

Be sure to read the manual before using the system

- This manual is the user manual of double-swing handheld laser welding system
- Read the manual carefully first to ensure the correct electrical connection

DWT20

Qilin Handheld Laser Welding Head-One Motor
V11⁺ controller + DWT20 welding head



Shenzhen Qilin Laser Application Technology Co., Ltd.

Address: Building 8, Fanmao Industrial Zone, Shuiyin Road,

Gongming Street, Guangming New District, Shenzhen

Tel: 0755-27999931 Mob.: +86-13424151221

Address: www.qilinlaser.com

Copyright Statement

Shenzhen Qilin Laser Application Technology Co., LTD. (hereinafter referred to as Qilin Laser) reserves all powers.

—Qilin Laser has the patent copyright and intellectual property rights of this product. Without the authorization and permission of Qilin Laser, it shall not directly or indirectly copy, manufacture, process or use the product and its relevant parts, otherwise Qilin Laser will be investigated for relevant legal liabilities according to law.

—Qilin Laser retains the right to modify the documents such as products and product specifications in this manual without notice, while retaining the right to modify any documentation attached with this product.

—Users should read the manual carefully when using the products described in this article. Qilin Laser does not bear the direct, indirect, special, incidental or corresponding losses or liabilities caused by the improper use of this manual or this product. Qilin Laser does not bear the following direct or indirect liabilities or losses:

- Users use this manual or this product improperly
- The loss caused by the user for failing to follow the relevant safety operating procedures

—The loss caused by natural forces makes the machine in movement dangerous, the user is responsible to design an effective error handling and safety protection mechanism in the machine, and Qilin laser has no obligation or responsibility to be responsible for the incidental or corresponding losses caused thereby.

Certification statement

The CE Certification Statement

This product has passed the EU CE (Communate Europene) safety certification, has passed the corresponding conformity assessment procedures and the manufacturer's conformity declaration, and comply with the relevant EU directives.

ROHS, Certification Statement

This product has passed the EU legislation on restricting the use of certain harmful components in electronic and electrical equipment (Restriction of Hazardous Substances) safety certification, in accordance with the relevant EU environmental regulations.

The FCC Certification Statement

This product has passed the US Federal Communications Commission (Federal Communications Commission) safety certification and complies with the relevant safety regulations of American electronic products.

Security information

Please use the system and operate safely. Use some signs or text to remind you of dangerous matters and some important information.

**DANGER:**

Represents a serious danger. In the process of use, if improper operation or wrong use, may lead to serious injury or even death, please do not operate easily, until ensure that the operation method is correct and correct use of use.

**WARNING:**

It indicates a danger. In the process of use, if improper operation or wrong use, may cause personnel injury, please do not operate easily, until to ensure that the operation method is correct and use the correct.

**CAUTION:**

Represents a potential risk of the product. During use, if the use method is wrong or improper operation, the product or some parts may be damaged. Please users and related personnel do not operate easily, until to ensure that the operation method is correct and correct before use.

**IMPORTANT:**

Represents important information to note during product use. Please do not ignore this information, these, the information will provide effective operational help.



This label indicates that the laser radiation is generally attached to the output laser products. Be careful of the laser and safety when using such equipment.

Receiving & Unpacking & Inspection

The product uses shock-proof soft packaging. If the package has any external damage traces, please check the equipment damage and inform the carrier and the carrier of the damage in written documents.

Important:



After receiving the product, please check whether the outer package is intact, and check whether the product is complete and all parts are intact after unpacking. If any damage is found, please contact Qilin immediately.

Remove all goods from the package and keep the packaging materials and wiring parts. Please be careful that the goods are safe when dismantling the package and After removing the goods, please check if the parts are complete and intact. If missing parts are found or damaged, please contact Qilin Laser immediately. If any obvious damage to the equipment is found, do not install or debug the equipment. The delivery list of the user manual is shown in the following table: (As the product is constantly updated, the shipping list may be adjusted too.)

| | Component | Qty | Remarks |
|----|---------------------------------|-----|----------|
| 1 | The DWT20 handheld welding head | 1 | |
| 2 | V11+ controller | 1 | |
| 3 | T20 wire feeder | 1 | Optional |
| 4 | 7-inch LCD screen (HMI) | 1 | |
| 5 | 7-inch display display cable | 1 | |
| 6 | ±15V power supply | 1 | |
| 7 | ±15V power cable | 1 | |
| 8 | 24V power cord | 1 | |
| 9 | Urgent stop trigger line | 1 | |
| 10 | 7.5m DB15 cable set | 1 | |
| 11 | Safety clip (with clip) | 1 | |
| 12 | Set of wire protection box | 1 | |
| 13 | Nozzle and feeding holder box | 1 | |
| 14 | Laser goggles | 1 | |
| 15 | Protect the lens | 5 | |

Chapter 1

Summary

The main contents of this chapter are follows:

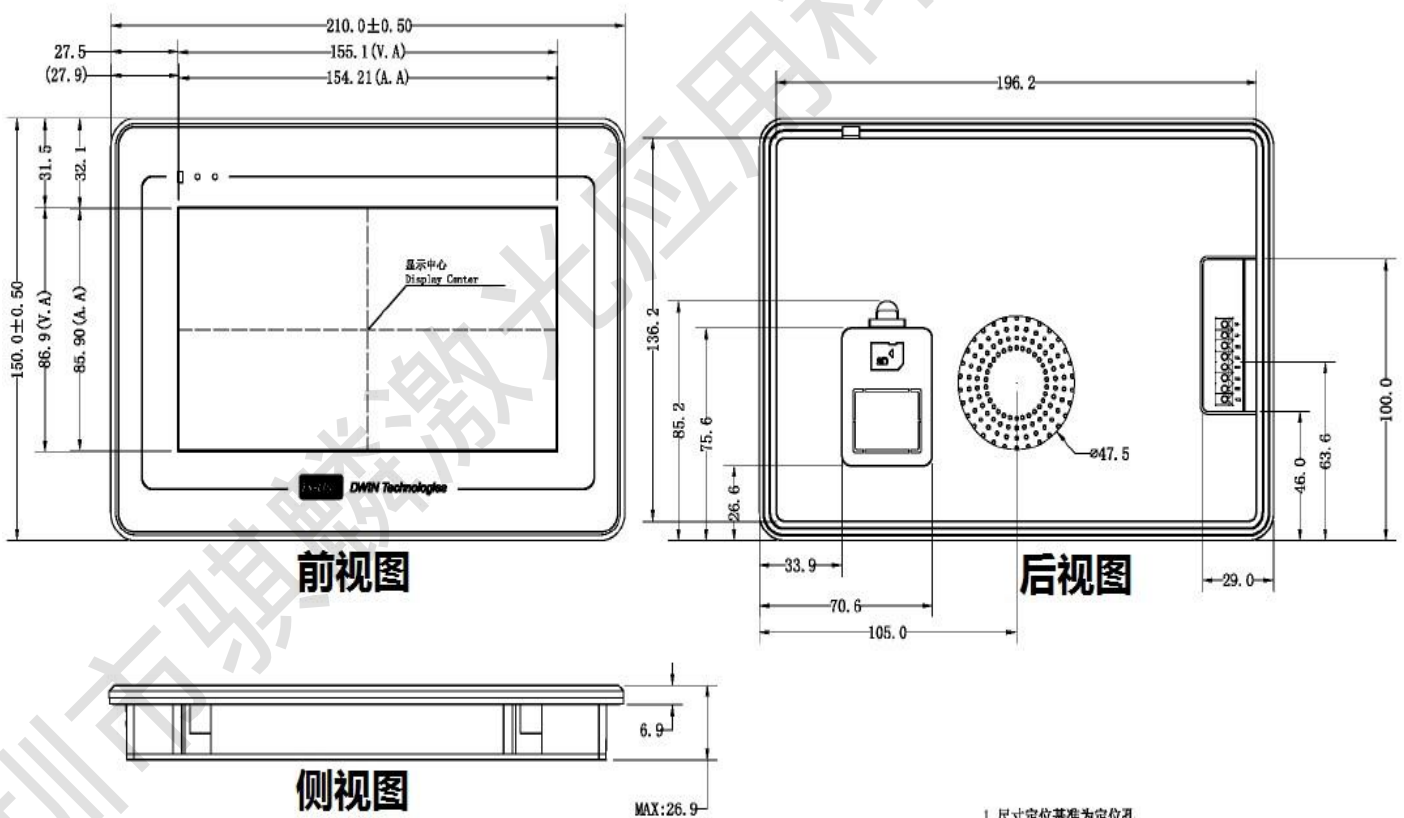
- Introduction of Wobble handheld laser welding system
- Product installation dimension drawing

Introduction to the handheld laser welding system

Qilin single pendulum hand-held laser welding system is a control system specially developed by Qilin laser for fiber laser welding. Single galvanometer motor design, light weight, rapid cooling light path cavity, ergonomic design, high-end chip, a variety of safety measures and other features.

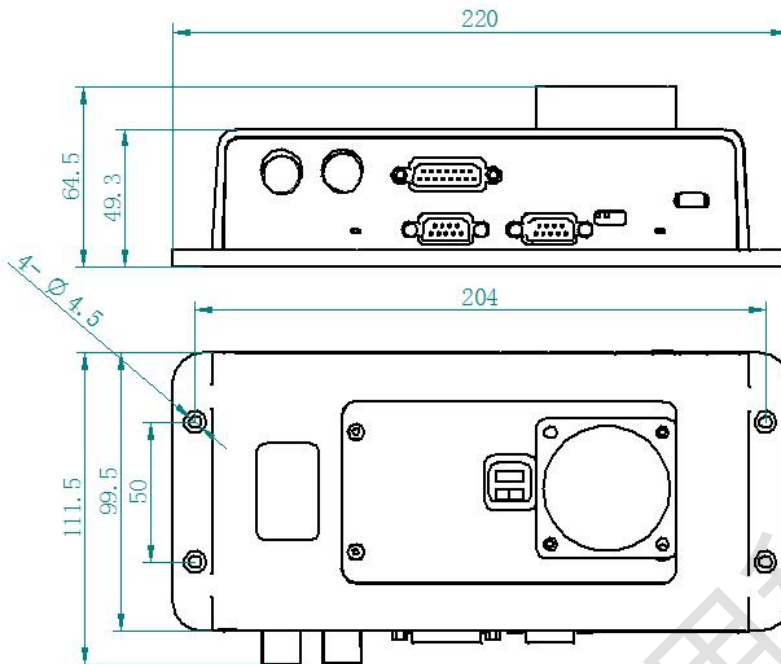
1.2 Installation size of the touch screen

1.2.1 Touch-screen installation dimensions are shown in the figure below:

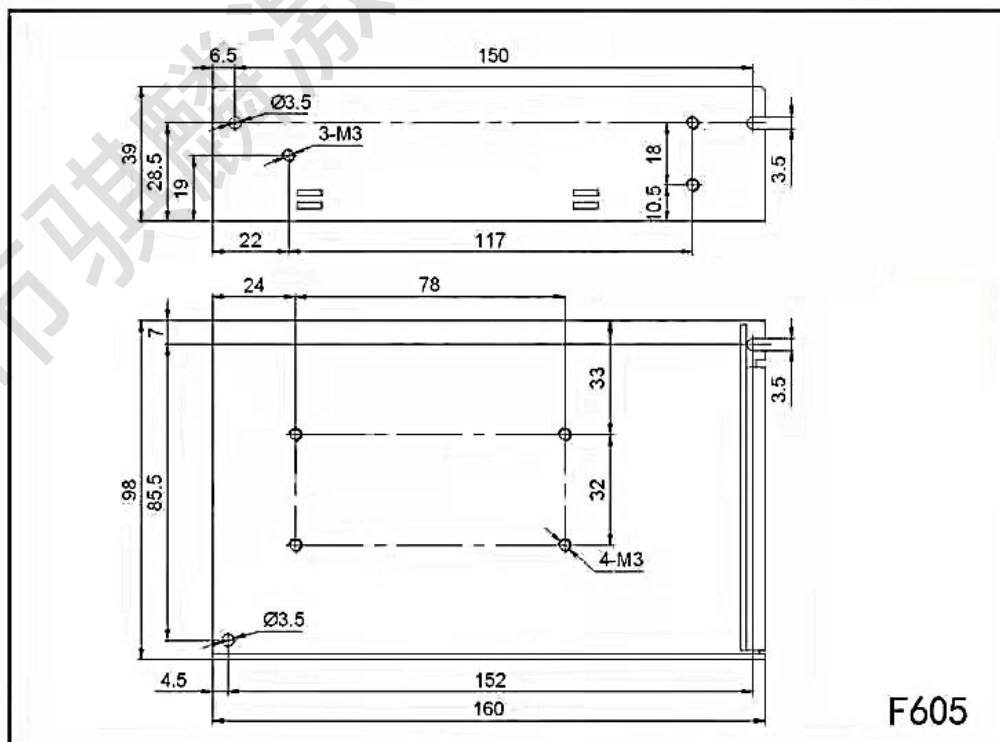


1. 尺寸定位基准为定位孔
Location hole is used as position reference.
 2. 未标注公差为 $\pm 0.3\text{mm}$
Unmarked Tolerance is $\pm 0.3\text{mm}$
- 注: 虚线标注为有效显示区域
Active area is marked in Dash lines

1.2.2 The installation size of the control box is shown in the figure below



1.2.3 The installation size of the 15 V switch power supply is shown in the following figure



Chapter 2

System wiring

The main contents
of this chapter
are follows:

- Control box wiring
- Structural diagram of the gun and connections for water/gas pipes
- Power interface HMI
- Laser-decoding interface
- Welding head interface
- Trigger cable
- Fan interface introduction
- Control interface of wire feeder
- Description of wire feeder's button
- Laser control interface
- Gas control, air pressure detection interface
- Dial switch

2.1 Control box wiring

The following diagram shows the wiring diagram of the whole system, the system wiring can refer to the schematic diagram, please refer to the relevant sections for detailed interface definition.

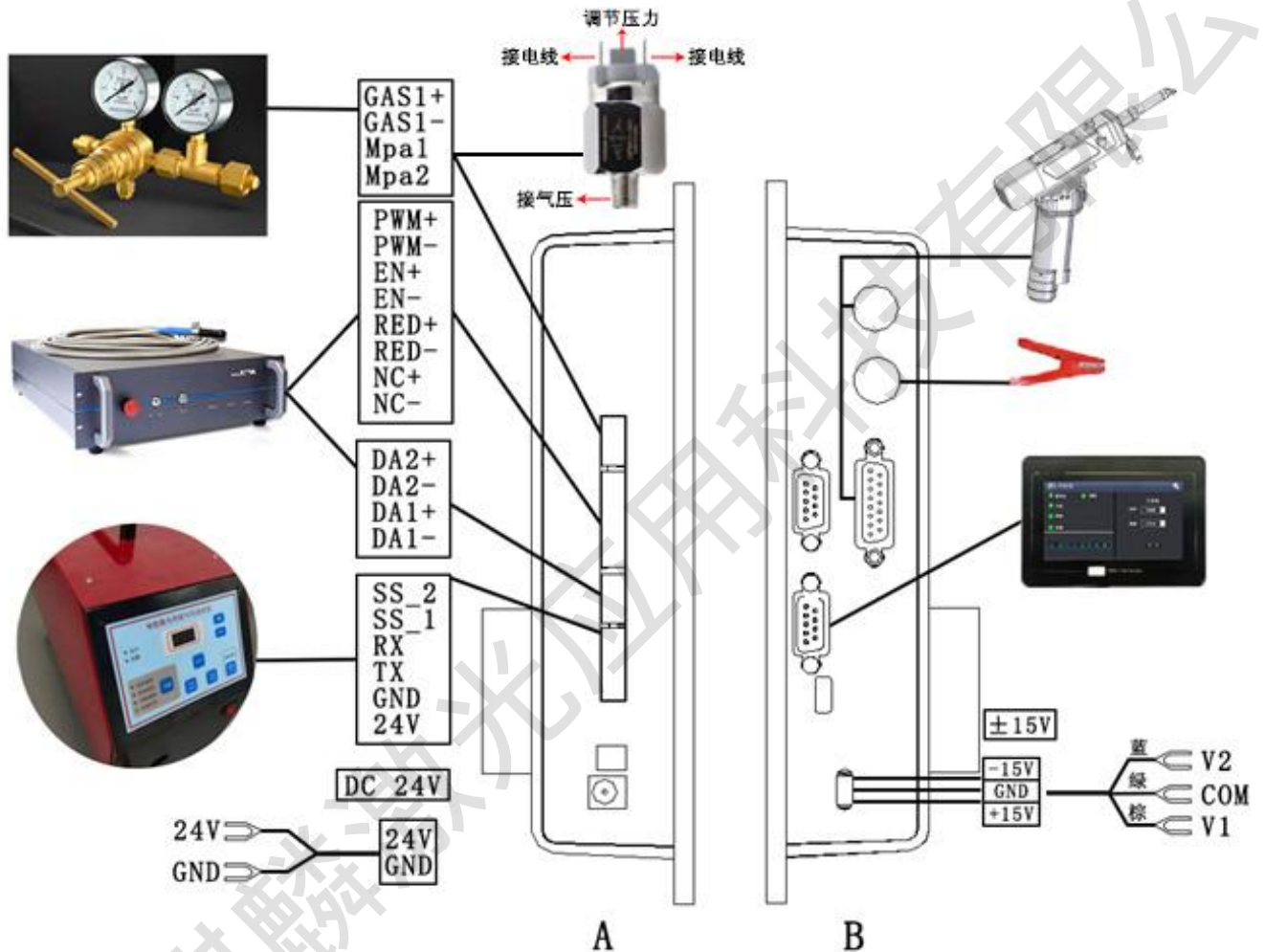


Figure 2.1 Schematic diagram of the system wiring

important:



Do not access other cables to other parts which not specified in the control box.

2.2 Structure diagram of the gun and trachea and water pipe interface



Figure 2.21 Schematic schematic diagram of the gun

| Technical parameters | |
|---------------------------------|-----------------|
| Interface type | QBH/RD |
| Power Range | 2000W |
| Laser Wavelength | 1064-1080 |
| Wobble Width | 0-5.0 mm |
| Protective lens | D20X2 |
| Collimating length | 50 (D20F50*3.5) |
| Focal length | 150 (D20F150*3) |
| Reflect lens | 22.5*17*3 |
| Cooling Way | Water/Air |
| Weight | 0.75 kg |
| Max air pressure | 0.6Mpa |
| Adjustable vertical focus range | ±3mm |
| Working Mode | ● — |



Figure 2.22 Schematic diagram of gas pipe and water pipe interface

Water pipe: water pipe in and out, forming a closed water circulation.

Gas pipe: single joint, gas output.

DB15 interface: the connector connecting the control system and the gun head communication function.

Samsung aviation plug: the connector connecting the conduction and trigger signal.

2.3 Power interface



Figure 2.31 Schematic diagram of the Power interface



The + 15V interface is the interface that provides power for the motor drive inside the control box, the voltage is plus or minus 15V (± 15V)

Table 2.31 shows the definition of the + 15V interface power cord

Table 2.31

| Pin | Signal | Definition | Description |
|-----|--------|------------------|---|
| 1 | V1 | power input +15V | + 15 External power supply input, external power supply output Current is bigger than 2A |
| 2 | COM | GND | Power ground |
| 3 | V2 | power input -15V | -15 External power supply input, external power supply output Current is greater than 2A |

DC24V interface is the interface providing power for internal control system of control box, the voltage is DC 24V (DC24V).



Figure 2.32 shows the schematic diagram of the POWER 2 power cord



Table 2.32 shows the definition of the \pm 24V interface power cord

Table 2.32

| Pin | Signal | Definition | Description |
|-----|--------|------------------------|---|
| 1 | 24V | power input | + 24V external, power supply input, power supply output power requirements: above 200W, means the output current is bigger than 8A (Power supply requires for feeder) |
| 2 | COM | Power reference ground | Power ground |

2.4 HMI

The HMI interface is a DB9 black plug through which the motherboard supplies and communicates to the HMI.

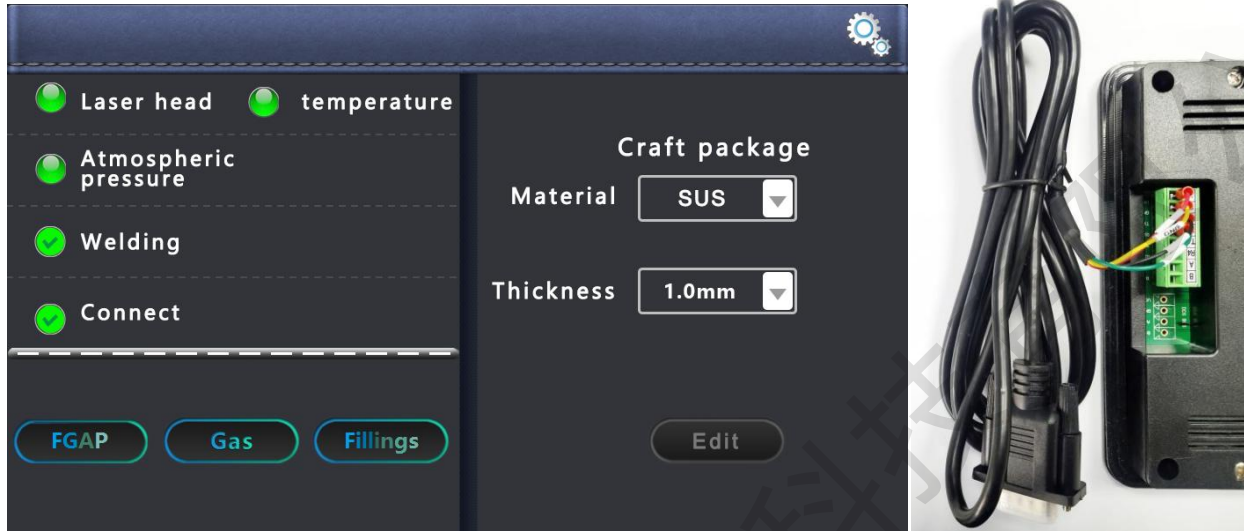


Figure 2.4 Schematic diagram of the HMI

Table 2.4 is the definition of the HMI interface.

Table 2.4

| Pin | Signal | Definition | Description |
|-----|--------|----------------------------|---|
| 1 | 24V | Power supply output, 500mA | HMI supply electricity |
| 2 | GND | Power supply output place | Power reference |
| 3 | TXD | The sender of the HMI | Serial port communication with the TXD signal |
| 4 | RXD | Receiver end of the HMI | Serial port communication with the RXD signal |

2.5 Laser device decoding interface



The LASER RS232 interface is a board card and a laser communication port.

| Pin | Signal | Definition | Description |
|-----|--------|--|---|
| 1 | DB9 | Laser and board card communication interface | Communication with the laser source and unlock it |

2.6 Welding Head Interface

The mainboard provides a galvanometer port which compatible with the universal digital mirror interface on the market.

Table 2.6 shows the definition of galvanometer interface .

| Pin | Signal | Definition | Description |
|-----|--------|----------------------------------|---|
| 1 | DB15 | Vibrator mirror & OLED interface | Control wire for communication with the handheld welding head |

Table 2.6

2.7 Trigger Cable

The control box provides a special security trigger signal interface, which can provide a security guarantee for the operation.

Table 2.7 defines the safety clip interface.

Table 2.7

| Pin | Signal | Definition | Description |
|-----|--------|-------------------|--|
| 1 | CF | Trigger signal | The light condition is reached when triggered |
| 2 | DT | Continuity signal | The light condition is achieved only during conduction |

2.8 Introduction of the fan interface

The control box provides a dedicated 24V fan port interface position, independent port, not easy to insert wrong.



Figure 2.8 Schematic diagram of the fan interface

2.9 Control interface of wire feeder

The control box provides a special communication interface for controlling the wire transmitter, and the 24V power supply is directly connected to the power input of the control box and can be provided 3A Current.

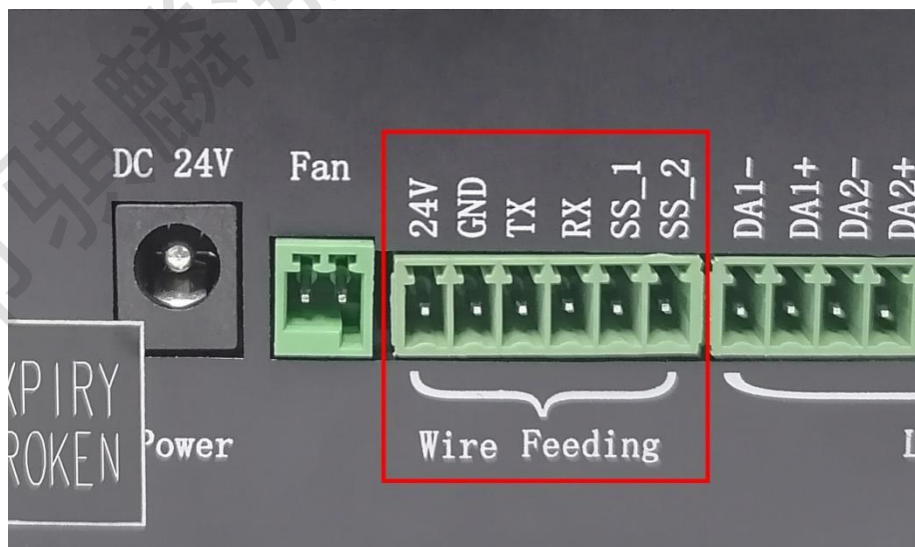


Figure 2.9 Schematic diagram of the control interface of the wire feeder

Table 2.9 defines the wire feeder control interface.

Table 2.9

| Pin | Signal | Definition | Description |
|-----|--------|---|---|
| 1 | 24V | Power supply output end of the wire feeder | Silk feeder 24V + power interface |
| 2 | GND | GND | GND |
| 3 | TX | Silk delivery machine and board card communication port | The wire transmitter communicates the TX signal with the control system |
| 4 | RX | Silk delivery machine and board card communication port | The wire transmitter communicates the RX signal with the control system |
| 5 | SS_1 | Wfeeder trigger signal 1 | Automatic discharge when short circuit SS_1, SS_2 |
| 6 | SS_2 | Wfeeder trigger signal 2 | Automatic discharge when short circuit SS_1, SS_2 |

2.10 Button description of the wire delivery machine

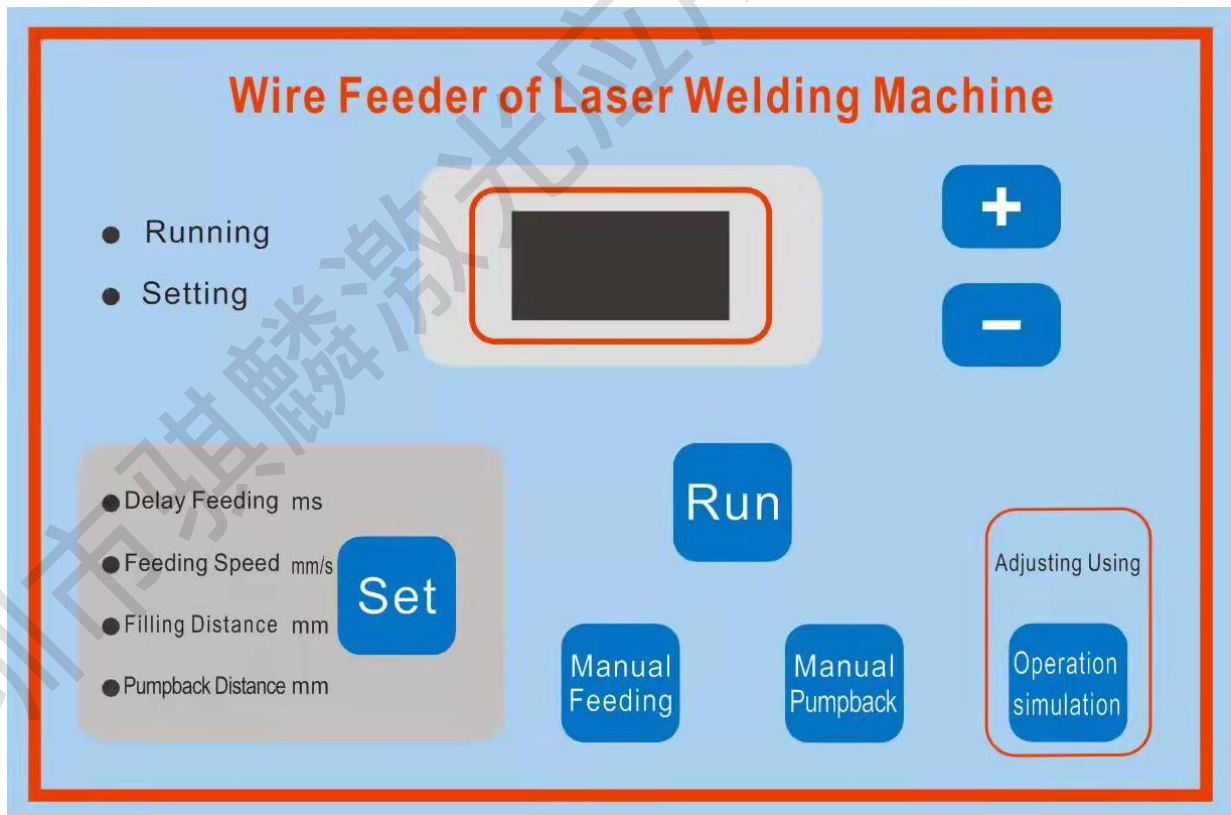


Figure 2.10 Description diagram of wire feeder keys

Feeder button description:

| Icons | Description | |
|-------|--|---|
| | Select below 4 functions | |
| | Delay feeding: | After setting, the light output is delayed first and then the wire is sent. |
| | Feeding speed: | Running speed of the wire delivery wheel. |
| | Filling distance: | compensate the distance. |
| | Pumpback distance: | After the wire supply stops, the wire pulls the back distance. |
| | Data up | |
| | Data down | |
| | Save the parameters after setting them. | |
| | Click the manual wire supply, and the wire supply wheel runs the wire supply at the maximum speed. | |
| | Click the manual pumping wheel to return the wire at the highest speed. | |
| | After the wire speed is set, click simulation operation is the set wire speed. | |

2.11 Laser control interface

The laser interface is an 8PIN green terminal + 4PIN green terminal.

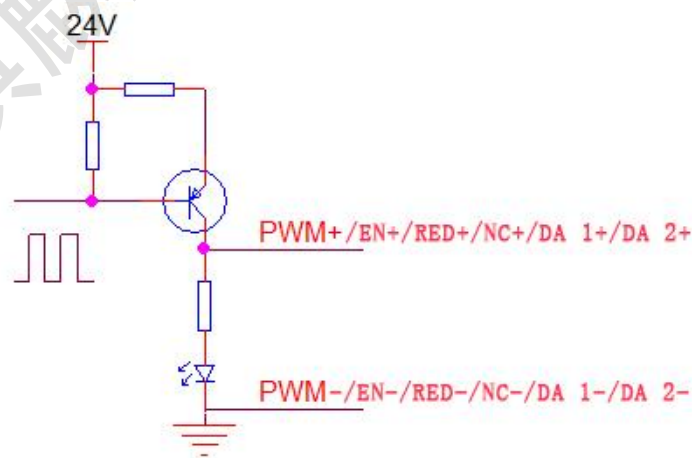


Figure 2.11 Schematic diagram of the laser control interface

Table 2.11 is the definition of the laser interface.

Table 2.11

| Pin | Signal | Definition | Description |
|-----|--------|------------------------------------|--|
| 1 | PWM+ | Laser-modulated signal + | Duty cycle is 1% -99% adjustable, 24V and 5V switchable |
| 2 | PWM- | Laser Modulated signal- | Reference place for connecting to the power source |
| 3 | EN+ | Laser enabling signal + | Control laser light signal, high level effective, 24V and 5V switchable |
| 4 | EN- | Laser-enabling signal- | Reference place for connecting to the power source |
| 5 | RED+ | Laser red light signal | Laser red light control (not connected) |
| 6 | RED- | GND | Reference place for connecting to the power source |
| 7 | NC+ | The laser enables the backup ports | Laser 24V spare port |
| 8 | NC- | Laser backup port ground | Reference place for connecting to the power source |
| 9 | DA 1+ | Analog voltage output + | For laser peak power regulation, 0-10V and 0-4V analog voltages are optional |
| 10 | DA 1- | Analog voltage output- | Reference place for connecting to the power source |
| 11 | DA 2+ | Analog voltage output | For proportional valve adjustment, 0-10V analog voltage, |
| 12 | DA 2- | GND | Reference place for connecting to the power source |

2.12 Gas control and air pressure detection interface

The control box provides a dedicated IO interface, all output IO are OC output can directly drive the relay, the maximum current can reach to 500mA, the wiring diagram is shown below.



Figure 2.121 Schematic diagram of the gas control interface

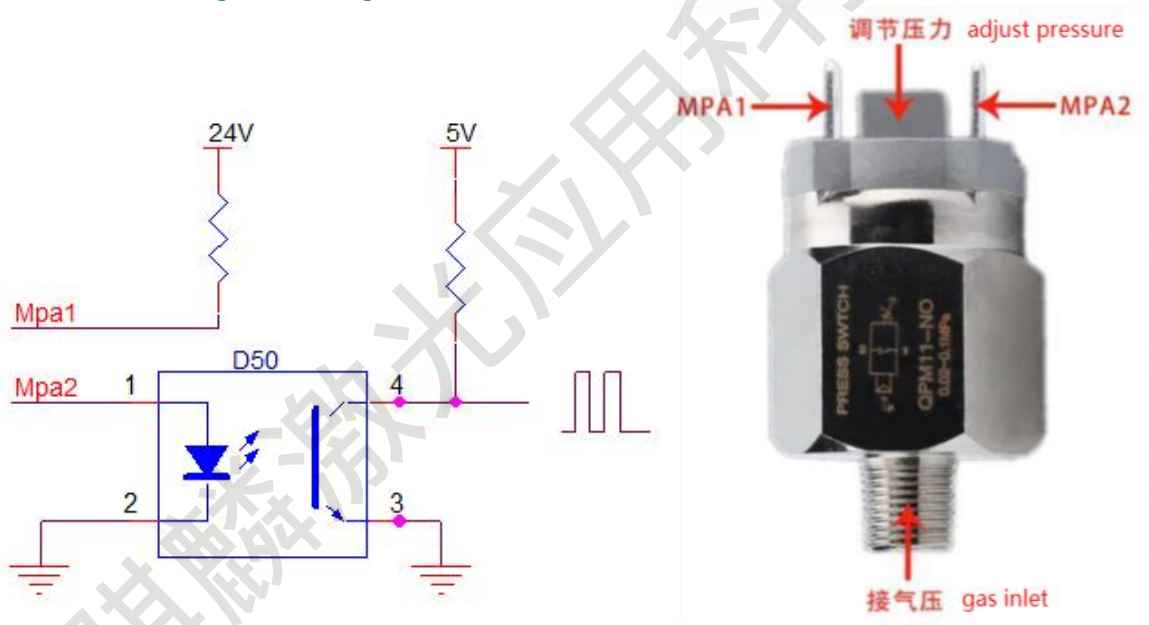


Figure 2.122 Schematic diagram of the air pressure detection interface

Table 2.12 is the definition of the gas control interface

| Pin | Signal | Definition | Description |
|-----|--------|--|--|
| 1 | CAS 1+ | For protect gas blowing control positive electrode | Air valve + connecting card GAS1 + |
| 2 | CAS 1- | Use to protect the gas to blow the gas to control the negative electrode | Air valve-connecting card GAS1- |
| 3 | Mpa1 | For detect air pressure alarm | Air pressure alarm + connecting plate Mpa1 |
| 4 | Mpa2 | For detect air pressure alarm | Air pressure alarm + connecting plate Mpa2 |

2.13, Dialing Switch for IPG

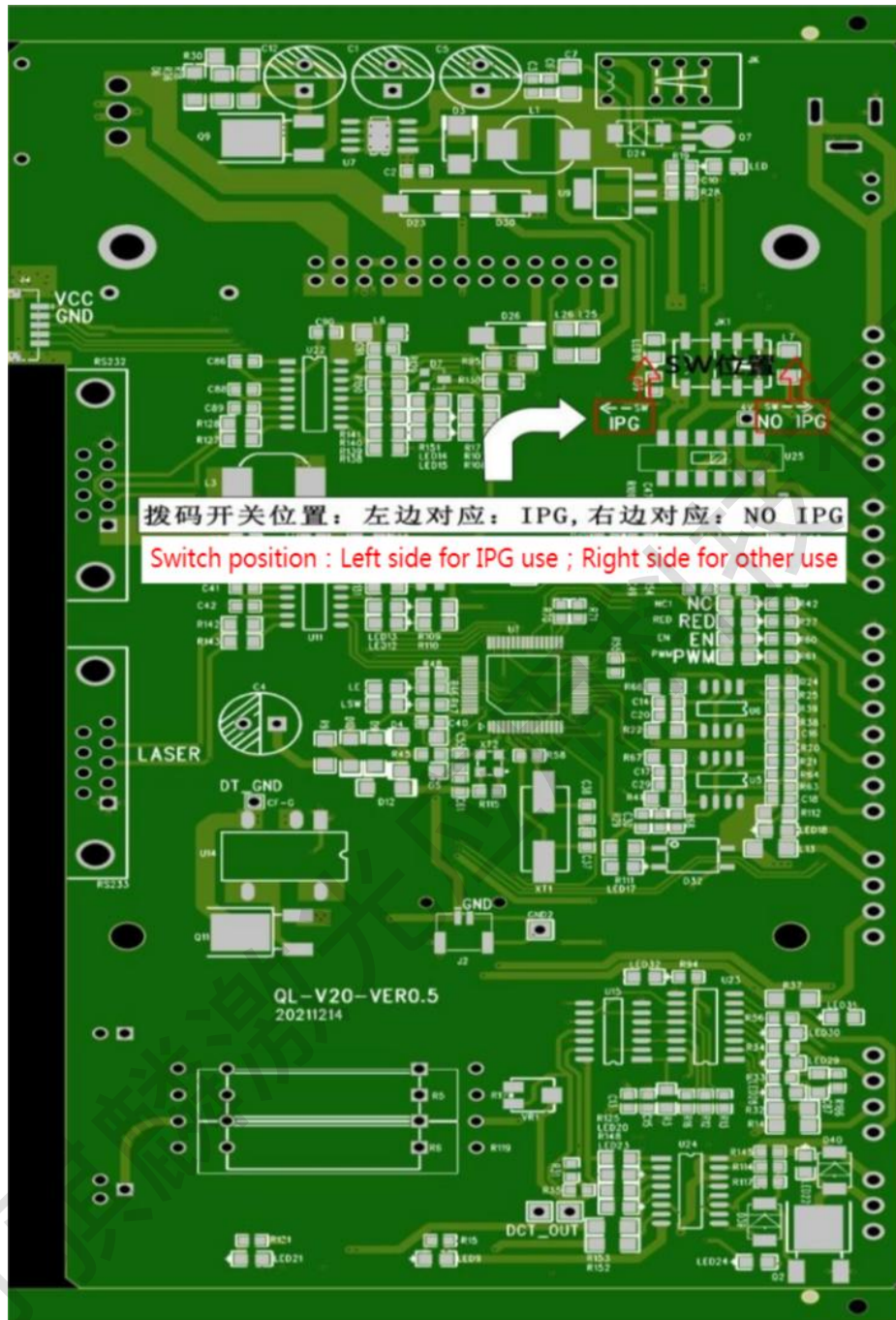


Figure 2.13 Schematic diagram of the dial code switch

| Pin | Signal | Definition | Description |
|-----|--------|----------------------|---|
| 1 | IPG | Laser control signal | PWM, EN, RED, NC outputs of 5V Power adjustment: 0-4V analog voltage with adjustable section |
| 2 | NO IPG | Laser control signal | PWM, EN, RED, NC outputs of 24V Power adjustment: analog voltage adjustable section 0-10V |

Chapter 3.

Human-machine Interface -HMI

The main contents
of this chapter
are follows:

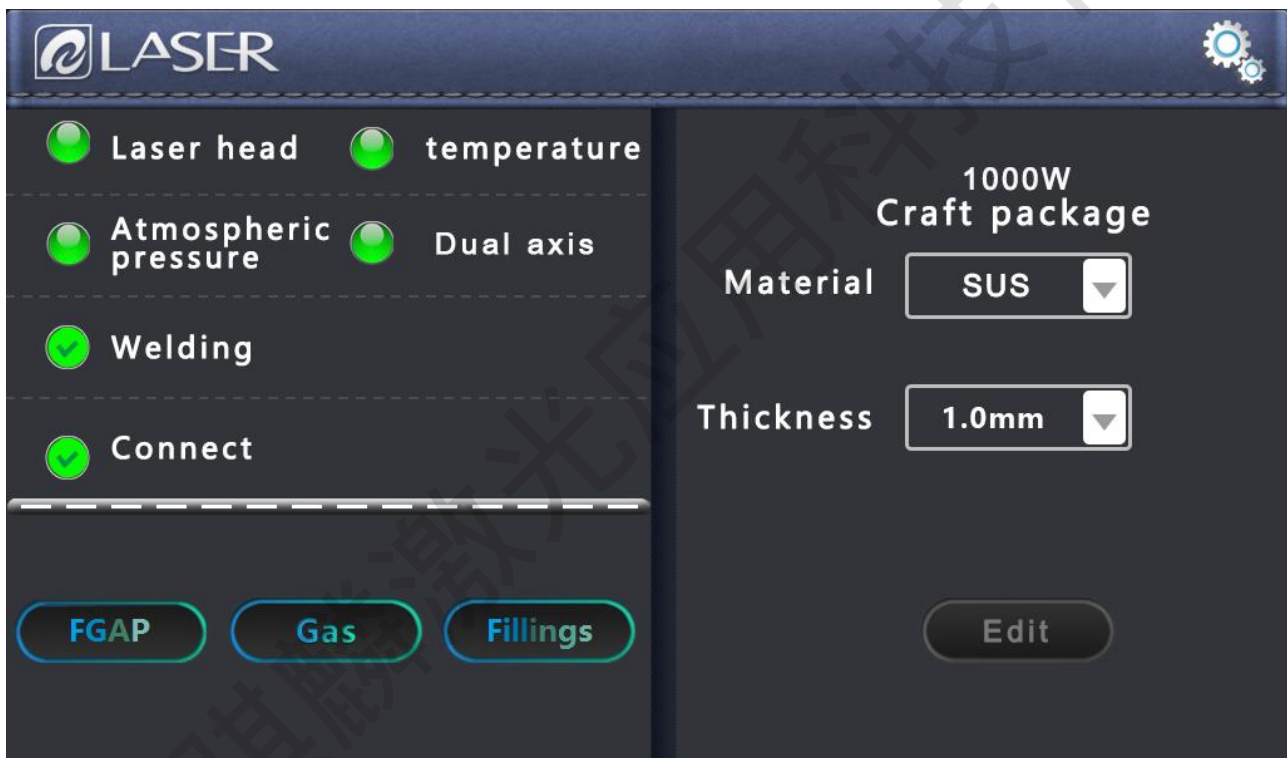
- Introduction of the main interface function and operation
- Main interface's function and operation
- Setting interface's function and operation
- OLED Screen introduction

3.1 Introduction to HMI function and operation

3.1.1 Introduction of main interface function and operation

Qilin single-axis hand-held laser welding/cleaning system operating panel adopts 7 inch configuration capacitor touch screen, dignified appearance, generous, easy to operate. The relevant parameters of laser and laser swing head can be set respectively, and the light mode can be controlled. At the same time, the process parameters stored inside the machine can be selected on the main interface, and the parameters can be adjusted and saved to facilitate the subsequent direct call, and the process package can also be customized.

3.1.2 Setting of interface and operation introduction



Main interface pic

Alarm signal lamps: Being the monitor and alarm the temperature of laser head, air pressure, welding gun, conduction and handle. Full alarm status is displayed synchronously on the main screen and alarm light to remind users and quickly troubleshoot problems.

FGAP: Laser comes out only if FGAP button is on.

Gas: When the Gas button is on, the air valve port will output 24V voltage, and the gas will automatically provide gas without opening it during welding.

Fillings: The wire feeder works when fires when the Fillings button is on; When it off, the wire feeder won't work.

Process Package:

There are 4 common use materials, definitions as follows:

SUS: stainless steel // **CS:** carbon steel

SECC: Galvanized plate // **AL:** aluminum

The number behind materials is thickness, for example:

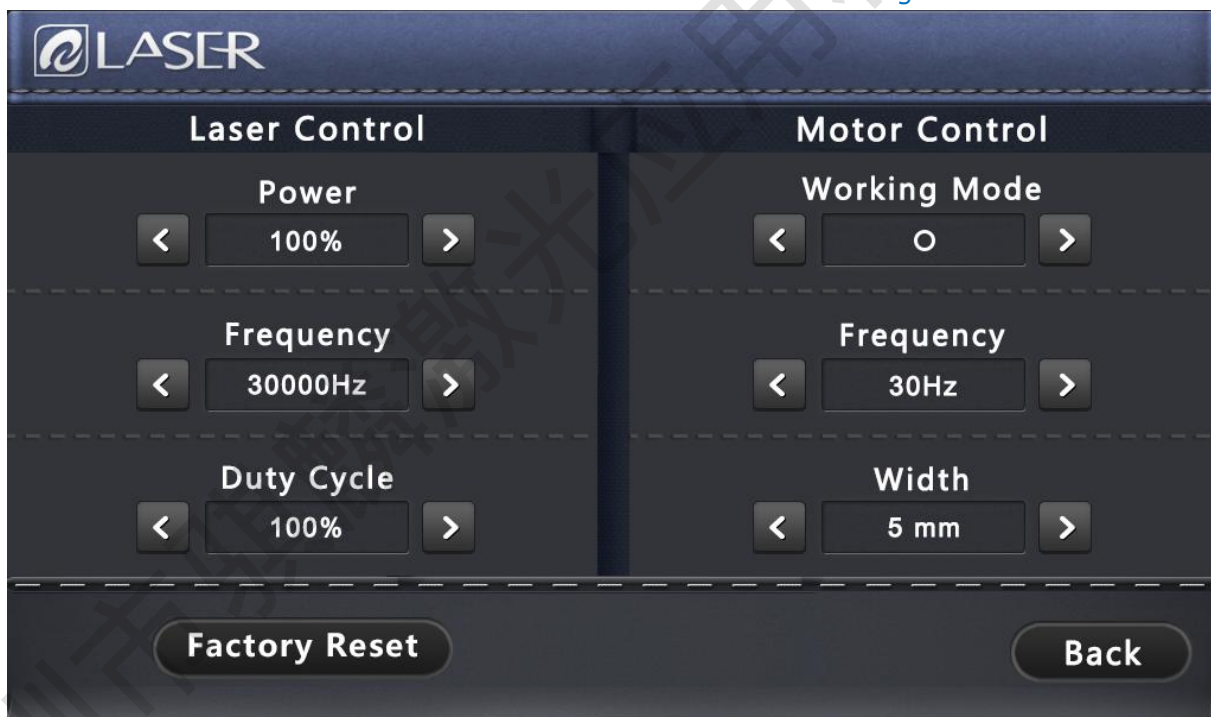
SUS/1.0 means 1.0mm Stainless Steel

Custom (UDC): can edit parameters, facilitate customers to retrieve the process for welding.

Other (OTS): internal manufacturer special process editing, can transfer special process for special material welding.

Click "Edit" button to enter the main editing interface.

Edit the main interface schematic diagram



Edit: no need to click to confirm, after changing parameters, directly use parameters.

Laser control:

Power: Set the peak power of the laser at welding.

PWM frequency: Set the frequency of the laser PWM modulation signal.

Duty cycle: Set the pulse width of the laser NE enabling signal.

Motor/Laser head control:

Working Mode: Set the mode of the motor swing.

Frequency: Set the speed of the motor's swing.

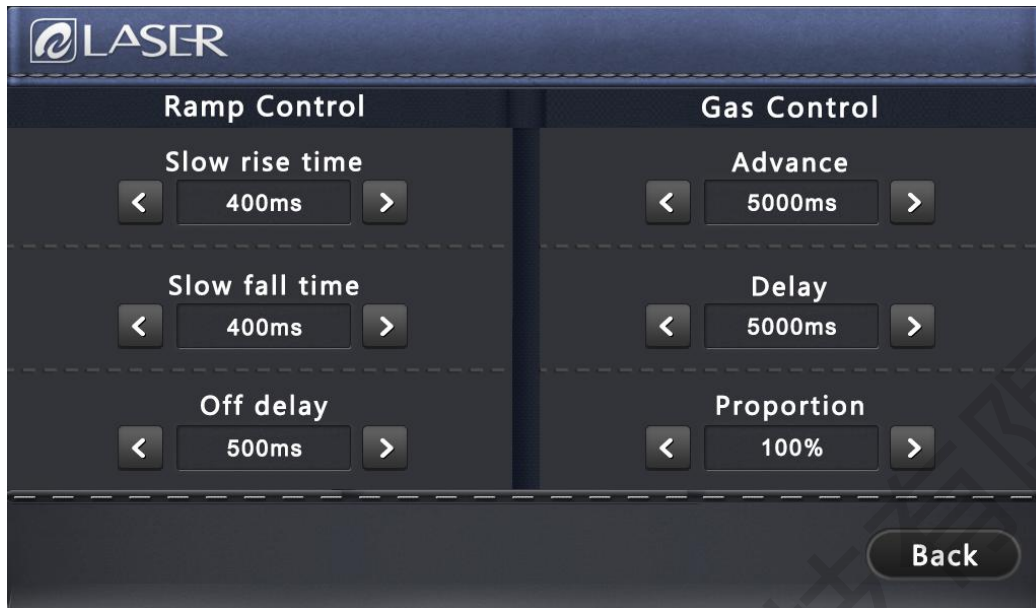
Width: Set the width of the motor swing.

Factory Reset: after entering the edit page, reset the single page parameters.

Press "  " on the main interface to enter the main setup interface, shows as figure below



Parameter Settings



Ramp Control

Slow rise time: The laser power slowly reaches the peak power within the set slow rise time.

Slow fall time: After the laser power is off, the laser energy is slowly off to 0.

Off delay: After turning off the laser, there is also a full power output during the setting time to optimize the wire breaking function.

Gas Control:

Advance: The time setting of gas comes out first before laser comes out.

Delay: The time setting of gas comes out after laser comes out.

Proportion valve: if the equipment has a scale valve to control the gas strength, then the percentage of protection gas can be controlled by this function.

Setting position of red light

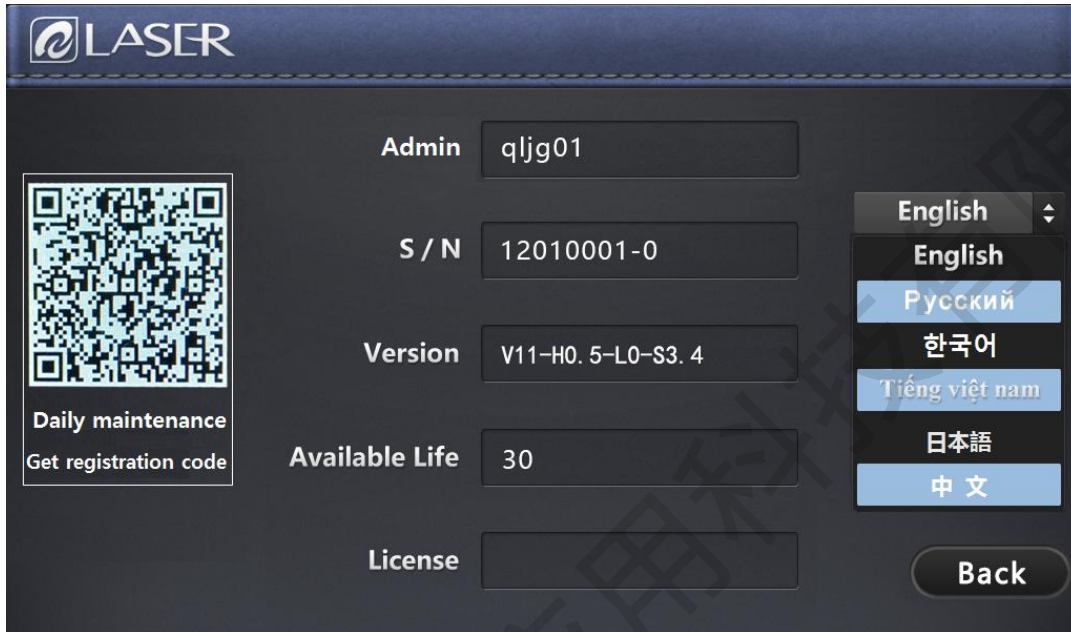


Red light offset setting: when the red light is not in the center of the nozzle, it can be adjusted by adjusting X and Y coordinates.

Start correction: zero the coordinates of X and Y.

Clear correction: Clear the previous correction.

Setting for SN and languages



S/N: the serial no. of welding head and controller.

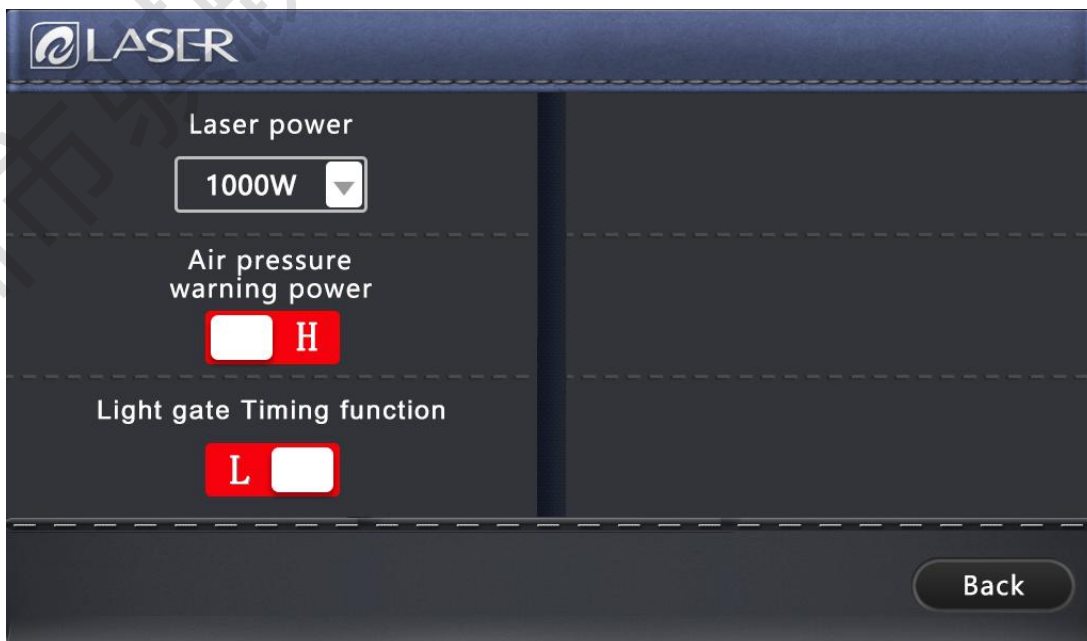
Version: Firmware version.

Available life (days): Available using time, all functions fail after expiration. (Automatic reminder when it less than 7 days)

License: Password to unlock the products.

Languages: English, Russian, Korean, Vietnamese, Japanese, Chinese.

Hardware Configuration:



Password: 123456.

Laser power: Select the laser power used to get the laser process package.

High and low electric frequency conversion: high and low electric frequency shielding alarm can be selected.

The timing function of the optical brake: The optical brake automatically closes in 15 minutes without any operation. After the optical brake is closed, the optical brake needs to be closed manually.

Cleaning function:



Enter the cleaning mode:

In the cleaning mode, you need to continuously pull trigger button twice to keep the light out for cleaning.

Cleaning mode: Line cleaning mode.

Cleaning strength: including heavy cleaning, standard cleaning, non-destructive cleaning, click to change the cleaning mode.

Cleaning power: Set the peak power of the laser during cleaning.

Cleaning width: Set the cleaning range of the laser during cleaning.

FGAP: Laser comes out only if FGAP button is on.

Gas: When the Gas button is on, the air valve port will output 24V voltage, and the gas will automatically provide gas without opening it during welding.

Red Light: When the red light preview is turned on, the cleaning mode will be showed.

Quit: Exit cleaning mode and enter welding mode.

Red Light Position Setting for CLEANING:



Red light offset setting: When the red light is not in the center of the nozzle, it can be adjusted by the X coordinate position of the red light offset setting.

Start correction: Save the offset parameter of setting cleaning to the system, and make the display coordinate clear to zero.

Clear correction: Clear set the offset parameter of cleaning, and make the display coordinates clear to zero.

Craft Package Parameters Ref:

| No. | 1500W Laser control | | | | Laser head control | | |
|---|------------------------|-------|--------|------------|--------------------|-------|-------|
| | Material and thickness | Power | Freq. | Duty cycle | Pattern | Freq. | Width |
| 1 | Stainless steel 1.0 | 30% | 3000Hz | 100% | — | 10hz | 1.6mm |
| | Stainless steel 2.0 | 60% | 3000Hz | 100% | — | 10hz | 2.6mm |
| | Stainless steel 3.0 | 90% | 3000Hz | 100% | —⊗ | 10hz | 3mm |
| 2 | Carbon steel 1.0 | 30% | 3000Hz | 100% | — | 10hz | 1.6mm |
| | Carbon steel 2.0 | 60% | 3000Hz | 100% | — | 10hz | 2.6mm |
| | Carbon steel 3.0 | 85% | 3000Hz | 100% | —⊗ | 10hz | 3mm |
| 3 | Galvanized plate 1.0 | 35% | 3000Hz | 100% | — | 16hz | 1.6mm |
| | Galvanized plate 2.0 | 65% | 3000Hz | 100% | — | 16hz | 2.6mm |
| | Galvanized plate 3.0 | 85% | 3000Hz | 100% | —⊗ | 16hz | 3mm |
| 4 | Aluminum plate 1.0 | 40% | 3000Hz | 100% | — | 10hz | 1.6mm |
| | Aluminum board 2.0 | 70% | 3000Hz | 100% | — | 8hz | 2.6mm |
| | Aluminum plate 3.0 | 85% | 3000Hz | 100% | —⊗ | 8hz | 3mm |
| The above parameters are provided for reference only | | | | | | | |

Precautions for using a laser welding system

1. Laser welding machine includes laser source, chiller, laser welding system, laser welding head. In order to avoid interference, to ensure that the argon arc welding machine and related equipment with large interference, to ensure a safe distance of more than 5 meters. Ensure that the laser welding machine has independent space when conditions permit.
2. In order to reduce the equipment leakage or static electricity, to ensure that the light double pendulum industrial welding head equipment uses effective ground wire.

3. Please repeatedly confirm whether the sleeve joint is normally connected and locked, which can be wrapped with insulation tape.
4. Check whether the laser head and the optical fiber are locked and connected. After confirming the normal condition, use the tape to ensure that the dust does not enter the laser head cavity.
5. Check whether there is water seepage in the cavity. There are many waterways in the cavity. The screws should not be loosened without professional training to prevent water droplets from entering the cavity.
6. Check whether the protective lens drawer is normal, ensure that the sealing ring is normal and effective, ensure that the protective lens wipes the external stains of the laser lens, at least 5 times, and ensure that the lens environment is dust and wind.
7. The laser head is complex. To avoid short circuit, stay away from the water source and ensure that no liquid can be sprayed on the laser head.
8. Laser head refuse to use strong wind to blow and clean the laser head, can only use alcohol and dust-free cloth to wipe.
9. A digital motor is installed inside the laser head, which must be taken and put gently when used to prevent motor failure.
10. If the laser head is not used, please use the system gas for many times to discharge the dust, remove the copper nozzle, seal with sealant belt, and install the copper nozzle to blow gas more than 2 times before use.
11. Continuous interruption of power supply will cause damage to the welding control system. If the external wire transmitter, 24V power supply should provide 200W (supply voltage 24V, output current equal to or greater than 8A)!
12. The external safety lock is 24V high level, do not short connect with the aviation plug GND shell of the system cable, or do not pay attention to collide with each other when installation, otherwise the short circuit may burn the power supply or the main control board.

Quality Assurance:

1. The warranty period of Qilin products is 12 months, starting from the date of delivery.
2. During the warranty period, if there is any fault in hardware such as system motherboard, motor drive, wiring and main display screen, you can send the products back to our company for free maintenance and free labor cost(freight afforded by customer).
3. All lens categories are not covered by warranty, such as collimating lens, focusing lens, reflecting lens, protective lens, seal ring etc.
4. All pistol integral cases, brass nozzles, stainless tubing, wire feed brackets, etc. are not covered by this warranty.
5. If it is necessary to carry out repairs aboard, the travelling expenses shall be paid by the customer.

**All parts of this description, the property right of the book belongs to Shenzhen Qilin Laser Application Technology Co., Ltd., no unit or individual shall reprint, copy or distribute the relevant content of the product description without the permission of Qilin.

If you have any comments or suggestions on the product and instructions during use, please feel free to contact with us !

Company Name: Shenzhen Qilin Laser Application Technology Co., Ltd.

Mob./Wechat:+86-13424151221

Contact: Anita Chou

Thank you for using the products of Qilin !