

# DENALIWELD

## G series laser welding machine user manual

(500W, 800W)

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## Preface

Thank you for choosing DenaliWeld for your handheld laser welding projects. We've compiled this easy-to-follow instruction manual to help familiarize you with the machine's different functions, safety criteria and maintenance schedules.

. Thank you again for using DENALIWELD' products.

Please take time to read and understand this User's Guide and familiarize yourself with the operating and maintenance instructions before you use the product. We strongly recommend that the operator read Section 2 titled "Safety Information" prior to operating the product.

This User's Guide should stay with the product to provide you and all future users with important operating, safety, and other pertinent information.

We've identified the parts that you will need to pay special attention to with an underscore. Please note this information to prevent unnecessary damage.

## Company Profile

**DENALIWELD** is a US based laser welding company specializing in manual and automatic laser welding and cleaning solutions. Adhering to the profound professional ability, numerical control system, optical system, and other core technologies, we are committed to providing high-quality welding and cleaning solutions to customers in various industries around the world. After decades of development, the company has become a modern high-tech enterprise, integrating research and development, sales, production, and service.

DENALIWELD is a professional manufacturer of manual and automatic laser welding and cleaning machines. It is a company integrating research and development, production and sales of laser equipment and has formed a complete supply platform for laser equipment sales and support. Professional technical personnel, rich management experience and clear development direction ensure our rapid development in the laser industry.

Our Company has a professional independent core research and development team, software engineers, mechanical engineers, electrical engineers, industrial designers, and other professional teams who are all striving for perfection. It has a stable customer base and extensive technical recognition worldwide. DENALIWELD has mastered core technologies such as numerical control systems, precision welding head and precision field mirror systems to realize higher precision and faster processing products in the laser welding industry.

For more information, please visit our website:

<http://www.DENALIWELD.com>

## Characteristics Explained

The G series is a series of high-efficiency, high-reliability ultraportable equipment, maintenance-free low-power lasers developed by DENALIWELD. It adopts the phase-change heat dissipation method, the wavelength range is 1060nm~1100 nm, and the laser efficiency is >25%.

DENALIWELD G series lasers belong to Class 4 (Class 4) laser products, and throughout the product design and testing we have focused upon safety first.

Laser light exhibits unique characteristics that may pose safety hazards. Therefore, the laser light cannot be associated with any other light sources, all operators and people near the laser must be aware of these special hazards.

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

Do not open the handheld laser head or laser source. There are no user serviceable parts, equipment or assemblies associated with this product. Unauthorized disassembly may result in voiding your warranty.

# General Safety Information




## 1 -Handheld Laser Welding Machine are Safe to Use

Handheld laser welding machines are classified as hazardous, invisible laser radiation Class 4 laser products. This product emits infrared laser radiation with a wavelength of 1060nm~1100nm, which can cause damage to eyes and skin, directly or indirectly exposed to such light intensity. This infrared radiation is invisible, and the laser beam can cause irreversible damage to the retina or cornea. Be sure to wear appropriate and certified 1060nm~1100nm near-infrared laser safety glasses before operating any handheld laser welding machine.

- (1) For the safety of you and others, it is strictly forbidden to point the welding head at yourself or anyone else.
- (2) Appropriate and certified 1060nm~1100nm near-infrared band laser safety glasses or helmets and anti-high temperature gloves must be worn before using the handheld laser welding machine.
- (3) For the safety of you and others, the alligator clip must be clamped to the welding workpiece before triggering the laser, and it is strictly prohibited to clamp it in other places except the workpiece to avoid safety hazards caused by abnormal light output.
- (4) The welding operation of the hand-held laser welding machine should be carried out in an independent space with laser protection; non-welding personnel and combustible and flammable materials should be kept away from the welding operation table, and a fire extinguisher should always be placed near the welding area.
- (5) Wear an approved welding helmet when welding all materials.
- (6) Make sure that the hand-held laser welding machine is properly grounded, otherwise it may cause the product shell to be electrified, resulting in personal injury to the operator; if the grounding is not operated as required, it may cause a laser alarm, no light, laser instability and other hidden faults.
- (7) Please do not weld in the rain or direct sunlight, it may activate the high temperature and high humidity alarm or short circuit, affecting the normal use of the laser, and even causing potential safety hazards.

## 2 -Safety Conventions

As shown in the table below, all safety warning signs during the operation of the hand-held laser welding machine include:

SYMBOLS	DESCRIPTION
	<p>WARN:</p> <p>Text marked with an electrical warning symbol indicates a potential personal hazard. Failure to follow certain procedures may cause certain or fatal hazards to you or others.</p>
	<p>NOTICE:</p> <p>There is a potential hazard to the product; certain procedures need to be followed, otherwise your equipment or components may be damaged. Do not violate the requirements of the attention signs during operation to ensure the normal use of the equipment.</p>
	<p>This logo represents laser radiation, and we have affixed this logo to the laser output of the product.</p>
	<p>This symbol means wearing protective eyewear, please be sure to wear appropriate and certified 1060nm~1100nm near- infrared band laser protective eyewear.</p>
NO SYMBOL	<p>IMPORTANT: Refers to any information regarding the operation of the product. Please do not overlook this information.</p>

NOTE: ©

On DENALIWELD handheld laser welding machines, the wavelength range is 1060nm~1100nm, which is not in the visible light range, but these beams may cause irreversible damage to the retina and cornea. DENALIWELD recommends that you wear qualified and safe protective glasses or helmets when operating the handheld welding machine at all times.

### **3-Laser protection**

#### **1.Laser Safety Goggles and Helmets Requirements**

Laser safety goggles and helmets should be selected based on the ability to shield the entire wavelength range of the laser, emitted by the hand-held laser welding machine. When operating this device, please wear appropriate laser safety goggles or helmets. Selecting the appropriate laser safety goggles or helmets requires the end user to accurately identify the laser safety specifications compared with the wavelength range emitted by the product. If the device is a tunable laser or Raman product, it emits light in a range of wavelengths. End users should verify that the laser safety glasses or helmets used are capable of blocking light emitted by the device over its entire wavelength range. Please check the safety label on the product and verify that personal protective equipment (i.e. safety shield, viewing window or windows, goggles, helmets etc.) is adequate for output power and wavelength range. Decisions regarding safety glasses or helmets must also consider any secondary radiation hazards posed by the welding process (see Chapter II, Section 4-1)

#### **Laser Protective Equipment Suppliers**

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.

### **4-Weld Feature 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 lead to conjunctivitis, photochemical damage to the retina, or a sunburn- like reaction to 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 cutting 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. Sleeves and collars should be buttoned.

### **3.Fire Hazard**

If flammable or flammable materials are near the welding area, the heat and sparks generated during welding can cause a fire or explosion. Laser welding is only possible if the area is free of combustible materials. Never weld containers containing flammable or combustible materials. If the contents of the containers are unknown, they should be assumed to be flammable or combustible. Fire extinguishers should be located nearby, easily accessible, and have personnel trained in their use.

### **4.Smoke Hazard**

Welding "fume" can consist of very fine particles and gases. Welding fumes and gases come from a combination of welding materials, or any filler materials, shielding gases, paints, coatings, chemical reactions, and air pollutants. Welding fumes can adversely affect the lungs, heart, kidneys, and central nervous system.

- (1) When welding, keep the head away from the smoke. Always weld in a well-ventilated area for safe breathing.
- (2) Use a fume extraction system to remove vapors, particulates, and hazardous debris from the welding process area.
- (3) Respirator may also be required in confined spaces and other situations.
- (4) Routine air monitoring should be performed to determine the level of noxious fumes in the welding area.

### **5.Cylinder Safety**

The gas cylinder may explode if damaged or placed near the welding area. Shielding gas cylinders should be placed where they will not be bumped or damaged. Keep them away from heat, sparks, or flames. Cylinders must be stored upright and secured to a fixed stand. A working regulator for the required gas and pressure is required. All hoses and fittings should also be suitable for the application and in good working order.

### **General Safety Instructions**

#### **1.Mirror Reflection**

The location of the hand-held laser welder's output port may generate a secondary laser beam or divergent beam, that radiates outward at multiple angles after being reflected on a plane. This phenomenon is called specular reflection. Although the energy of the secondary laser beam is much less than that of the primary laser beam, this intensity can also cause damage to eyes, skin, and some material surfaces.

#### **WARNING:**

- © Since the laser radiation is invisible, you must exercise extreme care to avoid or reduce specular reflections.



## **2.Accessories Safety Instructions**

The photosensitive elements integrated in the optical accessories related to the hand-held laser welding machine may be damaged due to laser exposure, so related device protection should be adhered to.

**WARNING:**

© The output laser intensity of DENALIWELD handheld laser welding machines is enough to weld metal, burn skin, clothing, paint, and ignite volatile substances such as alcohol, gasoline, ether, etc. Therefore, during operation and use, be sure to isolate the flammable items around 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 at the light-emitting hole of the handheld laser welding machine.
- (2) Avoid placing the hand-held laser welding machine and related optical output devices on the same level as your eyes.
- (3) Reasonable selection of safety protective equipment according to the output power and wavelength requirements of the handheld laser welding machine to ensure the safety of operators.
- (4) A warning sign should be pasted in the area where the handheld laser welding machine is placed to limit the safe area for operating the handheld laser welding machine.
- (5) Do not use the handheld laser welding machine in a dark environment.
- (6) It is strictly forbidden to turn on the hand-held laser welding machine without installing the optical coupling fiber or optical output connector.
- (7) Please ensure that the protective lens, copper nozzle and wire feeding structure are installed and cleaned when the handheld laser welding machine is turned off and the power supply is disconnected.
- (8) When debugging, calibrating, and focusing, please do it without the laser, and turn on the laser after the debugging is completed.
- (9) Please operate the equipment strictly in accordance with the instructions in this document, otherwise the protection devices and performance of the equipment will be impaired, and DENALIWELD will not guarantee it.

**WARNING:**

© Reasonable selection of safety protection equipment according to the laser output power and wavelength requirements.

© Do not look directly at the tip of the gun and please ensure that safety helmets or goggles are always worn during each operation.

#### **4. Electrical Operating Instructions**

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

- (1) Please ensure that the equipment shell is well grounded, any interruption in the grounding loop may cause personal injury.
- (2) Please make sure that the power supply connected to the device is connected to the protective ground before use.
- (3) In order to reduce the risk of fire, when necessary, the replacement of in line fuses can only be of the same type and power level recommended by DENALIWELD.
- (4) Ensure that the input AC voltage to the Handheld Laser Welder is normal AC mains voltage (AC230V) and that it is wired correctly. Any incorrect wiring method may cause personal or equipment injury.
- (5) Except for the gun head consumables, the user does not need to repair the parts or components by themselves. All maintenance operations need to be completed by professionals from DENALIWELD.
- (6) It is strictly forbidden to disassemble and assemble the hand-held laser welding machine without authorization, and damage the relevant labels, otherwise there will be a danger of 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) Any product that has been disassembled without permission no longer enjoys the warranty rights.

#### **WARNING:**

© The input voltage of the handheld laser welding machine is AC (AC230V), 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 commonly used in: (1) below 2000 meters (1.2 Miles) above sea level, (2) overvoltage category II, (3) environmental pollution degree 2, (4) dry location. For more information, please refer to the product specifications.

Humidity: Do not expose the device to high humidity (>85% humidity)

Cooling and temperature: The laser unit is cooled by air. Operating at higher temperatures accelerates aging, increases threshold current and reduces slope efficiency. If the device overheats, do not use it and call DENALIWELD for help.

When the temperature of the laser is too high, the device will trigger an alarm and stop emitting light.

Ensure a safe laser work area, the interaction between the laser and the work surface can create additional safety hazards due to the high temperatures that generate gases, sparks, and debris. The corresponding operators need to go through certain assessments and training and be familiar with and master the general safety regulations of laser operations.

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

- (1) Please ensure that the working area is properly ventilated and place the hand-held laser welding machine in a dry, cool, and clean environment. Do not expose the hand-held laser welding machine to high temperature, high humidity, and water hazards.
- (2) During the operation of the hand-held laser welding machine, ensure that there is no foreign matter blocking the air suction port at the front of the laser, and ensure that there is no debris within 1 meter (3') that affects the smooth air intake; Make sure the rear outlet is 1M (3 ') wide..
- (3) It is necessary to ensure that no debris (including liquid) enters the laser, it will damage the laser and may cause personal injury.
- (4) Running the equipment at high temperature will accelerate aging, increase the current threshold, and reduce the sensitivity and conversion efficiency of the handheld laser welding machine. If the device overheats, please stop using it and seek help from DENALIWELD.

NOTICE:

- © Please operate the equipment carefully to avoid accidental damage to the equipment.
- © The filter at the front of the laser needs to be cleaned to remove dust and dirt from the air inlet from time to time.

For More Safety Information please refer to:

Laser Institute of America (LIA)

13501 Ingenuity Drive, Suite 128

Orlando, 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 Electro-technical 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 Buyer's Guides

## 1. Technology Profile

The laser welding process consists of fusing the contact area of the joined elements, with the heat obtained because of bringing a concentrated beam of light with a very high energy and density to the welded area. The single-module fiber supply provides the device with constant, stable, high-quality power & beam. The laser power range is adjustable depending on the production needs. This solution guarantees unrivaled flexibility of use and high reliability. Laser welding is a method particularly efficient in multiple series, automated or robotic production.

## 2. Product Presentation

The DENALIWELD handheld laser welder uses the latest fiber laser, equipped with a self-developed welding head fitted with an oscillating motor, which fills the empty space in manual laser welding. The equipment is easy to use, has good welding quality, high welding speed and zero consumption of consumables. It can perfectly replace traditional argon arc welding, electric welding and other processes when welding thin stainless-steel, sheet, iron sheet, galvanized sheet, or other metal materials. The handheld laser welding machine can be used for cabinets, kitchens, racks, ovens, stainless steel doors, distribution boxes, stainless steel materials and other complex welding processes.



### **3. Product Parameters**

1. Name: Portable Laser Welding Machine
2. Laser power: 500W, 800W
3. Laser wavelength: 1060nm-1100 nm
4. Fiber optic cable length: Standard: 5 m (32')
5. Technical parameters: Continuous
6. Welding speed: 0 ~ 80 mm / s
7. Cooling: Forced Air Cooling
8. Operating temperature range: -10 ~ 45 °C (14°F~113°F)
9. Working humidity: <70% RH
10. Recommended welding thickness: 0.5-3mm
11. Joint width: ≥0.5 mm
12. Working voltage: AC 230V - customized for different countries, please refer to nameplate.

### **4. Features and Benefits**

DenaliWeld welding heads are created by DenaliWeld, we have developed a method of oscillating laser welding.

Our products overcome the shortcomings of traditional laser products with an alternating point zone, a high resistance to damage, and better weld formations.

A. Our Machines provide Different ways of welding with a variety of welding heads that can be realized with a simple operation.

B. Fast welding speed, 2-10 times faster than traditional welding; each machine can save at least 2 welders per year; less consumables; long service life; safer and greener welding.

### **5. Scope of application**

Many industries will benefit from laser welding such as the manufacturing of cabinets, shelves, ovens, distribution boxes, stainless steel furniture, etc. The range of laser welding applications is unparalleled.

## Chapter I . Machine structure

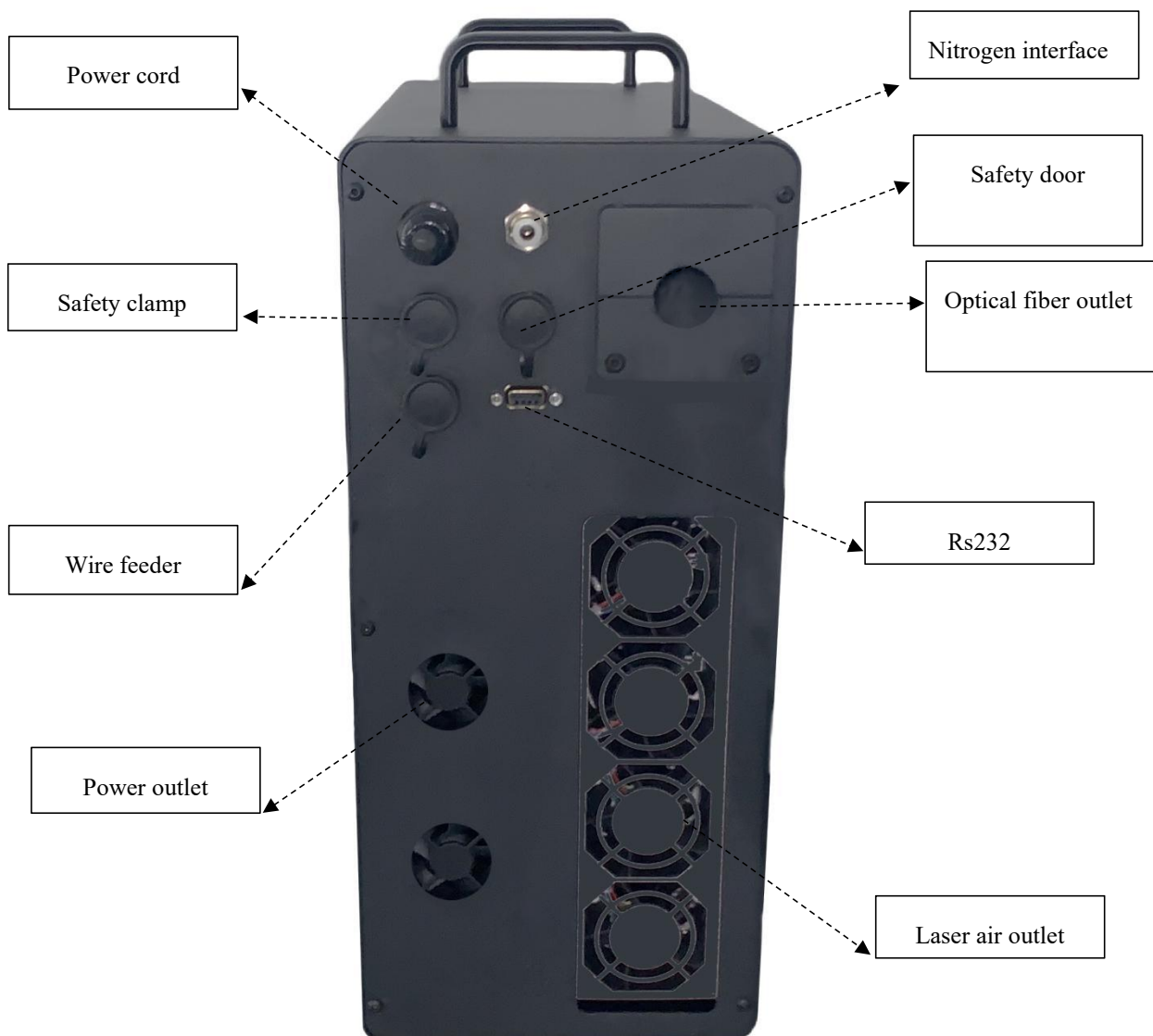
### 1. Construction of the Machine

The ultra-portable welding machine is small in size, light in weight, easy to carry, suitable for outdoor, field and other places for welding operations, especially for maintenance or installation across a long distance . Simple, lightweight structure and operating system, convenient operation, does not require too much technical basis.



Front view

The shielding gas connection are in the rear part of the housing. In addition, there is also a socket for connecting an automatic wire feeder and a safety clamp.



Back View

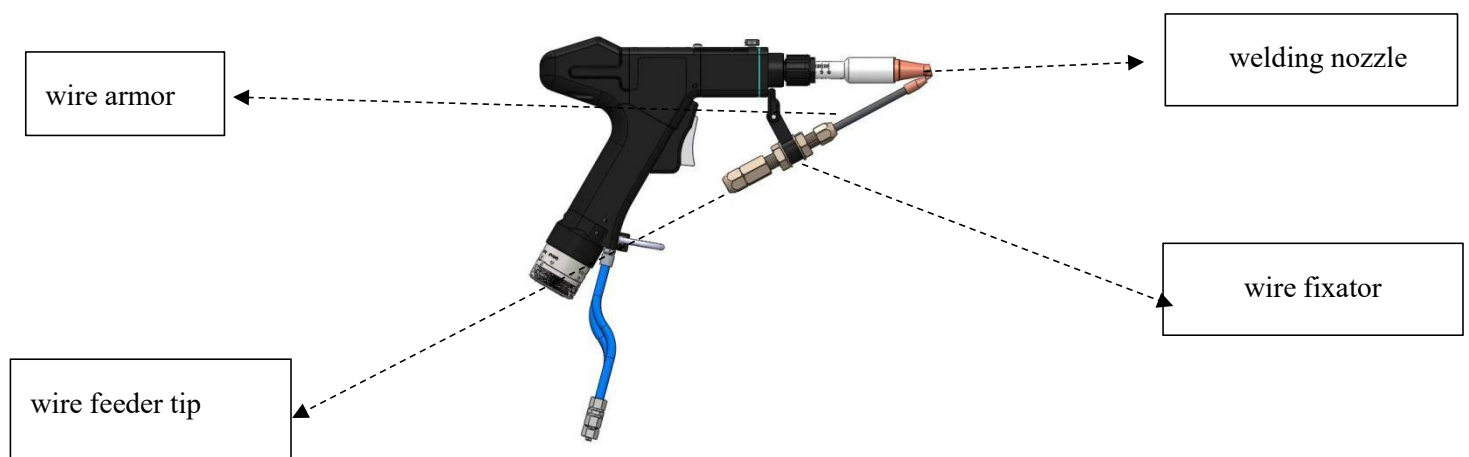
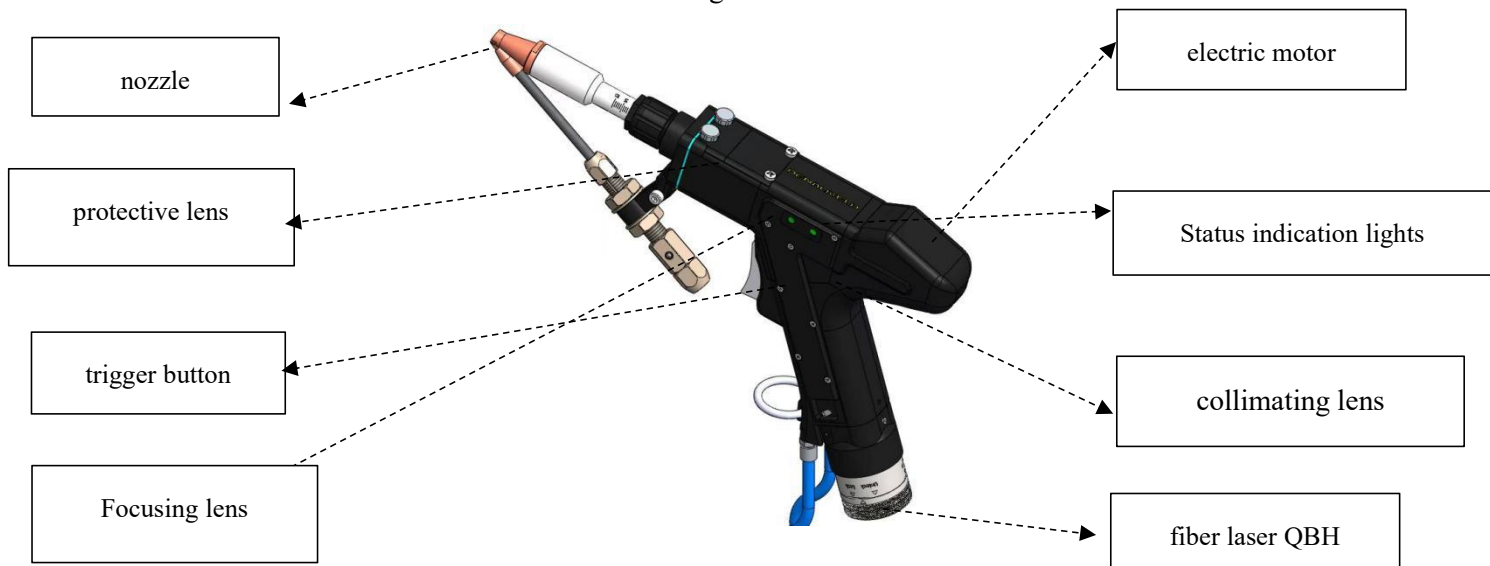
The Heat from the source cooler and the head is dissipated by a fan at the back of the machine. This design ensures that the temperature of each component remains constant.



## Main welding head

The DENALIWELD welder is equipped with a proprietary, modern head with an electric system of the moving beam PRO WOBBLE. It has a patented mechanism that drives the focusing lens through an electric motor, which allows you to automatically change its position, and thus change the width of the beam. In this way, the width of the desired joint can be easily adjusted. The head is water-cooled, which allows it to work stably and without interruptions. The device has an ergonomic design and lies securely in the hand.

Welding head



## QBH Connection



Remove the dust cover of optical fiber and check whether the protective cap of fiber crystal head is locked.

Clean the optical fiber head with a dust-free cotton swab and absolute ethanol to ensure that the optical fiber section is clean and dust-free.

- ◆ Place the welding head horizontally.
- ◆ Align the red point at the end of the QBH interface to the red point of the handwheel.
- ◆ Remove QBH dustproof cover.
- ◆ Align the red mark of male fiber end to red mark on female QBH head when you insert the fiber end.
- straightly to bottom of QBH interface of head.
  - ◆ Turn the QBH handwheel clockwise. It is in place when you hear the "Da" sound, then pull the handwheel up and turn clockwise to end.

## Daily Inspection

- Check whether the cover glass is dirty before daily use and replace it if necessary.
- Check whether the QBH connector is loose before daily use and ensure that the lock does not shake before it can work normally.
- Check whether the copper nozzle is blocked and whether it is conductive between the copper nozzle and the safety lock before daily use. If it is blocked and the welding slag cannot be removed, replace the copper nozzle. If the conductivity is poor, replace the copper nozzle.
- Check whether there is water leakage to wiring before daily use.
- Pay attention to the correct connection of gas, gas pipe is  $\varnothing$  6mm.

## Automatic wire feeder



Power source	24V DC
Rated power	80W
Time delay	0-800ms
Feeding speed	5-100(mm/s)
Retract speed	100(mm/s)
Retract length	0-100mm Continuously adjustable
Filling Time	0-800ms Continuously adjustable
Filling Speed	0-100mm Continuously adjustable
Customized-made	Acceptable

Correctly mounted wire feeder at the head ensures good wire guiding in the nozzle groove. It is mounted rigidly, ensuring good guidance. The wire feeding speed is adjusted to the specific welding technology. The feed speed is adjusted by a button on the feeder.

### Attention information.

- 1) Ensure reliable grounding before supplying power.
- 2) The wire feed wheel matches the wire and corresponds to the wire feed tube
- 3) Don't twist the wire feed tube

## Troubleshooting of Wire Feeder

S/N	Faults	Reason	Solution
1	Power LED not ON	24V power cable breaks Power switch fails Poor welding / disconnection of internal wire inside switch plug of welding head Wire feeding motor fails Out of wire Motor plug loose on motion card	Change power cable. Change power switch Replace the plug and check the connecting wire. Replace the wire feeding motor. Replace the welding wire disc. Replug
2	Wire feeding fails by operating welding head	Welding wire knotted Wire feeding tube knotted The welding wire is blocked at the outlet of the wire feeder Wire feeding tube blocked Insufficient tension Control board fails The welding wire is knotted in the welding wire reel Mismatch or wear of wire feeding tube Improper wire feeding reel Incorrect tension by tension regulator	Loosen the tension regulator and rewind the wire Straighten out the wire feeding tube. Adjust the wire guide tube to align with the outlet of the wire feeder Replace the wire feeding tube. Loosen the welding wire disc brake. Replace the control board. Remove the knotted part and rewind the wire. Replace wire feeding tube. Replace wire feeding reel. Modify the tension.
3	Unstable wire feeding speed and poor wire feeding	Wire feeding motor fails Drive card fails Jam of wire feeding tube The bending angle of wire feeding tube is less than 30 degrees Deformation of wire feeding tube after Extrusion	Replace the wire feeding motor. Replace drive card. replace or clean the wire feeding tube the wire feeding tube must be as straight as as possible Replace the wire feeding 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 inside of feeding tube with compressed air to remove the impurities in the wire feeding tube.
- The wire guide tube shall be kept smooth without extrusion, deformation and folding.
- Regularly clean the dust in the machine and check the smooth rotation and noise of the motor.

## 2 Cautions

### Operation Environment

- This machine is for indoor use. Do not use it where water drops and raindrops are available.
- Please use it at ambient temperature of - 10 °C to 45 °C. (14°F~113°F)
- Do not locate it on the table with strong vibration or great impact.

### Use Attention

- When installing the welding wire spool or inserting the welding wire into the wire guide tube, do not wear gloves to avoid winding accidents caused by the rotation of rotating parts.
- Please confirm the weight of the welding wire spool. The weight of the welding wire shall not be greater than 15kg. Otherwise the spool of wire may fall off.
- During welding, please close the right-side plate as electric shock or winding accidents may occur due to the rotation.
- Before welding, please confirm whether the disc shaft end cover is tightened otherwise the welding wire disc may fall off due to the inclination of the welding wire disc.

## 2. Control panel

From the control panel, you can regulate machine functions, such as: laser power, Wobble Width.



Control Panel

The front end of the welding machine is provided with two knobs, and the process parameters can be quickly adjusted through the knobs.

- Laser Power: laser output power from 0 to 500/800W.
- Wobble Size: to adjust the line spot width 0-5mm while wobble welding.

## 3 **Auxiliary Function**

### 3. 1 **Weld Seam Clean**

#### 3. 1. 1 **Configuration**

- 2 -in-1 laser head with welding and seam cleaning functions.
- Remove wire feeding mechanism, welding nozzle and extension tube.
- Mount the clean tube.

#### 3. 1. 2 **Parameter Setting**

- Laser Power: laser output power from 0 to 500/800W.
- Clean Width: to adjust the line spot width 0-5mm while cleaning.

### 3. Laser source

(The laser cannot operate in an environment with a temperature lower than 10 °C, (50°F) to prevent laser condensation from damaging the internal light source!

DENALIWELD Laser source is a highly efficient, reliable, and maintenance-free high-power device. The wavelength range is from 1060 nm to 1100 nm. Compared to water cooling, the photoelectric conversion efficiency is 25% higher. This brand is a top-class product, the design and testing fully take safety into accountability.

The Accurate operation of the laser source in strict accordance with this manual instruction guide guarantees reliability and safety. This kind of laser source has some unique features that may present some safety hazards and therefore cannot be treated like other light or low power laser sources. All personnel that operate the laser or are near it must be informed of all these dangers. To ensure safety, the disassembling of this device is not allowed. This product has no user-serviceable parts or components. The warranty will be void if the laser source has been disassembled without authorization. All laser parameters are set before leaving the factory. Unauthorized personnel should not perform the installation, setting, maintenance or other operations.

Please refer to the separate laser source user manual.

## Chapter II Installation and Start-up of the Device and Guidelines on Operation

### 1. Preparation before installation

#### (1) Requirements:

The equipment should be installed in an independent space with access to suitable gas and electric connections. The floor should be level, hard and shockproof, and the laser warning logo should be visible on the front door.

#### (2) Environmental Requirements:

A. Lighting in the work room should be in good condition. Within 20 meters (65') from the device, there should be no interference from equipment with strong vibrations and an electromagnetic field.

B. The ambient temperature must be between -10 ° C and 45 ° C, (14°F -113°F) the humidity should be below 70% and the absolute altitude should be less than 1000m (3280') to ensure the equipment is in the best working condition. The ambient temperature must be stable, and the working space should be equipped with air conditioning.

C. To ensure clean air in the workroom, the customer should install a smoke exhaust system in accordance with the conditions prevailing on site after installation and commissioning of the device.

D. It cannot be used in an explosive and dangerous environment.

#### (3) Power Requirements:

Voltage: 230 VAC with permissible voltage fluctuation 230 VAC  $\pm 3\%$ .

Frequency: 60 Hz frequency, 60 Hz  $\pm 0.2$  Hz fluctuation allowed.

---power supply may be customized for use in different countries. Please refer to nameplate.



## 2. Installation process

Connect the machine to the power supply, connect the gas hose to the cylinder with a shielding gas regulator.

### (1) Turn-on process:

- 1) Turn on the POWER (front panel of the machine)
- 2) Make sure shielding gas is supplied
- 3) Make sure the protective glass is clear
- 4) Enter the parameters

### (2) Shutdown Process:

- 1) Turn off the START (panel on the front of the machine)
- 2) Secure the welding heads

## 3. Principles of operation during the welding process

To emit the active laser beam, you must confirm that all the indicators are in the normal state, and then press the trigger button to activate the laser.

- (1) The operator must be equipped with gloves suitable for laser welding, protective goggles against the reflected laser and a protection helmet.

- (2) On the operation Control panel, set the parameters for the desired effect to be welded.

(3) By adjusting the extension of the nozzle, you must correctly set the focal length of the head, i.e. the focus of the beam. **ATTENTION!** Working on an inadequately matched focus may damage the optical components of the head.

(4) Keep the correct angle between the nozzle and the welded material, aim the laser beam (red dot / dash) between two connected elements and activate the beam with the trigger button. Begin welding by moving the head along the joint.

## Chapter III Equipment Safety Regulations, Daily Maintenance and After-sales Service




### 1.Safety rules

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

Warning 1: Since the laser wave is not visible, special care is required to avoid mirror reflection.

Warning 2: The energy of the laser beam from the welding head is sufficient to cut or weld metal, to burn skin, clothing, and paint, and to ignite volatile substances such as alcohol, gasoline, ether etc. Therefore, isolate flammable materials around the laser on work.

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, please check all labels on the body of the machine!

## 2. Safety rules for the use of equipment

When laser equipment is in use, it will be very dangerous if a breakdown happens. The operator must strictly follow the rules of safe operation of the laser system which not only ensures the safety of the person who is working and using the equipment, but also ensure the standard operation of the laser device, achieve technical efficiency, and take full advantage of processing benefits. Therefore, during operation, the safety regulations must be strictly observed.

- (1). Comply with the safety regulations for the equipment operation.
- (2). The operator must undergo initial training, master the construction and operation of the equipment, familiarize themselves with operating procedures and is qualified before starting independent work.
- (3). While operating the laser welder, the operator should wear personal protective equipment in accordance with health and safety regulations, e.g. safety glasses, protective visor, welding apron, welding gloves and approved goggles or helmets. It is totally forbidden to emit lasers on unprocessed products and human bodies.
- (4). After starting the device, the operator should not leave the dedicated, specialized workstation or entrust it to unauthorized persons, the machine should be turned off when it is necessary to move away from the workplace.
- (5). Keep a fire extinguisher within easy reach, turn off the laser when not in use, and do not put paper, fabric or other flammable materials around an unprotected laser beam.
- (6). Keep the area around the device clean, tidy and without residue. Make sure that Items, tools, and waste are properly stored.
- (7). When using shielding gas cylinders, do not crush wires, cables, or gas pipes to avoid accidents and gas leaks. The use and transportation of gas cylinders should conform to the regulations of safety provided by the supplier of industrial gas. It is forbidden to expose the gas cylinder to sunlight or to a heat source. The operator must stand on the side of outlet of the cylinder when opening the valve.
- (8). If any abnormalities are detected during the operation of the machine, the equipment should be turned off immediately to minimize potential damage.
- (9). The operator must concentrate all their attention while operating the device and do not talk, play, listen to music or do other activities not related to welding work.
- (10). If the machine will not be used for more than thirty minutes, it is required that you turn off the power.

(11). When installing, repairing, and maintaining the machine, turn off the main power source. Any inadequate operations while the equipment is running could have fatal consequences. Inadvertent exposure to high-voltage electric shock may cause cardiac arrest, burns or other serious injury.

(12). The emergency stop has priority over any other control operation; it will disable the laser operation. Stop the power supply, stop power to all system controls and potentially dangerous functional parts. Then the laser light will appear. In case of errors of the laser light, you should immediately release the trigger button and press the emergency stop button to check and find the cause of the error.

(13). In addition to trained operators, other unrelated personnel should stay as far as possible away from the welding operation area. Avoid unqualified welding operators or operating errors that may cause damage.

(14). Unqualified personnel who do not operate welding machines or unauthorized laser engineers are not allowed to operate any peripheral device of the hand-held welding machine without direct permission. DenaliWeld and its distributors are not responsible for any consequences caused by private activity or non-compliance with the operational process.

(15). If the machine will not turn on, please check the laser alarm lights, GREEN: normal action; RED: malfunction. All parameters are preset from the factory. Do not disassemble the laser without permission from DenaliWeld.

### 3. Daily maintenance

- (1) Clean the machine, remove dust and dirt to maintain its beautiful appearance.
- (2) Check the integrity of the dust cover, remove all dust and dirt.
- (3) Check and make sure the protective glass is clean.
- (4) Check the voltage stabilizer. Monitor input / output voltage and gas pressure.
- (5) Make sure there are no leaks.

### 4. Cleaning and replacing the protective lens

During cleaning and replacement, any contamination affects the light transmittance of the lens which will shorten its life.

Here are the precautions to take before starting work:

Before removing the drawer with the protective glass, clean the area of the drawer to minimize the chance of any dirt getting inside the head.

#### Replacing the protective glass

- a. Before putting on the protective lens, wear powder-free gloves / rubber gloves / latex gloves.
- b. Carefully install the protective glass with tools, do not scratch it.

#### Cleaning the protective glass:

- a. Hold the edge of the glass without touching the top surface. Always put glass on lenticular paper.
- b. Keep the protective lens as clean as possible and away from dirt.
- c. Only alcohol (99%) will dissolve contaminants without damaging the lens.
- d. Clean the lens as thoroughly as possible in a dust-free room.

Main cleaning tools: Aurilave ball, alcohol (99%), dust-free swabs



If there is dust on the lens: use the Aurilave ball to blow the dust off, then clean the lens carefully with a dry cotton swab, without using force.

For stains on the lens: take a dry cotton swab and dip it in anhydrous ethanol. Caution, make sure that no dust particles are visible on the surface. Clean the lens in a circular motion starting from the center, do not use an anterior-posterior movement.

Then, as long as the lens surface is still wet, wipe the lens in the same way with a dry cotton swab. Do not re-use cotton balls. If contamination persists, an anhydrous mixture of ethanol and anhydrous diethyl ether can be used for final treatment.

The process of cleaning correctly is very important. You can practice with a damaged laser protective lens. However, regardless of the technique, slight damages may occur on the surface of the lens.

After removing the drawer with the protective glass, immediately cover the opening of the head, e.g. with tape, to minimize the risk of contamination of the lower focusing lens.

## 5. Possible problems and ways to solve them.

No	Problem	Likely cause of the error	Comment
1	No laser	<ul style="list-style-type: none"> <li>- Turn off the laser.</li> <li>- The laser alarms and does not start the source.</li> <li>- Damage to the laser button, damage to the indicator light, or opening of the safety lock when the components are not connected.</li> <li>- Damage to the laser source.</li> </ul>	<ul style="list-style-type: none"> <li>- Check that the laser power button turns on.</li> <li>- Verify the laser source is on or alerting and reading signal alert information.</li> <li>- Check the operation of the cooler.</li> <li>- Check signal line for laser connection and safety line.</li> </ul>
2	No oscillation	<ul style="list-style-type: none"> <li>- Oscillation function disabled,</li> <li>- Invalid oscillation parameter.</li> <li>- Electric motor defective.</li> <li>- No signal, broken wire.</li> </ul>	<ul style="list-style-type: none"> <li>- Check if the oscillation function is on turned on</li> <li>- Check the correct operation of the power supply 24 V</li> <li>- Check if the set oscillation value is standard, if the IO output on the touch screen is working and if the motor signal line is connected.</li> </ul>
3	Weak Laser power	<ul style="list-style-type: none"> <li>- Damaged protective glass, focusing lens or collimating lens.</li> <li>- Problem with the temperature inside the radiator.</li> </ul>	<ul style="list-style-type: none"> <li>- Damage or contamination of the protective lens / focusing lens / collimating lens can cause the laser to refract, weakening it.</li> </ul>
4	The oscillating red light decreases	<ul style="list-style-type: none"> <li>- Badly adjusted electric motor,</li> <li>- Damaged electric motor or its control.</li> <li>- Incorrect angle of the angular lens.</li> </ul>	<ul style="list-style-type: none"> <li>- Check that the electric motor is working,</li> <li>- Check the position of the angular lens and the correct reflection of the laser light,</li> <li>- Unscrew the cover screw. Block first.</li> </ul>

5	Laser Source alarm	<ul style="list-style-type: none"> <li>- Faulty tip of QBH</li> <li>- Too low / high water temperature in the cooler</li> <li>- Source blockage due to reflected beam</li> <li>- Other factors</li> </ul>	<ul style="list-style-type: none"> <li>- Still active laser source extinction alarm, can be read by decoding laser software input string.</li> <li>- Other faults are also read by the alarm information of the laser software and check that the water line and the amount of water in the tank are adequate.</li> </ul> <p>QBH alarm: check QBH connection or thermistor on break line</p>



## 6. Regular Cleaning

1) Dust removal: keep the machine clean - remove dust from the head, clean / replace the filters behind the fans at the back of the machine to ensure adequate ventilation.

2) Nozzle cleaning: After a long period of use, the nozzle tip will show residues and deposits which will block the shielding gas and affect the laser energy on the surface of the processing material.

## 7. Repair process.

Repair demands could be sent by mail, telephone, or online APP to contact with the related salesman or after sales services engineers. We ensure that the reports are constantly followed and processed within no more than 48 hours of their receipt.

## 8. Storage requirements

Storage temperature 10 °C ~ 30 °C, (50°F~86°F) humidity 10% ~ 70%.

## 9. Equipment transportation requirements

When transporting the device, make all possible protective measures.

## 10. Equipment abandonment instructions

The power cord should be removed and marked as scrap.

## 11. Loss of Warranty

It is forbidden to make any modifications to the device without prior written authorization from the manufacturer. It is forbidden to use an external service that is not authorized by the manufacturer. It is forbidden to use consumables and service parts not authorized by the manufacturer.