



GeKaLaser



GeKa Laser P1000
GeKa Laser P1500
GeKa Laser P2000

Users Manual

Please Read and Understand This Manual
Before Operating The Welding Machine

www.gedik.com.tr

Preface

Thank you for purchasing a product from our company. We are always ready to provide you with the best service.

Machines are high-tech products consisting of a combination of light, motor and electricity. They are characterized by compact structure, high precision, long service life, aesthetic design and reasonable price. To use the machines effectively and maintain them well, please read this manual carefully before using them.

We've included many images in this user guide to make it easier for comprehension. These images cover topics such as machine installation and operation, assembly, settings, daily maintenance and safety precautions.

We hope this guide will help you to use your machine with ease.

Thank you!

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Laser Machine Installation And Basic Operation Guide

1. Disclaimer

1. This manual does not contain information related to product updates and customizations etc.
2. All products are described based on the real object. Photos in this manual may appear different due to light and angle conditions.

2. Safety Measures

- Have fire extinguishing equipment ready before using the machine.
- Our machines perform intensive laser work, which may cause accidents.
- They can ignite the surrounding combustible materials.
- Risks may arise during laser operations, so users should pay attention to whether your materials are suitable for welding.
- When the laser is applied on different materials, it may produce radiation or dangerous gas.
- Exposure to direct laser beam can harm the human body.
- Prohibit stacking of flammable and explosive materials in the work area.
- Make sure the environment is well ventilated.
- Prevent unprofessional personnel from approaching the machines.
- Materials and wastewater must meet the requirements of local regulations.
- There is high pressure and some other potential hazards inside the machine, please disassemble the machine according to the instructions.
- A trained personnel should be in charge once the machine starts to operate.
- Please turn off all power sources before leaving the work area.
- It is strictly forbidden to open any cover while the machine is running.
- Before starting the machine, please make sure that the machine and its related parts are securely attached to the ground.
-
- Avoid inserting irrelevant or reflective objects in the machine, as the laser may reflect on the human body or flammable materials.
- Technicians should pay attention to the working condition when the machine is active. In case of abnormal situation, please disconnect the power source.
- Machines must remain dry and should be kept free from dirt, vibrations, strong currents and strong magnetism etc.
- Working temperature should be between 5-35°C and humidity should be between 5-95%. (There should be no condensation)
-
- Our machines should be kept away from electrical equipment that is sensitive to magnetism. This may affect your equipment.

 **Working voltage is AC 220V/380V, 50-60HZ. Please do not operate the machine if your voltage is unstable or incompatible!**



The manufacturer cannot be held responsible for any damage caused by improper or illegal use.

Introduction of Main Machine and Parts

Introduction of Main Machine and Parts

1. FIBER LASER RESONATOR

Fiber laser resonator is defined as a powerful beam of light with a wavelength of 1080 nm, with a high amplitude, in parallel waves of intense and same phase. Their weights and dimensions differ according to laser power.

*It is strictly forbidden to undertake any intervention other than the authorized service!



Introduction of Main Machine and Parts

2. INTERNAL WATER CHILLER

A water cooling unit is used to prevent damage to the torch due to heating in welding with high power. Circulation pump in the cooling unit ensures that the water circulates in the torch continuously, preventing the torch from heating up. The temperature is fixed at 25 °C. It cools the water in the summer and heats the water in the winter to the temperature of 10 °C – 25 °C, which is required for the operation of the system.



Introduction of Main Machine and Parts

3. ELECTRICAL CONTROL PANEL

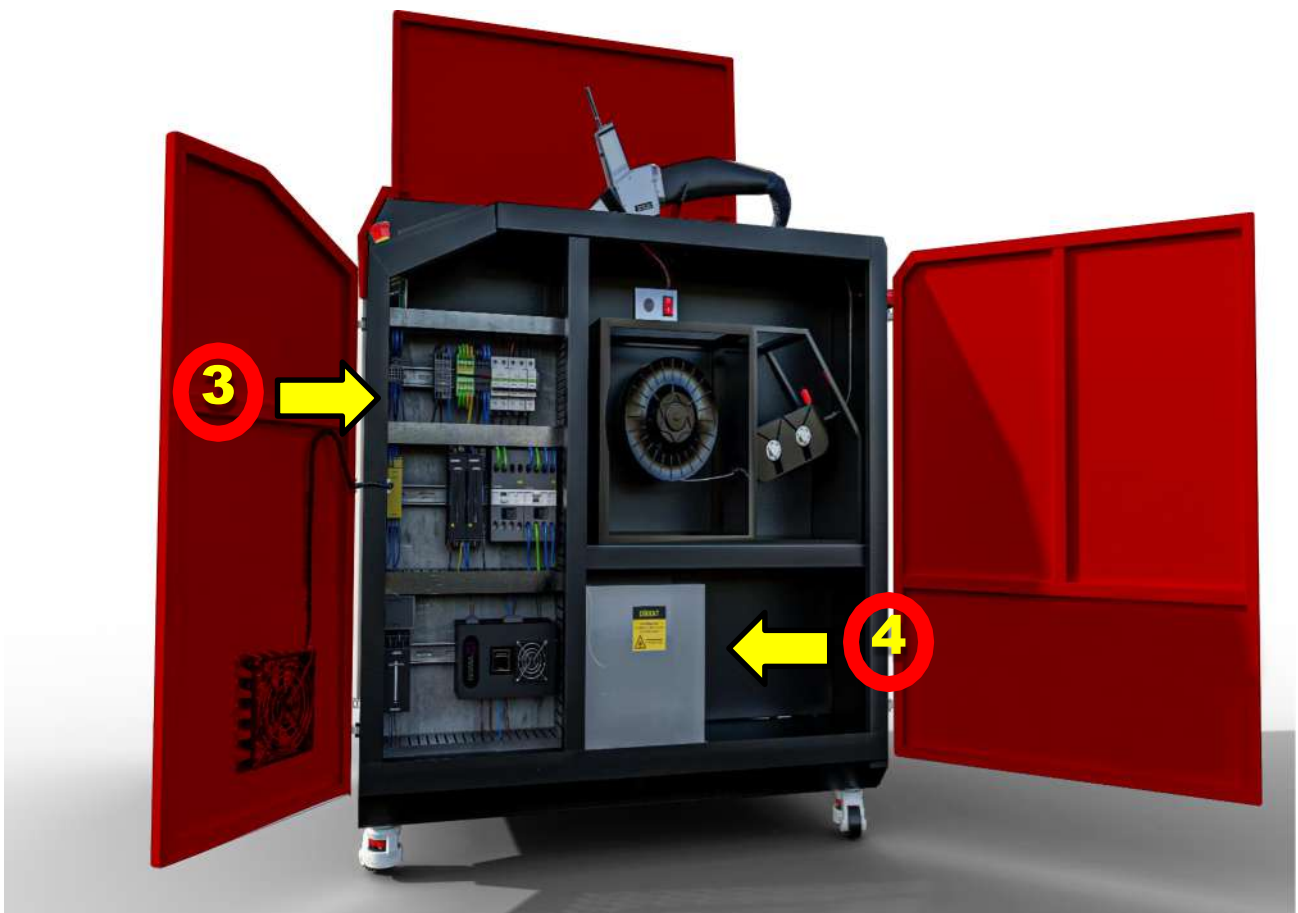
It is the cabinet housing the switchgear materials and cables used in the distribution and transmission of electricity to the systems in the device.

*It is strictly forbidden to undertake any intervention other than the authorized service!

4. ISOLATION TRANSFORMER (Optional)

The isolation transformer ensures that the network and the load are isolated from each other. Thus, the effects of network problems on the devices are minimized.

*It is strictly forbidden to undertake any intervention other than the authorized service!



Introduction of Main Machine and Parts

5. INTERNAL WIRE FEED UNIT

Wire feeding unit is a motor driven mechanism to drive the reeled wire to the welding area. Wire feed speed can be selected from the wire feed control panel.

*Depending on the wire diameter (0.8-1.0-1.2-1.6) to be used, the V or U reel apparatus in the wire feeding unit should be selected.



Introduction of Main Machine and Parts

6. WIRE FEED CONTROL PANEL

The speed of reeled wire to welding gun is selected from the wire feed control panel. The selected wire speed requires a proportional current for melting. In addition, the panel indicated in the image is used in the Wire Feeding Unit, which is optionally connected to the device.

7. TOUCH SCREEN LASER CONTROL PANEL

The Touchscreen Laser System Panel is the main screen where initial device settings, necessary pre-use settings and controls are made.



Introduction of Main Machine and Parts

8. WELDING TORCH

Water-cooled torches are used at high Powers to transmit laser beams and shielding gas to the welding zone. In addition, they are completely isolated in terms of working safety. Wire harness includes the current conductor control cable, gas hose, water cooling hoses, and wire feed guide. The torch should be well maintained and kept clean and away from any dust, burrs, dirt, etc. in the nozzle tip.



Introduction of Main Machine and Parts

9. WIRE FEED LINE

The wire feeding line is a flexible line with spiral steel inside that allows the wire coming out of the wire feeding unit to reach the nozzle at the end of the torch. Two different sizes exist , 0.8-1.0 and 1.2-1.6, depending on the wire thickness.

10. CHASSIS CABLE AND PLIERS

Power supply made of ground wire and pliers to the base material to complete the electrical circuit is the link.



11. EXTERNAL WATER CHILLER (RG-W2000H Optional)

A water cooling unit is used to prevent damage to the torch due to overheating in welding with high power. Circulation pump in the cooling unit ensures that the water circulates in the torch continuously, preventing the torch from heating up. The temperature is fixed at 25 °C. It cools the water in the summer and heats the water in the winter to the temperature of 10 °C – 25 °C, which is required for the operation of the system.

Since the RG-W2000H device has a high rating, the internal chiller cooling system is located next to the device to allow for rapid cooling / heating and more efficient use.



12. EXTERNAL WIRE FEEDING UNIT

External wire feeder is a motor driven mechanism to drive the reeled wire into the welding area. Wire feed speed can be selected from the wire feed control panel.

Its difference from internal wire feeding is its mobility thanks to its long cable, which facilitates access to distant points.

Depending on the wire diameter (0.8-1.0-1.2-1.6) to be used and the type of wire, V or U apparatus must be selected.

In general, the working principle is the same. Settings are adjusted from the wire feed control unit on the top.



ACCESSORIES



PROTECTIVE LENS (10 PCS)



NOZZLE (10 PCS)



PROTECTIVE GLASSES (1 PIECE)



TOOL BAG

NOZZLE TYPES

PIECE	DEFINITION
	WIRE FEEDING NOZZLE (0.8 mm, 1 mm, 1.2 mm, 1.6 mm)
	WIRELESS DEEP OUTER CORNER WELD NOZZLE
	WIRELESS OUTER CORNER WELD NOZZLE
	WIRELESS INNER CORNER WELD NOZZLE
	CUTTING NOZZLE

Laser Welding Machine Installation and Operation Basics

Laser Welding Machine Installation Basics

1. Gas Connection

Unpack the device, then follow the instructions below:

STEP 1 Connect the power cable of the device to the nearest electrical panel where you will install it.

STEP 2 Connect one end of the gas hose to the back of the device and the other end to the meter with BAR output on the tube. The gas pressure should be in the range of 2-3 bar during the welding phase.

STEP 1 Connect the power cable of the device to the nearest electrical panel where you will install it.

WARNING ! The gas meter in the tube must have a BAR output. Pure Argon gas should be used.



Gas Protection System

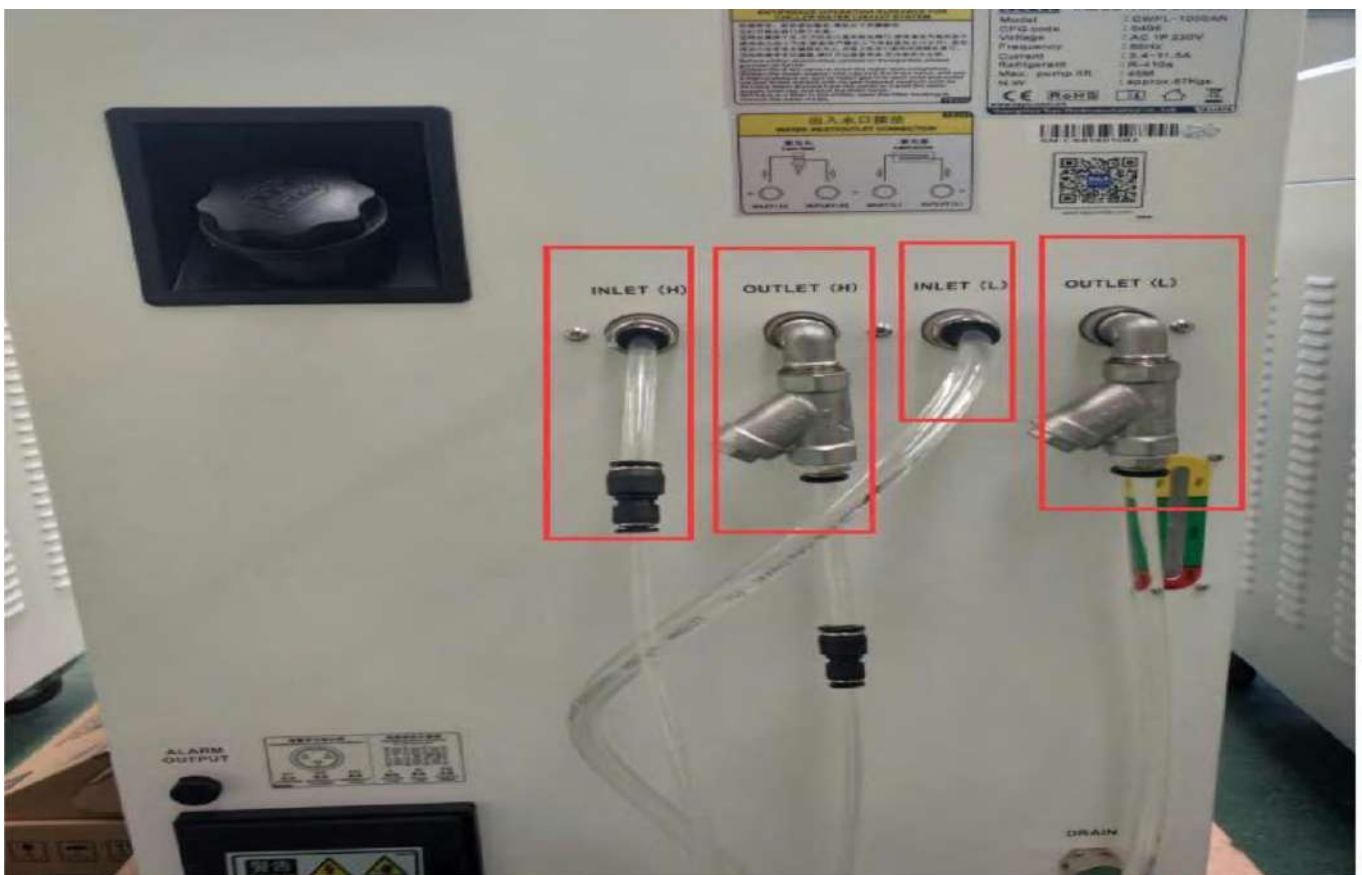
Pure Argon or Nitrogen are used to protect the lens from burrs that may come from outside, to cool and to prevent oxidation or tarnishing during welding. l/min pressure regulator cannot be used. The pressure regulator with BAR gauge indicated in image 2 should be used. The gas pressure should be in the range of 2-3 bar during the welding process.



2. External Chiller Connection

- There are four water hoses as INPUT (H) – OUTPUT (H) – INPUT (L) – OUTPUT (L) coming from the main device.
- Match the 4 water hoses on the device with the inlet ports on the back of the chiller and assemble them.
- Air outlet at the back or top of the cooler should be 50 cm away from surrounding material/obstacles.
- A distance of at least 30 cm should be left between the air inlet and the material/obstacles around it.

WARNING: Before turning on the laser switch, please make sure that there is no water in the connecting pipe, otherwise you will damage the laser source!



Main Power, located behind the external chiller, is where the communication cable from the external chiller is plugged into.



3. External Wire Feeder Connection

Connect the communication cable from the external wire feeder, whose working and control principle is the same as the internal wire feeder, to the input port located in the lower left corner of the main device. Then turn the routing switch located both above the internal wire feeder on the main Device in the direction of the arrow to provide power and control to the external wire feeder to have the device ready for use.



Laser Welding Machine Installation Basics

3. Laser Torch Nozzle Connection

Connect Laser Torch and Nozzle by following the nozzle measurements given below:

- Approximately 71 mm if the material to be weld is Aluminum,
- Approximately 75 mm if the material to be weld is Aluminum Stainless steel,
- Approximately 75 mm if the material to be weld is Aluminum Carbon alloy steel.



Laser Welding Machine Installation Basics

4. Reel and Wire Installation to Wire Feeder

Place your reel in the reel compartment, Before inserting the end of the wire into the feed motor, check the V or reels. Attach the spool suitable for the wire diameter (0.8, 1.0, 1.2, 1.6) and type to the wire feeder motor. Otherwise, the motor and reels may not drive the wire forward or wind the wire onto the spool. Insert the end of the wire from the required point and insert it into the wire feeding line by passing it through the reels.

Press and hold the MANUAL FEED FORWARD button on the wire feeder control panel, and eject the wire from the end of the wire feed line. you took it out

*V reel is used for Black (DKP), stainless etc. wires.

*U reel is used for aluminum wires.



Laser Welding Machine Installation Basics

5. Wire feed Settings

The driving speed of reeled wire to the welding area is selected from the wire feeding control panel. Selected wire speed needs a proportional power for fusion.

- Select feed rate with the Adjust button on top
- **Press (+)** to increase feed rate
- **Press (-)** to decrease feed rate
- **Press the MANUAL FEED FORWARD button to feed the wire to the tip of the nozzle**
- Press the MANUAL FEEDBACK key to wind the wire from the tip of the nozzle to the reel (Rewind manually each time when you open the wire feeding unit)
- You can test the wire and wire speed before welding by using the WORK SIMULATION key.



Laser Welding Machine Installation Basics

5. Laser Torch Wire Feed Connection

- Assemble the Wire Feed line (1) to the torch's junction point (marked in red),
- Make sure that the wire coming from the Wire Feeding line is in contact with the Nozzle,
- Reels in the wire feeding unit
- and the apparatus (marked in blue) located at the end of the wire feed line must be changed according the thickness of the welding wire to be used (0.8,1.0, 1.2, 1.6), .
- Adjust the Laser Red Light Position (page 25) at the wire end.




TOUCH LASER CONTROL PANEL

Dokunmatik Lazer Sistem Paneli, cihazın gerekli başlangıç ayarlarının, lazer kaynak işlemine başlamadan önce gerekli ayarların ve kontrollerin yapılacağı ana ekrandır.

On the left side of the screen:

- Lazer displays the status of the source device. Green LED light turns red in case of any error.
- LASER / GAS / WIRE FEED boxes at the bottom display the status of 3 main basic tasks that must be completed in order to start the laser welding process.

Ekranın sağ tarafında;

- Other device settings can be made from the Settings  menu on the upper right.
- Prior to laser welding process, please see MODES section where the device can be adjusted according to the type and thickness of the material.
- Settings in the MODES section vary completely depending on the mastery, expertise of the person who will work with the laser and the type & thickness criteria of the material. They are user-dependent variable settings and can be saved in the device's memory.



v.2.0

TOUCH LASER CONTROL PANEL

- i. If the Laser box signals LASER OFF, welding wire will not be released from the torch and no welding can be done. Press the box once to turn it on and set it to LASER ON
- ii. If the Gas box signals GAS, welding wire will not be released from the torch and no welding can be done. Press the box once to turn it on and set it to GAS.
- iii. If the Wire Feed box signals WIRE FEED, welding wire will not be released from the wire feed line at the end of the torch and no welding can be done. Press the box once to turn it on and set it to WIRE FEED.




v.2.0

LASER WELDING DEVICE SETTINGS

1.1. Laser Red Light Position Settings

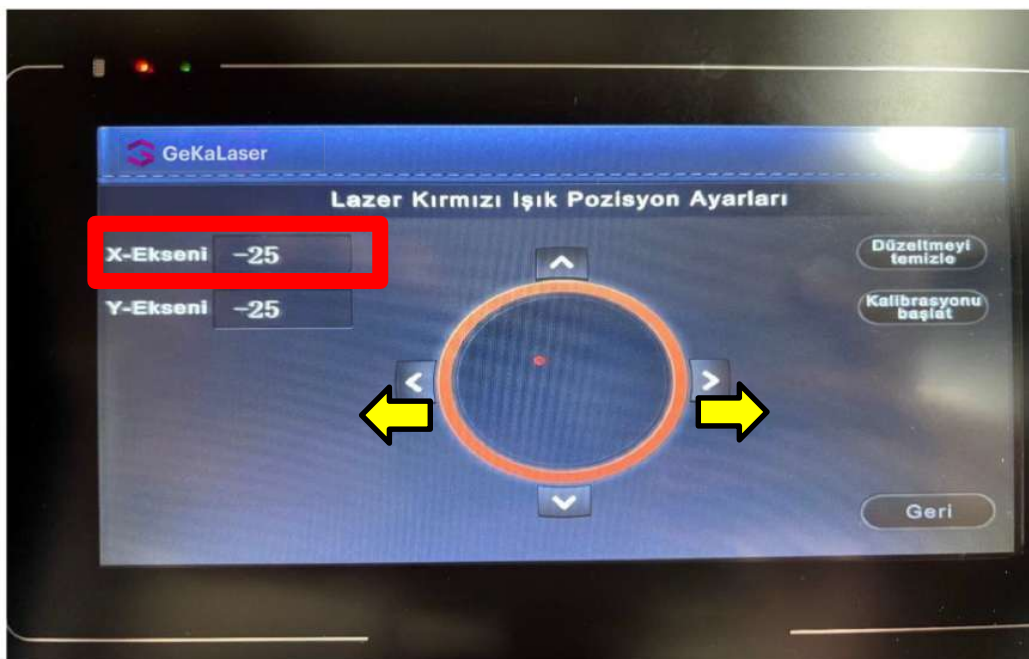
The following settings must be applied to bring the laser red light at the tip of the Welding Torch to the center of the wire.

Otherwise, the wire will not melt and the weld will not reach the desired quality.

- First, Laser Red Light Position Settings must be selected from the Settings  section of the Touch Laser System Panel, located at the top right.

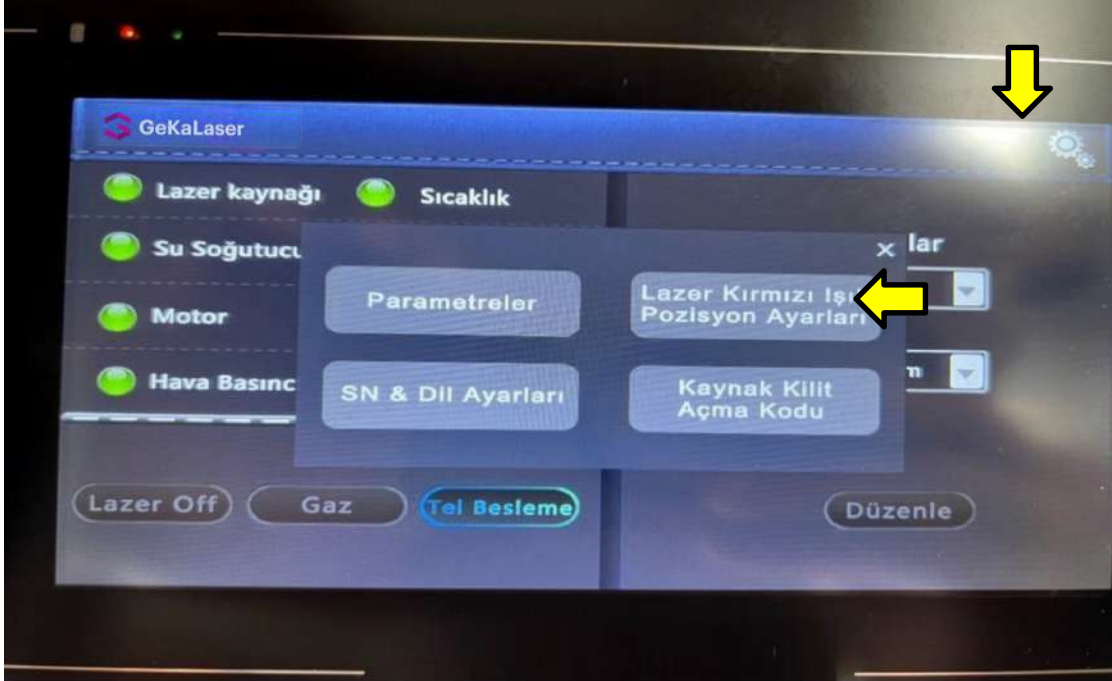


- Laser red light adjustment should be done carefully. The laser light must not hit the Nozzle walls.
- Position adjustment should be made only in the X-axis direction. Otherwise, the Nozzle may heat up and damage the Laser Torch.
- Once you press the back button, the settings will be saved automatically.



Laser Red Light Position Settings

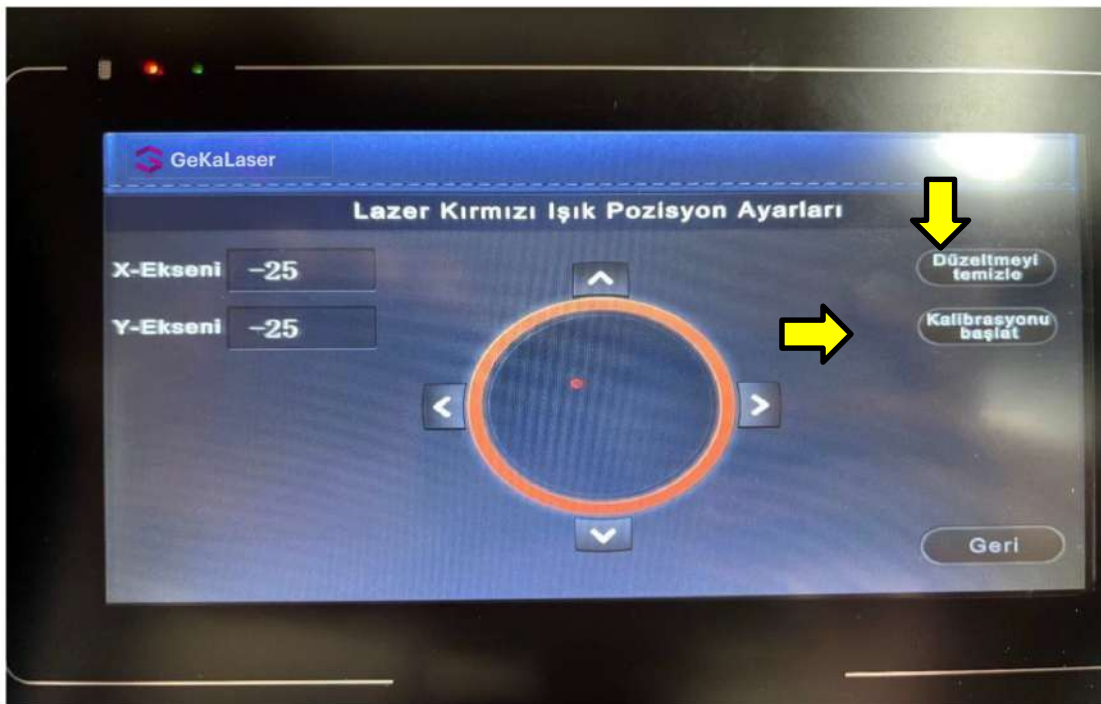
In some cases, the red light position setting needs to be calibrated. Select the red light adjustment menu.



Switch device nozzle to Cutting nozzle.

Step 1: Click the Clear correction button.

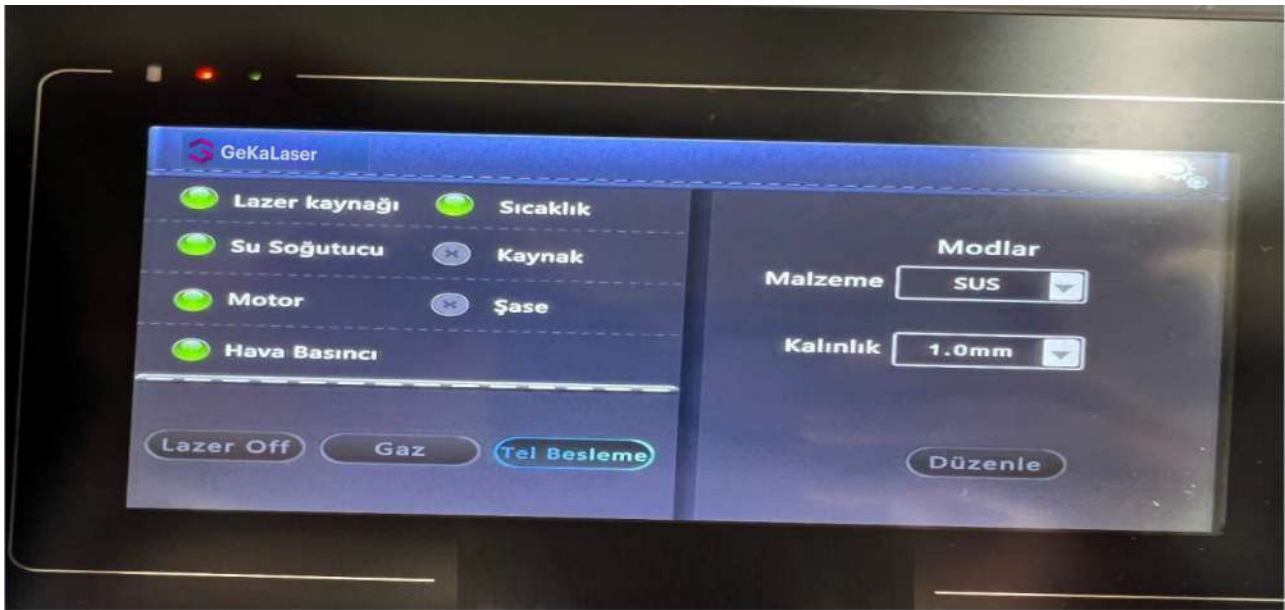
Step 2: Ensure that the red light comes out clearly from the tip of the cutting nozzle. Changes should be made as X – Y. After it is brought to the center, press the start calibration button to have the red light calibrated.



LASER WELDING PROCESS DEVICE SETTINGS

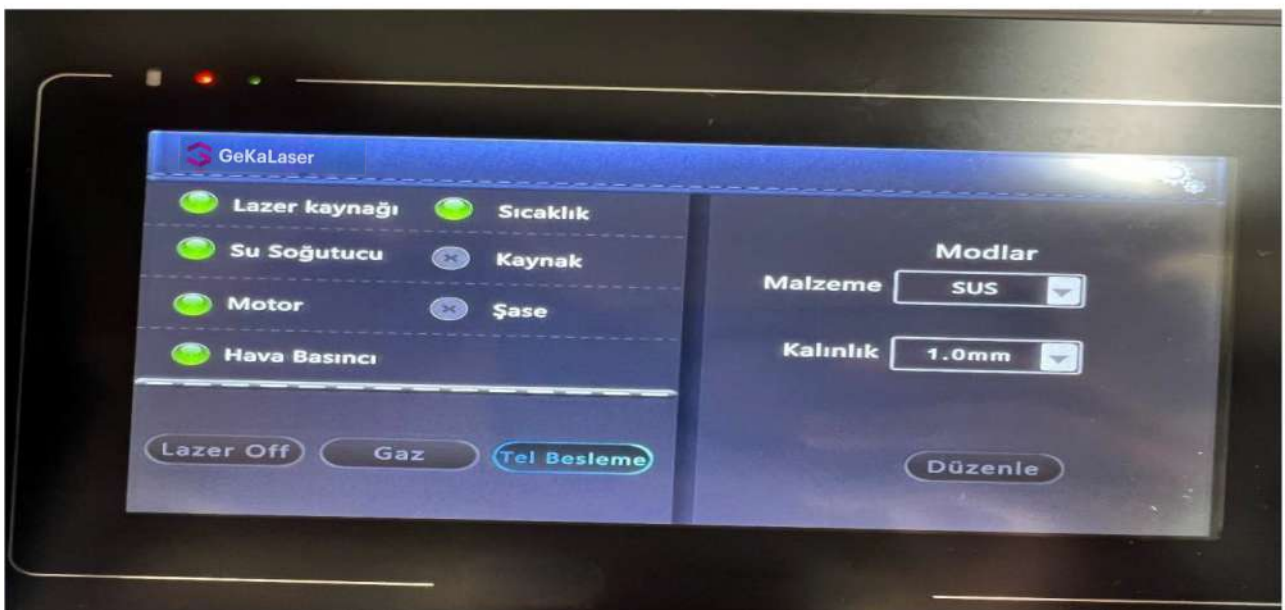
2. Laser Control Settings

The MODES screen located on the left side of the touch laser system panel consists of two parts as Material and Thickness. At the bottom is the Edit section.



2.1 Material

It allows you to easily switch between materials during laser welding as you can select the type of material to be welded and the settings you have made for the relevant material are saved in the memory



LASER WELDING PROCESS DEVICE SETTINGS

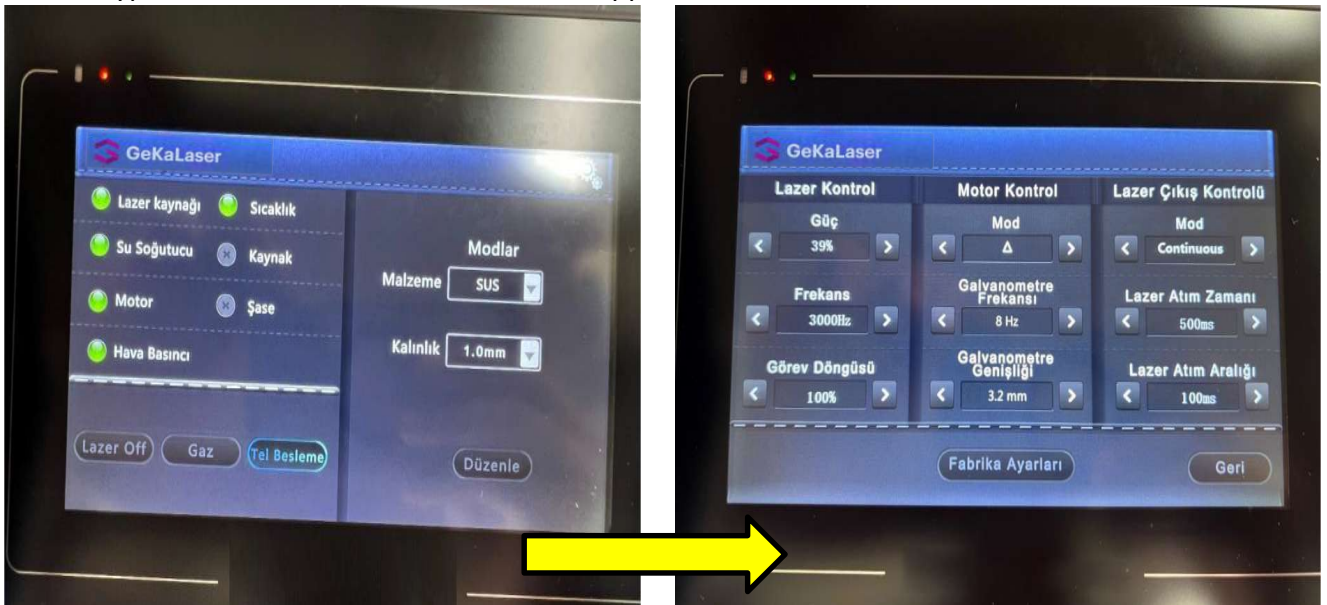
2.2 Thickness

It allows you to easily switch between material thicknesses during the welding process, as you can select the thickness of the material you will laser welding and save the settings you make according to the thickness of the relevant material.



2.3 Adjust

This is the section where the necessary laser welding settings are made after selection of the type and thickness of the material to be laser welded. The settings completely vary depending on the operator. When the Adjust box is pressed, the laser welding adjustment screen according to the type and thickness of the material will appear.



LASER WELDING PROCESS DEVICE SETTINGS

- ❖ Panel that appears contains three main sections where settings will be made based on
- ❖ type and thickness of the material before starting the laser welding process.

2.3.1 Laser Control

Laser control screen located on the left side of the touchscreen laser system panel consists of 3 parts as Power, Frequency, Task Cycle.

A) Power (RECOMMENDED SETTING)

Power varies with the thickness of material. If you're welding aluminum, you can test 60% of it at initially. If you are welding stainless steel and carbon alloy steel, you can test 20% of it initially.

*It completely depends on the mastery and expertise of the operator.

B) Frequency

Frequency is the working setting for the FIBER LASER RESONATOR. It is definitely NOT RECOMMENDED to make changes other than the authorized person!

C) Task Cycle

Task Cycle is the working setting for the FIBER LASER RESONATOR. It is definitely NOT RECOMMENDED to make changes other than the authorized person!



LASER WELDING PROCESS DEVICE SETTINGS

2.3.2 Motor Control

The Motor Control screen located in the middle of the touch laser system panel consists of 3 parts as Mode, Galvanometer Frequency, Galvanometer Width.



A) Mod

The machine has 7 different operating modes where you can select laser source design and pattern. Triangle, Hourglass, and Half-circle are the most stable and suggested patterns. Different modes can be selected according to welding quality, angle, welding area and material type.



LASER WELDING PROCESS DEVICE SETTINGS

B) Galvanometer Frequency

Nominal frequency (8-14Hz) is recommended. As the frequency is lowered, Galvanometer motor wobbles more, and vica versa. It should be adjusted in proportion to the Galvanometer Width. Different values can be selected according to welding quality, angle, area to be processed and material type.



C) Galvanometer Width

The galvanometer width reaches up to 3.6mm according to the desired weld thickness. It should be adjusted in proportion to the galvanometer frequency. Different values can be selected according to welding quality, angle, area to be processed and material type.

WARNING: Width over 3.6 mm is not recommended. The nozzle can heat up!



LASER WELDING PROCESS DEVICE SETTINGS

2.3.3 Laser Output Control

Laser Output Control screen, located on the left side of the touch laser system panel, contains 3 parts as Mode, Laser Pulse Time and Laser Pulse Interval.



A) Mod

This part contains two modes for laser welding:

- Continuous: Suitable for the classical welding process.
- **(Spot Welding)**: Suitable for pre-welding spot welding on the material or for welding at certain intervals. By operating proportionally with the Laser Pulse Time and Laser Pulse Interval to be set, it allows to perform spotting at certain intervals on the material without lifting the torch.



LASER WELDING PROCESS DEVICE SETTINGS

B) Laser Pulse Time

Usually it should be set when performing Spot Welding. It is used to set how many milliseconds the laser source will fire, in other words, how many milliseconds the torch will automatically stop the welding process when the trigger is pressed for welding. *It must be synchronized with the Laser Pulse Interval, otherwise centering cannot be performed.



C) Laser Pulse Range

Usually it should be set when performing Spot Welding. It is used to set how many milliseconds the laser source will fire, in other words, how many milliseconds the torch will automatically start the welding process when the trigger is pressed for welding. *It must be synchronized with the Laser Pulse Time, otherwise centering cannot be performed.



CAUTION

- ❖ Any adjustment made or to be made under Laser Control Settings may vary depending on the operator's experience and expertise.
- ❖ To achieve a more efficient and quality welding, please be sensitive about not going out of the recommended settings as per the instructions.
- ❖ Adjustments can be made separately for each material type and thickness and saved in the device's memory. Thus, there is no need to re-adjust for the same material and thickness later on. Before starting the process, please select the material type and thickness.
- ❖ Based on the quality of the material, the settings you have created before may not be suitable for further processing. Please make a trial on one side and check the values at regular intervals before starting the welding process.
- ❖ Do it carefully when setting the red light position. Make sure you set the most suitable position.
- ❖ During the welding process, no one should be in front of the torch and laser light or pass by the device!



How to Use Laser Welding Machine and Operation Basics

Steps to Open System and Device

STEP 1 Make sure the emergency stop button is in the OFF mode.



STEP 2 Before the system is turned on, the chiller (Water Cooler) must be turned ON (I). (To turn it off, it must be set to OFF (O)). Start the water cooler and wait for the temperature to drop to around 25°C (in summer) or up (in winter).



Laser Welding Machine Operation Basics

STEP 3 With the laser turned off, turn the System switch (1) to the ON mode.



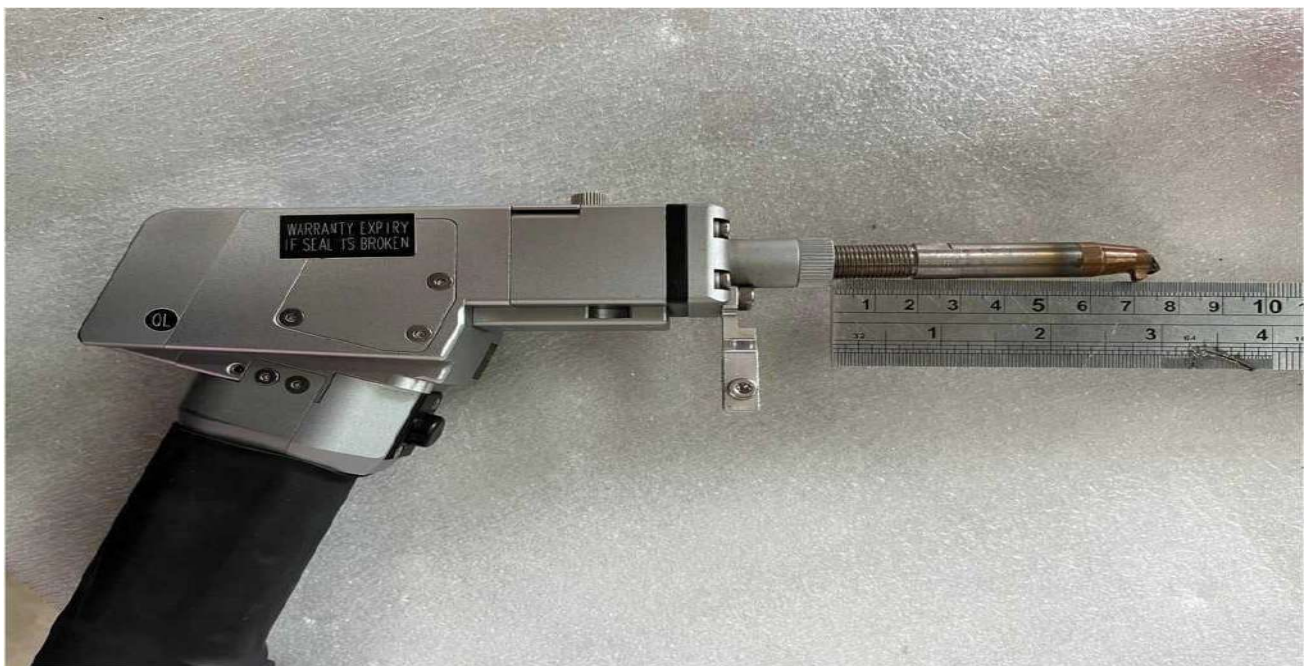
STEP 4 After the screen in the above image appears, switch Laser Key (2) to the ON mode. Then the system will be available for other settings.



STEP 5 Attach the wire and reels suitable for the material to be welded to the wire feeding unit and drive the wire until it comes out from the end of the wire feeding line.



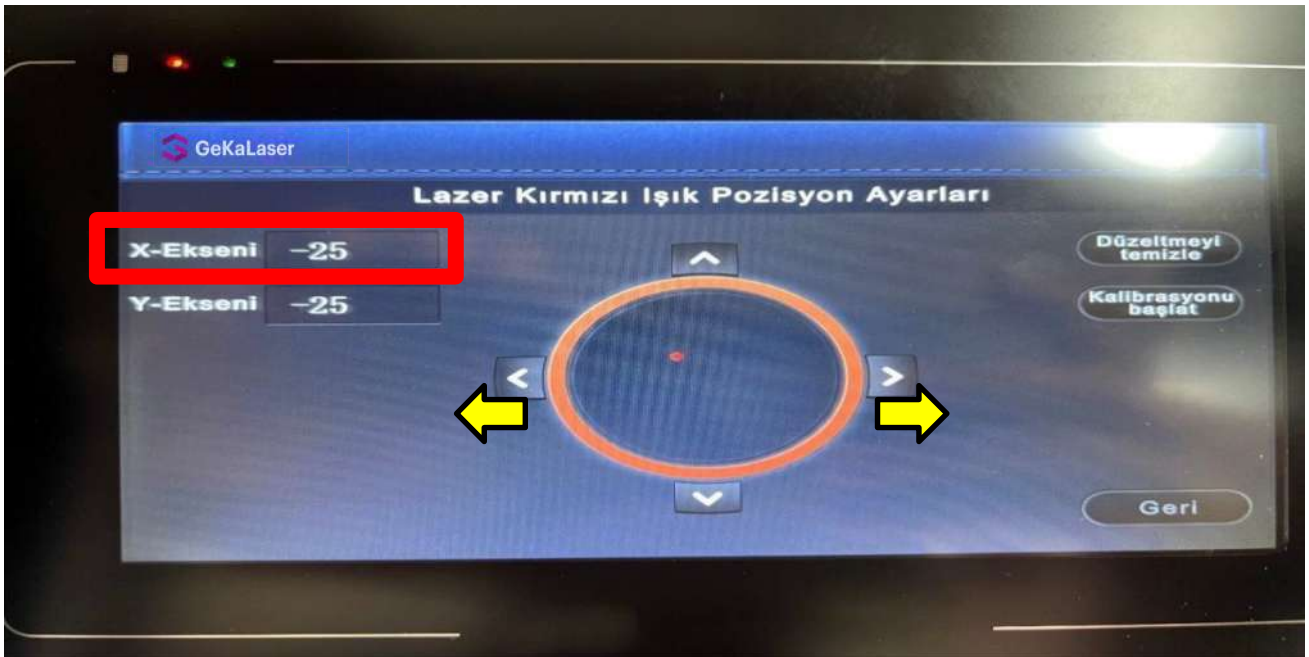
STEP 6 Find the welding focus. Place the nozzle at a distance of about 7.1 cm to Aluminum, about 7.5 cm to Stainless steel, about 7.5 cm to Carbon alloy steel to find the focus.



STEP 7 Find the welding focus. Place the nozzle at a distance of about 7.1 cm to Aluminum, about 7.5 cm to Stainless steel, about 7.5 cm to Carbon alloy steel to find the focus.



8. STEP Adjust the Laser Red Position of the torch after all connections are made. The laser light from the torch should be directly above the wire. If red light does not hit the wire, the wire does not melt during the welding process thus the operation fails.



STEP 9 Adjusting the Pure Argon/Nitrogen gas between 1.5-2 BAR on the bar output indicator will be sufficient for the welding process. The bar can be increased or decreased depending on the material to be welded.

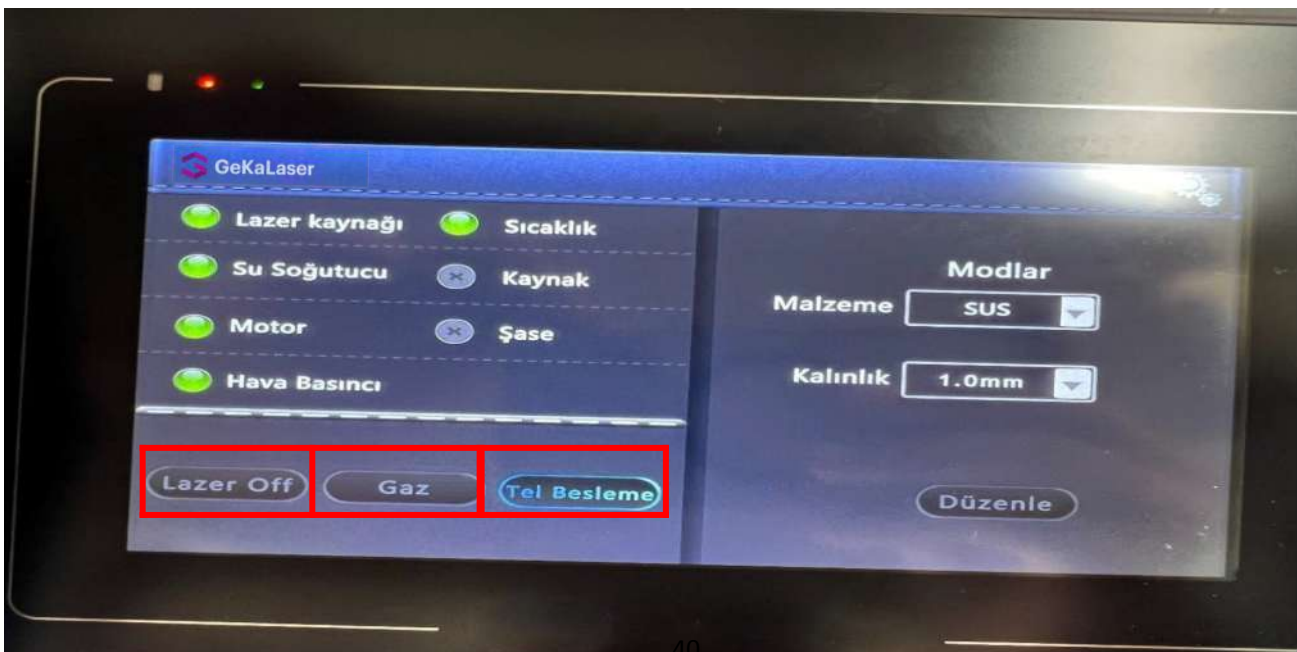


STEP 10 Activate the gas after the laser is turned ON. Please check the gas first. If there is a gas blowing sound from the welding torch, bring it together with the chassis and press the trigger once. Thus, the gas will be turned off. Note: (When the gas is first activated, it blows until it meets the chassis.)

i. Laser box: If it's on LASER OFF mode, laser will not come out of the tip of the torch and welding cannot be performed. To turn it on, press the box once and set it to LASER ON.

ii. Gas box: If it's on GAS mode, gas will not come from the tip of the torch and welding cannot be performed. To turn it on, press the box once and set it to GAS.

ii. Wire Feed box: If it's on WIRE FEED mode, welding wire will not be released from the wire feeding line at the end of the torch and welding cannot be performed. To turn it on, press the box once and set it to WIRE FEED.



Laser Welding Machine Operation Basics

STEP 11 Adjust POWER, MODE, GALVANOMETER FREQUENCY, GALVANOMETER WIDTH GALVANOMETRE settings required for the welding process in accordance with the material to be processed.

*Note: Before welding the material to be processed, use trial and error until you find the ideal welding settings on a sample piece.




STEP 12 Connect the clamp to the material to be welded to start welding.



Laser Welding Machine Operation Basics

STEP 13 Start the welding process by pressing the trigger on the torch.



 **WARNING:** No one should be in front of or pass by the torch and laser light during the welding process!

Laser Welding Machine Operation Basics

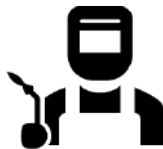
Wireless Welding

All parameters and connections in wire welding are valid in wireless welding.

For wireless welding:

- You need to manually pull the wire back from the end of the wire feed line that is mounted to the torch by pressing the MANUAL BACK button on the wire feeder control panel or completely remove the wire feed line from the torch.
- Press the wire feeding box on the touch control screen and set it from WIRE FEED to WIRE FEED mode
- Check your settings according to the material to be welded.

The device is ready for wireless welding.



Steps to Shutdown the System and Device

STEP 1 When turning off the machine, turn the Laser Switch (1) to the off mode first

STEP 2 Set the System Switch (2) to the off mode.

Upon completion of the steps, the device and the system will be disabled.



Daily Maintenance and Common Problems

Daily Maintenance

General Device Cleaning

At the end of each working day, it is recommended to remove dust from the electrical panel, wire feeding unit and all parts remotely with compressed air when the device is in the off position. In the meantime, air must be kept inside the welding torch.

Daily Maintenance and Common Problems

Daily Maintenance

Lens Inspection and Replacement

At the end of each working day, the device should be checked and the protective lens removed and reattached. (Make sure the hands are clean before removing the protective lens.)



1- First protective lens, (Should be checked at the end of each session)

2- Second protective lens, (may not be available on some torch models.)

After the Protective Lens receptacle is removed, it should be tightly closed with paper tape to keep dust, dirt, etc. away, as shown in the adjacent photo.



Do not continue welding if there is any burr, dust or dirt on the Protective Lens.
Change the lens without touching the lens as shown in the following photos.



Daily Maintenance and Common Problems

Common Problems

Due to the unique nature of the fiber laser, improper use can seriously damage the components inside the fiber laser if the ambient temperature is too low. For this reason, pay extra attention to the maintenance of the fiber laser in freezing winter days.

To better protect your laser equipment and extend its life of service, we recommend the following solutions:

Please follow the instructions in the user manual completely. Permissible temperature range for the laser is 10 °C to 35 °C.

Extremely low temperatures can cause the waterway inside the laser to freeze and not function properly.

Therefore, we recommend the following steps:

Please add distilled water according to the volume of the coolant tank. Under normal conditions, the additional solution tank should be equal to the 10% to 20% of the tank. For example, if the capacity of your coolant tank

is 100 liters, the additional amount of distilled water should not exceed 20 liters. (Never add alkaline mineral water!).

It is also recommended that you consult the manufacturer of your water cooler before adding distilled water.

Note: Pure water can also be added.

Since the ambient temperature will drop at winter nights, customers should not turn the cooler off if the water pipe connection of the laser is outdoors (If your laser power is 2kW or higher, make sure that the 24V power switch is turned on while working.)

1. If the ambient temperature of the laser is between 10 °C and 40 °C, there is no need to add antifreeze. Also, please empty the antifreeze in the cooler and add distilled water in the summer season.
2. If your laser will not work for a long time in winter, be sure to empty the residual water inside the laser water pipe.
3. If the laser needs to be transported or repaired in low-grade air, make sure that the residual water in the cooling circuit is drained before transportation.
4. If your laser has a power of 2kW or more, make sure the laser is operating at 24 volts before discharging the waste water. Otherwise, since the electromagnetic valve of the water cooling circuit inside the laser will not rotate, the water will not discharge properly.

5. Change the pure water in the cooler every 180 days.
6. During the welding process, nitrogen or argon should be used. Otherwise, the protective lens will burn out.
7. Please wash and dry your hands and wipe the welding head with alcohol before changing the protective lens.
8. When connecting the water cooler to the laser source, please make sure that there is no water in the connecting pipe before pressing the laser source button. This is very important, otherwise the laser source may be impaired.

Laser Series



GeKaMac[®]



Gedik Welding Inc.

Ankara Caddesi No: 306 Şeyhli 34906 Pendik - İstanbul / Turkey

P. +90 216 378 50 00 • **F.** +90 216 378 20 44

www.gedik.com.tr