

Wattsan FL HT

Fiber laser marker manual



Wattsan

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Dear customer!

Thank you for purchasing our equipment. We hope that his work will delight you for a long time.

The machines are manufactured in accordance with global standards. Each equipment undergoes pre-sale preparation.

First of all, we strongly recommend that this manual be read carefully and completely before using the equipment. Failure to comply with certain points of the Operating Manual may result in injury to personnel and/or damage to equipment!

Follow the instructions in this instruction. This will not only make the work easier, but also make the use of the equipment safe and long-term. Please follow these instructions carefully.

This document is intended to introduce the basic technical data and requirements for the use of Wattsan laser CNC machine.

In the event that the equipment is transferred to another customer, this document shall be transferred with it.

The manufacturer reserves the right to make changes and improvements to the design that do not impair the declared characteristics of the equipment.

Basic information about the equipment and its technical data:

Equipment name: _____

Serial Number: _____

Month and year of issue: _____

Information about signs and symbols

In this operating manual and on the equipment, the following designations, signs and symbols are used to transmit especially important information:

	This indicates a hazardous situation that could result in serious injury or death if the specified instructions are not strictly followed.
	Indicates a potential hazard that could result in minor injury or damage to the product.
	It contains important information about the safe and correct handling of the product.
	This component is energized by an electric current. In these places, strictly follow the safety rules when working with electricity.
	Caution: Laser beam hazard.

Read the instructions carefully before starting.

Note!

The equipment you directly purchased may differ from the equipment shown in the figures.

	Untrained personnel should not be allowed to work with this equipment and install it.
	The equipment complies with safety class 4. The use of this equipment may lead to the following consequences: • Ignition of nearby materials • Materials exposed to laser radiation can become sources of dangerous gases • Laser beams can cause direct harm to humans
 MUST-DO	The location of the equipment must be equipped with fire extinguishing equipment. It is forbidden to store flammable and explosive substances near the device.
 MUST-DO	The user must ensure that the material to be processed is suitable for laser processing in order to avoid risks to the life and operation of the equipment.
 FORBIDDEN	The operator must not leave the equipment unattended while it is in operation. The equipment must be turned off at the end of operation.
	The use of highly reflective materials is prohibited to avoid the reflection of the laser beam on a person.
	The equipment must be located in a dry, uncontaminated place. The temperature inside the room should be 15-35 °C. Humidity should be in the range of 5-70% (provided there is no condensation).
	The equipment operates from an alternating power supply of 220 / 380 V with a frequency of 50 / 60 Hz. It is forbidden to use the equipment without a voltage stabilizer.

Attention!

The seller is not responsible for the improper use of the equipment and if the user fails to take precautions.

Specifications

Model		FL HT
Laser power, W		20/30/50
Laser frequency range, kHz		27-60
Wavelength		1066±5 нм
Working field, mm		100x100 (50x50/150x150 optional)
Marking speed, mm/m		≤10000
Repeatability, mm		±0.005
Minimum marker line width, mm		0,1
Minimum character height, mm		0,15
Emitter cooling method		Air
Hardware form factor		Desktop/Handheld
Controller		LC2000
OS		Linux
Supported formats		PLT, DXF, BMP, JPG, PNG и др.
PC Connection Interface		USB
Power supply	Max power, W	500
	Voltage, V	100-220
	Frequency, Hz	50/60
Battery life		Up to 8 hours
Battery capacity, W*h		188
Ambient temperature range, °C		+10...+40
Ambient humidity value, %		<70
Weight, kg		~6
Classification of the laser system		Class 4

Equipment

Name	Quantity
Laser marker	1 pc
Carrying case	1 pc
F-Theta Lens	1 pc
Power supply	1 pc
Protective glasses in a case	1 pc
Machine manual	1 pc

CHAPTER 1. INTRODUCTION

1.1 MAIN PURPOSE AND SCOPE OF THE EQUIPMENT

Wattsan laser marking machine is the most modern, high-tech and delicate way to perform the marking work of various surfaces. This equipment is designed for use in industry, manufacturing, scientific research, and other fields that require high accuracy, speed, and quality of marking.

1.2 BASIC OPERATING REQUIREMENTS

- Good ventilation is required to prevent the accumulation of dust and combustion products.
- To prevent fire, the workplace must be equipped with a suitable fire extinguisher.
- There should be a free area around the machine of about 1 m on each side.

1.3 IMPACT ON THE ENVIRONMENT AND PEOPLE

The laser machine belongs to the IV class of laser equipment. Its laser beam and reflected light can cause damage to the human body (especially the eyes). The operator and operating personnel should pay attention to eye protection and use special goggles (with radiation protection with a wavelength range of 1064 nm).

CHAPTER 2. SAFETY

2.1 REVIEW

Before operating the machine and performing daily maintenance, the operator should read this chapter carefully, learn the safety precautions and requirements of the machine, and follow the appropriate precautions.

2.2 ENSURING THE SAFETY OF WORKING WITH EQUIPMENT

- It is necessary to appoint an industrial safety specialist for the operation of the equipment, determine the scope of his responsibilities and provide safety training for the machine operator.
- Specify the machine location area, set a warning card for entering and exiting the machine area, specifying: machine power, type of laser source, type of eye protection used, full name of the industrial safety specialist, etc.
- The machine operator must receive special training.

2.3 LASER SAFETY WARNING



Never point the laser beam at people or animals. High-power laser radiation can cause serious burns or damage to vision. Always keep an eye on the direction of the beam and control its movement.

2.3.1 EYE AND SKIN PROTECTION

Fiber-optic laser sources can damage the retina of the eye because the wavelength of the laser beam is visible to the human eye. Both types of lasers can cause cataracts of the eye and skin burns. Therefore, appropriate protective measures are applied when adjusting the laser. This machine is equipped with a fiber laser, so it is strictly necessary to wear special safety glasses (with radiation protection with a wavelength range of 1080 nm).

A combination of face shields, masks, filters, and/or goggles will provide better protection while the equipment is running. All personnel working near the laser marking area must also wear PPE.

	Parts can be very hot even after the labeling process is complete. Take steps to prevent skin damage by wearing protective clothing such as flame retardant gloves, caps, leather apron, and other flame retardant clothing. Sleeves and collars should be buttoned.
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2.3.2 FIRE PROTECTION

The use of oxygen, as well as sparks during operation, can easily cause a fire.

Therefore, there should be no flammable and explosive objects in the working area of the machine.

	Fire extinguishers should be nearby and accessible, and staff should be trained in their use.
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2.3.3 SECONDARY RADIATION HAZARDS

During laser marking, both visible and invisible light radiation is generated. The interaction between high-power laser light and the target materials being welded can create a plasma that produces UV radiation and "blue light" that can cause conjunctivitis, photochemical damage to the retina and/or a sunburn-like skin reaction. Welders who are exposed to invisible ultraviolet light without proper protection can sustain permanent eye damage. Even short-term exposure to invisible ultraviolet light during laser operation can cause blurred vision, burning, watery eyes, eye pain, and irritation (a feeling of sand in the eye).

	To avoid the effects of radiation, it is necessary to wear special protective glasses.
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2.3.4 SMOKE POISONING HAZARDS

The smoke emitted from the material during laser treatment can consist of very small particles and gases, the smoke and gas are formed from a mixture of fumes of the material being treated, paints, coatings, taking into account chemical reactions and air pollutants. Smoke can negatively affect the lungs, heart, kidneys and central nervous system.

When the laser interacts with materials such as plastics, metals, and composites, the material can start to evaporate. Often the fumes and mist are not visible, but they are highly toxic and pose a serious health risk.

Laser marking material in a poorly ventilated confined space is extremely dangerous. Dangerous concentrations of toxic fumes and gases can build up very quickly, causing loss of consciousness or death by suffocation.

Keep your head away from smoke while working. Always work in an area with adequate ventilation to ensure safe breathing air.

Hazardous vapors must be captured and pumped out. Use a fume extraction system to remove vapors, particles, and hazardous debris from the machine operating area.

Read and follow the safety guidelines and warning labels for all materials used.

In confined spaces and other circumstances, a respirator may also be required.

Regular air monitoring should be carried out to determine the levels of hazardous vapors in the area of operation.

2.4 ELECTRICAL SAFETY

- Make sure the installation is properly grounded.
- Make sure the correct AC supply voltage is used before applying power to the unit. Using the wrong voltage may damage the installation.
- Never use the device in a humid or wet environment. Do not touch electrical contacts and switches with wet hands to avoid electric shock.
- Do not open the machine body or change the machine parameters without consulting the manual. If you need to change something, then these changes must be approved with the equipment supplier. Before modifying, record the original values so that the machine can be restored to its original parameters if necessary.
- At the beginning of the work shift, it is necessary to remove the protective cover from the lens and check the condition of the optics. At the end of the shift, the cover must be put back on.
- Always turn off the device when not in use. Never leave the laser cleaner running unattended.

	After turning off the power to the machine, you must wait at least 5 minutes, and only then you can touch the electrical circuit of the machine. For a period of time after the power is turned off, there may be a high voltage in the machine's electrical system, which can cause harm to people and equipment.
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2.5 OBLIGATIONS OF THE OPERATOR

- The operator must undergo special training in order to start working on the machine.
- Follow the instructions for regular maintenance of the appliance to keep it operational and prevent accidents.

	Each employee who is near the laser during its operation must wear appropriate laser safety goggles and protective clothing.
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2.6 REQUIREMENTS FOR THE PREMISES

2.6.1 AMBIENT TEMPERATURE

When operating the machine, the ambient temperature should be between +15 °C and +35 °C. When the equipment is switched off, the ambient temperature should not be lower than + 4 °C. If the ambient temperature is above 35 °C, a device that lowers the temperature (e.g. air conditioner) must be installed in the room.

2.6.2 HUMIDITY

For the correct operation of the equipment, it is recommended to use it at a relative humidity of <70%. A wet room is not suitable for the operation of the machine, as it corrodes it, which leads to the failure of the electrical and mechanical systems of the machine

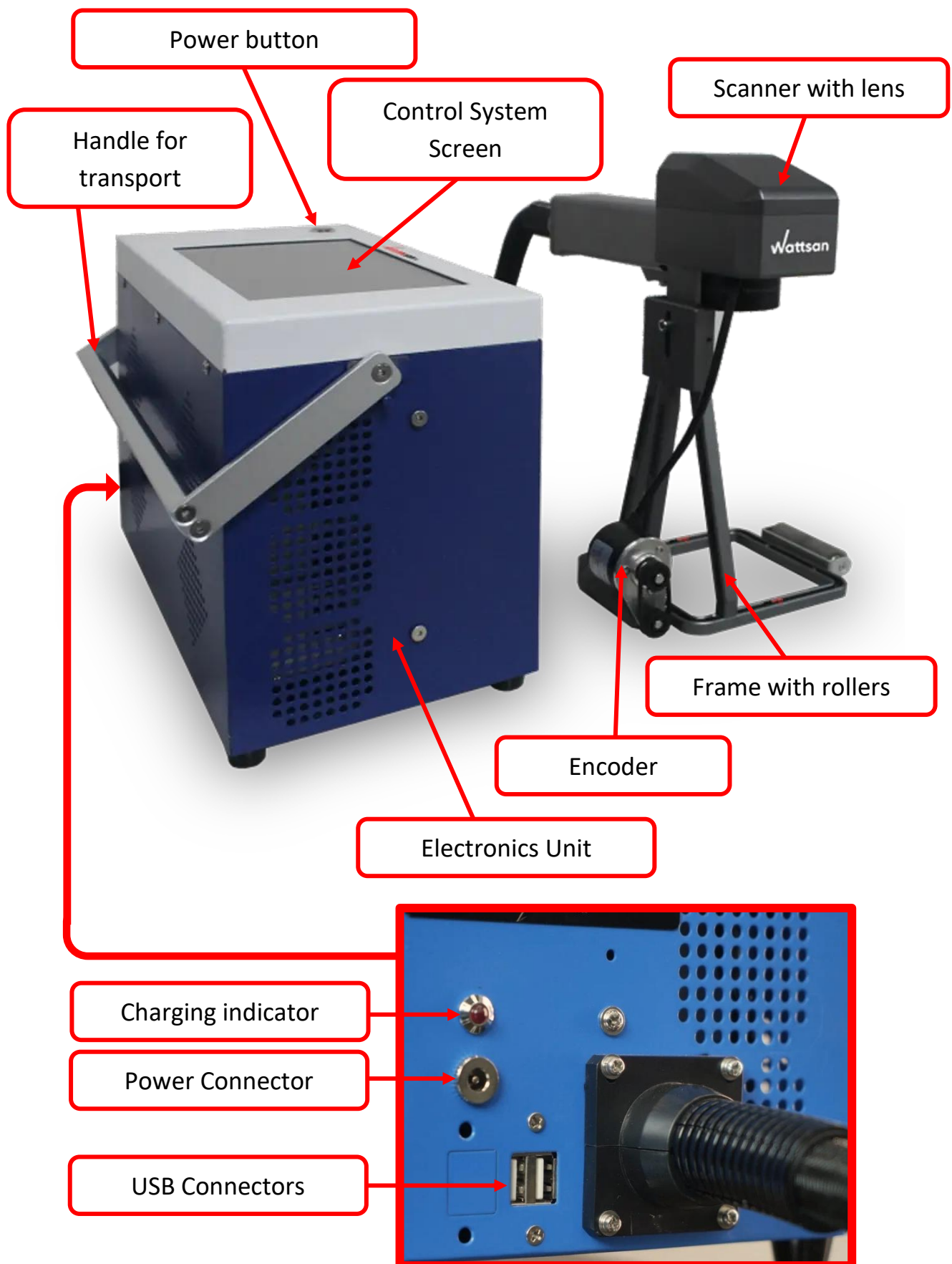
	It is forbidden to use the equipment at a relative humidity of more than 70%.
	Do not use the equipment at temperatures below the dew point.

Temperature	Humidity															
	20%	25%	30%	35%	40%	45%	50%	55%	60%	65%	70%	75%	80%	85%	90%	95%
16°C				0	2	4	5	7	8	9	10	11	12	13	14	15
18°C			1	3	4	6	8	9	11	12	13	14	15	16	17	18
21°C		1	3	5	7	9	11	12	13	14	16	17	18	18	19	21
27°C	2	5	8	10	12	13	16	17	18	19	21	22	23	24	25	26
29°C	4	7	10	12	14	16	18	19	21	22	23	24	26	27	28	28
32°C	7	10	12	15	17	19	21	22	23	25	26	27	28	29	31	31
35°C	9	12	15	17	19	21	23	24	26	27	29	30	31	32	33	34
38°C	11	14	17	20	22	24	26	27	29	30	31	33	34	35	36	37

2.6.3 EQUIPMENT COOLING

The equipment is cooled by air circulation inside the case. Therefore, it is important that the air filters are free of dust and dirt.

CHAPTER 3. APPEARANCE AND STRUCTURE



CHAPTER 4. UNLOADING AND UNPACKING EQUIPMENT

4.1 UNLOADING

The equipment is always packed in a plywood box, ensuring its safety during cargo transportation.

Before unloading the equipment, carefully inspect the cargo and packaging for damage, check the number of pieces declared in the bill of lading. In the presence of damage and/or the absence of cargo packages, we recommend that you draw up a commercial act, since without this document, the insurance company has the right to refuse to pay compensation.

When transferring ownership of equipment in a port or railway station, it is recommended to use the services of a transport company. Qualified employees will accept the equipment, organize loading and unloading operations and select the best method of delivery to the destination.

When ordering vehicles and planning unloading operations, pay attention to the weight and dimensions of the equipment.

We strongly recommend that only specially trained personnel unload the machine.

4.2 UNPACKING

The Wattsan laser marker is packed in a box that houses the laser machine and its optional accessories. Tip: Keep the packaging box. You will need it in case of return. Dispose of all waste in accordance with current waste disposal legislation.

Check the machine box and all accessories outside the box (if any) for external damage when accepting the equipment from the carrier. If possible, unpack the boxes when accepting the equipment together with a representative of the cargo carrier.

If any damage to the equipment is found, it is necessary to draw up a commercial damage report with the carrier and send photos with a description of the damage to our mail help@wattsan.com.

CHAPTER 5. FIRST TIME SWITCHING ON

The premises must meet the workplace and safety requirements described above.

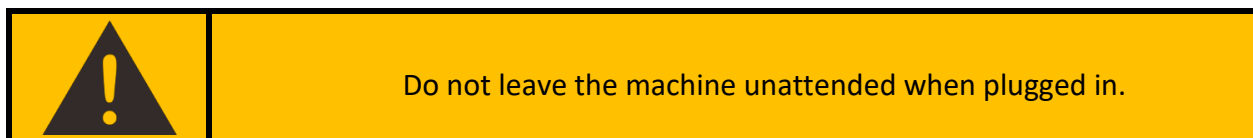
Avoid areas where equipment may be subject to mechanical shock or vibration.

5.1 STARTING THE MACHINE

1. Remove the machine from the shipping case.
2. Place the electronics unit on a flat and dry surface.
3. Connect the plug from the power supply to the power supply.
4. Connect the cable from the power supply to the power supply connector on the machine body.
5. Start the machine by pressing the power button on the top panel.
6. Remove the protective cover from the lens.
7. The machine is ready to go!

After completing the work, perform these operations in reverse order.

The machine is equipped with a built-in battery, which allows you to carry out work without being connected to the mains. Use this feature when you are away from a source of electricity or when necessary. However, we recommend that you work with the power supply connected if possible and do not allow the battery to be completely discharged.



CHAPTER 6. MACHINE SETTINGS AND ADJUSTMENTS

6.1 FOCAL LENGTH

This is the distance from the lens to the focus point at which the object to be marked should be located.

It is essential to maintain the correct focal length for each laser marking process. Only at focus does the laser beam achieve the power density required for constant and clear marking.

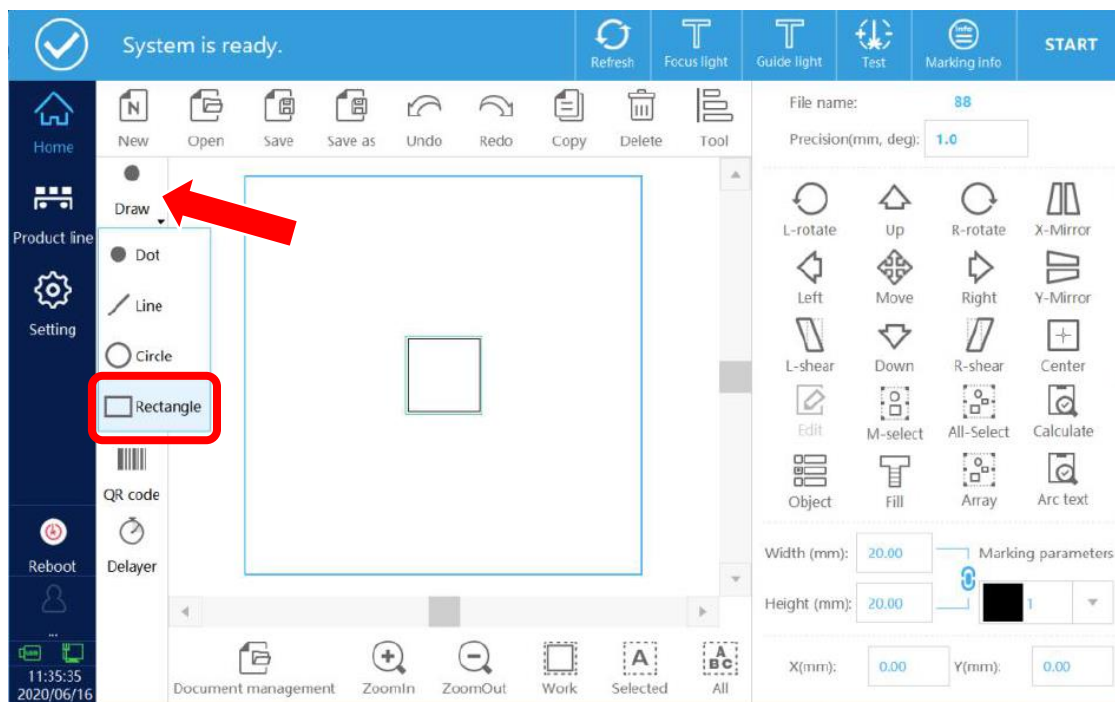
Therefore, the correct focal length between the marking head and the workpiece must be set before any marking. Incorrect focal length is the most common cause of poor or even indistinguishable markings.

In this marker, the focal length is provided by the height at which the frame with rollers is fixed.

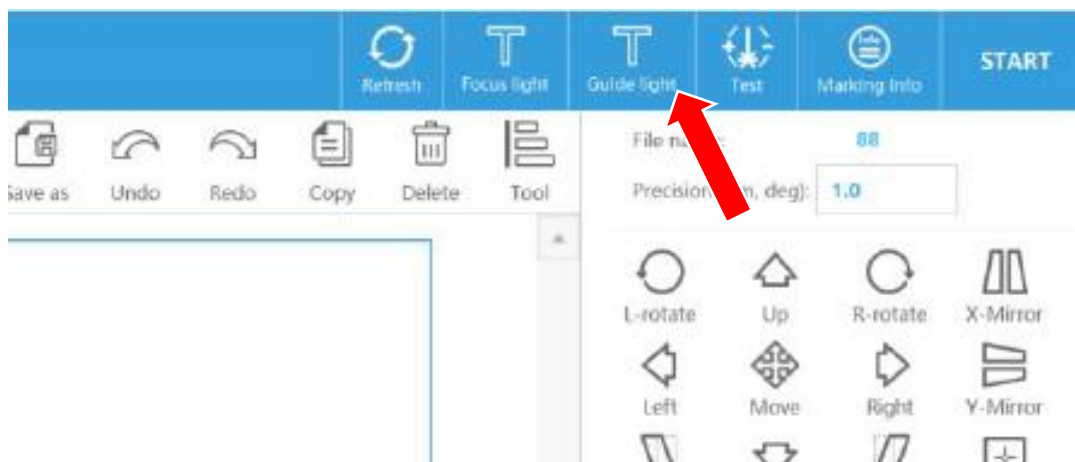
By default, the frame is set to the desired height, but you can adjust this as needed.

6.2 ADJUSTING THE FOCAL LENGTH

1. Create a shape (such as a square).



2. Position the marking material under the lens of your marker.
3. Click the **Guide Light** button to see where your square will be marked on the workpiece.



4. Adjust the position of the scanner up and down by changing the height of the frame. Loosen the fasteners of the screw holding the frame. At the moment when the sparks from the material in contact with the laser beam are the greatest, it will mean that you have found the focal length.

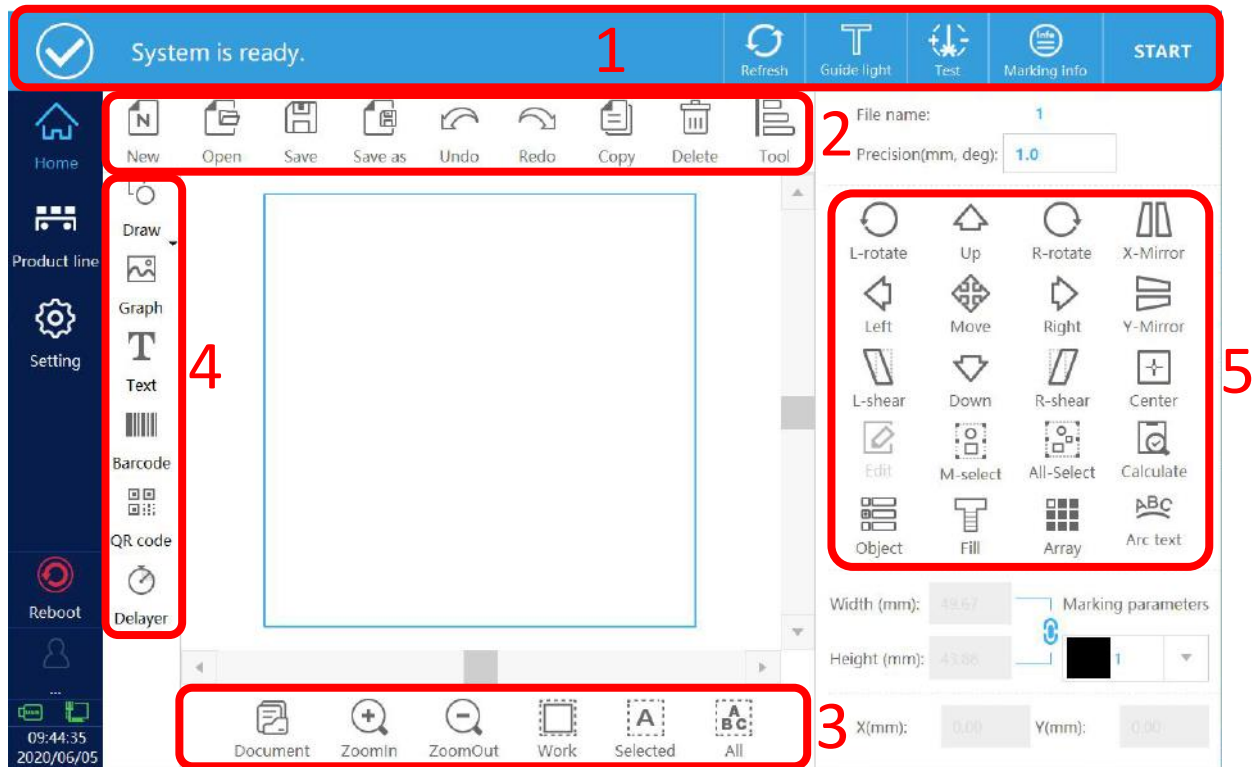


Fix the scanner at the found focal length. Turn off the marking mode.

CHAPTER 7. DESCRIPTION OF THE SOFTWARE

7.1 INTRODUCTION TO THE CONTROL SYSTEM

7.1.1 BASIC INTERFACE VIEW



1. System status bar - the status bar of the marking system, displaying the current status and providing quick access to the main management functions:

- **System status prompt** - Shows system readiness, marking process, or error messages.
- **Refresh** — updating the marking data in the process of operation (online update).
- **Focus light** — turns on the focusing red light when the module is connected.
- **Guide light** - A guide red light to preview the marking area.
- **Test** — testing the marking time of the selected data (the result is displayed in the status bar).
- **Marking info** — opens a window with marking information.
- **Start / Pause** — start or pause the marking process.

2. Edit bar - a toolbar for working with files and objects. Allows you to create, open, save and save projects as new, as well as undo and redo actions, copy, delete and access additional tools.

3. System toolbar - a control panel for displaying and selecting objects. It allows you to view the document, change the scale, as well as select the area of work, individual elements or all objects in their entirety.

4. Add object - Add materials that need to be marked, including text, points, lines,

circles, rectangles, barcodes, QR codes, graphics, delay.

5. Positioning objects – Move objects Up, down, left or right, or the distance or angle traveled by each point of the rotary button (unit: mm/deg).

Detailed instructions on how to operate the control system are provided in a separate manual.

7.1.2 MARKING PARAMETER

- Loop Count — here you can specify the number of cycles of processing the object, you can specify a value greater than 1, then the marking will be repeated the specified number of times.
- Speed—Specifies the speed of the beam in millimeters per second.
- Power—Defines the % of the rated power of the laser source to be used.
- Frequency – Determines the laser frequency in kilohertz (kHz).

7.2 GENERAL RECOMMENDATIONS FOR LABELING

7.2.1 METALS

When marking metals, use maximum power, low frequency, and low or medium speed. Remember that some metals produce toxic dust. In addition to the risk to the user's skin and eyes, quite a lot of dust can be generated, so we recommend installing exhaust systems on the equipment. Similarly, operators and others in the work area may require personal respiratory protective equipment, such as masks and respirators.

Aluminum: Pure aluminum requires a slightly higher frequency than other metals, and there will never be a dark black hue like that created by marking steel. If darker markings are required, consider using anodized aluminum or creating deep markings that can be darkened with black epoxy resin or other filler. Anodized aluminum requires a little more speed but a very low frequency.

Powder-coated metals: Powder-coated metals usually require a very high frequency and, for best results, at least 3 passes to remove the coating and polish the bottom layer.

Precious metals: Gold, silver and similar soft metals should be marked at a lower power but at a medium speed to avoid strong reflection of the laser beam from the metal.

7.2.2 PLASTICS

When labeling plastic, low power and high speed are usually used. Marking with too much power or too low a speed can concentrate too much energy at the point of contact, causing the plastic to melt. Among other problems, this can lead to poor quality markings, poisonous gases, and even fire.

7.2.3 STONE

When marking different types of stone, use medium power and speed at a low frequency. As with ceramics and metals, be aware of the dust generated (especially during long marking cycles) and take similar measures to ensure the safety of users and others in the work area.

7.2.4 CONTRAST AND DEPTH OF MARKING

To darken the image, use a higher frequency. To lighten the marking, use a lower frequency. To increase the depth of marking, reduce the speed or increase the power of the laser or increase the number of processing cycles. Remember that marking too deep reduces image quality, especially for coated materials.

CHAPTER 8. EQUIPMENT MAINTENANCE

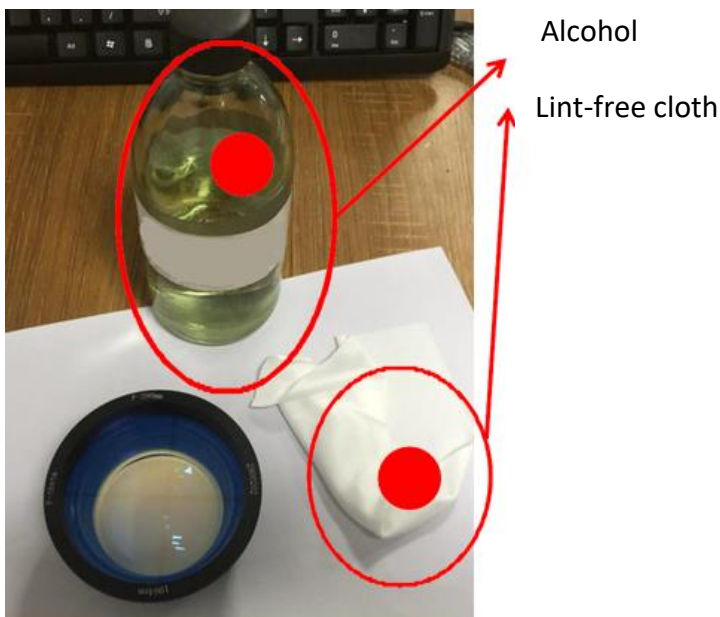
8.1 GENERAL MAINTENANCE NOTES

1. The laser marker is mainly composed of electronic devices, precision elements and optical components, and requires high standards of service.
2. Before carrying out any work on the equipment, make sure that it is switched off and unplugged from the power supply.
3. Scheduled maintenance is necessary to maintain the maximum performance of the equipment.
4. All maintenance work must be carried out in accordance with safety regulations.
5. Always keep your workspace clean and dust-free.
6. Cover the lens with a protective cover when the laser marker is not in use.

8.2 CLEANING OPTICAL ELEMENTS

1. Be very careful when handling lenses, avoid touching them with your fingers and hard objects.
2. The material from which the lenses are made is extremely susceptible to water (and water vapor). Do not allow water compounds to come into contact with the lens.
3. Try not to touch the optical components with your fingers! Oily or dirty hands can damage the surfaces of the optical elements.
4. Do not use tools or hard objects to clean the optics. Scratches on the optics are irreparable, if the optics are damaged, they will need to be replaced!
5. Do not press the optical element while cleaning it.
6. Do not wipe the optics with a dry cloth. Do not touch the back of the fabric. Dirt and sebum from the fingers can enter the surface of the optical element through the fabric and cause damage to it.

To clean the optical elements, you will need:



To start cleaning the optical elements, unplug your equipment from the power supply and gently unscrew the lens from the scanner.

Then soak the napkin in a small amount of alcohol.



Remove the protective lens retainer (if a protective lens is fitted).



And remove the protective glass (if any).



Clean the protective glass and focusing lens with slow circular motions



Do not forget to clean the lens on the back side.



Check the mirrors of the scanner as well. Peel them if necessary.



8.3 MAINTENANCE OF FANS IN THE CASE OF THE MARKER CONTROL UNIT

The laser emitter and electronic components are cooled by fans located at the back of the case. Fans need to be cleaned periodically.

When removing dust from the ventilation openings of the unit with a vacuum cleaner, use ONLY the lowest power setting to avoid damaging internal components.

8.4 CONSERVATION

To preserve the equipment, it is necessary to abundantly lubricate the lifting screw of the machine.

8.5 SERVICE PLAN

Weekly	● Lens cleanliness control. ● control of cleanliness of all cavities and panels. ● Monitor cable fastening for damage or looseness. ● Inspect the filters of the laser system for visible clogging.
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Every three months	● Purging of air filters of the power element block.
After a year of operation and annually thereafter	● Checking the fixation of the system connectors. ● Purging the internal space of the laser marker control unit. ● Lubrication of the scanner lift screw.

CHAPTER 9. TYPICAL MALFUNCTIONS AND WAYS TO ELIMINATE THEM

Defect	Decision
No laser beam	Adjust the focal length
	Check the processing parameters (power and speed)
	Check the parameters in EzCad on the Ports tab
	Check the connection between the machine and your PC
	Check that all buttons on the laser machine control unit are turned on and the key is turned to the On position
No Laser Beam + Beep	Check the water temperature in the chiller
The buttons on the control unit are not lit	Check the functionality of the buttons
	Check that the equipment is connected to the power
Fiber laser error	Check that all buttons on the laser machine control unit are turned on and the key is turned to the On position
	Check the parameters in EzCad on the Ports tab
	Check that the equipment is connected to the power
	Contact the supplier for technical assistance
Low laser power	Check the processing parameters (power and speed)
	Adjust the focal length
	Contact the supplier for technical assistance

CHAPTER 10. WARRANTY

10.1 DURING THE WARRANTY PERIOD

In case of equipment breakdown during its warranty period due to a defect caused by the manufacturer, repair is carried out by the supplier's company free of charge.

However, consumable parts such as optical parts (e.g., focusing lens) are not eligible for warranty service.

For free repair or replacement of accessories, the buyer bears the cost of delivering new components from the place of their storage to the buyer's address, and, if necessary, the buyer bears the cost of the specialist's visit to the place of work.

If the equipment failure is caused by a defective part or assembly of the equipment, this part or assembly is repaired or replaced free of charge.

Defective components and parts must be returned to the supplier.

If the malfunction is not caused by the quality of parts or components of the equipment, the buyer will have to pay the cost of repair as well.

Warranty service is also not subject to malfunctions due to improper use of equipment, non-compliance with maintenance rules, operating conditions, as well as warnings specified in manuals and on warning plates that have arisen during the warranty period.

It is also a prerequisite that your equipment and peripheral devices are grounded and operated through a voltage stabilizer.

10.2 OUTSIDE THE WARRANTY PERIOD

The buyer pays for the visit of a specialist, repair or replacement services for parts or assemblies and delivery of parts or assemblies back and forth.

10.3 SERVICE LIFE OF COMPONENTS AND COMPONENTS

In compliance with the rules of the current operational documentation, the service life of the main components of the equipment is 1 calendar year, except for consumable parts.

List of consumables:

	Consumables	Warranty period
1	Focusing lens	No warranty
2	Mirrors of the scanner.	No warranty

Also, the warranty does not apply to all other components if:

- the equipment was used and stored in conditions that led to the penetration of foreign objects and liquids into it;

- the equipment was used and stored in conditions that led to its mechanical damage;
- there was a use and storage of equipment in conditions under which insects, rodents, etc. had access to the goods;
- the repair was carried out by any person who is not authorized by the supplier of the equipment and does not have the appropriate certificate or authorization;
- there was damage to control labels and seals (if any).

Changes in resources, service life and storage, manufacturer's guarantees:

Basis for changing warranty obligations, name and number of documents	Date until which the warranty is extended	Title, Name and Signature	Note

The warranty period is not suspended and is extended except as provided for by applicable law.

10.4 DISPOSAL DETAILS

The equipment does not contain materials that are dangerous to life, human health, and the environment. The procedure for disposal of the module after the end of its service life is determined by the consumer of the equipment.