

DENALIWELD

User Manual

DENALIWELD JET 3-in-1
(1000W,1500W,2000W)



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Preface

Thank you for choosing DENALIWELD handheld laser welding products. We have prepared this manual to help you use and maintain the laser properly. While every effort has been made to ensure accuracy, some errors or omissions may remain. We appreciate your understanding and welcome suggestions that can help us improve this manual. Thank you again for choosing DENALIWELD products.

Please read and understand this User Manual and familiarize yourself with the operating and maintenance instructions before using the product. We strongly recommend that the operator read Section 2, “Safety Information,” before operating the product.

Keep this User Manual with the product so that you and all future users and owners have access to important operating, safety, and other information.

Important information requiring special attention is identified by underlining in this document. Read these notices carefully to help prevent unnecessary injury or equipment damage.

Company Profile

DENALIWELD is a U.S.-based laser welding company specializing in manual and automated laser welding and cleaning solutions. Building on expertise in control systems, optical systems, and other core technologies, we are

committed to providing high-quality welding and cleaning solutions to customers across industries worldwide. Through continuous development, the company has grown into a modern high-tech enterprise integrating research and development, production, sales, and service.

With a professional U.S. team and standardized process management, our years of industry experience allow us to serve customers across major markets worldwide.

DENALIWELD manufactures manual and automated laser welding machines as well as laser cleaning machines. We integrate research and development, production, and sales of laser equipment and have developed a comprehensive product platform. Skilled technical personnel, extensive management experience, and a clear development strategy support our continued growth in the laser industry.

The company has an independent research and development team that includes software engineers, mechanical engineers, electrical engineers, industrial designers, and other technical specialists. DENALIWELD has a stable customer base and broad technical recognition worldwide. We have developed core technologies including control systems, precision welding heads, and precision field-lens systems to achieve higher-precision and faster processing. Our independently developed oscillating welding head and control system expand the range of laser welding applications.

For more information, please visit our website:

<http://www.denaliweld.com>

Product Characteristics

The JET Series consists of high-efficiency, highly reliable, maintenance-free, high-power air-cooled lasers jointly developed by DENALIWELD. It uses phase-change heat dissipation, operates at wavelengths of 1060-1100 nm, and achieves laser efficiency greater than 25%.

DENALIWELD JET Series lasers are Class 4 laser products, and their design and testing fully account for safety requirements.

Laser light has unique characteristics that can present safety hazards. It must not be treated like ordinary light sources, and all operators and personnel near the laser must understand these specific hazards.

To ensure safe operation and optimal product performance, follow all warnings and safety instructions in this manual during operation, maintenance, and service.

For operator safety, do not open or disassemble the equipment. There are no user-serviceable parts or assemblies inside this product. Equipment that has been disassembled without authorization is not covered by the warranty.

General Safety Information

1. Handheld Laser Welding Machine Safety

Handheld laser welding machines are Class 4 laser products that emit hazardous, invisible laser radiation. This product emits infrared laser radiation at wavelengths from 1060 nm to 1100 nm. The average power emitted by the welding head exceeds 100 W and can injure the eyes and skin through direct or indirect exposure to this radiation. The infrared beam is invisible and can cause irreversible damage to the retina or cornea. Always wear appropriate, certified laser safety eyewear rated for 1060-1100 nm before operating the handheld laser welding machine.

- (1) To protect yourself and others, never point the welding head at yourself or another person;
- (2) Appropriate, certified 1060-1100 nm near-infrared laser safety eyewear and heat-resistant gloves must be worn when using the handheld laser welding machine;
- (3) Before triggering the laser, clamp the alligator clip securely to the welding workpiece. Do not attach it anywhere other than the workpiece, as doing so may create a safety hazard due to unintended laser output;
- (4) The handheld laser welding machine is equipped with two emergency stop buttons located on the top of the machine and at the rear of the welding head. Either button can stop the machine immediately in an emergency;
- (5) Operate the handheld laser welding machine only in a dedicated, laser-protected area. Keep non-welding personnel and combustible or flammable materials at least 10 meters (33 ft) from the welding area, and keep a fire extinguisher nearby;
- (6) Wear a mask when welding highly reflective materials;
- (7) Make sure the handheld laser welding machine is properly grounded. Improper grounding may energize the machine enclosure and cause personal injury. It may also cause laser alarms, loss of laser output, instability, or other faults;
- (8) Do not operate the equipment in rain or direct sunlight. These conditions may cause high-temperature or high-humidity alarms, short circuits, abnormal laser operation, and potential safety hazards.

2. Safety Conventions

The safety symbols used during operation of the handheld laser welding machine are shown below:

SYMBOLS	DESCRIPTION
	WARNING: Text marked with an electrical warning symbol indicates a potential personal hazard. Failure to follow the specified procedures may result in serious or fatal injury to you or others.
	NOTICE: Indicates a potential hazard to the product. Follow the specified procedures; otherwise, the equipment or its components may be damaged. Observe all notices during operation to ensure proper use of the equipment.

	This symbol indicates laser radiation and is affixed near the laser output of the product.
	This symbol indicates that protective eyewear is required. Always wear appropriate, certified laser protective eyewear rated for the 1060-1100 nm near-infrared wavelength range.
NO SYMBOL	IMPORTANT: Indicates information related to product operation. Do not overlook this information.

NOTE :

The DENALIWELD handheld laser welding machine operates at wavelengths of 1060-1100 nm, which are outside the visible-light range. These beams can cause irreversible damage to the retina and cornea. DENALIWELD requires appropriate, certified laser protective eyewear to be worn whenever operating the handheld welding machine.

3. Laser Protection

1. Laser Safety Eyewear Requirements

Laser safety eyewear must provide protection across the entire wavelength range of the laser emitted by the handheld laser welding machine. Always wear appropriate laser safety eyewear when operating this device. When selecting eyewear, verify that its protection rating covers the full wavelength range emitted by the product. If the device uses a tunable laser or Raman source, it may emit light across a range of wavelengths. Verify that the selected laser safety eyewear provides protection from all light emitted by the device across its entire wavelength range. Check the product safety label and verify that all personal protective equipment (such as safety shields, viewing windows, and goggles) is rated for the output power and wavelength range. Selection of laser eyewear must also account for any secondary radiation hazards created by the welding process (see Chapter II, Section 4-1).

2. Laser Protective Equipment

Whether the laser is being used in a new facility or retrofitting an existing system, the end user is solely responsible for determining the suitability of all personal protective equipment.

DENALIWELD provides a laser protective mask with the machine. Contact DENALIWELD if additional protection is required.

4. Welding Process Safety

1. Radiation Hazard

Visible and invisible radiation is generated during welding. The interaction between the high-power laser beam and the target material to be welded can create a plasma that generates ultraviolet radiation and "blue light," which

can cause conjunctivitis, photochemical retinal damage, or a sunburn-like reaction on the skin. Welders exposed to invisible UV light without proper protection can suffer permanent eye damage.

2. Skin Hazard

Exposure to infrared and ultraviolet radiation during welding can damage skin. Infrared and ultraviolet light can cause skin burns, increase welders' risk of skin cancer, and accelerate signs of skin aging. Welding sparks can also cause burns. Laser material processing can transfer large amounts of energy into parts. Even after the processing process is complete, parts can be very hot to the touch. Make sure to use proper personal protective equipment to prevent potential burns. Take precautions to prevent skin damage by wearing protective clothing such as fire-resistant gloves, hats, leather aprons, and other fire-resistant clothing. Keep sleeves and collars fastened.

3. Fire Hazard

If flammable or combustible materials are near the welding area, heat and sparks generated during welding can cause a fire or explosion. Perform laser welding only in areas free of combustible materials. Never weld containers containing flammable or combustible materials. If the contents of the containers are unknown, they should be treated as flammable or combustible. Fire extinguishers should be nearby and readily accessible, and personnel should be trained in their use.

4. Fume Hazard

Welding fumes can contain very fine particles and gases. They may come from a combination of base materials, filler materials, shielding gases, paints, coatings, chemical reactions, and airborne contaminants. Welding fumes can adversely affect the lungs, heart, kidneys, and central nervous system.

- (1) Keep your head away from welding fumes. Always weld in a well-ventilated area with sufficient clean breathing air.
- (2) Use a fume-extraction system to remove vapors, particulates, and hazardous debris from the welding area.
- (3) A respirator may also be required in confined spaces or other situations.
- (4) Routine air monitoring should be performed to determine the level of noxious fumes in the welding area.

5. Cylinder Safety

A gas cylinder may explode if it is damaged or exposed to welding hazards. Shielding-gas cylinders should be placed where they will not be struck or damaged. Keep them away from heat, sparks, and flames. Cylinders must be stored upright and secured to a fixed support. Use a properly functioning regulator rated for the required gas and pressure. All hoses and fittings must be suitable for the application and in good working condition.

General Safety Instructions

1. Specular Reflection

The output port of the handheld laser welder may produce secondary laser reflections that radiate outward at multiple angles. This phenomenon, in which the primary beam is reflected from a surface, is called specular reflection.

Welding machine is reflected from a flat surface is called specular reflection. Although the energy of a reflected secondary beam is much lower than that of the primary beam, it can still damage the eyes, skin, or certain material surfaces.

WARNING:

- Because laser radiation is invisible, use extreme caution to avoid or minimize specular reflections.



2. Accessory Safety Instructions

Photosensitive elements in optical accessories used with the handheld laser welding machine may be damaged by laser exposure. Appropriate protective measures must be taken.

WARNING:

- The output of the DENALIWELD handheld laser welding machine is powerful enough to weld metal, burn skin, clothing, and paint, and ignite volatile substances such as alcohol, gasoline, and ether. Therefore, during operation, keep all flammable materials isolated from the handheld laser welding machine.

3. Optical Handling Precautions

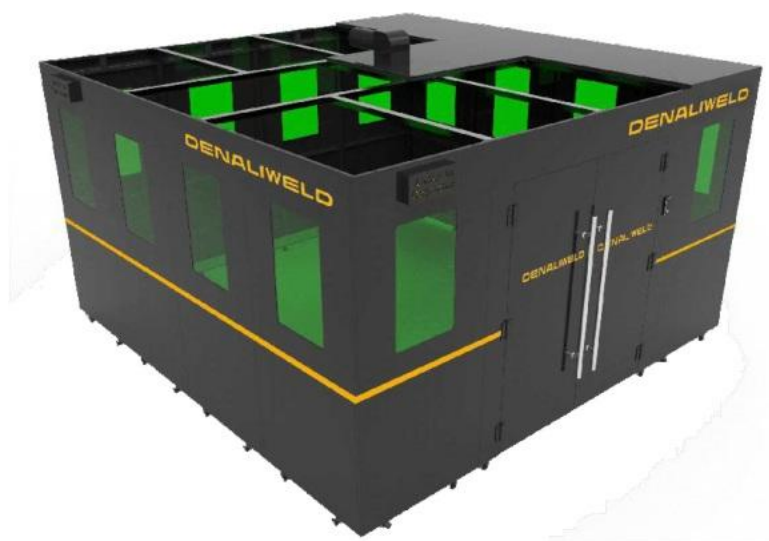
DENALIWELD strongly recommends that you read the following operating points before operating the handheld laser welding machine:

- (1) Do not look directly into the laser output aperture. (2) Do not position the handheld laser welding machine or related optical output devices at eye level;
- (3) Select protective equipment appropriate for the output power and wavelength of the handheld laser welding machine to ensure operator safety;
- (4) Post warning signs in the area where the handheld laser welding machine is used to clearly define the controlled laser operating area;
- (5) Do not use the handheld laser welding machine in a dark environment;
- (6) Do not turn on the handheld laser welding machine unless the optical coupling fiber or optical output connector is installed;

- (7) Install or clean the protective lens, copper nozzle, and wire-feeding assembly only when the handheld laser welding machine is turned off and disconnected from power;
- (8) Perform debugging, calibration, and focusing with the laser disabled. Enable the laser only after these procedures are complete;
- (9) Operate the equipment strictly according to this manual. Failure to do so may impair the protective features or performance of the equipment and may void the DENALIWELD warranty.

WARNING :

- Select protective equipment appropriate for the laser output power and wavelength requirements.
- Do not look directly at the welding-head tip. Always wear approved laser safety eyewear during operation.



4. Electrical Safety Instructions

DENALIWELD strongly recommends that you read the following operating points before operating the handheld laser welding machine:

- (1) Make sure the equipment enclosure is properly grounded. Any interruption in the grounding circuit may cause personal injury;
- (2) Before use, make sure the power supply connected to the device is also connected to protective ground;
- (3) To reduce the risk of fire, replacement line fuses must be of the same type and rating. Do not substitute other fuses or materials;
- (4) Make sure the input AC voltage of the handheld laser welding machine matches the specified mains voltage (single-phase 200-240 VAC) and that the wiring is correct. Incorrect wiring may cause personal injury or equipment damage;
- (5) Except for welding-head consumables, users must not repair parts or components themselves. All maintenance must be performed by qualified DENALIWELD personnel;
- (6) Do not disassemble or reassemble the handheld laser welding machine without authorization or damage its safety labels. Doing so may result in electric shock or burns;

(7) There should be no flammable materials near the welding area. The heat and sparks generated during the welding process may cause fire or explosion. Laser welding can only be performed in areas free of combustible materials.

(8) Never weld on containers containing flammable or combustible materials. If the contents of a container are unknown, you should assume they are flammable or combustible. Fire extinguishers should be nearby, easily accessible, and personnel trained to use them.

(9) Unauthorized disassembly of the product will void the warranty.

WARNING :

- The input voltage of the hand-held laser welding machine is single-phase alternating current (200-240VAC), and there is a danger of electric shock. All associated cables and connections are potentially hazardous.

5. Operating Environment Requirements for Handheld Laser Welding Machines

This equipment is intended for use under the following conditions: (1) altitude below 2,000 m, (2) overvoltage category II, (3) pollution degree 2, and (4) a dry location. For more information, refer to the product specifications.

Humidity: Do not expose the device to relative humidity above 85%.

Cooling and temperature: The laser unit is air-cooled. Operation at higher temperatures accelerates aging, increases threshold current, and reduces slope efficiency. If the device overheats, stop using it and contact DENALIWELD for assistance.

If the laser temperature becomes too high, the device will trigger an alarm and stop laser output.

The interaction between the laser and the work surface can create additional hazards, including gases, sparks, and debris generated by high temperatures. Operators must receive appropriate assessment and training and must understand the general safety requirements for laser operation.

DENALIWELD recommends that you take the following measures to prolong the service life of the handheld laser welding machine:

- (1) Make sure the work area is properly ventilated, and place the handheld laser welding machine in a dry, cool, and clean environment. Do not expose the handheld laser welding machine to high temperatures, high humidity, or water.
- (2) During operation, make sure no foreign material blocks the air intake at the bottom of the laser. Keep the surrounding area clear of debris so air can flow freely, and maintain at least 1 m of clearance around the top air outlet.
- (3) Make sure no debris or liquid enters the laser through the top, as this may damage the laser and cause personal injury;
- (4) Operating the equipment at high temperatures will accelerate aging, increase the current threshold, and reduce the sensitivity and conversion efficiency of the handheld laser welding machine. If the device overheats, stop using it and contact DENALIWELD for assistance.

NOTICE :

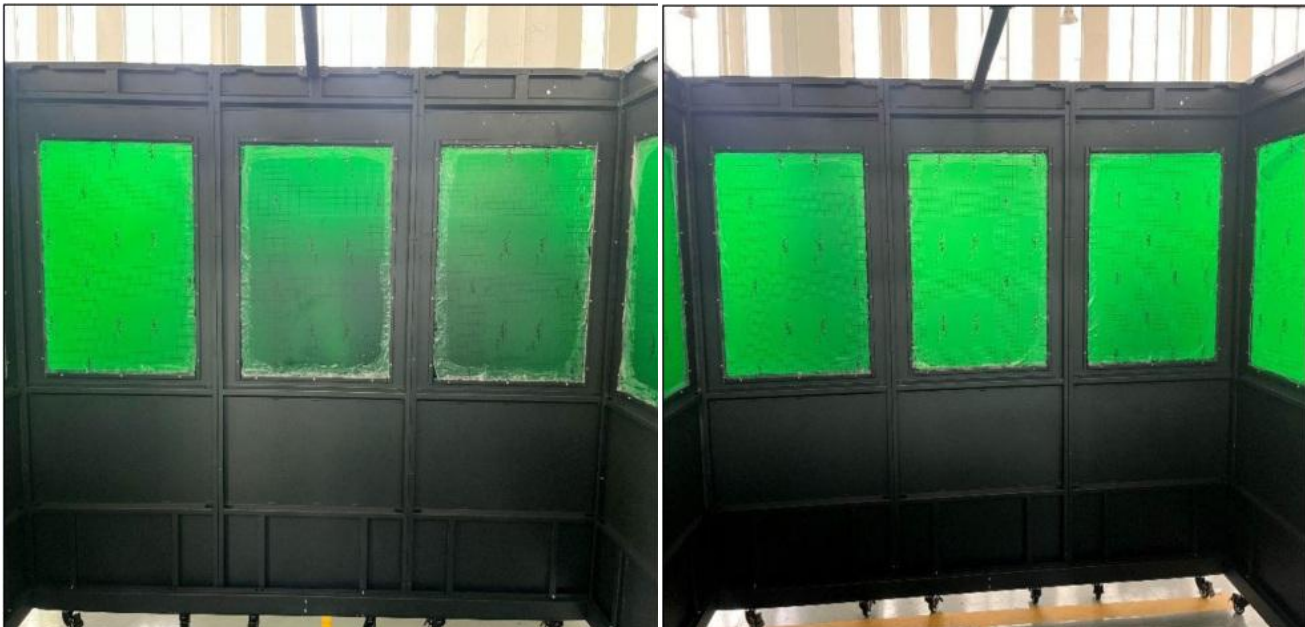
- Operate the equipment carefully to avoid accidental damage.
- Periodically remove dust and debris from the air-intake filter at the bottom of the laser.

6. Workstation Installation

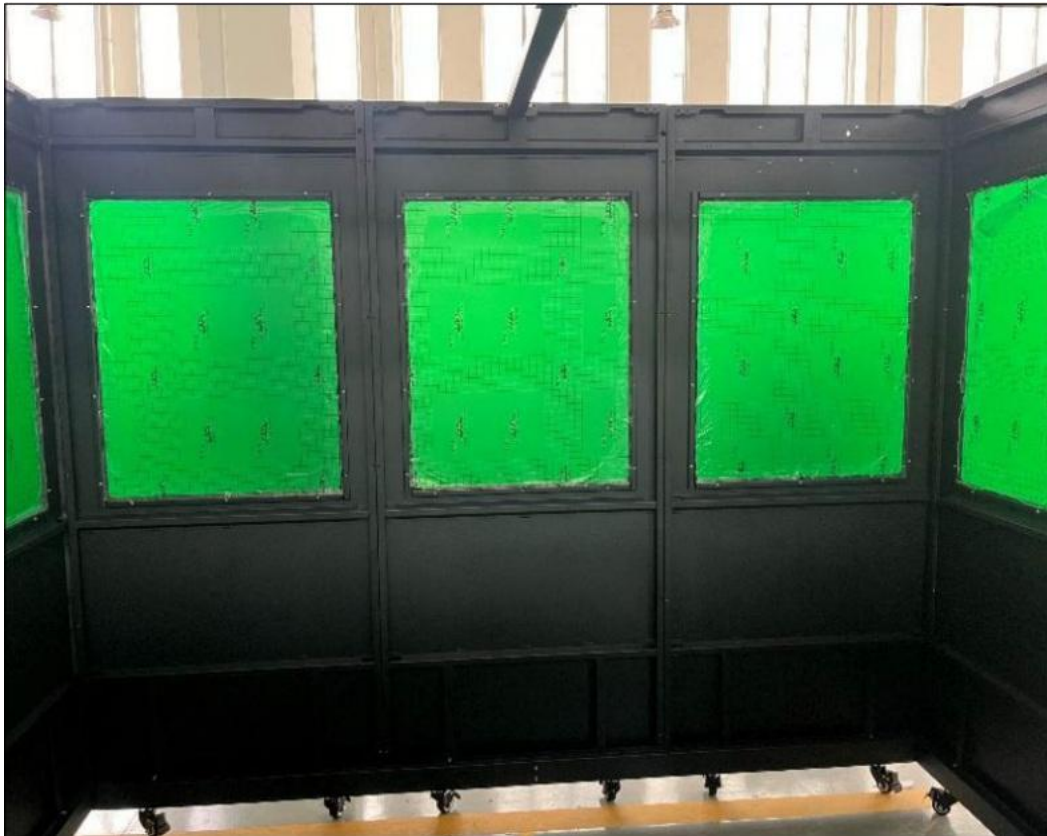
Secure the panels together using the screw holes and screws, as shown below.



The diagrams below show the left and right sides, with the three panels fastened together as a single unit.



The rear of the workstation consists of four panels, as shown below.



The front of the workstation also consists of four panels, as shown below.

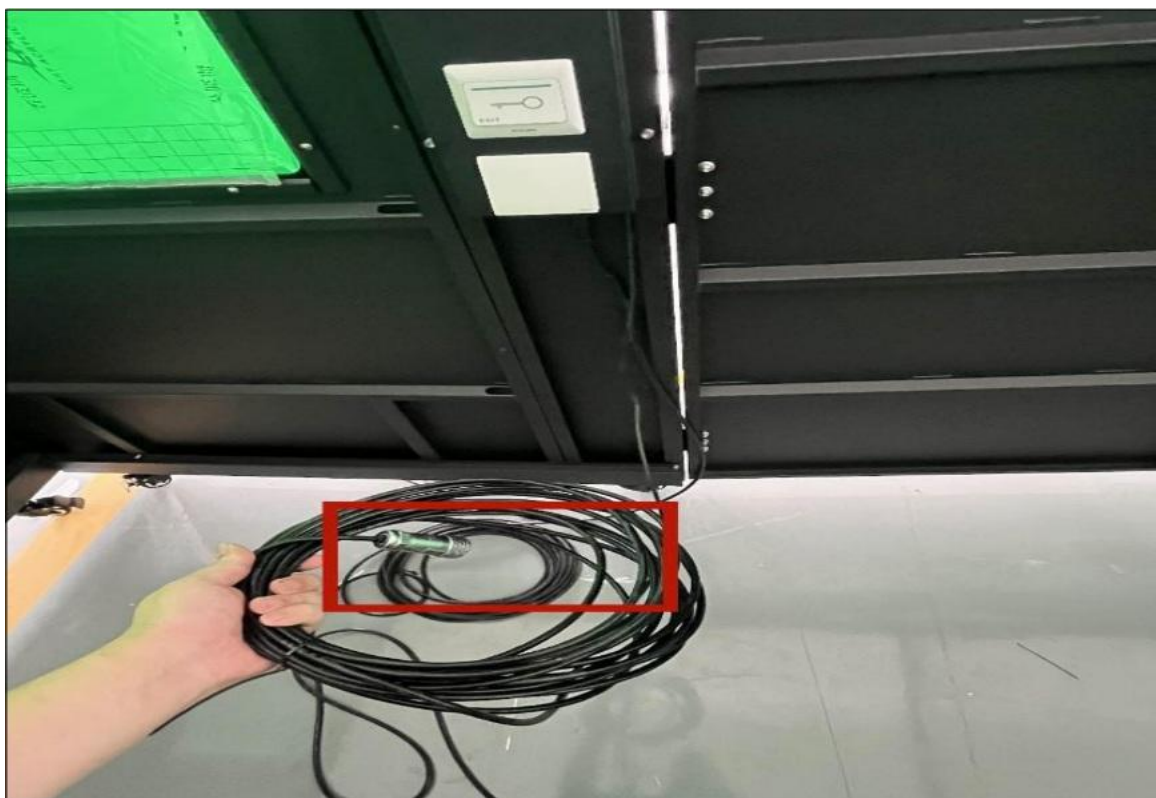
It includes two door panels and two side panels.



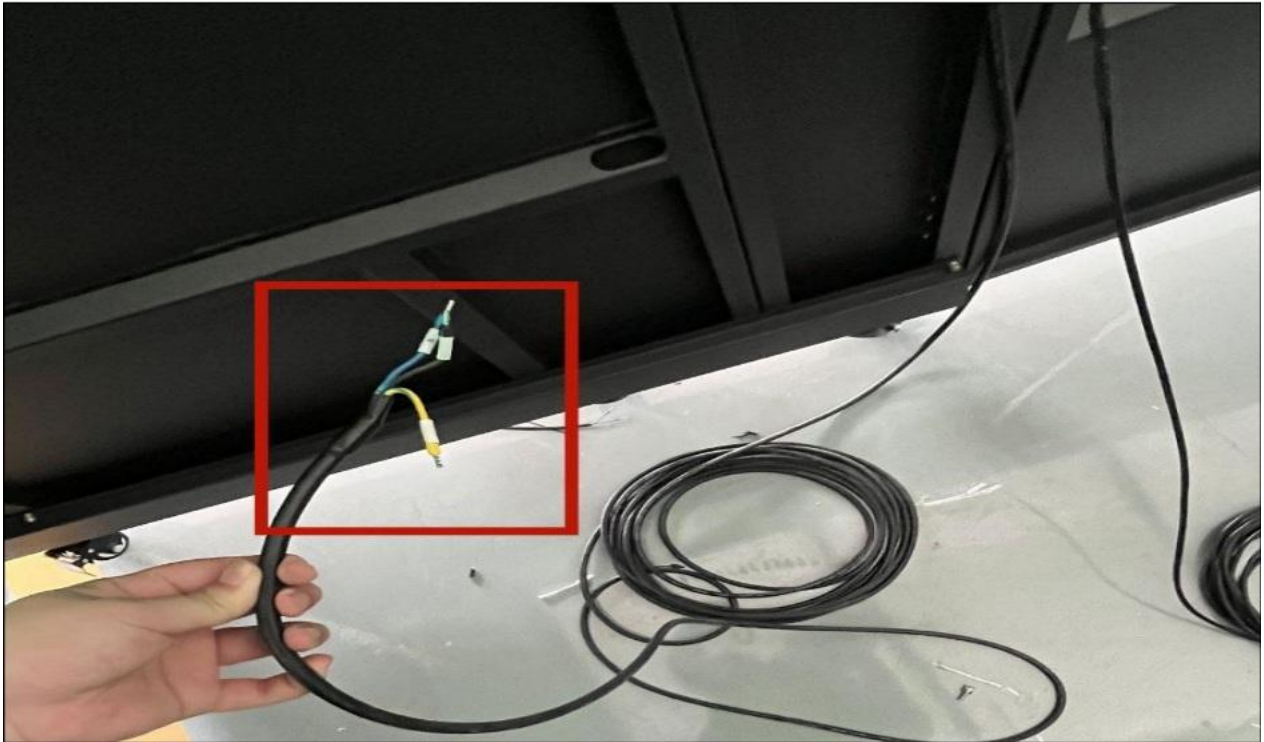
The fixed-beam connection for the workstation is shown below.



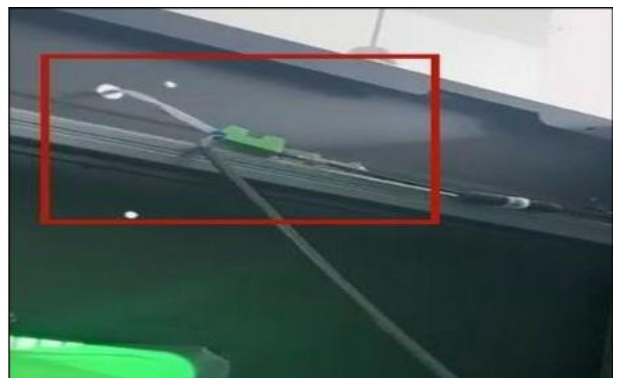
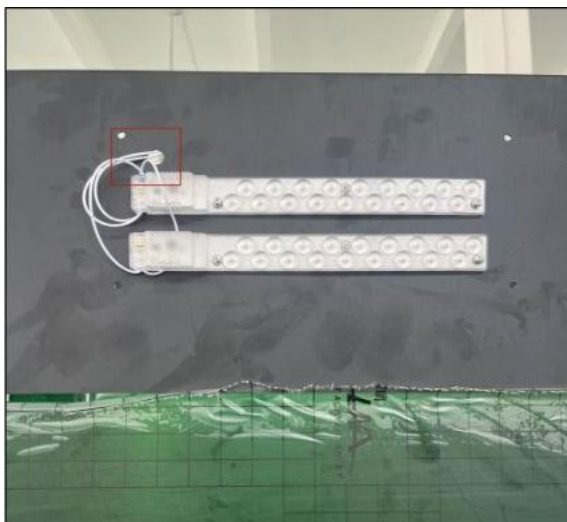
The image below shows the safety-door connection cable. Connect this cable to the machine's safety-door socket during operation.



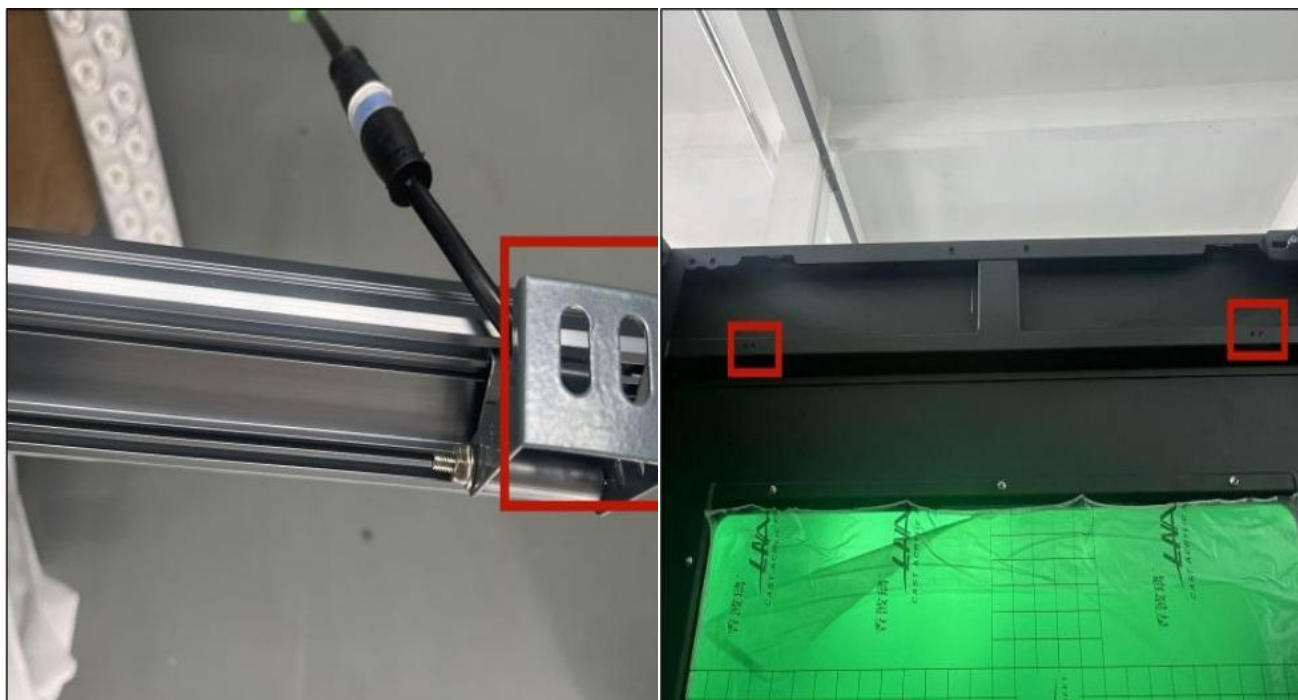
The diagram below shows the 220 V power cables supplied for the lamp posts and access control unit.



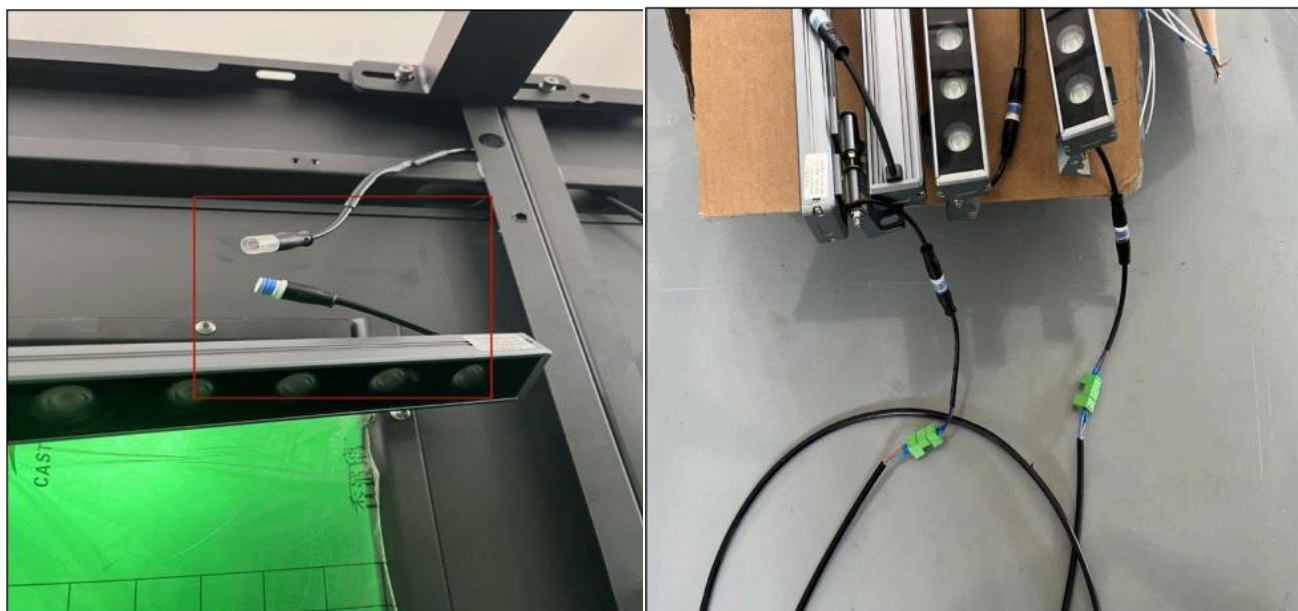
The diagram below shows the mounting location and screw-hole positions for the illuminated sign.



Mount each lamp post to the side panels at the front and rear of the workstation, aligning it with the screw holes.



The diagram below shows where the lamp-post connections begin. The front and rear sides are fitted with lamp posts, four in total, connected to one another as shown below.



7. More Safety Information

If you need more laser safety information, please refer to:

Laser Institute of America (LIA)

13501 Ingenuity Drive, Suite 12

8Orlando, Florida 32826

Phone: 407 380 1553, Fax: 407 380 5588

Toll Free: 1 800 34 LASER

American National Standards Institute

ANSI Z136.1, American National Standard for the Safe Use of Lasers (Available through LIA)

International Electrotechnical Commission

IEC 60825-1, Edition 1.2

Center for Devices and Radiological Health

21 CFR 1040.10 - Performance Standards for Light-Emitting Products US Department of Labor - OSHA

Publication 8-1.7 - Guidelines for Laser Safety and Hazard Assessment. Laser Safety Equipment

Laurin Publishing

Laser safety equipment and buyers' guides

Introduction

1. Technology Overview

Laser welding joins components by melting the contact area with heat generated by a highly concentrated beam of light with high energy density. The single-module fiber source provides stable, consistent beam output. The laser power range is adjustable to suit production requirements, providing excellent flexibility and reliability. Laser welding is especially effective for high-volume, automated, or robotic production.

2. Product Overview

The DENALIWELD handheld laser welder uses an advanced fiber laser and a proprietary welding head with an oscillating motor designed to improve manual laser welding performance. The equipment is easy to operate and provides high weld quality and welding speed with minimal consumable use. It can replace traditional argon arc welding, electric welding, and other processes for thin stainless steel, mild steel, galvanized sheet, and other metal materials. Typical applications include cabinets, kitchens, stairs, elevators, racks, ovens, stainless steel doors, window railings, distribution boxes, and other complex metal-welding applications.



3. Product Parameters

1. Name: Handheld Laser Welding Machine
2. Laser power: 1000W, 1500W, 2000W
3. Laser wavelength: 1060nm-1100 nm
4. Fiber optic cable length: Standard: 10 m
5. Operating mode: Continuous / modulated wave
6. Welding speed: 0 ~ 120 mm / s
7. Cooling: Forced air cooling
8. Operating temperature range: -10 ~ 45 °C
9. Operating humidity: <70% RH
10. Recommended welding thickness: 0.5-6 mm
11. Joint width: ≥ 0.5 mm
12. Operating voltage: AC 230 V / 400 V - customized by country; refer to the nameplate.

4. Features and Benefits

DENALIWELD has developed an oscillating laser welding system using a proprietary welding head. Our design addresses limitations of conventional laser welding systems and offers high resistance to damage while improving weld formation.

- A. Multiple welding modes can be achieved with different welding-head configurations and simple operation.
- B. Welding speed is 2-10 times faster than traditional welding; each machine can reduce labor requirements by the equivalent of at least two welders per year, while using fewer consumables and offering a long service life and safer, cleaner welding.



5. Scope of Application

Typical applications include cabinets, railings, stairs, shelves, ovens, distribution boxes, stainless steel furniture, and more. The range of laser welding applications continues to expand as the technology advances.

Chapter I. Machine Structure

1. Machine Construction

The welder is mounted on large, durable casters that allow the machine to move easily between workstations. The clear, easy-to-use touchscreen allows you to load previously saved welding parameters, speeding up parameter selection for different workpieces.



Front view

The main disconnect switch and shielding-gas connection are located on the rear of the housing. The rear panel also includes connections for the automatic wire feeder and safety clamp.



Back View

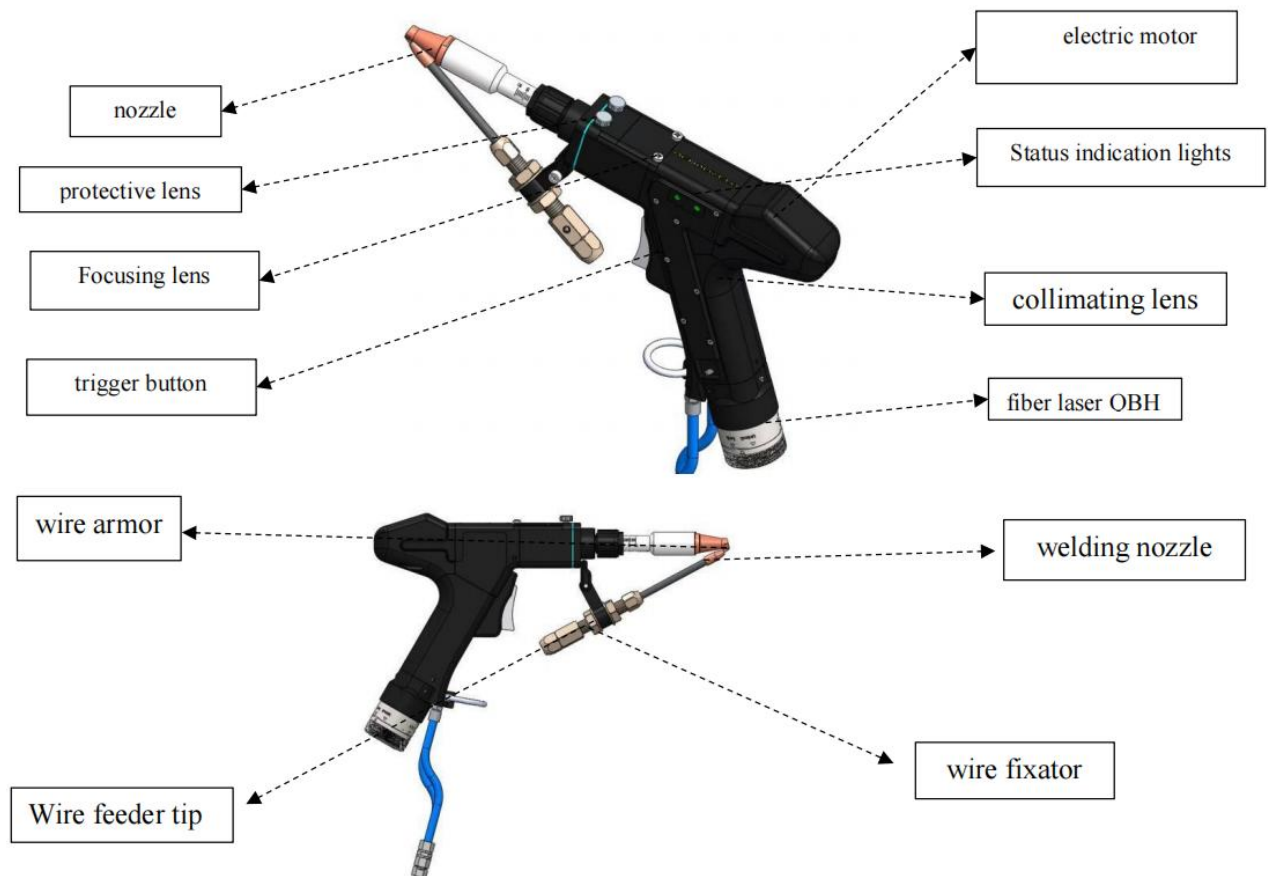
Rear View

Two emergency stop buttons are provided: one on top of the machine and one on the welding head. Their purpose is to stop the equipment quickly in an emergency and protect personnel and equipment.

Heat from the laser source and welding head is dissipated by fans on top of the machine. This design helps maintain stable component temperatures.

The DENALIWELD welder is equipped with a proprietary PRO WOBBLE welding head featuring an electrically driven beam-oscillation system. A patented mechanism uses an electric motor to move the focusing lens, which allows automatic position adjustment and beam-width control. This makes the desired weld width easy to adjust. The head is water-cooled for stable, continuous operation. Its ergonomic design provides a secure, comfortable grip.

Welding head



QBH Connection



Remove the optical-fiber dust cover and check that the protective cap on the fiber connector is locked.

Clean the optical-fiber connector with a lint-free swab and absolute ethanol to ensure that the optical fiber end face is clean and dust-free.

- ◆ Place the welding head horizontally.
- ◆ Align the red mark on the QBH interface with the red mark on the handwheel.
- ◆ Remove the QBH dust cover.
- ◆ Align the red mark on the male fiber connector with the red mark on the female QBH connector of the welding head, then insert the fiber connector straight into the bottom of the QBH interface.

straightly to bottom of QBH interface of cutting head.

- ◆ Turn the QBH handwheel clockwise. When you hear a click, pull the handwheel upward and continue turning clockwise until fully locked.

turn clockwise to end.

Daily Inspection

- Check the cover glass for contamination before each use and replace it if necessary.
- Check the QBH connector for looseness before each use and make sure the locking mechanism is secure before normal operation.
- Check whether the copper nozzle is blocked and verify electrical continuity between the copper nozzle and safety lock before each use. If the nozzle is blocked and welding slag cannot be removed, replace the copper nozzle. If continuity is poor, replace the copper nozzle.
- Check for water leakage near the wiring before each use.
- Make sure the gas connection (center) and water connections (both sides, one inlet and one outlet) are correct, as shown below. Both the gas and water hoses are 6 mm in diameter.

Automatic wire feeder



Supply voltage (V)	220 ± 10%VAC50/60Hz
Place the environment	Flat, no vibration and shock
Working environment temperature (℃)	10~40
Working environment humidity (%)	<70
Maximum support wire weight	25KG
Maximum support for wire feeding wire warp	2.0mm

A correctly mounted wire feeder at the welding head ensures smooth wire guidance through the nozzle groove. It is mounted securely, providing stable guidance. Adjust the wire-feeding speed to suit the specific welding process. The feeding speed is controlled by a potentiometer on the feeder.

Important Information

- 1) Ensure reliable grounding before connecting power.
- 2) Make sure the wire-feed roller matches the wire diameter and the corresponding wire-feed tube.
- 3) Do not twist the wire-feed tube.

Wire Feeder Troubleshooting

S/N	Faults	Reason	Solution
1	Power LED not ON	24 V power cable is damaged	Replace the power cable
		Power switch failure	Replace the power switch
2	Wire feeding fails while operating the welding head	Poor connection / disconnection of internal wire in the welding-head switch plug	Replace the plug and check the connecting wire
		Wire-feed motor failure	Replace the wire-feed motor
		Welding wire is depleted	Replace the welding wire spool
		Motor plug is loose on the motion card	Reconnect the plug
		Welding wire is tangled	Loosen the tension regulator and rewind the wire
		The welding wire is blocked at the outlet of the wire feeder	Adjust the wire guide tube to align with the outlet of the wire feeder
		Wire-feed tube is blocked	Replace the wire-feed tube
		Incorrect spool tension	Adjust the welding-wire spool brake
		Control board failure	Replace the control board
		The welding wire is tangled on the welding-wire spool	Remove the tangled section and rewind the wire
		Wire-feed tube is mismatched or worn	Replace the wire-feed tube
		Incorrect wire-feed reel	Replace the wire-feed reel
3	Unstable wire feeding speed and poor wire feeding	Incorrect tension-regulator setting	Adjust the tension
		Wire-feed motor failure	Replace the wire-feed motor
		Drive card failure	Replace the drive card
		Wire-feed tube is jammed	Replace or clean the wire-feed tube
		The bend angle of the wire-feed tube is less than 30 degrees	Straighten the wire-feed tube as much as possible
		Wire-feed tube is deformed after compression	Replace the wire-feed tube

Daily Maintenance of Wire Feeder

1. Daily Maintenance

- When not in use, the wire feeder should be shut down and placed in a cool, dry place away from dust.
- Do not put other objects on the wire feeder to avoid damage.
- Before installing a new welding-wire spool, blow compressed air through the feed tube to remove contaminants from the wire-feed tube.
- Keep the wire guide tube free of compression, deformation, and kinks.
- Regularly remove dust from inside the machine and check that the motor rotates smoothly without abnormal noise.

2. Cautions

Operating Environment

- This machine is intended for indoor use and has an IP2X protection rating. Do not use it where it may be exposed to dripping water or rain.
- Use the machine at an ambient temperature of -10°C to 40°C.
- Do not place it on a surface subject to strong vibration or impact.

Operating Precautions

- When installing the welding-wire spool or inserting wire into the wire guide tube, do not wear gloves, as they may become caught in rotating parts and cause an entanglement accident.
- Confirm the weight of the welding-wire spool. The spool must not weigh more than 25 kg. Otherwise, the wire spool may fall off.
- During welding, keep the right-side panel closed. Otherwise, electric shock or entanglement may occur due to rotating parts.
- Before welding, make sure the spool-shaft end cover is tightened; otherwise, the welding-wire spool may fall off if the spool tilts.

2. Control Panel

Use the control panel to adjust all machine functions, including power, frequency, and beam diameter.

The interface supports multiple languages: Chinese, English, French, Korean, Japanese, Spanish, Russian, Sabra, and Polish.



Control Panel

Instructions for selecting control-panel parameters and their definitions are provided in the documentation appendix (Control Panel Operation Manual).

2.1 Home Page

- DENALIWELD logo: Tap to open the multifunction menu: "Welding / Weld Cleaning / Remote Cleaning."

Mode	Weld	Remote clean	WeldSeam clean
Function			
Laser Power	200-2000W	200-2000W	200-2000W
Pattern	Spot / Line		
Laser Freq	0-50000HZ	0-50000HZ	0-50000HZ
Wobble Freq	0-200HZ	0-100HZ	0-150HZ
PWM	0-100%	0-100%	0-100%
Wobble Size	0-5mm	0-80mm	0-10mm
Laser	turn on/off laser		
Wire Feeding	turn on/off wire feeding		
Scale Weld	turn on when spot-welding is required		
Gas-Manual	continuous gas blow for independent test		
Process No	16 processes in total including full parameters could be saved for various applications.		
Safety Lock	Green indicates conduction and grey indicates non-conduction.		
Setting	enter submenu of basic setting or galvo setting to modify parameters.		
Process	enter submenu of process to modify parameters or select process for running.		
Monitoring	show red if alert occurs. Enter the submenu to check I/O status and faults.		
Lock HMI	Lock the human-machine interface to prevent the operator from touching the screen by mistake. It is used to ensure the safety of the operator.		
language selection.	English		

2.2 Settings

2.2.1 Basic Settings



- Pre-blow: duration of shielding-gas flow between laser start and beam emission.
- Post-blow delay: duration of shielding-gas flow after the laser turns off.

- Light-off delay: duration of laser output after the off signal. Used for wire-fed welding.
- Open-light power: starting power during the ramp-up process. Set according to the ramp-up duration.
- Light-off power: ending power during the ramp-down process. Set according to the ramp-down duration.
- Slow-rise time: time from initial power to the set power after the beam turns on.
- Slow-descent time: time from set power to power-off after the beam turns off.
- Maximum power: set according to the rated laser power. The maximum limit is 2000 W.
- Laser alarm power level: PNP 24 V is valid.
- Copper-nozzle loosening time: duration of beam output while the nozzle is not in contact with the workpiece. If the non-contact duration exceeds this setting, the beam will turn off.
- Scale-welding duration: adjust beam-output duration according to the spot-welding application.
- Fish-scale welding interval: the beam-off interval during spot welding.

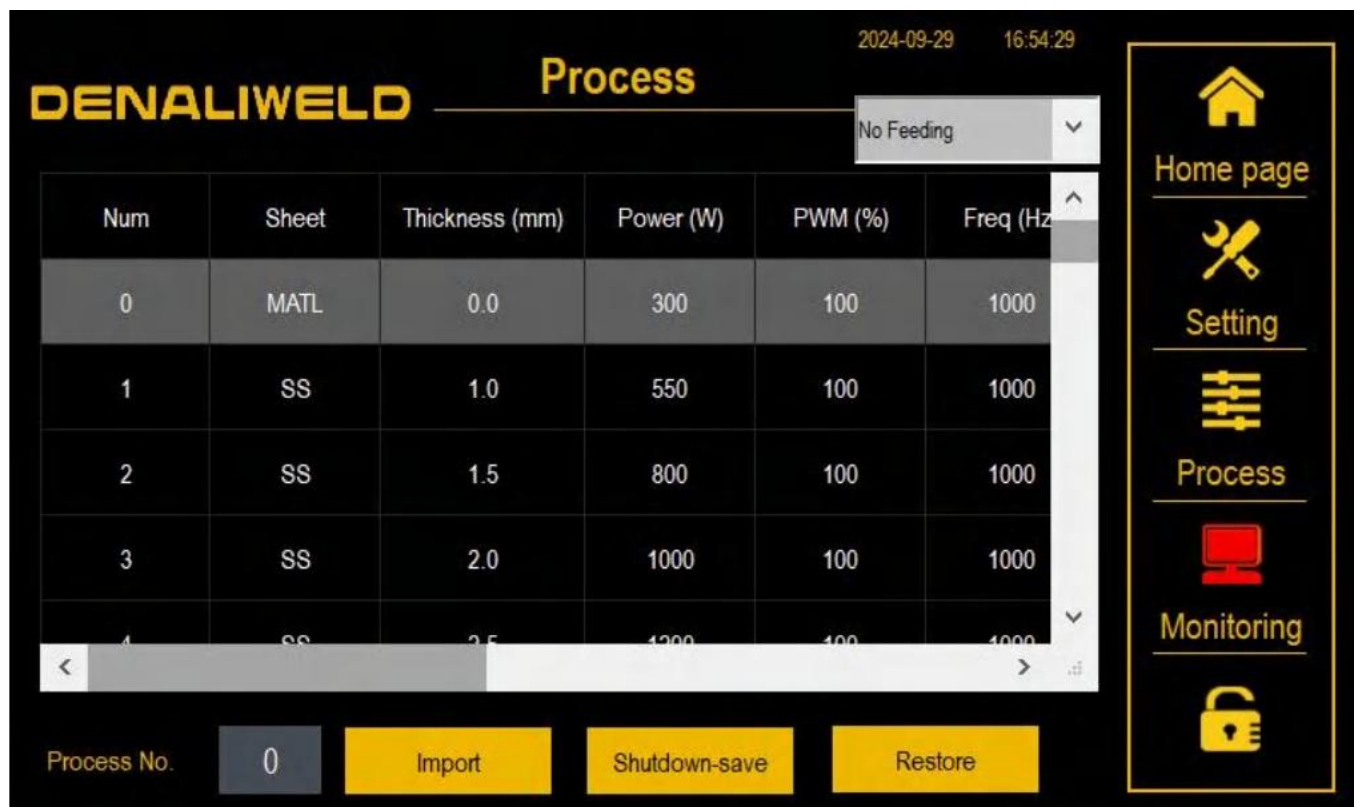
2.2.2 Wobble Settings



- Wobble switch: turns oscillation on / off.
- Wobble graph: selects a line or point pattern.

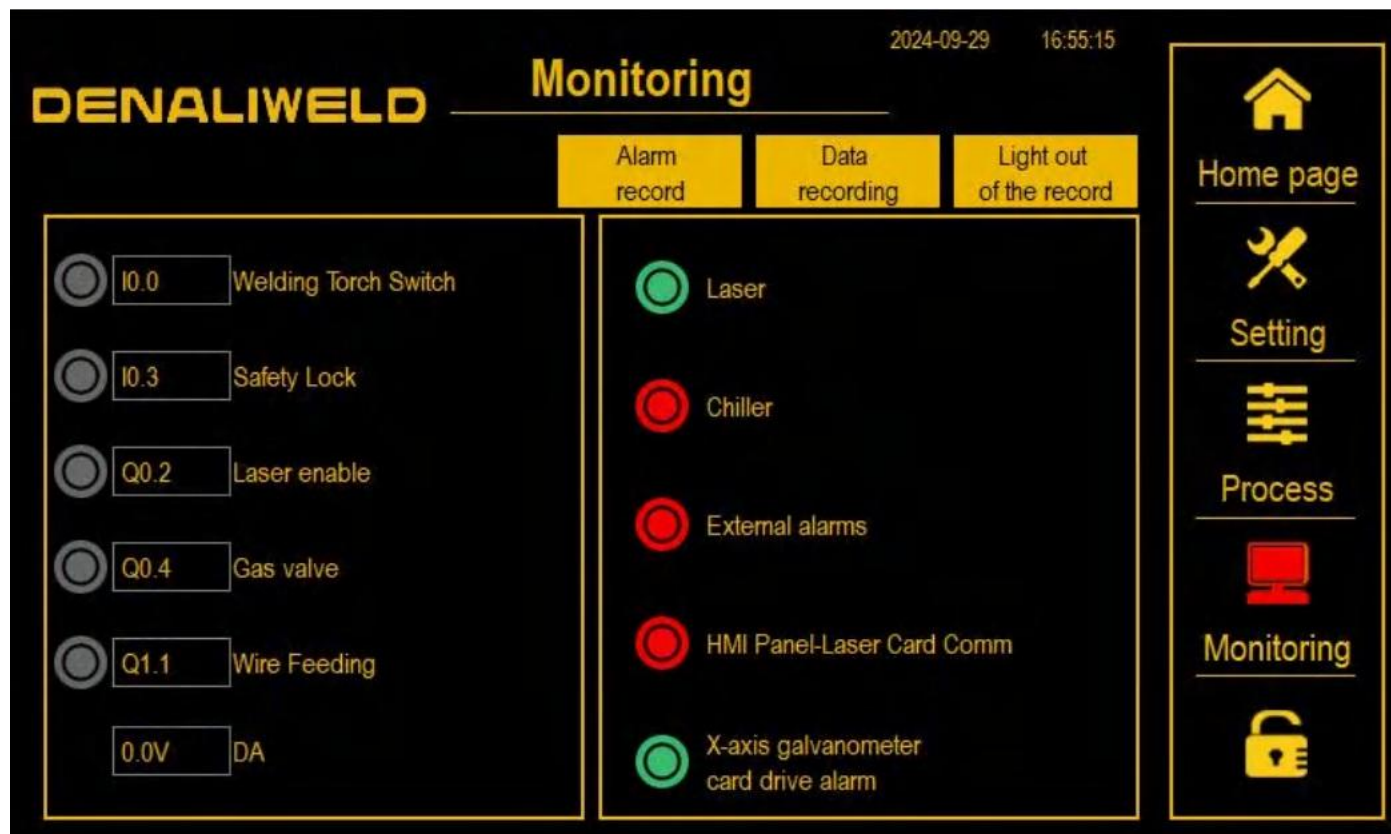
- Wobble width: adjustable line width from 0 to 5 mm.
- Wobble frequency: adjustable from 0 to 200 Hz according to the process.
- X-axis center offset: used for center alignment. Beam alignment is completed before delivery; only minor adjustment should be made if needed to align the beam with the wire center. Unnecessary adjustment is prohibited.
- X-axis amplification factor: set during factory commissioning. Only minor adjustment should be made if required. Unnecessary adjustments are prohibited.

2.3 Process Bank



- No Feeding: switches between wire feeding and no wire feeding.
- Process No.: current process number. Each process parameter can be modified and saved.
- Import: loads the selected process number for operation.
- Shutdown-save: saves the modified process.
- Restore: restores the default process settings.

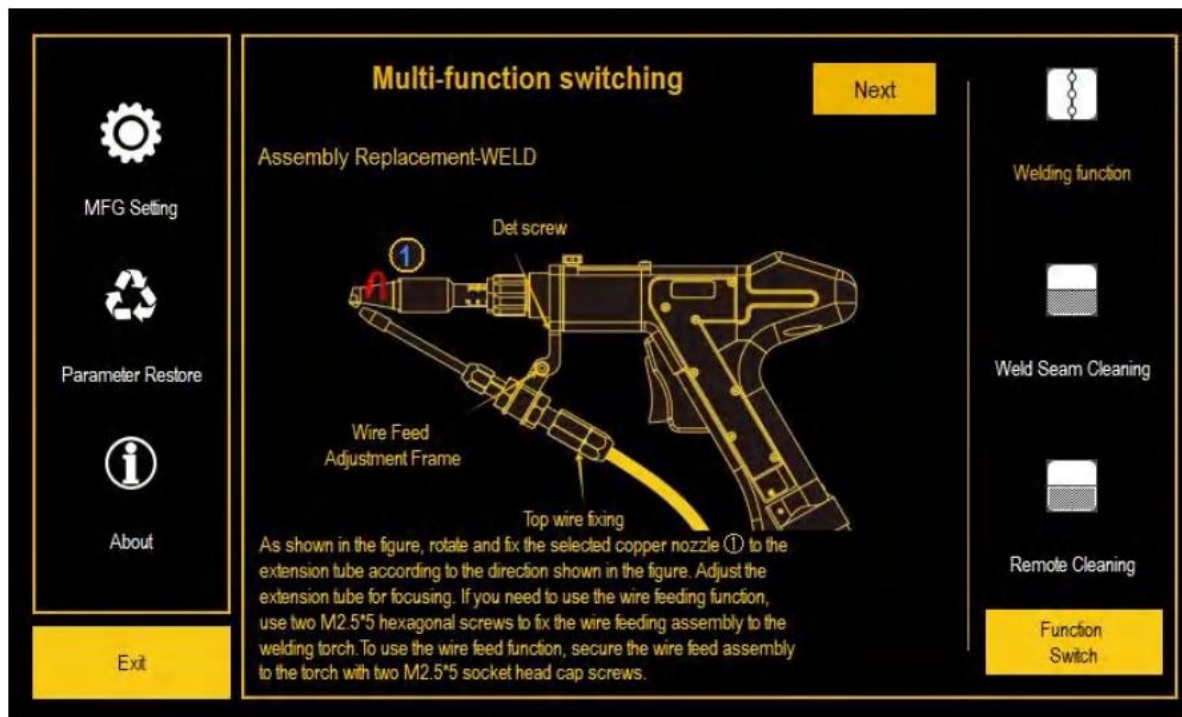
2.4 Monitoring



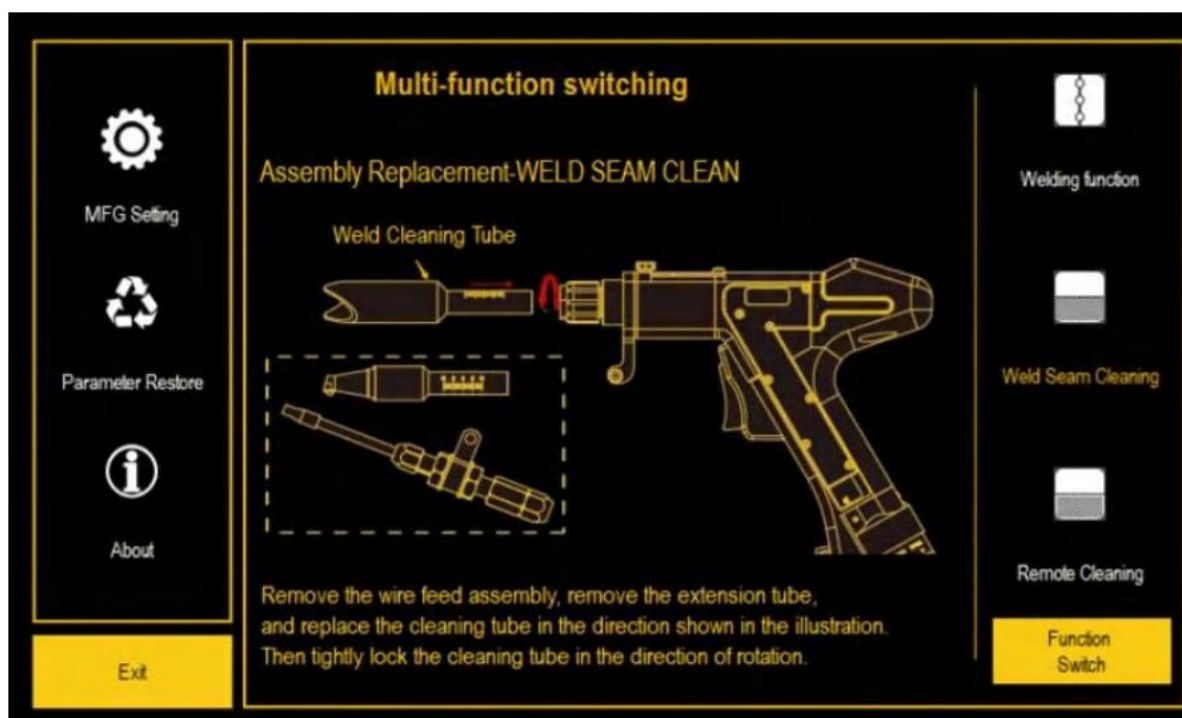
- I0.0 Welding Torch Switch: trigger-button status of the welding head.
- I0.3 Safety Lock: indicates whether the head is in contact with the workpiece. Laser output is allowed only when contact is detected.
- Q0.2 Laser Enable: output status of the laser-enable signal.
- Q0.4 Gas Valve: output status of the gas valve.
- Q1.1 Wire Feeding: wire-feeder output signal.
- Laser: green = normal; red = abnormal.
- Chiller: green = normal; red = abnormal.
- External alarms: green = normal; red = abnormal.
- HMI Panel-Laser Card Comm: communication status between the HMI panel and laser control card. Green = normal; red = abnormal.
- X-axis galvanometer card drive alarm: communication status between the HMI panel and galvo motion card. Green = normal; red = abnormal.

2.5 Function Switch

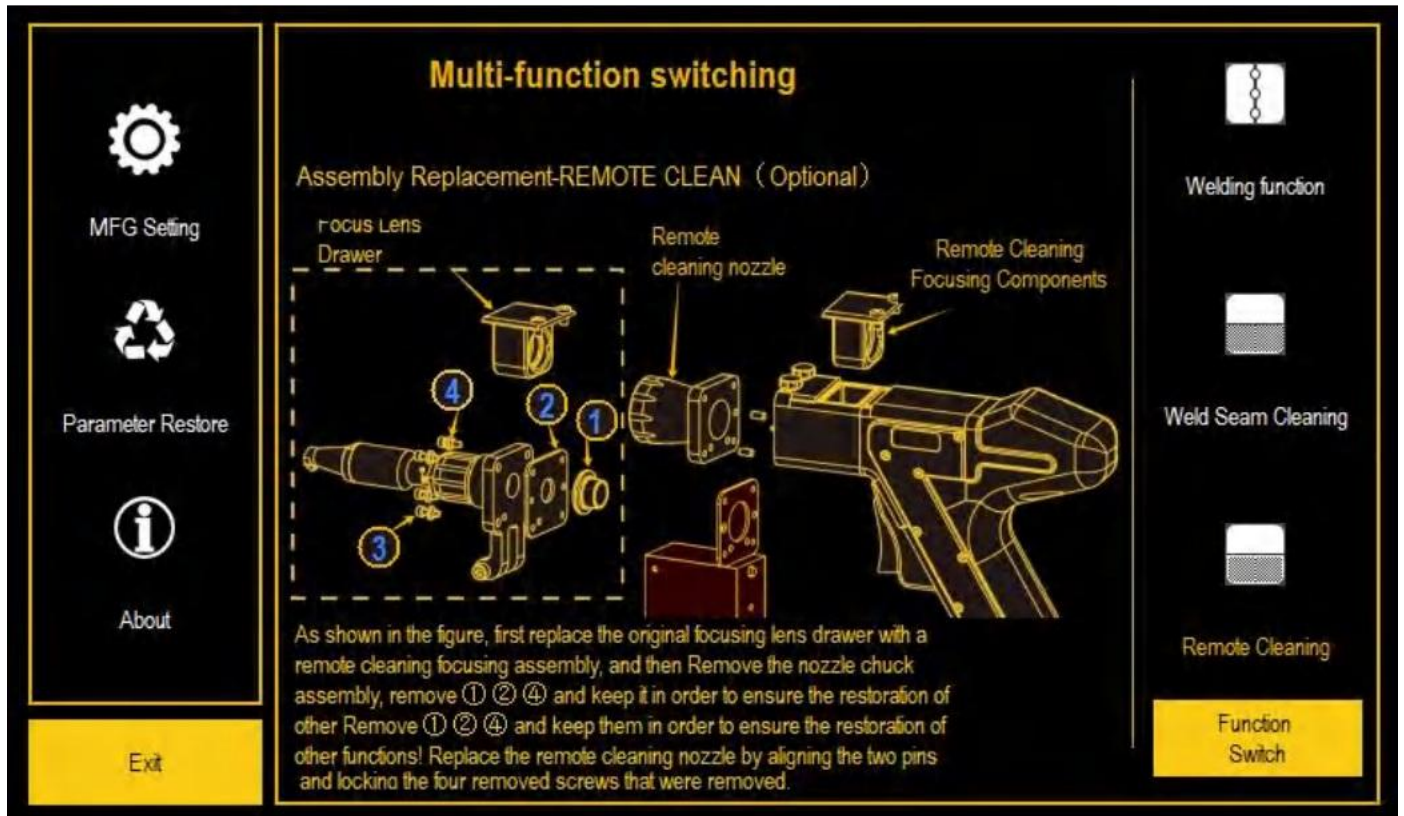
- Open the multifunction switch page by tapping the logo on the Home page.
- Weld: displays the assembly replacement diagram. Tap "Next" to select a nozzle option.



- Weld Seam Cleaning: displays the assembly replacement diagram.



- Remote Clean: displays the assembly replacement diagram.



- Function Switch: select the required function, then tap "Function Switch" to open its sub-interface.
- MFR Setting: restores the factory defaults with one touch. This will erase all custom parameters. Use with caution.
- About: displays hardware versions for the HMI panel, laser control card, and galvo motion card.

2.6 Product Information

Each product generation supports specific versions for control and traceability. These versions correspond to the HMI panel, laser control card, and galvo motion card. Version upgrades must be confirmed by DENALIWELD.

2.7 Auxiliary Functions

2.7.1 Weld-Seam Cleaning

2.7.2 Config

Handheld laser weld cleaning is one of the system's three functions.

- Remove the wire-feeding mechanism, welding nozzle, and extension tube. Install the cleaning tube.



- Select the Weld Cleaning function and adjust the process parameters as required.

2.7.3 Functions and Features

Functions

- Remove paint and coatings from metal or glass.
- Quickly remove rust and various oxides from iron.
- Remove grease, resin, adhesive, dust, stains, and production residue.
- Remove paint, rust, and oil before welding or bonding, and remove oxides and residue after welding.
- Clean molds such as tire molds, electronic molds, and food molds.
- Remove oxides, paint, and rust during the production or maintenance of aerospace equipment, weapons, and ships.

Characteristics

Low power consumption, small scanning range, and flexible operation.

2.8 Remote Cleaning

Functions



- Remove paint and coatings from metal or glass.
- Quickly remove rust and various oxides.
- Remove grease, resin, adhesive, dust, stains, and production residue.
- Remove paint, rust, and oil before welding or bonding, and remove oxides and residue after welding.
- Clean molds such as tire molds, electronic molds, and food molds.
- Remove oxides, paint, and rust.

Features

- Low power consumption, medium scanning range, non-contact operation, and flexible, user-friendly operation.

3. Laser Source

(Operate the laser in an environment from 0-40°C (32-104°F) to prevent condensation from damaging the internal laser source.) The DENALIWELD laser source is a highly efficient, reliable, maintenance-free, high-power device. Its wavelength range is 1060-1100 nm. The product is designed and tested with safety as a primary consideration. Operating the laser source strictly according to this manual helps ensure reliability and safety. This laser source has unique characteristics that may present safety hazards and therefore must not be treated like an ordinary light source or low-power laser. Anyone operating or working near the laser must be informed of these hazards. For

safety, do not disassemble the device. This product has no user-serviceable parts or components. The warranty is void if the laser source is disassembled without authorization. All laser parameters are preset before shipment. Unauthorized personnel must not perform installation, settings, maintenance, or other operations. Please refer to the separate laser source user manual.



Chapter II. Installation, Start-Up, and Operating Guidelines

1. Preparation Before Installation

Install the equipment in a dedicated space of at least 15 m² with access to suitable gas and electrical connections. The floor must be level, hard, and resistant to vibration, and a laser warning sign must be posted on the entrance door.

(2) Environmental Requirements:

- A. The work area must have adequate lighting. No equipment that produces strong vibration or electromagnetic fields should be operated within 20 meters of the device.
- B. Ambient temperature must be between -10°C and 45°C, relative humidity must be below 70%, and altitude must be below 1,000 m to maintain optimal operating conditions. The ambient temperature should remain stable, and the work area should be air-conditioned as needed.
- C. To maintain clean air in the work area, install a fume-extraction system appropriate for site conditions after installation and commissioning.
- D. Do not use the equipment in explosive or hazardous environments.

(3) Power Requirements: Voltage: 230 / 400 V AC, with allowable voltage fluctuation of $\pm 10\%$. Frequency: 50 Hz, with allowable fluctuation of ± 0.2 Hz. Power supply may be customized for different countries. Refer to the nameplate.

2. Installation Process

Connect the machine to the power supply: 220 V single-phase for 1000 W, 1500 W, and 2000 W machines.

Europe: All machines sold in Europe use 400 V three-phase power.

Connect the machine to the power supply, then connect the gas hose to the cylinder through a shielding-gas regulator.

(1) Start-Up Procedure:

- 1) Turn the main switch (on the back of the machine) to the "ON" position
- 2) Turn on the POWER switch on the front panel
- 3) Confirm that shielding gas is supplied
- 4) Confirm that the protective glass is clean
- 5) Log in on the operator panel (see the Control Panel Operation Manual)
- 6) Enter the parameters

(2) Shutdown Procedure:

- 1) Turn off START on the front panel
- 2) Turn the main switch to the "OFF" position
- 3) Secure the welding head

3. Welding Operation Principles

Before laser output can be enabled, unlock the welding head using the safety button. The green indicator means the head is ready for operation. Then press the trigger to activate the laser.

- (1) The operator must wear gloves suitable for laser welding, protective goggles rated for reflected laser radiation, and a protective helmet.
- (2) On the control panel, set parameters appropriate for the material being welded and the desired result.
- (3) Adjust the nozzle extension to set the correct focal length of the welding head, i.e., the focus of the beam.
CAUTION! Operating with an incorrect focal position may damage the optical components of the head.
- (4) Maintain the correct angle between the nozzle and workpiece. Aim the laser guide (red dot / dash) at the joint between the two pieces, then press the trigger to activate the beam. Weld by moving the head along the joint.

Chapter III. Equipment Safety, Daily Maintenance, and After-Sales Service

1. Safety Rules

The table below shows all safety warning signs during the operation.

Warning 1: Because the laser beam is invisible, use extreme caution to avoid specular reflections.

Warning 2: The laser beam from the welding head has enough energy to cut or weld metal, burn skin, clothing, and paint, and ignite volatile substances such as alcohol, gasoline, and ether. Therefore, keep flammable materials away from the laser work area.

See the explanatory table below:

Warning Mark	Description
	This sign represents laser radiation and is matched to the laser performance of the product.
	There is a potential risk to the product; follow the specified procedure, otherwise the equipment or components may be damaged. Do not violate the warning requirements during operation to ensure the standard use of the device.
	There is a potential for damage to the human body; it is necessary to follow certain procedures, otherwise it may harm you or others. Don't disregard the warning signs while working to ensure complete safety.

For more information, review all labels on the machine.

2. Safety Rules for Equipment Use

A laser equipment malfunction can create serious hazards. Operators must strictly follow all laser-system safety rules. These rules protect personnel and ensure proper equipment operation, maintain technical performance, and help achieve the intended processing results. All safety requirements must be observed during operation.

- (1) Comply with all equipment operating safety regulations;
- (2) The operator must complete initial training, understand the construction and operation of the equipment, become familiar with operating procedures, and be qualified before working independently;
- (3) While operating the laser welder, the operator must wear personal protective equipment in accordance with health and safety regulations, including safety glasses, a protective visor, a welding apron, and welding gloves. Never direct laser output at unintended workpieces or any person;
- (4) After starting the device, the operator must not leave the designated workstation or allow unauthorized persons to operate it. If the operator must leave the work area, turn off the machine;
- (5) Keep a fire extinguisher within easy reach, turn off the laser when not in use, and keep paper, fabric, and other flammable materials away from an unprotected laser beam;
- (6) Keep the area around the device clean, organized, and free of oil. Store items, tools, and waste properly;
- (7) When using shielding-gas cylinders, do not crush wires, cables, or gas hoses, as this may cause accidents or gas leaks. Use and transport gas cylinders in accordance with the safety requirements provided by the industrial-gas supplier. Do not expose cylinders to direct sunlight or heat sources. The operator must stand to the side of the cylinder outlet when opening the valve;
- (8) If any abnormal condition is detected during machine operation, turn off the equipment to minimize potential damage;
- (9) The operator must give full attention to the equipment and must not talk, play, listen to music, or perform unrelated activities while welding;
- (10) If the machine will not be used for more than 30 minutes, turn off the main power as required.
- (11) Before installation, repair, or manual maintenance, turn off the main power source. Any improper operation while the equipment is energized can have fatal consequences. Accidental exposure to high-voltage electricity may cause cardiac arrest, burns, or other serious injury.
- (12) The emergency stop takes priority over all other controls and disables laser operation. Pressing it cuts power to system controls and potentially hazardous functional components. If abnormal laser output occurs, immediately release the trigger button and press the emergency stop button, then identify and correct the cause before restarting.
- (13) Personnel other than trained operators should remain as far as practical from the welding area. Unqualified operation or operating errors may cause injury or equipment damage.
- (14) Unqualified personnel and unauthorized laser service personnel are not permitted to operate peripheral devices of the handheld welding machine without authorization. DENALIWELD is not responsible for consequences resulting from unauthorized activity or failure to follow operating procedures.
- (15) Before first start-up, check that the chiller contains sufficient water and that the water temperature and pressure are correct. If the water level is low, add sufficient water before starting the machine to avoid damage.

(16) If the machine cannot be restarted, check the laser alarm indicators: GREEN = normal; RED = malfunction. All laser parameters are preset. Do not disassemble the laser or water chiller without manufacturer authorization. All buttons except the water switch can be operated.

3. Daily Maintenance

- (1) Remove dust and dirt from the machine to keep it clean;
- (2) Inspect the dust cover thoroughly and remove accumulated dust;
- (3) Verify that the protective glass is clean;
- (4) Verify that the cooling-water temperature and pressure are correct;
- (5) Check the voltage stabilizer. Monitor input/output voltage and gas pressure. Contact the seller if any reading is abnormal;
- (6) Make sure there are no leaks.

4. Cleaning and Replacing the Protective Lens

Contamination during cleaning or replacement reduces lens transmittance and shortens lens life.

Here are the precautions to take before starting work:

Before removing the protective-glass drawer, clean the surrounding area to minimize the chance of debris entering the welding head.

Replacing the Protective Glass

- a. Before handling the protective lens, wear powder-free rubber or latex gloves;
- b. Use appropriate tools to install the protective glass carefully. Do not scratch it;
- c. Hold the glass by the edge without touching its surface. Always place the glass on lens-cleaning paper;
- d. Keep the protective lens as free from contamination as possible;
- e. Use 99% alcohol to dissolve contamination without damaging the lens;
- f. Clean the lens as thoroughly as possible in a dust-free environment. Main cleaning tools: aurilave ball, alcohol (99%), dust-free swabs



If dust is present on the lens, first use the auralave ball to blow it off. Then gently clean the lens with a dry cotton swab without applying pressure.

For stains on the lens, take a dry cotton swab and dip its tip in anhydrous ethanol. First, make sure that no dust particles are visible on the surface. Clean the lens in a circular motion starting from the center; do not wipe back-and-forth. While the lens surface is still wet, wipe it again in the same manner with a dry cotton swab. Do not reuse cotton swabs. If contamination remains, a mixture of anhydrous ethanol and anhydrous diethyl ether may be used for final cleaning.

Wiping technique is very important. Practice on a damaged laser protective lens if needed. Even with proper technique, slight surface damage may occur.

After removing the protective-glass drawer, immediately cover the opening in the head, for example with paper tape, to minimize the risk of contamination of the lower focusing lens.

5. Troubleshooting

No	Problem	Likely Cause	Recommended Action
1	No laser	- Turn off the laser; - The laser is in alarm and does not start the source; - The water chiller is off or indicates an alarm; - The laser button or indicator light is damaged, or the safety lock is open because components are not connected. - Damage to the laser source.	- Check that the laser power button is on. - Verify whether the laser source is on or in alarm, and read the alarm information. - Check the operation of the cooler. - Check the laser connection signal line and safety circuit.
2	No oscillation	- Oscillation function disabled, - Invalid oscillation parameter. - Electric motor defective. - No signal, broken wire.	- Check whether the oscillation function is turned on. - Check that the 24 V power supply is operating correctly. - Check whether the oscillation setting is within the normal range, whether the I/O output on the touchscreen is working, and whether the motor signal line is connected.
3	Weak Laser Power	- Damaged protective glass, focusing lens or collimating lens. - Problem with the temperature inside the radiator.	- Damage or contamination of the protective lens, focusing lens, or collimating lens can refract and weaken the laser beam. - Condensation on the collimating or focusing lens caused by a large temperature difference between the warm cooling water and the surroundings can weaken the laser.
4	Oscillating red-light intensity decreases	- Electric motor is improperly adjusted, - Electric motor or controller is damaged. - Angular lens is set to the wrong angle.	- Check that the electric motor is operating correctly. - Check the angular-lens position and verify correct reflection of the laser beam. - Loosen the cover screw only after the system is safely disabled.
5	Laser Source alarm	- Faulty tip of QBH - Too low / high water temperature in the cooler - Source blockage due to reflected beam - Other factors	- If the laser-source shutdown alarm remains active, it can be read by decoding the laser software input data. - Other faults can also be identified from the alarm information in the laser software. Check that the water line and water level in the tank are adequate. - QBH alarm: check the QBH connection or thermistor for an open circuit.
6	Common chiller problem	- No power - Lower cooling capacity - Water temperature rise	- Check that the voltage at the plug is sufficient and that the plug fuse is not blown. - Check whether the water level in the tank is sufficient. - If the water level is too low or cooling capacity is insufficient, check whether the ambient temperature in the workshop is too high or whether the radiator reservoir is damaged.

6. Regular Cleaning

1) Cooler/Chiller Maintenance

- a. Change the water in the cooler every month.
- b. Check the water-pipe connections in the chiller every week.

2) Dust removal: Keep the machine clean. Remove dust from the welding head and clean or replace the filters behind the fans at the rear of the machine to ensure adequate ventilation.

3) Nozzle cleaning: After extended use, residue and deposits may accumulate on the nozzle tip and block shielding-gas flow or affect laser energy at the workpiece surface.

7. Repair Process

Repair requests may be submitted by email, telephone, or the online app to the appropriate sales representative or after-sales service engineer. We track all service requests and process them within 48 hours of receipt.

8. Storage Requirements

Storage temperature: 10°C to 30°C; humidity: 10% to 70%.

9. Equipment Transportation Requirements

When transporting the device, take all appropriate protective measures.

10. Equipment Disposal Instructions

Remove the power cord and mark the equipment for disposal.

11. Loss of Warranty

Do not modify the device without prior written authorization from the manufacturer. Do not use service providers that are not authorized by the manufacturer. Do not use consumables or service parts that are not authorized by the manufacturer.