### PL1220 Laser Machine Specifications

**MLC122040**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laser Type</td>
<td>Water cooled CO2 sealed laser, 10.6µm wavelength</td>
</tr>
<tr>
<td>Laser Power</td>
<td>40 Watt</td>
</tr>
<tr>
<td>Work Envelope</td>
<td>12&quot;L x 20&quot;W (cm: 30.5, 50.8)</td>
</tr>
<tr>
<td>Max Material Thickness</td>
<td>3/4&quot; (1.9 cm)</td>
</tr>
<tr>
<td>Max Material Thickness Bottomless</td>
<td>Infinite</td>
</tr>
<tr>
<td>Engraving Speed</td>
<td>0-500mm/s</td>
</tr>
<tr>
<td>Cutting Speed</td>
<td>0-500mm/s</td>
</tr>
<tr>
<td>Laser Output Control</td>
<td>0-100% Set by Software</td>
</tr>
<tr>
<td>Min. Engraving Size</td>
<td>1mm x 1mm</td>
</tr>
<tr>
<td>Highest Scanning Precision</td>
<td>4000 DPI</td>
</tr>
<tr>
<td>Locating Precision</td>
<td>≤+0.01mm</td>
</tr>
<tr>
<td>Controlling Software</td>
<td>Ruida RDWorks</td>
</tr>
<tr>
<td>Graphic Format Supported</td>
<td>DST PLT BMP DXF DWG AI LAS, etc.</td>
</tr>
<tr>
<td>Color Separation</td>
<td>Yes</td>
</tr>
<tr>
<td>Working Environment</td>
<td>32º – 104 º F , Humidity 5-95%</td>
</tr>
<tr>
<td>Phase</td>
<td>1 PH</td>
</tr>
<tr>
<td>Voltage</td>
<td>110V</td>
</tr>
<tr>
<td>Motor Type</td>
<td>2 x steppers</td>
</tr>
<tr>
<td>Motor Spec</td>
<td>4.0 AMP (1-8°)</td>
</tr>
<tr>
<td>Cycle</td>
<td>50HZ or 60HZ (auto switching)</td>
</tr>
<tr>
<td>Full Load Amperage</td>
<td>14.5 AMP</td>
</tr>
<tr>
<td>Switch Type</td>
<td>Automatic shut off</td>
</tr>
<tr>
<td>Power Cord</td>
<td>IEC320-C13 to NEMA 5-15P</td>
</tr>
<tr>
<td>Power Plug Included</td>
<td>NEMA 5-15P</td>
</tr>
<tr>
<td>NEMA Breaker Recommendation</td>
<td>15 AMP</td>
</tr>
<tr>
<td>Foot Print (LxW)</td>
<td>30&quot;L x 40&quot;W (cm: 76.2, 101.6)</td>
</tr>
<tr>
<td>Overall Dimensions (LxWxH)</td>
<td>30&quot;L x 40&quot;W x 9&quot;H* (cm: 76.2, 101.6, 22.9)</td>
</tr>
<tr>
<td>Shipping Dimensions (LxWxH)</td>
<td>1 of 2: 35&quot;L x 42&quot;W x 16&quot;H. 2 of 2: 16&quot;L x 42&quot;W x 19&quot;H.</td>
</tr>
<tr>
<td>Net Weight (No Accessories)</td>
<td>150 Lbs. (68.04 Kgs.)</td>
</tr>
<tr>
<td>Shipping Weight</td>
<td>230 Lbs. (104.3)</td>
</tr>
<tr>
<td>Venting: Outlet Dia.</td>
<td>1 x 6&quot;</td>
</tr>
<tr>
<td>Venting: CFM Min. Req.</td>
<td>300 CFM</td>
</tr>
<tr>
<td>Sound Emissions</td>
<td>55 dBA</td>
</tr>
</tbody>
</table>

*Machine needs 27.5" (69.9 cm) height clearance to open lid.*

See back cover for dimensional drawings
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VIDEO LIBRARIES

We work hard to offer a large library of videos for each and every product that we sell. This list is on-going and subject to change without notice. To access these videos, please navigate to the product page, the video library, or the Laguna Tools YouTube Channels with the following QR codes or web links.

When a video is available for certain sections or jobs in this manual, the following video callout plat will be present. Use this with a QR code reader or follow the link to access the video.

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Thank you!
Welcome to the Laguna Tools® group of discriminating woodworkers. We understand that you have a choice of where to purchase your machines and appreciate the confidence you have in the Laguna Tools® brand. Through hands-on experience, Laguna Tools® is constantly working hard to make innovative, precision products. Products that inspire you to create works of art, are a joy to operate, and encourage your best work.

Laguna Tools®
Imagination, Innovation, and Invention at Work

Warranty & Registration
Every product sold is warranted to be free of manufacturers’ defective workmanship, parts, and materials. For any questions about this product, the intended use or what it was designed for, customer service, or replacement parts, please contact our customer service department:

Laguna Tools® Customer Service
2072 Alton Parkway, Irvine, California 92606, USA
1-800-332-4094
customerservice@lagunatools.com
www.lagunatools.com/why/customer-service/
8AM to 5PM PST, Monday through Friday

For warranty claims or to report damage upon receiving – please reach out to our warranty department:

Laguna Tools® Warranty Service
2072 Alton Parkway, Irvine, California 92606, USA
1-949-474-1200
customerservice@lagunatools.com
www.lagunatools.com/policies/warranty
8AM to 5PM PST, Monday through Friday

Registration
To prevent voiding this warranty, all products sold must be registered within thirty (30) days of receiving the product. Registering the product will enable the original purchaser to receive notifications about important product changes, receive customer service, and be able to file a warranty claim against defective workmanship, parts, or materials.

Who is covered
The applicable warranty covers only the initial purchaser of the product from the date of receiving the product. To file such claims, the original purchaser must present the original receipt as proof of purchase.

What is covered
The warranty covers any defects in the workmanship of all parts and materials that make up the machine unless otherwise specified. Any part, determined by Laguna Tools®, to have a defect will be repaired or replaced (and shipped), without charge. The defective item/part must be returned to Laguna Tools® with the complaint and proof of purchase in the original packaging that it was received in. In the event the item/part is determined to be not covered by this warranty, the customer will be responsible for the cost to replace the item/part and all related shipping charges.

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
All new machines and optional accessories sold through an authorized dealer carry a two-year warranty effective the date of receiving the product. Machines sold for either commercial or industrial use have a one-year warranty. Wearable parts like throat plates, bandsaw guides, etc., have a ninety-day warranty.

Table A-1 Warranty Lengths

<table>
<thead>
<tr>
<th>Warranty Length</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>90 Days – Wearable Parts</td>
<td></td>
</tr>
<tr>
<td>1 Year – Blades and Accessories outside of Machine Options</td>
<td></td>
</tr>
<tr>
<td>1 Year – Machines Sold for Commercial or Industrial Use</td>
<td></td>
</tr>
<tr>
<td>2 Year – New Machines Sold through an Authorized Dealer</td>
<td></td>
</tr>
<tr>
<td>2 Year – Accessories Sold as Machine Options (excluding blades)</td>
<td></td>
</tr>
</tbody>
</table>

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. The determination of a consumable part will be made on a case-by-case basis by Laguna Tools®.

Shipping Damage
Laguna Tools® 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 damage goods must be made to Laguna Tools within twenty-four hours of delivery.

How to receive support
To file a warranty-claim please contact the warranty department at 1-949-474-1200. To receive customer service or technical support please contact the customer service department at 1-800-332-4094. Parts, under warranty, are shipped at the expense of the operator and are available for replacement or inventory purchase. Technical support to install replacement parts is primarily provided by phone, fax, email, or the Laguna Tools Customer Support Website.

WANT A FREE LAGUNA T-SHIRT?
POST A PHOTO OF YOU WITH YOUR LAGUNA MACHINE ON OUR FACEBOOK PAGE AND WE WILL SEND YOU ONE.

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ABOUT THIS MANUAL

This manual is intended to thoroughly cover the setup, maintenance, and proper adjustments of the product. Aside from the proceeding general safety considerations, this manual DOES NOT cover the techniques that are possible with the product nor the appropriate safety precautions necessary. There are organizations with published safe practices, techniques, and proper operation of this product.

Power Tool Institute
www.powertoolinstitute.com
ANSI Safety Standards
wwwansi.org
NFPA Fire Safety
www.nfpa.org
Occupational Safety and Health Administration
www.osha.gov

In addition to safe and proper operation of the machine, it is also important to understand the materials that will be used with the machine. It is 100% the operator’s responsibility to understand the materials, and those related safety precautions necessary for safe practice. All material safety data sheets (MSDS) are, by law, available from the manufacturer of the material.

Any suggestions or comments about this manual are highly appreciated. Please email us at manuals@lagunatools.com.

SECTIONS OF THIS MANUAL

Safety – Covers general safety, tool specific safety, intended use, operator rules, risks to operator, specific instructions or do-not do’s, and regulation rulings.

Machine Maps – Functional maps of the product that define components main function and use. This section should not serve as a parts list, as the parts list (exploded view) is Appendix 6.

Setup – Procedures and explanations of proper setup.

Adjustments – Procedures and explanations of proper adjustments.

Appendices – All other items: Maintenance, Troubleshooting, Exploded Parts, User guides, specification sheets and wiring diagrams.

CALLOUTS IN THIS MANUAL

WARNING: Indicates a possible threat that could result in serious injury or death to the operator and/or bystanders as well as severe damage to the machine.

USE CAUTION: Indicates a possible threat that could result in injury and/or unwarrantable damage to the machine.

TECH TIP: Indicates a technical tip that can help the action, process, or procedure described. A QR code will be present when applicable content is available.

NOTICE: Indicates important information to the reader about questionable subject, objects of importance, or to explain alternative methods or options.

1. SAFETY

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.

1.1 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.

1.2 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.

1.3 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 biproduct, are unstable, produce a degrading by-product, 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.

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1.4 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.

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

Table 1-1 Do not cut list

1.5 GENERAL SHOP & TOOL SAFETY

READ ALL SAFETY CONSIDERATIONS. Failure to follow this set of guidelines can result in unwarranted damage to the machine and serious injury to the operator and/or bystanders.

1.5.1 Work Area

KEEP ALL CHILDREN AND UNTRAINED PERSONS AWAY FROM THE MACHINE. Do not allow bystanders to touch the machine or power cord. Only the operator should be in the work area.

KEEP WORK AREA CLEAN. A cluttered area can limit the range of motion needed by the machine and cause serious injury to the operator or damage to the machine.

MAKE SURE THE WORK AREA IS CHILD-PROOF AND UNACCESSIBLE TO UNTRAINED PERSONS. Use padlocks where possible to secure the machine and keep all machines unplugged when not in use.

DO NOT KEEP OR PLACE TOOLS IN OUTDOOR, DAMP, OR DANGEROUS ENVIRONMENTS. Never operate the tool under wet or damp conditions; there is a serious risk of electrical shock. Do not use the tool in the presence of flammable liquids or gasses.

1.5.2 Personal Safety

KNOW YOUR MACHINE. Read and understand the owner’s manual and labels affixed to the tool. Learn its application and limitations as well as the specific potential hazards peculiar to this tool.

DRESS PROPERLY. Do not wear loose clothing or jewelry. Do not wear gloves that can be caught in any part of the machine. Tie up or wear protective coverings to contain long hair.

USE THE APPROPRIATE SAFETY GOGGLES. Some machines require additional face shielding or light shielding than offered by safety goggles alone. Know your machine and the proper personal protective equipment (PPE) to use.

USE EAR PROTECTION. Some machines operate at very high noise levels. To prevent harm, be sure to use ear protection always.

GUARD AGAINST ELECTRIC SHOCK. Prevent all bodily contact with grounded surfaces and parts of the machine that pose electrical threats.

DO NOT OVERREACH THE CUTTER HEAD, BLADE, OR PROCESSING POINT. DO NOT STAND ON THE MACHINE. Serious injury can occur from mishandling this tool. Keep proper footing on the floor.

AVOID ACCIDENTAL STARTING. Make sure the tool is in the OFF position prior to plugging it in.

KEEP GUARDS IN PLACE. Machine parts like riving knives, blade guards, cutter-head guards, feather boards, push sticks, panels or doors, etc., are designed to minimize possible injury. Keep those parts in place during operation.

DO NOT RELY ON GUARDS. The operator of this tool is 100% responsible for his/her own safety. The guards and safety components sold with this machine are not enough to ensure safety.

BE ALERT ALWAYS AND GIVE 100% OF YOUR ATTENTION TO THE OPERATION OF THIS TOOL. Failure to do so can result in serious injury to both the operator and bystanders.

CHECK FOR DAMAGED PARTS. Before every use of this tool, make sure the machine and any components of the machine are not damaged or at the risk of being damaged. If a damaged part is discovered, stop immediately and put the machine out of service until the part is replaced. Parts can be ordered directly from Laguna Tools at: 1-800-332-4049.

1.5.3 Tool Use

USE THE CORRECT TOOL FOR THE JOB. Know the limitations and capabilities of your new purchase by reviewing the Intended Use section of this manual.

DO NOT FORCE TOOL. The tool is designed to operate at a certain feed rate determined by the cutter. Forcing the workpiece beyond that rate will do an inadequate job and may cause damage to the machine or harm to the operator.

SECURE THE WORK PIECE. For all woodworking and metalworking applications, the workpiece should be secured correctly by the operator using appropriate clamps and vises. Always use a clamp or vise when available.

NEVER LEAVE TOOL RUNNING UNATTENDED. Do not leave the tool until it comes to a complete stop. When it will be unattended, unplug the tool.

KEEP CUTTERHEADS AND BLADES SHARP. Never operate this machine with unsharpened (dull) cutter heads or blades. Operating under these conditions greatly increases the chance of kickback and overloads.

FEED DIRECTION. If feed rate is applicable, then there is only one direction of feed rate for the tool. Do not force the workpiece in the wrong feed direction.

USE ONLY LAGUNA TOOLS OR COMPATIBLE AND MARKED REPLACEMENT PARTS. All others may cause damage or harm.

USE ONLY MANUFACTURER-RECOMMENDED ACCESSORIES. Some accessories may cause damage or harm.

ALL REPAIRS SHOULD BE DONE BY TRAINED REPAIRMEN. Contact Laguna Tools or a competent repair service.
1.5.4 Electrical

DISCONNECT THE POWER FIRST. Always disconnect the machine from power supply BEFORE adjusting, changing tooling, or servicing it. USE A QUALIFIED ELECTRICIAN FOR ALL ELECTRICAL CONNECTIONS. Failure to do so may result in damage to the tool and/or electrical shock to the operator and bystanders.

NEVER TOUCH ANY TERMINALS OR BARE WIRE WITH HANDS OR TOOLS. Check for frayed wires frequently.

POWER PLUGS. The machine may not come with a power plug because of the variance in power receptacles. Consult with a local electrician prior to purchasing a power plug. The following table should only serve as a guideline to choosing the appropriate power plug.

BREAKER/AMP SERVICE/FUSES. The machine is designed to be used with a circuit breaker depending on the machine power supply specifications, so make sure that the voltage supplied is the same that is specified on the nameplate of the tool. Also make sure that the power supply is equipped with the appropriate breaker and plug according to your local electrical code. IF IN DOUBT, DO NOT PLUG IN THE MACHINE. Using this tool with a voltage different than that stated on the nameplate can damage the electrical components of this machine and any such damage will not be covered by a warranty.

GROUNDING. In the event of a malfunction, properly grounding the tool provides a path for electric charge to dissipate in a safe manner. Make sure all grounded connections are making good contact to grounded and conductive pathways.

DO NOT MODIFY THE PLUG. Do not remove any of the prongs attached to the proper plug for the machine.

ALLWAYS USE A HARDWIRED GROUND FOR DUST COLLECTION AND SIMILAR MACHINES THAT GENERATE A STATIC CHARGE. Especially with dust collection tools, the static charge generated could result in an explosion or fire. If you can see a static charge build up (fine dust orthogonal to tube or surface) or sense one by a small shock – STOP and make sure all grounding connections are properly installed and making proper contact.

### Table 1-2 Plugs and Receptacles

<table>
<thead>
<tr>
<th>RATING</th>
<th>100-125V</th>
<th>200-250V</th>
</tr>
</thead>
<tbody>
<tr>
<td>125V AC</td>
<td>15 Amps</td>
<td>15 Amps</td>
</tr>
<tr>
<td></td>
<td>5-15</td>
<td>6-15</td>
</tr>
<tr>
<td>125V AC</td>
<td>20 Amps</td>
<td>20 Amps</td>
</tr>
<tr>
<td></td>
<td>5-20</td>
<td>6-20</td>
</tr>
<tr>
<td>125V AC</td>
<td>30 Amps</td>
<td>30 Amps</td>
</tr>
<tr>
<td></td>
<td>L5-30</td>
<td>L6-30</td>
</tr>
<tr>
<td>250V AC</td>
<td>15 Amps</td>
<td>15 Amps</td>
</tr>
<tr>
<td></td>
<td>6-15</td>
<td>6-15</td>
</tr>
<tr>
<td>250V AC</td>
<td>20 Amps</td>
<td>20 Amps</td>
</tr>
<tr>
<td></td>
<td>6-20</td>
<td>6-20</td>
</tr>
<tr>
<td>250V AC</td>
<td>30 Amps</td>
<td>30 Amps</td>
</tr>
<tr>
<td></td>
<td>L6-30</td>
<td>L6-30</td>
</tr>
</tbody>
</table>

Table 1-3 Extension Cord Lengths

<table>
<thead>
<tr>
<th>TOOLS AMPERAGE RATING</th>
<th>VOLTS</th>
<th>A.W.G CORD SIZE</th>
<th>CORD LENGTH IN FEET</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>120</td>
<td>25</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>240</td>
<td>50</td>
<td>100</td>
</tr>
<tr>
<td>3-6</td>
<td></td>
<td>18 ga.</td>
<td>16 ga.</td>
</tr>
<tr>
<td>6-8</td>
<td></td>
<td>18 ga.</td>
<td>16 ga.</td>
</tr>
<tr>
<td>8-10</td>
<td></td>
<td>16 ga.</td>
<td>14 ga.</td>
</tr>
<tr>
<td>10-12</td>
<td></td>
<td>14 ga.</td>
<td>14 ga.</td>
</tr>
<tr>
<td>12-16</td>
<td></td>
<td>14 ga.</td>
<td>12 ga.</td>
</tr>
<tr>
<td>16-20</td>
<td></td>
<td>12 ga.</td>
<td>12 ga.</td>
</tr>
</tbody>
</table>

EXTENSION CORDS. Consult with or use a qualified electrician prior to sizing extension cords for use with this machine. Repair any damaged extension cords when discovered. Table 1-3 should only serve as a guideline to choosing the appropriate extension cord.

1.6 Regulation Rulings

1.6.1 Voltage: Before connecting this tool to a power supply (receptacle, outlet, etc.) make sure that the voltage supplied is the same that is specified on the nameplate of the tool. 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 AND USING THIS PRODUCT REQUIRES 100% OF YOUR ATTENTION.

1.6.2 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.

1.6.3 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. NEVER LEAVE THE MACHINE RUNNING UNATTENDED.

1.6.3 Federal Communications Commission Statement Warning - This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

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 AND USING THIS PRODUCT REQUIRES 100% OF YOUR ATTENTION.
2. MACHINE MAPS

2.1 LOCATION OF SAFETY STICKERS

KEY

A. Machine Plate
B. Rules/Safety Sticker
C. Laser Classification 3A
D. Open Lid Laser Classification 4

OPERATOR RULES

- Always wear proper personal protective equipment when using this machine.
- Maximum continuous use: 5 hours. Safe operating temperature: 10 - 33 degrees Celsius.
- Replace dirty water every 30 days.

WARNING RISK OF FIRE

DO NOT OPERATE MACHINE UNATTENDED

A properly maintained CO2 fire extinguisher should be kept near the machine at all times.

AVOID ALL AREAS OF LASER AND FIRE PROTECTIVE CLEANING AND CONTAMINANTS

WARNING LASER RADIATION

CLASS 3R LASER RADIATION TIMES INTERLOCKS DEFECTED

AVOID EYE OR SKIN EXPOSURE TO DIRECT OR SCATTERED RADIATION

WARNING ELECTRICAL SHOCK

HIGH-VOLTAGE INSIDE CABINET

MULTIPLE POWER SOURCES INSIDE CABINET

DISCONNECT POWER BEFORE OPENING PANEL

NEVER OPERATE MACHINE WITH PANELS OPEN

ENSURE PROPER GROUNDING TO MACHINE AND ALL COMPONENTS PRIOR TO OPERATION

LAGUNA

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2.2 EXTERNAL MAP

**DESCRIPTION AND PURPOSE**

**A. Frame** – Also called the enclosure, the frame encloses the laser beam and all internal components.

**B. Lid with Viewing Window** – The lid is hinged on two dampening rods that hold the lid in place when open. It is equipped with sensors to detect when the laser is running. The laser beam will not fire with the lid in the open position.

**C. Removable Bottom** – The bottom can be placed into the laser Chassis or removed for cleaning and maintenance.

**D. Removable Side Panel** – Used to enclose the laser beam. Can be removed to service the machine.

**E. Emergency Stop** – To be used to stop the machine at any point in time during operation. The switch must then be rotated and unlocked prior to restarting the machine.

**F. Power Switch** – Used to turn the machine on and off.

**G. Controller & Display** – The controller used has many functions and features and works in collaboration with the software package RDWorks. See the Controls and Software Machine Map sections to further explore them and get started.

**H. 4" Fume Port** – The fume port is to be used with 4" metal ductwork and a blower or fume extractor to vent the machine.

**I. PC-USB Connection Input** – Used to connect the machine to a PC or other device to transfer work files to the machine. A PC can also be connected to the machine to transfer machine data to the RDWorks Software on the PC.

**J. USB Flash Drive Input** – Used to transfer job files via USB flash drive (AKA memory card).

**K. Ethernet Connection Input** – Used to connect the machine to a network to transfer work files.

**L. Circuit Breaker** – Used to protect the lasers electrical components and operator from electrical malfunctions. The breaker included with the machine is a 2P C10 10 Amp breaker.

**M. Power Connection Input** – To be used with an IEC320-C13 to NEMA 5-15P power cord to give power to the machine. The same cable is used to connect the chiller unit to a power source.

**N. Distilled Water Inlet** – To be used with the supplied ¼" silicon water hose to supply water from the chiller output connection to the laser tube. The laser will not fire without water circulating through the laser tube.

**O. Distilled Water Output** – To be used with a ¼" silicone water hose to take water from the laser back to the chiller input connection.

**P. Compressed Air inlet** – Used with an air hose and included air pump to supply air to the workpiece through the laser head. The air supply keeps the path for the laser beam open and free of debris.

**Q. Standby Alarm Input** – This is an optional plug that is not used with the PL1220 Machine.

**R. Chiller Alarm Input** – To be used to connect the chiller alarm circuitry and the laser tube. The alarm will sound when water cannot be supplied to the laser tube and the laser will not fire.

**S. Removable Rear Panel** – Houses electrical components, can be removed to service the machine.
### Description and Purpose

1. **Laser Tube** – Used in conjunction with the laser power supply to emit a laser beam.
2. **Laser Tube Mount** – Mounts the laser tube and is adjustable to align the laser and the beam mirrors.
3. **Beam Mirror** – Used to change the direction of the beam. There are three mirrors in total to direct the laser beam to the work piece.
4. **Y-Axis Motor** – Drives the gantry along the linear rails to control the laser beam coordinates on the workpiece.
5. **X-Axis Motor** – Drives the gantry along the linear rails to control the laser beam coordinates on the workpiece.
6. **Y-Axis Motor Driver** – Uses user input parameters to control the rotation direction and speed of the Y-axis motor.
7. **X-Axis Motor Driver** – Uses user input parameters to control the rotation direction and speed of the X-axis motor.
8. **24 V Power Supply** – Converts AC input power to 24V DC power to run the electrical components of the laser. The beam has a separate power supply (N).
9. **Controller Computer** – Converts user input parameters to mechanical output. The computer unit controls the motor drives and laser output.
10. **Work Area** – The area in which the laser head can travel.
11. **Gantry** – Allows the laser head to be translated to any position in the work area.
12. **Laser Head** – Consists of a mirror to direct the beam to the work piece, a focal lens to concentrate the laser beam, and a casing to adjust the position of the focal lens and enclose the beam. The laser head also mounts the red dot indicator as well as the air inlet tube. The user can adjust the mirror position, red dot location, and air inlet direction. The recommended focal lens is documented on the specifications sheet.
13. **Connection Input Panel** – Mounts all connections needed to operate the machine. See External Machine map for description of connections.
14. **Laser Power Supply** – Converts 110V/220V (50/60Hz) AC input power to 20,000V DC power to produce a laser beam.
**2.4 CONTROLS MAP**

**KEY**

- Jog Y axis forward or move up cursor
- Jog Y axis reverse or move down cursor
- Jog X axis right or move right cursor
- Jog X axis left or move left cursor
- Show entries in interface
- Stop Work or Escape a menu
- Validate the change
- Set the relative origin
- Samples frame size
- Start or Pause work
- Enter file manager
- Set maximum laser power of current layer
- Set minimum laser power of current layer
- Set speed of current layer
- Pulse laser control
- Reset controller

---

**DESCRIPTION AND PURPOSE**

**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.

---

Also See:
2.5 CONNECTIONS MAP

Exhaust Ducting
Water Tubing
1/2" Air Tubing
Connection Cable
Power Cable

To Router
USB Drive
To PC

PI1220

Exhaust System

Air Pump

Water Chiller Inlet
Water Chiller Outlet
Alarm Cable

Water Chiller System

110V 60Hz 20Amp
3. SET-UP PROCEDURES

3.1 PRODUCT OVERVIEW

NAME
Advertised Name: PL1220 Portable Laser
SKU(S): MLC122040
UPC: 650434695541
Certifications: CE, FDA

STANDARD FEATURES
Cooling, venting, and air solutions included & ready to run
Able to engrave any surface with open-bottom design
RDWorks software package
Red dot pointer
Advanced safety features
Shielded roller bearings
Precision linear rails
Compact industrial design

For full specifications see Appendix 3: PL1220 Specifications Sheet

Table 3-1: PL1220 unboxing inventory

<table>
<thead>
<tr>
<th>PART NUMBER</th>
<th>ITEM DESCRIPTION</th>
<th>NOTES</th>
<th>Q</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLC122040-22</td>
<td>PL1220 Laser Machine</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>PLC122040-23</td>
<td>Exhaust Blower</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>PLC122040-24</td>
<td>Water Chiller</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>PLC122040-25</td>
<td>Air Pump</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>PLC122040-54</td>
<td>Air Pump Tubing</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>PLC122040-55</td>
<td>Water Chiller Tubing</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>PLC122040-57</td>
<td>Chiller Alarm Cable</td>
<td>One for chiller, one for PL1220.</td>
<td>2</td>
</tr>
<tr>
<td>PLC122040-58</td>
<td>IEC320-C13 to NEMA 5-15P Power Cord</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PLC122040-59</td>
<td>Ethernet Cable</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>PLC122040-60</td>
<td>USB CABLE</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>PLC122040-61</td>
<td>Ducting</td>
<td>4&quot;</td>
<td>2</td>
</tr>
<tr>
<td>PLC122040-62</td>
<td>USB Thumb Drive &amp; RDWorks Software</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>PLC122040-63</td>
<td>Hardware Kit</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>PLC122040-64</td>
<td>Manual</td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>

DESCRIPTION
The PL1220 can be used to engrave, mark, and cut a variety of materials. It is sold as a turnkey package, with everything included to run the machine, straight out of the box. All that is needed is a PC to run the included RDWorks software package.

3.2 HARDWARE SET-UP

A VIDEO IS AVAILABLE!
LAGUNA PL:12|20 LASER
SETUP VIDEO
https://www.youtube.com/watch?v=uvE8NCl9mnE

Summary of Steps:
3.2.1 Receiving and Unboxing
3.2.2 Check Inventory/Gather Tools
3.2.3 Ventilation (Exhaust/Fume Extraction) Set-Up
3.2.4 Water Chiller Set-Up
3.2.5 Air Pump Set-Up

Additional Parts and Tools Required for Set-up:
- Distilled Water, 9 Liters (~3 Gallons)
- Computer (See specifications sheet for requirements)
- Flat head screwdriver
- Power Strip with Surge Protector (optional)

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.

USE 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.

3.2.1 RECEIVING AND UNBOXING

If any damage has occurred during shipment, note the damage on the bill of lading or refuse the shipment. Immediately call the dealer store, or Laguna Tools, where the machine was purchased.

Unboxing Procedure
1. Prepare Work Space. An open work space of 30” x 40” or greater is required to place the PL1220 machine on. There should also be adequate space for the chiller, air pump, and ventilations system.
2. Pry off the lids of both crates. The larger of the two crates contains the laser machine, the smaller contains the accessories. To remove the crate lid, pry up the metal fastener clip with a flat head screwdriver and remove.
3. Use two persons to carefully place the machine on table top.
4. Remove all contents of both boxes and prepare for set-up.
3.2.2 VENTILATION (EXHAUST/FUME EXTRACTION) SET-UP
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.

Set-up Procedure
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.

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: 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.

NOTICE: The use of an indoor fume extractor can be very helpful in isolating and control the fumes emitted from laser cutting and engraving.

3.2.3 WATER CHILLER SET-UP
You will need 7 liters of distilled or deionized water, the water chiller tubing, the alarm cable, and one of the power cables.

Set-up Procedure
1. Place the chiller in its location.
2. Unscrew the cap [A] 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 [C].
6. Do not connect to power until set-up is complete.

NOTICE: The chiller will leak water out the inlet and outlet ports, so use caution when moving.

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.

USE 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.
3.2.4 AIR PUMP SET-UP

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.

Set-up Procedure

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.

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.

3.2.5 MACHINE SETUP

After the machine has been moved 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.

Set-up Procedure

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.
3. Do not give power to the machine until setup is complete. The machine will not turn on without the chiller running.

WARNING: Do not give power to the machine until setup is complete. The machine will not turn on without the chiller running.

NOTICE: The laser will not fire if the door is open. The switch detecting an open door located at [E].

USE CAUTION: Be careful not to cut or nick the belts when removing zip ties.
3.2.6 Connections

1. With the power still unplugged, make all connections according to the connection diagram. Make sure water and air connections are not leaking.
   a. 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.
   b. Cooling System: Press fit the rubber water hoses from the cooling system (water chiller) to the laser machine.
   c. Air Pump: Press fit the air hose from the air pump to the machine.
2. Remove the rear panel.
   
   **NOTICE:** The panel can be opened with all connections made.
3. With panel removed, check that all systems are working by powering them on individually. Do not give power to the laser machine during this check.
   a. Exhaust System: Make sure the ducting is installed and will not come loose. Make sure the fan will not tip over.
   b. Cooling System: With the rear panel removed, 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.
   c. Air Support System: Ensure that air is flowing to the laser head assembly.
4. Give power to the machine and all components.
5. Hardware Setup Complete

**WARNING:** Make sure that the power supply matches the machine’s requirements as stated on the plate. The PL1220 is prewired for 110V but can be converted to 220V. Please call Customer Support for instructions.
3.2.7 CONFIRMATION OF PROPER SET-UP TEST

It is now possible to place a sample workpiece in the work area and pulse the machine to test that the laser is aligned and working properly.

1. Place sample in work area
2. Jog the laser head above the sample test piece.
3. Fire the laser machine by pushing the pulse command.

WARNING: Make sure to remove all zip ties located on the belts prior to jogging the laser head.

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.

Laser fires but does not process the work piece:
See section 7.1 and section 7.3. Confirm that the focal lens is installed correctly. Confirm the correct focal spacing is set.
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.
4. SOFTWARE INSTALLATION

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/

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 drive 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):

<table>
<thead>
<tr>
<th>Setting</th>
<th>Selection</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Units</td>
<td>mm</td>
<td>Laser machine preset to mm.</td>
</tr>
<tr>
<td>Page Width</td>
<td>500mm</td>
<td>Config&gt;page_settings&gt;</td>
</tr>
<tr>
<td>Page Height</td>
<td>300mm</td>
<td></td>
</tr>
</tbody>
</table>

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.

4.0 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)
1. 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+.
3. Set the IP address to any known value. Use 10.10.100.10 if confused.
4. Set the Gateway to the IP address of the Internet Router used.

TECH TIP: 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.

5. Connect the PC to the now available Laser machine network with the known IP address of the laser machine (10.10.100.10)

NOTICE: 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:

![Communication Error](https://via.placeholder.com/150)

NOTICE: 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:

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.
4.1 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.

Summary of Steps:
4.1.1 Download RDWorks or connect USB Thumb-Drive.
4.1.2 Install RDWorks
4.1.3 Sync Machine Settings with RDWorksV8
4.1.3 Sync Machine Settings with RDWorksV8 (alternative method)

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

NOTICE: Alternatively go to https://lagunatools.com/design-software-resources/machine-software-posts/ and download the installer:

Install RDWorks

Install Procedure
1. 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.
2. Run the RdworksSetup.exe file and follow the on-screen setup instructions.
3. 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
4. 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 explorer> This_PC > Windows (C:) > RDWorksV8
Cannot run the RdworksSetup.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.
4.1.3 Sync Machine Settings with RDWorksV8

**Sync Procedure**

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.

---

4.1.3 Sync Machine Settings with RDWorksV8 (alternate method)

**Fig 4-6: RDworks read commands method 2.**

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

**Sync Procedure**

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.
4.2 INSTALL RDWORKS AS A PLUG-IN PRINT DRIVER (ADVANCED)

Installing this version of RDWorks will allow the operator to use the laser machine directly with a design program – CorelDraw, AutoCAD, EngraveLAB, or Adobe Illustrator. It is recommended that this method be used only by advanced operators who know the design program and how to utilize the macros and ad-ons the program allows.

The LaserWork “type” version of RDWorksV8 is a standalone program that allows the operator to import documents of several file types and is very compatible with artwork produced and exported from any of the listed design programs. See section 4.1 to install the stand-alone version.

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

Summary of Steps:

4.2.1 Download RDWorks or connect USB Thumb-Drive.
4.2.2 Install RDWorks V8 as a Plug-In
4.2.3 Continue with Design Program Instructions

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

NOTICE: Alternatively go to https://lagunatools.com/design-software-resources/machine-software-posts/ and download the installer:

4.2.2 Install RDWorks as a Plug-In (advanced method)

The design program must be installed and not running.

1. If the file was downloaded, unzip the .zip file [A] and run the .exe file [C] in the unzipped folder [B].
2. Run the RdworksSetup.exe file and follow the on-screen setup instructions.
3. Choose the Type, Origin, and units that you wish to use.
   NOTICE: Some of the types are only compatible with certain software packages. For example, CorelDraw_Laser will install a plugin into the CorelDraw software package.
4. Install

4.2.3 Continue with Design Program Instructions
Depending on the Program, you will now need to enable the macro or plugin according to the method described by the program.

TROUBLESHOOTING:
Cannot find ad-in on design program: Consult design program user manual for ad-on or macro locations.
5 ADJUSTMENTS & MAINTENANCE WORK

5.1 FOCAL LENS ADJUSTMENT
To make cuts and engravings on different materials, the operator will need to adjust the focal length according to the material’s properties.

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.

TECH TIP: 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.

Figure 5-3: Focal Spacing Tool

5.2 CUTTING STRATEGIES
The focal spacing depends heavily on the workpiece and the single pass limit or maximum cut depth of that workpiece. The single pass limit guidelines can be found in Appendix 4 of this manual. It is advised that you experiment with focal spacing prior to running a work file.

Figure 5-2: Cutting Strategies

TECH TIP: Focal spacing will vary. Experiment with sample materials and make small adjustments.
5.3 Changing or Cleaning the Focal Lens

Adjustments & Maintenance Work

Figure 5-5: Mirror Assemblies

Adjustable Head Tube
Nozzle
Focal Lens
Rubber Seal
Lock Ring
Cut/Etch Path

Procedure
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:
   a. Using a microfiber cloth and alcohol or appropriate glass lens cleaner, gently wipe the surface.
   b. To clean the mirrors, the same method is advised.
5. Re-assemble the assembly as shown.

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

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

5.4 Mirror Assembly Adjustments

**NOTICE:** See Sections 5.4-5.8 for the entire mirror alignment procedure.

**TECH TIP:** A video is available on the alignment procedure.

**USE CAUTION** Do not adjust any mirror unless you are troubleshooting a machine. All machines come aligned from the factory and will only become un-aligned when damaged.
5.5 CHECKING FOR MIRROR ALIGNMENT

When troubleshooting the machine, if it is discovered that the laser machine does not fire correctly, or is not giving consistent cuts, the mirrors may need to be realigned. The operator can check the alignment by observing the firing position (on the mirror) in both the close and far positions. The following is an example showing how to check the alignment of mirror 1.

**TECH TIP:** A video is available on the alignment procedure.

![Figure 5-6: PL1220 Mirror 1 Aligned](image)

If the mirrors are not aligned, something like the following will be observed:

![Figure 5-7: PL1220 Mirror 1 Not-Aligned](image)

Similarly, one could check the alignment of mirror 2 by moving the laser head assembly:

![Figure 5-8: PL1220 Mirror 2 Not-Aligned](image)
5.5 CHECKING FOR MIRROR ALIGNMENT (CONTINUED)

Figure 5-8: Tape on mirror assembly to check for alignment

A Fire Proof Tape

Procedure to Check for Mirror Alignment

1. Position the mirrors in the furthest position possible from one another.
   \[ \downarrow \text{or} \uparrow \]

2. Apply fire resistant tape or an acrylic block to the mirror after the mirror to be aligned. If aligning mirror 1, apply tape to mirror 2.

3. Pulse the laser machine to leave a position mark.
   Pulse

4. Position the mirrors in the closest position possible from one another.
   \[ \uparrow \text{or} \downarrow \]

5. Pulse the laser machine again
   Pulse

WARNING: BE VERY CAREFUL WHEN PULSING THE MACHINE: THERE IS A HIGH PROBABILITY OF FIRE IF USING MASKING TAPE.

NOTICE: It is possible that the mirror needs to be repositioned by loosening the Allen screws. The laser mark does not necessarily need to be centered in the mirror, but the mirrors must be square with each other to be aligned. In other words, the pulse marks should not move after moving the mirror from its furthest to closest position.

NOTICE: See Sections 5.4-5.8 for the entire mirror alignment procedure.

5.6 MIRROR ALIGNMENT PROCEDURE

Aligning the mirrors is important to insure the accuracy of the laser marking machine. This process can be a very frustrating: take your time, and thoroughly read these instructions before proceeding. Prior to adjusting any mirror, make sure the machine mirrors need to be aligned by CHECKING FOR MIRROR ALIGNMENT (section 5.5) and make sure the Laser Tube is installed properly by seeing the LASER TUBE INSTALLATION (section 5.7).

Mirror Alignment Procedure

1. Remove the rear and right-side panels from the machine with an Alan key.
2. Verify that the laser tube is installed properly — see LASER TUBE INSTALLATION (section 5.7).
3. Apply the CHECKING MIRROR ALIGNMENT PROCEDURE (section 5.5) to mirror 1.
4. Adjust the mirror as needed according to the MIRROR ASSEMBLY ADJUSTMENTS (section 5.4).
5. Tighten the lock ring on the mirror adjustment screws to lock the position in place.
6. Repeat steps 3 through 5 for mirror 2.
7. On the laser head assembly, unscrew and remove the focal lens assembly and remove from the PL1220. NOTICE: You may need to lift the front of the PL1220 to remove the focal lens tube (see figure 6-2) of the laser head assembly.
8. Place tape on the bottom of the open tube and pulse the machine.
9. Adjust the brass adjustment screws on mirror 3 to center the pulse mark. Lock the adjustment screws in place with the lock ring.

A VIDEO IS AVAILABLE!
Laser CNC Machine Tube Install and Alignment
https://www.youtube.com/watch?v=dxNUr3BA23M

NOTICE: It is possible that the mirror needs to be repositioned by loosening the Allen screws on the mount. The laser pulse mark does not necessarily need to be centered in the mirror, but the mirrors must be square with each other to be aligned. In other words, the pulse marks should not move after moving the mirror from its furthest to closest position.
5.7 Laser Tube Installation

Laser Tube Installation Procedure

1. Unplug the laser machine and all components. **USE CAUTION:** Avoid electrical shock.
2. Remove 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. **USE 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.
6. Carefully connect a water tube between the outlet on the rear of the connection panel and the water outlet on the laser tube.
7. Connect the high voltage (+) terminal (cathode) to the power supply according to the wiring diagram in this manual.
8. Connect the low voltage (-) terminal (anode) to the power supply according to the wiring diagram in this manual.
9. Re-install the top mounts (E) and fasten the laser tube in place.
10. 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.
   **TECH TIP:** 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. Give power to the machine and check that the laser beam is shooting directly into the first mirror by first applying a marking tape to the first mirror and then pulsing the laser.
13. Tighten the Tube Height Lock Screws.
14. Proceed with **MIRROR ALIGNMENT PROCEDURE** (section 5.6)

**USE CAUTION:** Be very careful with the laser tube as it is fragile and excessive pressure can lead to fracture.

**USE CAUTION:** Avoid electrical shock: unless otherwise specified, do not perform any maintenance work with the machine connected to a power source.
5.8 LEVELING THE MACHINE

Figure 6-1: Leveling the PL1220

Leveling Feet

**Leveling Procedure**

1. With the Laser machine on the table, use a level to measure if the PL1220 is not level.
2. Adjust one of the four leveling casters located at the bottom of the machine, as needed, to level it.

**TECH TIP:** It is only important to level the machine with the work surface if operating the machine with the bottom removed (workpiece on the work surface). When cutting in this setting, make sure the work surface is level prior to leveling the machine to the work surface.

**TECH TIP:** When installing a new tube or performing a mirror alignment, note that it is not important that the machine is level to that table. However, it is important that the laser tube is level with the machine chassis.
APPENDIX 1: MAINTENANCE SCHEDULE

To keep this Laguna Tools machine in top performance for many years, please follow this maintenance schedule and refer to any instructions.

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

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

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

USE CAUTION: Excessive cleaning can be problematic. Clean mirrors and lenses only when needed.

Motion System Lubrication: White lithium (PTFE) grease.

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NOTES

WARNING: Avoid electrical shock. Unless otherwise specified, do not perform any maintenance work with the machine connected to a power source.
**APPENDIX 2: TROUBLESHOOTING**

<table>
<thead>
<tr>
<th>BEHAVIOR</th>
<th>POSSIBLE CAUSES</th>
<th>POSSIBLE SOLUTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laser machine will not turn on</td>
<td>1. Breaker is on defeated position &lt;br&gt;2. Improper input power</td>
<td>1. Flip Breaker Switch &lt;br&gt;2. Confirm Power supply meets Machine Specifications</td>
</tr>
<tr>
<td>All systems are powered but Laser will not fire</td>
<td>1. Interlock Switch (door sensor) defeated &lt;br&gt;2. Chiller Alarm defeated &lt;br&gt;3. Water is flowing in the wrong direction</td>
<td>1. Close door, inspect switch &lt;br&gt;2. Troubleshoot Chiller Unit &lt;br&gt;3. Confirm direction of water flow (should be with direction of laser beam, towards first mirror)</td>
</tr>
<tr>
<td>Laser fires but does not process work surface or quality of process is poor</td>
<td>1. Mirror is not aligned &lt;br&gt;2. Focal distance is not set correctly &lt;br&gt;3. Incorrect Focal Lens &lt;br&gt;4. Focal Lens is dirty &lt;br&gt;5. Non-compatible material</td>
<td>1. Perform mirror alignment procedure &lt;br&gt;2. Adjust focal spacing to 7mm from work surface. &lt;br&gt;3. Use lens with 50.8mm focal length &lt;br&gt;4. Clean focal lens and ensure that the Air Assist System is working. &lt;br&gt;5. No soln.</td>
</tr>
</tbody>
</table>

**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.
Appendix 3: PL1220 Specifications Sheet

**NAME**
- Advertised Name: PL1220 Portable Laser
- SKU(S): MLC122040
- UPC: 650434695541
- Certifications: CE, FDA

**STANDARD FEATURES**
- Cooling, venting, and air solutions included and ready to run
- Able to engrave any surface with open-bottom design
- RDWorks software package
- Red dot pointer
- Advanced safety features
- Shielded roller bearings
- Precision linear rails
- Compact industrial design
- Sample projects and full manual included

**INCLUDED WITH MLC122040 PURCHASE**
- Water Chilling System
- Exhaust Venting System
- Compressed Air System
- RDWorks Software License
- USB Connection Cord
- Ethernet Connection Cord
- Air Hoses
- Water Hoses
- Alarm Cord
- 6" Metal Ductwork
- IEC320-C13 to NEMA 5-15P Power Cords
- Laser Set Block
- Spare Parts
- Installation and Adjustment Tools

**ELECTRICAL SPECIFICATIONS**
- Phase: 1 PH
- Voltage: 110V
- Motor Type: 2 x steppers
- Motor Spec: 4.0 AMP (1.8")
- Cycle: 50Hz or 60Hz (auto switching)
- Full Load Amperage: 14.5 AMP
- Switch Type: Automatic shut off
- Power Cord: IEC320-C13 to NEMA 5-15P
- Power Plug Included: NEMA 5-15P
- NEMA Breaker: 15 AMP

**GENERAL SPECIFICATIONS**
- Foot Print (L x W): 30"L x 40"W (cm: 76.2, 101.6)
- Overall Dimensions (L x W x H): 30"L x 40"W x 9"H (cm: 76.2, 101.6, 22.9)

**Box Dimensions (L x W x H)**
- 1 of 2: 35"L x 42"W x 16"H
- 2 of 2: 16"L x 42"W x 19"H

**Net Weight (No Accessories)**
- 150 Lbs. (68.04 Kg)

**Shipping Weight**
- 230 Lbs. (104.3 Kg)

**Venting: Outlet Dia.**
- 1 x 6"

**Venting: CFM Min. Req.**
- 300 CFM

**Sound Emissions**
- 55 dBA

*Machine needs 27.5" (69.9 cm) height clearance to open lid.

**LASER MACHINE SPECIFICATIONS**
- Laser Type: Water cooled CO2 sealed laser, 10.6µm wavelength
- Focal Lens (included): 20mm Diameter, 25.4mm Focal Length
- Laser Power: 40 Watt
- Work Envelope: 12"L x 20"W (cm: 30.5, 50.8)
- Max Material Thickness: 3/4" (1.9 cm)
- Max Material Thickness: Infinite
- Bottomless
- Engraving Speed: 0-500 mm/s
- Cutting Speed: 0-500 mm/s
- Laser Output Control: 0-100% Set by Software
- Min. Engraving Size: 1mm x 1mm
- Highest Scanning Precision: 4000 DPI
- Locating Precision: ≤0.01mm
- Controlling Software: Ruida RDWorks
- Graphic Formats Supported: DST PLT BMP DXF DWG AI LAS, etc.
- Color Separation: Yes
- Working Environment: 32º – 104 º F, Humidity 5-95%

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ACCESSORIES
Fume Extractors: Coming early 2018 – check lagunatools.com
Laser Machine Table: Coming early 2018 – check lagunatools.com
Rotary Adapter: Check lagunatools.com

SOFTWARE AND COMPATIBILITY
Included Software
RDWorks® V8
Compatible Operating Systems
Windows 32 bit or 64 bit: XP, Vista, Windows 7, Windows 8, Windows 10
Minimum Processor Speed
2.0 GHz
Minimum RAM
4 GB
Min. Hard Drive (free disk space)
64GB (1GB)
Compatible Vector Format Files
.dxf .ai .plt .dst .dsb...etc.
Compatible Bitmap Format Files
.bmp .jpg .png .gif .tif .mng...etc.
Compatible Drawing, Image Manipulation Programs, and Modeling Programs
InkScape®, CorelDRAW®, Adobe® (illustrator, photoshop), AutoDesk® (AutoCAD, Fusion360), ...Several Others

Notice: The computing power needed to run the RDWorks® software is often much less than that of drawing and image processing programs that you may wish to use in conjunction with RDWorks®. Although you can do everything within RDWorks®, common and compatible programs for manipulating files are InkScape®, CorelDRAW®, FUSION360®, and Adobe®.

CERTIFICATION CONFORMITY
Certificate of Conformity
No. 1089-CI-32016
Technical File No. 1089-CI-32016/SDML-CE-2016A-0823

Product Type
Laser Marking Machine
Reference Standards
EN ISO 11533-1:2008
EN 60204-1:2006+A1+AC2010
Conformity Directives
Machinery Directive 2006/42/EC
Low Voltage Directive 2014/35/EU
Testing By
Christian Soponos, Vasile Zele Ceprom® S.A.
Issuing Date
29.08.2016
Expiration Date
28.08.2021

*Actual document available upon request

APPLICABLE SAFETY REGULATIONS
ANSI 01.1 Safety Requirements for Woodworking Machines
ANSI Z136.1 American Standard for the Safe Use of Lasers
ANSI Z136.5 Safe Use of Lasers in Educational Institutions
ISO 11252 Lasers and laser-related equipment — Laser device — Minimum requirements for documentation
ISO 11553-1 Safety of machinery — Laser processing machines
NFPA 115 Standard for Laser Fire Protection
APPENDIX 4: CO2 LASER MACHINE SETTINGS FOR RDWORKS

PREPARING A WORKFILE

1. Use the following tables and select the material closest in material properties to the workpiece to be cut or engraved.
2. Place the workpiece inside the PL1220 Laser Machine, close the door and give power to all systems.
3. Position the focal spacing according to section 5.1 and 5.2.
4. Input the (Speed(mm/s) - MinPower% - MaxPower%) parameters from this chart into the on-board controller parameters.
5. Position the laser head directly over a sacrificial portion of the workpiece.
6. Fire a test shot by hitting the PULSE command and JOG (left, right, up, or down arrow) command simultaneous.
7. Make small adjustments to the parameters and focal spacing as needed and repeat steps 3-5 until satisfied with the result. These parameters should always be adjusted to acquire the desired depth of cut through a trial-and-error process.
8. Input the (Speed(mm/s) - MinPower% - MaxPower%) final parameters into the RDWorks work file (in layers) and proceed to complete the project.

CONSIDERATIONS AND TIPS

UNITS: These results were achieved using metric units – mm/s. Make sure that these settings are not inputted as inch/s. The max power is 100%. The max speed is 500mm/s. The default interval is 0.1mm.

THIS CHART MAY NOT BE ACCURATE. Because every laser machine is unique, it is difficult to produce a finite cut chart for reference. This chart should be used as a baseline for the operator to adjust the RDWorks parameters to perform a proper cut or engraving on the work material. It is highly advised that the operator save working parameters in the RDWorks Parameter Library. Feedback and suggestions will help us to further develop these parameters and are highly appreciated. Please email us at manuals@lagunatools.com

TECH TIP, MULTIPLE PASSES: Start with low settings and gradually increase them. If the workpiece does not move, the work file can be run multiple times to complete a cut or further detail an engraving. This strategy can be used to cut thicker workpieces.

RDWORKS SOFTWARE USER MANUAL: The RDWorks software manual will be useful in learning and referencing the RDWorks software. This manual can be downloaded from: https://lagunatools.com/resources/product-manuals/

MANUAL FOCAL SPACING: These results were achieved with a focal spacing between 7mm and 9mm. See section 5.2 for more on focal spacing.

---

### MATERIAL GROUP

#### LASER TUBE POWER

<table>
<thead>
<tr>
<th>Specific Materials</th>
<th>40 WATT</th>
<th>80 WATT</th>
<th>120 WATT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process</td>
<td>Speed (mm/s)</td>
<td>MinPower%</td>
<td>MaxPower%</td>
</tr>
</tbody>
</table>

### POLYMERS

<table>
<thead>
<tr>
<th>Acrylic / Lucite / Plexiglass / PMMA</th>
<th>40 WATT</th>
<th>80 WATT</th>
<th>120 WATT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engrave</td>
<td>450 – 50%</td>
<td>450 – 35%</td>
<td>450 – 25%</td>
</tr>
<tr>
<td>Cut 1/8” (3.2mm)</td>
<td>25 – 100%</td>
<td>50 – 100%</td>
<td>60 – 100%</td>
</tr>
<tr>
<td>Cut 1/4” (6.4mm)</td>
<td>10 – 100%</td>
<td>20 – 100%</td>
<td>35 – 100%</td>
</tr>
<tr>
<td>Cut 3/8” (9.5mm)</td>
<td>5 – 100%</td>
<td>15 – 100%</td>
<td>5 – 100%</td>
</tr>
<tr>
<td>Cut 1/2” (12.7mm)</td>
<td>5 – 100%</td>
<td>15 – 100%</td>
<td>5 – 100%</td>
</tr>
</tbody>
</table>

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

### WOODS

<table>
<thead>
<tr>
<th>Hardwoods / Plywoods / MDF / Particle Board</th>
<th>40 WATT</th>
<th>80 WATT</th>
<th>120 WATT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engrave</td>
<td>150 – 100%</td>
<td>300 – 100%</td>
<td>450 – 100%</td>
</tr>
<tr>
<td>Deep Engrave</td>
<td>75 – 100%</td>
<td>175 – 100%</td>
<td>300 – 100%</td>
</tr>
<tr>
<td>Cut Veneer</td>
<td>150 – 80%</td>
<td>250 – 80%</td>
<td>250 – 100%</td>
</tr>
<tr>
<td>Cut 1/8” (3.2mm)</td>
<td>25 – 100%</td>
<td>100 – 100%</td>
<td>200 – 100%</td>
</tr>
<tr>
<td>Cut 1/4” (6.4mm)</td>
<td>5 – 100%</td>
<td>25 – 100%</td>
<td>50 – 100%</td>
</tr>
<tr>
<td>Cut 3/8” (9.5mm)</td>
<td>5 – 100%</td>
<td>40 – 100%</td>
<td>5 – 100%</td>
</tr>
<tr>
<td>Cut 1/2” (12.7mm)</td>
<td>5 – 100%</td>
<td>40 – 100%</td>
<td>5 – 100%</td>
</tr>
</tbody>
</table>

**NOTES:** 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.

### THIN MATERIALS

<table>
<thead>
<tr>
<th>Paper</th>
<th>40 WATT</th>
<th>80 WATT</th>
<th>120 WATT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cut</td>
<td>500 – 15%</td>
<td>500 – 10%</td>
<td>500 – 5%</td>
</tr>
</tbody>
</table>

**NOTES:** 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)

| Cut                                      | 250 – 35% | 450 – 80% | 450 – 60% |

**NOTES:** Use a spray on adhesive to hole the fabric to the work surface.

### Leather

<table>
<thead>
<tr>
<th>Engrave</th>
<th>150 – 100%</th>
<th>300 – 100%</th>
<th>450 – 100%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cut 1/8” (3.2mm)</td>
<td>75 – 100%</td>
<td>175 – 100%</td>
<td>300 – 100%</td>
</tr>
</tbody>
</table>

**NOTES:** Leathers are very 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.

### MARKED METAL

<table>
<thead>
<tr>
<th>Cermark®, Alumark®, Thermark®, Painted, Anodized</th>
<th>40 WATT</th>
<th>80 WATT</th>
<th>120 WATT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cermark®</td>
<td>125 – 100%</td>
<td>250 – 100%</td>
<td>300 – 100%</td>
</tr>
<tr>
<td>Anodized</td>
<td>450 – 50%</td>
<td>450 – 70%</td>
<td>450 – 100%</td>
</tr>
<tr>
<td>Painted</td>
<td>450 – 40%</td>
<td>450 – 25%</td>
<td>450 – 15%</td>
</tr>
</tbody>
</table>

**NOTES:** 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.
NOTICE: Please contact Laguna Tools customer service for 220V conversion instructions.
## Appendix 6: Exploded Parts

### External Components

<table>
<thead>
<tr>
<th>Index</th>
<th>Part Number</th>
<th>Description</th>
<th>Q</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PLC122040-1</td>
<td>Frame</td>
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<td>2</td>
<td>PLC122040-2</td>
<td>Bottom Panel</td>
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<td>3</td>
<td>PLC122040-3</td>
<td>Lid Assembly</td>
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<td>4</td>
<td>PLC122040-4</td>
<td>Lid Hinge Bracket</td>
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<td>5</td>
<td>PLC122040-5</td>
<td>Door Damper Rod, 15/6-250-85-50N</td>
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<tr>
<td>6</td>
<td>PLC122040-6</td>
<td>Exhaust Adapter</td>
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<td>PLC122040-7</td>
<td>Back Panel</td>
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<td>8</td>
<td>PLC122040-8</td>
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<td>Right Panel</td>
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<td>PLC122040-11</td>
<td>On/Off Switch</td>
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<td>RDC6442S-B (EC) Control System</td>
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<tr>
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<td>40-Watt Laser Tube</td>
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<td>16</td>
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<td>17</td>
<td>PLC122040-17</td>
<td>Y Motor Driver</td>
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<td>24</td>
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INTERNAL COMPONENTS


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<th>Part Number</th>
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<tr>
<td>25</td>
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<td>63</td>
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<td>Hardware Kit (with install tools)</td>
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<tr>
<td>64</td>
<td>PLC122040-64</td>
<td>Manual</td>
<td>1</td>
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</tbody>
</table>
HOW DID WE DO?

How was your unboxing and set-up experience? Any suggestions, feedback, or comments regarding this manual and the tools we sell are highly appreciated. Please email us at manuals@lagunatools.com and thank you again for choosing the Laguna Tools® brand.
PL1220 LASER MACHINE DIMENSIONS

INCLUDED WITH PURCHASE

- CW3000 Water Chiller
- Venting Blower Exhaust Fan
- Air Pump
- Software License
- USB Connection Cord
- Ethernet Connection Cord
- Air Hoses
- Water Hoses
- Alarm Cord
- 6" Metal Ductwork and Clamps
- IEC320-C13 to NEMA 5-15P Power Cords
- Laser Set Block
- Spare Sensor
- Installation and Adjustment Tools

STANDARD FEATURES

- Ready to run - all components included
- Engrave any surface with open-bottom design
- RDWorks software package
- Red dot pointer
- Advanced safety features
- Shielded roller bearings
- Precision linear rails
- Compact industrial design
- Sample projects and full manual included
- IEC320-C13 to NEMA 5-15P Power Cords
- Laser Set Block
- Spare Parts
- Installation and Adjustment Tools

PL1220 LASER MACHINE ACCESSORIES

- MLC1220040
  PL1220 Laser Machine
- SKU TBD
  Rotray Attachment
- SKU TBD
  Fume Extractors
- SKU TBD
  Allignment Tools
- SKU TBD
  Focal Lenses

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