Operator’s Manual

V1- 2024.6.18

HAND-HELD FIBER LASER WELDER

CY-WF1500S

(Air-cooled Version)

DISCLAIMER:

Thank you for purchasing this Class 4 (IV) laser welder made by DOMAIN LASER.

IMPORTANT:

Do not attempt to operate this equipment without prior consent and training from an DOMAIN LASER qualified technician.

a. All electrical work should be performed by a certified electrician in accordance with state and localrequirements.
b. Please read the entire manual carefully before operating thisequipment
c. This equipment meets all government published guidelines for Class IV laser equipment and is FDA approved for use in the USA/Canada and CE certified for use in Europe.
d. Operating the equipment shall be performed in accordance with state and local guidelines for the Class IV laserequipment
e. The company must appoint a Laser SafetyOfficer (LSO).The LSO will follow the written safetyproceduresandguidelinesforClassIVlaserequipment andthoseprovidedbyDOMAIN LASER.It is recommended that all persons using this equipment take additional laser training onlineat:
www.lia.org/training/non-medical/online-courses/laser-safety-officer-training-onlinehttps://www.compliancetrainingonline.com/laser_safety.cfm
f. When operating this laser equipment, the operator must wear the approved Laser Eyewear that is provided with this equipment. Failure to do so could result in personal injury.

While numerous measures have been taken to ensure the operator's safety and safe use of the laser equipment as per the published guidelines for Class 4 laser equipment, incorrect or improper use, maintenance, modifications of the equipment may cause unnecessary damages and personal injury to the operator and/or the equipment.

Please pay special attention to the following tips:

1、Do not attempt to change any parts inside the machine with power on.

2、Make sure this machine is well-grounded and regular inspection is necessary.

3、Use one hand only to turn on/off the main switch in order to avoid possible electrical shock.

4、If you have to touch the parts with high voltage, please use well-insulated tools for security.

NOTICE

1、This machine is a Class 4 laser machine. Any direct exposure to laser flash or beam can be harmful to the operator's eyes or skin. Please wear laser safety goggles for 1064nm laser to prevent possible hurt to operator's eyes and wear fire-proof suit or gloves to prevent possible burnt on skin

2. There is a risk of fire or even explosion if the laser beam comes in contact with flammable materials. Therefore, avoid any flammable materials nearby the laser path.

3、 Please do not operate this machine when the top cover is open, unless you're permitted to do so by our technician for the purpose of checking or repairing.

4、 Safety clamp must be applied in order to prevent false triggering of laser. Laser output only occurs when the clamp is touching on metal material itself. Metal material with insulating coating or painting won't activate laser.

INSTALLATION DATE: _____

INSTALLATION PERSON: _____

INSTALLATION VOLTAGE: ☒220/60 ☒220/50 ~ 20A

☒380/60 ☒380/50 ~ 40A

LASER SOURCE MODEL NO: _____

LASER SOURCE SERIAL NO: _____

LASER GUN MODEL NO: _____

LASER GUN SERIAL NO: _____

Chapter 1: Machine Introduction

* Machine appearance or color can be different without prior notice.
Gas bottle is not offered, users must prepare by themselves.

1-1 Application

Welding and forming of different sheet metal pieces, AD signs, commercial kitchen, stove, crill cart, food cart, doors, windows, frames, metal furniture, lamp covers, power cases, fire boxes, pipes and etc.

1-2 Features

- Long life fiber laser adopted, high photo-electronic conversion efficiency, low maintenance
- Easy step-in interface with multiple language option
- Compact all-in-1 design save its footprint and ensure greatest mobility
- 1000W/1500W/2000W available to meet different demand for welding depth and work efficiency
- Wobble laser gun can realize up to 5mm wide weld bead, which allows wider seam or rough edge
- Nice and smooth finishing, repeat welding or double sides welding acceptable, less polishing
- Versitile nozzle kit can serve in more application sceneries from welding to cutting
- Standard welding head and wobble head both available per application demand
- Optional auto wire feeder can build up a better and stronger finishing with not leakage

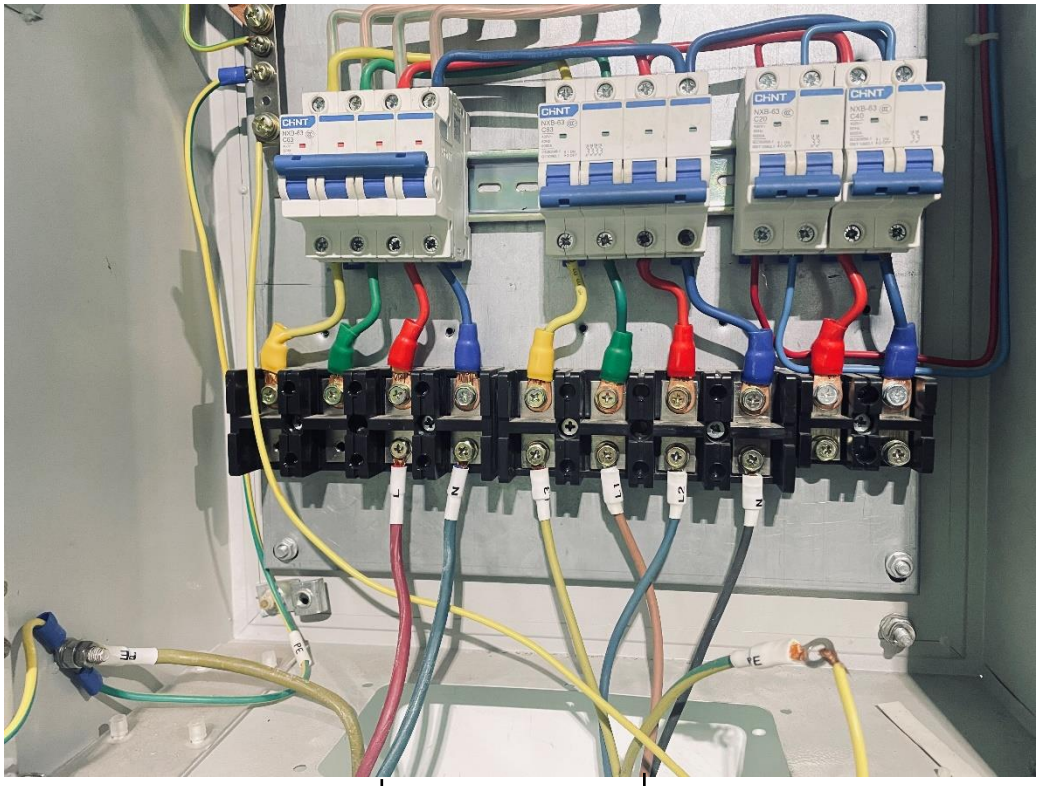
1-3 Technical Data

Model No.	CY-WF1500S
Laser Power	1500W (±1.5%)
Laser Wavelength	1064nm
Laser Mode	continuous or modulated
Laser Frequency	1~3000 kHz
Weld Width	0.2~5mm (without filler);1~5mm (with filler)
Max Penetration Depth	5mm
Power Consumption	4KW
Power Supply	AC 220V, 50/60Hz
Locating System	red laser pointer
Flexible Extension	support co-work with robot arm
Fiber Cable Length	10 meters
Fiber Gun Type	Wobble laser gun with QBH fiber connector
Cooling Type	Air-Cooling
Dimensions	L85*W40*H117 (cm)
Net Weight	92KG (laser 40KG,feeder 19KG,cart 33KG)
Ambient Environment	Temperature -20℃~40℃,Humidity 5%~85%

Chaper 2: Quick Start

2-1 Power Connection

Single phase AC220V 50Hz/60Hz power supply is required for this system.And 16A fuse is suggested.



FOR 1000W /1500W /2000W (220V)

L: live wire (red color)

N: Neutral wire (blue color)

PE: ground wire (yellow color)

Please follow the wire code that printed on plastic wire caps !!!!!

FOR 3000W laser (380V)

L1: live wire (brown color)

L2: live wire (blue color)

L3: live wire (yellow color)

N: Neutral wire (black color)

PE: ground wire (green&yellow)

2-2 Gas Connection

Shield gas or clean compressed air MUST be connected to this laser system in any condition !!!!

▪ If argon/nitrogen gas adopted, please connect gas bottle directly to Gas Port behind machine body by air tube of outer diameter 8mm.

▪ If compressed air to be used, please make sure it's clean and dry in order to extend the lifetime of optical lens and laser gun significantly.

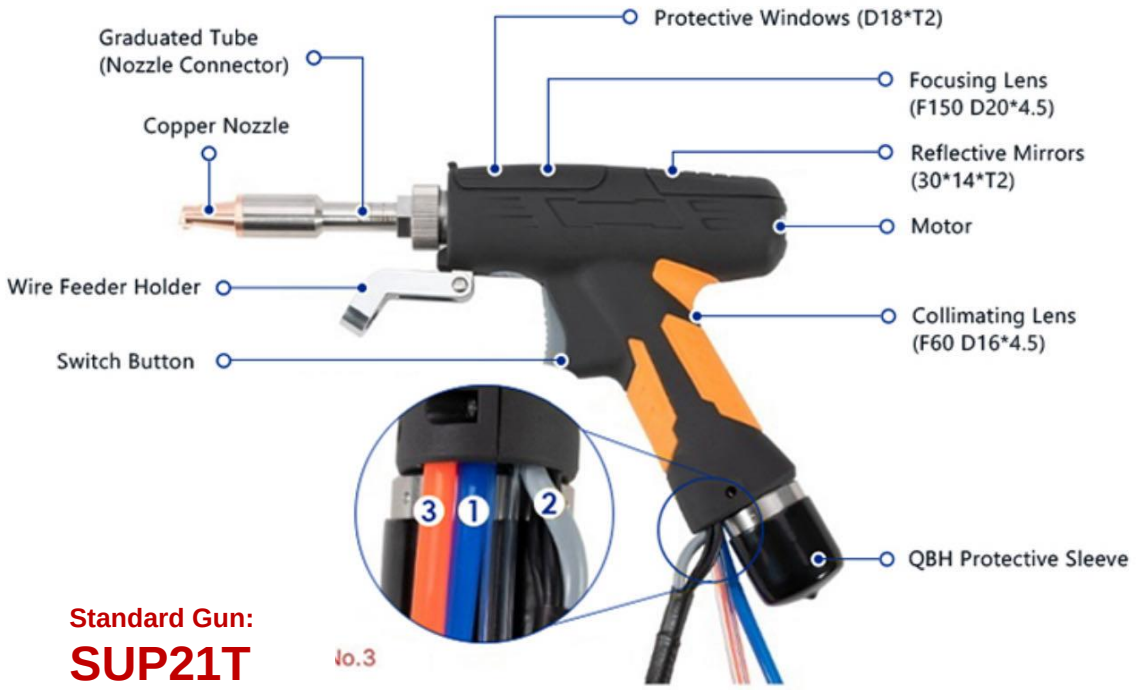
▪ Suggested gas pressure is 0.3~0.5 MPa (3~5 bar) for welding or cleaning job. For laser cutting, please raise the gas pressure to 1MPa (10 bar)

2-3 Laser Gun Preparation:

Take the gun out from the side-hanger and leave the spare fiber in coil.

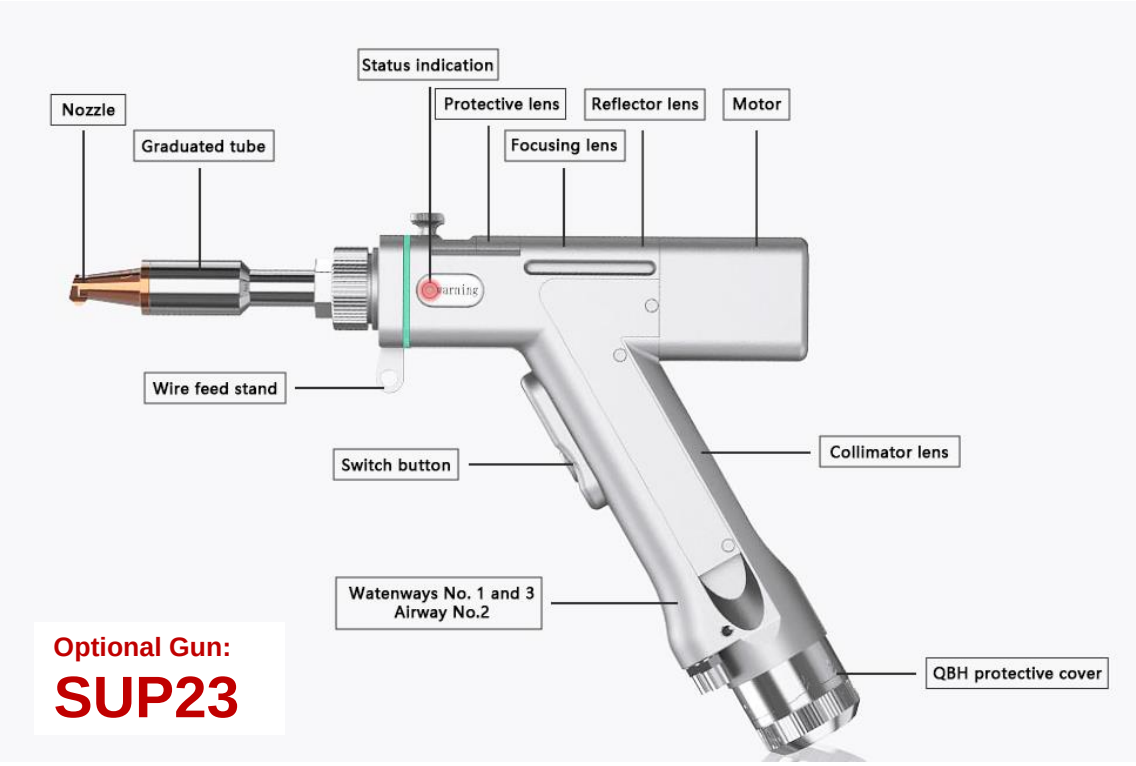
Choose suitable nozzles from the tool box and install it on laser gun

We supply stardard plastic gun SUP21T and optional metal gun SUP23T.



Standard Gun:

SUP21T



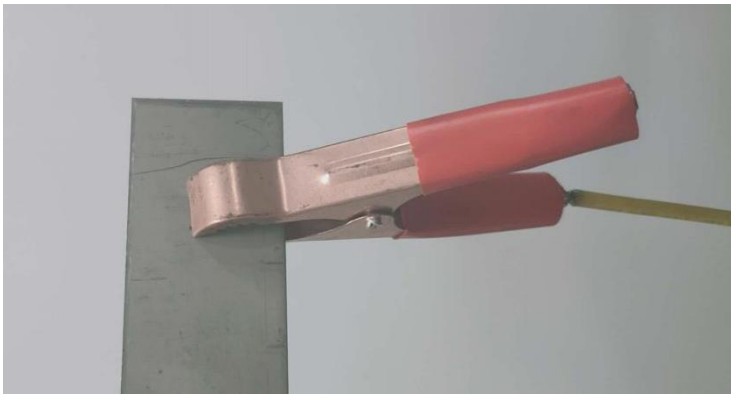
Optional Gun:

SUP23

2-4 Safety Clamp Connection

Laser safety clamp must be applied in order to prevent false triggering of laser or further accident. When safety lamp is connected, laser output only occurs when the nozzle is touching on metal materials.

Metals with insulating coating or painting,operator fingers, rubber gloves, stone, wood, and any other non-conductive material won't activate laser at all.



2-5 Start-up & Shut-down

① Release Emergency Stop
② Turn key switch clockwise
③ Power Status will light up in no time
④ After welcoming page, operation interface will display, then you're free to work

When you finish work , please follow below sequence to shut it down:

① Turn key switch counter clockwise
② Press Emergency button
③ Turn off safety fuse if necessary

2-6 Wire Feeder Preparation

1. There are 4 different specs filler wheels (0.8/1.0/1.2/1.6mm), two sides are different models for different wire diameter. Please install same diameter wheels on one side. If use 1.2mm welding wire, please install the wire wheel mark 1.2mm is outside (Figure 2)

2. When installation, stick the welding wire in the slot and then clamp again (Figure 3)

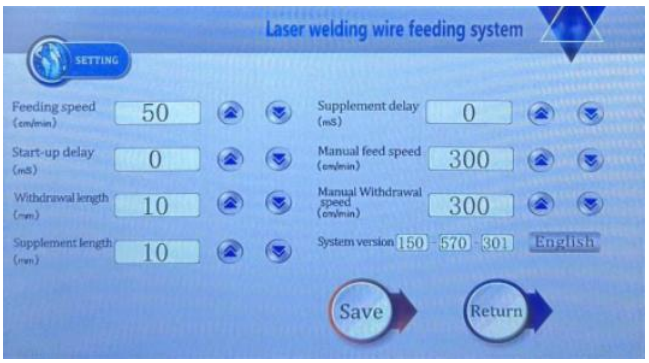
Figure 3

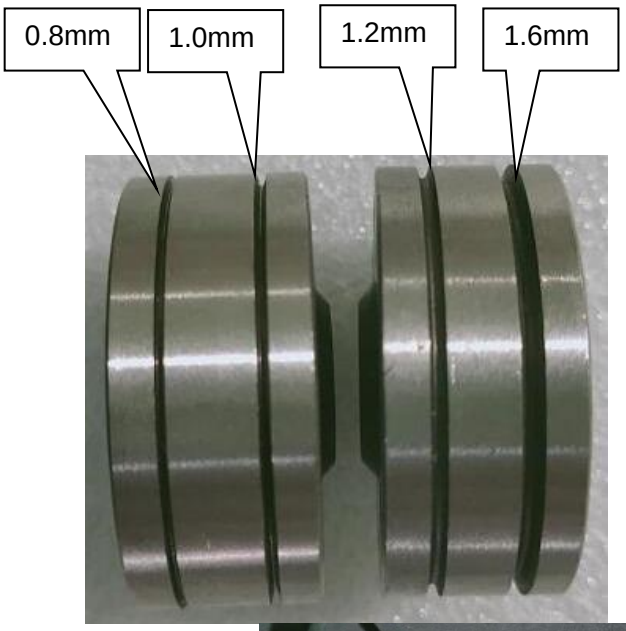
Figure 4

3. After placing the wire into the feeding tube, insert, then tighten the screw (Figure 4)

4. When installing the wire feeding pipe, remove the copper nozzle and match the corresponding copper nozzle

5. Set all required parameters and press Save button to active. Then return to home page.

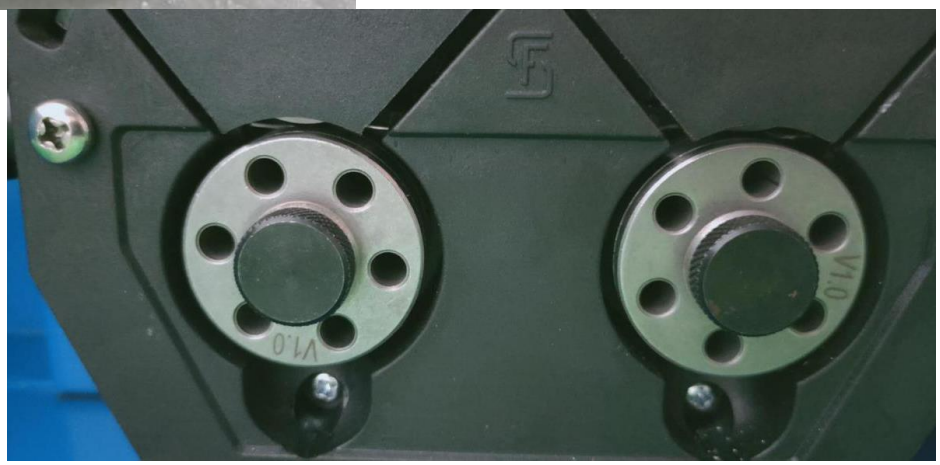




Attention!
The spec of wire feeding wheel must match with the wire diameter.

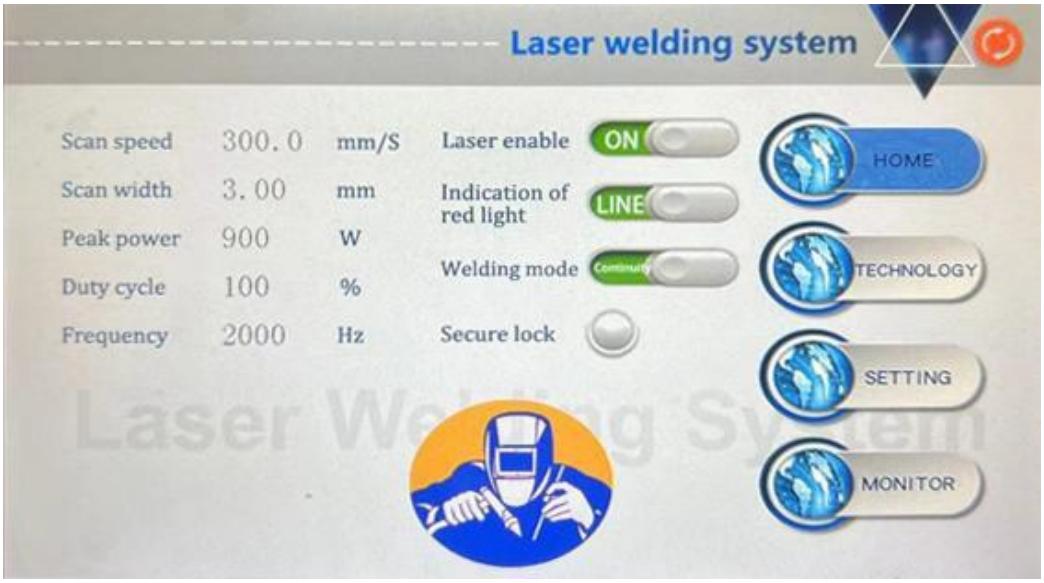
Please install two same spec wheels at the same time.

One wheel can work with two specs wire if you install the wheel on different sides.

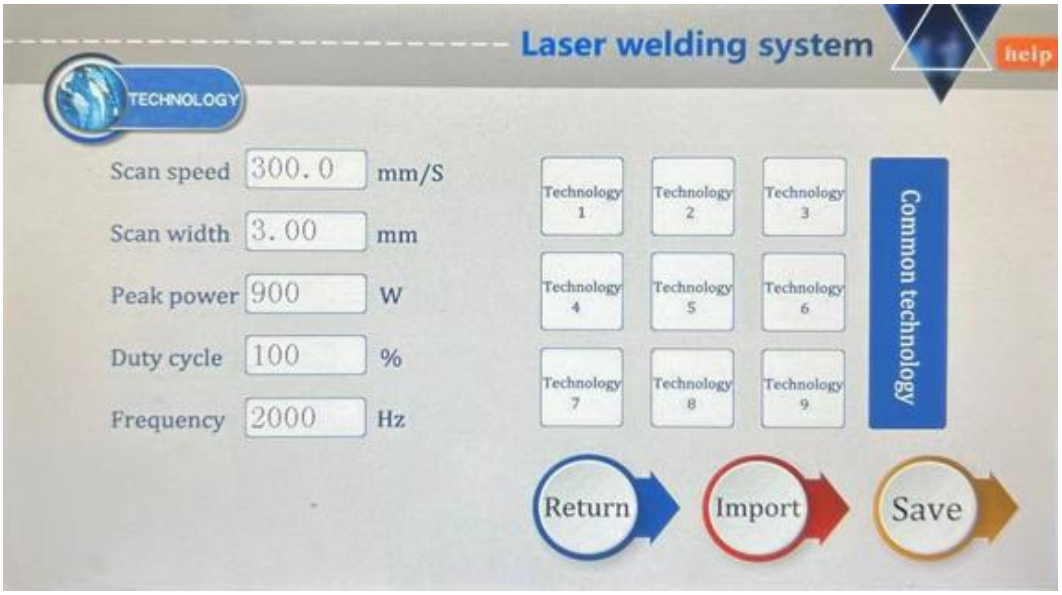


* Please buy extra U-grooved wheels and graphite feeding tube to feed aluminum wire smoothly.

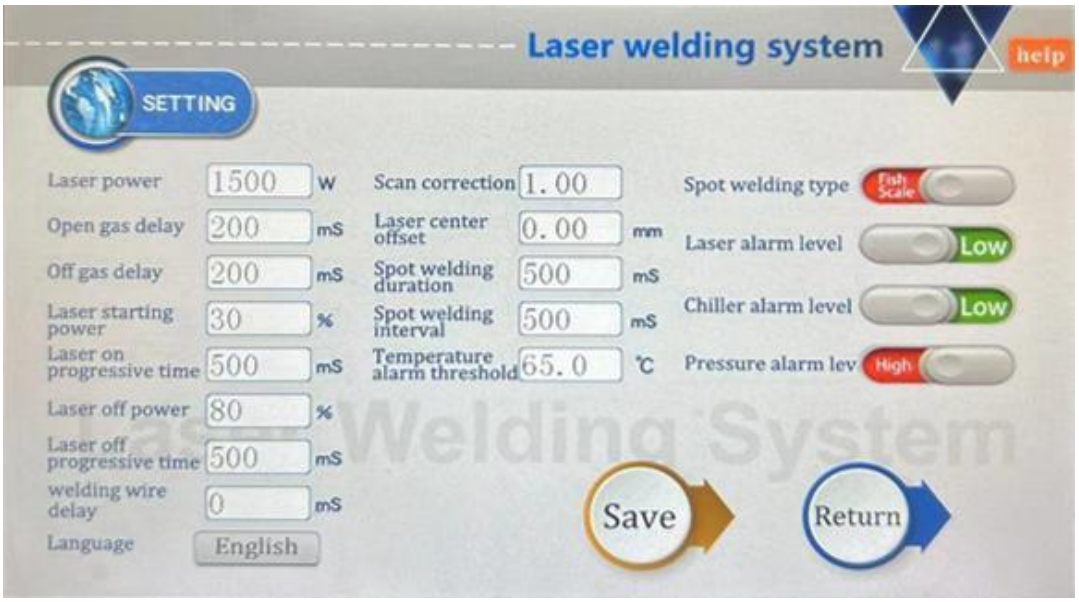
2-6 Operation Panel



1. Click "Technology" enter the parameters setting page. Adjust the above parameters according to the Process Parameters Table. There are 9 craft combinations can be memorized and recalled during work. After setting is done, click "Save", and then click "Import" before Return to homepage.



2. To adjust the red guide light, you need to check whether the red light is in the center of the outlet of the welding nozzle. If there is an offset, you need to click the "Settings" button to adjust. The first step is to click "Settings" and enter the **password:123456** to enter setting page as figure 7, adjust the left-and-right movement of the red light by pressing + or -



3. Shift to Cleaning Mode: Press the orange button on right top of the interface, confirm to shift, restart the laser, and you will eneter into laser cleaning system.

When you enter into laser cleaning system, please firslty set the focus distance and clean width per the lens specs that you purchased . Normally we offer F400 lens or F800 lens for option.

Chaper 3: Maintenance

3.1 Maintenance of Laser

（1）Cracks appear during the welding of the laser welding machine

1）The flow of protective gas is too large, which can reduce the flow of protective gas to solve.

2）The cooling speed of work piece is too fast, the temperature of cooling water on the clamp is to low, increase the water temperature.

3）The work piece is not cleaned and needs to be cleaned again.

4）The coordination gap between work pieces is too large or has burr, so the processing accuracy of work piece should be improved.

（2）The melting depth of the laser welding machine is not enough

1）Laser energy is not enough, check whether the parameters are set correctly;

2）If the focus amount of the focus mirror is wrong, the copper nozzle at the front end of the handheld head should be adjusted or the copper nozzle should be replaced (see Article 6 of this section);

3）Protection lenses, contaminated or damaged, shall be wiped or replaced (see Article 7 of this section)

（3）Laser source alarm

1）Check whether the water cooler temperature setting and the actual water cooling is normal;

2）Check whether the water flow rate of the water cooler is normal; 3）Check whether the QBH is loose;

（4）Take care of using the hand-held welding head

a）Protective gas or compressed air with a pressure of no less than 1.5Mpa shall be used;

b）A handheld head can not be aimed at people;

c）Ensure the cleanliness of optical components inside

（5）Instructions for replacement of handheld head

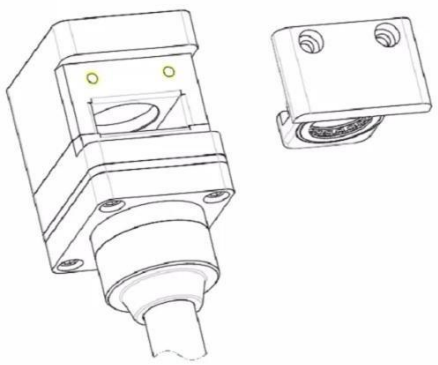
a) Unscrew the lock cover from head and take it out;

b) Remove the copper nozzle and replace it with a new one one

c) Screw the lock cover.

3.2 Lens Cleaning & Changing

The process characteristics of laser welding need clean optical component, we need regular maintenance of the lens every day, if the lens inside is burnt, please replace it.



Lens cleaning skills are extremely important, Improper cleaning will lead to lens performance decline. Please do it in a clean and dust-free environment and always be very careful when cleaning the lenses.

Before cleaning, prepare balloon (tiger), a set of spanner, dust-free and non-adhesive tape, anhydrous skim cotton, more than 99% industrial alcohol, sleeve or rubber gloves, optics cleaning paper.

Before operation, wash your hands with detergent, and wipe your hands again with sticky alcoholic cotton. Unscrew the screws, pull out the protective lens bracket, wipe the warehouse mouth and inside with a cotton ball dipped in alcohol, and quickly return the lens cover after cleaning.

Take the removed protective lens holder to a dust-free place to operate.

Check the protective lens first. (If there is an obvious burning point on the surface, it is recommended to replace it directly.)

Then check the white seal ring under the protective lens (If any scratch or deformation of the sealing ring cannot be used, it must be replaced immediately. Continuing the use will cause damage to the focus and collimation lens groups.)

When maintenance, use the mirror paper clean the surface of the protection frame, buckle, then the protection lens pressure ring and the protection lens.

Chapter 4: Trouble Shooting

Trouble	Reason	How to check	Solution
Laser won't fire	Laser disabled	Check if enable button pressed	Press enable button
	No clamp signal	Check if clamp applied on metal surface; Check if nozzle touching on metal surface	Make sure clamp and nozzle are touching on a same conductive metal piece (aluminum or painted metal are not conductive)
		Short connect two touching points on airflow switch	Supply gas to laser; raise gas flow; change airflow switch
		Check brass touching points on ceramic insulating ring inside the fiber gun (if ceramic ring installed)	Make sure two brass touching points on ceramic insulating ring are having good contact with QBH connector
		Check connection wire or connectors of clamp wire to laser	Make sure connection wire and connectors are firmly connected to laser
	Laser source no power supply	Check voltage between port 005 and Live wire, get AC220V	Change AC contactor
		Check voltage between 005 and Live wire, get no voltage	Turn on chiller, make sure chiller is working normally without any alarm. (please refer to chiller manual if any alarm heard and error code displayed)
Laser output discontinuously	Gas pressure too low	Short circuit the two feet on flow switch, laser can output continuously	Raise the gas pressure, or reduce the flow switch lowest limit by adjusting the nuts on flow switch
	Trigger button not sensitive	Short circuit COM and X1 on PLC, laser can output continuously	Change the trigger button
Power attenuation during welding	protetive lens got dusts or spoiled dots	Loosen the screw on lens drawer to take out the protective lens and cover the empty drawer with lens paper or sticker paper	Clean lens with absolute ethanol and absorbent cotton stick quickly but gently; Change a new lens if necessary
	Focal length was set improperly	/	Adjust focal distance until you find laser is stronger
	Welding parameters was set improperly	Test on S/S sheet and no attenuation	Set correct parameters per different material and thickness
		Test on S/S sheet and still attnuation found	Check PLC status or monitor laser source

Chapter 5: Parameter Setting Guide

WELDING SETTINGS								
Material	Thickness	Laser Power (W)	Scan Speed	Freq	Duty Cycle	Wobble Width	Feeding Speed	Gas
S/S	1.0	350~400	300	1000	100%	2.5	90	Nitrogen/ Argon
	1.5	400~450	300	1000	100%	2.5	85	
	2.0	500~500	300	1000	100%	3.0	80	
	2.5	600~700	300	1000	100%	3.0	75	
	3.0	700~800	300	1000	100%	3.0	70	
	4.0	1000~1200	300	1000	100%	3.5	65	
	5.0	1200~1500	300	1000	100%	3.5	60	
Carbon Steel	1.0	400~450	300	1000	100%	2.5	80	Clean Air
	1.5	700~750	300	1000	100%	2.5	75	
	2.0	750~800	300	1000	100%	3.0	70	
	2.5	1000~1100	300	1000	100%	3.0	65	
	3.0	1200~1300	300	1000	100%	3.0	65	
	4.0	1400	300	1000	100%	3.5	60	
	5.0	1500	300	1000	100%	3.5	60	
Aluminum	1.0	500	300	1000	100%	2.5	80	Nitrogen
	1.5	700	300	1000	100%	2.5	75	
	2.0	900	300	1000	100%	3.0	70	
	2.5	1200	300	1000	100%	3.0	65	
	3.0	1500	300	1000	100%	3.0	60	

- Parameters above only for reference based on test data in DOMAIN LASER lab.
- To avoid strong sparks/spatter during welding process on carbon steel, please set the nozzle tip 2~5mm away from exactly focal point.
- When welding aluminum, please adjust nozzle position to exact focal point to get the highest energy.

CLEANING SETTINGS								
Laser Power	Material	Wobble Frequency	Clean Speed	Clean Width	Clean Depth	Duty Cycle	Pulse Frequency	Efficiency
1000W 1500W	Free Rust	80hz	25mm/s 50mm/s	150mm	20μm	100%	2000	6m²/hr 15m²/hr
1000W 1500W	Painting	80hz	25mm/s 50mm/s	150mm	100μm	100%	2000	4m²/hr 6m²/hr
1000W 1500W	Thick Rust	80hz	25mm/s 50mm/s	150mm	120μm	100%	2000	2.5m²/hr 4m²/hr

Chapter 6: Pre-sales & After-sales Service

6.1 Service commitment

Wuhan Chuyu Optoelectronic technology Co.,Ltd to the customer as the center, fully understand the customer needs, to provide customers with perfect, personalized installation, debugging, training, maintenance and other pre-sales and after-sales services.

（1）Pre-sale service

Before signing the contract, the company will provide customers with various production process solutions, and provide laser welding equipment for technical consultation, sample testing, equipment selection and other services.

（2）Installation and trial run

According to the contract, our company will safely transport the equipment to the installation place designated by the user within the specified time, and provide installation and use video, online technical service to install it. ensure the installation and debugging successful.

（1）After-sales training

After the installation and debugging, the company shall provide free technical training. until the operators can use the equipment independently. The main training contents are as follows:

- Basic principles of laser welding technology
- Main structure of laser welding equipment
- Use of laser welding equipment for operation
- Adjustment of laser welding process parameters
- Maintenance of the laser welding equipment

（2）After-sales commitment

- Free equipment warranty for one year (excluding man-made damage, optical fiber broken);
- Free technical consultation, process and software upgrade services;
- Response time of customer service is within 3 hours;
- Provide lifetime maintenance service, only for the parts cost charge;
- Extensive hardware and software support for machine life.

6.2 Limitations of the warranty

Damage to products and their components (including optical fibers) caused by tampering, opening, removal, miss assembly, and improvement caused by non - Domain laser personnel, or damage caused by misuse, negligence, or accident, abnormal installation and maintenance, misuse or information and warnings in the user's manual are not covered by the warranty. The customer is responsible to understand and follow the operation instructions in the user manual and operation scope, and the damage caused by the incorrect operation is not guaranteed. Accessories and other parts are not covered by the warranty.

6.3 Technical Support and Product Maintenance

There are no other built-in accessories for user maintenance except those provided, so the maintenance outside the accessories provided shall be carried out by Domain Laser technicians. In case of any fault during the process of use, and do the trouble shooting.

All repair and replacement products must be placed in the original package provided, otherwise Domain Laser will be not entitled to repair any product damage caused.

When you receive the Domain Laser product for the first time, please check whether the product is intact and the accessories are complete. If there is any abnormal situation, please contact the carrier and Domain Laser in time.

Domain Laser will continue to develop new products. The product information listed in the manual is subject to change without prior notice. All technical parameters shall be subject to the contract terms.

The above warranty and service terms of DOMAIN LASER for the products are for user reference only, and the formal service and warranty content shall be subject to the treaty in the contract.