RUBY

Ruby
6090

RUBY

PRODUCT MANUAL

Integrated Engraving Machine

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Preface

Respected Users:

Thank you for choosing Kindlelaser Lasers . This user manual is designed to guide you step-by-step through the proper and efficient use of our laser engraving and cutting machine. It also offers essential maintenance tips to maximize your machine's performance. The manual is organized into six comprehensive chapters, covering general machine information, safety precautions, installation instructions, operational guidelines, maintenance principles, & vital troubleshooting methods. To enhance your understanding, we have included many real-world photographs throughout the manual.

Attention: Please read this manual carefully and abide by it before installing and operating the machine. Failure to follow the instructions may result in personal injury and/or material damage! For machine maintenance, only the provided or listed accessories should be used, and unspecified parts shall not be replaced without our permission. kindlelaser will not offer free maintenance services for any damage caused thereby.

It should be emphasized that the installation must meet the requirements of kindlelaser. Otherwise, the machine will not function properly, leading to poor performance, a shortened lifespan, increased maintenance costs, and even machine damage. We hope that every customer can understand these precautions before installation and use. If you encounter any problems during the installation process, please feel free to contact us.

We welcome your valuable comments or suggestions and will be very grateful for them!

目录

1 General Information

1.1 Information about this manual

Before beginning any work on the machine, read this manual completely and carefully.

Keep the manual for further consultation close to the machine.

This manual describes how to operate the machine properly and safely. Be sure to follow the safety instructions given here, as well as any local accident prevention regulations and general safety regulations applicable to the field of usage. Before beginning any work on the machine, ensure that the manual, in particular the chapter entitled "Safety Information" and the respective safety guidelines, has been read in its entirety and fully understood.

1.2 Explanation of symbols

Important technical safety notes and instructions in this manual are indicated by symbols. It is important to observe and follow these notes and instructions on workplace safety. Avoid accidents, personal injury and material damage to property by acting with extreme caution.

Danger

This symbol indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

Warning

This symbol indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

Warning Current

This symbol warns of potentially dangerous situations related to the electric voltage. Failure to observe the safety instructions leads to risk of serious injury or death. Particular care should be taken during maintenance and repair work.

Warning Laser

This symbol warns of potentially dangerous situations related to the laser beam. Failure to observe the safety instructions leads to risk of serious injury.

Caution

This symbol indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.

Notice

This symbol indicates potential risks of damage to the supported product (or to property).
In addition, non-observance may result in damage, malfunction or failure of the machine.

Information

This symbol indicates tips and information which must be observed for efficient and trouble-free handling of the product.

Disposal

This symbol indicates notes regarding the professional disposal of the product or accessories.

1.3 Liability and warranty

Warranty periods specified in the manufacturers "warranty terms and conditions" shall be binding for the buyer. If no warranty periods are specified, the general terms and conditions of sale, delivery and payment apply.

All information, illustrations, tables, specifications and diagrams contained in this operating manual have been carefully compiled according to the current state of technology. No liability is accepted with regard to errors, missing information and any resulting damage or consequential loss.

Strict compliance with the safety procedures described in this operating manual and extreme caution when using

the equipment are essential for avoiding and reducing the possibility of personal injury or damage to the equipment. The manufacturer shall not be liable for any damage and or faults resulting from nonobservance of instructions in this manual.

Nonobservance of the operation, maintenance and service instructions described within this manual absolves kindlelaser from any liability in case of a defect.

Furthermore, kindlelaser accept no liability whatsoever for damage caused by the use of non-original parts and accessories.

Additionally, kindlelaser not be held responsible for any personal injury or property damage, of an indirect or specific nature, consequential loss, loss of commercial profits, interruption to business, or loss of commercial information resulting from use of the equipment described in this manual.

It is strictly prohibited to make any alterations, to prepare translations, decompile, disassemble, reverse engineer or copy the sofeware.

kindlelaser reserves the right to update any of the information, illustrations, tables, specifications and diagrams contained in this operating manual with regard to technical developments at any time without notice.

2 Safety

TO AVOID POSSIBLE HARM READ AND FOLLOW THESE INSTRUCTIONS.

The machine is built at the time of it's development and production according to applicable, established technical rules and is considered to be safe to operate.

Dangers can be caused by the machine if the machine:

- is operated by unqualified personnel,
- the personnel have not been trained,
- the machine is used improperly or not as intended,
- or if the machine is used for other intended purposes.

This chapter provides an overview of all important safety aspects that are necessary for optimum protection of persons and safe and trouble-free operation of the machine. Other chapters of this manual contain specific safety notes for the avoidance and prevention of hazards.

2.1 General safety notes

2.1.1 Intended use

The machine described in this manual is intended for cutting, engraving and marking of materials according to the intended use of the machine, using the supplied sofeware.

The system must be operated, maintained and repaired only by trained personnel familiar with the designated field of use and the dangers of the machine!

Operate the machine only in technically flawless condition and when it fully complies with the EC Machinery Directive.

For material details see chapter "List of materials" or contact your local Trotec representative, or our Technical Support.

The machine may only be operated with a suitable and effective exhaust system.

The intended use of this machine also includes that all personnel involved in installation, set-up, operation maintenance and repair of the machine must have read and understood the operating manual and in particular the

“Safety” section, and comply with the instructions.

2.1.2 Improper use

Use of the machine for any purposes other than those intended or described in the present manual is regarded as improper and therefore prohibited. Trotec Laser GmbH will not accept any liability for damage caused by improper use. The operator is solely liable for all damages caused by improper use.

Non-observance of the operation, maintenance and service instructions described within this manual absolves Trotec from any liability in case of a defect.

2.1.3 Machine modification

It is strictly prohibited to alter, refit or modify the machine in any way without the express consent of the manufacturer.

Likewise, it is strictly prohibited to remove, bridge or bypass any safety devices. Operating conditions and connection and setup values stated in the data sheet must be complied with at all times.

Operation of the system is permitted only with original parts and accessories by the manufacturer. Use of third-party parts affects machine safety.

2.1.4 Operating modes

NORMAL OPERATION

For normal operation the following conditions must be met:

- Operation of the machine only by trained personnel.
- Full functional and mounted safety devices.
- Machine must be in technically flawless condition.
- Processing of permissible materials according to the material list.
- Maintenance and service are not included.

SERVICE OPERATION

Service activities may be carried out only by authorized, trained service technicians. If side panels as well as covers get removed and safety devices get bypassed, it can lead to direct and indirect scattered radiation. The service operation is therefore declared as laser class 4 (US: class IV) and proper precautions need to be taken (see "Laser classification").

2.2 Laser safety

2.2.1 Laser classification

The laser safety class indicates the risk potential from accessible laser radiation.

The laser system is a Class 2 (US: Class II) laser marking system as per IEC 60825-1 "Safety of Laser Product".

The integrated laser source is a Class 4 (US: Class IV) laser marking system according to IEC 60825-1 and identified as such.

Class 2 (US: class II)

The accessible laser radiation of Class 2 (US: Class II) laser systems does not pose any hazard for the skin. Diffuse reflections as well as any short-term irradiation of the eyes (exposure time max. 0.25 seconds) also pose no risk due to the low output power. However, it is possible to suppress the natural eyelid closure reflex and stare into the class-2 laser beam for a time long enough for the eyes to get injured.

Warning Laser
Laser radiation of Class 2 (US: class II)

For Class 2 (US: class II) laser is short term exposure (up to 0.25 seconds) harmless to the eyes and can therefore be operated without additional protective measures. However it can cause irritation of the eyes if the natural avoidance reaction (staring into the laser beam deliberately) or eyelid closure reflex is suppressed.

Notice

It is the responsibility of the operator to comply with the national official and statutory regulations for the operation of a laser system with a build in laser source of class 4 (US: class IV).

2.3 Areas of responsibility

Responsibilities of the operating company

· In addition to the safety notes and instructions stated in this manual, consider and observe the local accident prevention regulations and general safety regulations that apply at the operation site of the machine.

· A CO2 fire extinguisher must always be at hand, as the laser beam can ignite flammable materials.

· If the machine is used industrially, the operator is subject to the legal obligations concerning industrial safety.

· All personnel involved in installation, set-up, operation, maintenance and repair of the machine must have read and understood this manual and in particular the “Safety” section. The personnel must be trained and informed about all the functions, potential dangers and safety issues of the machine on a yearly basis.

· The user is recommended to prepare company internal instructions considering the occupational qualifications of the personnel employed in each case, and the receipt of the instruction/this manual or the participation in the introduction/training should in each case be acknowledged in writing.

· Keep the manual in the immediate vicinity of the machine so that it is accessible at all times to all persons working on or with the machine.

· Authority for the individual activities relating to the application of the machine (e.g. installation, operation, maintenance and cleaning) must be clearly defined and observed, so that no unclear competencies result under the aspect of safety. This applies in particular to work to be performed on the electrical equipment that may only be performed by qualified specialists.

· Maintenance and repair work as specified in the manual must be carried out regularly.

· For all activities concerning installation, set-up, start-up, operation, modifications of conditions and methods of operation, maintenance, inspection and repair, the switch-off procedures that may be provided in the manual must be observed.

· Provide appropriate personal protection equipment (e.g. protective goggles according to wavelength and laser power).

· The operator is responsible for the safety-related state of the machine.

· Do not store any flammable materials in the working area or in the immediate vicinity of the device. Particularly, residues of processed materials have to be removed to prevent any fire hazard.

· The operator must ensure cleanliness and accessibility at and around the machine by corresponding instructions and controls.

2.3.2 Responsibilities of the operating personnel

The operating personnel has the following responsibilities:

· Always wear personal protective equipment.

· It is the duty of the operating personnel to check the machine before start of work for externally visible damage and defects, and to immediately report any changes that appear (including behavior during operation) that may affect the safety of the machine. It must be made sure that the machine is operated only in perfect condition.

· The machine must not be le☒ unattended while it is operating (supervised operation).

· Switch off the machine described herein at the main switch for periods of non-use.

· Operate the machine described here only with a lens in place. A missing lens may cause the unfocused laser beam to be reflected out of the housing.

· Stop this machine immediately in case of failure.

· No working methods are permitted that affect the safety of persons or of the machine.

· The machine and its components, such as the lens and mirrors, are to be kept clean at all times.

Caution

The adjustment of the beam path may only be carried out by service personnel

2.4 equirements for operating an service personnel

The requirements for the operating and service personnel are:

· The personnel must have read and understood this manual and in particular the "Safety" section.

· The personnel must not be under the influence of drugs, alcohol or reactivity affecting medication when working on or with the machine.

· The personnel must be familiar with using the CO2 fire extinguisher.

· The personnel must be trained in order to be qualified to operate the machine. If the personnel lack the necessary knowledge for working on or with the machine, they must first be trained and note down the training in the training verification form.

2.5 Warning and information labels

The warning and information labels are attached to the device at those points which could represent a source of danger before commissioning or during operation. Therefore, pay special attention to the information on the labels.

Caution

Lost or damaged warning and safety stickers.

If any warning and safety stickers are lost or damaged, the user is not able identify risks anymore, and there is danger of injury.

2.6 Safety devices

Warning

Danger from laser beam.

Safety and protection devices that are not installed or are not fully functional can lead to bodily injury and material damage.

– Do not remove, modify or deactivate the interlock safety switches or protective covers on the machine. Safety and protection devices must be fully functional at all times.

– In case of assumed or presumed damage of safety devices, disconnect the machine from the mains.

– Damaged safety and protection devices need to be replaced by a Trotec technician immediately.

2.7 Technical protective measures

2.7.1 Main switch

Pressing the main switch on the backside of the machine to disconnect the machine from the mains power supply.

2.7.2 Key switch

Turning the key switch counterclockwise powers off the motor, laser source and electric system. The operation of the machine by unauthorized persons can be prevented by securing the key switch.

2.7.3 ACKNOWLEDGE THE EMERGENCY STOP SWITCH

Pressing the emergency stop button immediately switches off the circuit. The laser beam is interrupted and all movements are stopped.

The task of the emergency stop switch is:

First priority:Prevention of danger to the operating personnel.

Second priority:Prevention of damage or destruction of the machine and/or material.

1. Turn the emergency stop switch counterclockwise to unlock it so that the green marking is visible.
2. Restart the laser system using the key switch.

2.7.4 Interlock safety switches

Interlock safety switch query the closed status of the acrylic top lid, side panels and front door. If the safety devices are open or not present, the laser cannot be operated. However, the pilot laser stays active.

2.7.5 Acrylic top lid

The type of acrylic top lid depends on the laser type. It protects the operator from uncontrolled emission of dangerous laser radiation.

2.7.6 Side cover

The side panels protect from laser light and must always be closed and properly attached.

2.7.7 In case of safety device malfunction

Actual or presumed damage to the safety devices can cause injury or damage. Following measures must be carried out.

1. Press the emergency stop button.
2. Disconnect the machine from the mains.
3. Contact our Technical Support in your local area.

2.8 Secondary (indirect) hazards

2.8.1 Fire hazard

Warning

Fire hazard

Fire hazard from gas and processing of inflammable materials.

– Do not operate the device without supervision.

– Keep CO2 fire extinguisher ready at hand in the immediate vicinity of the device.

If a main laser beam hits easily flammable material, e.g. paper, this may ignite and a fire can quickly occur. Therefore, before switching on the laser, you should make absolutely sure that there is no easily flammable material in the beam path.

Furthermore, gases that can form below the material to be processed may ignite. Especially if the extraction requirements are not met.

Inadequate care and cleaning of the system increases the risk of flame formation.

Regularly check the cooling slots of the cooling system.

2.8.2 Gases, fumes and dust

Depending on the materials being processed and the parameters selected, laser processing may generate gases, fumes, aerosols or dust. Depending on the material, such by-products may be toxic. In individual cases, the reaction products may be electrically conductive dusts. If these enter electric systems, short-circuiting with personal injury and property damage may occur.

The operator is responsible for ensuring presence of a suitable extraction system and compliance with the relevant guidelines in order to protect persons and the environment. The guideline VDI 2262 1-3 "Workplace air" provides, among other things, additional remarks.

The operator must also ensure that gases, fumes or dust do not settle on the processing lens. Any dirt accumulating on the processing lens can lead to loss of performance, poor processing results and damage to the device.

2.8.3 Reflection through materials

Warning

Danger from laser beam.

Invisible laser radiation of reflecting materials can cause serious injury or material damage.

– Only material according to the intended use of the machine may be used.

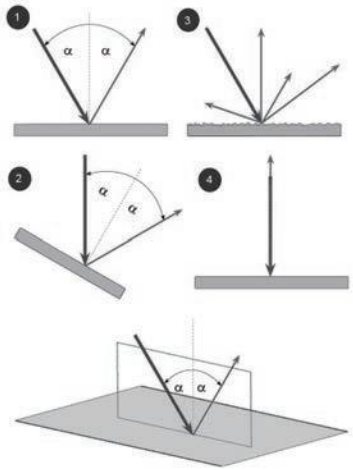
– Do not use material with high reflecting surfaces such as aluminum, chromium, precious metals, metal foils, stainless steel, brass, copper and titanium.

– Take special care with surfaces formed convex and concave.

– Do not leave or put objects on the work surface/working area.

LASER BEAM REFLECTION

The law of reflection is applicable to the reflection of laser radiation: The angle of incidence = the angle of reflection.



①Directed reflection: Reflected ray on smooth surface.

②Directed reflection: Reflected ray on sloping surface.

③Diffuse reflection: Reflected ray on rough surface.

④Directed reflection: Horizontally reflected ray on smooth surface.

2.8.4 Hazards due to damaged optics

Warning

Damage to optics.

Soiled optics absorb laser radiation and can thus be destroyed. Broken or damaged lenses as well as thermal decomposition of lenses release particles which cause serious damage to the health.

- The passive reflectors and optics in the area of the laser beam guidance should be cleaned regularly.
- Special care is required when handling, attaching and cleaning these elements.
- Do not exert non-uniform pressure.
- Do not use tools or hard objects to clean the surface.
- Never touch the optics with your bare fingers.
- Never use cleaning tissues twice.
- When lenses get broken, damaged or thermal decomposed follow the protective measures.
- Disposal according to regulations and laws valid in the user's country.
- Lenses with scratches or lenses with penetrations must not be used anymore!

Scratched or destroyed lens surface

Be aware that scratches in the coating may release small quantities of thorium, which may be harmful upon inhalation or swallowing.

Thermal decomposition

Upon thermal decompositions, vapors of selenium oxide and zinc oxide are formed. Upon inhalation or swallowing there is danger of poisoning. Indicators for thermal decomposition of ZnSe include deposits in the form of red or white powder and an unpleasant odor.

Broken lenses

When optical components of zinc selenide (ZnSe) are destroyed, toxic dusts and vapors are formed which must not be inhaled. The dust can additionally cause irritations of the eyes, skin and respiratory tract. If a lens has been destroyed during operations, care is to be taken during removal and cleaning.

Disposal

The ZnSe dust and the lens are to be collected drily and disposed of with fragments, broom, shovel and protective clothing into hermetically sealable containers or plastics bags as hazardous waste.

Do not dispose of optical components as domestic waste, and do not let them enter the sewer or water bodies.

Dispose of according to regulations and laws valid in the users' country.

2.9 In case of emergency

What to do in the event of malfunctions

· In unusual operating conditions, open the lid to stop the machining process press the emergency stop button and switch off the machine.

· If necessary, disconnect the machine from the main power supply.

· Inform the laser protection officer and your supervisor.

· Repair work must only be carried out by kindlelaser service technicians.

· In the event of a fire: Fight the fire with a CO2fire extinguisher as far as is possible without risk.

What to do in the event of an accident, first aid

· If eye damage occurs due to laser radiation, the casualty must present to an ophthalmologist immediately.

· First aiders must protect themselves.

· Disconnect the device from the power supply and secure it against restarting

– Remove the key switch.

– Unplug the power cable.

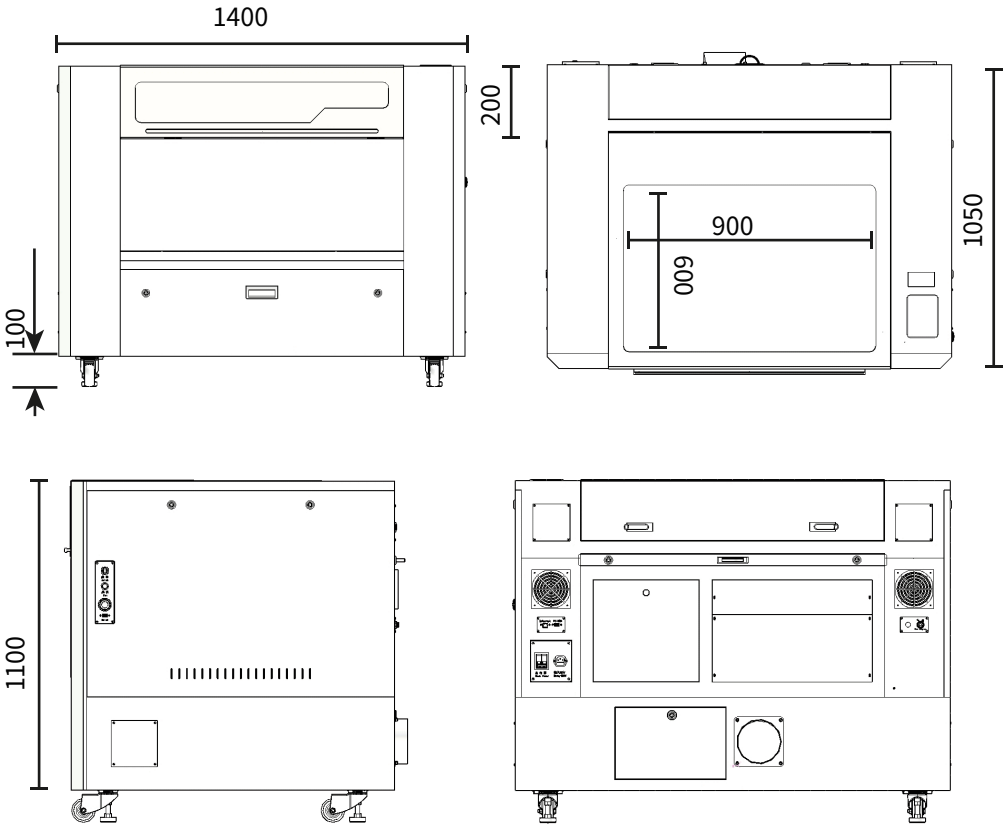
· Rescue the injured person from the danger area and provide first aid.

· Call an emergency doctor!

3 Technical Data

3.1 Dimensions

unit：mm



3.2 Network connection

RECOMMENDATIONS PC Client

- Operation System: 64 bit
- Screen Resolution: min. 1920x1080 (FullHD)
- Browser: latest Google Chrome
- RAM: min. 4GB
- Processor: min. i5

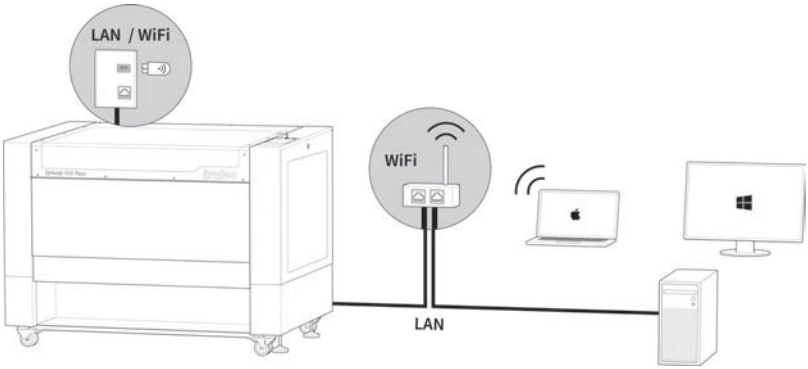
Network

- DHCP Active
- 100Mbit Speed
- CAT5e or higher
- Wifi: 2,4GHz or 5GHz

3.3 Computer connection

Connect the machine to the local network port using a LAN cable or plug in the optional Wifi dongle on the back of the machine.

The network settings must be set up when the machine is first started.



3.4 Electrical requirements of the machine

Laser power	55-80 W (TLS CO2)		85-100 W(TL6 CO2)	105-120w(TL8 CO2)
Voltage	230 V~	115 V~	230 V~	230 V~
Fuse	8A	16A	12A	12A
Power consumption	1590 W	1590 W	2100 W	2100 W

Caution

Inadequate or inappropriate power sources can lead to machine damage and are not covered by any liability.

Verify that the electrical outlet is capable of providing the proper voltage, frequency and amperage required by the laser machine described in this manual.

Caution

Electrical noise, unstable power supply as well as voltage spikes in power supply can cause interference and possible damage to the electronics of the laser machine.

Notice
Use an individual circuit for the laser machine and the PC and an individual circuit for the exhaust system. Install your computer to the same circuit as the laser machine to prevent electromagnetic interactions.
Furthermore it is highly recommended that you use a overvoltage protection switch to protect your computer equipment.
If electrical power fluctuations, brownouts or power outages are a problem in your area, an electrical line stabilizer, UPS (Uninterruptible Power Supply) or backup generator are required. When installing any of these devices, ensure that they meet the electrical requirements of the laser machine.

3.5 Exhaust system requirements

Caution
The laser may only be operated with properly installed and operating exhaust system. Damage to the system, caused by the use of not any exhaust system or improper extraction equipment, will not be covered by any liability.

The monitoring point for flow rate and pressure is at the exhaust port at the laser machine. Pressure loss by hoses /pipes or filter parts of the exhaust system has to be determined and additionally calculated when selecting a proper exhaust system.

A powerful exhaust system keeps the lifetime of optics and mechanical components, the cutting quality and the laser power interacting with the workpiece from being impaired by fumes and dust accumulating in the machine.

Notice
The exhaust power available for the application will be reduced by e. g. bends, small hose diameters and long hoses.
You should therefore note the following:
- Avoid bends.
- Keep hose as short as possible.
- Use hose diameters as large as possible.

Applications generating large amounts of dust or fumes may require a stronger exhaust system. Use of separate exhaust systems for head and table exhaust may also be necessary.
In this case it is absolute necessary to consult your distributor.

3.6 Safety Materials

Laser machines use high heat to cut or etch materials. Some materials respond well to this method, while others do not. It's crucial to understand the material you are working with, as some, like PVC, can be easily cut but release harmful chlorine gas that can be dangerous to both humans and the machine. Below is a guide to common materials. New materials are developed frequently, so if you are unsure about a material's compatibility with laser processing, please contact us for assistance in identifying its properties and determining if it is safe and feasible to process with a laser machine.

Plastics:

- ABS (Acrylonitrile Butadiene Styrene)----good for engraving and cutting
- Acrylic (also known as Plexiglas, Lucite, PMMA)----good for engraving and cutting
- Delrin(POM, Acetal)---- good for engraving and cutting
- High-Density Polyethylene (HDPE) ---- Melts poorly, not very good for cutting or engraving.
- Kapton Tape (Polyimide)---good to use
- Mylar (Polyester)---good to use
- Nylon – Melts poorly, not recommend
- PETG (Polyethylene Terephthalate Glycol)----good to use
- Polyethylene (PE) – Melts poorly, not recommend
- Polypropylene (PP)– Melts somewhat, not recommend

Styrene

- Two-tone acrylic-top color different than core material, usually for custom instrumentation panels, signs and plaques.good for laser processing

Foam

- Depron foam-often used for RC planes, good for laser processing

EPM

- Gator foam- foam core gets burned and eaten away compared to the top and bottom hard shel

Other:

- Cloths(leather, suede, felt, hemp, cotton)
- Papers
- Rubbers(only if they do not contain chlorine Teflon(PTFE, Polytetrafluoroethylene)
- Woods(MDF, balsa, birch, poplar, red oak, cherry, holly, etc

Materials that can' t or should not be cut

Metals
Polycarbonate(PC, Lexan)due to the fumes
Any materials containing chlorine
a. PVC(Cintra)-contains chlorine
b. Vinyl- contains chlorine
High pressure materials include all the above guidelines and as listed:
Stainless steel: up to 18 gauge
Mild steel: up to 18 gauge
Thicker and Denser woods

Below is a chart of some frequently processed materials by CO2 laser machines:

Material		Engraving	Cutting	Marking
Composite Material	Label Film		●	●
	Brick Tile	●		●
	Carbon Fiber/Glass Fiber		●	●
	Ceramics	●		●
	Pearl Foam Board	●	●	
Natural Inorganic Materials	Gemstones			●
	Shell		●	
	Stone	●		●
	Glass	●		●
Natural Organic Materials	Leather		●	●
	Wood	●	●	●
	Elastomer Rubber/Silicone	●	●	●
Foam	EVA/Silicone	●	●	
	Ceramic/Metal Foam	●		●
Paper Base		●	●	●
Plastic	PMMA	●	●	●
	ABS	●	●	●
	PDMS	●	●	●
	PEEK	●	●	●
	PLA	●	●	
	PET		●	●
	POM		●	●
	PC/PA/PE/PP		●	●
Fabric/Textile Fabric	Cotton	●	●	●
	Felt	●	●	●
	Denim	●	●	●
	Cashmere		●	
	Nylon Fabric		●	
	Polyester		●	
	Aramid Fiber		●	
Metal	Brass			●
	Stainless Steel			●
	Titanium			●
	Coated Metal			●
	Anodized Aluminum			●

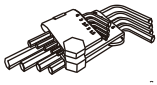
* CO2 lasers can engrave or mark coated metal. For bare metal, it is not recommended, as the laser light might reflect back into the laser path, causing permanent damage to the optical parts. However, there are CO2 laser marking solvents available on the market. After applying these solvents, it is safe to use a CO2 laser for marking

4 Machine overview

4.1 Accessories

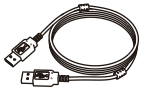

Network Cable

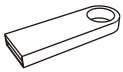

Data Cable


Allen key

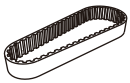

Exhaust Pipe

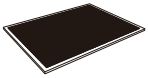

Key Switch

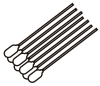

USB Camera Cable


USB disk


Pipe Clamp


Timing Belt


Honeycomb Table


Cotton Swab

Sealing Plug

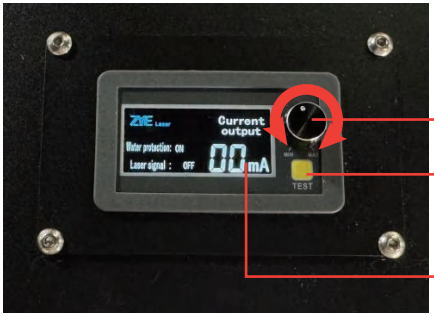
4.2 Laser Parts Overview

1. LED light
2. Organ Guide rail cover Laser head
3. Integrated auto-focus laser head
4. Air regulator
5. Control panel
6. Current meter
7. Key switch
8. Fan switch
9. Emergency Stop button
10. Waste collection
11. Drawer storage cabinet

12 Material Pass-through door
13 Cooling fan
14 LAN interface
15 USB interface
16 Power input
17 Chiller
18 External air input
19 Three-layer air filter
20 Exhaust fan
21 Laser tube service lid

4.2 Digital Ammeter

Using the Laserpower potentiometer (available as an option), you can electrically adjust the laser power during the engraving or cutting process. cutting process. Adjustments of ± 20% are possible. This application can be used, for example, to increase the laser power when cutting outer contours, so that the job does not have to be started again.



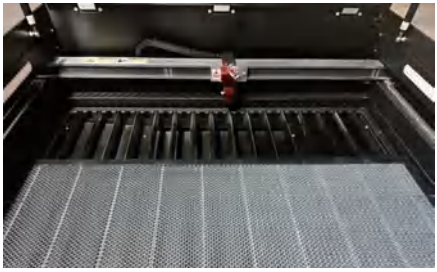
Adjust the current to control the power output.

test

Current status display

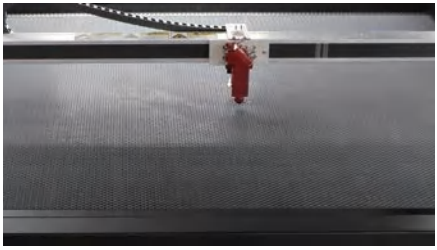
4.3 Waste collection device

4.4 Multifunctional Worktable



The machine is equipped with a double-layer multifunctional workbench.

knife table
The cutting table with aluminum slats is ideal for cutting thicker materials (from 8 mm thickness) and for parts over 100 mm wide. The lamellas can be arranged individually, so the table can be adapted to any individual application.

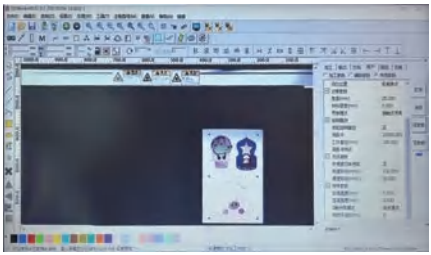


Honeycomb
This robust cutting table offers excellent stability and is particularly suitable for cutting tasks with work pieces smaller than 100 mm, as these remain in a flat position after cutting.

4.5 CCD

Camera-aided design and positioning are directly carried out on the workbench, regardless of whether the cover is open or closed. This enables users to view a visual display of laser processing on the workpiece in the laser software.

Once the camera is activated, you will obtain a real-time image of the entire work area.



4.6 Lens(es)

Standard: FL 50.8mm

Optional: FL 63.5mm

4.7 Nozzles

Standard: nozzle 3 mm

5 Transport

5.1 Safety notes

Warning

Risk of injury

There is risk of injury from falling parts during transport, loading and unloading of the machine.

– Follow the safety notes.

Observe the safety notes to avoid damage to the machine from improper handling during transport:

- Always move the machine with utmost care and attention.
- Transport the machine/machine components only in its original packaging.
- Take the machine' s center of gravity into account when transporting it (minimize the risk of tipping over).
- Observe the packaging symbols (e.g. transport the machine only in upright position).
- Take measures to prevent the machine from slipping sideways, tipping or falling over.
- Transport the machine as carefully as possible in order to prevent damage.
- Avoid vibrations.
- When transporting the machine overseas, the device must be packaged airtight and protected against corrosion.
- When transporting outdoors, transport only in vehicles with roof or sufficient weather protection.
- Protect the machine against transportation damage using straps and inserts, and leave sufficient gaps to other transported items.
- Do not place any other loads or items on the machine or machine components.

5.2 Delivery state

Unless otherwise agreed, the machine is delivered in a wooden crate that contains the laser machine and additional accessories. Transport the machine only in its original packaging.

Caution

Risk of injury

There is risk of injury from falling parts during transport, loading and unloading of the machine.

– Follow the safety notes.

OBSERVE THE PACKAGING SYMBOLS:


keep dry!


Fragile,handle with care


this way up!


Do not stack!

5.3 Required tools for unloading and transport

Required tools:

- Unloading - Forklift
- Transport - Pallet truck

5.4 Place of storage

- Keep the machine sealed in its packaging until it is assembled or installed.
- The storage location must be dry, free of dust, caustic materials, vapors and combustible materials.
- Store in a storage room or packaged with adequate weather protection.
- Avoid exposure of the machine to shocks or vibrations.
- Avoid extreme temperature fluctuations.
- Take particular care when packing away electronic components.
- When storing for a longer period, apply a coat of oil to all bare-metal machine parts.
- Regularly check the overall condition of all parts and of the packaging.

5.5 Unpacking the machine

Only trained and authorized personnel are permitted to transport and unpack the machine. To avoid falling off of any wooden parts or tipping of the machine, be very careful when opening the transport case.

Notice

Only trained and authorized personnel may transport and unpack the machine. To prevent wooden parts from falling or the machine from tilting, be very careful when opening the transport box.

Caution

The lens unit should be unpacked only after installation of the machine. The lenses are high-quality optical components which must be kept clean in order to ensure optimum marking results. Never touch the lenses with bare fingers.

STEPS:

1. Position the transport case vertically on level ground (using a pallet truck or forklift).
2. Remove any vertical tightening straps.
3. First remove the top and after wards the side plates of the transport case.
4. Slide out the two wooden rails in the form of ramps that are stored beneath the machine.
5. To secure the machine against moving, the wheels are locked using wooden blocks.

In order to remove those blocks, put the two wooden rails together, push the upper part of the rails under one side of the machine and press down the rail in order to reach a levering effect.

6. Pull out the blocks.
7. Repeat this procedure on the opposite side as well.
8. Now you can pull out the blocks.

5.6 Relocation of the machine

STEPS:

1. Switch off the machine.
2. Disconnect the power cable.
3. Remove the exhaust system.
4. Reposition the machine (e.g. with auxiliary equipment if necessary) and place it on a level, clean floor.
5. Adjust the machine.
6. Initial commissioning of the electrical system.
7. Carry out function test.

Caution

Transport the machine only in its original packaging. Ensure the wooden crates are properly secured otherwise the crates can slip, tip or fall over during transport.

Observe the corresponding safety norms and regulations from the chapters "Safety notes" and
"Transport".

– When transporting over long distances, use transport boxes including transport securing.

6 Setup and installation

6.1 For your safety

Notice
The setup has to be carried out by Technical Support.

6.2 Temperature and humidity

Ambiente conditions

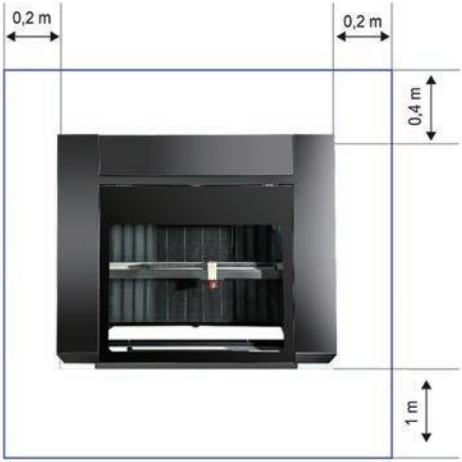
Operating temperature (ambiente temperature):	+15°C至+25°C(59°F至77°F)
Relative humidity:	45%至65%, , non-condensing

***If the system has been exposed to large temperature fluctuations, it must first be brought back to room temperature before commissioning.**

- Provide sufficient illumination at the workplace.
- Shielding from EMC.
- Freedom of interfering electrical installations, hoses and pipe lines.
- Power supply free of fluctuations.

6.3 Space requirements

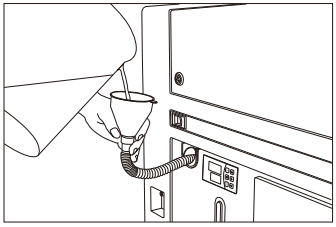
Observe shielding or sufficient distance to the wall and adjacent objects.



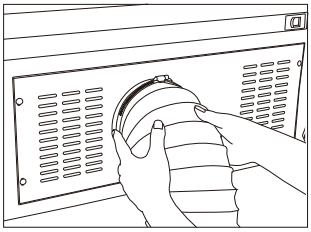
6.4 Setup and Installation

This laser machine features a compact design that integrates a water cooling system, exhaust fan, and air assist system, simplifying the setup process. Installation is straightforward and does not require a separate water bucket or air pump.

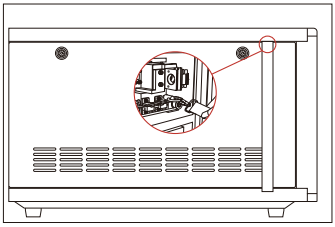
Perpetration



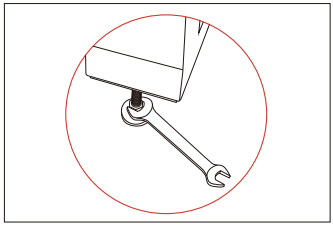
Add Water to the Chiller, The water level must be at or above the green “NORMAL" zone.



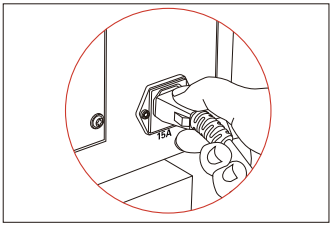
Install the Exhaust Pipe



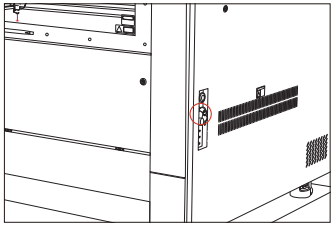
Remove the Fixing Latches



Leveling Your Machine



Connect the power

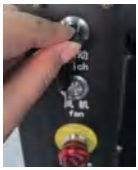


Turn on the machine

7.1 Power On/Off

Switch on machine:

Turn on the power switch, Release the emergency stop button ,turn on the key switch

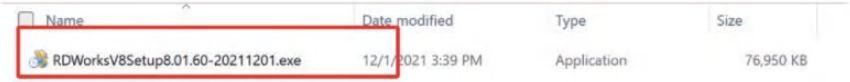


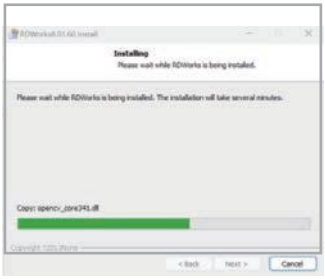
Notice

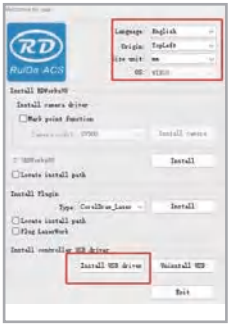
When installing for the first time, do NOT run the machine immediately after powering on.Wait a minute or two for the water cooling system to circulate to fill the laser tube with pure water.

7.1.1 nstall Software (RDWorks V8)

Insert the accessory U disk into the computer; double-click to run the RDWorks Setup file.





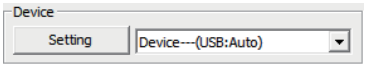


Select the Language on the right top corner,set the machine origin to Top-right choose the size unit from Inch and mm.

Don’ t forget to install USB driver.

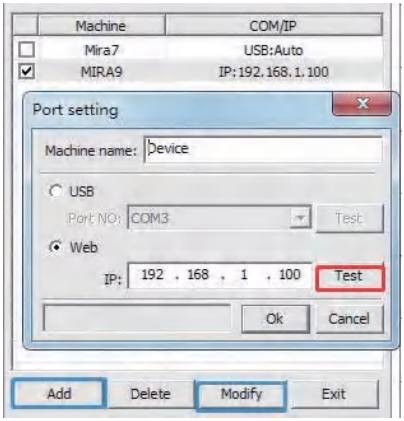
Connect your machine to RDworks with USB data cable

Insert the data cable into the USB port , and connect the other end to the computer, run RDWorks, set :“Device -USB:Auto”, and the software will automatically determine the connection interface with the device.



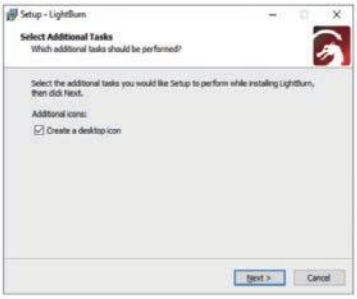
When there are multiple laser devices connected to the computer, click [Add] to add a new machine. When you need to use one of those machines, click the check box to choose it.

Click [Add] or [Modify], a dialog box will pop up. After adding or modifying, you can click [Test] to check whether the connection with the device is successful.Find the currently connected device and select the machine with the corresponding IP address from the list.

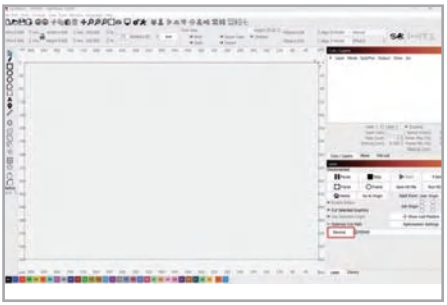


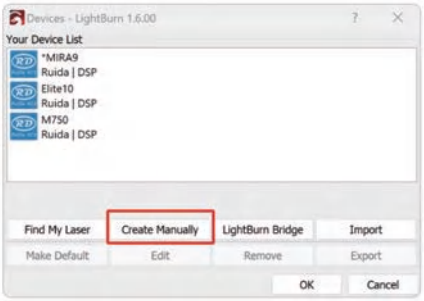
7.1.2 Install Lightburn software.

Download LightBurn
Visit the Download Page: https://lightburnsoftware.com/pages/license-page

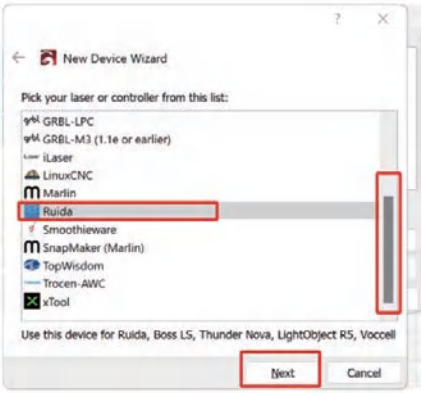


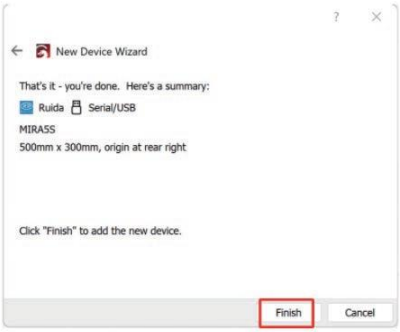
Connect your machine to Lightburn with USB data cable





Complete the setup according to the prompts.

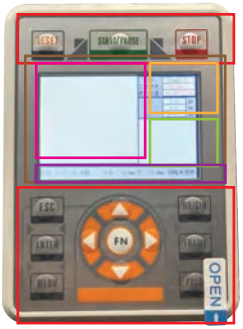




Finish！You are ready to go!

7.2 Opertation Panel Instruction

After power on the machine, the panel will display the following interface:



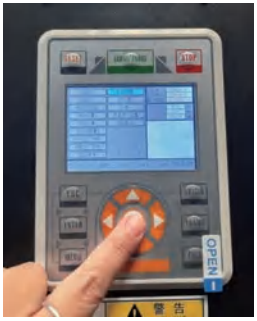
- Keypad operation area
- LCD display area
- Layer display area
- Processing status display area
- Parameter setting menu area /preview display area
- Machine status display area

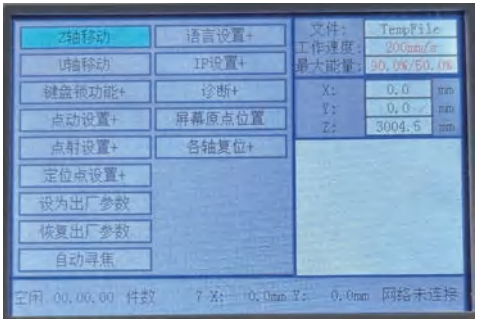
RETSET	Reset	START/PAUSE	Start/Pause	STOP	Stop
ESC	Return to the previous menu, cancel parameter settings, etc.	ORIGIN	Set Origin	ENTER	Confirm
FRAME	Frame	MENU	Menu	PULSE	Pulse
FN	Function	◀ ▲ ▼ ▶	Used for X ,Y,Zaxis movement and menu parameter value change		

7.2.1 LCD function description

- **Layer display area:** Display the layer parameters of the current file or preview file, the parameters from left to right are: layer number/color/speed/maximum power; In the file management state, the graphic preview of the selected file is displayed. During the operation of the panel, the operation prompts and the execution command status of the machine are displayed.
- **Processing status display area:** display the file number, speed and maximum energy of the current processing file; the coordinate value of the current position of the laser head; the intermittent or continuous motion status display
- **Parameter setting menu area/preview display area:** Display the settings and prompts of all parameter control menus; Show the processing file image during processing.
- **Machine status display area:** Display the real-time status of the equipment: progress bar, water temperature, voltage and communication connection status.

7.2.2 FN description





7.3 Laser Path Alignment

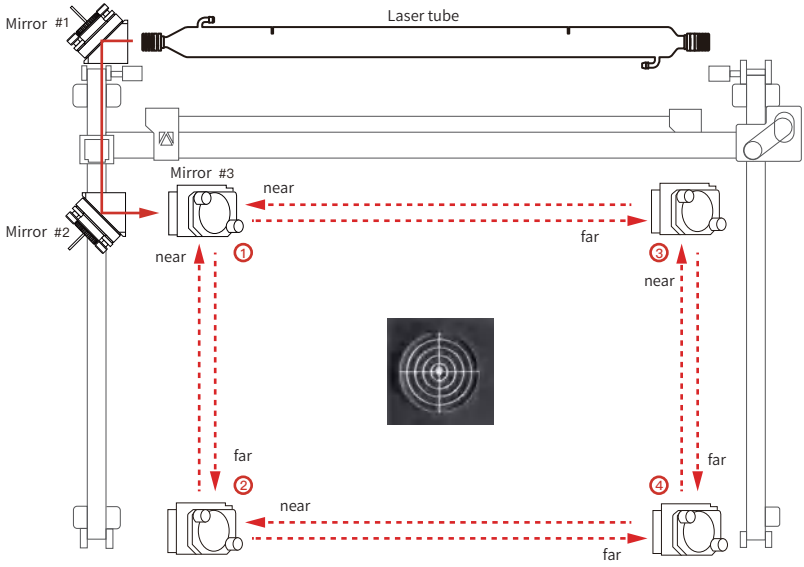
Notice
Please ensure that it is operated by laser professional technical support personnel.

The ruby series is equipped with a precision-engineered optical path designed to maintain consistent alignment, even after replacing mirrors, lenses, or laser tubes. However, minor errors may occasionally arise across batches, There are steps to verify correct optical path and how to correct the wrong light path.

Let' s first understand the general theory:

The principle is simple: Light propagates in a straight line. Our goal is to ensure that the laser beam passes through the center of the laser head nozzle precisely and is absolutely perpendicular to the worktable.

To test that, place a piece of acrylic or masking tape in front of the Mirror #3, and use the laser's pulse function to burn marks onto the acrylic or tape in different positions (typically at the four corners and the center of the working area of the machine) to check if they overlap. T



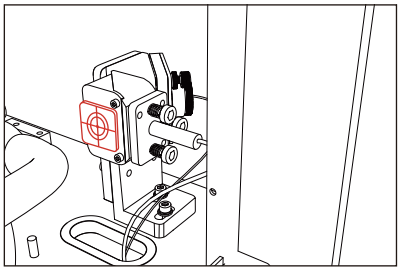
If you find the pulse dots at 5 positions don't overlap, here goes the calibration steps. Tools needed:

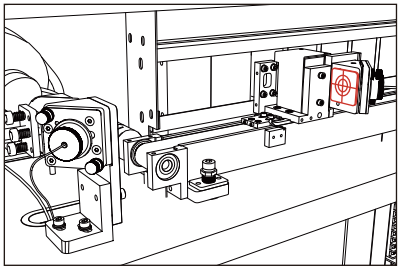
Cabinet key/Double-sided adhensive/Shooting target (Usually small piece of acrylic block, or masking tape)/Allen key.

Before starting, ensure the lid of the machine is closed. Go to the control panel, press the Menu key, and select Laser Setting. Set the mode to Pulse, press Enter to save the changes. Set the laser time on 30ms and press enter. Then press ESC to return to the main interface. Press the combo key Shift + Z- to set the maximum pulse power to 35% and save it. This configuration ensures that when you initiate the pulse, it will create a sufficiently large circular mark on the acrylic for easy verification.

Next, start with the first mirror. Open the back lid of the laser cabinet. Apply a piece of double-sided adhensive to the back of the acrylic shooting target and attach it to Mirror #2. Move the gantry to the up near side of working space.

Press the Pulse key to make a pulse. The laser will burn a small mark on the acrylic. Check if the mark is centered on the target.

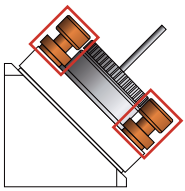


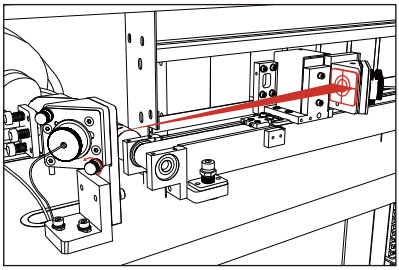


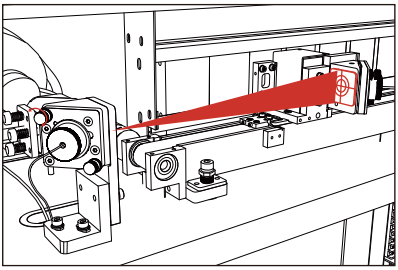
If it isn't, proceed as follows:

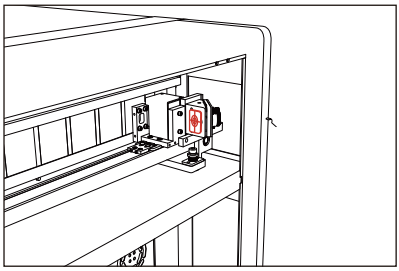
Loosen the knob screws of Mirror #1 by turning the small ring undeneath. Adjust the beam's position by rotating the knob screws :

1. Clockwise rotation of the right knob moves the beam right; anticlockwise moves it left.
2. Clockwise rotation of the left knob moves the beam up; anticlockwise moves it down.









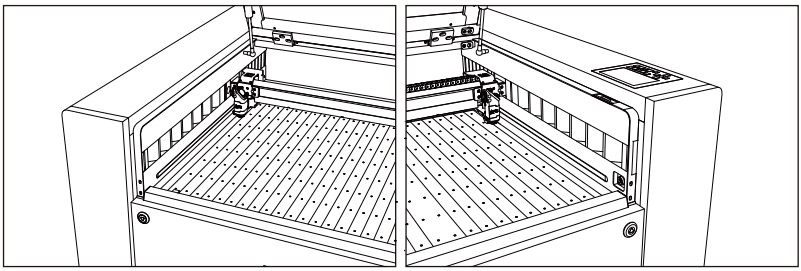
Once the burn mark is centered on the near up side, replace the acrylic block with a new one. Make a pulse, then move the gantry to the bottom near side of the working area by pressing the Arrow key. Make another pulse.

Compare the two pulse made by the laser to see if the two burn marks are overlapped.

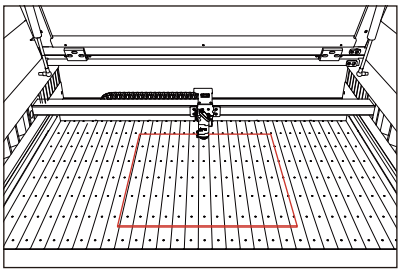
If the second burn mark shifts to the left, rotate the right knob screw clockwise. If it shifts to the right, rotate counterclockwise. Make a pulse and compare the marks again. Repeat the process until the burn marks overlap with the first mark, then tighten the ring beneath the knob screw to fix the mirror.

If you are unsure of the knob direction, refer to the red beam direction during adjustment. We will cover how to adjust the red beam later.

After adjusting Mirror #1, remove the protective lens on the left of the laser head attach the acrylic target to Mirror #2. Position the laser head to the middle near side of the workspace. Make a pulse on the far side, check if it is in the middle, if not adjust with the knobs on second mirror), then move the laser head to the far side and press Pulse. Compare the two burn marks and, if they are not aligned, adjust the knobs on Mirror #2 until the marks overlap in the middle.



Change a piece of clean acrylic shooting target, take pulse in the four corners of the working area to see if they are overlapped (within 2mm error will be acceptable). If they are not overlapped or not centered, adjust the knobs on the mirror #2 until they are good.



Then, jog the laser head to the middle of the working area. Put a piece of acrylic under the laser head.

Press the Focus key to focus the laser, then press the Pulse key to burn a mark. Next, press the Z- key to lower the worktable by 100mm, and press the Pulse key again to make another burn mark.

Compare the first and second mark, see if the first mark is in the center of the second mark, if not you can adjust the laser tube to center it.

7.4 How to Use the Overhead Camera

7.4.1 Camera setup

All Ruby series come with a built-in overhead camera, which works best with LightBurn software. The camera is used for:

- Positioning designs on material
- Tracing artwork directly from the bed of the laser

To Use the Camera:

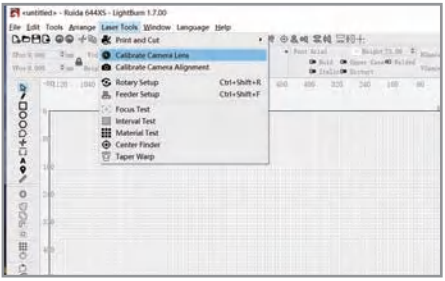
- Connect the camera to the machine using with the USB cable in accessory package.
- For the Ruby, you do not need to open the lid while connecting the camera.

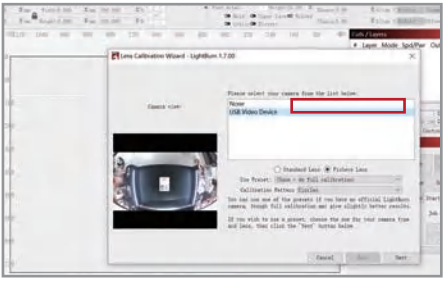
Camera Calibration:

Camera lenses can distort images (if the alignment is not done), especially fisheye lenses on larger lasers. Calibration ensures accurate use. The Redline camera comes with preset values that work well with LightBurn software.

To calibrate:

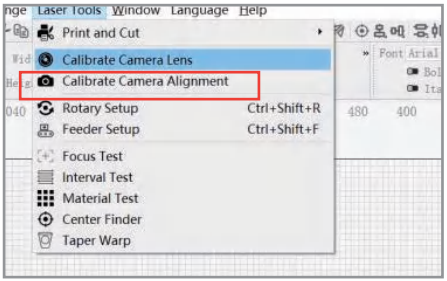
- Start LightBurn software.
- If using the latest version, click Laser Tools on the top menu and select calibration Camera Lens.
- Follow the calibration wizard step by step.



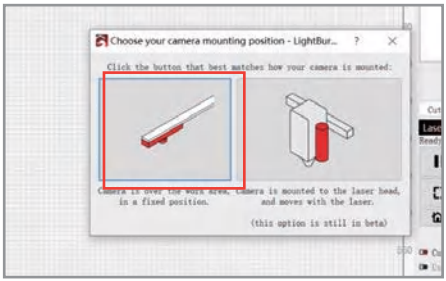


Camera Alignment

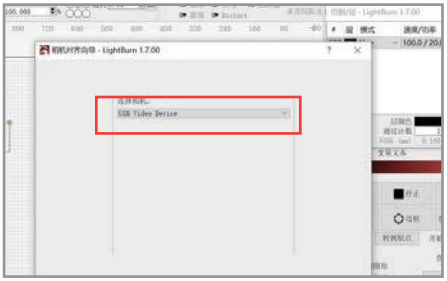
Now that the camera is calibrated, proceed to camera alignment. This step informs LightBurn of your camera's position relative to the machine's work area.



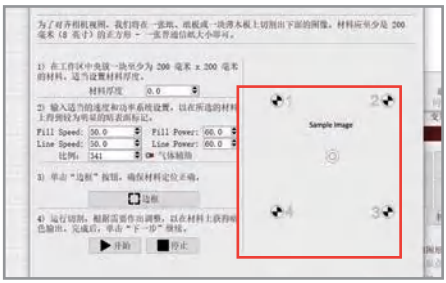
For the latest version of LightBurn, click Laser Tools on the top menu bar and select Calibrate Camera Alignment to start the wizard.



Select the first installation method.



Select Camera and click”Next”

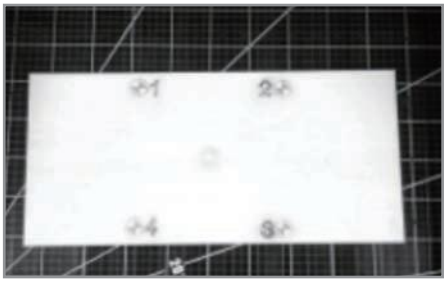


You'll get to this screen:

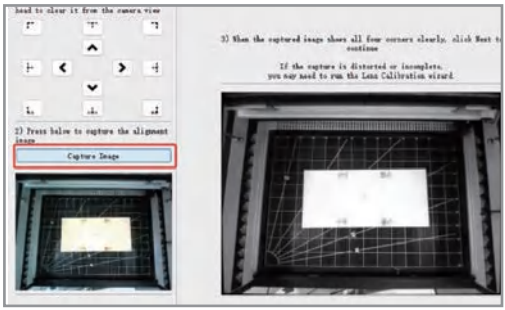
This tool uses your laser to cut a target pattern onto a piece of material, such as card stock, paper, cardboard, or thin wood. The pattern to be cut is shown on the right side of the display.

Enter appropriate speed and power settings to achieve a moderately dark mark without burning through.Adjust these settings based on your laser and material.

If the mark is not dark enough, adjust the settings and run it again. When the pattern is clearly visible and easy to see, click Next.



From this screen, you'll capture the alignment image. Use the jog or "send to corner" buttons to move the laser out of the view of the camera. When the camera has a clear view of all four targets, click the Capture button. You should see an undistorted version of the camera view appear in the right side of the window, with all four corner targets visible, as shown below:



From this screen, tag each of the targets by double-clicking the center of each one in order. You can pan and zoom using the same controls as in the LightBurn edit and preview windows. Dou-ble-clicking will place a red '+' mark. Tag each of the four targets in their numbered order (1, 2, 3, 4). If a marker is placed incorrect-ly, double-click nearby to adjust it or click Undo Last to remove it and try again.

Place each marker as accurately as you can. You can see the ideal placement here:

Click Next to finish the marker placement screen, then click Finish to complete the process and store the results. You're done!

7.4.2 Use the camera to trace an artwork and positing.

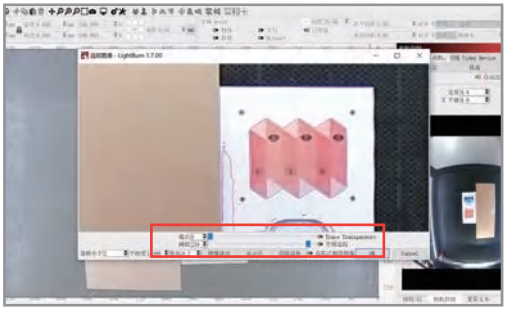
*Place a piece of paper with your printed artwork (or hand drawings) on the laser bed.

Keep the lid open. Open the Camera Control window in LightBurn, and click Update Overlay to capture and project whatever is in the camera view onto your workspace.

Then Click “Trace”

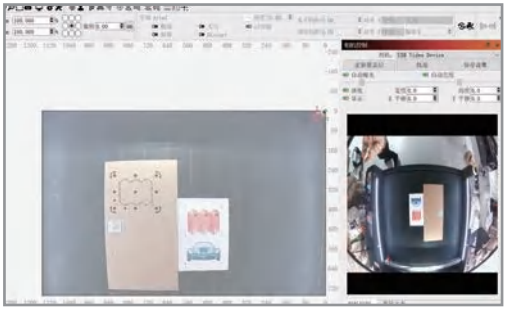
The Cutoff slider controls the lower end of the brightness range that LightBurn will outline with vectors, while the Threshold slider sets the upper end.

Adjust these sliders until the selection area (red lines) fits the edges of the full artwork.



Select the artwork by dragging the mouse and click OK, then you’ ll get a vectorized new artwork in blue color.

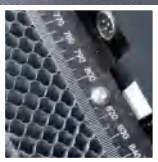
Drag the artwork on the material.



7.5 Change the Focus Lens

· Drawer-type magnetic suction design, directly remove the lenses.
· Check whether the lenses are damaged.
· If necessary, clean both sides of the lenses with cleaning fluid and cleaning wipes.
· Replace the focusing lenses according to the lens type.
· Install the protective gasket.
· Reinsert the laser head.

7.6 Change the worktable



Unscrew the fixing screws of the honeycomb plate.

7.7 Replace the air filter

If it is necessary to change the filter mat, open the power supply cover on the rear of the machine and replace it.

8 Maintenance

8.1 Safety notes

Danger

Improper maintenance can cause serious injury or damage.
Maintenance may be carried out only by authorized, trained personnel who are familiar with how to operate the machine and in strict observance of all safety notes.

Danger

Risk of fire or explosion.
Improper handling of the machine may cause fire or explosion.

– For cleaning the machine, do not use explosive or flammable substances or cleaning agents.
– No flammable or explosive liquids may be stored in or near the machine.
– Always keep the system clean, and remove flammable parts from the working area or exhaust area.

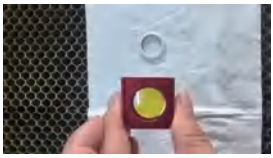
8.2 Cleaning

8.2.1 Machine

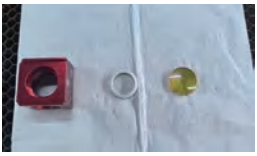
1. Move the working table into a position in which it is easiest for you to clean the surface with a window cleaning agent and paper towels.
2. Switch off and disconnect the machine from the mains.
3. Open the transparent acrylic top lid and front panel.
4. Thoroughly remove all loose dirt particles and deposits in the interior of the machine (e.g. with a vacuum cleaner or broom).
5. Clean the air guide plate and vent slots of the exhaust box inside the machine using a dry or damp cloth or brush.
6. Clean the cover of the laser source and vent slots at the back of the machine using a dry or damp cloth.
7. Clean the transparent acrylic top lid using a dry or slightly damp cotton cloth. Do not use paper towels as they could scratch the acrylic.

8.2.2 the Focus Lens

Remove the lens.



Remove the Silicone washer



check the surface.

Prepare lens cleaning paper.

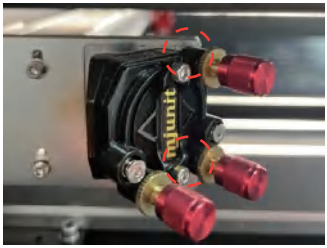
Clean the lens carefully and without pressure with the lens cleaning cloth.

Insert lens.

Caution

Make sure that you do not touch the mirror with your fingers, since this would greatly reduce the service life of the mirror.
Do not touch the mirror with your fingers or with tools, and never use a cleaning tissue twice, as the surface could easily be scratched.

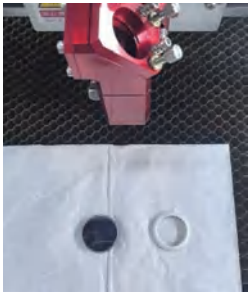
Mirror #1,Mirro #2



Use a dedicated Allen wrench to remove the fixing screws, take off the reflector, and after inspecting and cleaning the lens, put it back in place.

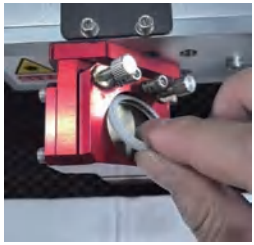
Mirror #3

Remove the Silicone washer



Remove the lens.check the surface.

Clean the lens carefully and without pressure with the lens cleaning cloth.



put it back in place

Information

To ensure a long service life of the machine with high quality and performance, you should spend a few minutes per week (depending on the environment) on cleaning.
After cleaning the rails it is necessary to clean the table, the interior of the machine and the cleaning drawer.

Clean the entire length of the x,y axis rail with a cleaning cloth and a cotton swab.

8.3 Chiller Maintenance

This series is equipped with 5000/5200 built-in water chiller to ensure the machine' s stable working. Therefore, it is necessary to routinely maintain the water source and piping of the water chiller.

Most of users fill the water chiller with pure water, since it is economical and easy to get. However, ordinary distilled water or deionized water will become weakly acidic liquid after a period of time, which will cause rust

on metal parts; in addition, hard water contains a large amount of alkaline substances, which become scale after heating and separation, which adheres to the heat dissipation. If the metal surface inside the device cannot be cleaned regularly, the thick scale will seriously affect the function of the cooling system.

Therefore, if you choose pure water, it is recommended to clean the water tank and change the water every 6 months. If the frequency of use is high and the load is heavy, the water changing time can be appropriately shortened and the water changing frequency can be increased. Otherwise, impurities such as calcium and magnesium in pure water will adhere to the inner wall of the laser tube and affect the laser energy.

Draining steps:

※ Open the cap for the water inlet

※ Place a proper container below the water inlet

※ Unscrew the cap for the water inlet

※ Draining the water in the laser tube with auxiliary equipment such as air compressor

9 Troubleshooting

This chapter should enable the maintenance personnel to identify and resolve operational faults based on error messages and symptoms.

Warning

Risk of fire from incorrect parameter settings.
Laser operation with incorrect parameter settings such as power settings, speed or frequency can result in flame formation.
– Laser operation permitted only under supervision.

Caution

System failures that cannot be remedied can cause damage to the machine.
– Disconnect the machine from the mains and contact your local Technical Support.

Problem	Possible cause	Remedy
Too low engraving depth.	· Imprecise focusing. · Dirty optics.	· Check focus. · Clean optics.
Blurred edges.	· Imprecise focusing.	· Check focus.
Missing cut lines.	· Zero passes in material database. · Line thickness in CorelDraw too big. · Color was skipped in the software.	· Increase the amount of passes in the material database. · Reduce line thickness to the smallest possible value. · Set color to cutting in the database.
Waviness of the lines.	· Lens is loose.	· Check lens and lens holder.
No visible marking result.	· Too low laser power. · Too high speed. · Not focused. · Wrong focus tool.	· Increase power setting. · Reduce speed. · Check focus. · Change focus tool. · When using autofocus, check the settings within the software (lens, material thickness, table).

Problem	Possible cause	Remedy
The size to be engraved or cut does not match the size in CorelDraw.	· Raster correction ON in the software. · Wrong size settings in the printer driver. · Wrong image position is selected in the layout tab (printing). · Wrong machine is selected in the software.	· Switch off raster correction in the software (settings/advanced options/laser tab). · Use the same size as in CorelDraw. · Switch the layout settings to: as in document. · Select the proper machine in the software.
Corners and angles are not cut or marked.	· Power too low.	· Increase the correction in the software (Settings / Material Templates Setup - Correction).
No referencing after comissioning.	Top, front or side door not closed.	Close doors.
No response upon switching on of the system.	· Fuse blown. · No electric power at power outlet.	· Check fuses. · Check power outlet.
Connection to machine frequently interrupted.	Electromagnetic emissions.	Make sure that machine and computer are connected to the same electric circuit; the original cable lengths should not be exceeded.
Offsets between engraving jobs and cut lines.	Speed too high.	Reduce speed.
Other faults.		Contact Technical Support.

10 Disassembly

Warning

Danger of injury when disassembling the machine.
There is danger of injury when disassembling the machine.
Always wear suitable protective clothing (e.g. safety goggles, safety shoes, safety gloves).

Warning Dangerous electrical voltage

Electric current.
The machine must be disconnected from the main power supply.

Process:

1. Switch off the main switch at the back of the machine.
2. Remove the exhaust system.
3. Disconnect all cables at the back of the machine.
4. Disconnect the air assist and water cooling system.
5. Remove the glass laser source.

11 Disposal

Disposal

Do not dispose of the machine with domestic waste!
Electronic devices have to be disposed of according to the regional directives on electronic and electric waste disposal.
In case of further questions, please ask your supplier.
In case of disassembly, use suitable tools to dismantle the unit into individual parts. Sort the individual parts and have them disposed of professionally.

RUBY

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