



SLR PRO SERIES LASER WELDER

USER MANUAL



SLR 3000 / SLR 5000



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Chapter 1 Overview

1.1 Introduction

The SLR Series handheld laser welding system integrates laser light source, cooling module, welding gun and control module, and outputs high definition 1080nm laser. Because 1080nm laser is invisible light, operators should be aware of the danger of laser and operate the equipment according to the User Guide to avoid personal injury.

The SLR Laser handheld welding system has been strictly tested before leaving the factory, and it is fully safe to operate the equipment as per the instructions in this User Guide. Before using the equipment, the operator shall carefully read this User Guide and operate, store and transport the equipment in accordance with the requirements of this User Guide.

1.2 Application Scope

The SLR Laser handheld welding system is suitable for welding various metals, including stainless steel, galvanized steel, carbon steel, aluminum, copper, etc. Its common applications are as follows:

- hardware product processing
- sheet metal processing
- equipment maintenance
- household appliance repair and maintenance
- automotive body processing
- aerospace and transportation industry
- building and pipeline processing
- advertising, home appliances and other applications



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1.3 Product Packaging and Unpacking

The handheld welding system is packaged within a cardboard box secured with PET packing strip, as shown in the following figure:

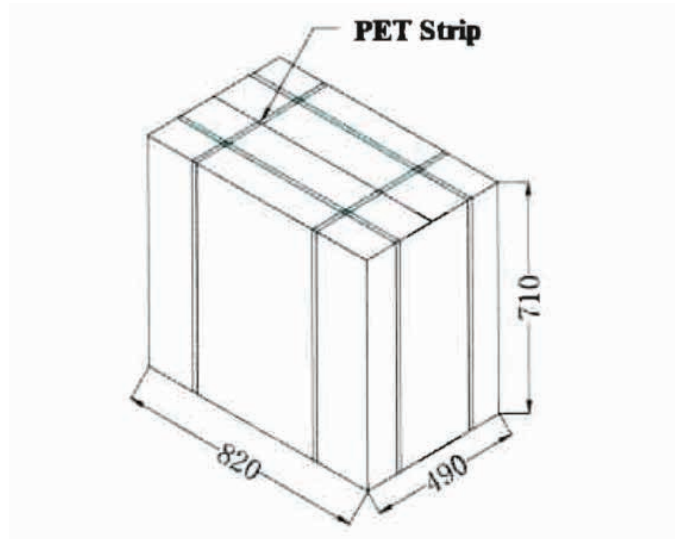


Figure 1-2 Schematic Diagram of Product Packaging

To unpack the unit from the cardboard box, cut off the packing strip, take out the foam board first and then remove the external box. See the following figure for details

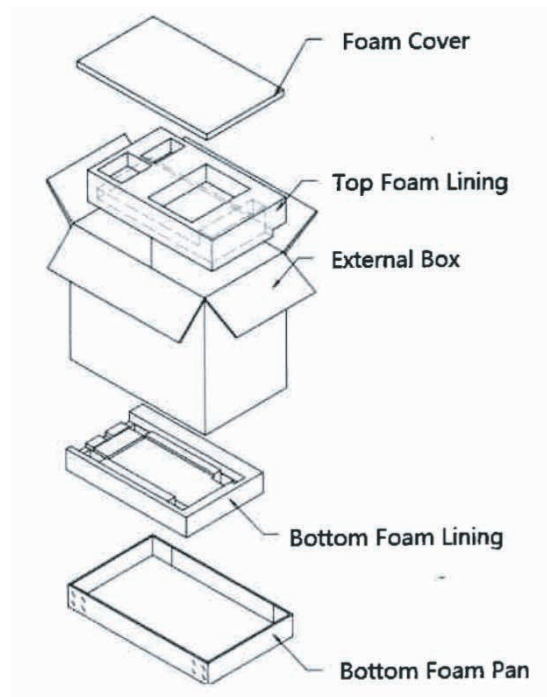


Figure 1-3 Illustration of Product Unpacking



Chapter 2 Safety Information

2.1 Laser Safety Level

The SLR laser welder series of output invisible laser radiation with a wavelength of 1080nm or near 1080nm, According to the definition in IEC/EN 60825-1, lasers in such series belong to Class 4 laser products.

2.2 Hazard Sources

Table 2-1 Hazard Sources of Laser System

Category	Remarks
Beam Hazard	The lasers' output features high power density, which can cause local high temperature to the illuminated part. Improper use may cause fire or personal injury.
Secondary Reflection Hazard	Part of the laser energy is reflected during laser welding, which may cause damage to human eyes.
Non Beam Hazard	Mechanical injury, electrical injury, high temperature injury, etc.

2.2.1 Beam Hazard

The high temperature caused by the laser radiation can instantly coagulate or vaporize proteins, thereby causing damage to biological tissues.

The most vulnerable parts of human body are eyes and skin.

Of all organs of the human body, eye is the one most vulnerable to laser. The IR radiation emitted by the laser is very harmful to the human eye. Without the correct protection it will potentially burn the retina, causing loss of vision and even blindness. It is essential that you wear qualified and safe safety goggles any time you operate the laser.

Laser illumination on the skin can cause burns, rashes, blisters, and pigmentation, with the potential to destroy subcutaneous tissues completely.

2.2.2 Secondary Reflection Hazard

During welding operation, part of the laser will be reflected around by the face of weld. Although the scattered laser energy has been greatly reduced, it may still cause damage to the eyes. We recommend that during welding operations, there should be no unauthorized person nearby, and qualified and safe safety goggles should be worn if observation is required.



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2.2.3 Non Beam Hazard

SLR handheld laser welder series are powered by 230V AC. Ensure that the power supply has been connected to the protective ground, otherwise it may cause equipment damage and personal injury.

When handling and servicing the SLR handheld laser welder series, attention should be paid to the risk of crushing or cutting caused by falling of some heavy or sharp objects.




During welding, sparks will be generated, so it is necessary to avoid sparks splashing to nearby combustibles. Otherwise, fire may be caused.

During welding, the metal temperature will rise. Please wear protective gloves to avoid burning.

2.3 Safety Warning Signs

The SLR laser welder series of output invisible laser radiation with a wavelength of 1080nm or near 1080nm, According to the definition in IEC/EN 60825-1, lasers in such series belong to Class 4 laser products.

Table 2-1 Warning Signs for Laser Safety

	<p>Warning: The voltage of the AC power supply of the laser system is high. If the operation is improper or the laser system is not properly grounded, there is a risk of electric shock.</p>
	<p>Warning: This sign indicates laser radiation, which has been affixed to the output end of the laser system.</p>
	<p>Class 4 laser products can cause damage both to the eyes and to the skin. High power laser light can burn the skin, and in some cases, even scattered laser light can cause damage to the eyes and skin, and cause a fire or an explosion.</p>



2.4 Laser Radiation Protection

2.4.1 Requirements for Laser Radiation Protection

Because the laser radiation with a wavelength of 1080nm light emitted by the laser is invisible radiation of high power, even the scattered light can still cause irreversible damage to the eyes. Therefore, laser safety glasses shall be the type that can shield the eyes from the damage of laser radiation in its entire wavelength range. When operating laser equipment, the operator shall wear proper laser safety glasses according to the wavelength of the laser radiation and shall wear all the time during the operation.

2.4.2 Laser Protection Equipment

Laser safety glasses are only effective for specific wave lengths.

The following information shall be taken into account when selecting the proper laser safety glasses:

1. Laser characteristics: output wavelength and power of laser;
2. Optical Density (OD): the larger the OD value, the stronger the protection capability of laser protective glasses can provide;
3. Visible Light Transmittance (VLT): If VLT value is less than 20%, laser safety glasses shall be worn in a well-lit environment;
4. Frame Style: whether to wear prescription glasses and temple size are factors that shall be considered when selecting the frame style suitable to the wearer.

We recommend protective equipment products from approved and premium quality suppliers only. This recommendation is only for informational purpose and we assume no liability for any problems arising from the use of the recommended products from other suppliers.

2.4.3 Laser Protection Measures

Technical measures:

- Welding interlock circuit: the welding interlock circuit is used to ensure that the laser can be output only when the welding gun contacts the workpiece to be welded; when the welding gun is not in contact with the welding surface, the laser emission is automatically terminated;
- Safe operation area: provide laser processing room, laser shield and curtain;
- Key management: implement lock out for the equipment or laser operation room;

Management measures:

- Formulation of rules and regulations: areas involved in laser radiation will be strictly controlled and operation instructions are formulated to ensure laser system safety;
- Supervision and inspection mechanism: regularly check the facilities to ensure its normal operation and check the safety rules and regulations to ensure they are feasible and implemented properly;



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- Personnel safety management must develop and maintain a training and assessment mechanism to ensure the employee of the user meet the safety requirements and strengthen their safety awareness.

2.5 Safe Operation of Equipment

2.5.1 Requirements for Laser Welding Operation Environment

To ensure the safety of laser welding operation, appropriate external warnings should be used, including but not limited to laser safety signs, interlocking devices and other hazard prevention measures. The interaction between the laser and the working surface will produce gas, sparks and debris due to high temperature, which may pose additional safety hazards. The corresponding operators shall undergo proper examination and training, and be familiar with and master the conventional safety specifications for laser operation.

We recommend that your operation of the laser welding equipment shall meet the following requirements to extend its service life:

1. Each SLR series handheld laser welder integrates a cooling system, and the heat is discharged from the bottom and top space. Do not block the bottom and top space. Otherwise the output performance of the laser system may be affected due to the decline of heat dissipation performance;
2. Use and store the equipment under the specified ambient temperature and humidity conditions to avoid equipment damage; If the equipment shuts down due to overheating, please stop using it and ask for help.

Note: Please operate the equipment carefully to avoid accidental damage to the equipment.

2.5.2 Safety Instructions for Operation Area

1. The intensity of output laser of the SLR series handheld laser welders is enough to burn skin, clothing and paint, and ignite volatile substances, such as alcohol, gasoline, ether, etc. Therefore, during operation and use, it is prohibited to stack items in the operation and processing area and the flammables shall be isolated from the laser operation and processing area.
2. During laser welding, a small amount of harmful dust and toxic gas will be generated. The workplace should be properly equipped with ventilation and dust collection devices, such as exhaust fans and industrial vacuum cleaners. Employees should wear appropriate masks for protection.



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2.5.3 Instructions to Optical Operation

We strongly recommend that you read the following operating instructions before operating the equipment:

1. Protective glass should always be installed during welding to avoid contamination of the focusing lens inside the hand-held welding gun;
2. The protective glass is a consumable item, which will lead to a poor welding effect after becoming dirty. Please replace the protective glass in a timely manner;
3. When replacing the protective glass, avoid contaminating the internal focusing lens;
4. The armored cable contains optical fibers. Do not trample or crush the armored cable. Otherwise, the optical fiber may be damaged;
5. Do not drag the armored optical fiber cable forcefully. Otherwise, the optical fiber may be damaged;
6. During welding operation, the workpiece clamp with work lead must be attached to the welding surface;
7. In order to avoid injury caused by secondary reflection laser, welding operator must wear safety goggles during welding operation;
8. If the equipment is not operated in a manner according to the instructions in this User Manual, the protective device and performance of the welder may be weakened, which will void warranty.

Note:

- In case the protective glass is dirty, the temperature of the protective glass will rise, and the accumulative effect in this state for a long term may cause damage to the internal optical path. Please replace the protective glass in time;
- Please be careful during laser welding operation to avoid overheating or molten metal particles that may cause harm.

Warning:

- Reasonably select safety protection equipment according to the laser output power and wavelength;
- Do not directly look into the laser welding gun, and ensure to wear safety goggles during all operation.

2.5.4 Instructions for Electrical Operation

We strongly recommend that you read the following operating instructions before operating the handheld laser welder:



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1. When using the handheld laser welder, please ensure that the equipment is well grounded; otherwise the housing may be charged and may cause personal injury;
2. In robotic or machine use ensure the power supply connected to the equipment is connected to its protective ground terminal;
3. When using the equipment, ensure that the input power supply meets the requirements and the wiring is correct. Any wrong wiring method may cause personal injury or equipment damage; During use, attention should be paid to electrical safety to prevent electric shock injury. The power supply must be switched off when installing and moving the laser. Always wear insulating gloves during electrical operation. Perform maintenance after power-off. In case of electrical injury, correct treatment measures shall be taken to prevent secondary injury;
4. This product has no parts, components or assemblies that need to be repaired by the user. All maintenance operations need to be completed by professional service agents.
5. Do not remove the housing of the welder, disassemble the laser or damage the relevant labels without authorization, there will be a risk of electric shock or burns;
6. Any product disassembled without permission will void the warranty terms for the Product.

2.5.5 Other Safety Precautions

1. Keep the working area well illuminated and work with lights on to prevent pupil dilation and increasing the risk of eye injury;
2. When handling equipment, it is necessary to wear protective gloves, safety shoes and other protective equipment;
3. Please operate the equipment in strict accordance with this User Guide, otherwise any damage to the equipment will void the warranty terms for the such product;
4. Operators shall wear gloves during welding to avoid burns caused by splashed sparks and high temperature on the metal surface;
5. The product has no built-in replaceable parts, and the equipment maintenance should be carried out by the professional service agents. In order to prevent electric shock, please do not damage any labels on the equipment or uncover the housing without permission. Otherwise any damage o the product will void the warranty terms for the such product.



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Chapter 3 Welder Description

3.1 Accessories of the Welder

The shipping list of the SLR series welders are as follows:

Table 3-1 Shipping List of a SLR Series Welders

Shipping List	S/N	Item	QTY	Remarks
	1	SLR series handheld welder	1 pcs	\
	2	Product Manual	1 pcs	\
	3	Quick Start Guide	1 pcs	\
	4	Power supply cable	1 pcs	5 m
	5	Wire feeding control line	1 pcs	\
	6	Work/Earth lead	1 pcs	10 m
	7	Wire feeding bracket	1 pcs	\
	8	Protective glass	5 pcs	\
	9	Nozzle tip	3 pcs	One for feeding 0.8 - 1mm wire, one for 1.2 - 1.6 mm wire feed nozzle, one for flat welding
	10	Safety goggles	1 pcs	\
11	Welding gloves	1 pcs	\	

3.2 Product Specifications

The main specifications of SLR series welders are as follows:

Table 3-2 Product Specifications

Item	SLR 3000	SLR 4000	SLR 5000
Weight (Base unit)	43kg	44kg	45kg
Dimensions	673mm (L) × 480mm (H) × 310mm	673mm (L) × 505mm (H) × 310mm	673mm (L) × 505mm (H) × 310mm
Operating temperature	-30 - 60 °C	-20 - 60 °C	-20 - 60 °C
Operating humidity	0% - 90%	0% - 90%	0% - 90%
Storage temperature	-40 - 70 °C	-30 - 70 °C	-30 - 70 °C
Type of refrigerant	R410a	R410a	R410a
Amount of refrigerant charged	0.8kg	0.8kg	0.8kg
Shape of welding gun	Integrated welding gun	Integrated welding gun	Integrated welding gun
Length of armored cable	5 m (cable of 10 m can be customized)	5 m (cable of 10 m can be customized)	5 m (cable of 10 m can be customized)
Weld penetration for aluminum (single side welding)	0 - 3mm	0 - 4mm	0 - 5mm
Weld penetration for stainless steel (single side welding)	0 - 3mm	0 - 4mm	0 - 6mm
Weld penetration for carbon steel (single side welding)	0 - 3mm	0 - 4mm	0 - 6mm
Weld penetration for galvanized sheet (single side welding)	0 - 3mm	0 - 4mm	0 - 6mm
Number of preset process package	24	30	40
Number of customized process package	20	20	20



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3.3 Description of Welders



Figure 3-1 View of Welder

Table 3-3 Welders Features

S/N	Feature	Feature Functions
1	Air outlet	The air outlet is located on the top of the welder housing
2	Front panel	The front panel is the main control panel of the welder
3	Welding Torch	The welding gun is coiled and attached on the side of the welder housing
4	Air inlet	The air inlet is located on the bottom of the welder housing
5	Foot pad (Caster optional)	The welder can be equipped with four casters for easy movement

3.4 Front Panel



Figure 3-2 Front Panel View

Table 3-4 Front Panel Features

S/N	Feature	Feature Functions
1	Indicators	From left to right: EMISSION, GAS, INTERLOCK, WARNING, ERROR: (1) Emission indicator: It turns yellow when emitting laser, and turns off when not emitting laser; (2) GAS indicator: It turns yellow when the gas pressure is insufficient, and it turns off when the gas pressure is normal; (3) INTERLOCK indicator: It turns yellow when abnormal contact occurs between the welding gun and the workpiece, and it turns off when contact is normal; (4) WARNING indicator: It turns yellow when the ambient temperature and humidity are abnormal, and it turns off when ambient temperature and humidity are normal; (5) ERROR indicator: It turns red when the welder is in fault and it turns off when it is normal.
2	LCD	The non touch screen displays the name of the process package, error information of the welder and operation tips.
3	Process Package Selector Buttons	Select welding process package.
4	Function Buttons	Perform function operation according to the LCD operation prompt
5	Digital Display Tubes	From left to right: the one above LASER POWER displays laser output power percentage, the one above Wobble Frequency displays the wobble frequency and the one above Wobble Length displays wobble length.
6	Adjusting Knob	From left to right, the one below LASER POWER is used to adjust laser output power percentage, the one below Wobble Frequency is used to adjust the wobble frequency and the one below Wobble Length is used to adjust wobble length.
7	Ethernet Port	RJ-45 connector for Ethernet communication.



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3.5 Rear Panel

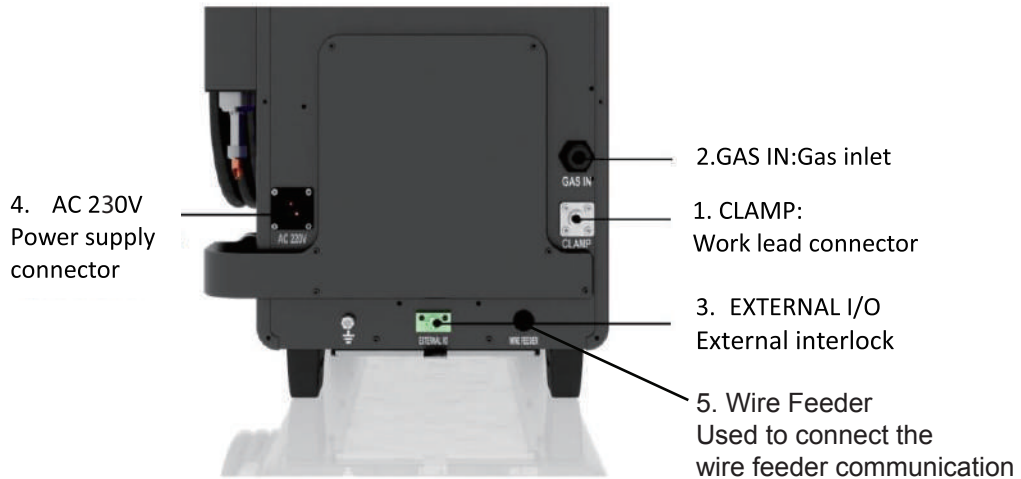


Figure 3-3 Rear Panel View

Table 3-5 Rear Panel Features

S/N	Feature	Functions
1	CLAMP	Used to attach work lead to the workpiece
2	GAS IN	12mm quick connector for welding gas input
3	EXTERNAL I/O	Used to connect external interlocking protection device. The welder can work normally only after the interface is short circuited
4	AC 230V	Used to input 230V, single-phase AC
5	Wire Feeder	Used to connect the wire feeder communication



3.6 Welding Gun Mk I Version



Figure 3-4 Welding Torch View

Table 3-6 Welding Torch Features

S/N	Feature	Functions
1	Nozzle tip	Output welding gas; During welding, the nozzle tip shall be in contact with the workpiece; The nozzle tip is replaceable;
2	Laser output button	When the laser output conditions are met, press this button to output laser; Release the button to stop outputting laser;
3	Protective glass	Used to prevent external dust from entering the optical path; it is a consumable item and should be replaced regularly;
4	Status indicator	When the laser output conditions are met, it turns green; When outputting laser, it turns red.



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3.7 Welding Gun Mk II Version

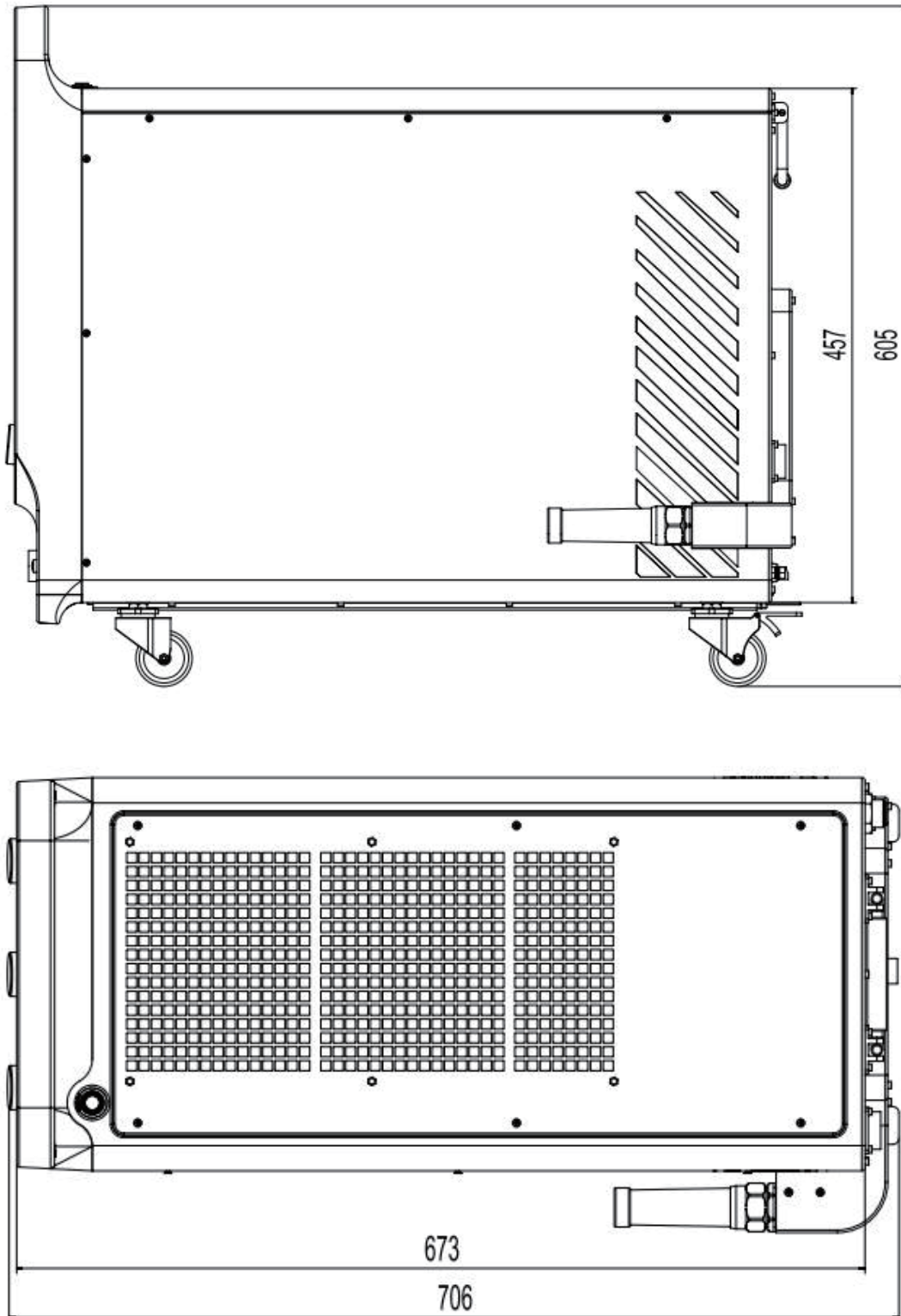


No.	Part	Part Function
1	Nozzle	Sending protective gas to the workpiece surface.
2	Nozzle nut	Fix nozzle on the barrel.
3	Barrel	The channel for the gas and the laser.
4	Barrel nut	Secure barrel on the torch.
5	Protective window screw	Secure protective window assembly.
6	Protective window assembly	Shields focus lens.
7	Focus lens assembly	Focus's laser beam.
8	LED indicator	Indicate work status: Green: Ready to weld; Yellow: Error; RED: Emission.
9	Bottom	LASER emission trigger.
10	Wire feeder hook	Fix wire feeding tube.



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3.8 Dimension Drawing of the Welder





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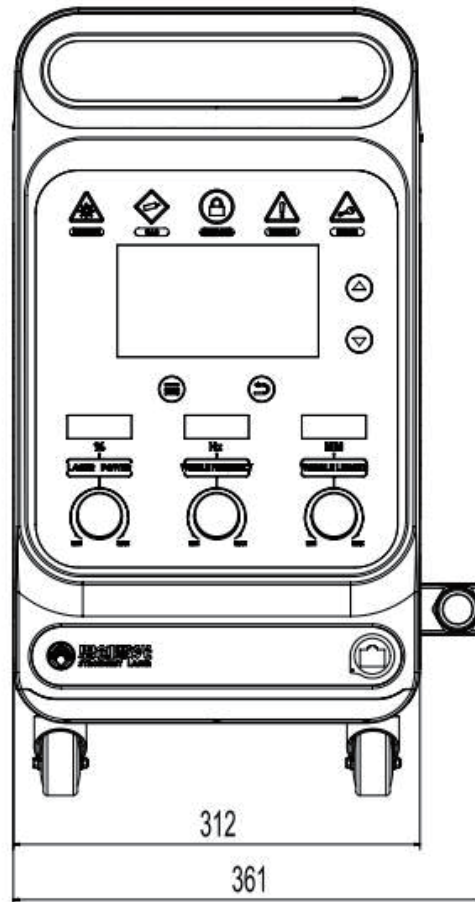


Figure 3-7 Overall Dimensions of Welder

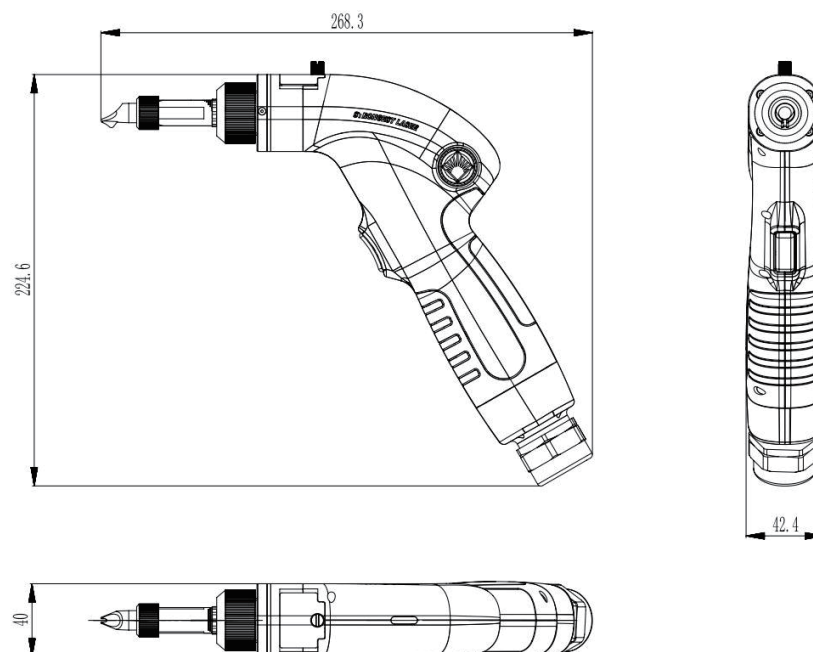


Figure 3-8 Dimensions of Welding Gun



Chapter 4 Setup of the Welder

4.1 Preparation Before Setup

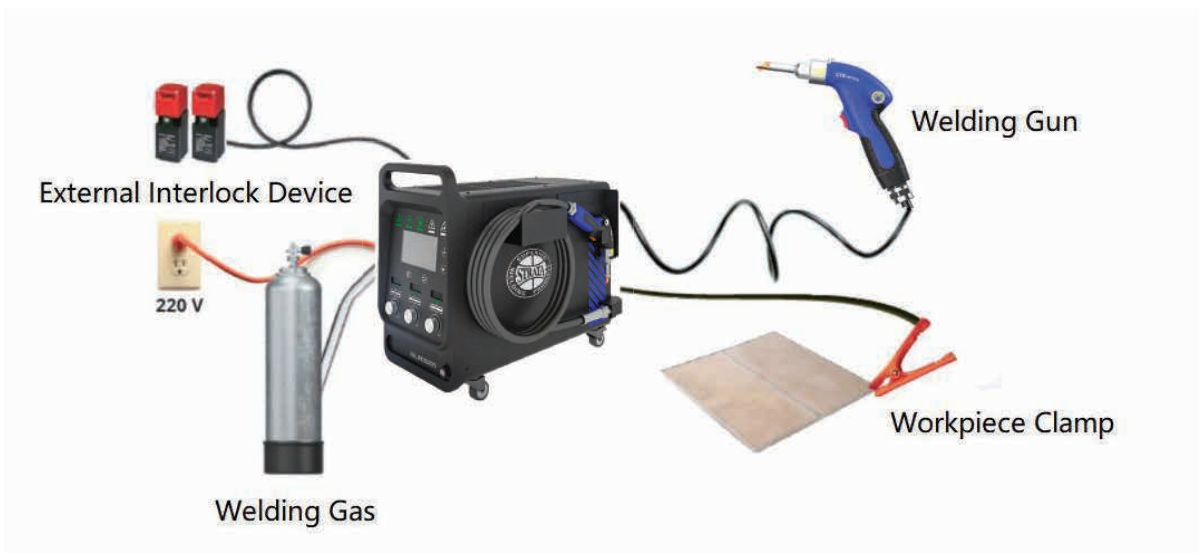


Figure 4-1 Typical Setup of the Welding System

Setup Description:

1. External interlock device connection: the welder is provided with an external interlock connector for connecting external interlock safety devices (such as safety pedal and external emergency stop lamp); Only when the interlock connector detects a closed circuit, the equipment can normally output laser. If there is no external interlock safety device, please short circuit the external interlock connector.
2. 230V power supply: the welder is powered by 230V AC. The aviation plug end of the power cord should be connected to the the 230V power supply aviation socket of the machine, and the other end L and N should be connected to the distribution box L and N respectively. In order to ensure safety, connect the welder with a ground wire.
3. Welding gas: Welding gas is input through the Φ 12 quick connector on rear panel.
4. Welding gun: the welding gun is integrated with the welder base unit and cannot be disassembled.
5. Work lead: before welding, attach workpiece clamp to the workpiece or the workpiece fixture that is electrically conducting with the workpiece.



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4.2 Setup Space and Heat Dissipation Airflow Requirement

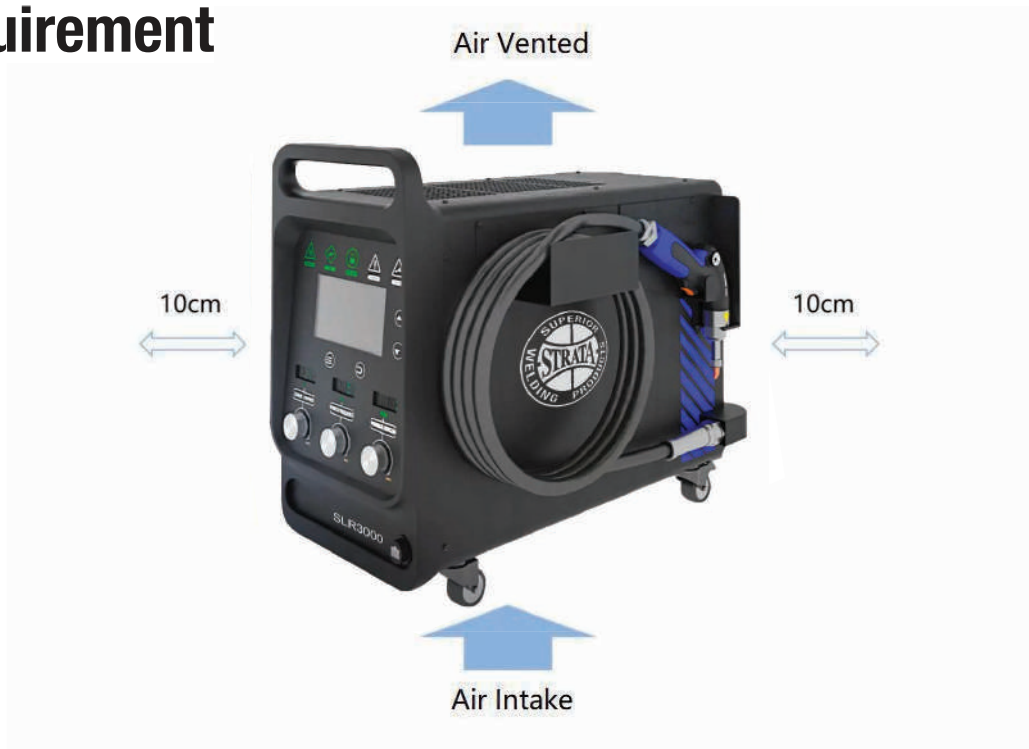


Figure 4-2 Airflow Direction and Setup Space

Precautions:

1. Air inlet at the bottom: the air inlet is provided at the bottom of the welder. Please ensure that the space under the welder is unobstructed.
2. Air outlet at the top: the air outlet is provided at the top of the welder. Please ensure that the space above the welder is unobstructed.
3. Setup space: at least 40cm space shall be reserved above, to the left and right sides of the welder.

4.3 Connecting Work Lead and Gas



Figure 4-3 Work Lead Connector



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Figure 4-4 Gas Inlet Connector

The work lead is secured with M8 screws.

Gas inlet connector is a \square 12 quick connector. The input gas pressure should be between 0.15Mpa (22psi) and 0.3MPa (44psi).

4.4 Connecting External Interlock Signals



Figure 4-5 External Interlock Signal Connector

Connect the external interlock safety device as required. If there is no external safety device, the connector shall be short circuited.

4.5 Connecting External Power Supply



Figure 4-6 Power Supply Connector

Note: please connect the welder to a ground wire when the welder is working on a mechanical application such as robot or cobot.



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4.6 Startup of Welder

- (1) Prepare for equipment installation according to 4.1 - 4.5;
- (2) Start 230V power supply;
- (3) Press the Startup button at the top right of the welder, as shown in the following figure:



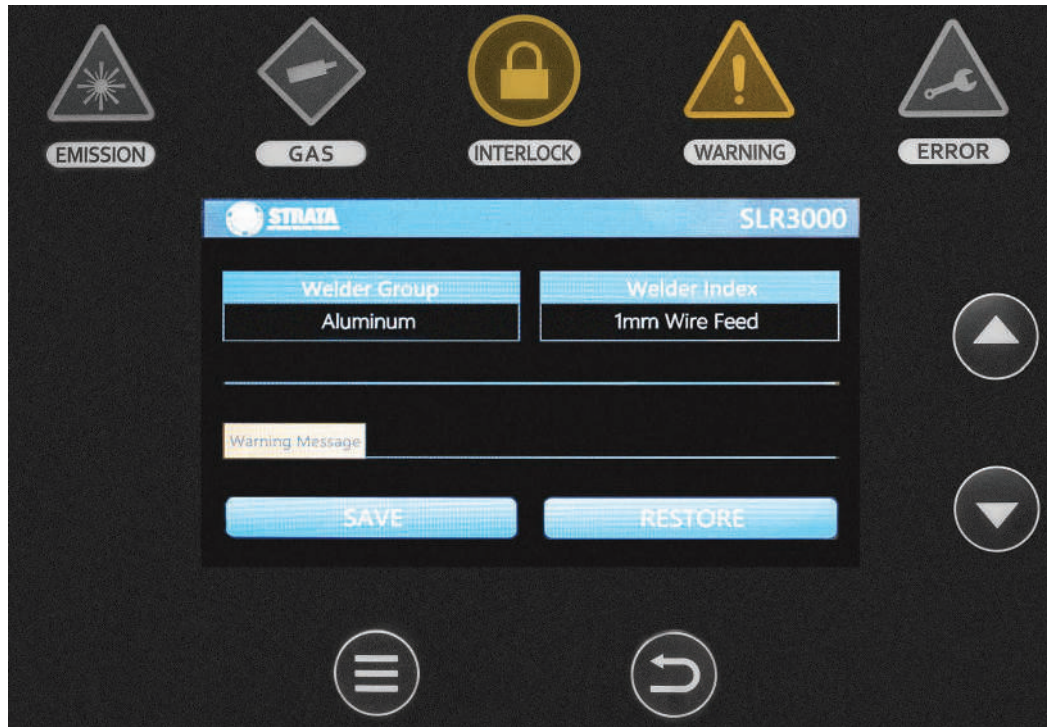
- (4) After pressing the startup button, the LCD enters the startup interface, as shown in the following figure:



- (5) After the startup is completed, the LCD enters the operation interface. At this time, the startup is completed and the welder can work normally.



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4.7 Shut Down the Welder

Follow following steps to shut down the welder:

- (1) Release the Laser Output button of the welding gun to stop outputting laser;
- (2) Remove the workpiece clamp;
- (3) Pop up the Startup button to shut down the welder;
- (4) Stop inputting gas;
- (5) Turn off the power supply of the welder.



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Chapter 5 Operating Features of the Welder

5.1 Front Panel Indicator Information



Figure 5-1 Front Panel Indicators

- (1) Emission indicator: it displays whether the welder is outputting laser. It turns yellow when outputting laser; otherwise it turns off;
- (2) GAS indicator: It turns yellow when there is no gas input or the air pressure is insufficient;
- (3) INTERLOCK indicator: It turns yellow when the interlock circuit is not closed due to disconnected work lead or no contact of welding nozzle tip with the workpiece;
- (4) WARNING indicator: It turns yellow when the working ambient temperature and humidity exceed the safe range;
- (5) ERROR indicator: It turns red when the welder fails.

5.2 LCD Information

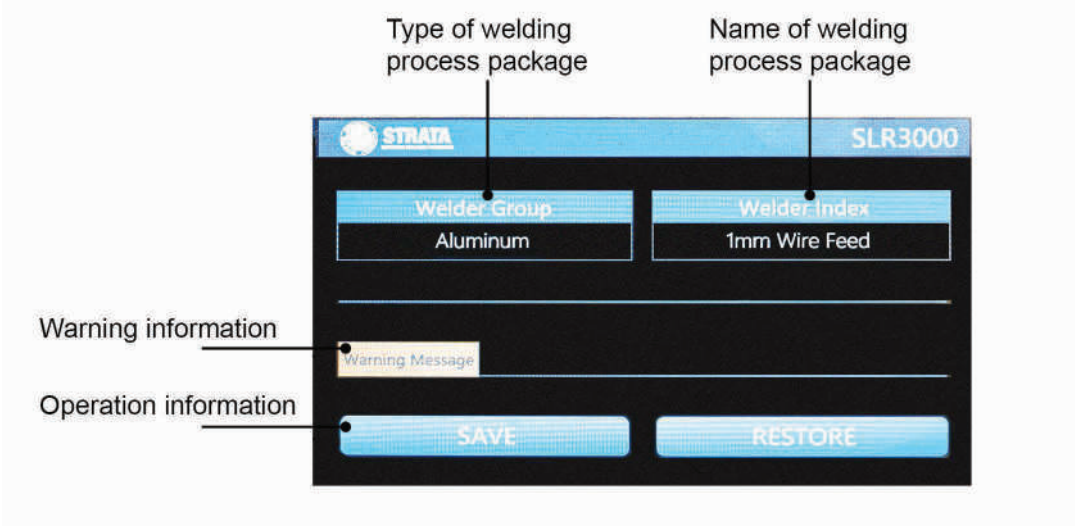


Figure 5-2 LCD Information Display

- (1) Welding process package type: by default, the welder has five welding process package types: aluminum, carbon steel, galvanized steel, stainless steel, and custom process package; Except for User-Defined Process Package, other types are factory built-in process packages;
- (2) Process package name: the name of the process package. The user-defined process package name can be set by the customer;



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- (3) Warning information bar: displays the current warning information of the welder;
- (4) Operation information: displays the functions of the operation buttons below.

5.3 Features for process Package Switching

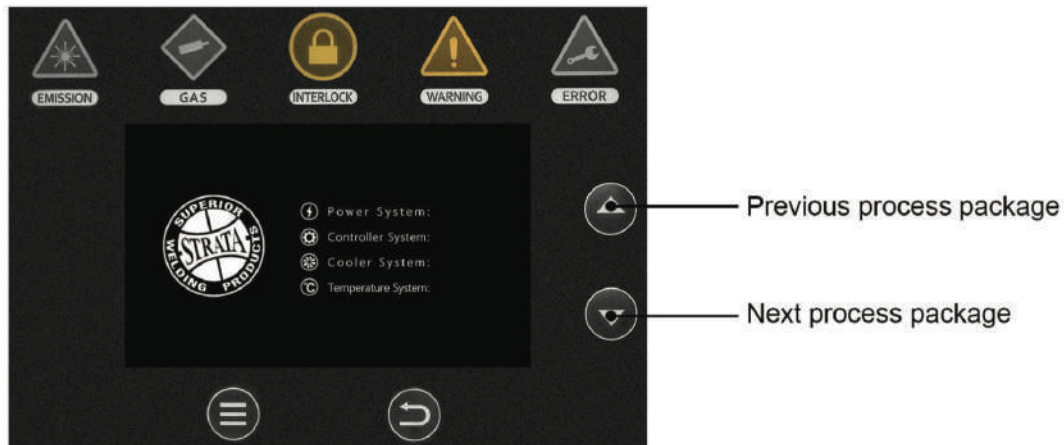


Figure 5-3 Switching Buttons of Process Packages

The operation of switching process package is as follows:

- (1) Short press a Previous button: switch to the previous process package;
- (2) Short press the Next button: switch to the next process package;
- (3) Long press the Previous button: switch to the previous process package type;
- (4) Long press the Next button: switch to the next process package type.



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5.4 Operating Buttons

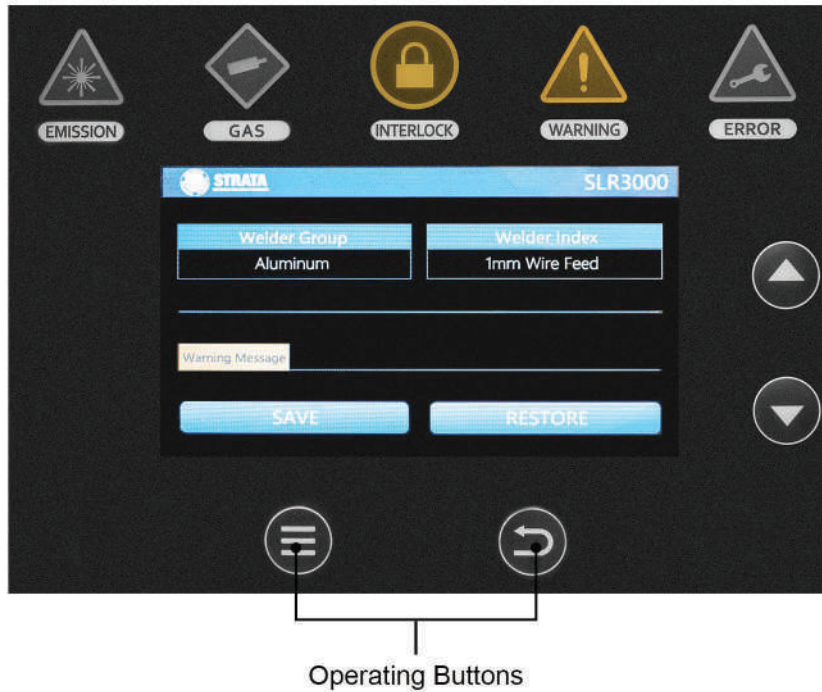


Figure 5-4 Operating Buttons

According to the LCD prompts, the functions of the operating buttons are as follows:

(1) Left button: Press it to store the welding package, i.e., store the parameters of active welding package;

(2) Right button: Press it to reset the parameters of active welding package parameters to the default parameters;

After operation, a window will pop up for confirmation. Press the left button again to confirm the operation, and press the right button again to cancel the operation.



Figure 5-5 Operation Confirmation



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5.5 Power Adjustment

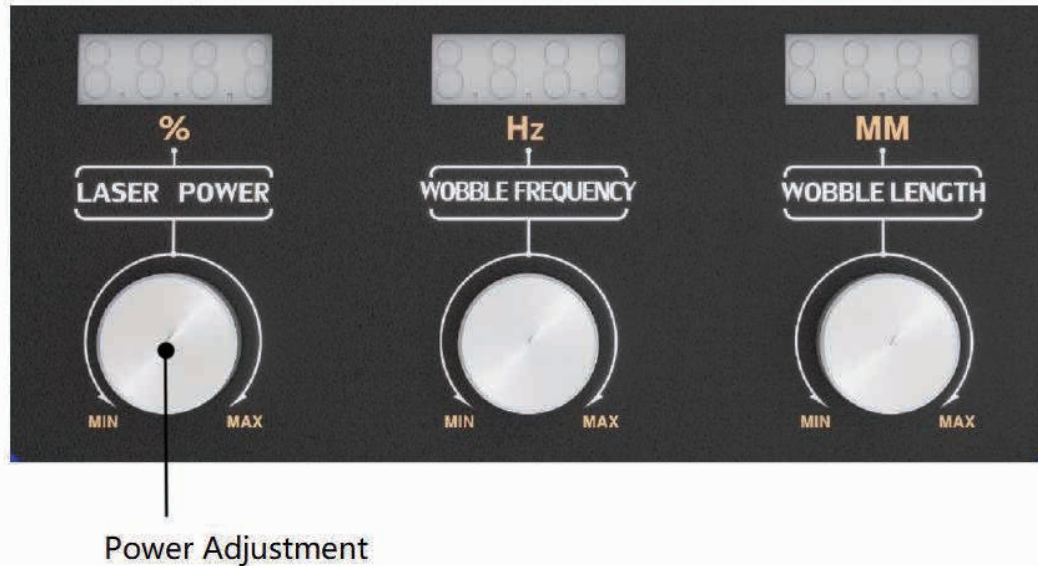


Figure 5-6 Power Adjustment

The digital display will display the power percentage of the active process package. The operation of adjusting the power as follows:

1. Rotate the knob clockwise and the power percentage will be increased;
2. Rotate the knob counterclockwise and the power percentage will be decreased;

The range of power adjustment is 0%, 10% -100%. When the power percentage is 0%, there will be no laser output.

5.6 Wobble Frequency Adjustment



Figure 5-7 Wobble Frequency Adjustment

The digital display tube will display the wobble frequency of the active process package; Wobble frequency adjustment operation is as follows:

- (1) Rotate the knob clockwise and the wobble frequency will be increased;



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(2) Rotate the knob counterclockwise and the wobble frequency will be decreased;
The range of wobble frequency adjustment is 0 - 200hz. When the wobble frequency is 0Hz, there will be no wobble.

5.7 Wobble Length Adjustment



Figure 5-8 Wobble Length Adjustment

The digital display tube will display the wobble length of the active process package;
Wobble length adjustment operation is as follows:

- (1) Rotate the knob clockwise and the wobble length will be increased;
- (2) Rotate the knob counterclockwise and the wobble length will be decreased;

The range of wobble length adjustment is 0 - 5.0 mm. When the wobble length is 0, there will be no wobble.



Chapter 6 Welding

6.1 Key Safety Features

6.1.1. Safety Interlock of Nozzle Tip and Work Lead

During welding, only when the nozzle tip and the work lead form a closed circuit, the laser is allowed to output. Before welding, the work lead should be attached to the workpiece. When the nozzle tip is not in contact with the welding surface, the welder will automatically stop outputting laser. When the work lead is not attached to the workpiece, the laser outputting operation is invalid.

6.1.2. Gas Pressure Protection Interlock

The gas pressure detection device is built in the welder. When the welding gas is not connected to the welder or the input gas pressure is less than 0.1MPa, the laser output operation is invalid; When the input gas pressure decreases during welding, the fault will be triggered and the laser output will stop automatically.

6.1.2. External Safety Interlock

The welder is provided with an external safety interlock connector, which can be used to connect safety devices such as safety pedal and external emergency shutdown device.

6.2 Quick Welding by Utilizing Process Package

Follow these steps to weld quickly:

- (1) Complete the welding system setup and connection as described in Chapter 4;
- (2) Startup the welder as described in Chapter 4;
- (3) Elect the appropriate process package as described in Chapter 5;
- (4) Contact the nozzle tip of the welding gun with the welding operation surface, and press the laser output button on the welding gun to began welding;



- (5) In order to achieve the best welding effect, the included angle between the welding gun nozzle tip and the welding surface is controlled between 30 and 60 ° during welding;
- (6) In order to prevent stray light from causing damage to human eyes, safety goggles should be worn.



6.3 Use and Replacement of Welding Nozzle Tips

The welder is provided with a variety of welding nozzle tips for users to replace; The steps for installing the copper nozzle tip are as follows:

- (1) Insert the copper nozzle into the air tube;
- (2) Put on the locking cap;
- (3) Tighten up the locking cap.



Figure 6-1 Schematic Diagram of Nozzle Tip Replacement



SLR PRO SERIES LASER WELDER

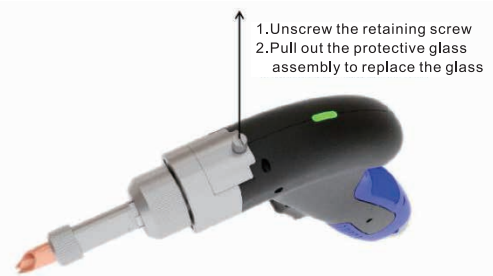
6.4 Use and Replacement of Protective and Focus Lens Mk I Version Torch

Replace Copper Nozzle



1. Insert the copper nozzle into the air tube;
2. Put on the locking cap;
3. Tighten up the locking cap.

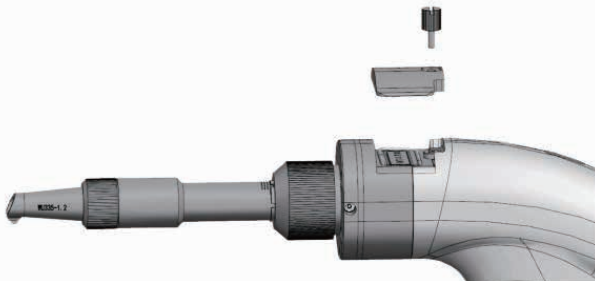
Replace the Protective Glass



1. Unscrew the retaining screw
2. Pull out the protective glass assembly to replace the glass

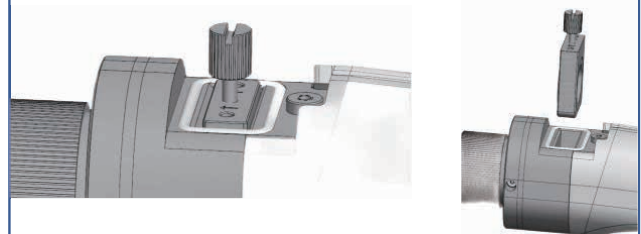
If the protective glass is damaged, the welding effect will be reduced; the long-term use of damaged protective glass will lead to temperature rise of the welding gun and affect the reliability of the welding gun.

Removing Cover Glass Lid



Unscrew the Hand-turn Screw and Remove the Cover Glass Lid.

Taking out Cover Glass

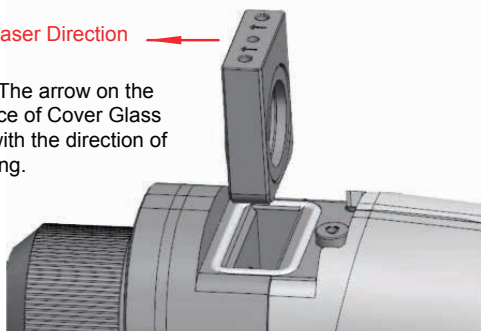


After Removing Cover Glass Lid, Turn the Hand-turn Screw into the thread hole in the middle of Cover Glass, then lift it up.

Removing Cover Glass Lid

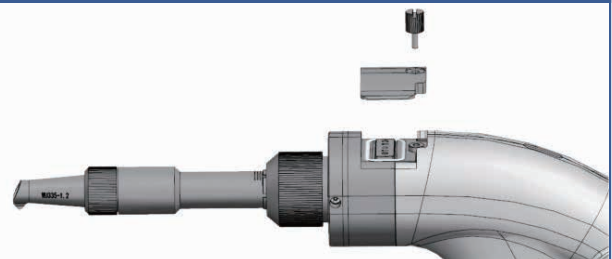
Laser Direction →

Note: The arrow on the end face of Cover Glass align with the direction of Shooting.



Get a new Cover Glass and Insert it downwards.

Installing Cover Glass Lid



After installing Cover Glass, put the Cover Glass Lid on and fix it on the main body with the hand-turn screw.



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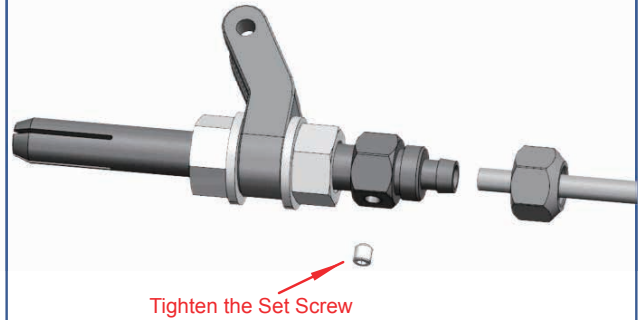
Mk I Version Torch

Wire Feeding Rotating Component Assembling



Install the parts in the correct order.

Installing Wire feeding Spring Tube



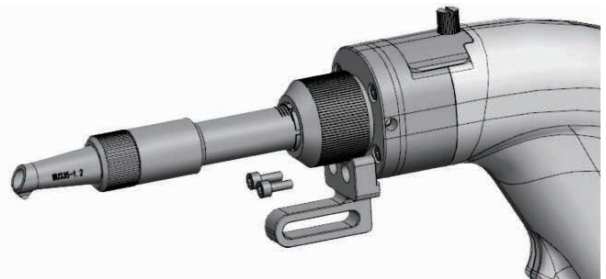
Insert Wire feeding Spring Tube Clamper through the Wire feeding Spring Tube, insert the Wire feeding Spring Tube into Wire feeding Tube Fixing Joint, tighten it with the Set Screw, and finally tighten Wire feeding Spring Tube Clamper to secure the outer skin of the Wire feeding Spring Tube.

Installing Wire feeding Tube Adjusting Joint



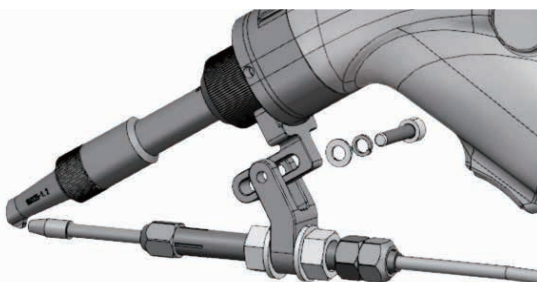
Install Wire feeding Copper Nozzle on Wire feeding Tube Adjusting Joint then assemble it on the Wire feeding Tube Fixing Joint, and pre-tighten it with the Wire feeding Tube Clamping Cap.

Installing Wire feeding Holder Clamp



Use screws to fix the Wire feeding Holder Clamp on the gun head.

Assembling Wire feeding Holder Clamper and Wire feeding Holder Rotator



Pre-assemble the screw with the spring washer and the flat washer, then assemble the Wire feeding Holder Clamp with Wire feeding Holder Rotator and tighten it with the nut. After adjusting the length of the Wire feeding Tube Adjusting Joint outside, tighten the Wire feeding Tube Clamp Cap.



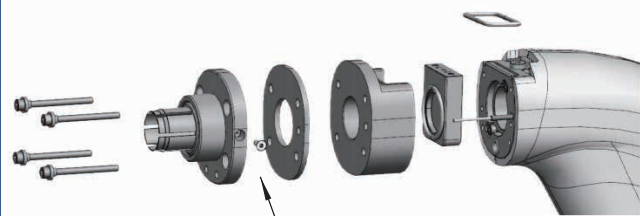
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Dismantling Gun Barrel and Cover Glass Lid



Dismantle the parts in sequence shown.

Dismantling Gun Head Part

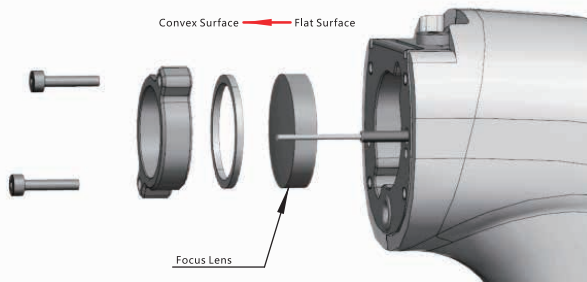


countersink screw

Dismantle the parts in sequence shown.

Note: Before Dismantling, make sure to loosen the countersink screw on the gun head.

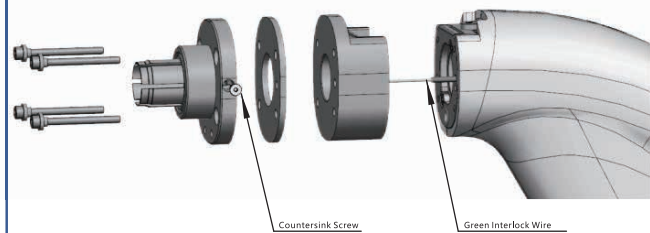
Replacing Focus Lens



Loosen the screw, dismantle the parts in sequence, replace the focus lens, and then install them in order.

Note: Please replace the focus lens in a relatively clean space and avoid directly contacting the flat and convex surfaces of the focus lens. Install the focus lens with the convex surface facing outwards.

Installing Gun Head Part



Assemble the parts in order.

Note: Insert the green interlock wire through the bottom base of Cover Glass and the heat insulation plate to the gun head position, and then tighten it with the countersink screw.

Installing Cover Glass



Assemble the parts in order.

Note: The arrow on the Cover Glass indicates the direction of Shooting.

Installing Gun Barrel Part



Assemble the parts in order, and tighten the nut to hold the gun barrel steadily.



6.5 Use and Replacement of Protective and Focus Lens Mk II Version Torch

During the long-term welding process, it may lead to dirt and damage to the focusing lens; After the focusing lens is damaged, it will cause a decrease in welding effect and a rise in temperature at the front of the welding torch; If the output line of the focusing lens is damaged, it should be replaced immediately. Simply loosen the fastening screw of the focusing lens to complete the replacement of the focusing lens, as shown in the following figure. (Note: The convex surface of the focusing lens faces outward)



Figure 6-2 Replacement Operation of Protective Lens



Figure 6-4 Replacement Operation of Focus Lens

6.6 Use and Cleaning of the Filter Screen

During the long-term use of the welder, the filter screen at its bottom is susceptible to buildup of a large amount of dust, resulting in the decline of heat dissipation effect and temperature failure; The operator shall regularly pull out the filter screen for cleaning. Refer to the following figure for the removal and installation of the filter screen.

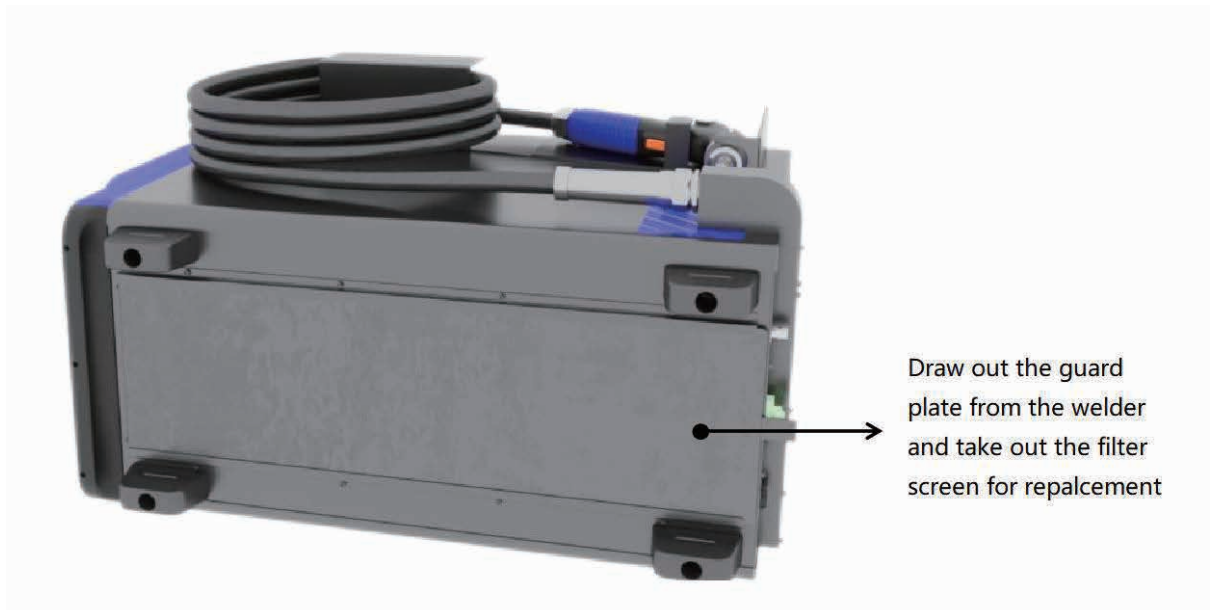


Figure 6-4 Schematic Diagram for Replacing Filter Screen



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Use and Replacement of the Wire Liner and Holder of the Mk II Version

- a) Assemble the wire feeding component

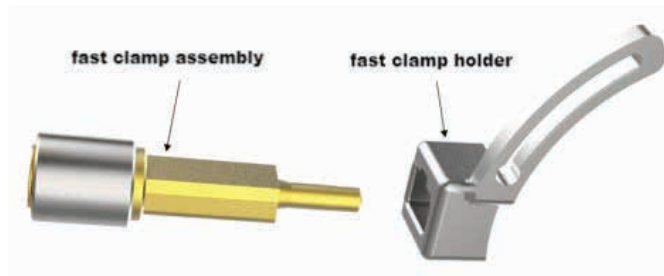


Figure 6-6

- b) Assemble the wire guide nozzle



Figure 6-7

- c) Install the Wire Holder Assembly



Figure 6-8

- d) Install the Wire Holder Assembly Fix the Wire Holder Assembly



Figure 6-9

- e) Fix the fast clamp assembly



Figure 6-10

- f) Install the wire feeding tube

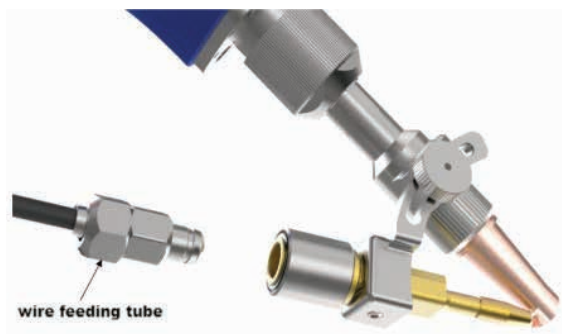


Figure 6-11



SLR PRO SERIES LASER WELDER

Chapter 7 Defining Welding Process Package

7.1 Preset Process Package

The welder has various preset process packages, all of which have been verified and can be directly accessed for use.

Table 7-1 Details of Preset Process Packages in SLR 5000 Handheld Welder

Material	Aluminum	Stainless Steel	Carbon Steel	Galvanized Sheet
Thickness	1mm- wire feed	1mm- wire feed	1mm - wire feed	1mm - wire feed
	1mm	1mm	1mm	1mm
	2mm - wire feed	2mm - wire feed	2mm- wire feeding	2mm- wire feed
	2mm	2mm	2mm	2mm
	3mm - wire feed	3mm - wire feed	3mm - wire feed	3mm - wire feed
	3mm	3mm	3mm	3mm
	4mm - wire feed	4mm - wire feed	4mm - wire feed	-
	4mm	4mm	4mm	-
	5mm - wire feed	5mm - wire feed	5mm - wire feed	-
	5mm	5mm	5mm	-
-	6mm- wire feed	6mm- wire feed	-	
-	6mm	6mm	-	

Table 7-2 Details of Preset Process Packages in SLR 4000 Handheld Welder

Material	Aluminum	Stainless Steel	Carbon Steel	Galvanized Sheet
Thickness	1mm - wire feed	1mm - wire feed	1mm - wire feed	1mm - wire feed
	1mm	1mm	1mm	1mm
	2mm- wire feed	2mm- wire feed	2mm- wire feed	2mm- wire feed
	2mm	2mm	2mm	2mm
	3mm - wire feed	3mm - wire feed	3mm - wire feed	3mm - wire feed
	3mm	3mm	3mm	3mm
	4mm - wire feed	4mm - wire feed	4mm - wire feed	-
	4mm - no wire feed	4mm	4mm	-

Material	Aluminum	Stainless Steel	Carbon Steel	Galvanized Sheet
Thickness	1mm - wire feed	1mm - wire feed	1mm - wire feed	1mm - wire feed
	1mm	1mm	1mm	1mm
	2mm - wire feed	2mm - wire feed	2mm - wire feed	2mm - wire feed
	2mm	2mm	2mm	2mm
	3mm - wire feed	3mm - wire feed	3mm - wire feed	3mm - wire feed
	3mm	3mm	3mm	3mm

7.2 Quickly Setting of Customized Process Packages

The product provides 20 customized process packages, which can be set and used by users themselves.

Welder operator can quickly set customized welding process packages by using the features on the front panel. The specific steps are as follows:

- (1) Use the process package switch button to access any customized welding process package; customized welding packages adopt DC output mode by default;
- (2) Use the knobs on front panel to adjust the power, wobble frequency and wobble length of the user-defined welding process package;



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(3) After the parameter adjustment is completed, use the function button to store the process package parameters;

The process package parameters will not be lost after storage even in case of power failure. User only needs to switch to the customized process package next time.

7.3 Detailed Setting of Customized Process Package

The user can set all parameters of the customized process package in detail through the Wechat APP of STRATA SLR; Refer to the following figure for details;

The screenshot shows a mobile application interface for setting welding parameters. At the top, there are two dropdown menus for 'Material-Group' and 'Material-Number'. Below these is a section titled 'Welding pack parameters' which includes several text input fields: 'Welding pack group', 'Welding pack name', 'Laser Power (%)', 'Open gas delay (ms)', 'Off gas delay (ms)', 'Swing width (mm)', and 'Swing frequency (Hz)'. At the bottom of the screen, there is a navigation bar with four icons: a plus sign in a circle, a wrench, a status icon, and a person icon, labeled 'Equipment', 'Status', 'Parameter', and 'Mine' respectively.

Figure 7-1 Setting Process Package Parameters via STRATA SLR Wechat APP



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The specific setting process is as follows:

- (1) Use Wechat to scan the QR code on the welder and enters the SLR's APP;
- (2) Open the bluetooth of mobile phone, enter the "Device" interface of APP, and connect the device;
- (3) Enter the Parameter interface of the APP and select the corresponding welding package group and change;
- (4) Change the name or parameters of the process package in the column of "Active welding package parameters".

7.4 Welding Mode and Process Parameters

SLR welder series provide four welding process modes:

- (1) Continuous emission mode: output laser continuously;
- (2) Pulse emission mode: output the laser according to the specified frequency and duty cycle;
- (3) Spot welding mode: output a single laser for specified period and of specified parameters;
- (4) Continuous spot welding mode: output the spot welding laser of specified times.

7.4.1. Process Parameters under Continuous Laser Output Mode

S/N	Parameter Name	Parameter Definition
1	Laser output power	Percentage of laser output power used by process package, %
2	Wobble frequency	Wobble frequency of Laser output used by process package, Hz
3	Wobble length	Wobble length of light output used by process package, in 0.1mm
4	Gas output delay	Air output delay used by process package, in ms
5	Gas shut-off delay	Gas shut-off delay used by process package, in ms
6	Power ramping-up time	Time when laser output is ramping up, in ms
7	Power coasting-down time	Time when laser output is coasting down, in ms
8	Wire feeding speed	Wire feeding speed when supported by dedicated wire feeder of STR Laser, in cm/min
9	Wire feeding delay	Wire feeding delay when supported by dedicated wire feeder of STR Laser, in ms

7.4.2. Process Parameters Under Pulse Laser Output Mode

S/N	Parameter Name	Parameter Definition
1	Laser output power	Percentage of laser output power used by process package, %
2	Wobble frequency	Wobble frequency of Laser output used by process package, Hz
3	Wobble length	Wobble length of light output used by process package, in 0.1mm
4	Gas output delay	Air output delay used by process package, in ms
5	Gas shut-off delay	Gas shut-off delay used by process package, in ms
6	Laser output frequency	Pulse repetition frequency of laser output, Hz
7	Laser output duty ratio	Pulse duty cycle of laser output, %
8	Wire feeding speed	Wire feeding speed when supported by dedicated wire feeder of STR Laser, in cm/min
9	Wire feeding delay	Wire feeding delay when supported by dedicated wire feeder of STR Laser, in ms



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7.4.3. Process Parameters under Spot Welding Laser Output Mode

S/N	Parameter Name	Parameter Definition
1	Laser output power	Percentage of laser output power used by process package, %
2	Wobble frequency	Wobble frequency of Laser output used by process package, Hz
3	Wobble length	Wobble length of light output used by process package, in 0.1mm
4	Gas output delay	Air output delay used by process package, in ms
5	Gas shut-off delay	Gas shut-off delay used by process package, in ms
6	Power ramping-up time	Time when laser output is ramping up, in ms
7	Power coasting-down time	Time when laser output is coasting down, in ms
8	Laser output duration for Spot welding	Laser output duration for Spot welding
9	Wire feeding speed	Wire feeding speed when supported by dedicated wire feeder of STR Laser, in cm/min
10	Wire feeding delay	Wire feeding delay when supported by dedicated wire feeder of STR Laser, in ms

7.4.4. Process Parameters under Continuous Mode

S/N	Parameter Name	Parameter Definition
1	Laser output power	Percentage of laser output power used by process package, %
2	Wobble frequency	Wobble frequency of Laser output used by process package, Hz
3	Wobble length	Wobble length of light output used by process package, in 0.1mm
4	Gas output delay	Air output delay used by process package, in ms
5	Gas shut-off delay	Gas shut-off delay used by process package, in ms
6	Power ramping-up time	Time when laser output is ramping up, in ms
7	Power coasting-down time	Time when laser output is coasting down, in ms
8	Laser output duration for Spot welding	Laser output duration for Spot welding, in ms
9	Interval for spot welding	Interval between two spot welds when there is no laser output, in ms
10	Spot welding times	Repetition times of spot welding
11	Wire feeding speed	Wire feeding speed when supported by dedicated wire feeder of STR Laser, in cm/min
12	Wire feeding delay	Wire feeding delay when supported by dedicated wire feeder of STR Laser, in ms



Chapter 8 Fault Information and Location

8.1 Fault Display

If any fault occurs to the welder, the corresponding indicators will go on, and the LCD screen will display the fault information as shown in the figure below.

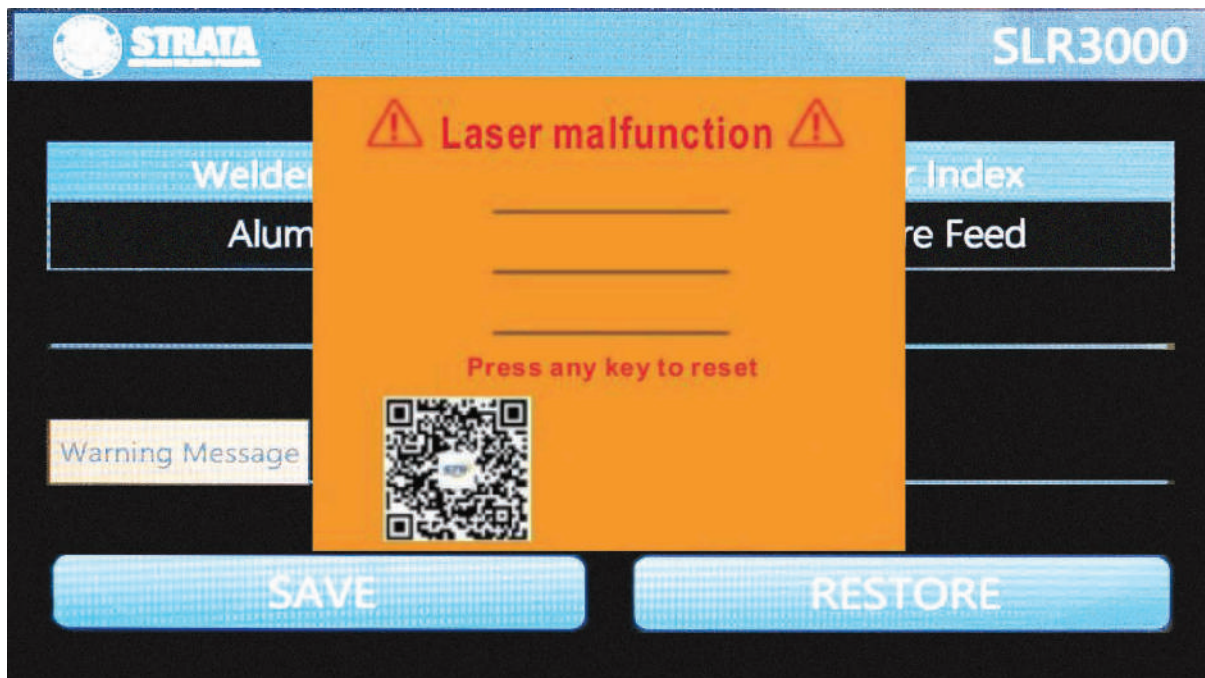


Figure 8-1 Fault Displayed on LCD

8.2 Fault Reset

After the fault occurs, press any operation button to reset the fault. When the fault is reset, the LCD will give a prompt.

After resetting, if the fault has been cleared, the LCD screen will give a prompt that the resetting is successful, and the welding operation can be continued; If the fault remains, the resetting fails, and the LCD will give a prompt that the resetting fails.

8.3 Use APP to View Detailed Fault Information

You can open the monitoring interface of the APP to view the detailed fault information, as shown in the figure below.



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Figure 8-3 Using APP to View Detailed Fault Information



8.4 Abnormalities and Troubleshooting

Table 8-1 Equipment Abnormalities and Location

S/N	Category	Abnormalities	Actions & Remarks
1	Warnings	Ambient temperature too high	Warning is sent out when the ambient temperature is approaching the upper limit
2		Ambient temperature too low	Warning is sent out when the ambient temperature is approaching the lower limit
3		High ambient humidity	Warning is sent out when the ambient humidity is approaching the upper limit
4	Faults	Abnormality has occurred to heat dissipation system	Abnormality has occurred to heat dissipation system inside the welder; Reset the welder to clear the abnormality. If the abnormality cannot be cleared, please contact after-sales personnel
5		Initialization timeout	The startup time of the welder is timeout, reset the welder to clear the abnormality. If the abnormality cannot be cleared, please contact the after-sales personnel
6		abnormal gas pressure	The input gas pressure is insufficient. Please check the input gas pressure and reset the fault
7		Abnormality occurs in fan system	The fan is faulty. After checking that the air inlet and outlet for no blockage, reset the fault
8		Abnormal temperature and humidity	Ambient temperature and humidity exceed the safety range. Please reset the fault in an ambient with suitable temperature and humidity.
9		Abnormality occurs in remote interlock	Remote interlock signal is disconnected. Please check the remote interlock signal connection and reset the fault
10		Abnormality occurs in welding gun system	Check protective glass of the welding gun for proper installation or any damage; Correct any improper installation or repair any damage to clear the fault
11		Abnormality occurs in optical path	Restart the welder. If any fault occurs again during welding, please contact after-sales personnel
12		Abnormal operating temperature	Check the air inlet and outlet for any blockage, clear the filter dust and reset any fault
13		Device time locking	This fault occurs when the welder exceeds the allowable service time, please contact after-sales personnel to unlock it
14		Abnormal driving power supply	If the power supply of the equipment is abnormal, this fault occurs. Reset the fault after it is abnormal. If the abnormality cannot be cleared, please contact the after-sales personnel
15		Abnormality occurs in wire feeder	The supporting SLR Laser wire feeder suffers malfunction. Please check the wire feeder



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Chapter 9 Handheld Laser Weld Torch Accessories and Spare Parts

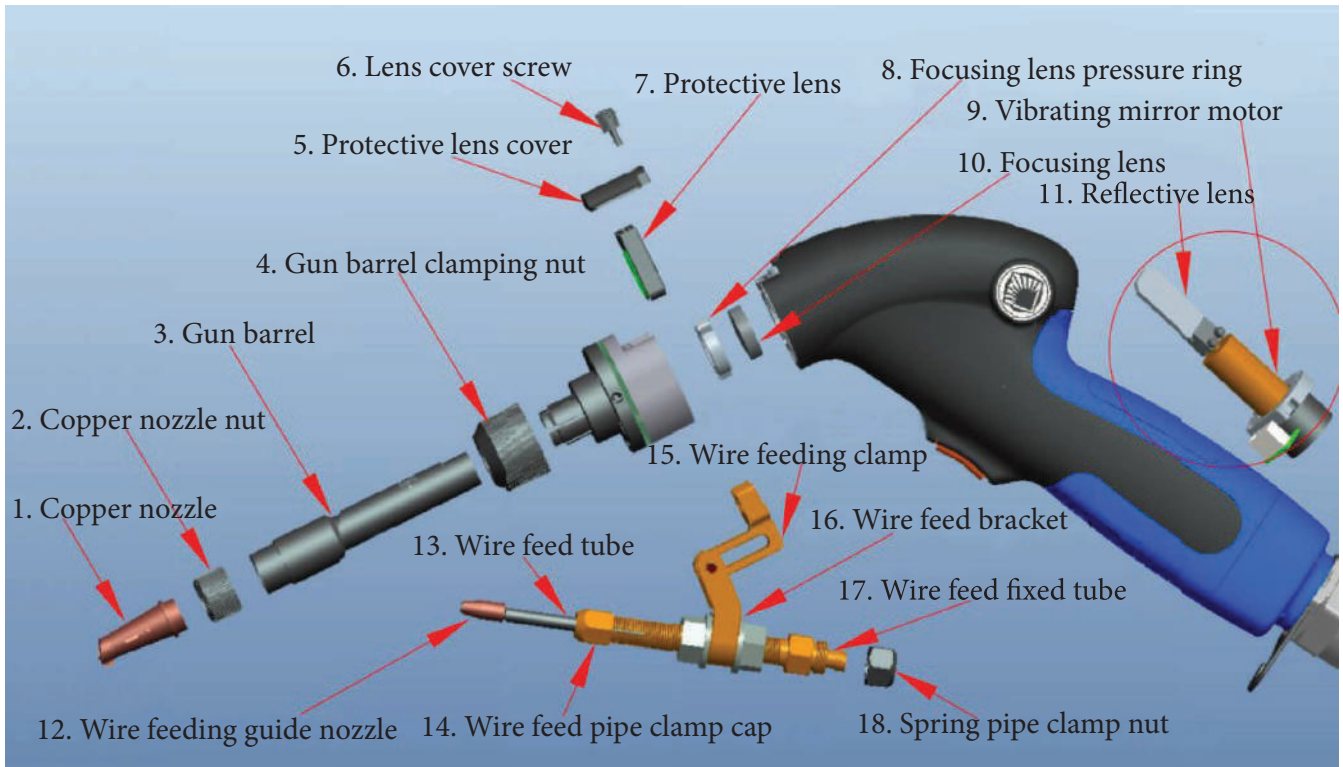




Photo	Diagram Part Number	SKU/Part Number	Sales Description	Comment	Brand
	1	A100	Copper Nozzle Type A100	Used for welding without wire feeder, and external fillet welding	Strata
	1	B080	Copper Nozzle Type B080-0.8mm	Used for wire feeding welding	Strata
	1	B100	Copper Nozzle Type B100-1.0mm		Strata
	1	B120	Copper Nozzle Type B120-1.2mm		Strata
	1	B160	Copper Nozzle Type B160-1.6mm		Strata



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Photo	Diagram Part Number	SKU/Part Number	Sales Description	Comment	Brand
	1	C100	Copper Nozzle Type C100	Used for non wire feeding external fillet welding	Strata
	1	D100	Copper Nozzle Type D100	Used for non wire feeding internal fillet welding	Strata
	1	E080	Copper Nozzle Type E080-0.8mm	Used for wire feeding tailor welding and internal fillet welding	Strata
	1	E100	Copper Nozzle Type E100-1.0mm		Strata
	1	E120	Copper Nozzle Type E120-1.2mm		Strata
	1	E160	Copper Nozzle Type E160-1.6mm		Strata
	1	F080	Copper Nozzle Type F080-0.8mm	Used for wire feeding external fillet welding	Strata
	1	F100	Copper Nozzle Type F100-1.0mm		Strata
	1	F120	Copper Nozzle Type F120-1.2mm		Strata
	1	F160	Copper Nozzle Type F160-1.6mm		Strata
	1	G080	Copper Nozzle Type G080-0.8mm	Used for wire feeding tailor welding and external fillet welding	Strata
	1	G100	Copper Nozzle Type G100-1.0mm		Strata



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Photo	Diagram Part Number	SKU/Part Number	Sales Description	Comment	Brand
	1	G120	Copper Nozzle Type G120- 1.2mm		Strata
	1	G160	Copper Nozzle Type G160- 1.6mm		Strata
	1	CN358	Cutting Nozzle CN358	Cutting Nozzle	Strata
	2	CN1612	Copper Nozzle Nut		Strata
	3	CB1488	Gun Barrel CB1488		Strata
	4	CN2521	Gun Barrel Clamping Nut		Strata
	5	CD36	Protective Cover Lens		Strata
	6	CND714	Lens Cover Screw		Strata
	7	PW52	Protective Lens		Strata
	8	CR1654	Focusing Lens Clamping Ring		Strata
	9	VMM1552	Vibrating Mirror Motor		Strata
	10	FL20150	Focusing Lens		Strata
	11	RL3014	Reflective Lens		Strata
	12	WFN1010	Wire Feeding Guide Nozzle 1.0mm		Strata
	12	WFN1012	Wire Feeding Guide Nozzle 1.2mm		Strata



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Photo	Diagram Part Number	SKU/Part Number	Sales Description	Comment	Brand
	12	WFN1016	Wire Feeding Guide Nozzle 1.6mm		Strata
	12	WFN1610	Wire Feeding Guide Nozzle HD 1.0mm		Strata
	12	WFN1612	Wire Feeding Guide Nozzle HD 1.2mm		Strata
	12	WFN1616	Wire Feeding Guide Nozzle HD 1.6mm		Strata
	13	FT7725	Wire Feed Tube		Strata
	14	CNM12	Wire Feed Pipe Clamp Cap Nut		Strata
	15	WFCM4	Wire Feeding Clamp		Strata
	16	WFR841	Wire Feeding Rotating Part		Strata
	17	WFT965	Wire Feeding Fixed Tube		Strata
	18	WPC1210	Spring Pipe Clamp Nut		Strata
		WFT980	Wire Feed Tube Assembly		Strata
		WFW0810	Drive Roller Set 0.8 / 1.0mm V Groove (set of 2 rollers)		Strata
		WFW1216	Drive Roller Set 1.2 / 1.6mm V Groove (set of 2 rollers)		Strata
		WFWU0810	Drive Roller Set 0.8 / 1.0mm U Groove (set of 4 rollers)		Strata



SLR PRO SERIES LASER WELDER

Photo	Diagram Part Number	SKU/Part Number	Sales Description	Comment	Brand
		WFWU1012	Drive Roller Set 1.0 / 1.2mm U Groove (set of 4 rollers)		Strata
		WFL3M0812	Laser Wire Feed Liner 0.8-1.2mm x 3m for Steel		Strata
		WFL5M0812	Laser Wire Feed Liner 0.8-1.2mm x 5m for Steel		Strata
		AWFL3M0820	Laser Wire Feed Liner 0.8-2.0mm x 3M for Aluminium		Strata
		AWFL5M0821	Laser Wire Feed Liner 0.8-2.0mm x 5M for Aluminium		Strata
		WFCC300	Wire Feeder Control Cable for SLR Laser Series		Strata
		SCC101	Safety Chain Cable for SLR Laser Series		Strata
		WPCC105	Welder Power Supply Cable for SLR Laser Series		Strata
		WFPC121	Wire Feeder Power Cable for SLR Laser Series		Strata
		SLR-SWF	Single Wire Feeder Unit for SLR3000/SLR5000		Strata
		SLR-5T	5m Torch to Suit SLR3000/SLR5000		Strata



SLR PRO SERIES LASER WELDER

Chapter 10 Warranty

As part of an on-going commitment to excellence in product support, Euroquip offers a comprehensive product warranty program.

Registered warranty period for the SLR Series Laser Welder:

Commercial Use: 12 Months

Domestic Use: 12 Months

Warranty covers failure caused by manufacturing and material defects in the product, during the warranty period specified. The warranty period begins when the product is purchased by the end user. Warranty is not transferable and is only claimable by the original purchaser.

Warranty does not cover parts that are subject to wear and tear from usage.

Warranty covers failure of a product caused by defective materials and/or manufacturing for the period given and the usage specified by Euroquip. The warranty period begins when the product is purchased by the end user. Warranty is not transferable and is only claimable by the original purchaser.

Warranty also does not cover failure caused by the untimely replacement or service of the above wearing parts. Evidence must be provided that the product has been maintained and serviced suitably for a claim to be considered under warranty.

Failure caused by incorrect operation of the product, lack of proper care and maintenance of the product, external damage, external circumstances such as contaminated fuel or poor water supply, modifications to the product, attempted repair/service by a party other than an Approved Service Agent, is not covered under warranty.

Warranty does not cover pre delivery service and adjustment, or failure that may occur as a result of lack of/ incorrect pre delivery service and adjustment.

Warranty does not cover any incidental, indirect or consequential loss, damage or expense that may result from any defect, failure or malfunction of a product.

Should any issue be found to be a combination of a warranty failure and a non-warranty issue, the repair cost component to rectify and repair the non-warranty failure is the customers' full responsibility.

The decision that an issue with a product qualifies as a warranty claim is made at the sole jurisdiction of Euroquip.

No costs incurred will be considered under warranty if repairs are carried out by a party other than a Euroquip Approved Service Agent, unless with prior consent in writing from Euroquip.

It is the responsibility of the purchaser to deliver a product under warranty to the nearest relevant service agent or product reseller. Warranty does not cover call outs, mile- age and freight costs.

If a product is repaired under warranty, parts and labour required for the repair will be supplied at no charge. Warranty assessment and repair will be scheduled and executed according to the normal work flow at the service location and depending on the availability of suitable replacement parts.

This warranty policy is an additional benefit and does not affect the legal rights of any end user, reseller or service agent.



SLR PRO SERIES LASER WELDER

10 .1 Technical Support

All servicing and repair activities, if necessary, on any components, parts or assemblies of Laser strike vehicle shall be performed by qualified persons.

In case that any fault occurs to any product in the process of using it, the qualified technical personnel of STRATA should be notified in time for troubleshooting such fault.

Any product returned to STRATA for repair or replacement shall be placed in the original packaging provided by STRATA. Otherwise, STRATA is entitled to paid repair service of any product suffering any damage caused thereby.

When the user receives the returned product, please check carefully whether that the product is in good condition. In case any abnormality is found, please contact the carrier or STRATA immediately at 0800 43 88 66



Congratulations on your new STRATA product. We are proud to have you as our customer and will strive to provide you with the best service and reliability in the industry. This product is backed by our extensive warranty and world-wide service network. To locate your nearest distributor or service agency visit www.strata.co.nz, or email us at info@euroquip.co.nz.

www.strata.co.nz