

PRECISION  
WOODWORKING

# PL1220 Precision Laser

Laguna Tools Owner's Manual



CE

Version 1.1.0  
8/14/2020

MLC122040-2  
Mobility Stand Sold Separately

Laguna takes pride in our products and stands behind them with continuing service and support for our customers. Your Laguna machine was designed to bring a new dimension of productivity to your shop.

Before using your machine for the first time, learn how to use it. This manual covers a step-by-step process of assembly and machine operation. If you have any questions, this manual will provide answers.

We do our best to thoroughly document every product that we sell for customer reference. Several files are compiled to cover all components of a machine.

Several machines may be covered by one manual.

Many machines sold by Laguna include components with independent owners' manuals.

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# Safety

Read and understand all warnings and operation instructions before using any tool or equipment. Always follow basic safety precautions to reduce the risk of personal injury. Improper operation, maintenance or modification of tools or equipment could result in serious injury and property damage. There are certain applications for which tools and equipment are designed. This product should NOT be modified and/or used for any application other than for which it was designed. It is important for you to read and understand this manual. The information it contains relates to protecting your safety and preventing problems.

## Safety Guidelines - Definitions

This manual contains information this is vital to protecting your safety and preventing equipment problems. To help you recognize this information, we use the symbols below. Please read the manual and pay attention to these sections.

 **DANGER** An imminently hazardous situation which, if not avoided, will result in death or serious injury. Sometimes displayed as  **DANGER!**

 **WARNING** A potentially hazardous situation which, if not avoided, could result in death or serious injury. Sometimes displayed as  **WARNING!**

 **CAUTION** A potentially hazardous situation which, if not avoided, may result in minor or moderate injury. Sometimes displayed as  **CAUTION!**

 **NOTICE** A helpful tip from our technical staff. Sometimes displayed as **NOTICE!**

- |  |  |   |                          |
|--|--|---|--------------------------|
|  | Disconnect from power before proceeding. |  | Wear ear protection.     |
|  | Be aware of possible laceration danger.  |  | Wear Eye Protection.     |
|  | Be aware of possible crushing danger.    |  | Wear a full face shield. |
|  | Be aware of possible crushing danger.    |  | Wear lung protection.    |
|  | Electrical Hazard.                       |  | Requires X People        |

## **WARNING** Important Safety Instructions

Read and understand all warnings and operating instructions before using this equipment. Failure to follow all instructions listed below, may result in electric shock, fire, and/or serious personal injury or property damage.

Woodworking can be dangerous if safe and proper operating procedures are not followed. As with all machinery, there are certain hazards involved with the operation of the product. Using the machine with respect and 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. Safety equipment such as guards, push sticks, hold-downs, feather boards, goggles, dust masks and hearing protection can reduce your potential for injury. But even the best guard won't make up for poor judgment, carelessness or inattention. Always use common sense and exercise caution in the workshop. If a procedure feels dangerous, don't try it. Figure out an alternative procedure that feels safer. REMEMBER: Your personal safety is your responsibility.

This machine was designed for certain applications only. We strongly recommend that this machine not be modified and/or used for any application other than that for which it was designed. If you have any questions relative to a particular application, do not use the machine until you have first contacted the manufacturer to determine if it can or should be performed on the product.

If you have any questions relative to its application do not use the product until you have contacted the manufacturer and we have advised you.



## **WARNING**

### **General Safety Rules**

FAILURE TO FOLLOW THESE RULES MAY RESULT IN SERIOUS PERSONAL INJURY.

FOR YOUR OWN SAFETY, READ AND UNDERSTAND THE INSTRUCTION MANUAL BEFORE OPERATING THE MACHINE.

Learn the unit's application and limitations as well as the specific hazards peculiar to it.

KEEP WORK AREA CLEAN. Cluttered areas and benches invite accidents.

DON'T USE IN DANGEROUS ENVIRONMENT. Don't use this unit in damp or wet locations or expose it to rain. Keep work area well-lighted.

KEEP CHILDREN AND VISITORS AWAY. All children and visitors should be kept a safe distance from work area.

DISCONNECT UNIT before servicing.

CHECK DAMAGED PARTS. Before further use of the unit, properly repair or replace any part that is damaged.



## **DANGER**

### **Specific Safety Information: CO2 Lasers**

This machine was developed and built in accordance with rigorous and continuous testing and therefore conforms to industrial safety regulations and standards. Certain safety precautions are necessary to minimize the injury risks inherent in the use of this product.

### **Intended Use**

The PL1220 Laser Marking Machine has been design solely for engraving, marking, cutting, and sintering materials that are safe and nonvolatile as described by the material safety data sheet (MSDS). It must not be used to process materials that emit a toxic biproduct, are unstable, produce a degrading by-product, or leave a residue on the machine.

If there is any concern related to the application you are intending to use this tool for, DO NOT proceed until you have contacted Laguna Tools® and have been advised on the correct application of the product.

### **Risks to Operator**

- Risk of fire when processing flammable workpieces.
- Risk of electrical shock when any doors or panels are removed, while machine is connected to power.
- Risk of burn when aligning laser mirrors, depending on method.
- Risk of laser beam burn if operated when interlocks are defeated (door open), without the focal lens in place, or with reflective workpieces.
- Risk of health impairments due to the inhalation of airborne particles and toxic fumes.

## Operator Rules

- At all times, this machine must be operated with a water-cooling system, venting system, and an air assist system. Before every use, check that all systems are working and properly adjusted prior to turning on the laser machine.
- Never leave the machine running unattended.
- Do not process materials that emit a toxic byproduct, are unstable, produce a degrading byproduct, or leave a residue on the machine.
- At all times, there must be a chemical fire extinguisher within close range of the machine.
- Personnel who have not received any prior training are prohibited from operating the machine. Reading and understanding the owner's manual shall serve as training.
- Only distilled or deionized water is to be used with the water cooling system.
- Never operate the machine with the interlocks defeated, or any of the panels or doors removed.
- Never open any access panels when the machine is connected to the power source.
- Never operate the machine without the focal lens in place.
- Never modify this machine in any way.
- Always use proper personal protective equipment when using this machine.
- Maximum continuous use is 5 hours.
- Safe operating temperature is from 10 to 33 degrees Celsius.

## Prohibited Materials

The following materials are not permitted to be used with any CO2 laser processing machine. This list is not a complete list and there may be other materials that can harm the operator and the machine.

Material	Danger
PVC (Polyvinyl Chloride) Vinyl Artificial Leather	Harmful toxic gas harmful to the operator and bystanders. Acidic by-product harmful to lens and machine components.
Polycarbonate (Lexan) Epoxy Fiberglass Resin	Harmful toxic gas harmful to the operator and bystanders. Acidic by-product harmful to lens and machine components. Material Properties resist laser cutting/engraving.
ABS	Toxic gas harmful to the operator and bystanders. Acidic by-product harmful to lens and machine components. Material Properties resist laser cutting/engraving.
HDPE	Very Flammable. Acidic by-product harmful to lens and machine components.
Polystyrene (Styrofoam) EPS Polyurethane Foam Polypropylene Foam	Extremely Flammable. Acidic by-product harmful to lens and machine components. This material has been reported to cause several fires by processing with a laser machine.

## Proposition 65 Warning of Harmful Exposure

Some dust created by power sanding, sawing, grinding, drilling and other construction activities contains chemicals known to cause cancer, birth defects or other reproductive harm. Some examples of these chemicals are:

- Lead from lead-based paint.
- Crystalline silica from bricks, cement, and other masonry products.

- Arsenic and chromium from chemically treated lumber.

Your risk of exposure varies, depending on how often you do this type of work. To reduce your exposure to these chemicals, work in a well-ventilated area and work with approved safety equipment, such as face or dust masks that are specifically designed to filter out microscopic particles.



**DANGER**

### **Fire Warning**

Use extreme caution when cutting flammable materials such as wood or acrylic. Keep the machine clean by following the supplied maintenance schedule and always have a fire extinguisher ready to extinguish a fire. Take extreme caution when cutting acrylic materials as they are more volatile than other materials. **⚠ DANGER! NEVER LEAVE THE MACHINE RUNNING UNATTENDED.**

The tools sold by Laguna Tools are safe when used properly, as described by The American National Safety Institute, the UL Standards of safe tool use, and the IEC standards of safe tool use. Laguna Tools is in no way responsible for injury or death that occurs while using this product. YOUR PERSONAL SAFETY IS 100% YOUR RESPONSIBILITY

# Electrical Saftey

## Power Connections

A separate electrical circuit should be used for each machine. This circuit should not be less than the wiring listed below and should be protected with an appropriate circuit breaker based on the total running and start-up amperage's (listed below). If an extension cord is used, use only 3-wire extension cords which have 3-prong grounding type plugs and matching receptacle which will accept the machine's plug.

**⚠ DANGER** Before connecting the machine to the power source, make sure the switch is in the "OFF" position.

MLC122040-2	
VOLTAGE	110V
PHASE	1PH
HERTZ	60Hz
FULL LOAD AMPERAGE	9.6A / 14.4A (all components)
<b>⚠ WARNING!</b> Below are RECOMMENDATIONS to be used for this machine based on the above information. Variables outside of our control are: <ul style="list-style-type: none"> <li>• Actual voltage supplied to the machine</li> <li>• Electrical code that must be met in your local province.</li> </ul> An electrician will verify that all the demands are met to properly wire the machine. If you have absolutely any doubt when wiring this machine - please consult with a qualified electrician.	
PLUG/RECEPTACLE	5-15
WIRING (Gauge)	14 Ga. (minimum)
CIRCUIT BREAKER	15 AMP

**⚠ WARNING** If this information is different than what is stated on the Motor Specification Plate - omit this information. It is possible that the documentation is outdated to a machine change - such as a different motor. **Always check the motor plate prior to any wiring. If any doubts, please consult a certified electrician.**

**⚠ CAUTION** Running on a different voltage than stated above will damage the machine. Never run the machine in wet or damp conditions.

**NOTICE** For a detailed wiring diagram please see the [Wiring Diagram](#)<sup>41</sup> section at the end of this manual.

## Grounding Methods

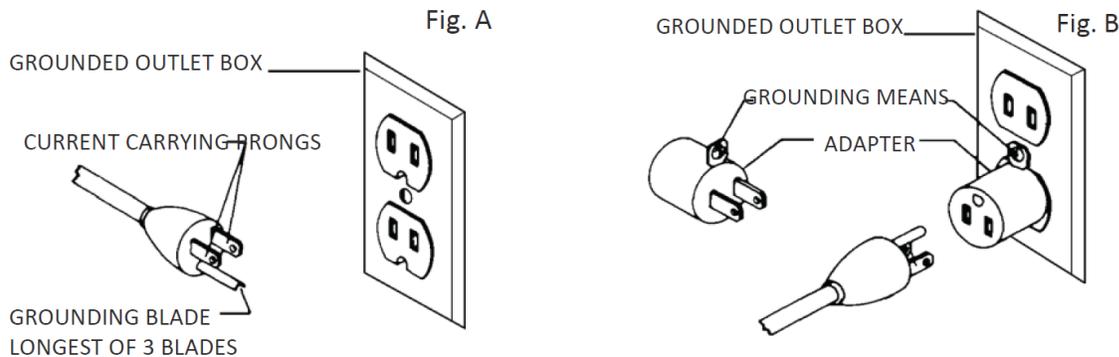


This machine must be grounded while in use to protect the operator from electric shock.



In all cases, make certain that the receptacle in question is properly grounded. If you are not sure, have a qualified electrician check the receptacle.

Grounding Methods Provided by CSA Group. (A) Receptacle with nominal rating less than 150 volts. (B) 150 volt receptacle without grounding pin fitted with adapter.



### 1. All grounded, cord-connected machines:

In the event of a malfunction or breakdown, grounding provides a path of least resistance for electric current to reduce the risk of electric shock. This machine is equipped with an electric cord having an equipment-grounding conductor and a grounding plug. The plug must be plugged into a matching outlet that is properly installed and grounded in accordance with all local codes and ordinances.

Do not modify the plug provided - if it will not fit the outlet, have the proper outlet installed by a qualified electrician. Improper connection of the equipment-grounding conductor can result in risk of electric shock. The conductor with insulation having an outer surface that is green with or without yellow stripes is the equipment-grounding conductor. If repair or replacement of the electric cord or plug is necessary, do not connect the equipment-grounding conductor to a live terminal.

Check with a qualified electrician or service personnel if the grounding instructions are not completely understood, or if in doubt as to whether the machine is properly grounded.

Use only 3-wire extension cords that have 3-prong grounding type plugs and matching 3-conductor receptacles that accept the machine's plug, as shown in Fig. A. Repair or replace damaged or worn cord immediately.

### 2. Grounded, cord-connected machines intended for use on a supply circuit having a nominal rating less than 150 volts:

If the machine is intended for use on a circuit that has an outlet that looks like the one illustrated in Fig. A, the machine will have a grounding plug that looks like the plug illustrated in Fig. A. A temporary adapter, which looks like the adapter illustrated in Fig. B, may be used to connect this plug to a matching 2-conductor receptacle as shown in Fig. B if a properly grounded outlet is not available. The temporary adapter should be used only until a properly grounded outlet can be installed by a qualified electrician. The green-colored rigid ear, lug, and the like, extending from the adapter is used, it must be held in a place with a metal screw. NOTE: In Canada, the use of a temporary adapter is not permitted by the Canadian Electric Code.

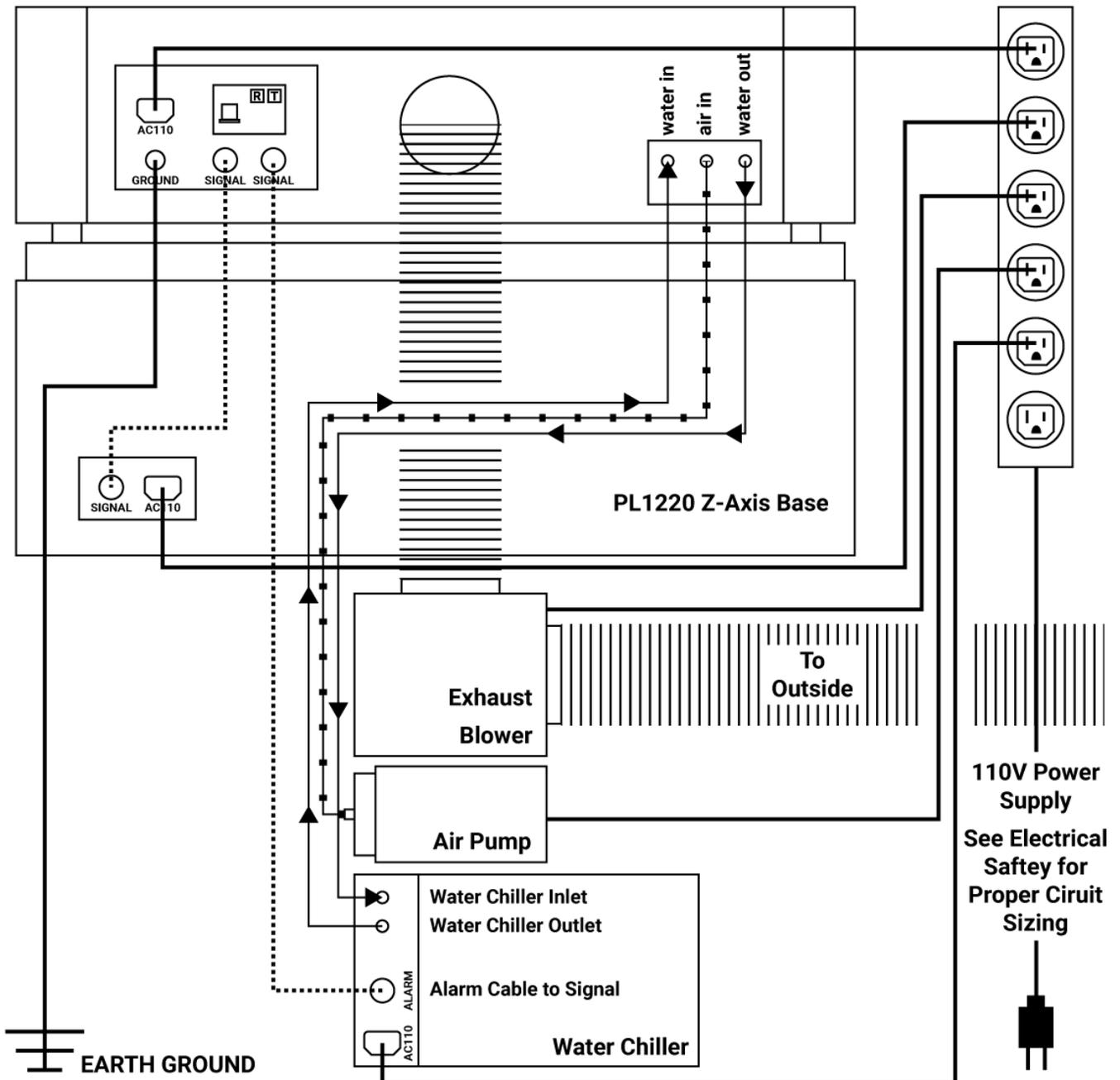
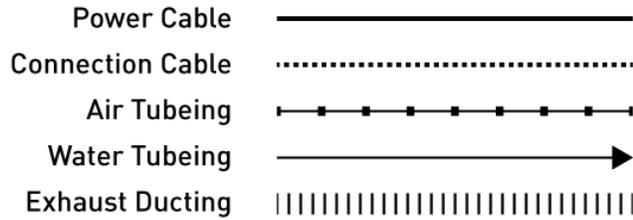
## Extension Cords

**⚠ WARNING!** Use proper extension cords. Make sure your extension cord is in good condition and is a 3-wire extension cord which has a 3-prong grounding type plug and matching receptacle which will accept the machine's plug. When using an extension cord, be sure to use one heavy enough to carry the current of the machine. An undersized cord will cause a drop in line voltage, resulting in loss of power and overheating. Fig. D.1 or D.2, shows the correct gauge to use depending on the cord length. If in doubt, use the next heavier gauge. The smaller the gauge number, the heavier the cord.

<b>MINIMUM GAUGE EXTENSION CORD 120V</b>			
<b>RECOMMENDED SIZES FOR USE WITH STATIONARY ELECTRIC MACHINES</b>			
Ampere Rating	Volts	Total Length of Cord in Feet	Gauge of Extension Cord
0-6	120	up to 25	18 AWG
0-6	120	25-50	16 AWG
0-6	120	50-100	16 AWG
0-6	120	100-150	14 AWG
6-10	120	up to 25	18 AWG
6-10	120	25-50	16 AWG
6-10	120	50-100	14 AWG
6-10	120	100-150	12 AWG
10-12	120	up to 25	16 AWG
10-12	120	25-50	16 AWG
10-12	120	50-100	14 AWG
10-12	120	100-150	12 AWG
12-16	120	up to 25	14 AWG
12-16	120	25-50	12 AWG
12-16	120	GREATER THAN 50 FEET NOT RECOMMENDED	

<b>MINIMUM GAUGE EXTENSION CORD 240V</b>			
<b>RECOMMENDED SIZES FOR USE WITH STATIONARY ELECTRIC MACHINES</b>			
Ampere Rating	Volts	Total Length of Cord in Feet	Gauge of Extension Cord
0-6	240	up to 50	18 AWG
0-6	240	50-100	16 AWG
0-6	240	100-200	16 AWG
0-6	240	200-300	14 AWG
6-10	240	up to 50	18 AWG
6-10	240	50-100	16 AWG
6-10	240	100-200	14 AWG
6-10	240	200-300	12 AWG
10-12	240	up to 50	16 AWG
10-12	240	50-100	16 AWG
10-12	240	100-200	14 AWG
10-12	240	200-300	12 AWG
12-16	240	up to 50	14 AWG
12-16	240	50-100	12 AWG
12-16	240	GREATER THAN 100 FEET NOT RECOMMENDED	

# Connection Diagram



## Connections

With the power still unplugged, make all connections according to the connection diagram. Make sure water and air connections are not leaking.

**Exhaust Blower:** Use a flat head screwdriver to install the Exhaust Ventilation system to the machine.

**Water Chiller:** Press fit the rubber water hoses from the cooling system (water chiller) to the laser machine.

**Air Pump:** Press fit the air hose from the air pump to the machine.

## Safety Check

Open the rear panel and check that all systems are working by powering them on individually. Do not give power to the laser machine during this check.

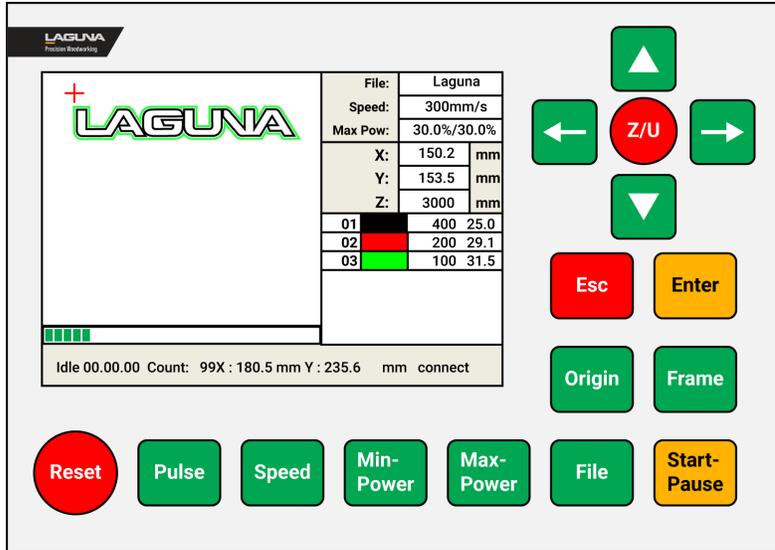
**Exhaust blower:** Make sure the ducting is installed and will not come loose. Make sure the fan will not tip over.

**Water Chiller:** With the rear panel open, water in the chiller, and all connections made, give power to the chiller and make sure there are no leaks or faulty connections. Confirm that the water is flowing towards the first mirror. Perform the “pinch test”: Pinch any line from the chiller to the laser and make sure the alarm sounds.

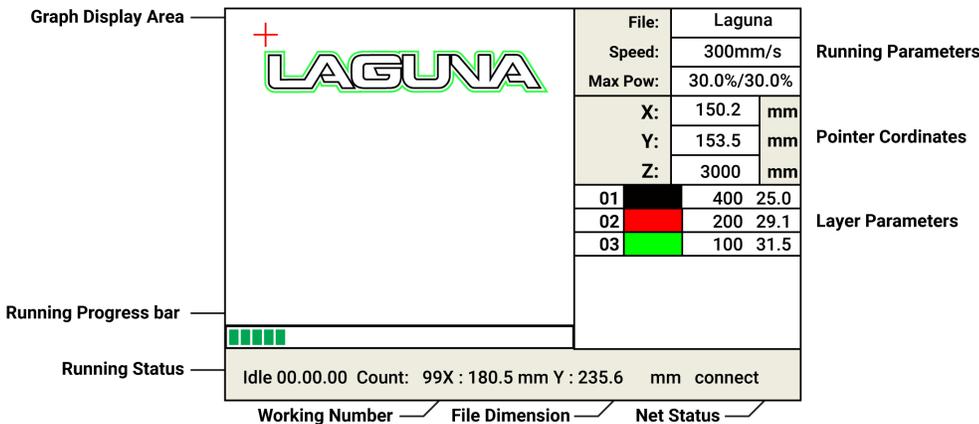
**Air Pump:** Ensure that air is flowing to the laser head assembly.

# Interface

The RDworks works interface is described below. The Buttons will be used within the text to help with tutorials.



-  Jog Y axis forward or move up cursor
-  Jog X axis left or move left cursor
-  Jog X axis right or move right cursor
-  Jog Y axis reverse or move down cursor
-  Show entries in interface, Select Z Axis
-  Stop Work or Escape a menu
-  Validate the change
-  Set the relative origin
-  Samples frame size
-  Reset controller
-  Pulse laser control. **CAUTION!** This fires the laser for a brief second.
-  Set speed of current layer
-  Set minimum laser power of current layer
-  Set maximum laser power of current layer
-  Enter file manager
-  Start or Pause work



**Graph Display Area:** To display the whole file's track and display the running track.

**Running Parameters:** To display the running file's file number, speed, max power, etc.

**Coordinates:** To display the current coordinate of X, Y and Z axes.

**Graph Layer Parameters:** To display the layers' information of the current file, such as max or min power, speed, etc. When system is idle, double click the layer. Then users can change the layer's parameters and the changes will be saved.

**Running Progress Bar:** To display the progress bar of the current running file.

**Running Status:** To display the current status of the machine, such as Idle, Run, Pause, Finish, etc.

**Working Number:** To accumulate the work number of the current file.

**File Destination:** To display the dimension of the current file.

**Net Status:** To display the connecting status of the Ethernet.

# Setup



Expand any section above to view help sections created. If you are reading this manual or viewing an electronic PDF version, You may want to check out our interactive manual. All videos and sections will be current on this website.

## Setup Overview (MUST READ)

When setting up your PL1220, please take a moment to read this overview prior to starting.

1. Carefully un-box the laser machine.
2. Make sure to setup on a level floor.
3. Level the base to the floor and then place the PL1220 Laser machine on top.
4. Install the laser tube.
5. Follow the [Connections Diagram](#)<sup>17</sup> for all connection to the PL1220
6. Begin by setting up the Chiller unit, you will need distilled water, tubes, and the connection cables.
7. Next, set up the air pump.
8. Next set up the Exhaust fan.
9. Finally install the software and sync with the PL1220 Laser machine.
10. Now that the Setup is complete, all that is left is to plug it in. **NOTICE!** It is a good idea to use a power strip with an on/off switch to give power to all components at the same time, and to turn the machine (systems) on and off easily.  
**⚠ WARNING!** Be sure wiring is correct according to local electric code. All needed electrical information can be found in the [Electrical Safety](#)<sup>87</sup> Section.
11. With Everything plugged in run the confirmation of proper set-up test.

After Setup, There may be a few adjustments to be made. All of these adjustments are done prior to shipping the saw, but if one is found to need adjustments please follow the adjustment guides.

# Unboxing

Your Machine will likely be delivered by a third party delivery service. Before unpacking your new machine, first inspect the packaging, the invoice, and the shipping documents supplied by the driver. When unpacking your table saw, separate all enclosed items from the packing materials and inspect them for damages. Ensure that there is no visible damage to either the packaging or the machine BEFORE the driver leaves. Save all packaging materials until you are satisfied with the machine and/or have resolved any issues concerning any missing or damaged items.

The machine should arrive attached to a wooden pallet and covered by a wooden crate housing the machine and its accessories. When unpacking your machine, separate all enclosed materials to ensure that there are no damages to the parts you've received. See the inventory section to cross reference the parts you should receive.

**NOTICE!** All shipping damage must be noted upon delivery and signed by the owner and the delivery driver. If you find any damaged items in your package, you must contact Laguna Tools to file a complaint. In order to return damaged goods under the limited warranty to Laguna Tools, Inc., you MUST have the original packaging. All claims of loss or damaged goods must be reported to Laguna Tools within 24 HOURS of delivery. Please contact the Laguna Tools, Inc. Customer Service Department to make claims for any damaged items/parts.



## DANGER

Do not plug in the machine until setup is complete.

Always unplug the machine prior to any maintenance or setup work.



## WARNING

This machine is heavy. If you have any doubt about the following unboxing or set up procedures seek assistance from an experienced professional. DO NOT attempt any procedure that you feel is unsafe or that you feel you do not have the physical capability of achieving.



## CAUTION

Do not cut deep into the wooden crate with a blade as it may scratch the paint. To prevent this, only use a dull edge or cut deep enough to only puncture the tape.

## NOTICE

Before setting up your machine, organize all additional set-up tools. The package will arrive fitted to a wooden pallet.

Complete Packaging of PL1220 Laser.



# Inventory

The following depicts items shipped with your machine. Before assembling, ensure that you have received all parts shown below. Machine parts should arrive sealed in plastic bags or packaging.

A blower, Chilling unit, Air compressor, PL120 CO2 Laser Machine, Lift bed base (not pictured), a steel bottom, and a honeycomb bottom.



A Spare Limit switch, power cables (x3, 1 is for the chiller, 1 is for the pl1220, 1 is for the lift bed), a USB cable, an Ethernet Cable, Air hose with quick connect, connection cables (x2)



2 expandable ducting tubes, tube straps, exhaust reducer. The exhaust reducer may already be installed on the machine.



USB Thumb Drive with RDWORKS software.



**NOT PICTURED: 40W Laser Tube**

**NOTICE**

There are several other parts included in the toolbox not pictured above. Throughout the manual, those parts will be listed when needed.

# General Setup

**⚠ WARNING!** Use caution when placing the PL1220 on the base, it is not bolted down and the Laser Tube can break if it were to drop from the foot pad.

**⚠ WARNING!** To avoid set-up problems, to prevent potential damage to the machine, and to prevent injury, read through the entire set-up section prior to proceeding.

**⚠ WARNING!** Do not connect to a power supply until the set-up is complete. Do not perform any of the following steps, installations, or adjustments with the machine connected to a power source unless directed to do so.

**⚠ CAUTION!** The machine is heavy and requires at least two people to lift it into position.

**NOTICE!** All shipping related claims for loss or damage goods must be made to Laguna Tools within twenty-four hours of delivery.

## Leveling the Machine

You will need 2 persons and a level to complete this setup section.

1. Make sure you are setting the machine up on a level surface
2. If you chose to purchase the optional base, start by leveling the base to the floor by installing and adjusting the wheels.
3. Otherwise, place the Z-axis base on the desired surface or floor and proceed to level the base by adjusting the pads on the bottom of the base.
4. With two persons, place the pl1220 centered atop the Z-axis base and level the pl1220 to the z axis base.
5. Reference the connections guide above to plug in the power cords, connection cords, and earth ground.

### NOTICE

The PL1220 does not need to be sitting on the Z-axis base to operate. It has been designed where if the z-axis base is not connected, everything will still work other than the auto-focus control. **Important:** If the z-axis base is not connected, the focal length will need to be set manually by twisting the cap and setting the proper focal spacing. The PL1220 is also designed to be used with an "open bottom". An example of this is when the operator would want to engrave onto the surface of a table. The operator will move the PL1220 to the tabletop, set the focal spacing manually and then proceed to operate the laser.

## Remove all Zip Ties

After the machine has been moved and leveled to where it will be used, remove the zip ties on the belts and install the exhaust adapter. You will need tools to remove the zip ties, and an Alan key to install the adapter.

**⚠ CAUTION!** Be careful not to cut or nick the belts when removing zip ties.

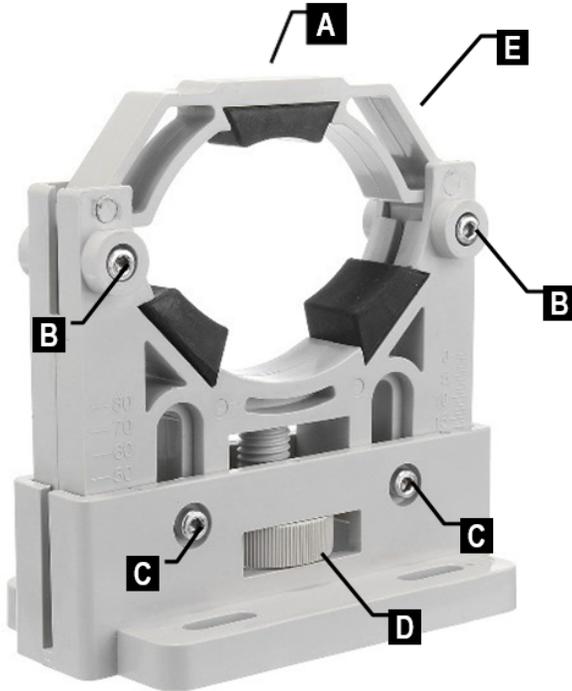
1. Remove all zip ties [A] from the Belts and Laser Head Assembly. There is one on each belt to prevent movement in transit, and one on the laser head assembly.
2. Install the Fume Extraction Adapter [C] on the rear of the machine with the included Alan keys.

### NOTICE

Please Reference the [Connection Diagram](#)  for all connections to the PL1220.

# Laser Tube

## Laser Tube Mounts

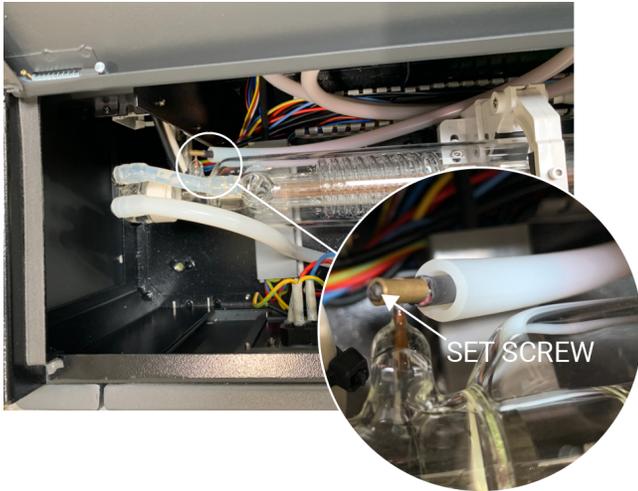


- A Tube Top Lock Screw
- B Tube Lock Screws
- C Tube Height Lock Screws
- D Tube Height Adjustment Dial
- E Top Mount

## Installing the laser tube

**NOTICE!** Please reference the [connections diagram](#) <sup>11</sup> when installing.

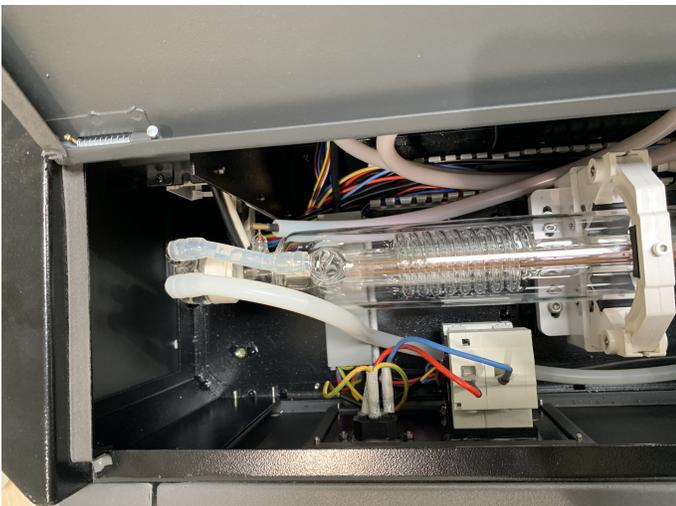
1. Unplug the laser machine and all components. **⚠ CAUTION!** Avoid electrical shock.
2. Open the rear panel of the laser machine.
3. Remove the top mounts (E) from each mount by removing the Tube Lock Screws (B). Now is a good time to loosen the Tube Height Lock Screws (C).
4. Carefully place the new, unconnected, laser tube inside the mounts. **⚠ CAUTION!** The laser tube is very fragile.
5. Carefully connect a water tube between the inlet on the rear of the connection panel and the water inlet on the laser tube (left side, cathode side). **NOTICE! The water should be flowing in the tube in the same direction that the laser is firing; towards the first mirror.**
6. Carefully connect a water tube between the outlet on the rear of the connection panel and the water outlet on the laser tube (right side, anode side)
7. Connect the high voltage (+) terminal (cathode) to the power supply according to the wiring diagram in this manual. Use the wire insulated with the rubber sleeve. **NOTICE! The connection should be from (+) to (-) the same direction that the laser is firing; towards the first mirror. ⚠ CAUTION!** There is a small set screw on the end of the cathode terminal. Please be sure to loosen and tighten, do not break off.



8. Connect the low voltage (-) terminal (anode) to the power supply according to the wiring diagram in this manual. Use the wire with the alligator clip.
9. Re-install the top mounts (E) and fasten the laser tube in place.
10. Slightly tighten the tube top lock screw to give **slight** pressure to the laser tube.
11. Make measurements and adjust the tube height adjustment dials (D) until the laser tube is firing perfectly straight.  
CAUTION: Ensure the Tube Height Lock Screws (C) are loose. **NOTICE!** If using a level, make sure that the laser machine is on a level surface. Note that it is crucial that the laser tube is parallel to the chassis of the machine. The first step of mirror alignment is to make certain that the tube is parallel to the chassis of the machine such that the mirrors can then be aligned to that plane.
12. Tighten the Tube Height Lock Screws.
13. **Do not worry about testing the laser for alignment at this point as we need to install all other systems prior.**

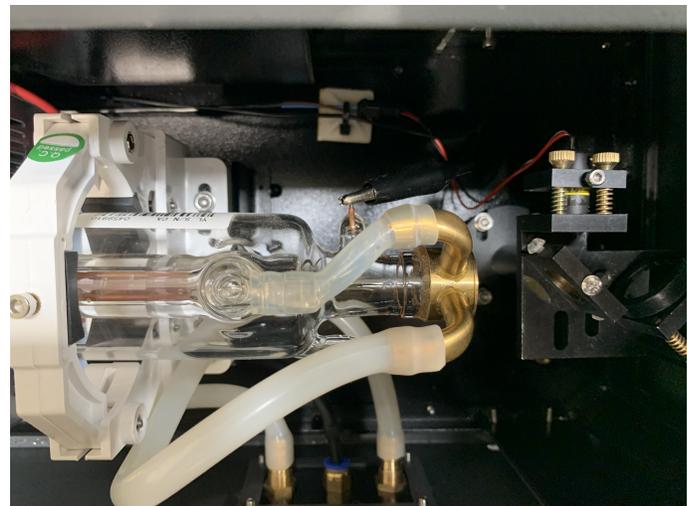
## Properly installed Laser tube

Cathode side (Left)



Water tubes connect to the "inlet" water port.  
The cathode wire connects to the pin with a set screw.

Anode Side (Right)



Water tubes connect to the "outlet" water port.  
The anode wire connects to the pin with the alligator clamp.

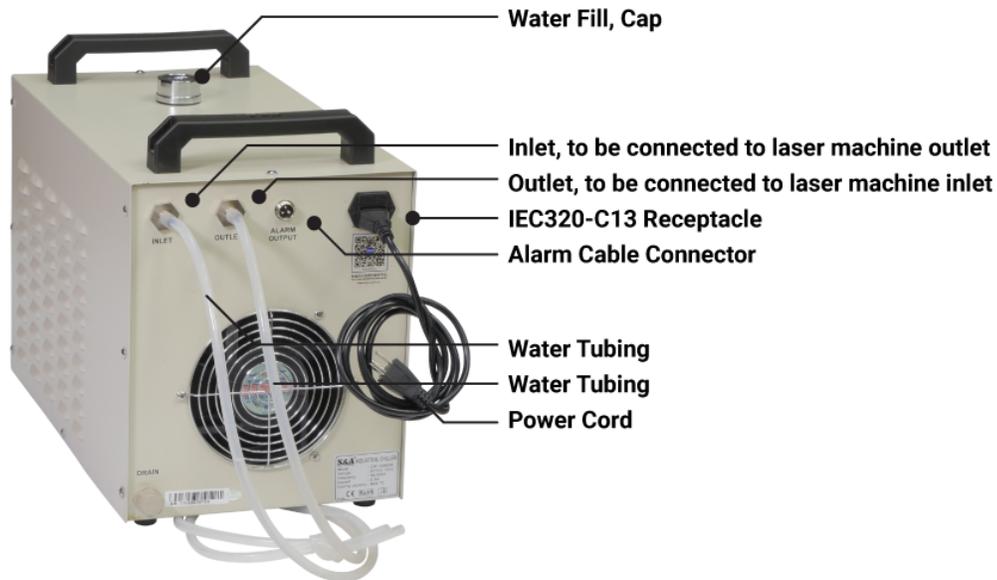
**NOTICE!** The Chiller, Air Pump, Exhaust fan, and software need to be properly installed prior to running and testing the function of the laser tube.

Do not test the laser tube or pulse the laser machine until the setup instructs you to do so.

# Chiller

**⚠ WARNING!** Do not connect to a power supply until the set-up is complete. Do not perform any of the following steps, installations, or adjustments with the machine connected to a power source unless directed to do so.

**⚠ CAUTION!** Only use deionized or distilled water. (Tap water or bottled water has minerals in it that will affect the performance and life of the laser tube.) DO NOT USE ANY TYPE OF CHEMICAL COOLANT.



You will need 7 liters of distilled or deionized water, the water chiller tubing, the alarm cable, and one of the power cables.

1. Place the chiller in its location.
2. Unscrew the cap and fill the unit with 7 liters of water. There is no fill limit, so measure it out before filling.
3. Connect the water inlet to the machine outlet according to the connection diagram.
4. Connect the water outlet to the machine inlet according to the connection diagram.
5. Connect the alarm cable to the laser machine.
6. Do not connect to power until set-up is complete.

## NOTICE

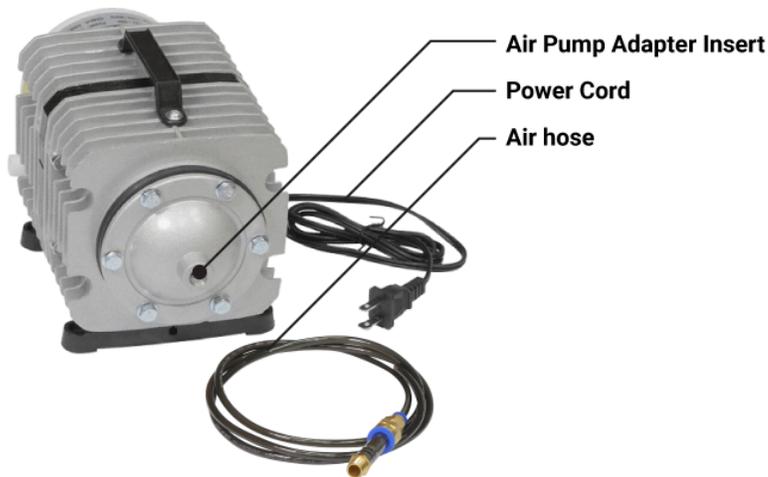
Please Reference the [Connection Diagram](#)  for all connections to the PL1220.

# Air Pump

**⚠ WARNING!** Do not connect to a power supply until the set-up is complete. Do not perform any of the following steps, installations, or adjustments with the machine connected to a power source unless directed to do so.

**NOTICE!** Make sure the air hose fits all the way into the adapter. The connection should leak very slightly – this is normal.

**NOTICE!** It is a good idea to use a power strip with an on/off switch to give power to all components at the same time, and to turn the machine (systems) on and off easily.



The air pump needs to supply air to the nozzle to direct fumes away from the focal lens. To install, you will need the air pump, the quick set adapter, and a ¼" air hose.

1. Screw the quick set adapter into the air pump adapter insert.
2. Press in the ¼" air hose.
3. Do not connect to power until set-up is complete.

## NOTICE

Please Reference the [Connection Diagram](#) <sup>1</sup> for all connections to the PL1220.

# Exhaust Fan

**⚠ WARNING!** Do not connect to a power supply until the set-up is complete. Do not perform any of the following steps, installations, or adjustments with the machine connected to a power source unless directed to do so.

**⚠ WARNING!** The fan can tip over if not fastened to a base.

The machine must be ventilated during operation. You will need 3 band clamps, 2 ducting coils or other duct-work, the blower unit, and a Flathead screwdriver to fasten the clamps.



1. Connect the exhaust intake to the rear of the laser machine with 1 (of 2) ducting coils.
2. Fasten the ducting coils together with the included band clamps.
3. Connect the exhaust outlet to the second ducting coil with a band clamp.
4. The exhaust must, safely and legally, take the fumes from the laser machine away from any individuals who could inhale the fumes.

It is a good idea to use a power strip with an on/off switch to give power to all components at the same time, and to turn the machine (systems) on and off easily. The use of an indoor fume extractor can be very helpful in isolating and control the fumes emitted from laser cutting and engraving.

## NOTICE

Please Reference the [Connection Diagram](#) <sup>1</sup> for all connections to the PL1220.

# Software

**NOTICE!** For techniques on how to use the RDWorks software suite, or manipulate work files, please refer to the Ruida RDWorks V8 software manual available at: <https://lagunatools.com/resources/product-manuals/>

**NOTICE!** The standalone setup is recommended for new users and is the easiest way to get started with the Laser Machine.

**NOTICE!** You must connect the laser machine to a computer to read the factory preset parameters on the Ruida controller.

**NOTICE!** Design programs may not be compatible with the newest versions of RDWorks and vice versa.

## RDWORKS PASSWORD: rd8888

RDWorks is adaptable and can be installed as a stand-alone program, or as an ad-in to a design program like AutoCAD or Adobe Illustrator. The following guide will go through the procedure of installing each individually.

No matter which configuration of RDWorks is chosen to operate the laser machine, it is advised to first connect the laser machine with the computer that will be manipulating files, just like one would do with an inkjet printer. The operator could, however, choose to put work files on a USB thumb driver and transfer them to the laser machine, but the Laser machine parameters (things like work area and mirror configurations) must to be synced with the software to preserve ratios and other parameters set by the onboard controller. The easiest way to sync this information is by connecting the PC to the laser machine via the included USB connector.

Confirm these software settings if choosing to not connect to a PC (intending to only transfer files via USB thumb drive):

Setting	Selection	Notes
Units	mm	Laser machine preset to mm.
Page Width	500mm	Config>page_settings>
Page Height	300mm	

There are three major steps to complete the software setup:

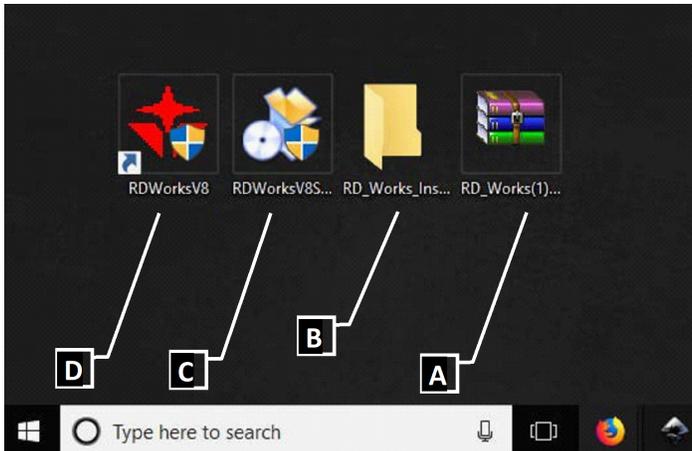
1. Install RDworks.
2. Sync Machine Settings.
3. Connect PC to Laser Machine.

## Install RDWorks as a stand-alone program (Recommended)

Installing this version of RDWorks will allow the operator to utilize the RDWorks software package to create or edit work files and send them to the laser machine to be executed. This is the easiest way to get started in laser machining and is recommended for beginner operators.

**NOTICE:** Please refer to the RDWorks v8 software manual for software-related guidance aside from this initial setup.

1. Download RDWorks or connect USB Thumb-Drive. To install the software, insert the included USB thumb drive into a USB port on your computer.
2. Install RDWorks



- A: .zip file form online download
- B: Folder containing the .exe file to install RDworks
- C: RDWorksSetup.exe file. Run to install.
- D: RDwork application launcher icon.



3. If the file was downloaded, unzip the .zip file [A] and run the .exe file [C] in the unzipped folder [B] to a known location.
4. Run the RdworksSetup.exe file and follow the on-screen setup instructions.
5. Select “LaserWork” as the Type and then select the Origin, and units that you wish to use. NOTICE: Other “types” are only compatible with certain software packages. For example, CorelDraw\_Laser will install a plugin into the CorelDraw software package. See Section 4.2
6. Install.

**TROUBLESHOOTING:**

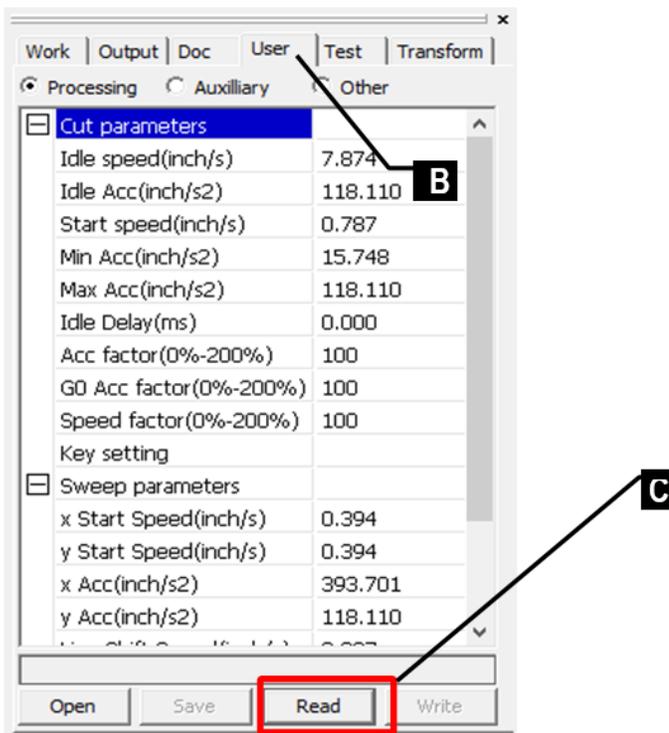
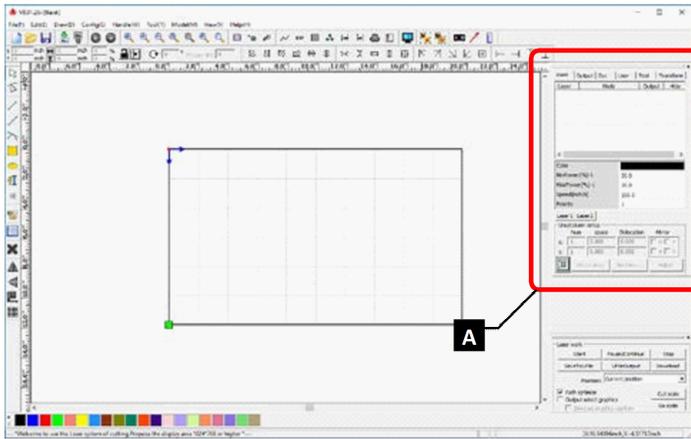
**Cannot Unzip the downloaded file:** You must use a file extractor software program (like 7-sip, winzip, or WinRar) to perform this task. Cannot locate RdworksSetup.exe: Check the C: drive. On Windows, open:

file explore>This\_PC>Windows (C:)>RDWorksV8

**Cannot run the RdworksSetuep.exe file:** Depending on the version of Windows installed, the operator may need to run the program as the administrator. To do this, right click rdworkssetup.exe and select “Run as Administrator”

**The Program will not install:** Make sure that the “Type” is Laserwork. Make sure that “Install” rather than “install USB driver” is selected.

## Sync Machine Settings with RDWorksV8



A: System Work Plat

B: User Tab

C: Read

**NOTICE!** RDWorks must be installed on the PC, and the laser machine must be fully set-up and operational.

1. Connect the PC to the Laser Machine.
2. On RDWorks, go to File, and select vendor settings [A].
3. Enter the Vendor Password: **RD8888**
4. In the right-side control panel (system work plat) select the "User" tab.
5. Click "Read"

**VERIFY SETTINGS**

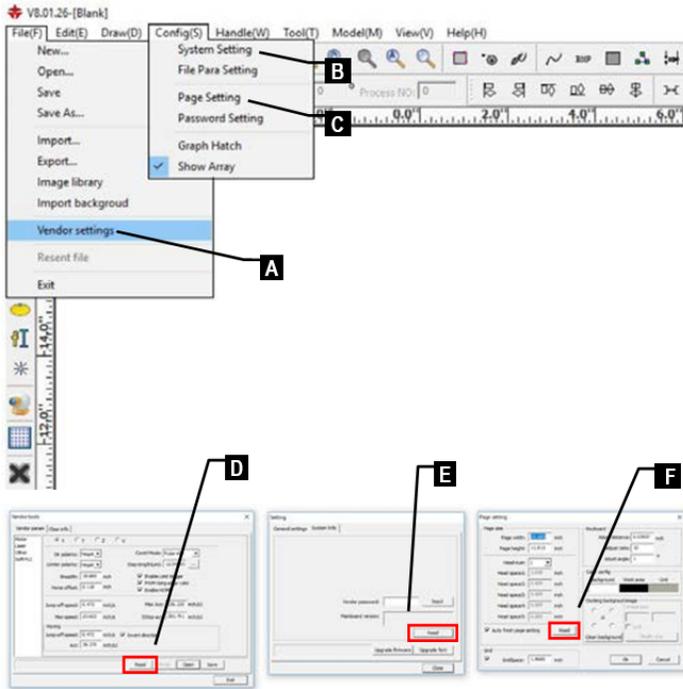
Page settings > page size > Page width: 19.685 inch (500mm), Page height: 11.811 inch (300mm)

**NOTICE!** Please refer to the RDWorks v8 software manual for software-related guidance aside from this initial setup.

**TROUBLESHOOTING:**

Cannot connect or communication error: Make sure the laser machine is powered on and functional. Use a hardwired USB to USB connection if the Ethernet method is problematic.

**Sync Machine Settings with RDWorksV8 (Alternate Method)**



- A: To enter password RD8888 and read machine settings.
- B: To read system settings
- C: To read page settings
- D: Read Machine Settings
- E: Read System Settings
- F: Read Page Settings

**NOTICE!** RDWorks must be installed on the PC, and the laser machine must be fully set-up and operational.

1. Connect the PC to the Laser Machine.
2. On RDWorks, go to File, and select vendor settings [A].
3. Enter the Vendor Password : RD8888
4. Click the “Read” button to read machine settings [D].
5. Save machine settings by clicking the Save button.
6. On RDWorks, go to Config, and select system settings [B].
7. Go to the System Info tab.
8. Click the “Read” button to read system settings [E].
9. On RDWorks, go to Config, and select page settings [C].
10. Click the “Read” button to read page settings [F].

**TROUBLESHOOTING:**

Cannot connect or communication error: Make sure the laser machine is powered on and functional. Use a hardwired USB to USB connection if the Ethernet method is problematic.

**Connect PC to Laser Machine**

To sync machine settings (4.1.3), you will need to connect the PC to the Laser Machine. The RDWorks software can also control the laser, start projects, and manage files directly from a PC by connecting the Laser Machine.

### Connecting Via USB (recommended for quick start)

Use the USB to USB connection cable from the PC to the Laser Machine.

### Connecting Via Ethernet (recommended for long term use)

1. Follow the Connection Diagram to connect the Laser Machine to the router that your PC is using to connect to the Internet. This includes connecting the Ethernet cable from the laser machine to the router.
2. Set the IP address of the Laser machine by hitting the Z/U button on the Ruida controller and navigating to **IP config+** (This is what it says on the laser interface)

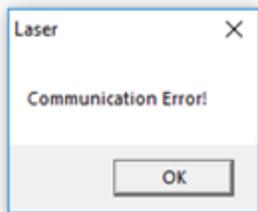


3. Set the **IP address** to any known value. Use 10.10.100.10 if confused.

**NOTICE!** Every device (computer, router, laser machine) has a unique IP address. By completing step 3, you are establishing an address so that other devices can connect to it.

4. Set the **Gateway** to the IP address of the Internet Router used. NOTICE: This IP address can be found on the bottom or side of the router. If not, please contact the router manufacture.
5. Connect the PC to the now available Laser machine network with the known IP address of the laser machine (10.10.100.10)

The PC will not send any notification that the Laser is connected. If the connection is not true, you will see this message from RDWorks when trying to run a command:



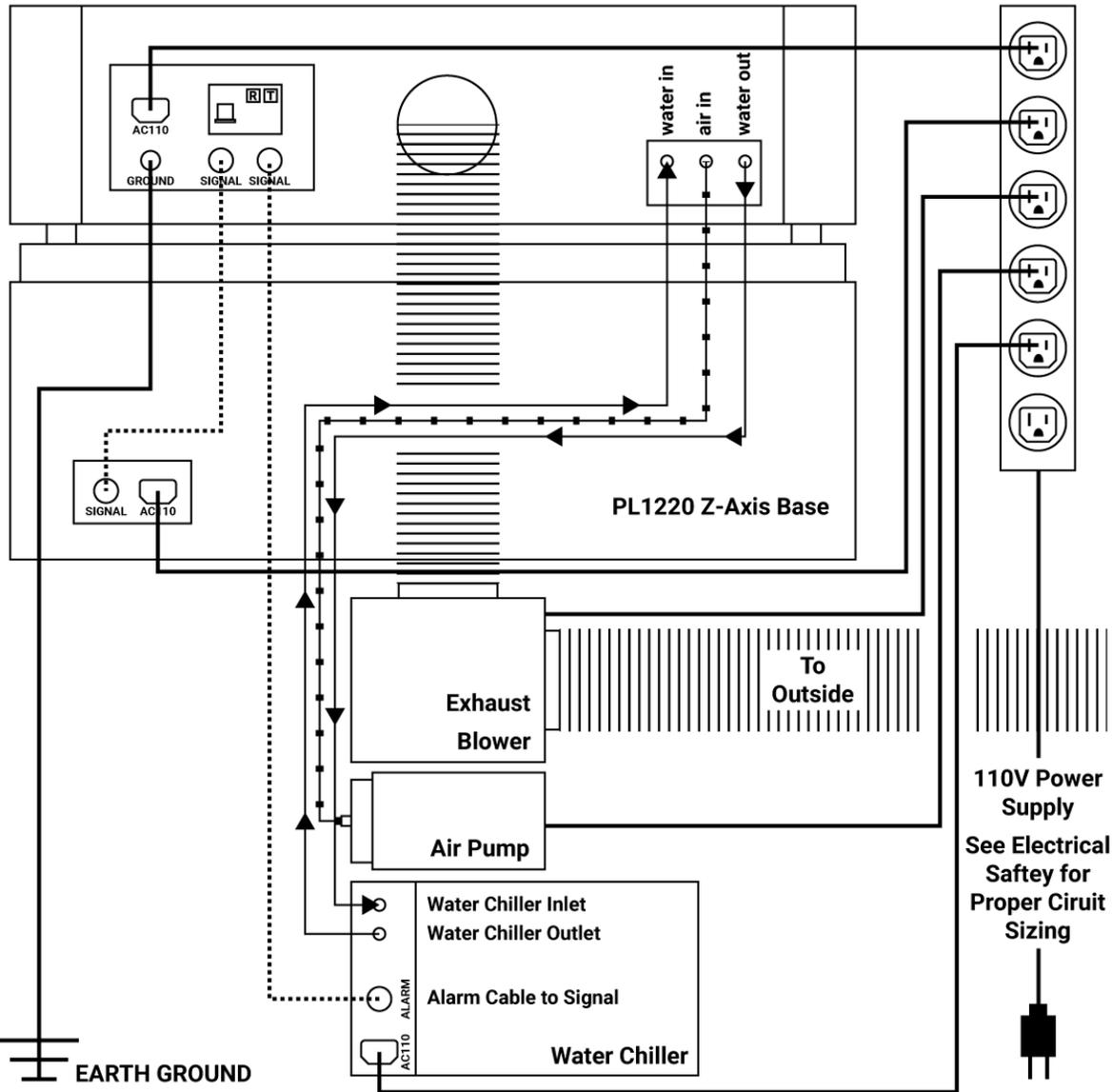
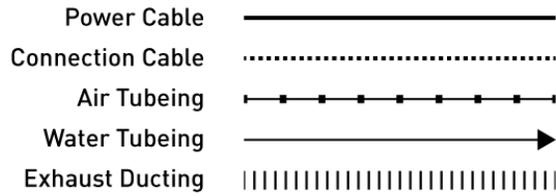
**NOTICE!** If you plan to use the laser machine with a USB stick only, it is still recommended that the RDWorks software (on PC) is initially synced to the factory preset machine settings.

#### TROUBLESHOOTING:

**Cannot connect:** Make sure the laser machine is powered on and functional, and make sure that RDWorks v8 is installed and running on the connecting computer.

**Cannot connect via Ethernet:** Make sure that the Laser machine is connected to an available Ethernet port on the router. With Ethernet connected, turn the router off, wait 20 seconds, and then turn the router back on.

# Test Run



## Test Run Procedure

1. With the power still unplugged, make all connections according to the connection diagram. Make sure water and air connections are not leaking.

**Exhaust System:** Use a flat head screwdriver to install the Exhaust Ventilation system to the machine. **NOTICE:** You will need to remove the rear panel in step 3 to verify connections. Only loosely attach the ducting.

**Cooling System:** Press fit the rubber water hoses from the cooling system (water chiller) to the laser machine.

**Air Pump:** Press fit the air hose from the air pump to the machine.

2. Open the rear panel and check that all systems are working by powering them on individually. Do not give power to the laser machine during this check.

**Laser Tube:** Make sure the cathode wire is connected and the cat screw is tightened (less than 1 NM or torque).

Make sure the anode wire is connected via the alligator clip.

**Exhaust System:** Make sure the ducting is installed and will not come loose. Make sure the fan will not tip over.

**Cooling System:** With the rear panel open, water in the chiller, and all connections made, give power to the chiller and make sure there are no leaks or faulty connections. Confirm that the water is flowing from right to left (towards the first mirror). Perform the "pinch test": Pinch any line from the chiller to the laser and make sure the alarm sounds.

**Air Support System:** Ensure that air is flowing to the laser head assembly.

3. Give power to the machine and all components.

## Alignment Check & Confirmation of Proper Setup.

1. Open the lid of the laser. There should be a red dot laser sight under the nozzle of the laser. This red dot is combined in the beam combiner to be in the exact same path as the laser tube. **IF YOU DO NOT SEE A RED DOT, THEN THE LASER IS NOT ALIGNED TO THE MIRRORS CORRECTLY.** If no red dot is visible, please view the Mirror Alignment Procedure.
2. If the red dot is present, open the lid and place a scrap piece of wood under the laser head with the red dot where you expect to fire the laser (on the scrap wood)
3. Rise the lift bed until the focal length sensor engages and stops the lift bed.
4. Close all doors.
5. Press the  PULSE button.
6. If the laser has pulsed properly and a small burn mark is present in the sample, setup is complete.

### **TROUBLESHOOTING:**

#### **Machine will not turn on**

Make sure the circuit breaker (on rear of machine) is flipped, and that the Emergency Switch is not engaged.

#### **Machine turns on, but Laser will not fire:**

Make sure door is closed.

Remove rear panel and confirm that water is flowing toward the first mirror. Laser will not fire if reversed.

Make sure the laser tube is properly connected, follow the [connections diagram](#)<sup>[11]</sup>; further follow the [wiring diagram](#)<sup>[41]</sup> if needed.

#### **Laser fires but does not process the work piece:**

See the sections titled [focal lens adjustments](#)<sup>[31]</sup>; Confirm that the focal lens is installed correctly. Confirm the correct focal spacing is set by the lift bed.

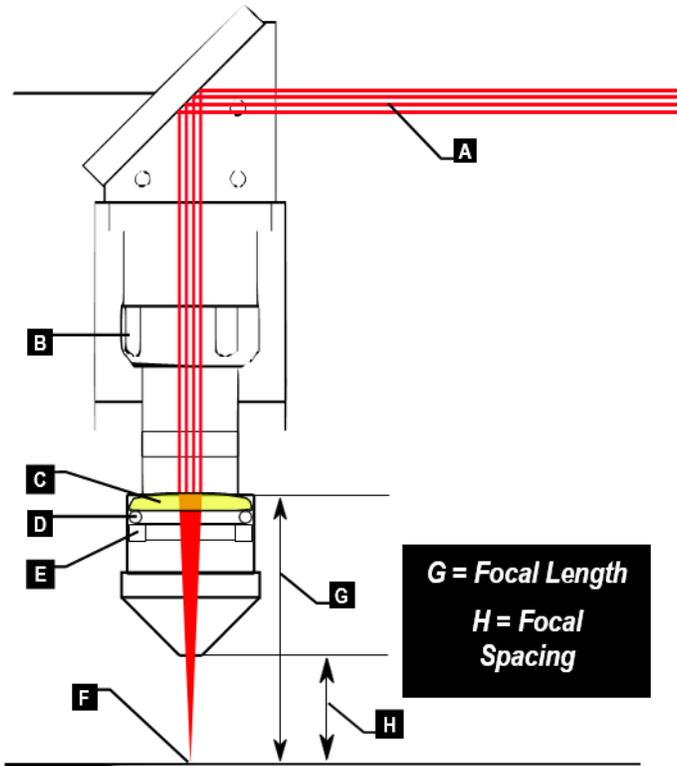
Unplug all systems and remove the protective panels. Confirm that nothing is blocking the laser beam path.

See section 7.4-7.8. Re-align mirrors, starting with the laser tube.

# Adjustments

## Focal Lens Adjustments

To make cuts and engravings on different materials, the operator will need to adjust the focal length according to the material's properties. This is either done using the lift bed and the focal length sensor, or by adjusting manually.



- A Incoming, Unfocused IR Laser Beam
- B Height Adjustment Clamp
- C Focal Lens (Standard is 50.8mm length, 20mm diameter)
- D Rubber Seal
- E Lock Ring
- F Focused IR Laser Beam
- G Focal Distance
- H Focal Spacing

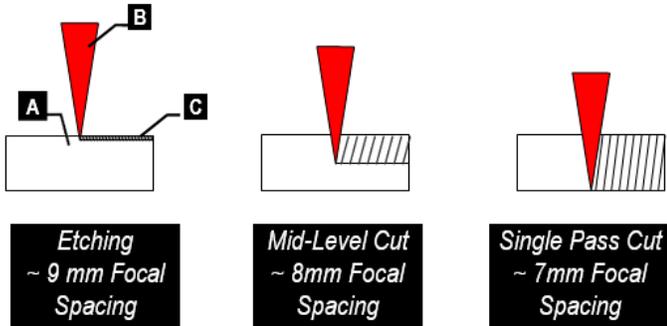
### Adjustment Procedures

1. Unscrew the height adjustment clamp [B].
2. Adjust the height of the laser tube such that the focused beam [F] is in contact with the work surface. This can be achieved by setting the focal spacing [H] to a distance between 7 and 9 mm.
3. The Focal Spacing [H] will depend on the process and the material, but it is generally between 7 and 9 mm.

**⚠ WARNING!** Never use the laser machine without the focal lens in place.

**NOTICE:** The maximum cut depth depends on the material. Always test the operation prior to running a work file.

# Cutting Strategies

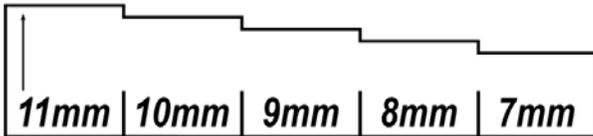


- A** Work Piece
- B** Focused Laser Beam
- C** Cut/Etch Path

The focal spacing depends heavily on the workpiece and the single pass limit or maximum cut depth of that workpiece. It is advised that you experiment with focal spacing prior to running a work file.

When using the lift bed, raise the bed until the work piece comes in contact with the focal length sensor. The focal spacing can be adjusted for repeated accuracy.

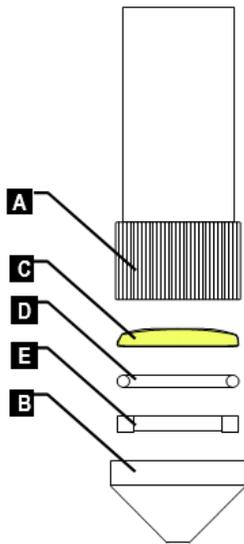
**NOTICE!** For when using the PL1220 off of the lift bed -for engraving a table top or materials that do not fit in the laser- a spacing block can be made to quickly adjust the focal spacing. Use ¼” acrylic or wood to cut out something like the following. Be sure to engrave the focal spacing on the surface for future reference.



**NOTICE!** The focal length is different than focal spacing and depends on the focal lens used. The stock lens installed in the PL1220 is 20mm in diameter, and 50.8mm in focal length.

**NOTICE!** Focal spacing will vary. Experiment with sample materials and make small adjustments.

# Changing or Cleaning the Focal Lens



- A Adjustable Head Tube
- B Nozzle
- C Focal Lens
- D Rubber Seal
- E Lock Ring
- C Cut/Etch Path

1. Unscrew the assembly and remove from the PL1220. NOTICE: The front of the PL1220 must be tilted up to remove the assembly.
2. Unscrew the nozzle [B] to expose the lock ring.
3. Carefully remove the lock ring with a small rod (a screwdriver will work).
4. Change or clean the focal lens as needed. **To clean:**  
Using a microfiber cloth and alcohol or appropriate glass lens cleaner, gently wipe the surface.  
To clean the mirrors, the same method is advised.
5. Re-assembly the assembly as shown.

**CAUTION!** not to scratch the focal lens.

**NOTICE!** The PL1220 is designed to be used with a 20mm diameter 50.8mm focal length lens.

# Feeds & Speeds

## Acrylic / Lucite / Plexiglass / PMMA

	40 WATT	80 WATT	120 WATT
Engrave	450 – 50%	450 – 35%	450 – 25%
Cut 1/8" (3.2mm)	25 – 100%	50 – 100%	60 – 100%
Cut 1/4" (6.4mm)	10 – 100%	20 – 100%	35 – 100%
Cut 3/8" (9.5mm)		5 – 100%	15 – 100%
Cut 1/2" (12.7mm)			5 – 100%

**NOTE:** There are commonly two types of acrylic. Cast acrylic produces a frosted-look engraving. Extruded Acrylic (the cheaper of the two) is best for cutting and produces a clear engraving.

## Natural Rubber

	40 WATT	80 WATT	120 WATT
Engrave	100- 80%	325 – 80%	400 – 80%
Cut 1/8" (3.2mm)	50 - 100%	120 – 100%	150 – 100%

**NOTE:** Typically used to cut or engrave rubber stamps to be used with an inkpad.

## Hardwoods / Plywoods / MDF / Particle Boards

	40 WATT	80 WATT	120 WATT
Engrave	150 – 100%	300 – 100%	450 – 100%
Deep Engrave	75 – 100%	175 – 100%	300 – 100%
Cut Veneer	150 – 80%	250 – 80%	250 – 100%
Cut 1/8" (3.2mm)	25 – 100%	100 – 100%	200 – 100%
Cut 1/4" (6.4mm)	5 – 100%	25 – 100%	50 – 100%
Cut 3/8" (9.5mm)		5 – 100%	40 – 100%
Cut 1/2" (12.7mm)			5 – 100%

**NOTE:** Cut with the grain when possible. Take into consideration that the density and water content of the wood will play a role in the above parameters. Do not process woods with flammable surface finishes like lacquer or varnish.

## Paper

	40 WATT	80 WATT	120 WATT
Cut	500 – 15%	500 – 10%	500 – 5%

**NOTE:** When cutting paper, be very cautious of the fire danger. Achieve laser settings such that the laser cuts the material as quickly as possible without leaving burn marks..

**Fabric (polyester, twill, cotton)**

	<b>40 WATT</b>	<b>80 WATT</b>	<b>120 WATT</b>
<b>Cut</b>	250 – 35%	450 – 80%	450 – 60%

**NOTE:** Use a spray on adhesive to hold the fabric to the work surface.

**Leathers**

	<b>40 WATT</b>	<b>80 WATT</b>	<b>120 WATT</b>
<b>Engrave</b>	150 – 100%	300 – 100%	450 – 100%
<b>Cut 1/8" (3.2mm)</b>	75 – 100%	175 – 100%	300 – 100%

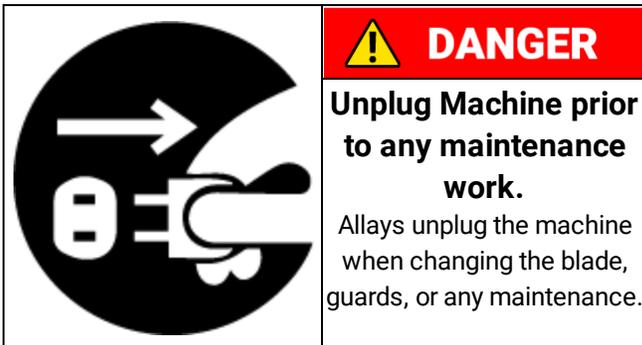
**NOTE:** Leathers are complicated to process because of the range in oil density and or finishes of the leather. It is best to use raw dried leather to cut or engrave.

**Cermark®, Alumark®, Thermark®, Painted, Anodized**

	<b>40 WATT</b>	<b>80 WATT</b>	<b>120 WATT</b>
<b>Engrave - Cermark®</b>	125 – 100%	250 – 100%	300 – 100%
<b>Engrave - Anodized</b>	450 – 50%	450 – 30%	450 – 25%
<b>Engrave - Painted</b>	450 – 40%	450 – 25%	450 – 15%

**NOTE:** There are several products that use sinter a ceramic marking into a metal surface. These parameters should only serve as a baseline to achieve a final engraving. Test a sample piece prior to running a work file..

# Maintenance



## General

Keep your machine clean. At the end of each day, clean the machine. Wood contains moisture, and if sawdust or wood chips are not removed, they will cause rust. In general, we recommend that you only use a Teflon-based lubricant on the saw. Regular oil attracts dust and dirt. Teflon lubricant tends to dry and has less of a tendency to accumulate dirt and saw dust. Periodically check that all nuts and bolts are tight.

## Drive belt

The drive belt should last for many years (depending on the usage) but needs to be inspected regularly for cracks, cuts and general wear. If damage is found, replace the belt.

## Bearings

All bearings are sealed for life and do not require any maintenance. If a bearing becomes faulty, replace it.

## As needed

- Clean Engraving Table (work surface)
- Clean Mirror Surfaces (ONLY IF DIRTY)
- Clean Focal Lens (ONLY IF DIRTY)
- Check Mirror Alignment
- Replace Laser Tube

## Before Every Use

- Clean Engraving Table (work surface)
- Check Mirror Surfaces (CLEAN ONLY IF DIRTY)
- Check Focal Lens (CLEAN ONLY IF DIRTY)
- Check Air Assist System

## Weekly (10 hours of use)

- Clean Venting Pathway
- Clean Air Assist Nozzle
- Check belts for debris and lubrication. Lubricate if needed.
- Check linear bearings and guides for debris and lubrication. Lubricate if needed.

## Monthly (100 hours of use)

- Lubricate Linear Bearings and Guides
- Replace Chiller Water
- Inspect all systems for loose screws and hazards
- Remove panels and confirm electrical connections.
- Check belts for cracks or frays. Replace if found.

## Yearly (independent of use)

- Replace water tubing
- Replace air tubing

## Cleaning & Lubrication Suggestions

**General Cleaning:** Soapy water. Do not use chemical cleaners or degreasers.

**Glass Cleaning:** Microfiber non-scratch cloth and alcohol-based glass cleaner.

**⚠ CAUTION!** Excessive cleaning can be problematic. Clean mirrors and lenses only when needed.

**Motion System Lubrication:** White lithium (PTFE) grease.

# Troubleshooting

Behavior	Possible Causes	Solutions
Laser machine will not turn on	<ol style="list-style-type: none"> <li>1. Breaker is on defeated position</li> <li>2. Improper input power</li> </ol>	<ol style="list-style-type: none"> <li>1. Flip Breaker Switch</li> <li>2. Confirm Power supply meets Machine Specifications</li> </ol>
All systems are powered but Laser will not fire	<ol style="list-style-type: none"> <li>1. Interlock Switch (door sensor) defeated</li> <li>2. Chiller Alarm defeated</li> <li>3. Water is flowing in the wrong direction</li> </ol>	<ol style="list-style-type: none"> <li>1. Close door, inspect switch</li> <li>2. Troubleshoot Chiller Unit</li> <li>3. Confirm direction of water flow (should be with direction of laser beam, towards first mirror)</li> </ol>
Laser fires but does not process work surface or quality of process is poor	<ol style="list-style-type: none"> <li>1. Mirror is not aligned</li> <li>2. Focal distance is not set correctly</li> <li>3. Incorrect Focal Lens</li> <li>4. Focal Lens is dirty</li> <li>5. Non-compatible material</li> </ol>	<ol style="list-style-type: none"> <li>1. Perform mirror alignment procedure</li> <li>2. Adjust focal spacing to 7mm from work surface.</li> <li>3. Use lens with 50.8mm focal length</li> <li>4. Clean focal lens and ensure that the Air Assist System is working.</li> <li>5. No soln.</li> </ol>

## Frequently Asked Questions.

Q: What materials can the 40-Watt CO2 Laser machine cut/engrave?

A: The processing capabilities of laser machines are distinguished by the wavelength of the laser beam and the power output of the laser tube. CO2 Lasers can cut and engrave most materials other than metals. By contrast, Fiber Lasers are engineered to produce a laser beam that can process metals. The 40watt CO2 laser can cut and engrave most polymers and polymer composites: plastics, woods, leathers, fabrics, papers, etc. It can also engrave several surfaces that it cannot cut, including anodized or coated metals, glass and stone. Please see Appendix 4, CO2 Laser Machine Single Pass Parameters for RDWorks, for a sample of what this machine can process. The operator must consider hazardous and problematic byproducts of some of these polymers. For example, polycarbonate should not be cut because it produces a toxic gas that can be harmful to the operator and will damage components of the laser machine. See the safety section for other hazardous materials and always check the Material Safety Data Sheet (MSDS) prior to cutting any questionable materials.

Q: Do I have to use RDWorks V8 software with a Ruida-controlled Laser Machine?

A: No. You can install RDWorks as a printer driver. (See the software setup section 4.2.) You can also use an independent software program like Lightburn®. Follow this link to learn more about the LightBurn Software for Laser Cutters: <https://lightburnsoftware.com/>

Q: How often do I need to change the Laser Tube?

A: The Laser Tube is classified as a consumable part and has a rated lifespan of 5000 hours of use. However, several variables affect the lifespan of the laser tube, like the power setting used and the quality of water coolant used. NOTICE: Only deionized or distilled water should be used with the chiller/laser tube cooling system.

Q: How often do I need to change the water in the chiller unit, and can I leave the water in the laser tube when not in use?

A: The water should be changed on a monthly (30 days) basis. The water can be left in the tube as long as the water cannot freeze. If you are operating this laser in temperatures where the water can freeze overnight, there is a high likelihood that the expanded frozen water will break the laser tube.

Q: Can I use a different Focal Length than the included 50.8mm focal length?

A: All focal lenses must be 20mm in diameter to fit the laser tube assembly. The shortest focal length that can be used is the 50.8mm, constraint by the laser assembly mounting tube. A longer focal length can be used by removing the removable bottom of the PL1220 and resting the machine on riser blocks to accommodate the larger focal spacing needed.

Q: What type of lubricant should I use for the linear bearings?

A: White lithium (PTFE) grease is recommended.

Q: Do I need to use a Fume Extractor with a CO2 laser cutting machine?

A: You must vent the machine to a safe location that will not harm yourself as the operator or any bystanders. This is most easily done with the use of a fume extractor machine. The use of a Fume Extractor is beneficial to the safety of the operator and bystanders as it filters the harmful byproduct away. This does not make it OK to use harmful materials as the fumes must still travel through the venting and parts of the machine that could be irreversible damaged.

# Specifications

## PL1220 Laser

<b>Power</b>	
Voltage	115V
Hertz	60Hz
Phase	1Ph
Running Amperage	9.6A (14.4A with all components)
Recommended breaker	Dedicated 15A on power strip for all components

## CO2 Laser

Laser Tube	RECI Water Cooled 40W 15,000H working life
Optics	U.S II-VI Focusing lens & Beam Combiner
Drive System	Leadshine Motors & 3PH Drivers
Linear Guides	Hiwin HG Resin Capped
Work Envelope	12" x 20"
Table Lift	12"
Control Software	RUIDA RDWorks, Lightburn option
Engraving Speed	0-500mm/s
Cutting Speed	0-500mm/s
Laser Output Control	0-100% Software controlled
Exhaust	300CFM
Working Environment	32° – 104 ° F , Humidity 5-95%
<b>Dimensions</b>	

Net Weight	300 Lbs (all components)
Ship Weight	325 Lbs
Assembled Height	10" / 27" / 40" (top unit, with base, with base and stand)
Assembled Width	40"
Assembled Depth	30"

**Chiller CW-3000DG**

Voltage	115V
Hertz	60Hz
Phase	1PH
Running Amperage	0.9A
Net Weight	21 Lbs
Ship Weight	26 Lbs
Tank Capacity:	9L (2.3 Gal)
Flow:	10L/min (2.64 Gal/min)

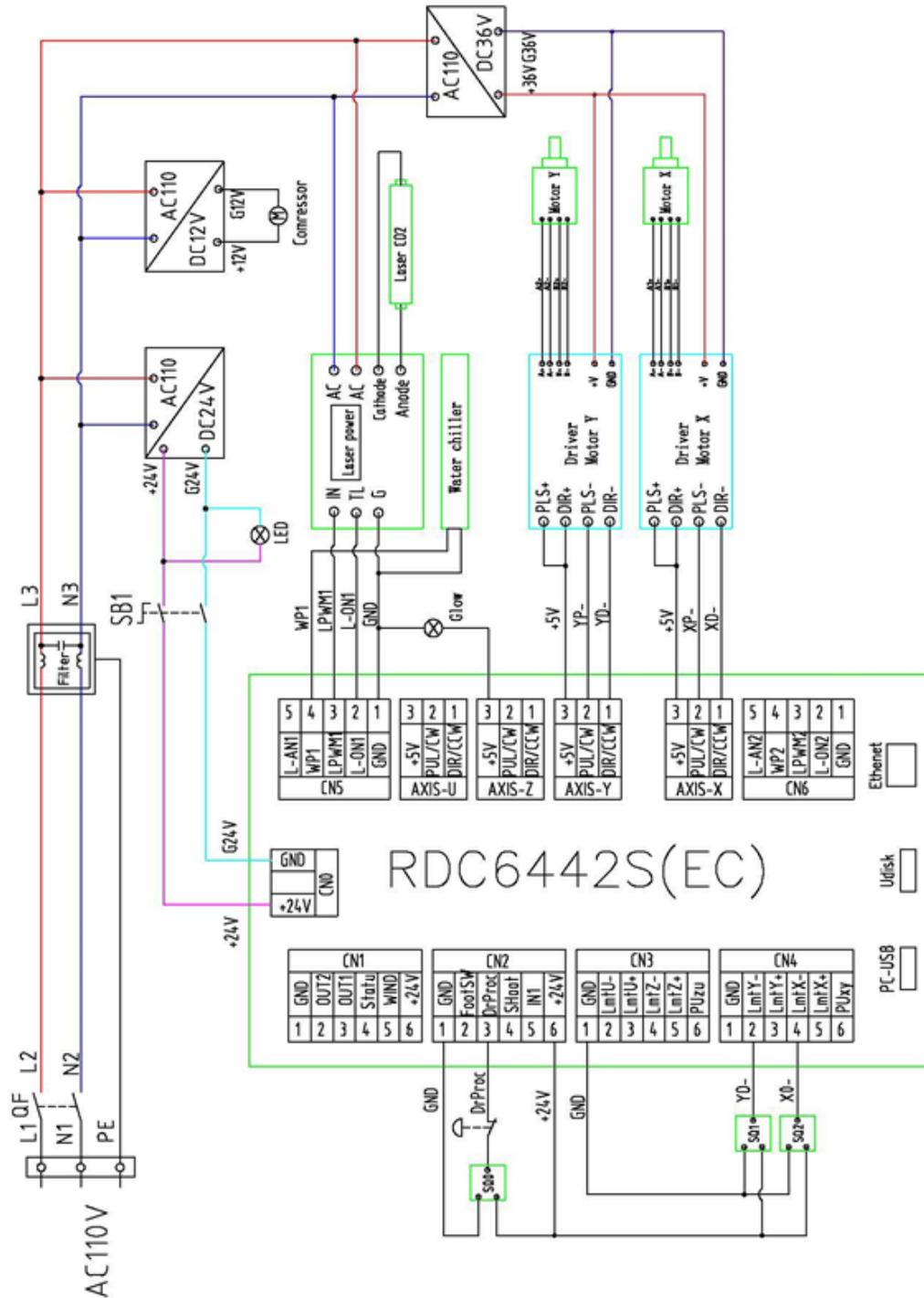
**Air pump**

Voltage	115V
Hertz	60Hz
Phase	1PH
Running Amperage	1.3A
Air Flow	5 CFM
Net Weight	9.9 Lbs
Ship Weight	10 Lbs

**Exhaust Fan**

Voltage	115V
Hertz	60Hz
Phase	1PH
Running Amperage	2.6A
Horse Power	1/3HP
Air Flow	300CFM

# Wiring Diagram



# Warranty

Every product sold is warranted to be free of manufacturers' defective workmanship, parts, and materials. For any questions about this product, the intended use, customer service, or replacement parts – **please contact the store where the product was purchased**. If you need further assistance, you can always contact Laguna Tools directly.

**Laguna Tools: +1 (949) 474-1200**  
[customerservice@lagunatools.com](mailto:customerservice@lagunatools.com)

## Registration



To prevent voiding this warranty, all products sold must be registered within thirty (30) days of receiving. Registering the product will enable the original purchaser to receive notifications about important product changes and receive customer support.  
<https://lagunatools.com/policies/warranty/>

## What Is Covered?

Any part, determined by Laguna Tools®, to have a defect will be repaired or replaced (and shipped), without charge. It is required that the defective item/part be returned to Laguna Tools® with the complaint and proof of purchase in the original packaging that it was received. In the event the item/part is determined to be void of this warranty, the customer will be responsible for the cost to replace the item/part and all related shipping charges.

## Who Is Covered?

The applicable warranty covers only the initial purchaser of the product from the receipt date. The original purchaser must present the original receipt as proof of purchase.

## Shipping Damage

Laguna Tools® and the purchasing customer is not responsible for damage or loss caused by a freight company or other circumstances not in the direct control of Laguna Tools®. All shipping related claims for loss or damaged goods must be made to Laguna Tools within twenty-four hours of delivery.

## Warranty Limitations

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, or lack-of/inadequate dust collection. The warranty may be voided against proof of misuse/abuse, damage caused where repair or alterations have been made or attempted by others, using the product for purposes other than those described as intended use (unless with consent by Laguna Tools®), modification to the product, or use with an accessory that was not designed for the product. 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 in this manual.

## Length of Warranty

Aside from being free of defects upon receiving, consumable parts, like cutters and abrasives, are not covered by this warranty unless otherwise stated by Laguna Tools®. These parts are designed to be used at the expense of the operator and are available for replacement or inventory purchase.

**2 Year – New purchases through authorized dealers.**

**1 Year – New purchases directly from Laguna Tools.**

**1 Year – Blades and Accessories**



# PL1220 Precision Laser

110V/1PH/60Hz w/ Z Axis Base, Chiller, Exhaust Fan, Air Pump

**MLC122040-2**



**NET WEIGHT: 220 Lbs**  
**GROSS WEIGHT: 260 Lbs**

**BOX NUMBER**

**SERIAL NUMBER**

## **READ BEFORE SIGNING**

### **CUSTOMER RESPONSIBILITIES**

Note any carton shortages on the carrier's shipping documents.  
Note all damages on the carrier's shipping documents.  
Note any missing or broken packaging on the carriers shipping documents.

All product shortage claims must be made to Laguna Tools within 2 days from the shipping date; otherwise claim cannot be honored.

### **CARRIER RESPONSIBILITIES**

Do not break down skid  
Do not remove any part of packaging  
Notify Consignee of any damage  
Carrier will be 100% liable for any damage.

The logo for LAGUNA, featuring the word "LAGUNA" in a bold, white, sans-serif font. A red horizontal line is positioned under the letter "A". The logo is set against a solid black rectangular background.

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