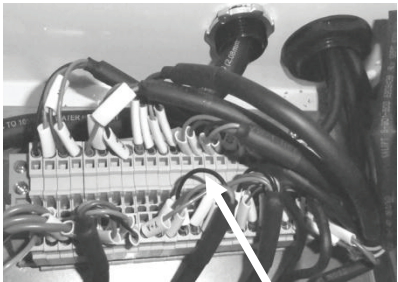
The ball screws come factory set, and no adjustment should be required. If the ball screws need adjustment, the C wrench nut needs to be adjusted.

1. Bend the locking tag washer out of the slot in the nut.
2. Tighten the nut so that it is snug tight.
3. Bend the relevant locking tab into the nut slot.

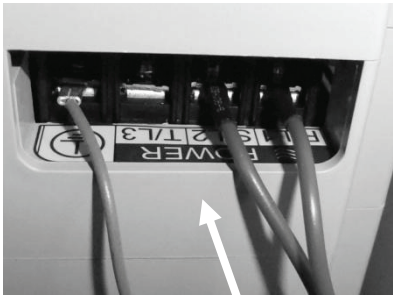




# Noise Emission



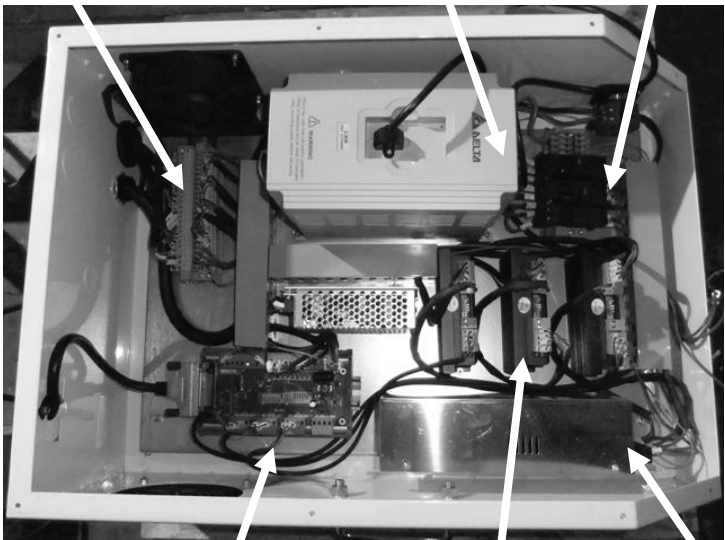
Termination strip



VFD "Variable frequency drive"



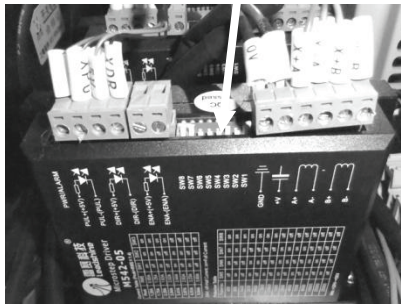
Fuse block



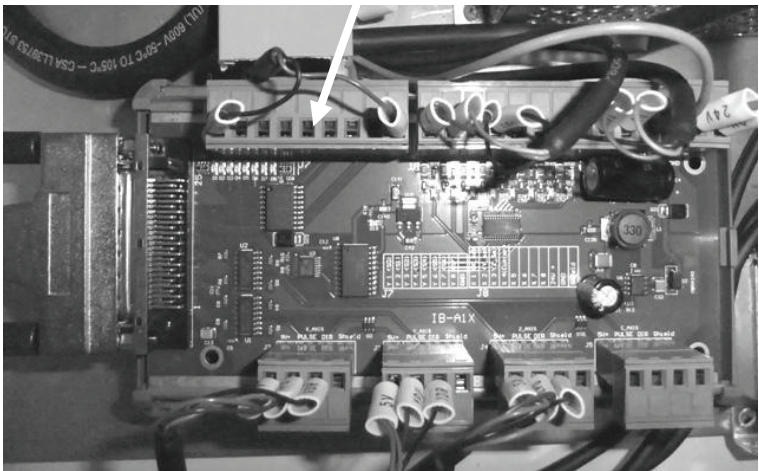
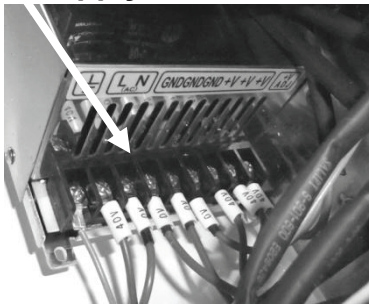
Electrical control box

Driver

Power supply



Electrical control box

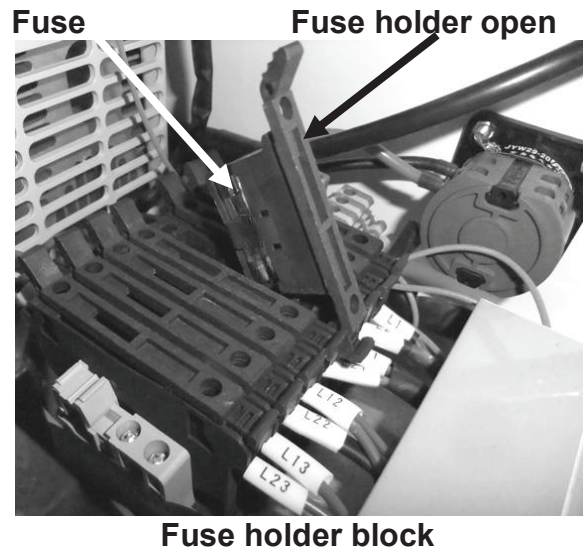


## Fuses

**Note: Never access the inside if the electrical box with the mains is connected.**

The electrical functions of the machine are protected by fuses.

To access the fuse, pull the fuse holder up. Once the fuse has been checked that it has not blown, ensure that the fuse holder is pushed down and is fully home.



## Troubleshooting

### Machine will not start

1. Check that the start switch is being pressed full in.
2. **Check that the red emergency stop switch is fully out.**
3. Check that the electrical power cord is plugged into the power outlet.
4. Check that the electrical supply is on (reset the breaker).
5. With the power disconnected from the machine, check that the wiring to the plug is correct. Check that the rubber insulation is stripped enough and is not causing a bad connection. Check that all the screws are tight.

### The machine will not stop

This is a very rare occurrence, as the machine is designed to fail-safe. If it should occur and you cannot fix the fault, seek professional assistance. The machine must be disconnected from the power and never run until the fault has been rectified.

1. Internal breaker faulty. Replace the breaker.

### Motor tries to start but will not turn

1. With the power disconnected from the machine, try to turn the spindle by hand. If the spindle will not turn, check the reason for the jamming.
2. Motor faulty. Replace the spindle.
3. Spindle run without coolant. Replace the motor.
4. Check that the voltage supplied to the VFD is 220V.

### Motor overheats

Typical reasons are dull cutting tools, no water in the coolant tank, blockage in the coolant pipe and excessive ambient temperature.

### Squeaking noise

1. Check the bearings.

### Spindle slows down during a cut

1. Dull cutting tools. Replace the tool or have it re-sharpened.
2. Feeding the wood too fast. Slow down the feed rate.
3. Cutter feeds and spindle speed are not correct. Adjust the feeds and speeds.

**Machine vibrates**

1. Machine not level on the bench. Re-level the machine, ensuring that it has no movement.

**Machine will not home**

1. Are the home position sensors connected, damaged or out of adjustment?
2. Are the parameters in the hand held controller correct?
3. After completing the job, press OK button and check if the router head returns to the home position.

**Jobs are machined inconsistently**

1. Check that the motor drive belt is tight and not damaged. If damaged, replace.
2. Check if the drive couplings are tight or damaged. If loose, tighten; if damaged, replace.
3. Check if the slider bearings are fixed tight or damaged. If loose, tighten; if damaged, replace.

**Inaccurate position of router head**

1. Check that the drive screws and the bearing rails are clean and lubricated.
2. If the gantry/router head movement is too fast:
  - 2.1 Check that the parameters are set correctly in the hand held controller.
  - 2.2 Check for static or external electrical interference and the machine is correctly earthed.
  - 2.3 Check that all the bearing, motor-fixing bolts are tight.
  - 2.4 Check the input voltage is correct; it must be 220V.

**The hand held controller screen is blank or dull or flickers**

1. Check that the cable to the hand held controller is fitted correctly and the clamping screws are tight.
2. Check that the connectors on the interface printed circuit board are fitted correctly and that all the screws are tight.
3. Check if a fuse has blown.
4. The 50-pin interface is damaged. Replace the damaged part.
5. The power supply is damaged. Replace the power supply.
6. The hand held controller is damaged. Replace the hand held controller.
7. The supply voltage is not within specification.

**The gantry or router head will not function**

1. Hand held controller cable loose.
2. Drive wires loose or damaged.
3. Hand held controller damaged.
4. Drive circuit board damaged. Replace drive circuit board.

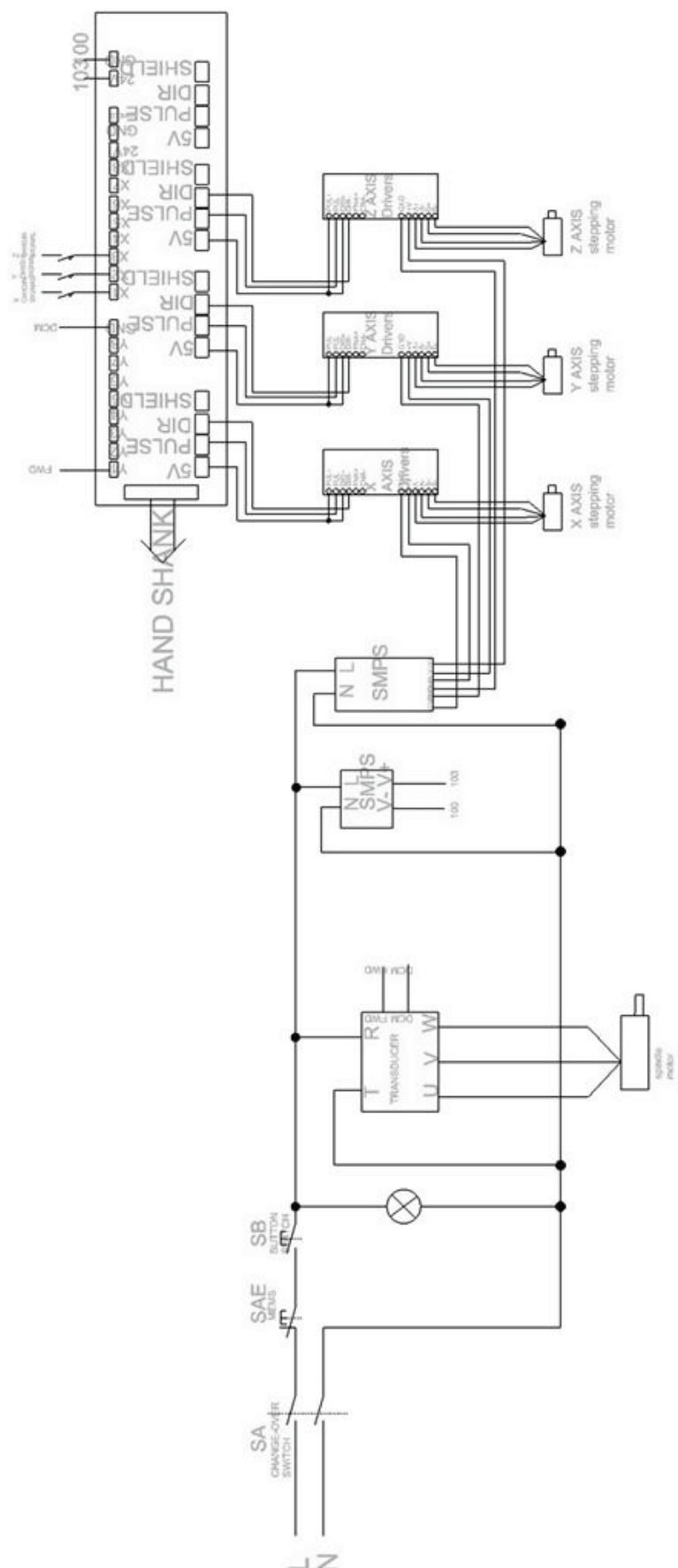
**The cutting depth is inconsistent**

1. Check that the spoil boards are flat and clean prior to fitting the job.
2. Check if there is excessive play in the Z axis ball screw drive mechanism.
3. Check that the bit is tight in the spindle collet.

**The hand held controller display shows that the spindle is on but the spindle is not rotating, and vice versa**

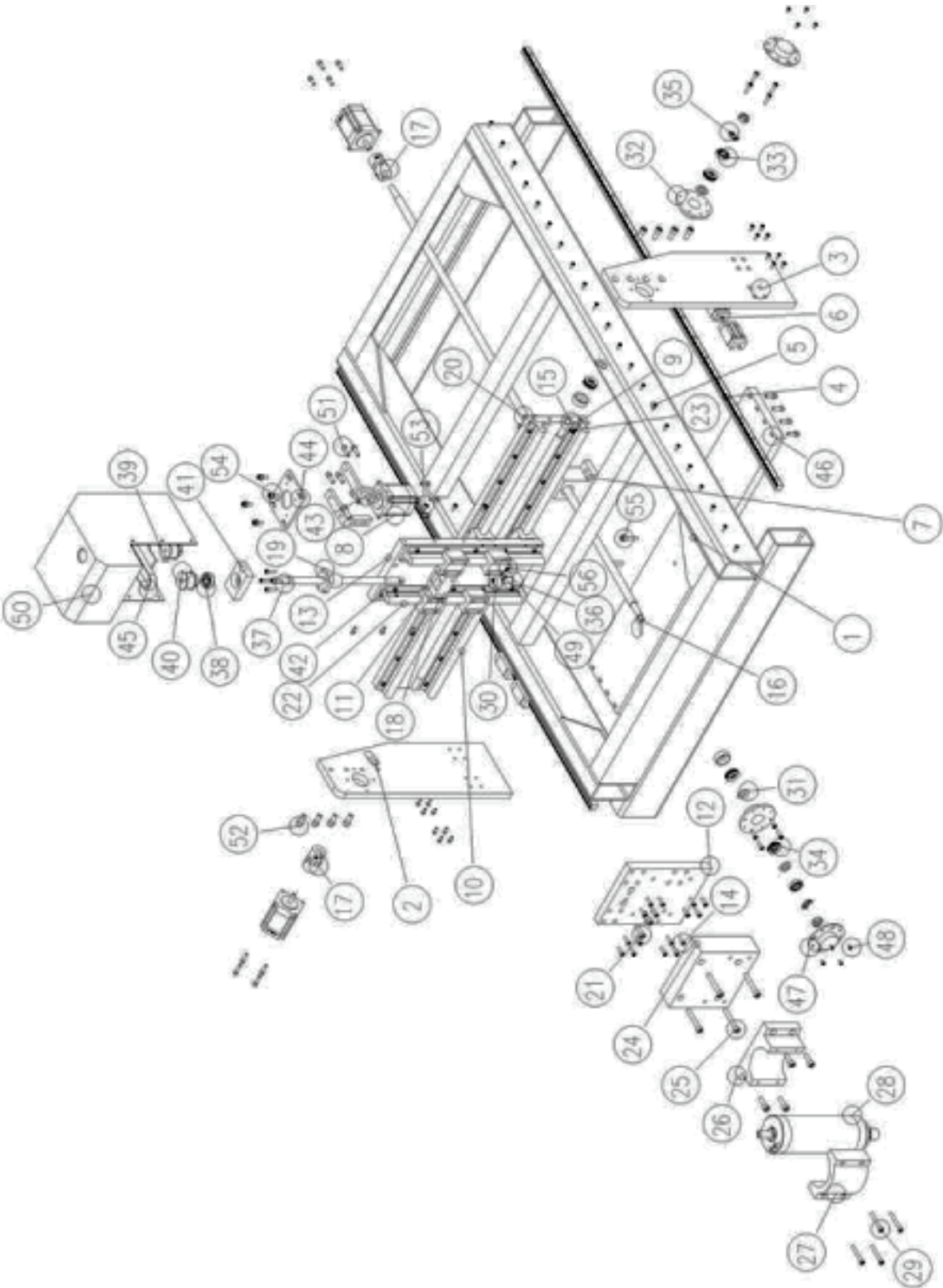
1. Check the wiring for loose or broken wires.
2. The spindle settings on the HHC are incorrect.

**For technical support contact,  
Laguna Tools at  
1-800-332-4094  
or  
email Laguna Tools Customer Service at  
customerservices@lagunatools.com  
Please input machine type in subject line.**





# Exploded View Drawings and Parts List





# **LAGUNA**

**LAGUNA TOOLS**  
17101 Murphy Ave.  
Irvine, California 92614  
Ph: 800.234.1976  
[www.lagunatools.com](http://www.lagunatools.com)

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