JASIC®

Handheld Laser Welding Machine

LS-15000F LS-20000F LS-20000F-D

Operating Manual

Intertek RoHS 2002/95/EC CE UK CA

Your new product

Jasic.co.uk

Thank you for selecting this Jasic Laser product.

This product manual has been designed to ensure that you get the most from your new product. Please ensure that you are fully conversant with the information provided paying particular attention to the safety precautions. The information will help protect yourself and others against the potential hazards that you may come across.

Please ensure that you carry out daily and periodic maintenance checks to ensure years of reliable and trouble free operation.

Please call your Jasic distributor in the unlikely event of a problem occurring.
Please record below the details from your product as these will be required for warranty purposes and to ensure you get the correct information should you require assistance or spare parts.

Date purchased _____

From where _____

Serial number _____

(The serial number is normally located either on the top or side of the machine)

For further information on your Jasic product warranty registration please visit:
www.jasic-warranty.co.uk

Disclaimer

We believe we have carried out our due diligence to ensure accuracy with the information offered within this operating manual. Whilst every effort has been made to ensure that the information contained within this manual is complete and accurate, we take no responsibility for any errors, omissions or changes to local regulations and as such any use of this information contained is done so at the readers/ user's discretion and we do not accept any liability for any consequences that may arise from its use.

When using class 4 handheld laser welding systems the legal responsibilities for installation and operation are for both the employer and employee.

Please Note:

- Products are subject to continual development and may be subject to change without notice.
- We recommend to regularly check our product pages at www.jasic.co.uk for revision updated operating manuals.
- No part of this manual may be copied or reproduced by any means without the written permission of Wilkinson Star Limited.
- This manual is translated from the original manufacturers operating instructions.

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INTRODUCTION TO HAND HELD LASER WELDING

Handheld laser welding is a manual process that uses a laser beam to join two materials together. The Jasic laser power sources do not produce an arc, however the laser welder produces up to 2kw of continuous-wave power at 100% duty cycle. It's a ytterbium, continuous-wave, 1,080-nm fibre laser, to be exact. The power also can be adjusted from 150 to 2kw, with 2,500 W of peak power in certain modes. Jasic handheld laser welding is a versatile process that can be used for joining a range of material and thicknesses including thin and thick materials. It's often used in industry to join thin sheets with minimal distortion, and the process involved offers many advantages for the use of handheld laser welding, which include:

Laser beam: A focused laser beam melts the materials, creating a bond between them. The laser source can be fibre or solid-state, and the speed and rate of the welding is determined by the laser source.

Moving mirror: A mirror within the hand torch directs the laser beam over the weld joint, melting the base material on both sides. The mirror moves dozens or hundreds of times per second.

Operator: The operator guides the welding gun along the edge to be welded

Filler: Unlike MIG which uses a filler wire, handheld laser welding (like TIG welding) can be achieved with and without filler wire.

Fast: Handheld laser welding can be up to four times faster than manual MIG or TIG processes.

Portable: Handheld laser welding machines are lightweight and portable.

Fewer HAZ zones: Jasic handheld laser machines use a laser beam to melt and join metals, this is an emerging manual welding technology that is much more efficient and precise than MIG/TIG with minimal distortion, undercut or burn-though thanks to very limited heat affected zones (HAZ).

User Friendly: The Jasic laser has an intuitive user interface, making it easier for people of different technical minds. With little training and easy functionality, the laser machine can adjust the laser parameters to suit your project needs. This reduces the chance of occupational hazards, promoting operator satisfaction.

It delivers excellent welding results with much less costs compared to manual MIG/TIG welding. As the challenges of metal fabrication industry grow, this new technology can significantly improve fabricators' efficiency and profitability in a competitive landscape where fast project delivery and effective cost control are vital and as such are providing numerous advantages to meet business demands. They allow even unskilled workers to become proficient welders capable of producing high-quality welds without the fine motor skills required by traditional working methods. The technology significantly reduces training time and costs, The hazards related to hand-held laser welding are similar to arc and flame welding, but some aspects are quite different, so it's very important that laser training is undertaken by operators and laser awareness training is undertaken by anyone who works in the designated laser welding area.

In conclusion, Jasic's hand held laser welding systems are becoming increasingly more popular due to its ability to transform unskilled workers into proficient welders, boosting productivity with faster techniques.

Always carry out a risk assessment before carrying out any welding or cleaning activity.

INTRODUCTION TO HAND HELD LASER WELDING SAFETY

These general safety instructions have been put together to cover Laser welding machines including aspects of arc welding applications where noted.
The owner is responsible for installing the equipment in accordance with any local laws along with the enclosed instructions. The owner and user is responsible for operating the equipment in accordance with the enclosed instructions.

Safety matters

The hand-held laser welding machine is a device that is manually controlled by the hand-held laser welding gun to implement welding operations. Safety matters include:

- Laser use safety matters.
- Welding safety matters.
- Equipment use safety matters.
- Other security matters.

Handheld laser welder Laser safety precautions for safe use

According to the European standard EN 60825-1, Article 9, this series of lasers belongs to Class 4 laser instruments.
The laser type of handheld laser welding machine is a dangerous, invisible laser radiation instrument. The welding machine emits infrared laser radiation with a wavelength of 1080nm, and the average power radiated by the welding head is greater than 100W, which will cause damage to the eyes and skin if directly or indirectly exposed to such light intensity.
The infrared radiation is invisible light, and the laser beam can cause irreparable damage to the retina or cornea. Therefore, operators need to be clear about the hazards of laser, and after receiving the corresponding safety training, they are allowed to operate the handheld laser welding machine.

Special attention!

Be sure to wear appropriate and certified 1080nm near-infrared laser protective glasses before operating the handheld laser welding machine. The following are the 12 safety rules:

1. When the device is running, do not look directly at the laser output head, and do not point the welding head at others.
2. Do not use the equipment in dim or dark environment.
3. For the safety of you and others, the crocodile clip must be clamped on the welding workpiece before triggering the laser, and it is strictly prohibited to clamp in other places except the workpiece to avoid abnormal light resulting in security risks.
4. Ensure that the hand-held laser welding machine is grounded properly, otherwise it may cause the product shell to be charged, resulting in personal injury to the operator; If the grounding is not performed as required, hidden faults such as laser alarm, no light, and laser instability may occur.
5. Do not work in the rain and direct sunlight environment, otherwise it may cause high temperature and humidity alarm or short circuit, affect the normal use of the laser, and even cause security risks.
6. The welding operation of the handheld laser welding machine needs to be carried out in an independent space with laser protection; Non-welding personnel and combustible and flammable materials should be more than 10 meters away from the welding operation table when in use, and fire extinguishers should be placed near the welding area.
7. When welding, to the front and side of the welding torch, ensure there is no work activity taking place, ensure that the surrounding environment is free of reflective material to reduce any reflection, so as to avoid personnel exposure and any flammable material being exposed to the laser.
8. Turn off the laser switch when stopping laser welding. Turn off all power supplies or turn off the laser switch when repairing the laser. Do not point the welding torch at people or other objects, which may cause laser damage.

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9. Welding protection gas must be clean and dry, pressure control below 0.5MPa, flow rate is not less than 15L/min.
10. Before starting any welding or commissioning you must turn on the protective gas, otherwise it will damage the optical lens, when the laser is weak during the welding process, please check whether the protective lens is damaged, pay attention to the cleaning of the lens when replacing the protective lens, there can be no fingerprints or other pollution.
11. When taking or placing the welding torch, please take care to handle it gently, do not bend, improperly pull, and clean the gun head regularly.
12. When welding the finished parts, pay attention to the residual heat temperature of the workpiece, do not directly touch with the hand and be careful of burns.

Harm and Protection of Laser Radiation

The handheld laser welding machine belongs to Class 4 types of laser products, with high output power, which will cause great harm to the eyes and skin. Users should take safety measures for the operators and working areas of laser products to prevent personnel from being harmed by laser radiation.
When the protection measures do not meet the requirements of this level, reasonable and feasible ways can be used, such as closing the processing area or providing interlock protection, personal protective equipment, etc., so that the exposure of personnel to laser radiation hazards and other hazards are limited to a certain extent. In all cases, the exposure of persons to laser radiation should avoid the possibility of exceeding the maximum allowable exposure for a duration of 3×104 s and the GBZ 2.2 limit as specified in EN60825-1.

1）Safety measures against the hazards of laser radiation:

a）Engineering Measures： The establishment of protective measures around the laser equipment, such as closed workshops. If the work room is closed, as shown in Fig.1-1, the safety warning sign shown in Fig.1-2 must be displayed at the door, stating "Do not enter unless permitted".

Fig.1-1 Enclosed workshop

Fig.1-2 Laser hazard warning sign

b) Administrative Measures: Use and display of hazard warning marks. Training and guidance of operators; Operator safety duties and prohibitions.

- Use and display of hazard warning signs: Around the laser welding work site, the relevant warning signs should be clearly marked and the relevant meanings should be annotated. Indicates that this area is a laser beam hazard, and only designated personnel with safety training and controlled personnel in this area are allowed to enter.
- Operator training and guidance: Conduct adequate safety training and assessment for operators. Train the operators on the use and commissioning methods of the equipment. Train operators to perform simple maintenance on the equipment.
- Operator's safety duties and prohibitions:

INTRODUCTION TO HAND HELD LASER WELDING SAFETY

- The safety responsibilities of the operator: In accordance with the use of handheld laser welding machine safety content.
  Prohibition: Non-safety training personnel and equipment training personnel are strictly prohibited from entering the laser welding area. Do not use laser welding equipment.

c) Set up laser safety inspectors

Laser safety inspectors must be aware of the hazards associated with the use of laser equipment and the necessary protective measures. The user must appoint a laser safety officer to manage and supervise the daily laser safety affairs of the equipment. Laser safety Officer duties include, at a minimum.

- Be aware of all potentially hazardous laser equipment and accessories (including instructions, accessories and uses of laser equipment). The location of storage. Special security requirements and keep records of it.
- Responsible for monitoring and ensuring that the safe use of laser equipment is followed and appropriate written records are maintained. Immediately stop and take appropriate action in the event of any violation and apparent non-compliance with safety procedures.

2）Personal protective equipment against laser radiation hazards:

a) Laser protective goggles.

Laser protective glasses are divided into: coating reflection type and material absorption type.
The coating reflection type is the evaporation of a reflective film on the surface of optical glass, which is fragile and potentially dangerous. Even if the glass coating is used for a short time, as long as there is a coating scratch, the protective performance of the glasses will immediately fail. At present, the mainstream material is: PC (polycarbonate, high-strength impact resistant plastic) injection moulding lens, the absorption material is evenly mixed in the PC lens, surface strengthening treatment, even if the surface scratch does not affect the overall protection performance.
The mainstream international standards for laser protective glasses are ANSI Z136 of the United States and EN207 of the European CE certification.
Good laser protective glasses will print the parameters required by the major standards directly on the lens, such as the protection band, optical density OD value, L grade and CE mark, to achieve a clear effect. For example, as shown in Fig.1-3, the glasses provided by Jasic are marked 900-1100nm D LB6 + IR LB8 LP S CE.

Fig1-3 Safety goggles

b) Special protective clothing and gloves.

In the modern manufacturing industry, laser welding with its efficient and precision characteristics has become a essential welding equipment for many applications. However, in the process of use, the safety protection of the operator is also a problem that cannot be ignored. This requires us to use protective clothing to achieve the purpose of protection, and the defensive nature of laser welding protective clothing is particularly important

1) Heat resistance

Laser welding process will produce a lot of heat, protective clothing needs to have good heat resistance, can resist the impact of high temperature and radiation, so as to protect the operator from injury. Scientifically designed protective clothing can effectively block and reflect heat sources, reducing the direct damage to human skin.

INTRODUCTION TO LASER WELDING SAFETY INSTRUCTIONS

2) Radiation resistance

Due to the strong light and radiation generated by laser welding, protective clothing must have good radiation resistance to ensure that the operator's eyes and skin do not receive strong light and radiation damage. Highly effective protective clothing is usually made of special radiation-resistant materials to reduce the impact of radiation on the human body.

3) Electrical resistance

During laser welding, static electricity or electromagnetic fields may be generated, which may cause injury to the operator if proper protective measures are not taken. Protective clothing must have good electrical resistance, can isolate and export static electricity, reduce the impact of electromagnetic radiation.

4) Wear resistance

In actual operation, protective clothing needs to withstand a variety of physical shocks and friction, so the wear resistance of protective clothing is also an important consideration. The use of strong and durable fabrics can increase the service life of protective clothing and ensure its lasting protective effect.

5) Comfort

While protective performance is crucial, we cannot ignore the comfort of protective clothing. A reasonably designed, comfortable protective clothing can not only improve the efficiency of the operator, but also increase their love for protective clothing, and further improve the use of protective clothing.

Fig.1-4 and 1-5 below show the 1064nm laser protective clothing and gloves that comply with the EN60825 standard (Safety of Laser Products - Part 1: Equipment Classification, Requirements). It adopts a three-layer structure, the outer layer is flame retardant anti-static fabric, the inner layer is polyester fabric, and the interlayer is laser protective fabric. The laser protective fabric uses a specially coated composite material, flanked by a heat-resistant silicone layer and a fibreglass fireproof cloth in the middle.

Fig. 1-4 Examples of laser protective clothing (left for front, right for back)

Fig. 1-5 Examples of laser protective gloves

a) The appropriate face mask to prevent dust from entering the respiratory system.
b) The appropriate ear protection to prevent noise hazards.

3） Protection of reflected beams：

A large number of secondary laser beams can usually be generated at different angles near the laser output aperture. These beams are called "specular reflected laser beams" and are produced when the laser is reflected off the surface where the main beam is incident. The laser welding system may produce specular reflections due to the interaction between the laser beam and the processed part. Although the power of these secondary beams is not as powerful as that emitted by lasers, they are strong enough to cause damage to the eyes, skin, and surrounding materials.

Highly reflective metals, such as aluminium or copper alloys, may cause part of the beam energy to reflect off the target weld site and require additional precautions. Specular reflection can also be dangerous to the operator if any part of the beam is reflected from more than one surface.

Take precautions to know the expected specular reflection of each machined part and do not attempt to look at that part or place any part of your body within the expected specular reflection area.

RECAP TO LASER WELDING SAFETY INSTRUCTIONS

These general safety instructions have been compiled to cover Laser welding machines including aspects of arc welding applications where noted.
The owner is responsible for installing the equipment in accordance with any local laws along with the enclosed instructions. The owner and user is responsible for operating the equipment in accordance with the enclosed instructions.

Safe Usage of Handheld Laser Welding Machines

Handheld laser welding machines have been classified as Class 4 laser products due to their emission of invisible, infrared laser radiation and as such have been categorised as a hazardous Class 4 laser product. Jasic laser welding equipment have a laser wavelength of 1080nm.
With a welding head that radiates on average over 100W, this high intensity light can cause indirect or direct damage to our skin and eyes. Any exposure of the laser beam to your eyes can result in irreversible damage to the cornea or retina.
It is important that users of this laser equipment protect themselves and others from harm.
It is crucial that when undertaking any laser welding activity and any bystanders in the presence of this laser welding activity should wear the appropriate certified 1080nm infrared laser safety glasses before operating a handheld laser welding machine to ensure safety.

IMPORTANT:

- Hand held laser equipment must only be used for the purpose it was designed for. Using it in any other way could result in damage or injury and in breach of the safety rules.
- Only suitably trained and competent persons should operate the equipment.
- Always avoid looking directly at the fibre output connector and ensure that you are wearing appropriate protective eyewear while using the laser to prevent potential eye injuries.
- Line of sight with laser welding refers to the fact that the laser beam should never be pointed directly at the eyes of anyone in the area.
- For facilities with a mezzanine floor or offices at a high level that could look into the laser welding area a roof on the enclosure will contain the risk of exposure.
- Never open up the laser device as there are no serviceable parts or accessories inside that requires the attention of the operator.
- All maintenance and repair work must be performed by authorized service personnel only.
- Ensure proper grounding power supply and normal voltage when operating this product.
- Before starting any laser activity, its important to verify that the surrounding work area temperature and humidity is within the recommended working range.
- PPE and workplace safety equipment must be compatible for the equipment and application of the work being carried out.
- Laser equipment relies on dry and dust free air cooling, please ensure that the work area air is suitable for laser equipment.
- Operating and/or machine adjustments made outside of the machines designed guidelines specified within this manual may result in product damage or error.
- A laser welding helmet should be used while laser welding to protect the welder's eyes and face from harmful radiation emitted by the welding process. Laser welding produces a concentrated beam of high-intensity light that can cause severe eye damage if not properly shielded.
  Laser welding helmets are designed to filter out the dangerous wavelengths of light while still allowing the welder to see the welding area clearly. Welding helmets also protect the face from debris and hot metal spatter that can occur during the welding process.
  In conclusion, wearing a laser welding helmet is essential for maintaining the welder's safety and preventing long-term eye damage

Always carry out a risk assessment before carrying out any welding or cleaning activity.

SAFETY INSTRUCTIONS

Laser Safety Symbols and Safety Information

As shown in the following table, all safety warning signs (not limited to those affixed to the laser body) during the operation of the handheld laser welding machine include:

Safety Aspect Name	Signage	Safety Aspect Description
Electrical Hazard		Any paragraph or text with the electrical hazard warning symbol highlights a potential electrical danger to the operator if certain procedures or not followed, which may cause fatal harm to the operator or bystanders.
Laser radiation Hazard		Any paragraph or text with this laser radiation warning symbol highlights a potential danger to operators. Equipment will also have this mark fixed to the product.
Warning		Any paragraphs or text with this warning symbol indicates that a potential hazard is a risk and requires an operating procedure that, if not followed correctly, can result in damage injury to product, component or operator.
Laser Safety Housing		Laser equipment and laser welding should only be carried out in the 'laser' safe enclosure or room equipped with interlocking safety devices, so if someone enters the laser working area unexpectedly, the interlock design will automatically shut down the laser welding system.
Laser Beam Dangers, direct or Reflected		The symbol represents a potential hazard, indirectly or directly which can cause damage to the eyes and skin from laser beam that can be reflected by welding. Operator and bystanders must wear suitable protective equipment and clothing.
Direct Laser Beam Dangers		The operator and any bystanders should never look directly at the output of the laser welding gun or point the laser gun at persons within the designated welding area.
Wear safety glasses that's suitable for laser welding		Symbol indicates that personnel must wear laser safety glasses (personal protective equipment) to prevent laser radiation hazards to your eyes.
Wear protective gloves that's suitable for laser welding		The symbol indicates that personnel must use and wear the appropriate protective laser and heat-resistant protective gloves that work with laser systems and welding heat.
Wear protective clothing that's suitable for laser welding		The symbol indicates that personnel must use and wear the appropriate protective clothing that work with laser systems and welding heat.
Use a welding helmet that's suitable for laser welding		The symbol indicates that personnel must use and wear the appropriate welding helmet designed to work with laser systems and heat.

SAFETY INSTRUCTIONS

General Electrical Safety

- The equipment should only be installed by a qualified person and in accordance with current standards in operation. It is the users responsibility to ensure that the equipment is installed correctly and is connected to a suitable power supply.
- Ensure electrical safety by properly grounding the equipment through the protective conductor of the AC mains power cable and protecting the ground terminal. Any interruption could potentially cause personal injury.
- Jasic handheld laser welding machines classified as Class 4 laser products and as such fall under the hazardous Class 4 laser product category due to their emission of invisible, infrared laser radiation with a wavelength of 1080nm.
- Before providing power to the equipment, ensure that the supply AC voltage is correct for the equipment being connected otherwise damage to the device may occur. Please refer to this operating manual (page 23) or the specification plate that is located on the machine being installed.
- The equipment does not contain any user-serviceable parts, and all servicing should be done by qualified personnel. To avoid electric shock and voiding the warranty, do not remove the protective cover or tamper with the product.
- External circuit connections, aside from power connections, should all comply with the local electrical guidelines where the equipment is being installed. Please consult with your local electrical installer for further details. The non-power output of other devices connected to this product must also be SELV (safe extra-low voltage) compatible.
- Do not use the equipment with the covers removed. Do not touch live electrical parts or parts which are electrically charged. Turn off all equipment when not in use.
- In the case of abnormal behaviour of the equipment, stop using the equipment and contact your supplier to have a suitably qualified service engineer check the machine over.
- If earth bonding of the work piece is required, bond it directly with a separate cable with a current carrying capacity capable of carrying the maximum capacity of the machine current.
- Cables (both primary supply and welding) should be regularly checked for damage and overheating.
- Never use worn, damaged, under sized or poorly jointed cables.
- Insulate yourself from work and earth using dry insulating mats or covers big enough to prevent any physical contact.
- Do not wrap cables over or around your body.
- Ensure that you take additional safety precautions when you are welding in electrically hazardous conditions such as damp environments, wearing wet clothing and metal structures.
- Try to avoid welding in cramped or restricted positions.
- Ensure that the equipment is well maintained. Repair or replace all damaged or defective parts immediately.
- Carry out any regular maintenance in accordance with the manufacturers instructions.
- The EMC classification of this product is class A in accordance with electromagnetic compatibility standards BS EN 61000 and therefore the product is designed to be used in industrial environments only.
- Ensure that all electrical and welding gas connections are properly connected and secured with screws, if necessary, before powering the unit. The input mains voltage to the laser can be lethal, and all cables, connectors, and equipment enclosures should be treated as hazardous.

WARNING: This equipment is not intended for use in residential locations where the electrical power is provided by a public low-voltage supply system. In those locations it may be difficult to ensure the electromagnetic compatibility due to conducted and radiated disturbances.

SAFETY INSTRUCTIONS

General Operating and Environmental safety

- Ensure that all personal protective equipment (PPE) is compatible with the output power and wavelength range indicated on the laser safety label attached to the laser machine.
- The laser can be damaged if the equipment is not handled carefully.

* Refer to the product specifications for more information.
* This device is not intended for use in areas where unprotected individuals or children may be present. Keep the power source and torch away from sources of shock or vibration.
* Utilize an appropriate enclosure to establish a laser-safe work environment, which should include laser safety signage, interlocking mechanisms, warning devices, and proper training and safety procedures.
* Do not operate the output welding head at eye level.
* Humidity: Avoid exposing the device to high humidity levels (> 90% humidity).
* This laser device uses air cooling, operating at higher ambient temperatures can accelerate aging, increase threshold current, and decrease slope efficiency. If the device overheats, stop using machine and allow to cool down, if this error continues, please contact your supplier for assistance.
* Ensure proper ventilation in the work area.
* A laser beam interacting with materials can produce steam, smoke, sparks, and particulate debris.
* Many by-products of laser processing can be toxic and pose additional safety risks. It is crucial to remove these fumes from the workspace using an extraction system.
* Always use the correct lift points or handles and never suspend the equipment by the carrying handles and especially during welding.
* Never pull or lift the machine by the laser welding torch or other cables.
* Always use the transport under gear as recommended by the manufacturer.
* If applicable, never lift a machine with the gas cylinder mounted on or to it.
* If the operating environment is classified as dangerous, only use S-marked welding equipment. Such environments may be for example: humid, hot or restricted accessibility spaces.
* For general information about laser products, please contact your supplier.
* Electronic devices must be disposed of in accordance with regional regulations on electronic waste disposal (WEEE).

The working environment

Ensure the machine is mounted in a safe and stable position allowing for cooling air circulation.
Do not operate equipment in an environment outside the laid down operating parameters.
The welding power source is not suitable for use in rain or snow.
Always store the machine in a clean, dry space. Ensure the equipment is kept clean from dust build up.
Always use the machine in an upright position.

LF Declaration

Consult the data plate on the equipment for the power supply requirements.
Due to the elevated absorbance of the primary current from the power supply network, high power systems affect the quality of power provided by the network. Consequently, connection restrictions or maximum impedance requirements permitted by the network at the public network connection point must be applied to these systems.
In this case, the installer or the user is responsible for ensuring the equipment can be connected and/or consulting the electricity provider if necessary.

SAFETY INSTRUCTION

Use of Personal Protective Equipment (PPE)
Welding arc rays from all laser, welding and cutting processes can produce intense, visible and invisible (ultraviolet and infrared) rays that can burn eyes and skin.

- Wear the approved laser welding googles or welding helmet designed for the laser equipment you have to ensure protection of your eyes and face when laser welding.
- As a minimum you should always wear the correct rated level of laser specific eyewear, these should be rated to the appropriate Optical Density (OD Rating) / LB Rating of the laser welding machine.
- A certified laser welding helmet should be worn over the top of over the laser eyewear to provide protection to the operators face.
- Never use any equipment that is damaged, broken or faulty.
- Always ensure there are adequate protective screens or barriers to protect others from the laser, welding flash, glare and sparks from the laser welding process enclosure/area.
- Ensure that there are adequate warnings that laser welding is taking place.
- Wear suitable protective flame resistant clothing, gloves and footwear.
- Ensure adequate extraction and ventilation is in place prior to laser welding to protect users and all workers nearby.
- Check and be sure the area is safe and clear of flammable material before carrying out any welding.

Some laser welding, cleaning and cutting operations may produce noise. Wear the appropriate safety ear protection to protect your hearing if the ambient noise level exceeds the local allowable limit (e.g: 85 dB).

Requirements for Laser Safety Goggles
When using a hand-held laser welding machine, it is crucial to wear laser safety goggles that provide protection against the entire wavelength range emitted by the device.

The most important aspects of the laser glasses are the optical density rating (OD) and the LB rating. These ratings importantly determine the level of protection provided from the laser radiated at defined wavelengths. For the wavelength of 1080nm from Jasic fibre laser welding systems, the minimum optical density rating required for adequate protection is 7 (OD7). The minimum LB rating is 6.
All Jasic handheld fibre laser welding systems from Wilkinson Star Limited come supplied with CE marked laser safety glasses with a rating of OD7+ and LB7, and are tested in accordance with EN-207:2017.

To select the appropriate goggles, end-users must accurately identify the product's wavelength range. Additionally, it is essential to verify that all personal protective equipment (e.g., safety shields, viewing windows, goggles) is sufficient for the device's output power and wavelength range.
Consideration should also be given to any secondary radiation hazards posed by the welding process.

Eye and Ultraviolet Radiation Hazards
Whether installing a new laser system or retrofitting an existing laser system, the end-user bears sole responsibility for determining the appropriateness of all personal protective equipment for the operator, fellow work personnel and the workshop environment its being installed and used in.
Please consult with your local laser safety equipment suppliers regarding materials and equipment required to be used. Wilkinson Star assumes no responsibility for the advice, products, or services provided by these suppliers.
The welding process, generates visible and invisible radiation, which can pose risks to welders.
The high-power laser beam's interaction with the material being welded can create plasma, emitting ultraviolet radiation and "blue light." These emissions can lead to conjunctivitis, photochemical damage to the retina, and skin reactions similar to sunburn.
Welding operators and bystanders exposed to UV light without adequate protection may experience permanent eye damage. All personnel who are within the laser controlled area, should wear personal protective equipment, including safety glasses and helmet shield devices, to protect eyes from any direct, reflected or scattered laser beam as well as welding strong light, ultraviolet light and heat and sparks.

SAFETY INSTRUCTION

Skin Hazards

Welding operators and anyone in the welding area are at risk of skin damage from infrared and ultraviolet radiation during welding. These types of radiation can cause skin burns, increase the likelihood of skin cancer, and promote premature skin aging. Welding sparks can also lead to burns.
The Laser welding process can cause parts to become extremely hot even after the welding process has ended. It is essential to use appropriate personal protective equipment to avoid potential burns.
To prevent skin damage, the operator should wear protective clothing such as heat resistant gloves, hats, leather aprons, and other flame-resistant clothing as required.

Cylinder Safety Measures

Laser welding does require the use of a gas cylinder which poses a risk of explosion if it is damaged or situated close to the welding zone.
To ensure safety, place shielding gas cylinders in a secure location where they are not susceptible to impact or damage, and maintain distance from sources of heat, sparks, or flames.
Always utilize a functioning regulator specifically designed for the intended gas, pressure and application.

Handling of compressed gas cylinders and regulators

- Mishandling gas cylinders can lead to rupture and the release of high pressure gas.
- Always check the gas cylinder is the correct type for the welding to be carried out.
- Always store and use cylinders in an upright and secure position.
- Use a suitable trolley for moving cylinders.
- All cylinders and pressure regulators used in welding operations should be handled with care.
- Never allow the electrode, electrode holder or any other electrically “hot” parts to touch a cylinder.
- Keep your head and face away from the cylinder valve outlet when opening the cylinder valve.
- Always secure the cylinder safely and never move with regulator and hoses connected.
- Regularly check all connections and joints for leaks. Additionally, verify that all hoses and fittings are appropriate for their intended application and are in optimal working condition.
- Full and empty cylinders should be stored separately.

<u>Never deface or alter any cylinder</u>

Protection from moving parts

When the machine is in operation keep away from moving parts such as motors and fans.
Moving parts, such as the fan, may cut fingers and hands and snag garments.
Protections and coverings may be removed for maintenance and managed only by qualified personnel after first disconnecting the power supply cable.
Replace the coverings and protections and close all doors when the intervention is finished and before starting the equipment.
Take care to avoid getting fingers trapped when loading and feeding wire during set up and operation.
When feeding wire be careful to avoid pointing it at other people or towards your body.
Always ensure machine covers and protective devices are in operation.

SAFETY INSTRUCTION

Safety against fumes and welding gases

The HSE has identified welders as an 'at risk' group for occupational diseases arising from exposure to dusts, gases, vapours and welding fumes. The main identified health effects are pneumonia, asthma, chronic obstructive pulmonary disease (COPD), lung and kidney cancer, metal fume fever (MFF) and lung function changes.
Whether the welding process is Laser, MIG, TIG, MMA or cutting 'hot work' operations, fumes are produced which are collectively known as welding fume. Depending upon the type of welding process being performed, the resultant fume generated is a complex and highly variable mixture of gases, particulates produced by the combination of welding materials, filler materials, shielding gases, paint, coatings, chemical reactions, and air pollutants.
The laser interaction with target materials like plastics, metals, and composites may cause them to evaporate, producing toxic and hazardous smoke and fog which are often invisible but pose serious health risks.

Regardless of the length of welding being carried out, all welding fume, including mild steel welding requires suitable engineering controls to be in place which is usually Local Exhaust Ventilation (LEV) extraction to reduce the exposure to welding fume indoors and where LEV does not adequately control exposure it should also be enhanced by using suitable respiratory protective equipment (RPE) to assist with protecting against residual fume. When welding outdoors the appropriate RPE should still be used.

Prior to undertaking any welding tasks an appropriate risk assessment should be carried out to ensure expected control measures are in place.

Locate the equipment in a well-ventilated position and keep your head out of the welding fume.
Do not breathe in the welding fume.
Performing welding tasks in enclosed spaces with poor ventilation is extremely dangerous, as toxic smoke and gas concentrations can quickly build up, leading to coma or asphyxiation.
The ultraviolet light emitted during welding reacts with oxygen and nitrogen in the air, producing ozone and nitrogen oxides, which can be lethal at high concentrations. Shielding gases used in welding can displace air and cause harm or even death.
Ensure the welding zone is well-ventilated and provision should be made for suitable local fume extraction system to be in place. If ventilation is poor, wear an approved airfed welding helmet or respirator.
Read and understand the Material Safety Data Sheets (MSDS's) and the manufacturer's instructions for metals, consumable, coatings, cleaners and de-greasers.
Do not weld in locations near any de-greasing, cleaning or spraying operations.
Be aware that heat and rays of the arc can react with vapours to form highly toxic and irritating gases.

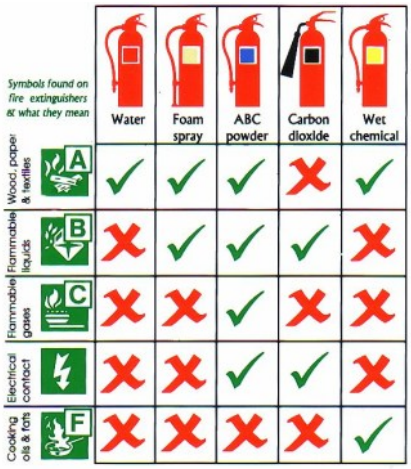
i) To prevent exposure to hazardous fumes during welding, keep your head away from the fume source and always work in a well-ventilated area.
ii) Implement smoke extraction systems to capture and remove dangerous fumes, vapours, particles, and debris from the welding workspace.
iii) Review and adhere to the safety data sheets and warning labels for all welding materials being used.
iv) In confined spaces and other high-risk situations, the use of respiratory protection may be necessary.
v) Regular air monitoring should be conducted to ensure that hazardous smoke levels are kept in check within the welding environment.

For further information please refer to the HSE website www.hse.gov.uk for related documentation.

SAFETY INSTRUCTION

Fire Awareness - Precautions Against Fire and Explosion

Laser welding and cleaning like other welding and cutting processes can cause serious risks of fire or explosion. Avoid causing fires due to sparks and hot waste or molten metal.
Check and risk assess the area is safe before doing any laser welding, ensure that appropriate fire safety devices are available near the welding area.
Remove any and all flammable materials away from the working area. If necessary, cover flammable materials or containers with approved covers (following manufacturers instructions) if unable to remove from the immediate area.
Laser welding sealed containers, tanks, drums or pipes can cause explosions.
Do not weld or clean fuel and lubricant containers, even if empty. These must be carefully cleaned before they can be laser welded or laser cleaned.
Always allow the welded material to cool before touching it or placing it in contact with combustible or flammable material.
Do not weld in atmospheres with high concentrations of combustible fumes, flammable gases, dust or liquid vapour.
Always check the work area half an hour after welding to make sure that no fires have begun.
Take care to avoid accidental contact of the torch electrode to metal objects, as this could cause arcs, explosion, overheating or fire.



Always have the appropriate fire extinguisher nearby and know how to use it.

KNOW AND UNDERSTAND YOUR FIRE EXTINGUISHERS

Hot parts

Always be aware that material being cut or welded will get very hot and hold that heat for a considerably long time which will cause severe burns if the appropriate PPE is not worn.
Do not touch hot material or parts with bare hands.
Always allow for a cooling down period before working on material recently cleaned or welded.
Use the appropriate insulated welding gloves and clothing to handle hot parts to prevent burns.

Local Equipment and Solvents

Please note that the photosensitive components that maybe within the supplied equipment or enclosure, including a photomultiplier tube, photodiode and camera may suffer damage from laser exposure.
The laser has the capacity to inflict burns on skin, clothing, and paint. It possesses the potential to weld and clean metal. Additionally, the laser can ignite volatile substances like alcohol, gasoline, ether and many other solvents.
Ensure to take necessary precautions and avoid exposure to solvents or flammable materials and gases during the installation and operation of the equipment.

Noise awareness

The welding process can generate noise that can cause permanent damage to your hearing. Noise from welding equipment can damage hearing. Always protect your ears from noise and wear approved and appropriate ear protection if noise levels are high.
Consult with your local specialist if you are unsure how to test for noise levels.

SAFETY INSTRUCTION

Safe Usage of Handheld Laser Machines

Jasic handheld laser welding machines classified as Class 4 laser products and as such fall under the hazardous Class 4 laser product category due to their emission of invisible, infrared laser radiation with a wavelength of 1080nm. The welding head radiates over 100W on average, this high intensity light can cause direct or indirect damage to our skin and eyes. The exposure of the laser beam to our eyes can result in irreversible damage to the cornea or retina.

It is crucial that when undertaking any laser welding activity and all in the presence of this welding should wear the appropriate certified 1080nm infrared laser safety glasses before operating a handheld laser welding machine to ensure safety.

IMPORTANT:

- Always avoid looking directly at the fibre output connector and ensure that you are wearing appropriate protective eyewear while using the laser to prevent potential eye injuries.
- Refrain from opening the laser device as there are no parts or accessories intended for user access inside. All maintenance and repair work must be performed by authorized service personnel only.
- Before starting the laser, verify that the surrounding temperature and humidity are within the recommended range. Avoid subjecting the product to excessive moisture.
- To ensure the safe use of the product and optimize its performance, please follow the instructions, warnings, and precautions detailed within this manual.
- Use the appropriate ground power supply when operating this product.
- Do not open any parts within the product for maintenance. If required, contact Wilkinson Star laser technicians for servicing. Unauthorized alterations to this product will void the warranty.
- To ensure the safe use of the product and optimize its performance, please follow the instructions, warnings, and precautions detailed in this manual.
- Be cautious when using hand-held welding tips connected to the output connector of this product via optical fibre cable.
- Adhere to the provided instructions as improper use may affect the safety mechanisms of the product. This product must only be operated under conventional conditions.
- Ensure the AC power is off when working with laser-welded output joints, such as installing optical cable joints or using optical instruments to test the end face of the connection.
- Avoid looking directly at the fibre output connector and always wear proper eye protection to prevent injury.
- Performing any operation or adjustment outside the scope of this manual may result in radiation related injuries.
- This laser relies on air cooling; ensure that the surrounding air is dry and clean.
- Any operation or adjustments made outside of the guidelines specified in this manual may result in damage or malfunction.

Safety of Welding Enclosures - Security Measures:

It is crucial to be aware that when the laser power supply is activated (ON), the laser is in a hazardous state. Every necessary precaution must be considered and taken to prevent any accidental exposure to the direct and reflected laser beam.

Both diffuse and specular reflections can lead to severe retinal or corneal damage, potentially causing permanent eye damage. Class 4 laser beams can pose a fire and skin damage risks when handling equipment or being in its vicinity. Ensure that all personnel wear the appropriate personal protective equipment (PPE), including safety goggles and helmets with face shields.

To maintain laser safety information, always adhere to your laser control measures and operate the system correctly, otherwise, exposure to laser and welding radiation may occur.

SAFETY INFORMATION SPECIFIC TO LASER WELDING

Precautionary Measures for Welding Protection and Minimizing Risks in the Laser Welding Process

To safeguard the operators and any bystanders eyes from harmful conditions during welding, it is crucial to wear appropriate personal protective equipment!

For the operator wearing a combination of a mask, gloves, welding helmet, and laser safety glasses can effectively mitigate the any effects of the welding process and equipment noise.

During welding, it's also important that you are wearing anti-noise earplugs to achieve optimal protection throughout the laser welding process. Welding helmets also shield welders from risks such as heat, spatter and sparks.

All individuals in the vicinity of laser welding activities must also be equipped with proper personal protective gear (PPE).

During the laser welding processes, always be mindful of the potential hazards and take the necessary precautions.

Ensure that all combustible and flammable materials are kept at a safe distance from the welding area, as heat and sparks produced during welding may result in fires or explosions.

Limit laser welding operations only to the designated areas which are free of combustible materials.
Avoid performing welding tasks on or in containers holding flammable or combustible substances. When the contents of containers are uncertain, treat them as potentially dangerous. Always keep suitable fire extinguishers nearby, and ensure that all personnel have undergone comprehensive training in the use of fire extinguishers.

Dangers of Reflected Beam in Welding Process

Always be thoughtful that during the laser welding process, numerous secondary laser beams, known as "specular reflections," can be generated at various angles near the laser's output aperture.
These intense reflections can occur when the main laser beam reflects off the surface it is directed at, and can be produced due to the interaction between the laser beam and the part being welded. These secondary beams are not as powerful as the laser's total emitted energy, but they are potent enough to cause harm to the eyes, skin, and surrounding materials.
Take extra precautions when working with highly reflective metals, such as aluminium and copper, as these materials may cause some of the beam energy to reflect away from the target weld site. Furthermore, specular reflections can pose a threat to the operator if any part of the beam is reflected from more than one surface. Ensure that you are aware of the anticipated specular cone once welding commences, and avoid looking at or placing any part of your body within the expected specular cone.

Secondary radiation hazard

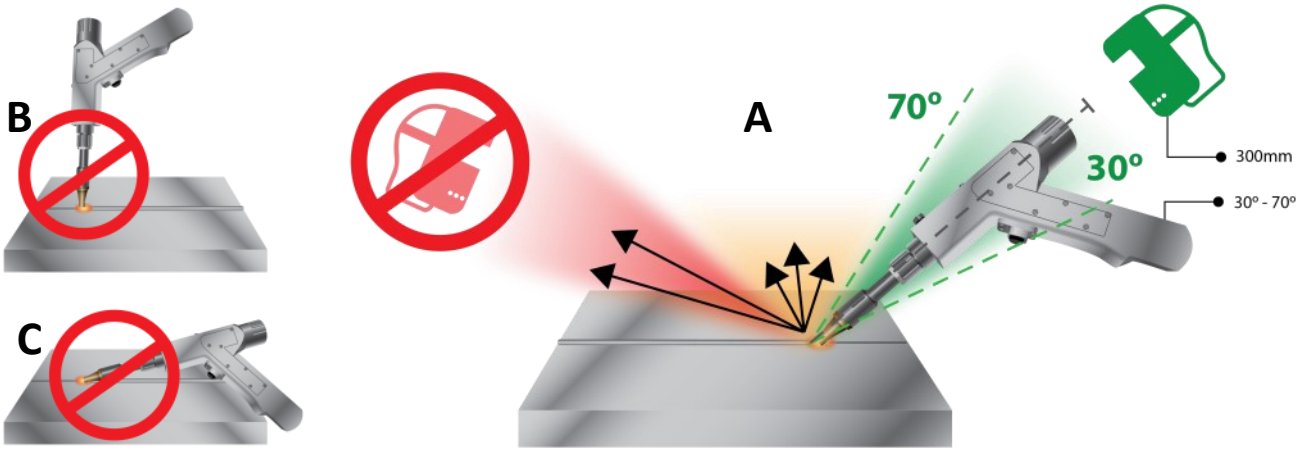
During the Laser welding process, both visible and invisible light radiation are generated. The interaction between the high-power laser beam and the target material being welded can result in the production of ultraviolet (UV) light and plasmas that emit "blue light."
These radiations can lead to various health issues, such as conjunctivitis, photochemical damage to the retina, and sunburn-like reactions on the skin.

Operators and bystanders who are exposed to these invisible UV rays without appropriate safety measures are at risk of incurring permanent eye damage. Even a short exposure to the UV rays during welding can lead to symptoms like, burning, eye pain, blurred vision and eye irritation which is often described as a sensation similar to having sand in the eye.

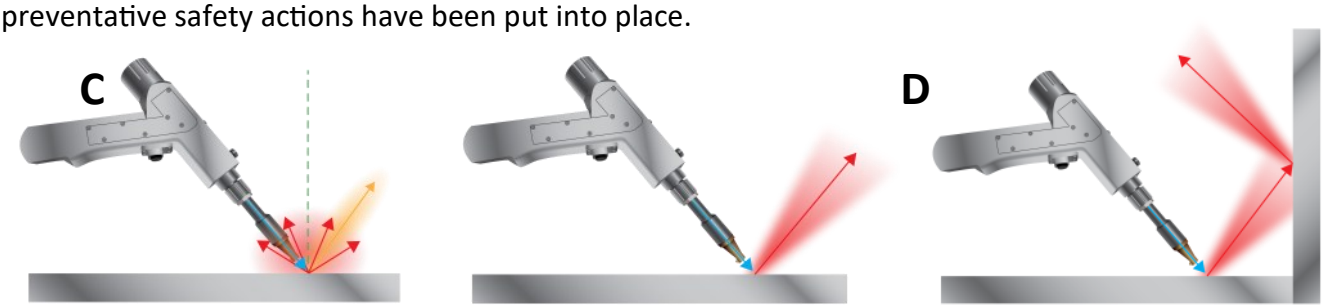
SAFETY INFORMATION SPECIFIC TO LASER WELDING

Precautions for Welding Gun Angle

Always pay attention to the following when handling and using the Jasic laser welding gun.
The welding gun for safety and performance reason serves as the point of contact during welding operations and during welding, always ensure that the copper nozzle of the welding gun is in direct contact with the workpiece to ensure that an electrical loop is created to ensure the safety circuits are satisfied.
To help minimize wear and tear of the copper nozzle, it's recommended where possible to maintain a smooth surface on the welding workpiece.



A. As shown in image (A) above, while welding, it is important to remember for the operator to maintain a gun head angle between 30°and 70°. Any and all personnel involved should stand at the back of the reflection area to avoid standing in the laser reflection zone, as it may pose a danger.
B. As shown in image (B) above, while welding, improper welding gun angles should always be avoided to prevent to the gun head, damage will be caused if the laser reflects back into the gun.
C. As shown in images (C) above and below, when welding you always need be cautious to the presence of multiple reflections, these reflections should always be taken into account and risk assessments should be carried out to ensure the correct safety precautions have been considered and any preventative safety actions have been put into place.



D. As shown in image (D) above, when welding you also need be cautious to the presence of reflections from surrounding materials and again, these reflections should always be taken into account and risk assessments should be carried out to ensure the correct safety precautions have been considered and any preventative safety actions have been put into place.

- When holding a laser gun, keep the nozzle facing downwards & avoid facing people to avoid pointing the laser emission and potentially injuring people.
- During the welding process, the gun should not be facing people.
- Before observing the copper nozzle at the gun head, always be sure to turn off the laser.
- Turn off the "laser enable" or turn off the laser machine, when not in use.
- There should be no HF type welding or plasma machines working close (within 5m) of the Laser machine. Ensure the laser machine does not share the same ground/work bench.

SAFETY INFORMATION SPECIFIC TO LASER WELDING

Optical Safety

Be cautious of the following optical safety measures:
The laser output needs to be able to transmit freely through the glass lenses (windows) within the gun. Always ensure that these are clean and of high quality
Any dust on or within the head assembly may cause damage to both the lens and the laser.
Periodically inspect the quality of the laser output spot, initially at low power levels, and then progressively increase the output power.
Never look directly at or in the laser output hole, such as the output optical fibre or the welding connector, when the device is powered on. It is mandatory to wear safety glasses, a helmet, and a face mask while operating or handling the product. Individuals in close proximity must also wear the same safety gear.
Ensure that all personal protective equipment (PPE) is appropriate for the power output and wavelength range specified on the laser safety label affixed to the product.

Warning:

- While operating a laser, refrain from looking directly into the output port.
- Ensure that the laser and all associated optical components are not placed at eye level.
- Refrain from utilizing the lasers in dimly lit enclosures or areas within workshop.
- Furnish a specialised protective casing for the laser beam.
- Never install or move the laser head while it is active. To perform any of these actions always ensure that the machine is switched "off" and that the laser machine is unplugged from mains AC supply.

For further detailed information in the UK please refer to the HSE website www.hse.gov.uk on guidance for Employers on the Control of Artificial Optical Radiation at Work Regulations or contract your location country heath and safety executive for the relevant standards/codes

Compliance and Standards

In compliance with EU and national standards and requirements, lasers must be categorized based on their output power and wavelength.
All Jasic laser machines fall under Class 4 classification, as per EN 60825-1, Chapter 8.

Reference Standard
Electromagnetic compatibility immunity:
EN IEC 61000-6-4:2019
EN IEC 61000-6-2:2019

Power supply safety:
EN 62368-1:2014+A11:201728

Laser Safety:
ISO 12100:2010
ISO 11553-2017

Functional Safety:
EN 60825-1:2014+A11:2021
CDRH 21 CFR 1040.10

Please Note:
When using class 4 handheld laser welding systems the legal responsibilities are for both the employer and employee and above offers information that sets out the applicable standards.
See page 82 onwards for further information and guidance.

Declaration
We believe we have carried out our due diligence to ensure accuracy with the above information offered. However, we do not accept any responsibility for any errors, omissions or changes to local, national or regional regulations and as such any use of this information contained is done so at the readers/user's discretion and we do not accept any liability for any consequences that may arise from its use.

PACKAGE CONTENTS AND UNPACKING

Supplied within your new Jasic Laser product package will be the following items with each model.
Use care when unpacking the contents and ensure all items are present and not damaged.
If damage is noted or items are missing, please contact the supplier in the first instance and before installing or using the product.
Record the product model, serial numbers and purchase date in the information section found on the inside front page of this operating manual.

Jasic Laser Packages:

ZXLS-15000F (LS-15000F Laser Welder C/W Single Wire Feeder)

- LS-15000F Handheld laser welding machine
- LS-SWF Single Wire Feeding Unit with 2 pcs 0.8-1.0 V type rollers – 1 set
- 8m earth lead and clamp
- Wire feeder accessories (liners, power cable, communication cable, 2-pin female connector)
- Accessory box

ZXLS-20000F (LS-20000F Laser Welder C/W Single Wire Feeder)

- LS-20000F Handheld laser welding machine
- LS-SWF Single Wire Feeding Unit with 2 pcs 0.8-1.0 V type rollers – 1 set
- 8m earth lead and clamp
- Wire feeder accessories (liners, power cable, communication cable, 2-pin female connector)
- Accessory box

ZXLS-20000F-D (LS-20000F Laser Welder C/W Double Wire Feeder)

- LS-20000F-D Handheld laser welding machine
- LS-DWF Double Wire Feeding Unit wit Wire feeder with 2 pcs 0.8-1.0 V type rollers – 2 set
- 8m earth lead and clamp
- Wire feeder accessories (liners, power cable, communication cable, 2-pin female connector)
- Accessory box

For a complete list of package contents, see page 77 to 80.

PRODUCT OVERVIEW

The Jasic handheld laser welding machine is designed with the purpose of welding by controlling the high energy laser beam to fuse the welding base material and the welding wire.
Compared with traditional arc welding, laser welding enjoys such advantages as more delicate, more stable, lower heat input, more beautiful weld formation, few consumables, simpler operation and higher efficiency, which can meet the welding needs of various industries.

Using a laser beam to melt and join metals, this is an emerging manual welding technology that is much more efficient and precise than MIG/TIG with minimal distortion, undercut or burn-though thanks to very limited heat affected zone (HAZ).
It delivers excellent welding results with much less costs compared to manual MIG/TIG welding. As the challenges of metal fabrication industry grow, this new technology can significantly improve fabricators' efficiency and profitability in a competitive landscape where fast project delivery and effective cost control are vital.

The unique display offers the operator clear and informative data for the laser welding process offered.

Features and functions that include:

- Compact industrial design, featuring better ergonomics, flexibility and reliability.
- Colour touch screen control panel with intuitive user interface.
- Comprehensive job parameter settings.
- Two wire feed drive systems available to choose from:
    - 4 roll, single wire feed drive unit. (Robust and durable frame structure with high visibility with 4 roll wire feeder delivers smooth and stable feeding).
    - 4 roll, dual wire feed drive unit. (Colour LCD touch screen control panel with 4 roll wire feeder that delivers smooth and stable feeding. Dual wire feeding offers higher deposition rate).
- Up to 10x faster than manual TIG welding offering hardly any weld spatter, therefore requiring very little rework following welding and little rework due to heat input.
- CW (continuous wave) lasers have a 30% greater electro-optical conversion efficiency.
- 10x higher efficiency compared to a solid-state YAG laser.
- High usability thanks to colour touchscreen control panel with intuitive user guidance.
- Comprehensive job parameter settings.
- In addition to the beautiful weld formation, and the heat input can be precisely controlled by finely adjusting the laser swing width, laser power, swing frequency, etc. to meet the welding strength, reduce the deformation of the workpiece, and achieve the optimal welding results.
- Reduce labour cost and material cost. The operation is less difficult, making it easy to get started; the welding speed is fast, enjoying high efficiency; the weld seam is beautiful, eliminating the need for later grinding; and the consumables are reduced.
- The human-machine interface is simple and easy to operate.
- Wide range of applications, basically suitable for welding all thin metal plates.
- Small footprint, great mobility and flexibility with a 2 Year comprehensive warranty.

TECHNICAL SPECIFICATION

Model Parameter	Unit	Jasic Hand Held Laser - LS-15000F		Jasic Hand Held Laser - LS-20000F	
Rated Input (U1)	V	AC 230V (-10% ~ +15%)			
Rated input Frequency	Hz	50			
Input Power	kW	5.8		7.8	
Conduction Type	-	Optical Fibre			
Laser type	-	Fibre laser			
Central Wavelength	Nm	1080 ± 10nm			
Optical Fibre	Um	Core diameter: 25um; length: 12m * Connector QBH		Core diameter: 34um; length: 12m * Connector QBH	
Operating Mode	-	Continuous or Modulated			
Output power stability (25°C)	-	〈±1.5% (2H)			
Output Power	W	1500W		2000W	
Scan Width	mm	Single Wire and Self Fusion Welding	0 ~ 6	Single Wire and Self Fusion Welding	0 ~ 6
Welding Wire Diameter	mm		0.8/1.0/1.2 / 1.6		0.8/1.0/1.2 / 1.6
Welding Thickness	mm		0.5 ~ 5		0.5 ~ 6
Penetration	mm		0.5 ~ 3		0.5 ~ 4.5
Scan Width	mm	-		Double Wire Welding	5 ~ 8
Welding Wire Diameter	mm	-			1.2 / 1.6
Welding Thickness	mm	-			3 ~ 6
Penetration	mm	-			3 ~ 5
Standards	-	EN60825-1 and EN ISO 11553			
Protection class	IP	IP23S			
Insulation class	-	H			
Pollution Level	-	Grade 3			
Noise	Db	< 70			
Operating Temperature Range	°C	-10°C ~ +40°C ≤7°C (Antifreeze should be used)			
Storage Temperature	°C	-20°C ~ +55°C			
Humidity	%	≤70% at 40°C; ≤90% at 20°C			
Laser Cooling Method	-	Water Cooled			
Refrigerant	-	R-410A			
Water Tank Volume	ltr	8			
Shield Gas	-	Argon or Nitrogen			
Gas Pressure	Bar	> 3bar			

Please Note

Due to variations in manufactured products all claimed performance ratings, capacities, measurements, dimensions and weights quoted are approximate only. Achievable performance and ratings when in use can depend upon correct installation, applications and use along with regular maintenance and service.

TECHNICAL SPECIFICATION

Model Parameter	Unit	Jasic Hand Held Laser - LS-15000F	Jasic Hand Held Laser - LS-20000F
Machine (power source)	mm	773 x 410 x 737 (LxWxH)	
Net weight	Kg	85	92
Machine Package Size	mm	865 x 475 x 1035 (LxWxH)	
Overall Weight	Kg	103	110

Model		Jasic Wire Feed Unit Parameters - WF-22L EV
Parameter	Unit	-
Rated Input (U1)	V	DC 24V
Operating Mode	-	Continuous or Modulated
Maximum Weight of Welding Wire	kg	20
Wire Diameter Size Supported	mm	0.8/1.0/1.2/1.6mm, 2.0/2.5mm customizable
Wire Feed Speed	cm/min	25 ~ 600
Operating Mode	-	Continuous mode, pulse mode
Installation Environment	-	Level and free of vibration or shock
Overall Dimensions	mm	628mm x 240mm x 340mm (LxWxH)
Weight	kg	11.5

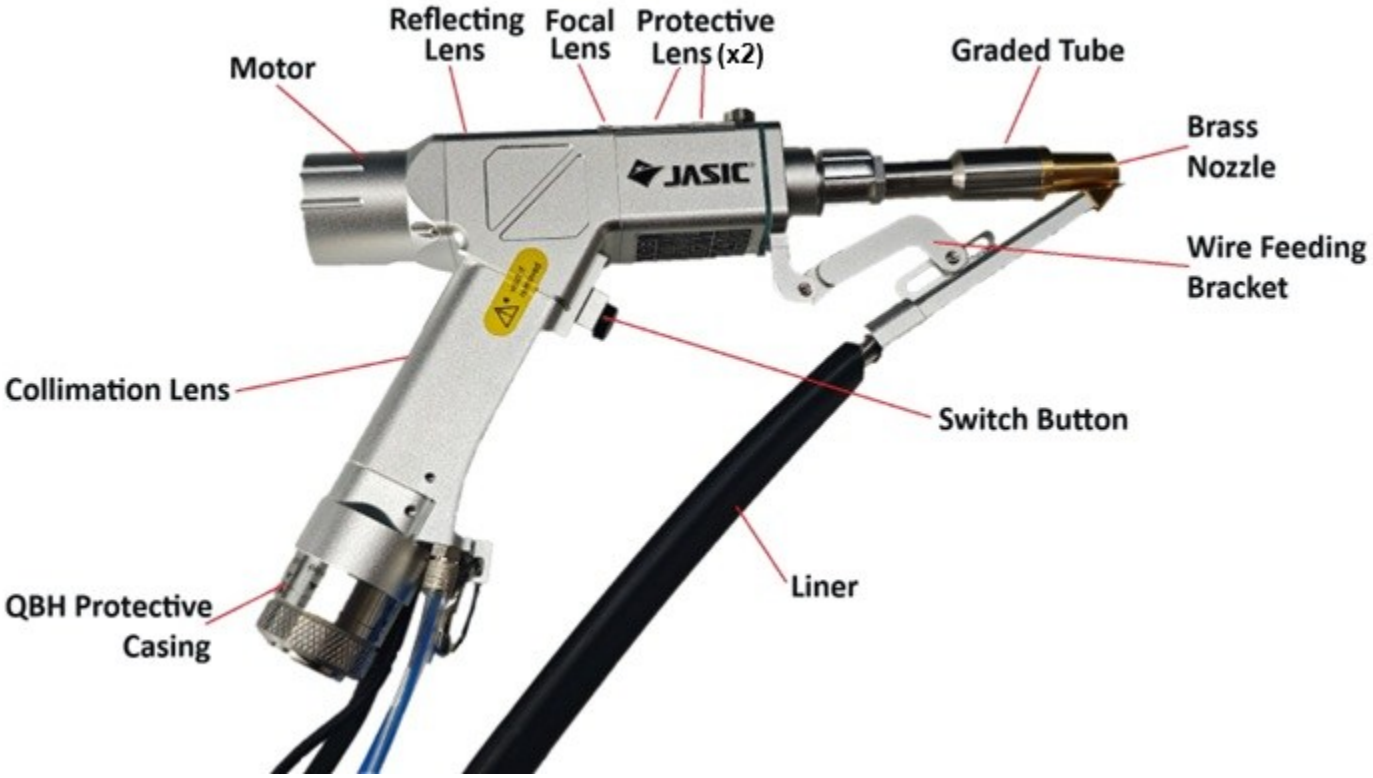
Model		Jasic Wire Feed Unit Parameters - SUP-AMF-D
Parameter	Unit	-
Rated Input (U1)	V	220V +/- 5% 50/60hz
Wire Feed Speed	cm/min	15 ~ 600
Wire Diameter Size Supported	mm	Single Wire Feeding 0.8/1.0/1.2/1.6mm
		Double Wire Feeding 1.2/1.6/2.0mm
Suitable Welding Wire Reel	-	Shaft diameter: MIN50mm
		Outer diameter: MAX300mm
		Width: MAX105mm
		Weight: ＜20kg
Overall Dimensions	mm	575mm x 250mm x 670mm (LxWxH)
Weight	kg	20

Please Note

Due to variations in manufactured products all claimed performance ratings, capacities, measurements, dimensions and weights quoted are approximate only. Achievable performance and ratings when in use can depend upon correct installation, applications and use along with regular maintenance and service.

TECHNICAL SPECIFICATIONS—WELDING TORCH

The Jasic water cooled handheld laser welding torch is JS23T, and the parts are listed and described as follows:



Model		Jasic Hand Held Laser - BW101-GS
Parameter	Unit	
Brass nozzle	-	AS-12/BS-16/CS-12/ES-12/FS-16/WS003/single layer 1.5cm
Graded tube	-	FT80
Protective lens	-	D18* 2
Focal lens	-	D20*4.5/F150
Reflector	-	30*14 T2
Collimation lens	-	D16*5/F60
1# and 3# water joint	-	Φ6
2# gas joint	-	Φ6

Please Note

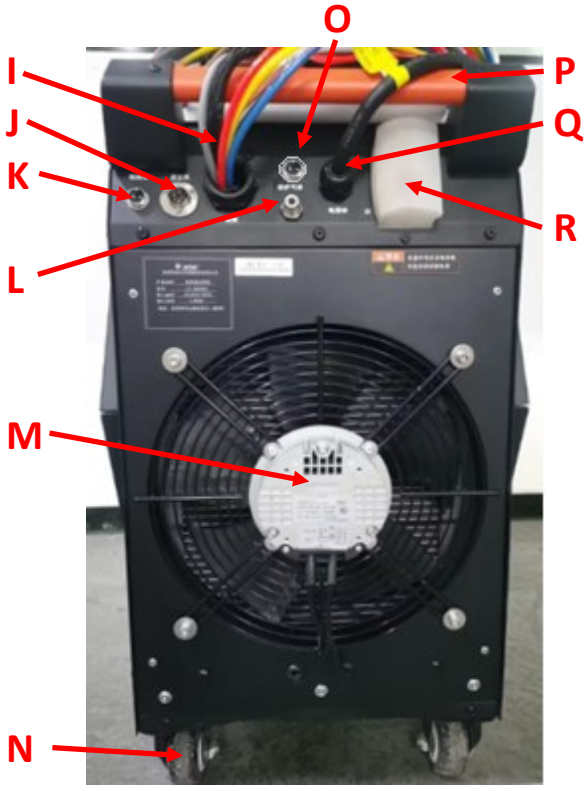
Due to variations in manufactured products all claimed performance ratings, capacities, measurements, dimensions and weights quoted are approximate only. Achievable performance and ratings when in use can depend upon correct installation, applications and use along with regular maintenance and service.

DESCRIPTION OF THE LS-15000F AND LS-20000F

Machine Front Panel

A. Machine Front Handle.
B. Emergency stop switch: When an emergency occurs, pressing the large red button will stop the welder, rotating the red button clockwise will reset it.
C. Laser enable LED: when the laser output is active then the indicator light will come on when this feature is on. The light can be emitted only when it is turned on at the same time as the operation interface "Laser Enabled".
D. The user digital display screen.
E. Key controlled power switch: The power control switch for the Laser welder. Insert the key and by rotating it clockwise will turn 'ON' the welder.
F. Cabinet door which allows access to the water cooler controls.
G. Cabinet door catch.
H. Front rotating castors (lockable).

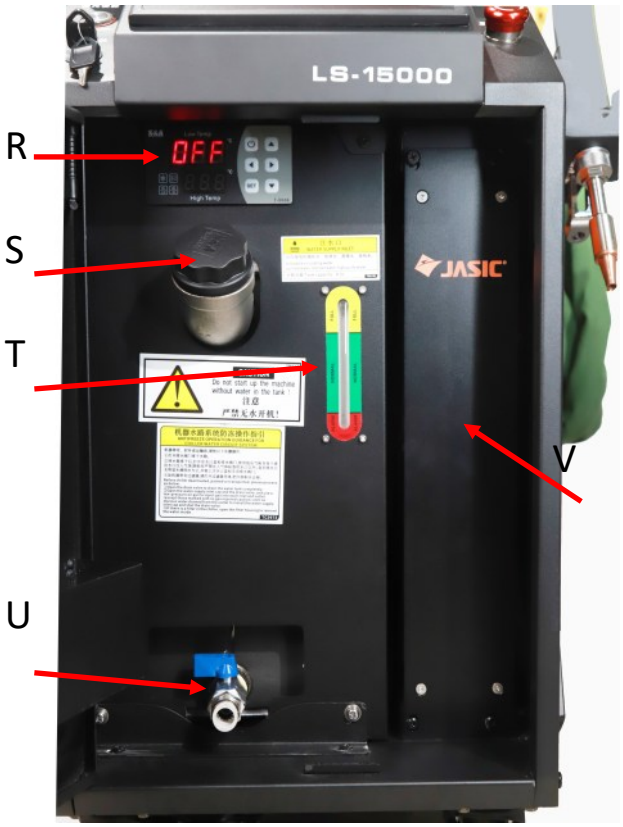
Machine Back Panel



I. Laser gun cable outlet: The outlet for the welding torch cables that come through the insulated gland which includes the optical cable, water pipe, gas pipe, and welding torch control wires.
J. Wire feeder connection: Insert the 7-pin control plug to the socket outlet for the wire feeder to provide power and control the wire output of the wire feeder unit.
K. Earth cable connection: Connect the earth wire clamp to the work piece during welding to form a loop with the welding torch head to allow welding to commence.
L. Shield gas connector: The connection for the shield gas which is supplied via a gas pipe for welding.
M. Rear panel mounted cooling fan.
N. Rear castors.
O. 4 pin dual interlock socket
P. Machine rear handle.
Q. Mains input power cable: The machine power cord, which requires to be connected to a single-phase 50/60hz AC 230V power supply.
R. Machine mains power ON/OFF switch c/w current leakage protection. Located under a protection cover which will switch the machine on or off by the operator.

DESCRIPTION OF THE LS-15000F AND LS-20000F

Machine Front Panel Cabinet



R. Temperature controller: This control panel is used to operate the CWFL-1500 2000ANW04 chiller, which offers various alarm codes for water temperature and water flow.

S. Water filling cap and tank: Unscrewing the cap will allow the user to fill or top up the cooling liquid. A filter gauze is also located in the neck of the tank and must be regularly cleaned to prevent clogging, clogging will lead to bad air circulation and the rising temperature inside the chiller, resulting in the decreasing of the chillers cooling capacity and even worse, the chiller failing to work normally because alarm occurs. It is suggested to clean the filter gauze at least once a week although the cleaning frequency may vary from customer to customer taking into account the end user environment.)

T. Water level indicator: A visual indicator to allow the user to see how much liquid is within the cooling tank. It is recommended that the circulating water within the chiller should be replaced every 3 months.

U. Cooling water tank drain tap.

V. Laser Generator: Only trained technical persons should access this area.

Please Note:
Items R, S, T & U are all part of the internal CWFL-1500 2000ANW04 water chiller unit.

DESCRIPTION OF THE LS-15000F AND LS-20000F Front Panel

Front Panel Overview

Power switch: The power control switch of the welder. Rotating it clockwise can turn on the welder.
Laser enablement: Controls the laser output. The indicator light comes on when this feature is on. The light can be emitted only when it is turned on at the same time as the operation interface "Laser Enablement".
Emergency stop switch: When an emergency occurs, press it to stop the welder and rotate it clockwise to reset.

Front Panel Overview

Current leakage protection switch: This ON/OFF switch controls the power input of the machine and has a short-circuit protection function.
Power cable: Relates to the machine power cable, which is connected to the single-phase AC 230V power. Ensure that the earth wire must be correctly and reliably grounded.
Shield gas: The shield gas is supplied via a gas pipe during welding.
Torch cable: The outlet of the welding torch cable, through which the optical fibre, water pipe, gas pipe, and welding torch control wires are put.
Wire feeder: Insert a 7-pin aviation socket cable, connect it to the wire feeder to provide power and control the wire output of the wire feeder.
Earth wire pliers: Connect the earth wire pliers. During welding, the earth wire pliers clamp the work piece to form a loop with the welding torch head to emit light.
Dual Interlock Socket: This allows for safety door switches, emergency stops and other external safety devises to be connected to the laser power source to stop the laser output in the event of a failure in the interlock circuit.

DESCRIPTION OF THE LS-SWF SINGLE WIRE FEED UNIT

Single Wire Feed Unit Overview

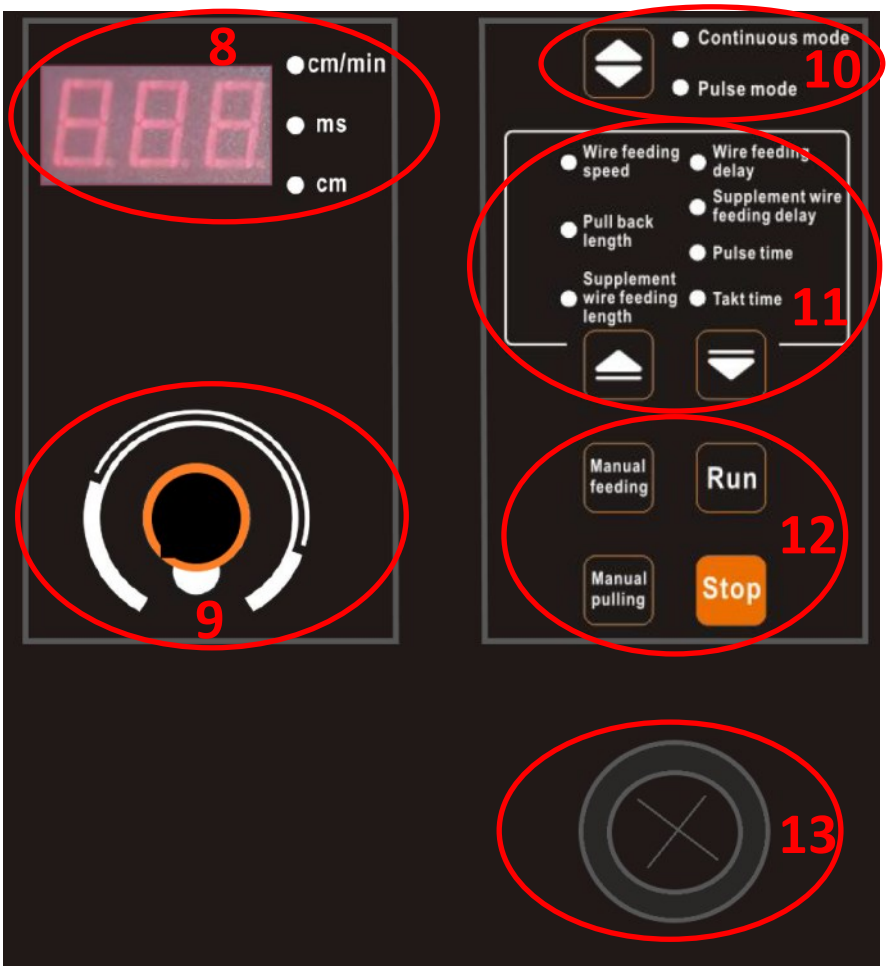
1. Wire feed unit carry handle
2. Digital display with encoder
3. Advanced wire feed control features
4. Wire liner outlet
5. Wire spool holder and locking nut
6. Wire feed unit side cover
7. Clips that secure the side cover in place, opening this door will reveal the wire drive assembly

Single Wire Feed Unit Rear Panel

Power switch: Turns the input power ON and OFF for the wire feeder.
Control cable: Connected to the machine so that it can provide power and welding torch signals to the wire feeder.

Single Wire Feed Unit Control Panel Overview

8. Digital display screen, where wire feed speed will be shown along with parameter setting when making adjustments to the various parameters options.
9. The encoder control dial which is used when adjusting setting and parameters.
10. Wire feed mode, by using the up/down selection button it will allow you to set the machine to either continues wire feed or pulse wire feed mode and the corresponding LED will be lit.
11. Parameter settings area, by using the up or down selection button will rotate you through the various features within this area, upon selection the corresponding LED will be lit.
12. Wire feed control area, where manual feeding, manual pulling options are located along with run and stop control.
13. Wire liner outlet, this is the exit for the wire liner when connected from the wire feed unit to the laser gun.



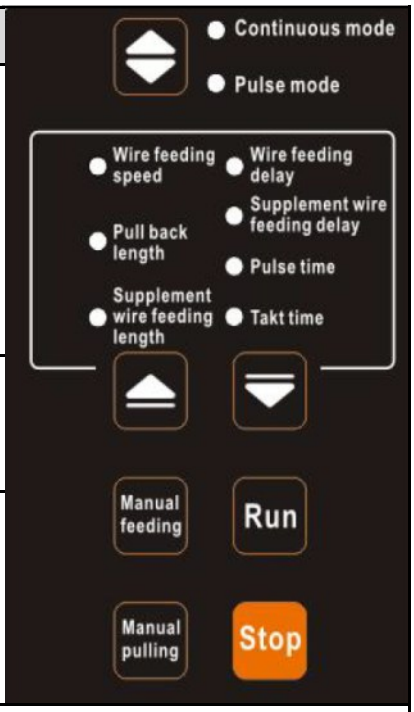
DESCRIPTION OF THE LS-SWF PANEL FUNCTIONS

Single Wire Feed Unit Overview

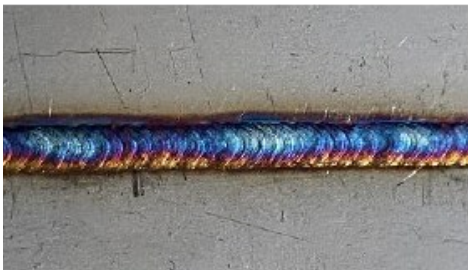
Rear panel:

Power switch: Turns the input power ON/OFF for the wire feeder.
Control cable: Connects to the machine to provide power and welding torch signals to the wire feeder.

Function	Description
Continuous and pulse modes.	Pressing the button will switch control between "Continuous" and "Pulse mode". In "Continuous mode", the pulse time and interval time are disabled and the corresponding parameters cannot be adjusted. In "Pulse mode", the pulse time, interval time (takt time) parameters can be adjusted (see below example).
Wire feed speed.	Controls the wire feed speed during welding. The range is 25 ~ 600 cm/min and can be directly adjusted through the front panel control dial.
Manual wire feed.	Controls the manual wire feed speed. It is generally used for daily debugging of the machine. Continuously pressing the "Manual wire feed" button & the motor will continue run and feed wire at the fastest speed, releasing the button will stop the wire feeding.
Manual wire withdraw.	Controls the manual withdraw speed. This is generally used for daily debugging of the machine. Continuously press the "Manual withdrawal" button, and the motor will continue to withdraw the wire at the fastest speed. Releasing the button will stop withdrawal of wire.
Run & stop mode.	Controls the wire feeder to switch the working state. Pressing "Stop" will display "——" on the control panel. At this point, the machine is in "Stop" state and the motor cannot feed or withdraw the wire. Press "Run" and the panel will display the set wire feeding speed. At this point, the machine is in "Run" state and the motor can feed the wire.



Pulse Mode:
Pulse feeding mode can achieve fish-scale welding bead.
Example shown right:
3mm Stainless steel, Power = 550W, Wire = Φ1.2, WFS = 240cm/min, Pulse time = 45ms and Takt time = 105ms.



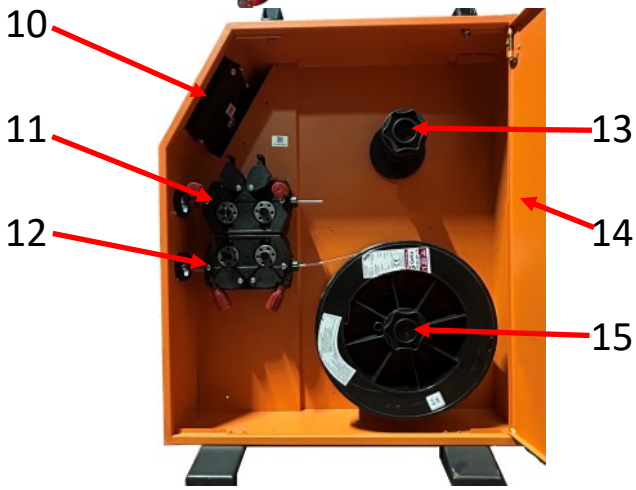
Pull Back Length
It is pull back length after finishing welding.
1. Reduce the chance of welding wire sticking to the workpiece
2. Avoid excessive length of wire for next welding with recommended value of 0.5 ~ 1.0cm
Note:
If the pull back length is too much, increase the supplement wire feeding length, recommended parameter 1/2 of pull back length.

DESCRIPTION OF THE LS-DWF DUAL WIRE FEED UNIT

Dual Wire Feed Unit - Front Overview

1. Wire feed unit rear handle
2. Digital display, touch screen
3. Wire feed unit on/off power switch
4. Wire feed unit wheels assembly
5. Wire feed unit front handle
6. Wire feed unit side door (out of view)
7. Wire feed outlet 1
8. Wire feed outlet 2
9. Wire feed liner (from outlet 1)

Please Note: Via the rear panel are the control cable inlets from the power source.

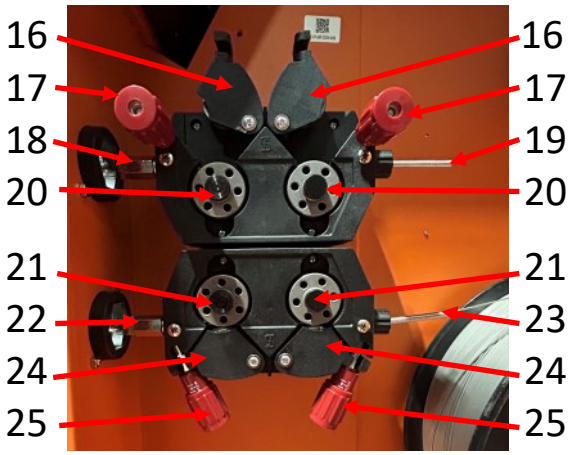


Dual Wire Feed Unit - Side Overview

10. Digital display, touch screen
11. Upper wire feed system and outlet (1)
12. Lower wire feed system and outlet (2)
13. Upper spool holder (1)
14. Wire feed unit side door
15. Lower spool holder (1)

Dual Wire Feed Unit - Wire Drive Assembly Overview

16. Upper drive pressure roll assembly: Holds the pressure roll(s) in place which applies pressure to the welding wire via the installed grooved drive roll(s).
17. Upper drive roll tensioner: Allows the correct amount of tension to be applied to the top roller to ensure good feed of the wire through the MIG torch.
18. Upper drive outlet feed liner: Part of the liner outlet connector which feeds the wire to the torch.
19. Inlet wire guide: The welding wire is fed through the inlet guide prior to feeding through the drive roll assembly.
20. Upper drive wire feed roll(s) and retaining screw which secures and holds the grooved drive roll(s) in place.
21. Lower drive feed roll(s) and retaining screw which secures and holds the grooved drive roll(s) in place.



22. Lower outlet feed liner: Part of the liner outlet connector which feeds the wire to the torch.
23. Inlet wire guide: The welding wire is fed through the inlet guide prior to feeding through the drive roll assembly.
24. Lower Pressure roll assembly: Holds the pressure roll(s) in place which applies pressure to the welding wire via the installed grooved drive roll(s).
25. Lower drive roll tensioner: Allows the correct amount of tension to be applied to the top roller to ensure good feed of the wire through the MIG torch.

DESCRIPTION OF THE LS-DWF DUAL WIRE FEED UNIT

Dual Wire Feed Unit Touch Screen Control Panel Overview

Operations of wire feeder panel

1) Continue mode switch: Pressing the action button will switch you between 'continue' and 'pulse' mode, the lower image shows the pulse setup screen where you can see additional pulse features.
2) Home button: Pressing this button will take you to the home screen which is shown above.
3) Motor selection switch: Pressing these 3 buttons will switch you between single and Dual motor feed modes. For single mode welding, the upper motor is 'A' and the lower motor is 'B', so selecting A or B will activate either the upper of lower wire feed drive.
   Pressing A&B will enter Dual (double) wire feed mode and run both wire feed drives simultaneously .
4) Speed adjustment: and display, pressing either the up or down button will increase or decrease the wire feed speed accordingly. Rapid adjustment can be achieved by pressing and hold to switch for 'rapid' increase/decrease. The adjustment wire feed speed range is 15 ~ 600cm/min.
5) Settings screen switch: Press to switch to the Parameter setting screen.
6) Weld output status indicator, This indicator icon when laser welding starts will illuminate green, when welding stops the icon will go back to being dark grey in colour.
7) Manual feed button: Press and holding this option will activate the wire drive motor and feed the wire out through the wire feed conduit and laser torch, releasing the button and the feed will stop.
8) Manual feed button: Press and holding this option will activate the wire drive motor and retract the wire, releasing the button and the feed will stop.

9) Run status button: Pressing the 'run' switch will start and make ready the wire feed drive. (Automatic wire feeding) is displayed in green, and other states are displayed in black.
10) Stop status button: Pressing the 'stop' switch will stop the wire feed drive. If stop is pressed the button will display in red.

INSTALLATION

Installation

The owner/user is responsible for installing and using this welding machine in according to this operating manual.
Before installing this equipment, the owner/user shall make an assessment of potential hazards in the surrounding area.

Unpacking

Check the packaging for any signs of damage.
Carefully remove the machine and retain the packaging or at least until the installation is complete.
Contact your supplier in the first instance if any item is missing or damaged.

Lifting

The Jasic LS-15000F and LS-20000F do have integrated handles although these are not to be used for lifting the machine. Always ensure the machine is lifted and transported safely and securely and never with the gas cylinder connected.

Warning!

The following operation requires sufficient professional knowledge on electric aspects and comprehensive safety knowledge. All connections shall be made with the power supply turned off. Incorrect input voltage may damage the equipment.
Electric shock may cause death; after switching off the machine, there are still high voltages within the machine, so if removing the covers do not touch any of the live parts on the equipment for at least 10 minutes. Never connect the machine to the mains supply with the panels removed.
The electrical connection of this equipment shall be carried out by suitably qualified personnel and these shall be made with the power supply off. Incorrect voltage may damage the equipment.

Input power connection

Before connecting the machine you should ensure that the correct supply is available.
Details of the machine requirements can be found on the data plate of the machine or in the technical specification table shown on page 23 and 24 within this manual.

This equipment should always be connected by a qualified competent person.
Always ensure the equipment is correctly grounded.

1. Test with multi-meter to ensure the input voltage value is within the specified input voltage range.
2. Ensure that the power switch of the welder is turned off.
3. Wire the input mains cable wires to the correct sized mains plug, ensuring that the live, neutral and earth (ground) wires are connected correctly.
4. Carry out an electrical test of the machine if required (i.e. PAT test).
5. Ensure that the input fuse is correctly rated for the machine.
6. Connect the machine mains power plug firmly to the corresponding supply socket.

Please Note!

If the machine needs to be operated on long extension leads, then please use an extension lead where the cable has a larger cross-sectional area to reduce the voltage drop.
Please consult your electrician or electrical supplier for the recommended size.

INSTALLATION

Connection of safety ground lock

Before carrying out any welding, connect the aviation socket of the safety ground lock to the interface on the rear panel of the machine, and clamp the alligator clip of the safety ground lock to the workpiece. The torch head will emit laser only when the laser enablement signal is valid and the torch head is in contact with the workpiece and the torch switch is pressed.

Gas Connections

The gas regulator is designed to reduce and control the high pressure gas from a cylinder or pipeline to the working pressure required for the Jasic Laser machine.

Before fitting the regulator, clean the cylinder valve outlet.
Match the regulator to cylinder and before connecting, ensure the regulator and the regulator inlet and cylinder outlet match.
Connect the regulator inlet connection to cylinder and tighten it firmly (do not overtighten) with a suitable spanner. If using a gas flowmeter, connect to the regulator outlet. Connect the gas hose to the regulator/flowmeter which is now located on the shield gas cylinder and connect the other end to the gas socket on the machines rear panel.
With the regulator connected to cylinder, always stand to one side of regulator and only then slowly open the cylinder valve. Slowly turn adjusting knob in (clockwise) direction until the outlet gauge indicates that you have set the required flow rate.
To reduce the gas flow rate, turn the adjustment knob anti-clockwise, until the required flow rate is indicated on the gauge/flow meter.

Output/Input Connections

When inserting cable plugs into there matching socket on the front or rear panels of the laser machine or wire feed units, line up the sockets, insert and rotate the locking nut clockwise to tighten.

It is very important to check these connections daily to ensure they have not become loose otherwise intermittent function may occur when used under.

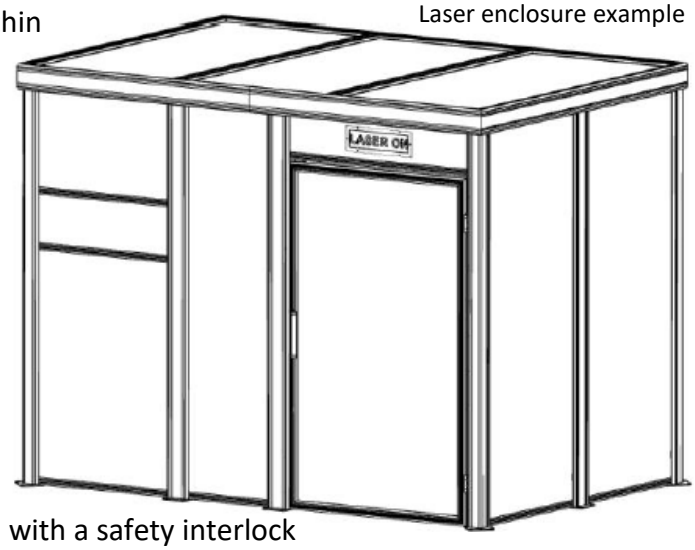
Laser Machine Installation Considerations:

- Care should be taken to avoid moisture, dust, steam, oil or corrosive gases.
- Place on a secure level surface and ensure that there is adequate clearance around the machine to ensure natural airflow.
- Position the welding power supply near an appropriate power point ensuring you leave at least 30cm of space around the machine to allow for proper ventilation.
- Always place the machine on a firm level surface before using, ensuring it cannot tip over.
- Never use the machine on its side.
- Most metals including stainless steel can give off toxic fume when laser welded or laser cleaned.
- To protect the operator and others working in the area from fume, its important to have adequate ventilation in the work area to ensure air quality level meets all local and national standards.

INSTALLATION

Installation Location

Laser enclosure example



The Jasic laser machine should be located indoors within a laser safe (class 4) environment in accordance with your local, regional or national regulations.
Everyone within a laser controlled area must read and fully understand the safety information as defined by IEC60825-1 and ANSI which refers to a Laser Controlled Area. A laser welding operating area where the occupancy and activity of those within is controlled and supervised.
This area may be defined by walls, barriers or other means. Within this area, potentially hazardous beam exposure is possible.
Laser controlled areas are generally enclosed areas capable of absorbing stray laser energy and equipped with a safety interlock system integrated with the laser to prevent unauthorized access while the laser is in use.

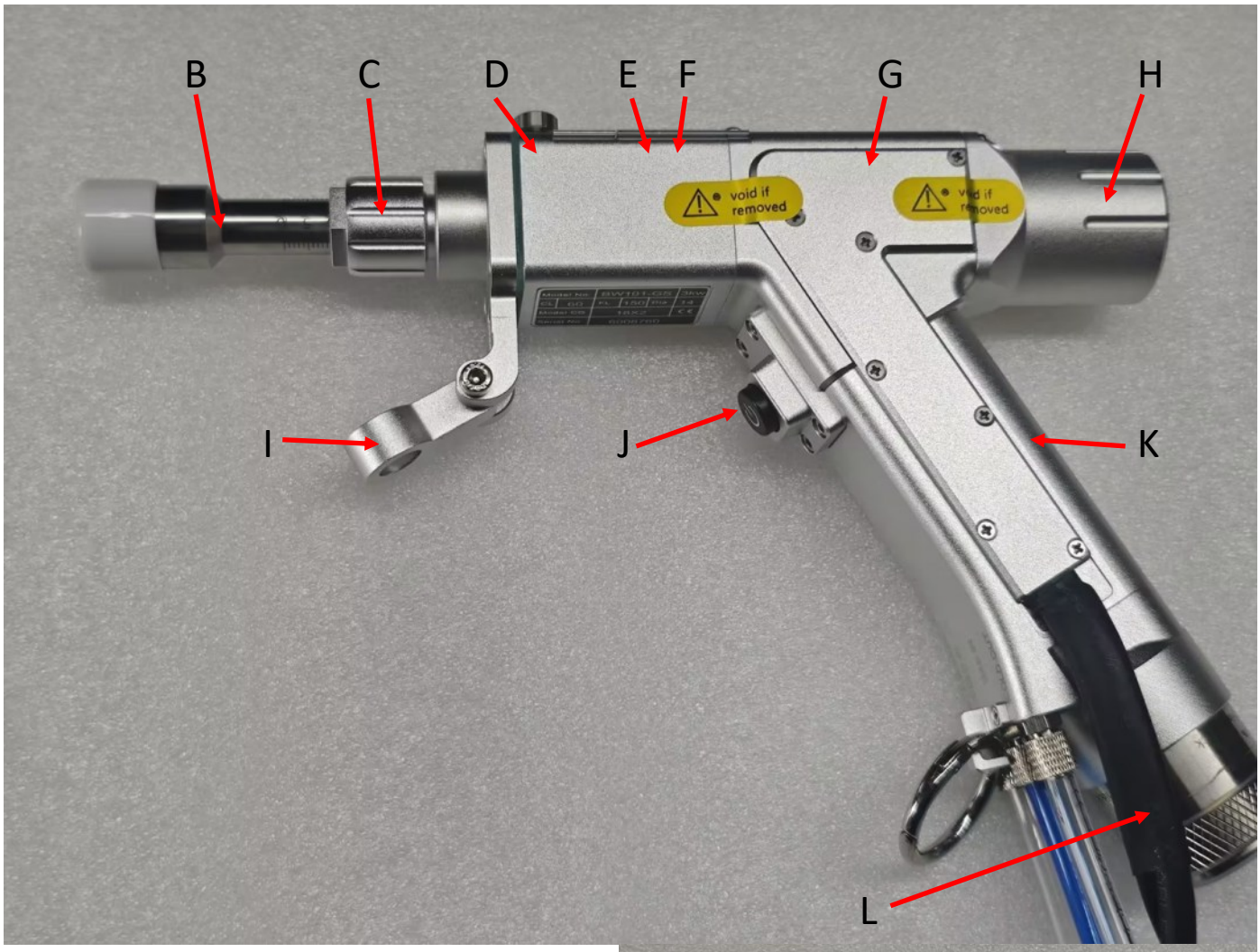
To ensure safety and compliance we have partnered up with Kyrus who manufacture hand-held laser welding enclosures which forms the basis of a Laser Controlled Area that integrates with the safety equipment on the Jasic laser machines to ensure safe usage.

Laser welding is a leading edge technology in modern manufacturing due to its precision, speed, and flexibility. However, the use of lasers can also pose significant safety risks to operators and other personnel in the vicinity of the welding process. Therefore, the installation of an enclosure for laser welding is a critical safety measure to protect people and equipment from potential hazards.
An enclosure provides a controlled and isolated environment for the laser welding process, minimizing the risk of exposure to laser radiation, hazardous fumes and sparks. This significantly improves the safety of the personnel working around the welding area and prevents accidents or injuries.
Using an enclosure will help to comply with safety regulations and standards.
Kyrus laser enclosures are specifically designed as a passive laser protection system for use with hand held laser welding equipment.

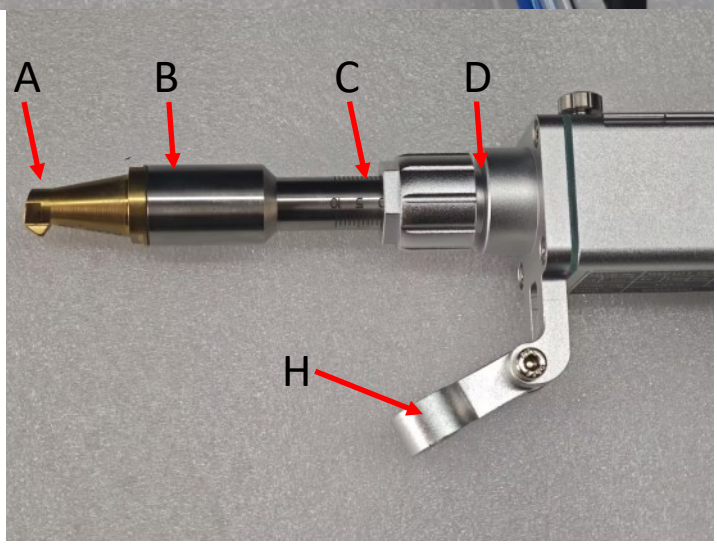
Laser enclosure must be used in conjunction with the safety devices on your hand held laser welder (such as interlock circuit, tip contact continuity circuit and plasma detection).
Failure to install and operate this enclosure in conjunction with the safety devices on the hand held laser equipment, will mean that the enclosure does not meet the relevant safety criteria.
The laser enclosure is not designed to protect against the negative effects of deliberately defeating the safety devices on your hand held laser welder equipment.

INSTALLATION

Main components of the Jasic Laser Gun



A. Copper Nozzle
B. Extension Tube
C. Bolt
D. Protective Lens
E. 2nd Protective Lens
F. Focusing Lens
G. Reflective Lens Mirror
H. Motor
I. Liner Bracket
J. Control Switch
K. Collimating Lens
L. QBH Protective Sleeve



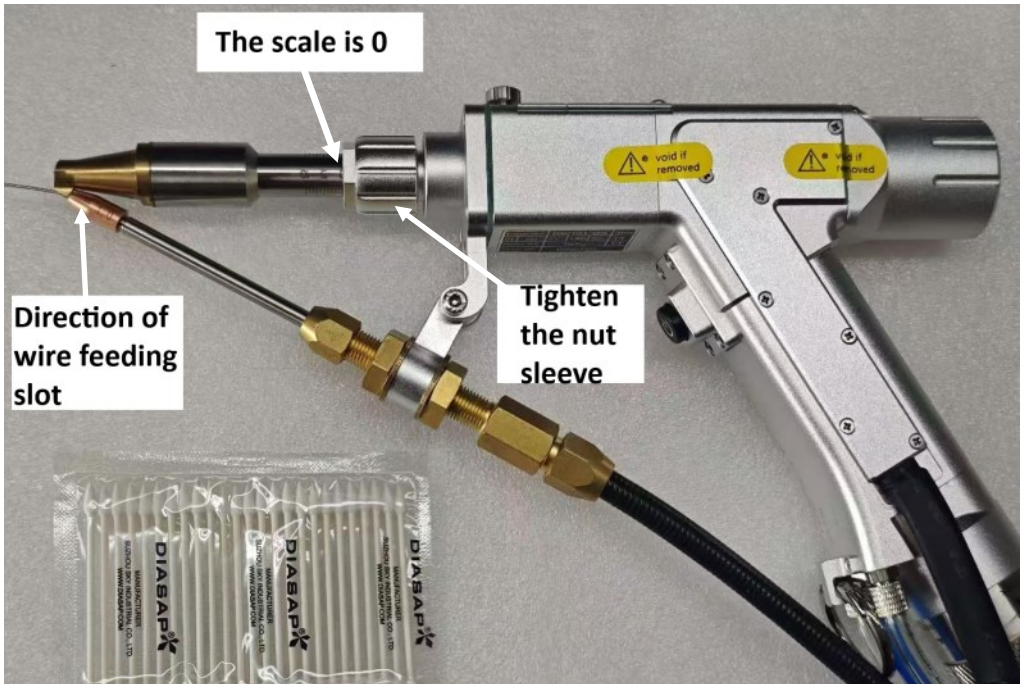
It is recommended that the focusing lens and protective lens should be inspected every 1-2 days in a clean environment to confirm whether any black spots or dust particles exist on the lenses.
If the welding workload is constant, then it is recommended that the protective lens should be inspected daily.

Please Note:
Inspecting and cleaning should be carried out in a clean room to ensure no additional dust is allowed to enter the clean areas of the laser torch.

INSTALLATION

Welding torch assembly

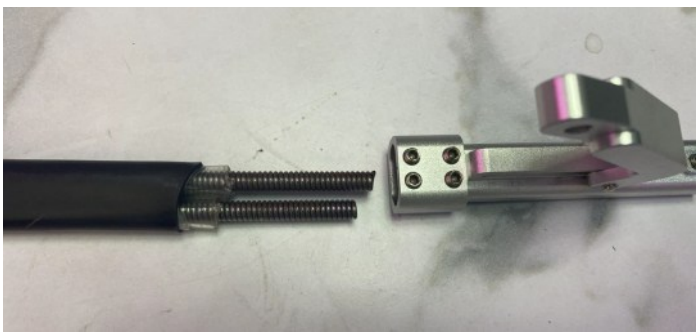
The extension tube and brass nozzle are not assembled on the welding torch at the factory, and need to be assembled before use.



1. Take out the extension tube and brass nozzle from the accessory box.
2. Remove the sealing plug from the torch nozzle.
3. Assemble the extension tube on the torch nozzle, and adjust the scale to 0.
4. Assemble the brass nozzle on the extension tube and tighten it, rotate the extension tube to align the wire feeding trough of brass nozzle with the welding wire, and then tighten the nut sleeve.
5. Connect the wire conduit. Loosen the locking screw to insert the brass nozzle of the wire conduit onto the wire feeder, pass the welding wire through the brass nozzle and tighten the screw fixing the brass nozzle.
6. Assemble the wire conduit on the torch head bracket and tighten the nut; adjust the length of wire conduit to extend to the welding brass nozzle.

Torch head end

7) After the above instructions have been completed, prepare the accessories for the torch head end and assemble them.
8) Please note that [Connecting block] is model-specific. Different models are provided with different connecting blocks. However, other accessories are the same.
9) Different connecting blocks are used for different focal lens.
10) Additional connecting blocks are required for some models



Assembling of wire feeding tube

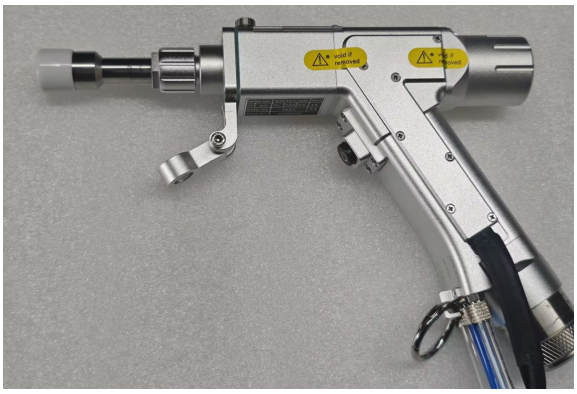
11) Loosen the locking screw of the wire feeding tube, insert the wire into the appropriate position, and then lock it tightly.

INSTALLATION AND SETUP INSTRUCTIONS FOR SINGLE WIRE FEEDER

Setup and assembling of the single wire feeding tube

Prepare accessories and tools.

Red Single liner: Suggested 1.2/1.6mm wire for Steel, stainless steel, copper.
Blue single liner: suggested for 0.8./1.0mm wire for steel, stainless steel, copper.
Black Single liner: Suggested 1.2/1.6mm wire for Aluminium.



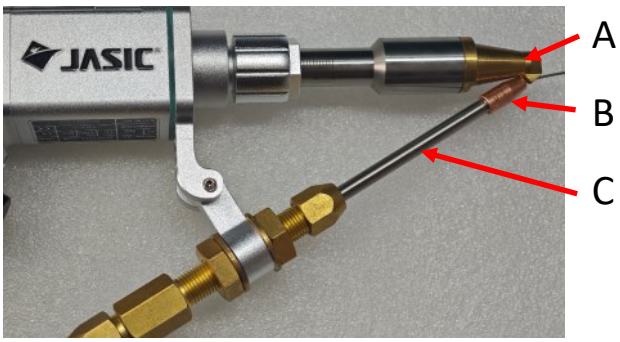
Assemble the extension tube and brass nozzle.

1. Install the copper nozzle onto the extension tube.
2. Install the extension tube into the laser gun head, adjust the tube to 0 scale, lock the bolt. 0 scale is the default focal length, the strongest point of laser.

Note: When welding, adjustment to the focal scale may need adjustment to achieve satisfactory welding results; Negative adjustment will give deeper penetration relative to the amount adjusted (e.g. -3 will focus the laser 3mm into the material) please note -3 is the recommended maximum adjustment in the negative range. In contrast a positive adjustment with have the opposite effect (less penetration).

Installation of the wire feeder at the torch end

1. Wire guide nozzle selection and wire diameter must match.
2. Wire guide should be as close as possible to the copper nozzle below the wire guide slot.



Install the wire guide tube and wire guide nozzle, whose sizes match the wire.

A. Nozzle
B. Tip
C. Wire guide straight line

INSTALLATION AND SETUP INSTRUCTIONS FOR DUAL WIRE FEEDER

Setup and assembling of the dual wire feeding tube

This page will assist with setting up the laser for dual wire feeding which is different than the single wire feeding setup.

Assemble the extension tube and brass nozzle.

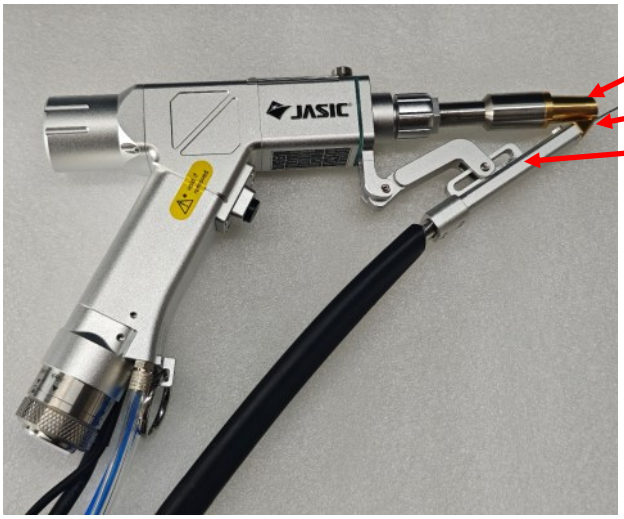
1. Install the copper nozzle onto the graded tube.
2. Install the graded tube into the laser gun head, adjust the graded tube to 0 scale, lock the bolt. 0 scale is the default focal length, the strongest point of laser.

0 Scale

Note: When welding, adjustment to the focal scale may need adjustment to achieve satisfactory welding results; Negative adjustment will give deeper penetration relative to the amount adjusted (e.g. -3 will focus the laser 3mm into the material) please note -3 is the recommended maximum adjustment in the negative range. In contrast a positive adjustment with have the opposite effect (less penetration).

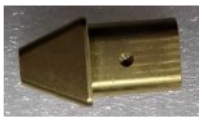
Installation of the wire feeder at the torch end.

1. Wire guide nozzle selection and wire diameter must match.
2. Wire guide nozzle as close as possible to the copper nozzle below the wire guide slot.



Install the wire guide tube and wire guide nozzle, whose sizes match the wire.

Dual Wire Nozzle



Dual Wire Tip

Dual-wires spring liner:
suggested for ϕ1.2/1.6 wire
Material: Steel, stainless steel, copper.

Dual Liner

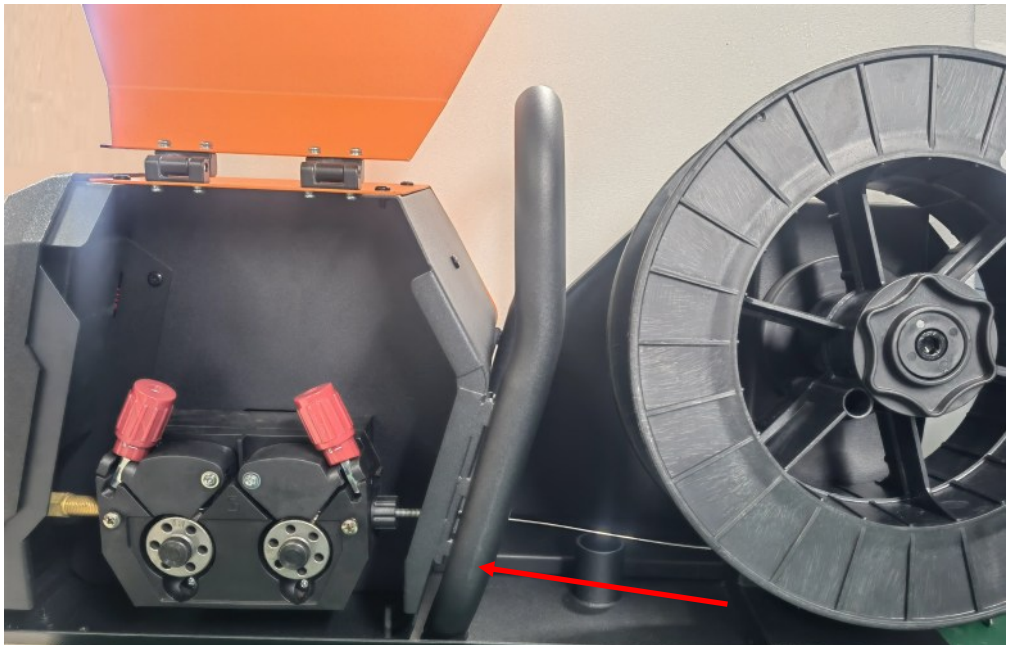
Dual Wire Feed Bracket

INSTALLATION AND SETUP INSTRUCTIONS FOR SINGLE WIRE FEEDER

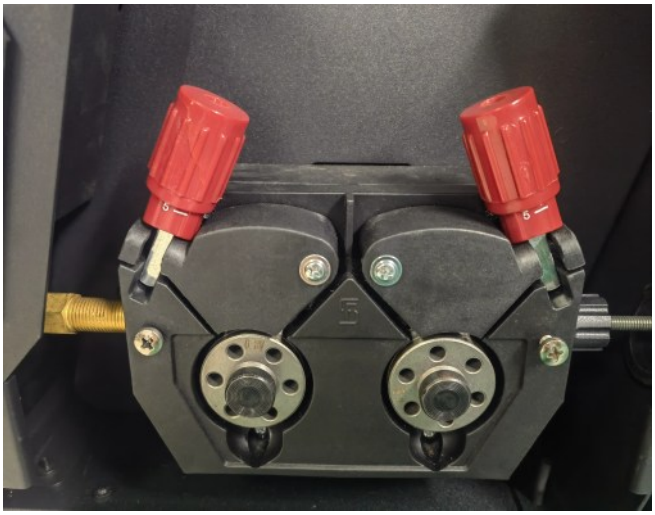
Precautions

A. Ensure that the machine is earthed CORRECTLY before the machine package is powered on.
B. Ensure that the wire feed roll size and the wire liner match the wire diameter and wire material type.
C. Ensure, when handling the welding wire liner that you do not bend the wire feeding tube.

Installation of wire reel/wire feed roller

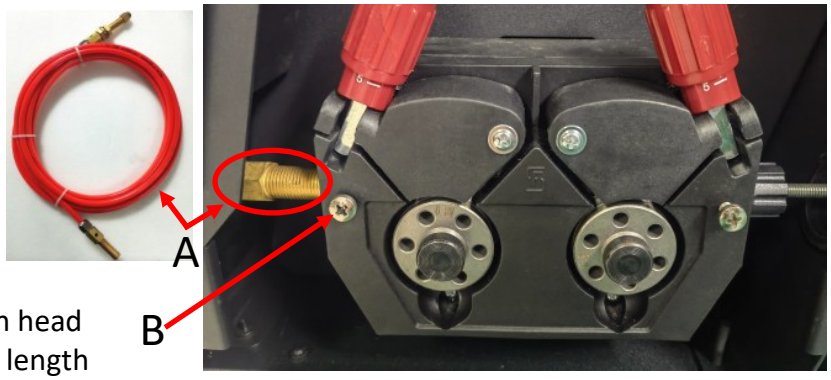


1) Do not use flux-cored wires, and the selected wire must match the material to be welded.
2) Before the installation, the wire must be placed in the slot and then clamped.
3) There are two wire feed rollers in total, with different size on both sides corresponding to different wire diameters. Be sure to install them properly.
   For example, during the installation of the 1.2welding wire, the side marked with the number 1.2 of the wire feed roller should face outward, as shown below
4) Ensure the side of the corresponding wire feeding trough is facing inwards, and then tighten the nut.
5) Release the two upper adjustable tensions arms
6) Unscrew the nut of wire feed roller and remove it.
7) Install the wire spool. Note that the welding wire must be led out from the wire spool, insert the wire spool on the spool shaft, and pass the welding wire through the inner inlet guide and the wire feed roller assembly . The welding wire must be placed in the roller groove and then clamped.
   The welding wire should be ordinary welding wire ranging from 5 kg to 25 kg, (but flux-cored wire should not be used.
7) Adjust the wire tension pressure to ensure smooth wire feed and inch the welding wire through the liner.



INSTALLATION AND SETUP INSTRUCTIONS FOR SINGLE WIRE FEEDER

Setup and assembly of the wire feeding tube



1. Step 1: Connect the wire conduit. Loosen the locking screw (B) to insert the brass nozzle of the wire conduit (A) onto the wire feeder, pass the welding wire through the brass nozzle and tighten the screw fixing the brass nozzle.
2. Assemble the wire conduit on the torch head bracket and tighten the nut; adjust the length of wire conduit to extend to the welding brass nozzle.
3. Connect the control line of the wire feeder. Insert the 7-pin connector plug of the control line into the 7-core socket on the rear panel of the wire feeder and tighten it. Then, insert the other end into the wire feeder interface on the rear panel of the machine.
4. After completing the above steps, turn on the power supply of the machine, switch on the wire feeder, and manually feed the wire until it comes out of the wire guide nozzle.

Please Note:

- Do not direct the wire guide nozzle at any person or equipment during the wire feeding to avoid personal injury.
- Avoid bending the wire guide tube to avoid affecting the wire feeding.

Operational instructions for the single wire feeder

After connecting the overall system, check again for any errors or omissions before startup.

1）Open the gas cylinder valve and adjust the gas flow.

2）Turn on the switch of the power distribution box, the switch of the rear panel of the machine, and the switch of the wire feeder in turn.

3）Turn on the power switch and emergency stop switch on the front panel. At this time, the machine will start, and the panel will light up. After startup, check whether the machine and water tank operate normally and have any alarms.

4）Press the manual wire feeding button of the wire feeder to make the welding wire come out of the wire guide nozzle.

5）Disable the laser enablement button to check if the red light is in the centre of the brass nozzle and right to the wire.

6）Welding can be carried out after setting welding parameters and wearing protective equipment.

7）After welding, disable the laser enablement button, turn off the power switch on the front panel, the rear panel switch, the power distribution box switch, and then the gas cylinder valve in turn.

8）Place the welding torch lightly on the torch holder.

Warning!

- When the wire feeder manually feeds the wire, do not direct the guide wire nozzle to people or equipment to avoid puncture.
- When adjusting the red light, it is forbidden to enable the laser enablement button, to avoid causing injury by light emission.

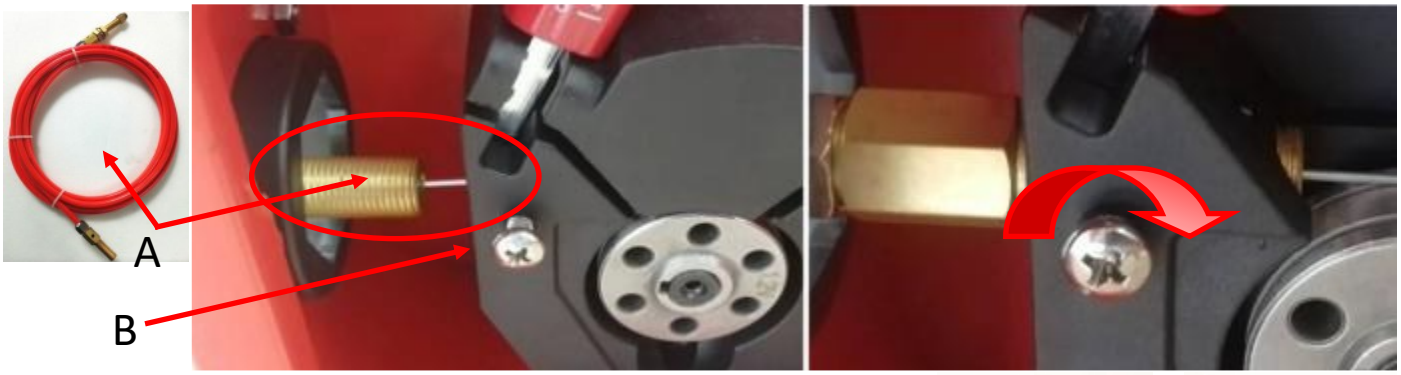
INSTALLATION AND SETUP INSTRUCTIONS FOR DUAL WIRE FEEDER

Precautions

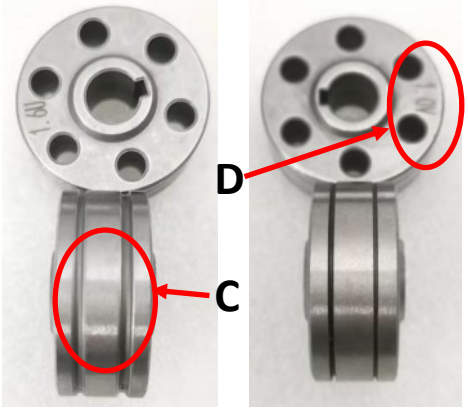
A. Ensure that the machine is earthed CORRECTLY before the machine package is powered on.
B. Ensure that the wire feed roll size and the torch wire liner match the wire diameter and wire material type.
C. Ensure, when handling the welding wire liner that you do not bend the wire feeding tube.
D. Ensure that the wire feed unit is connected to the laser power source via the control socket as shown right.

Installation of wire feed tube (liner) and the wire spool reel/wire feed rollers

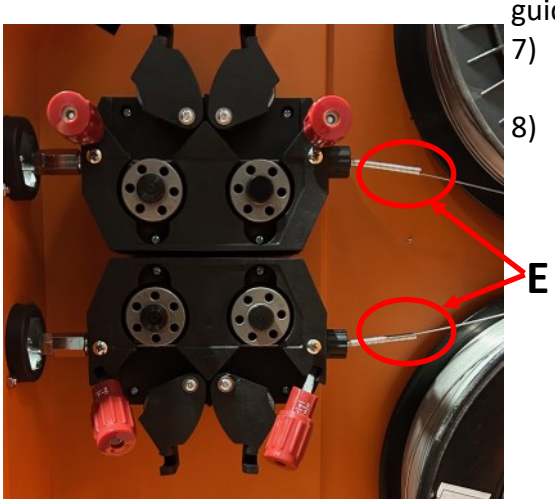
- Please Note: It is very important that you do not use flux-cored wires!

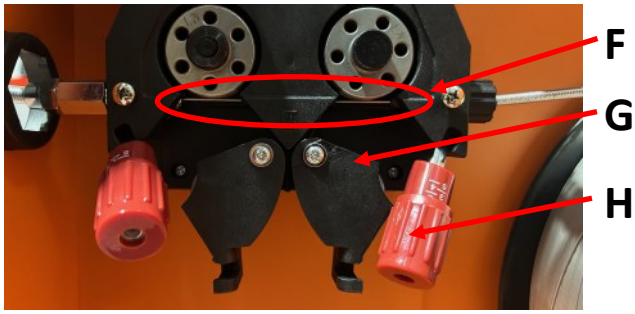


1) Please ensure that the selected welding wire matches the material to be welded.
2) Loosen the locking screw of the wire feeding tube, insert the wire tube liner (A) into the appropriate position, and then lock tightly in place using the screw as noted above (B).
4) As shown right, there are two wire drive feed rollers with 2 upper pressure rollers to assist with pushing the wire through to the torch.
5) The 2 drive rolls have different sized grooves rolls noted on the outer face as shown below (C) on either sides corresponding to different wire core diameters sizes. Be sure to install them the correct way round, for example, during the installation of the 1.0mm welding wire, the side marked with the number 1.0mm of the wire feed roller should face outward (E) as shown below.



6) As part of setting up this welding machine, the welding wire must be placed in and through the inner guide tube, then though and past both drive rolls (F).
7) Then place the upper pressure arm in place and rotate the adjustable tensioner in place (G).
8) Adjust the tension accordingly by rotating clockwise or anti clockwise (H).





START UP INSTRUCTIONS FOR LASER OPERATION

Startup Procedure:

1. Connection to the incoming power supply should be the correct specified input mains voltage and current rating.
2. Securely lock the connection to the loop interface and connect the wire-feeding power cord to the wire feed unit interface.
3. Attach the protective gas pipe (outer diameter 6mm) to the gas inlet port and open the gas valve.
4. Switch ON the mains power to the laser machine
5. Switch the power ON of the laser machine via the key switch located on the front panel.
6. If required, release the emergency stop switch on the laser's front panel.
7. Depending on which WFU is installed, switch ON the power of the feed unit.
    - On the single wire feed drive unit, the on/off is located on the rear panel.
    - On the Dual wire feed drive unit, the on/off is located on the front panel.
8. Tap the touch screen to access the software interface, and adjust the required parameters.
9. Open the gas valve to allow shield gas to flow normally, adjust the gas flow to approx. 15~20 L/min.
10. Attach the alligator clip to the bench or workpiece that requires welding.
11. Activate the laser start button and the laser enables switch.
12. Press and hold the torch head switch to emit light.

CAUTION:

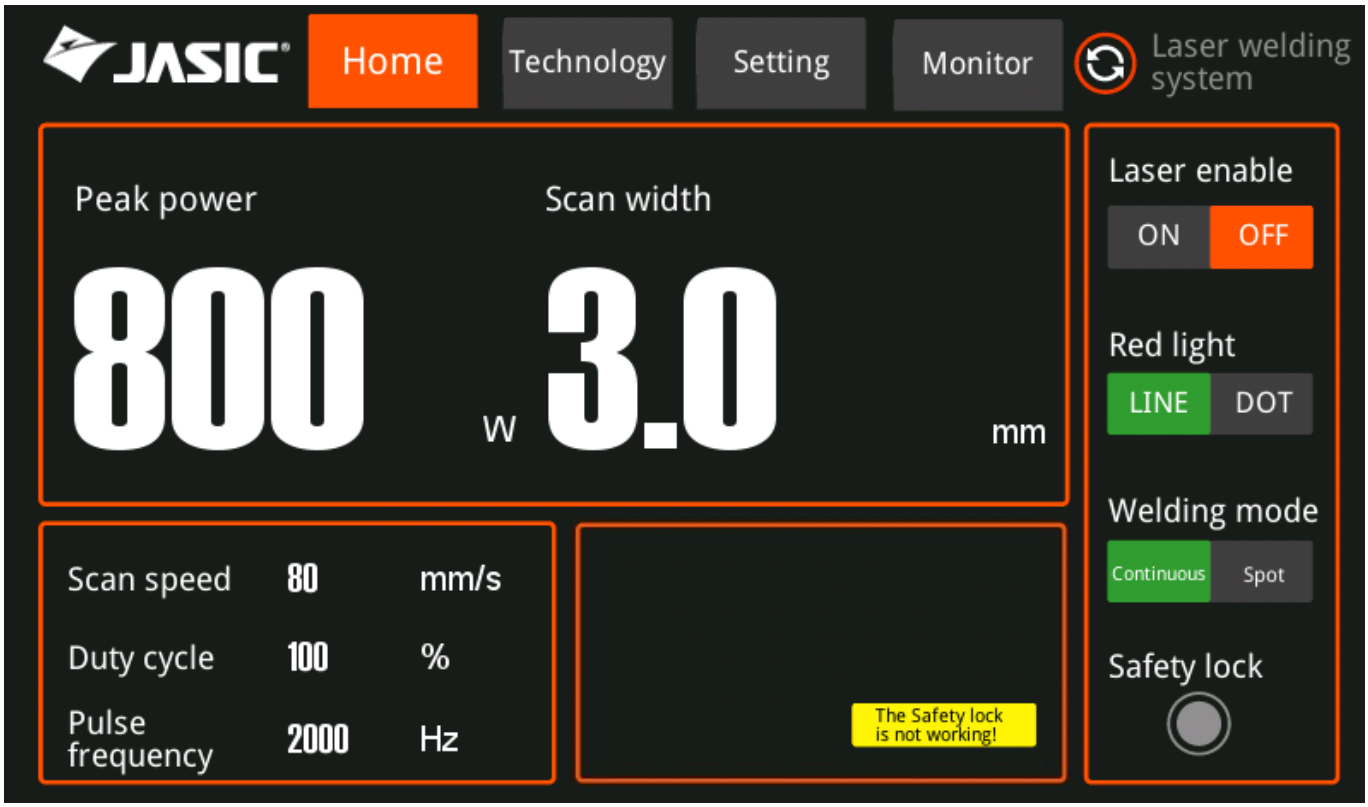
- When the wire feeder manually feeds the wire, do not direct the guide wire nozzle to people or equipment to avoid puncture.
- When adjusting the red light, it is forbidden to enable the laser enablement button, to avoid causing injury by light emission.
- Ensure all safety aspects of this operating manual have bene observed and instilled in to the installation.
- Always check over the machine, torch, cables and the enclosure (including interlocks) prior to usage.
- Ensure all electrical connections (including protective gas and grounding) have been adequately connected and checked prior to each usage. It is recommended to tighten and secure all connectors with screws whenever possible.
- Always avoid directly looking at the laser outlet during operation. Always wear appropriate safety gear such as protective eyewear, soundproof earplugs, and masks before operating the laser.
- Prior to any wiring alterations, make sure all the power switches of the laser machine are turn off.

DESCRIPTION OF WELDING CONTROLS - LS-15000F AND LS-20000F

WELDING MODE

To simplify the welding control panel operation and explanation, we have divided the control into four parts, including home screen, technology, settings, and monitoring.

Home interface of touch screen



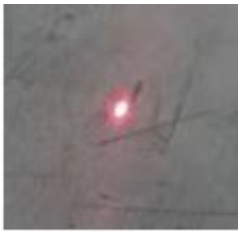
Home screen interface and overview:

Peak power: determine the strength of the laser energy, set the power according to the thickness of the workpiece.
Scan width: determine the width of the weld, ranging 0-6mm, 3mm ± 1mm is recommended.
Scan speed: default 100hz, no need to adjust. (50-100 is recommended).
Duty cycle： default 100%, no need to adjust, if it's 0, no laser output.
Frequency： default 1000Hz, no need to adjust.

Notes: enter the 'process' screen to set these above parameters.

Laser enable: Turn on during welding, otherwise no laser will be emitted and welding will not be possible. It is recommended to turn it off when not in use.
Indicating of red light: When welding, it is necessary to switch to the line. The length of the line is consistent with the parameters set for scanning width.
Welding mode: There is "continuous welding" and "spot welding", often set to "continuous" mode.
Secure lock: When the ground wire is clamped onto the workpiece, the welding Red light line gun contacts the workpiece, and the safety lock is lit to start welding.

Red Light Line



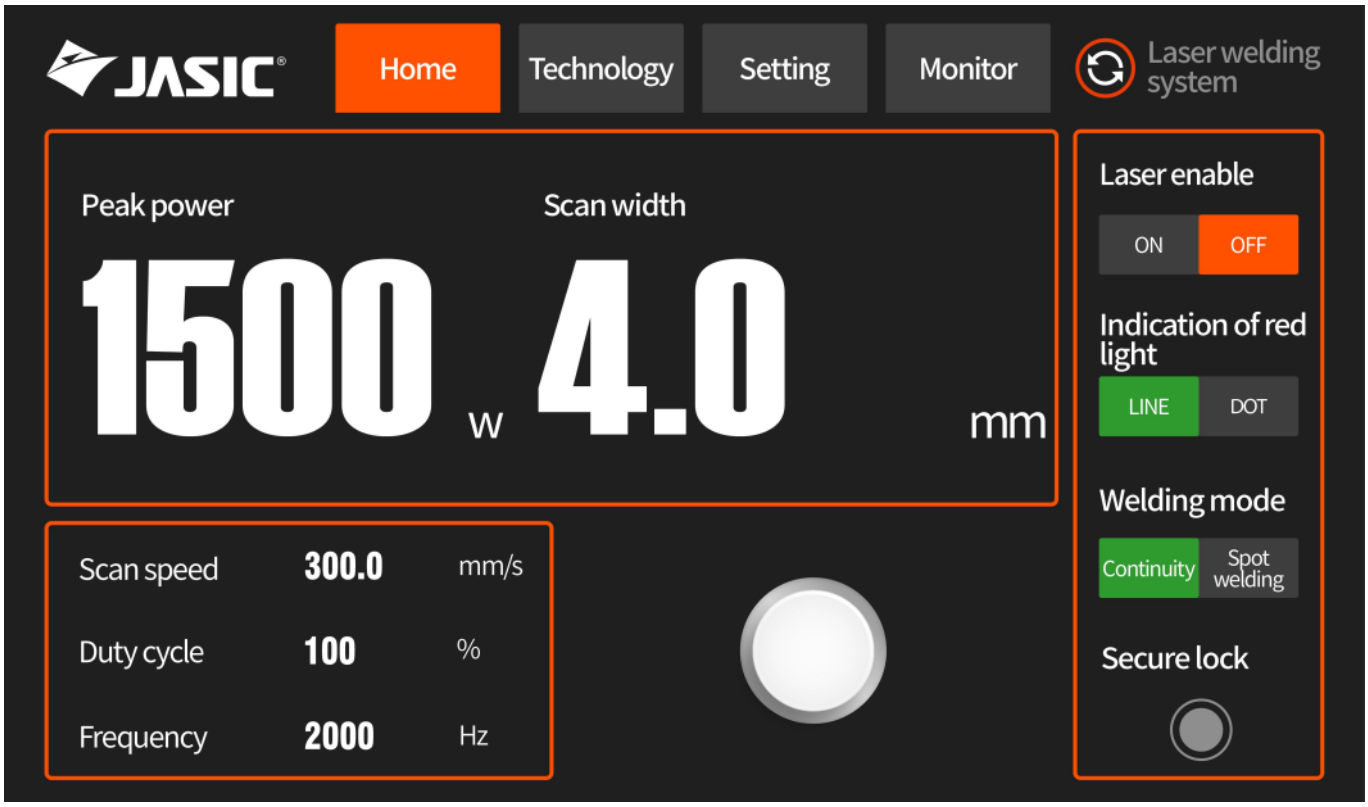
Red Light Dot

DESCRIPTION OF WELDING CONTROLS - LS-15000F AND LS-20000F

WELDING MODE

To simplify the welding control panel operation and explanation, we have divided the control into four parts, including home screen, technology, settings, and monitoring.

Home interface of touch screen



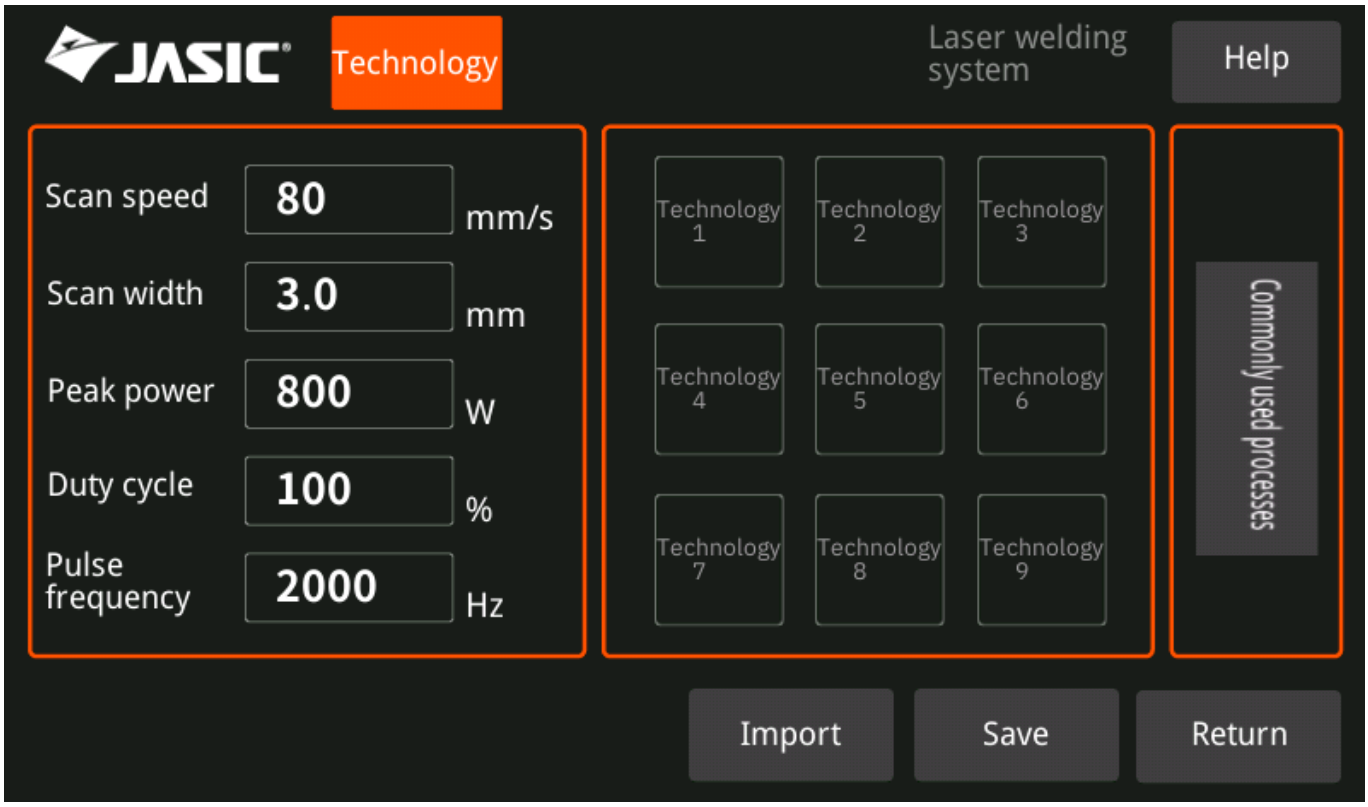
1) This interface shows the current technical parameters (which cannot be modified in this interface) and real-time alarm information.
2) When the enable is turned off, no enable signal will be sent to the laser, which can be used to test the gas outlet function. Turn off the red light indication and the motor stops working. At this point, the red light is a point, which is used to adjust the centre position. Welding modes are divided into continuous welding and spot welding. When selecting spot welding, you need to set the spot welding type on the settings screen.
3) The safety ground lock comes in grey and green. When the metal clip is clamped on the workpiece and the brass nozzle of the torch body contacts the workpiece, Pins 5 and 6 of the signal interface 1 are connected and the safety ground lock indicator light is green. At this point, press the laser enable button on the panel and then press the trigger to achieve light emission.
4) Press the button in the upper right corner to switch between cleaning modes
5) is the light emission indicator icon, which is white when no light is emitted. When the laser emission is normal, the icon turns orange
6) Set the scanning width to 0 and replace the brass nozzle for cutting to perform cutting operations. The cutting control logic is the same as welding, and press the trigger while connecting the safety ground lock.

DESCRIPTION OF WELDING CONTROLS - LS-15000F AND LS-20000F

WELDING MODE

Technology interface

The below image shows the screen interface in welding mode



Technology interface screen operation: Peak power, scan width, scan speed, duty cycle, pulse frequency parameter settings:
This interface can be used for debugging technology parameters, which can be modified by clicking the box; after modification, click OK to save it in the quick technology; and click Import to import the technology for use (Modify - Save - Import).

- 1, click on the corresponding data field, set the corresponding values.
- 2, then click "Import", "Save", "Return".

Commonly used process parameter group: It can be used to save the welding process parameters, which is convenient to retrieve and use directly when using.

1. The scanning speed range is 2-6000mm/S and the scanning width range is 0 ~ 6mm.
   The scanning speed is limited by the scanning width, and their relationship is: 10 ≤ scanning speed/(scanning width*2) ≤ 1000.
   If the limit is exceeded, it will automatically change to the limit value. When the scanning width is set to 0, the machine does not scan (i.e. point source) and the most common scanning speed is 300 mm/S, and width of 2.5 ~ 4mm.
2. The peak power needs to be less than or equal to the laser power on the parameter screen.
   For example, if the laser power is 1000W, this value shall be not higher than 1000.
3. The duty cycle range is 0 ~ 100 (100 by default, usually no changes are needed).
4. The suggested pulse frequency range is 5 ~ 5000Hz (2000 by default, which is often not changed).
5. Click the HELP button on the top right to get more description of relevant parameters.
6. After modifying the parameters, you can check whether the import is successful on the home screen.

OPERATIONAL INSTRUCTIONS FOR DUAL WIRE FEEDER

Switching operation guide

After connecting the overall system, check again for any errors or omissions before startup.

1）Open the gas cylinder valve and adjust the gas flow.

2）Turn on the switch of the power distribution box, then turn the wire feed unit power switch which is located on the front panel of the machine, and the switch of the wire feeder in turn.

3）Turn on the power switch and emergency stop switch of the laser machine, both located on the front panel. At this time, the machine will start, and the panel will light up. After startup, check whether the machine and water tank operate normally and have any alarms.

4）Press the manual wire feeding button of the wire feeder interface screen to drive the welding wire out up the welding wire tube towards the wire guide nozzle at the laser gun.

5）Disable the laser enablement button to check if the red light is in the centre of the brass nozzle and right to the wire.

6）Welding can be carried out after setting welding parameters and wearing protective equipment.

7）After welding, disable the laser enablement button, turn off the power switch on the front panel, the rear panel switch, the power distribution box switch, and then the gas cylinder valve in turn.

8）Place the welding torch lightly on the torch holder.

Warning!

- When the wire feeder manually feeds the wire, do not direct the guide wire nozzle to people or equipment to avoid puncture.
- When adjusting the red light, it is forbidden to enable the laser enablement button, to avoid causing injury by light emission.
- Ensure all safety aspects of this operating manual have bene observed and instilled in to the installation.
- Always check over the machine, torch, cables and the enclosure (including interlocks) prior to usage.
- Ensure all electrical connections (including protective gas and grounding) have been adequately connected and checked prior to each usage. It is recommended to tighten and secure all connectors with screws whenever possible.
- Always avoid directly looking at the laser outlet during operation. Always wear appropriate safety gear such as protective eyewear, soundproof earplugs, and masks before operating the laser.
- Prior to any wiring alterations, make sure all the power switches of the laser machine are turn off.

OPERATION OF THE DUAL WIRE FEED UNIT CONTROL PANEL

Operations of wire feeder panel

Touch functions and operations of wire feeder panel

1) Continues mode switch: Pressing the action button will switch you between ‘continues’ and ‘pulse’ mode, the lower image shows the pulse setup screen where you can see additional pulse features.
2) Home button: Pressing this button will take you to the home screen which is shown above.
3) Motor selection switch: Pressing these 3 buttons will switch you between single and Dual motor feed modes. For single mode welding, the upper motor is ’A’ and the lower motor is ‘B’, so selecting A or B will activate either the upper of lower wire feed drive.
   Pressing A&B will enter Dual (double) wire feed mode and run both wire feed drives simultaneously .
4) Speed adjustment: and display, pressing either the up or down button will increase or decrease the wire feed speed accordingly. Rapid adjustment can be achieved by pressing and hold to switch for ‘rapid’ increase/decrease. The adjustment wire feed speed range is 15 ~ 600cm/min.
   You can also press the feeding screen display (currently showing 50 above) and a pop up screen keyboard will show which allows the operator to enter directly the required wire feed speed rate.
5) Settings screen switch: Press to switch to the Parameter setting screen.
6) Weld output status indicator, This indicator icon when laser welding starts will illuminate green, when welding stops the icon will go back to being dark grey in colour.
7) Manual feed button: Press and holding this option will activate the wire drive motor and feed the wire out through the wire feed conduit and laser torch, releasing the button and the feed will stop.
8) Manual feed button: Press and holding this option will activate the wire drive motor and retract the wire, releasing the button and the feed will stop.
9) Run status button: Pressing the ‘run’ switch will start and make ready the wire feed drive. (Automatic wire feeding) is displayed in green, and other states are displayed in black.
10) Stop status button: Pressing the ‘stop’ switch will stop the wire feed drive. If stop is pressed the button will display in red.

OPERATION OF THE DUAL WIRE FEED UNIT CONTROL PANEL

Operation of wire feeder panel (Continued)

Touch functions and operations of wire feeder panel

To access the above screen, pressing the setting option which will take you to the parameter settings screen as shown above.

1) Wire feed speed: This is the same as the wire feed speed in (Home screen). This option is used to control
   the wire feed speed during the welding with a value range of 15 ~-600 cm/min.
2) Start delay: Controls the start delay time of wire feeder after the trigger of welding torch is pressed. The value is within the range of 0 ~ 2000ms and generally set to 0. For example, if the start delay is set to 1000ms, the machine will wait for 1s before feeding the wire after the torch trigger is pressed.
3) Withdrawal length: Controls the length of the wire drawn back during [Wire breaking] and is used to help break the wire. The value is within the range of 0 ~ 100 mm and generally set to 10, which can be increased according to the diameter of the welding wire and the length of the wire feeding tube.
4) Wire replenishment (supplement) length: Controls the wire replenishment length after the wire feeder draws back the 'broken wire' and compensates the effect of the 'withdrawal length' and maintain the consistency of the joint at the next welding. The value range is 0 ~ 100 mm and in principle, the value must be the same as the 'withdrawal length'. If the resistance of the wire feeding tube is large, the value can also be larger than the 'withdrawal length'.
5) Wire replenishment (supplement) delay: Controls the interval time between wire replenishment and withdrawn broken wire by the wire feeder during 'wire breaking' to prevent the wire from being bonded to the weld seam for the second time due to premature replenishment, thus improving the wire breaking effect. The value is within the range of 0 ~ 2000ms, and generally is set to 0.
6) Manual wire feed speed: This options sets the speed rate in the home screen when the operator presses the manual feed option that will activate the wire drive motor to feed the welding wire to the laser torch.
7) Manual wire retract feed speed: This options sets the retract speed rate in the home screen when the operator presses the manual retract feed option that will activate the wire drive motor to return the welding wire towards the wire feed unit.

OPERATION OF THE DUAL WIRE FEED UNIT CONTROL PANEL

Operations of wire feeder panel (Continued)

Following on from the previous page:

8) Speed balance: This option fine-tune the wire feed speed of the lower to maintain the speed consistency when running double wires. The value is within the range of -10 ~ 10cm/min and generally set to 0.
9) System version: Records the hardware and software versions of the equipment. The system version be provided to technical personnel for after-sales service.
10) Communication status: The communication status between standard control panels. When the system is setup and working correctly 'synced' is displayed. In case of a failure 'not synced' is displayed indicating that the lower motor is not setup correctly, connected or faulty.
11) Language: Indicates which language is currently set. Pressing this option allows you to change the language. The standard version includes eight languages which includes: English, Chinese, Traditional Chinese, Japanese, Korean, Russian, German, French and Latin.
12) Save: Save option that will save your chosen parameters settings. After modifying the parameters, press the Save button. If you do not press the save option then the previously set (saved) parameters will be automatically restored after the machine is powered off and restarted.
13) Return button: Pressing this screen button will return you to the home screen.

When 'pulse mode' has been selected rather than 'continuous mode' you will see a couple of additional parameters as described below:

14) Pulse specific parameters: You will now note that pulse cycle (period) and Smoothness are now displayed but these parameters and cannot be adjusted/modified.
15) When Pulse is selected, 'Average speed' is now shown rather than 'feeding speed'. Average speed means the overall wire feed speed in a pulse period. The "average speed" is not affected by the "pulse cycle" (period) and "smoothness". The value is within the range of 15 ~ 150cm/min and is generally set to 60 cm/min. You can touch on average speed number (shown as 60) to input a number through the pop up keyboard.

OPERATION OF THE DUAL WIRE FEED UNIT CONTROL PANEL

Operations of wire feeder panel (Continued)

To access the above screen, pressing the setting option which will take you to the parameter settings screen as shown above.

1) Average speed: it calculated as speed wire feed speed in a pulse period. The "average speed" is not affected by the "pulse period" and "smoothness". The value is within the range of 15-150cm/min and generally set to 60 cm/min. You can press "Number" to then input a value (number) of you through the keyboard, or quickly adjust the value with the "Arrow". Note: Average Speed is not equal to the manual wire feed Speed.
2) Pulse cycle (period): Controls the size of a single 'fish-scale' pattern. The longer the period, the larger a single fish-scale is . The value is within the range of 100 ~ 1000ms and generally set to 500ms.
3) Smoothness: Controls the interval between two fish-scale patterns. The smaller the value, the more obvious the overall effect. The value is within the range of 25% ~ 80% and is generally set to 30.
4) Withdrawal length: Controls the length of the wire drawn back during [Wire breaking] and is used to help break the wire. The value is within the range of 0 ~ 100 mm and generally set to 10, which can be increased according to the diameter of the welding wire and the length of the wire feeding tube.
5) Wire replenishment (supplement) length: Controls the wire replenishment length after the wire feeder draws back the 'broken wire' and compensates the effect of the 'withdrawal length' and maintain the consistency of the joint at the next welding. The value range is 0 ~ 100 mm and in principle, the value must be the same as the 'withdrawal length'. If the resistance of the wire feeding tube is large, the value can also be larger than the 'withdrawal length'.
6) Wire replenishment (supplement) delay: Controls the interval time between wire replenishment and withdrawn broken wire by the wire feeder during 'wire breaking' to prevent the wire from being bonded to the weld seam for the second time due to premature replenishment, thus improving the wire breaking effect. The value is within the range of 0 ~ 2000ms, and generally is set to 0.

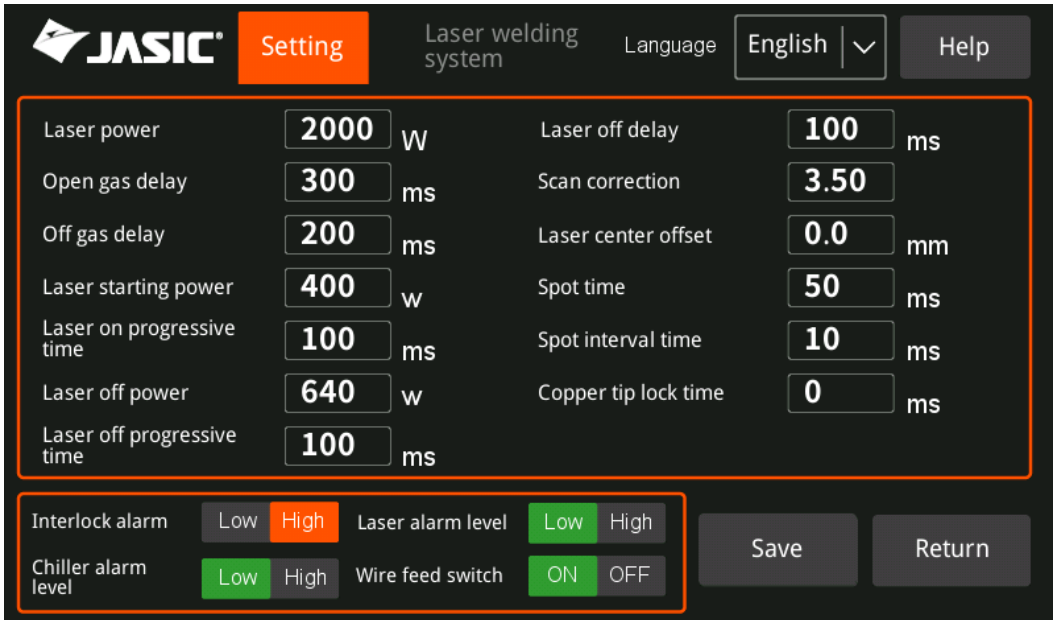
Please Note:

The manual wire feed/withdrawal speed, start delay and wire-supplementing delay in Pulse mode are the same as in continuous mode and usually do not need to be modified, hence no separate adjustment buttons.

DESCRIPTION OF WELDING CONTROLS - LS-15000F AND LS-20000F

WELDING MODE

Settings interface of welding mode



The screen image above shows the welding mode interface information and to access this interface screen, click on the Device Authorization to enter the authorization time, you will be required to manually input the password (123456) and the below offer you an insight into the parameter functions shown.

- **Laser power:** refers to the maximum power of the laser used and the setting corresponds to the machine model.
- **The gas switch-on/off delay:** this time is 200ms by default, and the range is 0ms ~ 3000ms and refers to the pre-gas flow time after triggering signal before laser coming out welding
- **Off gas delay:** post-gas flow time after releasing torch trigger.
- **Laser starting power:** refers to the initial power of laser output, which is the proportion of the set welding power.
- **Light on progressive time:** refers to up-slope time when the light on power slowly rises to the peak power.
- **Laser off power:** refers to the proportion of power that the laser is turned off at the end of welding.
- **Laser off progressive time:** refers to down-slope time for the peak power to slowly decrease to the laser off power when releasing trigger.
- **Welding wire delay:** The time for a section of wire to remain out after the torch is released. (Default value, no need to adjust)
- **Scan Correction:** Default setting "3.5". If decreasing this value, the width of red light is smaller than the set scan width. If set to 0, the red light has only one point.
- **Laser Centre Offset:** The red light is offset from the centre of the wire. If the red light is offset to the right and needs to be adjusted to the left, set a positive number; if the red light is offset to the left and needs to be adjusted to the right, set a negative number.
- **Spot welding type:** Fish scale and continuous, just select Continuous mode when welding.
- **Spot Welding Duration:** This parameter will work only when "Spot Welding" function is selected on the home screen. It refers to the time of light output when spot welding.
- **Spot Welding Interval :** Select "Spot Welding" function on the home screen, this parameter setting will work. This refers to the welding of a point after the end of welding, laser shutdown, after a certain interval and then out of the laser welding.
- **System language:** If you need to switch the language, click the language bar to switch.
- **Other parameters:** default value, no need to change. After all the parameters are set, click save first, and then return. For more information, click "Help".

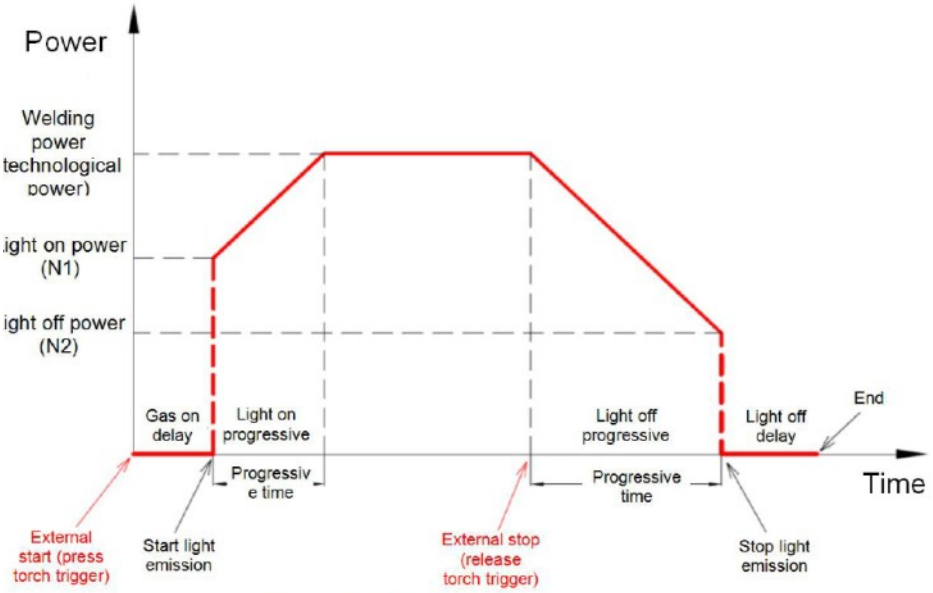
DESCRIPTION OF WELDING CONTROLS - LS-15000F AND LS-20000F

WELDING MODE

Settings interface of welding mode (continued)

Following on from the previous page.

When turning on the light, the light-on power gradually rises from N1% of technological power to the welding technological power; when turning off the light, the light-off power gradually reduces from the technological power to N2% of technological power, as shown in the figure below:



4) Wire feed delay compensation, i.e., the wire feed advance time relative to the light emitting signal, can be used in conjunction with the withdrawal function.
5) The maximum threshold value of the temperature alarm is 70°C. When the value is set to 0, no temperature alarm is detected.
6) Scan correction coefficient = target line width/measurement line width, which is within a range of 0.01 ~ 4. Generally set to 1.
7) The laser centre offset is -3~3 mm, decreasing to the left, increasing to the right.

Normal red light

Offset red light

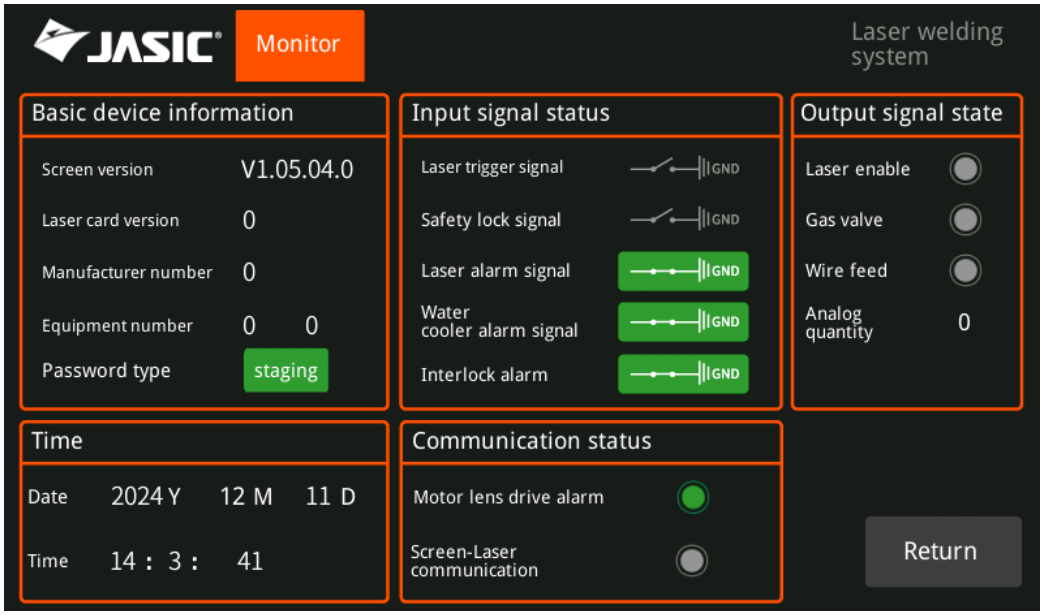
8) The spot welding duration is the light emission time when the trigger is pressed. Even if the trigger is released, the light will still be emitted according to the emission time.
9) The spot welding interval time is the light stopping time between two spot welds after the trigger is pressed.
10) The alarm level signal is set by default, masking alarm can directly change to the corresponding level detection.
11) Click the HELP button on the top right to get more description of relevant parameters.

DESCRIPTION OF WELDING CONTROLS - LS-15000F AND LS-20000F

WELDING MODE

Monitoring interface of welding mode

The below image is the interface displaying the status of each detection signal and device information. Click on the Device Authorization to enter the authorization time interface. After entering the password, the system can be authorized for the available time of use. The authorization encryption and decryption methods are the same.



Monitoring screen description: Machine does not need to be operating to see data.

Input signal status:
Laser trigger signal: signal closed when torch switch is pressed, torch released to disconnect.
Safety lock signal: Signal closes when earth clamp is clamped on the workpiece and the torch head touches the workpiece. Disconnect when earth wire and torch do not form a circuit.
Laser alarm signal: When the laser is faulty, the signal is closed and disconnected in normal working condition.
Water cooler alarm signal: not enabled.
Air pressure alarm signal: not enabled.
Galvanmeter drive alarm: The normal working status indicator light is constantly on.
Touch screen - Laser communication card: The normal working status indicator light is constantly on.

Output signal status:
PWM signal: Power supply voltage 24V, if there is no voltage will not come out of the laser.
Laser enable: Welding close to the power supply voltage 24V, if there is no voltage will not come out of the laser.
Analog voltage: Welding voltage is greater than 0V, less than or equal to 10V, (0-10V), according to the setting of the peak power size, the welding voltage also becomes bigger or smaller. If there is no voltage, the laser will not come out.
Gas valve/Wire feeding enable signal: Will be green when working normally.
To lock up being: 15ms, when the ground contact workpiece is not very good, the ground lock anti-shake can be set smaller, try to set 50ms or less.
Equipment authorization: Factory setting is "long-term effective", if it expired, contact the manufacturer to open the authority.
System version: It shows the version number of the control box.

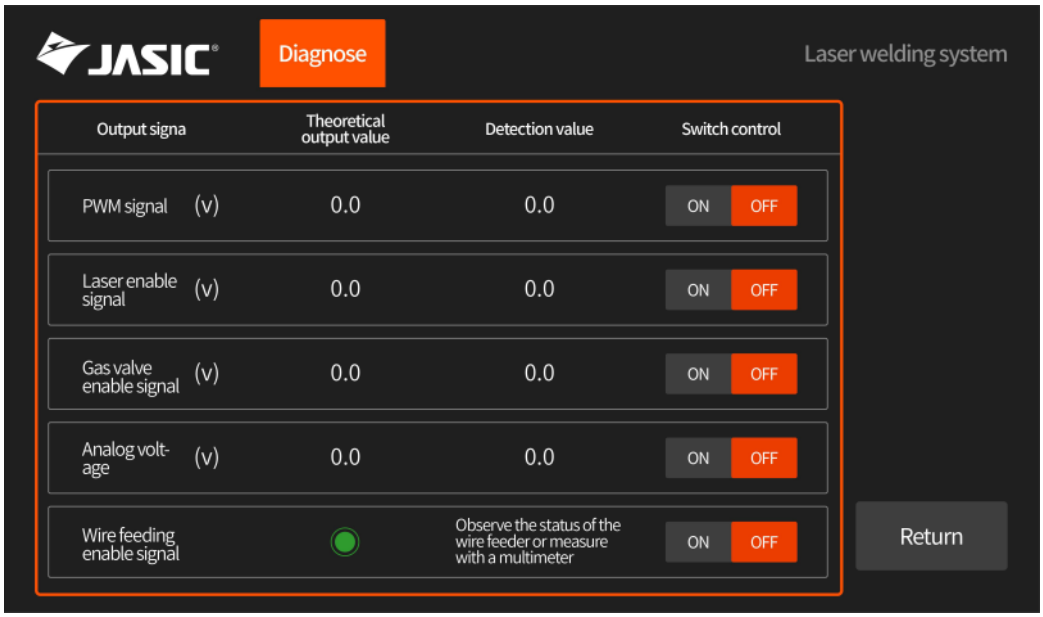
DESCRIPTION OF WELDING CONTROLS - LS-15000F AND LS-20000F

WELDING MODE

Diagnostic interface

The below image shows the screen set to the diagnostic mode

You can click the diagnostic button on the detection interface to enter the diagnostic interface.



The above shown diagnostic interface is used to confirm whether each signal port has an output.

Usually, the output value is the same as the detection value. In case of any inconsistency between the output value and detection value, indicate that the load is abnormal.
When the laser does not emit any light, you can confirm by operating a single port and using the laser monitoring software or a multi-meter for measurement whether the signal is present and sent.

DESCRIPTION OF WELDING CONTROLS - LS-15000F AND LS-20000F

WELDING MODE

Recommended technical parameters

The below technical references are based on the actual data although please note that the following list is for reference only.

Material	Thickness (mm)	Welding Wire Diameter (mm)	Laser Power (W)	Weave Width (mm)	Wire Feed Speed (cm/min)
Stainless Steel Carbon Steel	0.5	0.8	250 ~ 350	1.4± 0.2	60 ~ 80
Stainless Steel Carbon Steel	1	0.8, 1.0 & 1.2	350 ~ 780	2.5± 0.6	60 ~ 80
Stainless Steel Carbon Steel	1.5	0.8, 1.0 & 1.2	400 ~ 780	2.5± 0.6	60 ~ 80
Stainless Steel Carbon Steel	2	0.8, 1.0 & 1.2	450 ~ 1000	2.5± 0.6	60 ~ 80
Stainless Steel Carbon Steel	2.5	1.0 & 1.2	500 ~ 1500	3± 0.4	40 ~ 80
Stainless Steel Carbon Steel	3	1.0 & 1.2	700 ~ 1500	3± 0.4	40 ~ 80
Stainless Steel Carbon Steel	4	1.0 & 1.2	700 ~ 1500	3± 0.4	40 ~ 80
Stainless Steel Carbon Steel	5	1.6	1200 ~ 1700	3.5± 0.4	40 ~ 60
Stainless Steel Carbon Steel	6	1.6	1200 ~ 2000	3.5± 0.4	40 ~ 60
Stainless Steel Carbon Steel	6	1.6	2000 ~ 3000	4.5± 0.4	40 ~ 60
Stainless Steel Carbon Steel	6	1.6	2000 ~ 3000	5± 0.4 (double wire)	40 ~ 60
Aluminium	1	1.0 & 1.2	700 ~ 900	2.5± 0.5	50 ~ 70
Aluminium	1.5	1.0 & 1.2	750 ~ 950	2.5± 0.5	50 ~ 70
Aluminium	2	1.0 & 1.2	800 ~ 1000	2.5± 0.5	50 ~ 70
Aluminium	2.5	1.0 & 1.2	800 ~ 1100	2.5± 0.5	50 ~ 70
Aluminium	3	1.0 & 1.2	1000 ~ 1300	2.5± 0.5	50 ~ 70
Aluminium	4	1.0 & 1.2	1000 ~ 1500	2.5± 0.5	50 ~ 70
Aluminium	5	1.2	1000 ~ 1500	2.5± 0.5	50 ~ 70
Aluminium	6	1.2	1000 ~ 1500	2.5± 0.5	50 ~ 70

Please Note:
Default scanning speed: 300~500 mm/s; default duty cycle: 100%; default laser frequency: 2000 Hz.
Aluminium welding wire material: ER5356.

DESCRIPTION OF CLEANING CONTROLS - LS-15000F AND LS-20000F

CLEANING MODE

To simplify the control panel cleaning operation, we have divided the control into four parts, including home screen, technology, settings, and monitoring.

Home interface of touch screen

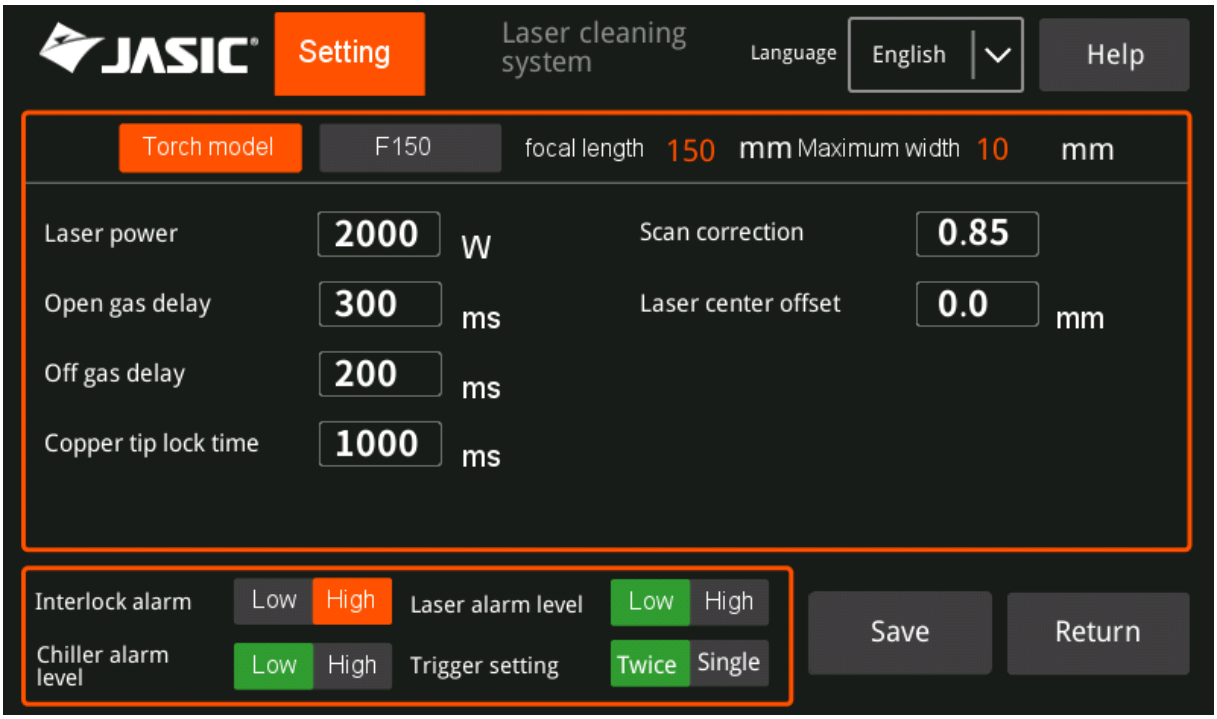
Cleaning width depends on specification of focusing lens.（F150, Max scan width 10mm，F600, Max scan width 80mm）Frequency:50Hz to 100 Hz is recommended for cleaning. 300-500mm/s recommended for welding, When welding, will approach to 24V power supply voltage. if not, there will no laser emitted. Without secure lock.

1) This interface shows the current cleaning technical parameter setup (which cannot be modified in this interface) and real-time alarm information.
2) When the enable is turned off, no enable signal will be sent to the laser, which can be used to test the gas outlet function. Turn off the red light indication and the motor stops working. At this point, the red light is a point, which is used to adjust the canter position.
3) Press the button in the upper right corner to switch between cleaning modes

DESCRIPTION OF CLEANING CONTROLS - LS-15000F AND LS-20000F

CLEANING MODE

Technology interface of cleaning mode



The technical interface contains the debugged technical parameters, which can be modified by clicking the (red) box. After the modification, click OK to save it. Click Import to import the technical parameters for use (Modify - Save - Import).

- 1, click on the corresponding data field, set the corresponding values.
- 2, then click "Import", "Save", "Return".

Commonly used process parameter group: It can be used to save the welding process parameters, which is convenient to retrieve and use directly when using.

1) The scanning frequency range is 10-100mm and the scanning width range is 0~30mm. (When the F800 focal lens is used, the maximum width is 120mm. When an F150 focal lens is used, the maximum width is 30mm).
2) The peak power should be less than or equal to the laser power on the parameter screen.
   Please Note: If the laser power is 1000W, this value should not exceed 1000.
3) The duty cycle range is 0~100 (100 by default, usually no changes are needed).
4) The suggested pulse frequency range is 5-5000Hz (2000 by default, which is usually not changed).
5) Click the “Help” button at the top right position to get more description of relevant parameters.
6) After modifying the parameters, you can check whether the import is successful on the home screen.

DESCRIPTION OF CLEANING CONTROLS - LS-15000F AND LS-20000F

CLEANING MODE

Setting interface of cleaning mode

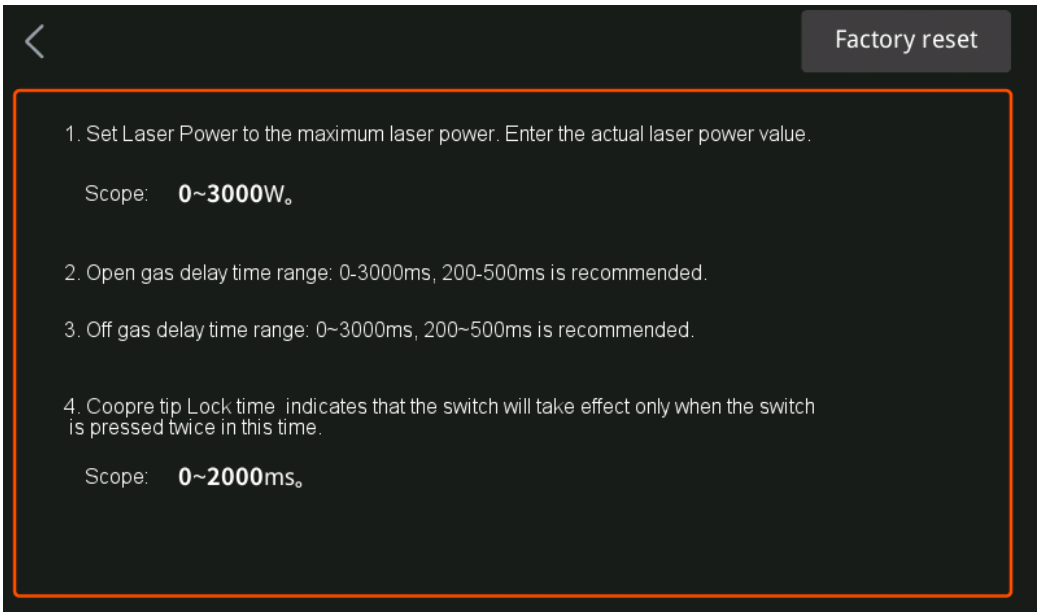
The screen image above shows the welding mode interface information and to access this interface screen, click on the Device Authorization to enter the authorization time, you will be required to manually input the password (123456) and the below offer you an insight into the parameter functions shown.

1) Laser cleaning power is the maximum power of the laser used.
2) Gas switching delay time is 200ms by default, and the range is 200ms -3000ms.
3) When the light is turned on, the power gradually rises from N1 to 100%.
   When the light is turned off, the power gradually reduces from 100% to N2, as shown in Figure 3-4.
   The higher the power, the lower the recommended light-on power.
   The light-on power should usually not exceed 50%, as excessive light-on power can greatly reduce the service life of the lens.
4) The maximum threshold value of temperature alarm is 65°C. When the value is set to 0, the temperature alarm is not detected.
5) The range of scan correction coefficient is 0.01 ~ 4 and the coefficient target line width/measured line width is 1.0 by default.
6) The laser centre offset range is -75 ~ 75mm. The offset value decreases to the left and increases to the right. This parameter is used to adjust the red light centre.
7) The alarm level signal of the air pressure/water cooler/laser is low level by default.
   When this alarm signal is used, it will be changed to the high level if an external air pressure alarm is installed. Otherwise, an abnormal alarm will appear. The same is true of other alarm signals.
8) Click the "Language" button to switch to another language in the language selection bar. Currently, the standard version supports nineteen languages.

DESCRIPTION OF CLEANING CONTROLS - LS-15000F AND LS-20000F

CLEANING MODE

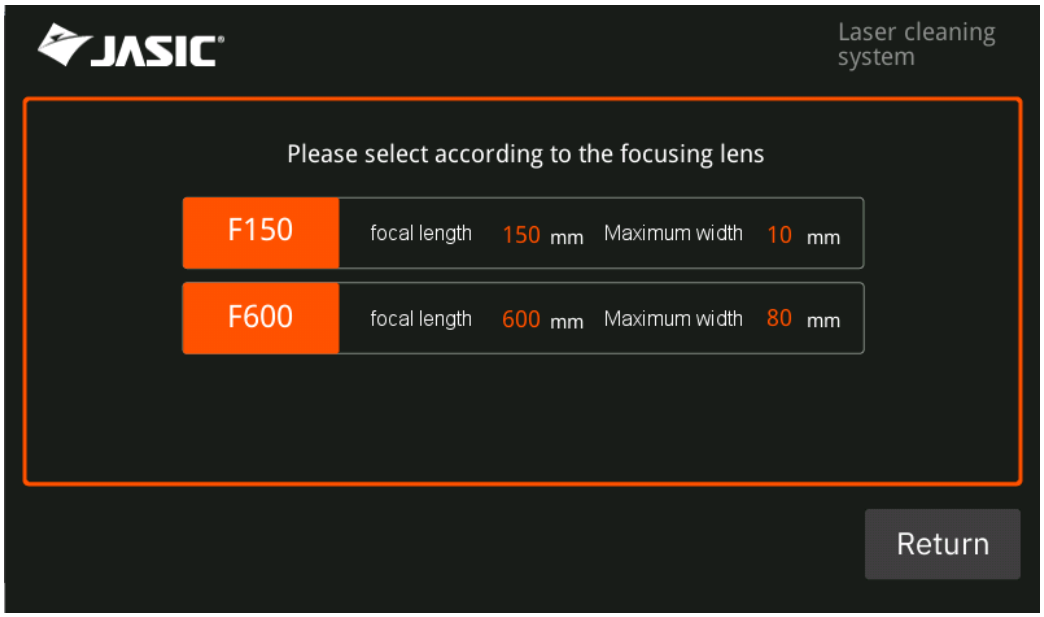
Setting interface of cleaning mode (continued)



9) Click "Help" in the upper right corner to enter the Help screen of the settings interface, and press and hold "Restore Factory Settings" to restore the setting parameters to the factory status. Press and hold "Save as Factory Settings" to modify factory parameter

Selection interface of focal lens

10) Click the "Torch body model" and select the maximum scanning width in terms of the focal lens.

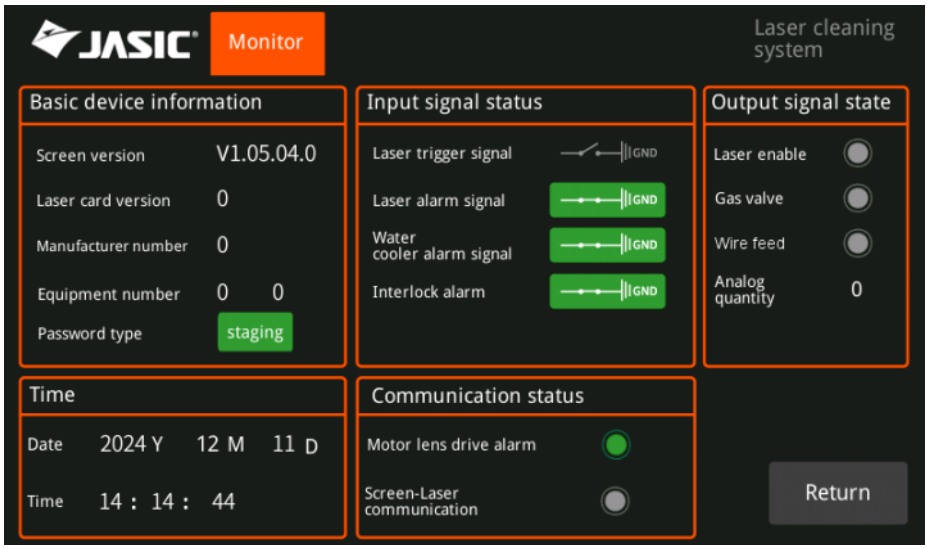


Gun head model, click to enter and select according to the focusing lens model
F150: Max scanning width 10mm
F600: Max scanning width 80mm
Trigger setting: It is recommended to set "double click" -continuously press twice to make the gun emit laser. If sets "CII", when accidentally touch the switch button during use may cause laser to emit, posing a safety hazard.

DESCRIPTION OF CLEANING CONTROLS - LS-15000F AND LS-20000F

CLEANING MODE

Monitoring interface of cleaning mode



This screen displays the status of each signal and device information.

- Laser trigger signal: When the trigger is pressed, this state changes from grey to green.
- Laser/water cooler/air pressure alarm signal: is used to monitor its set high or low level.
- The output signal is displayed in the middle of the screen, and when the signal is output, it changes from grey to green.

Device authorization: You can authorize the use duration of the device. If the device is used for a time period longer than its set time, the authorization will be terminated.

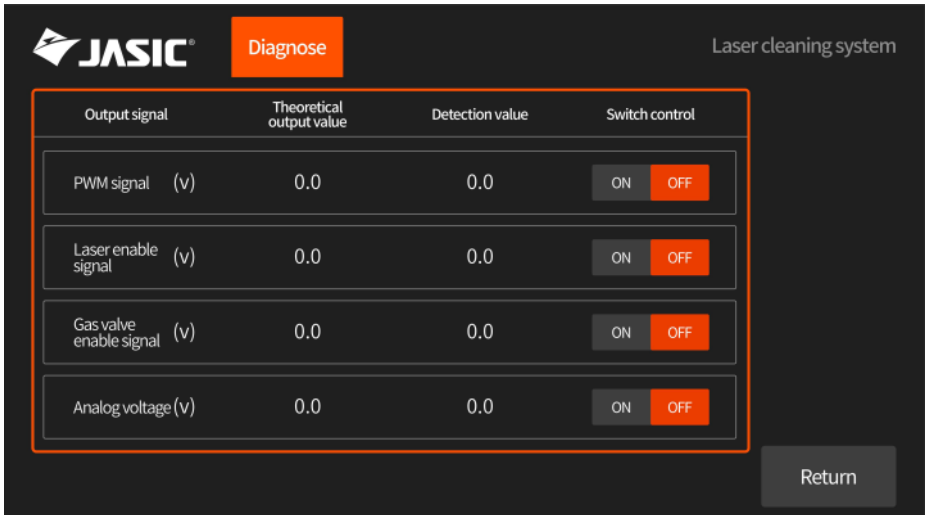
System version: Three groups of numbers, the first group indicates the hardware version, the second group indicates the program version of the single-chip microcomputer, and the third group indicates the touch screen version.

Diagnostic interface of cleaning mode

Pressing the Diagnostic button will enter you into the diagnostic interface screen which displays various information of the machine.

Please Note: On this screen, the laser will not emit any light.

The "switch control" can be used to independently output "PWM", "laser enablement", "gas valve enable", and "analog quantity". By comparing the detection value with the theoretical value, you can determine whether the control box function is normal.



MAINTENANCE

The following operation requires sufficient professional knowledge on electric aspects and comprehensive safety knowledge. Make sure the input cable of the machine is disconnected from the electricity supply and wait for 5 minutes before removing the machine covers.

In order to guarantee that the arc welding machine works efficiently and in safety, it must be maintained regularly. Operators should understand the maintenance methods and means of arc welding machine operation. This guide should enable customers to carry out simple examination and safeguarding by oneself, try to reduce the fault rate and repair times of the arc welding machine, so as to lengthen service life of arc welding machines.

Period	**Maintenance item**
Daily examination	Check the condition of the machine, mains cables, welding cables, connections and coolant levels. Check for any warning error codes and machine operation issues.
Monthly examination	Disconnect from the mains supply and wait for at least 5 minutes before removing the cover. Check the machine external & internal connections and tighten if required. Clean the inside of the machine with a soft brush and vacuum cleaner. Take care not to remove any cables or cause damage to components. Ensure that ventilation grills are clear. Carefully replace the covers and test the unit. **This work should be carried out by a suitably qualified competent person.**
Yearly examination	Carry out an annual service to include a safety check in accordance with the manufacturers standards. **This work should be carried out by a suitably qualified competent person.**

SERIAL NUMBER ID

All Jasic machines have a 22 or 24 digit serial number as well as the Wilkinson Star AA/AB ID code.
Digit 1 & 2 signify machine size
Digit 3, 4 & 5 signify production date details (year, month and date) as follows:

Digit 3 - Year Code		Digit 4 - Month Code		Digit 5 - Date Code		Digit 5 - Date Code	
A	2020	1	January	1	1	H	17
B	2021	2	February	2	2	I	18
C	2022	3	March	3	3	J	19
D	2023	4	April	4	4	K	20
E	2024	5	May	5	5	L	21
F	2025	6	June	6	6	M	22
G	2026	7	July	7	7	N	23
H	2027	8	August	8	8	O	24
I	2028	9	September	9	9	P	25
		10*	October	A	10	Q	26
		11*	November	B	11	R	27
		12*	December	C	12	S	28
				D	13	T	29
				E	14	U	30
				F	15	V	31
				G	16		

MAINTENANCE

The following operation requires sufficient professional knowledge on electric aspects and comprehensive safety knowledge. Make sure the input cable of the machine is disconnected from the electricity supply and wait for 5 minutes before removing the machine covers.

Maintenance of the water cooler

The main function of the water cooler is to cool the laser and welding head, so that the laser and welding head can maintain in a constant temperature working condition. Therefore, proper and regular maintenance is the key to ensure the normal work of the machine. At the same time, the circulating water of the water cooler must use distilled water.

Due to the water quality problems, there are still certain minerals, dust and other impurities in the circulating water, and the dust in the environment may also enter the circulating water in some operation links. The deposition of these impurities can lead to the blockage of water systems (such as metal filter, welding head, laser, QBH), which can seriously affect the welding results or even burn out the optical components. The accumulation of dust and other debris in the environment on the radiator and water pump of water cooler will lead to poor heat dissipation, resulting in poor cooling, burned compressor, or burned water pump, which will also directly affect the welding results or cause the machine not to work. Therefore, the daily maintenance of the water cooler is particularly important.

Please refer to the maintenance instructions for water cooler and regularly maintain the cooling system of the laser welder (cleaning machine).

Period	**Maintenance item**	Comment
Daily examination	1. Check whether the temperature setting of the water cooler is normal, set temperature: 25 ± 1°C.	Ensure that the temperature of the cooling water supplied to the laser is normal.
	2. Check whether the water circuit seal, water temperature and water pressure of the water cooler meet the requirements.	Ensure proper operation of the equipment and prevent water leakage.
	3. Keep the working environment of the water cooler dry, clean and ventilated.	Contribute to the proper operation of the water cooler.
Monthly examination	1. Remove the dirt on the surface of the water cooler with neutral cleaner or high quality soap. Do not clean the system with benzene, acid, abrasive powder, steel brush, or hot water.	Ensure that the surface of the water cooler is clean.
	2. Check the condenser is not blocked by dirt. Please use dry compressed air or brush to remove the dust from the condenser.	Ensure the normal operation of the condenser.
	3. You can use clean vacuum cleaner, air gun and brush to remove the dust on the filter. After cleaning, if the filter is wet, please shake it to dry and then install it back.	Prevent poor heat dissipation from causing poor cooling, and burning out the water pump and compressor.
	4. Check the water quality of the tank and replace as required.	Good water quality will ensure the normal function of the cooler and the laser .
	5. Replace the cooling water (distilled or purified water) operation of the laser. and clean the metal parts of the water tank and water circuit.	Good water quality can ensure the normal function of the cooler and the laser.
Quarterly examination	1. Check electrical parts (such as switches, terminals, etc.) and wipe clean with a dry rag.	Ensure that the surface of the electrical parts of the water cooler is clean to extend the service life.
	2. When the machine is used in winter, replace the antifreeze and clean the metal parts of the water tank and water circuit.	Ensure that the laser operates normally.

MAINTENANCE

The following operation requires sufficient professional knowledge on electric aspects and comprehensive safety knowledge. Make sure the input cable of the machine is disconnected from the electricity supply and wait for 5 minutes before removing the machine covers.

Maintenance of the water cooler

Precautions:
Cooling water should be deionized or distilled water, and tap water is strictly prohibited.
The cooling water and filter element of the water cooler should be replaced regularly every month.
Adding 5% -10% anhydrous alcohol to the water cooler can effectively prevent the production of micro organisms in the water, thus making the product more reliable.

When the laser is used in summer, pure water should be used as the cooling water to protect the water circuit of the water cooler from corrosion resulted from long-term use of the antifreeze.

When the laser is used in winter with an ambient temperature below 7°C, it is required to protect the internal water circuit of the laser and the water cooler from being frozen. An appropriate amount of antifreeze should be added to the cooling water for protection.
The freezing point of the antifreeze must be 5°C lower than the minimum ambient temperature

Any moisture/The water inside the equipment and QBH should be emptied in a timely manner before the machine is out of service for a long period. Otherwise, any moisture/water remained in the equipment for a long period may cause damage to the laser.
When any excess moisture/water inside the QBH is drained, the air pressure must be less than 0.1Mpa. Excessive air pressure should be avoided to protect the optical fibre from being damaged.

When the laser is used in summer, it is required to prevent any internal condensation. Once the cooling temperature of the water cooler drops below the dew point of the laser's internal environment, the moisture in the air will be condensed onto the electrical and optical modules.
If no measures are taken, the moisture will be condensed on the outer surface of the laser.
Once the condensation is visible on the laser housing, it indicates that the moisture is already condensed in the laser. In this case, the machine should be powered off and stopped, and the working environment of the laser should be improved.

To reduce the risk of condensation, connect the clean and dry compressed air line from the CDA on the back panel of the laser and inject the clean and dry compressed air into the inside of the laser. The air pressure should be kept at 0.1MPa. It is prohibited to use the compressed air containing water or oil.

To reduce the rick of dust entering the laser torch head, always use masking tape to cover any exposed internal areas when stripping down and remove lens holders etc.

Performing any maintenance on the laser or the laser torch should always be carried out in a clean area away from the workshop area where dirt/dust is present.

MAINTENANCE

The following operation requires sufficient professional knowledge on electric aspects and comprehensive safety knowledge. Make sure the input cable of the machine is disconnected from the electricity supply and wait for 5 minutes before removing the machine covers.

Maintenance and replacement of the protective lens and focal lens

The protective lens of the welding torch head needs regular maintenance and wiping to avoid dust or stains. If there is debris on the surface of the lens, it will affect the light emission and lead to a decrease in welding performance, or even burn the lens.

Tools required

- Rubber gloves or finger clots
- Lens cleaning cloth
- Non-woven cotton swab
- Masking tape (width: 5 cm)
- Anhydrous ethanol (purity ≥ 99%)

Please Note:

- Please perform lens maintenance or replacement in a dust-free environment!
- Do not touch the surface of the protective lenses with your fingers!
- Do not blow debris on the surface of the lens with your mouth!
- If the white energized sealing ring under the lens is scratched or deformed, it must be replaced immediately!

Operation steps

1. Turn off the power supply to the laser machine.
2. Wear rubber gloves or finger cots, open the lens protection cover, and take out the protective lens base.
3. Immediately close off the lens protection cover using masking tape to prevent the dust from entering into the device.
4. Wipe the surface of the protective lens with a cotton swab dipped with some anhydrous ethanol.
5. If damaged lenses are found, replace them timely with new ones.
6. Install the protective lens bracket into the welding head, pay attention to the installation direction, and close the lens protection cover.

A:
Prior to carrying out any maintenance of the laser torch, prepare the cotton swabs, gloves or finger cots (depending on your preference) anhydrous ethanol and masking tape.

MAINTENANCE

The following operation requires sufficient professional knowledge on electric aspects and comprehensive safety knowledge. Make sure the input cable of the machine is disconnected from the electricity supply and wait for 5 minutes before removing the machine covers.

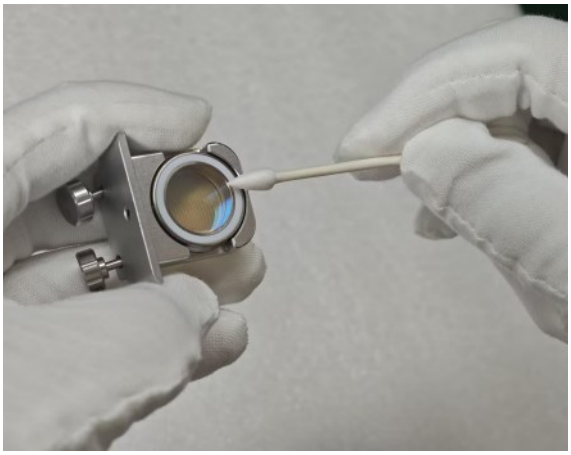
Maintenance and replacement of the front protective lens

B.
Unscrew the 2 screws, take out the protective lens holder, and seal the protective lens window with masking paper to prevent dust from having access into the device.

Please Note:

- Upon removing the protective lens base, immediately place masking tape over the now exposed area to stop dust from entering to laser torch.
- Protective lenses are flat on both sides, so you cannot fit them the wrong way round.

C.
Using the cotton buds, wipe the front and back of the lens, sealing ring and seat with alcohol.



D.
If any damage is noted on the lens, then replace with a new protective lens.

Please Note: Protective lenses are flat lenses on both sides, so you cannot fit them the wrong was round.

Once cleaned/replaced, place the sealing ring back into the protective lens seat, removing the protective masking tape and then refit back into the gun and tighten the screws back in place.

MAINTENANCE

The following operation requires sufficient professional knowledge on electric aspects and comprehensive safety knowledge. Make sure the input cable of the machine is disconnected from the electricity supply and wait for 5 minutes before removing the machine covers.

Maintenance and replacement of the focal lens and the 2nd protective lens

E.

Use a small Allen key to unscrew the two screws in the image left.

F.

Carefully remove the lens holder as shown right which shows the focal lens which is mounted toward the rear of the holder. On the reverse side of the holder is the 2nd protective lens mounted on the front side of this lens holder.

Please Note:

Upon removing the focal lens base, place masking tape over the now exposed area to stop dust from entering into laser torch.

Shown above is the focal lens being carefully cleaned with a cotton bud.

G.

Once the focal lens base is removed, check the lens for damage, then turn the holder around and remove the 2nd protective lens, again check for damage.

Using the cotton buds, wipe the front and back of the lenses with alcohol. Pay attention to the front and back of the lens and the lens base during the installation. Prior to refitting the focal and 2nd protective lens, remove the protecting masking tape and fit the lens back correctly taking note of which direction the convex side of the focal

Please Note:

- The convex side of the focal lens faces the rear of the gun where the flat side faces the front end of the gun.
- The protective lens is flat on both sides, so you cannot fit it the wrong way round.

TROUBLESHOOTING

The following operation requires sufficient professional knowledge on electric aspects and comprehensive safety knowledge. Make sure the input cable of the machine is disconnected from the electricity supply and wait for 5 minutes before removing any machine covers.

The control display is also used for providing error messages to the user, if an error message is displayed, the power source may only function to a limited capacity and the cause of the error should be checked as soon as possible.
The below is a list of error codes for the Jasic hand held laser systems.

Fault Location	Fault Description	Possible Cause	Check
Power Source	No response after start up	The input voltage is low insufficient; the power cord is damaged or in poor contact; or the emergency stop button on the panel is pressed.	Ensure that the input voltage conforms to the requirements, the power cord is properly connected, and the emergency stop button is released.
Water Cooler	Water cooler overheat alarm	The internal coolant temperature exceeds the set value.	In case of overheat, please stop welding, disable the laser enablement button, and continue welding after the alarm is removed.
		Insufficient water level leads to overheat.	Check the coolant level of water cooler, which should be in the standard area.
Welding Torch	No light emission after pressing the torch trigger	The enablement button or the laser button on the display is not enabled; or the earth clamp is not clamped.	Enter the diagnosis interface, and check the various parameters, to ensure that all preparation signals are normal and the safety ground lock is connected.
		The permission to use the controller has expired.	Contact your supplier to provide a password for reactivation.
	Welding torch protective lens often burn out	The welding method is not correct, and the laser reflection causes damage to the lens.	The welding torch should be welded at 45 degrees to the plate, not perpendicular to plate.
		Parameter settings are incorrect during high-power welding.	During high-power welding, upslope and downslope parameters shall be enabled.
		The environment where the welder is located is too dusty and the lens is contaminated with dust, resulting in burnout.	The welding machine should be stored in a room with little dust, and the nozzle should be protected from dust when the welding torch is not in use.
	Laser weakened during welding	Damage to the protective lens causes the laser to fail to gather properly.	Replace the protective lens, check the cause of lens damage and avoid it.
	Brass nozzle burnt	Laser light is not in the center; or the focal length adjustment of the graded tube is not appropriate.	Check whether the red light emission position and spot size are normal. If the position is not right, adjust the red light; if the spot size is not appropriate, adjust the focal length of graded tube.

TROUBLESHOOTING

The following operation requires sufficient professional knowledge on electric aspects and comprehensive safety knowledge. Make sure the input cable of the machine is disconnected from the electricity supply and wait for 5 minutes before removing any machine covers.

The control display is also used for providing error messages to the user, if an error message is displayed, the power source may only function to a limited capacity and the cause of the error should be checked as soon as possible.
The below is a list of error codes for the Jasic hand held laser systems.

Fault Location	Fault Description	Possible Cause	Check
Wire Feeder	No wire feeding after pressing the torch trigger	The wire feeder is not connected to the welder or the signal cable is damaged.	Ensure that it is properly connected to the welder. If the signal cable is damaged, replace it.
		The wire conduit is blocked or knotted; the wire conduit is bent too small; or the pressure of the pinch roller is incorrect.	Straighten out the wire conduit to ensure smooth feeding, prevent the bending angle from being too small, and increase the pressure of the pinch roller.
	Unstable wire feed speed or unsmooth wire feeding	The wire conduit is blocked or knotted; the wire conduit is bent too small; or the pressure of the pinch roller is incorrect.	Straighten out the wire conduit to ensure smooth feeding, prevent the bending angle from being too small, and increase the pressure of the pinch roller.
		The wire feed roller does not match the welding wire model; or the wire feed roller is deformed or damaged.	Replace the wire feed roller.
		The welding parameters do not match the wire feed speed. Adjust the welding parameters or wire feed speed.	Adjust the welding parameters or wire feed speed.
		The wire conduit material or size does not match the welding wire.	Replace the wire conduit.

TROUBLESHOOTING - ERROR CODES - LASER POWER SOURCE

The following operation requires sufficient professional knowledge on electric aspects and comprehensive safety knowledge. Make sure the input cable of the machine is disconnected from the electricity supply and wait for 5 minutes before removing any machine covers.

The control display is also used for providing error messages to the user, if an error message is displayed, the power source may only function to a limited capacity and the cause of the error should be checked as soon as possible. The below is a list of error codes for the Jasic Laser hand held welding system

Error Code	Error Code Description	Error Code	Error Code Description
8	High humidity	55	Drive 5 over current
10	Water chiller fault	56	Drive 6 over current
11	Interlock fault	57	Drive 7 over current
12	QBH	58	Drive 8 over current
13	Emergency stop	60	Small module fault
14	Time locked up	61	3.3v high voltage fault
15	FPGA communication fault	62	5v high voltage fault
16	Hardware fault	63	12v high voltage fault
17	4G module not initiated	64	48v high voltage fault
18	Exorbitant input frequency	65	3.3v low voltage fault
21	PD1 fault	66	5v low voltage fault
22	PD2 fault	67	12v low voltage fault
23	PD3 fault	68	48v low voltage fault
24	PD4 fault	71	Over current protection
25	Three consecutive PD failures locked up	72	Fan fault
30	Temperature difference fault	73	Over voltage protection
31	Lower limit of temperature 1	74	Rectifier fault
32	Lower limit of temperature 2	75	Overheat
33	Lower limit of temperature 3	76	AC input fault
34	Lower limit of temperature 4	77	DC output fault
35	Upper limit of temperature 1	101	Drive 1 open circuit
36	Upper limit of temperature 2	102	Drive 2 open circuit
37	Upper limit of temperature 3	103	Drive 3 open circuit
38	Upper limit of temperature 4	104	Drive 4 open circuit
40	Drive 9 over current	105	Drive 5 open circuit
41	Drive 10 over current	106	Drive 6 open circuit
42	Drive 11 over current	107	Drive 7 open circuit
43	Drive 12 over current	108	Drive 8 open circuit
51	Drive 1 over current	109	Drive 9 open circuit
52	Drive 2 over current	110	Drive 10 open circuit
53	Drive 3 over current	111	Drive 11 open circuit
54	Drive 4 over current	112	Drive 12 open circuit

TROUBLESHOOTING - ERROR CODES - WATER CHILLER UNIT

The following operation requires sufficient professional knowledge on electric aspects and comprehensive safety knowledge. Make sure the input cable of the machine is disconnected from the electricity supply and wait for 5 minutes before removing any machine covers.

The water chiller unit display is also used for providing error messages to the user, if an error message is displayed, the power source may only function to a limited capacity and the cause of the error should be checked as soon as possible. The below is a list of error codes for the internal Jasic Laser water chiller.

Error Code	Operating Status	Sound	Troubleshooting Method
E1	Water low temperature over high alarm	✓	1. Detect whether the laser water circulation work 2. Ensure the fan, compressor is working 3. Detect whether the radiator is too dusty and need to dust 4. If the actual water temperature is not high, it is the low-temperature water temperature control probe failure, replace it.
E2	Water low temperature over low alarm	✓	1. Turn on the machine, don't use it until the temperature rises. 2. The fan, the compressor does not stop are the control board failure, replace it. 3. If the actual water temperature is not low, it is the low temperature water temperature control probe failure, replace it.
E3	High Temperature Water Temperature over high Alarm 	✓	1. Check the circulating water of torch head, if not work, test whether the torch and the water pipe is blocked. 2. The compressor, the fan does not work, you need to check whether they are energized. 3. Replace the water chiller control board. 4. If the actual water temperature is not high, it is the high temperature water temperature control probe failure, replace it.
E4	High Temperature Water Temperature Over Low Alarm	✓	1. Turn on the machine, don't use it until the temperature rises. 2. Fan, compressor does not stop are the control board failure, replace it. 3. If the actual water temperature is not low, it is the high temperature water temperature control probe failure, replace it.
E5	malfunction of the water temperature sensor at the low temperature end	✓	Water temperature is fine, replace the low temperature water temperature control probe
E6	malfunction of High Temperature Sensor	✓	Water temperature no problem, replace the high temperature water temperature control probe
E7	Switched Flow Alarm/Level Alarm	✓	1. Check whether the water pump is working 2. Check whether the water pipe circulating water and pressure is enough 3. Replace the liquid level flow switch
E8	Sensing Flow Alarm	✓	1. Check if the pump is working 2. Check if the water pipe circulating water and pressure is enough 3. Replace the sensing flow switch

WEEE disposal

The equipment is manufactured with materials which do not contain any toxic or poisonous materials dangerous to the operator.
When the equipment is scrapped, it should be dismantled separating components according to the type of materials.
Do not dispose of the equipment with normal waste. The European Directive 2002/96/EC and United Kingdom's Directive The Waste Electrical and Electronic Equipment (WEEE) regulations 2013 states that electrical equipment that has reached its end of life must be collected separately and returned to an environmentally compatible recycling facility.
Jasic has a relevant recycling system which is compliant and registered in the UK with the environment agency. Our registration reference is WEEMM3813AA.
In order to comply with WEEE regulations outside the UK you should contact your supplier.

RoHS Compliance Declaration

We herewith confirm, that the above mentioned product does not contain any of the restricted substances as listed in EU Directive 2011/65/EU and the UK directive ROHS Regulations 2012 in concentrations above the limits as specified therein.

Materials and their disposal

Welding equipment is manufactured with BSI published standards meeting CE requirements for materials which do not contain any toxic or poisonous materials dangerous to the operator. Do not dispose of the equipment with normal waste.

The European Directive 2012/19/EU on Waste Electrical and Electronic Equipment states that electrical equipment that has reached its end of life must be collected separately and returned to an environmentally compatible recycling facility for disposal.

Disclaimer:
Please note that this confirmation is given to the best of our present knowledge and belief.
Nothing herein represents and/or may be interpreted as warranty within the meaning of the applicable warranty law.

DECLARATION OF CONFORMITY

WILKINSON STAR

EU Declaration of Conformity

The manufacture or its legal representative Wilkinson Star Limited declares that the equipment listed described below is designed and produced according to the following EU directives:

Machinery Directive:	2006/42/EC
EMC Directive:	2014/30/EU
ROHS2.0:	2011/65/EU
	2015/863/EU

For the evaluation of the compliance with this Directives, the following standards were applied:

Safety Standards:	EN ISO 11553-2-2008
	EN ISO 11553-1:2020+A11:2020
	EN 60204-1:2018
	EN ISO 12100:2010
	EN 80825-1:2015
	EN 60825-4;2007
EMC Standards:	EN IEC 61000-6-2:2019
	EN IEC 61000-6-4:2019

Any alterations or change to these machines by any unauthorised person makes this declaration invalid.

Wilkinson Star Model	Jasic Model
Jasic Handheld Welding Laser LS-15000F	Jasic Laser LS-15000F
Jasic Handheld Welding Laser LS-20000F	Jasic Laser LS-20000F
Jasic Handheld Welding Laser LS-20000F-D	Jasic Laser LS-20000F

Authorised Representative
Wilkinson Star Limited
Shield Drive, Wardley Industrial Estate,
Worsley, Salford, M28 2WD.
Tel: +44 161 793 8127

Signature:

Dr John A Wilkinson OBE

Position: CHAIRMAN

Date: 11th February 2025

Company Stamp

Manufacture
Shenzhen Jasic Technology Co Ltd
No3 Qinglan, 1st Road,
Pingshan District,
Shenzhen, China.

Signature: Carmen Ye

Shenzhen Jasic Technology Co Ltd

Position: Deputy Director of INTL Business

Date: 11th Feb. 2025

Company Stamp

Authorized representative established within the EU: JTE S.R.L Via Fogazzaro CAP 36030 Calogno (VI) Vicenza Italy

STATEMENT OF WARRANTY

All new JASIC Laser welding systems are sold through our partner Wilkinson Star Limited within the United Kingdom and Ireland shall be warrantied to the original owner, non transferable, against failure due to defective materials or production.
The warranty period is 2 years following the date of purchase, we also recommend that you register your product online within 28 days of purchase.
The original invoice is documentation for the standard warranty period. The warranty period is based on a single shift pattern.

Defective units shall be repaired or replaced by the company at our workshop. The company may opt to refund the purchase price (less any costs and depreciation due to use and wear).
The company reserves the right to alter the warranty conditions at any time with effect for the future.

A prerequisite for the full warranty is that products are operated in accordance with the operating instructions supplied, observing the relevant installation and any legal requirements recommendations and guidelines and carrying out the maintenance instructions shown in the operator manual. This should be carried out by a suitably qualified competent person.

Warranty claims will only be accepted from authorised Jasic distributors and in the unlikely event of a problem this should be reported to the technical support team to review the claim.
The customer has no claim to loan or replacement products whilst repairs are being performed.

The following falls outside the scope of the warranty:

- Defects due to natural wear and tear
- Failure to observe the operating and maintenance instructions
- Connection to an incorrect or faulty mains supply
- Overloading during use
- Any modifications that are made to the product without the prior written consent
- Software errors due incorrect operation
- Any repairs that are carried out using non-approved spare parts
- Any transport or storage damage
- Direct or indirect damage as well as any loss of earnings are not covered under the warranty
- External damage such as fire or damage due to natural causes e.g. flooding
- Warranty repairs carried out by non-authorised Jasic distributors.

NOTE: Under the terms of the warranty, welding torches, their consumable parts, wire feed unit drive rolls and guide tubes, work return cables and clamps, electrode holders, connection and extension cables, mains and control leads, plugs, wheels, coolant etc. are covered with a 3 month warranty.

Jasic shall in no event be responsible for any third party expenses or expenses/costs or any indirect or consequential expenses/costs.

Jasic will submit an invoice for any repair work performed outside the scope of the warranty. A quotation for any non warranty will be raised prior to any repairs being carried out.

The decision about repair or replacement of the defective part(s) is made by Jasic. The replaced part(s) remain(s) Jasic property.

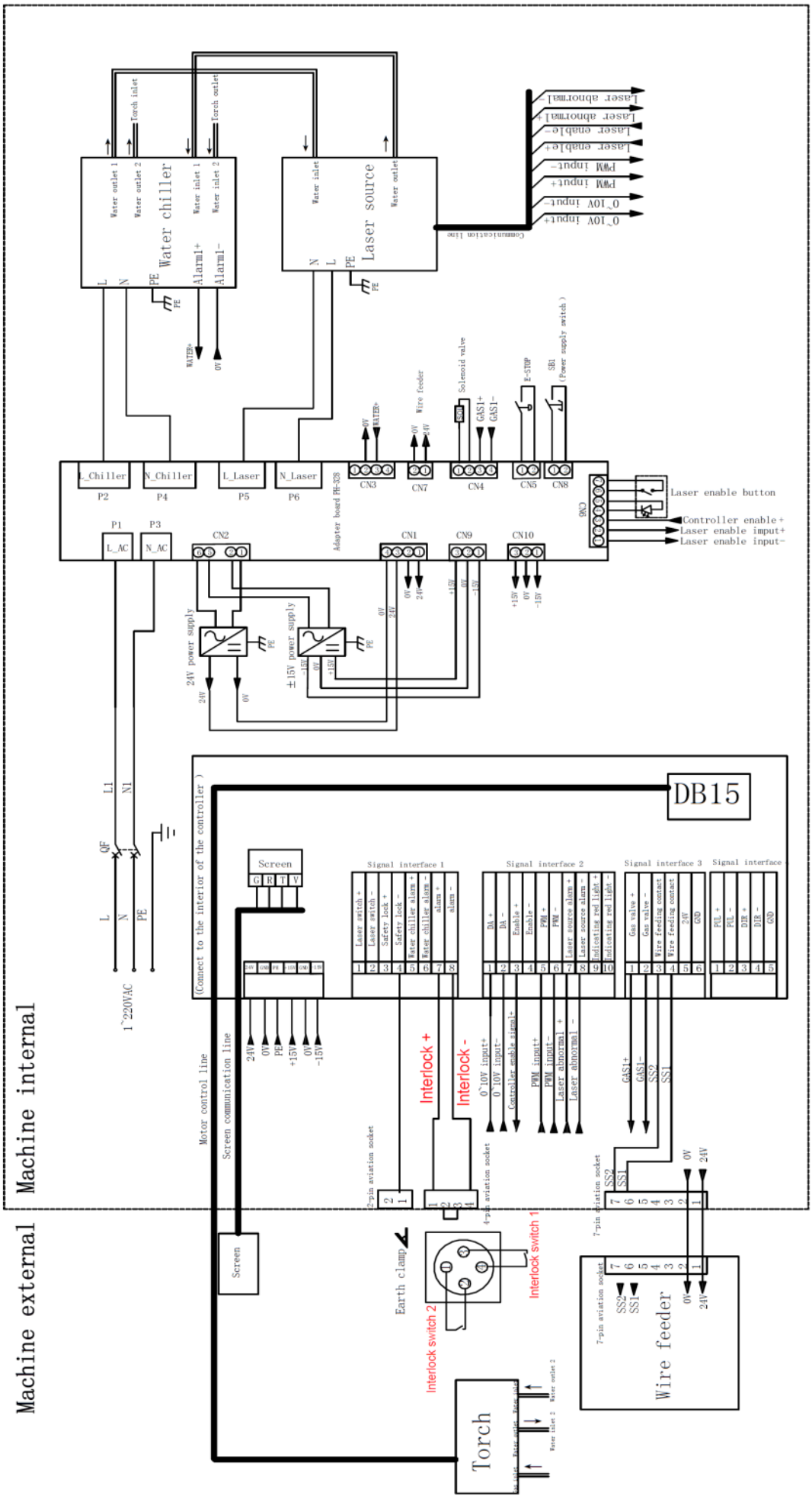
Warranty extends only to the machine, its accessories and parts contained inside. No other warranty is expressed or implied. No warranty is expressed or implied in regards to the fitness of the product for any particular application or use.

If in our judgment you fail, or we suspect that you have failed, to comply with any term or provision of the product warranty terms, we reserve the right to deny you access to our services (or any part thereof).

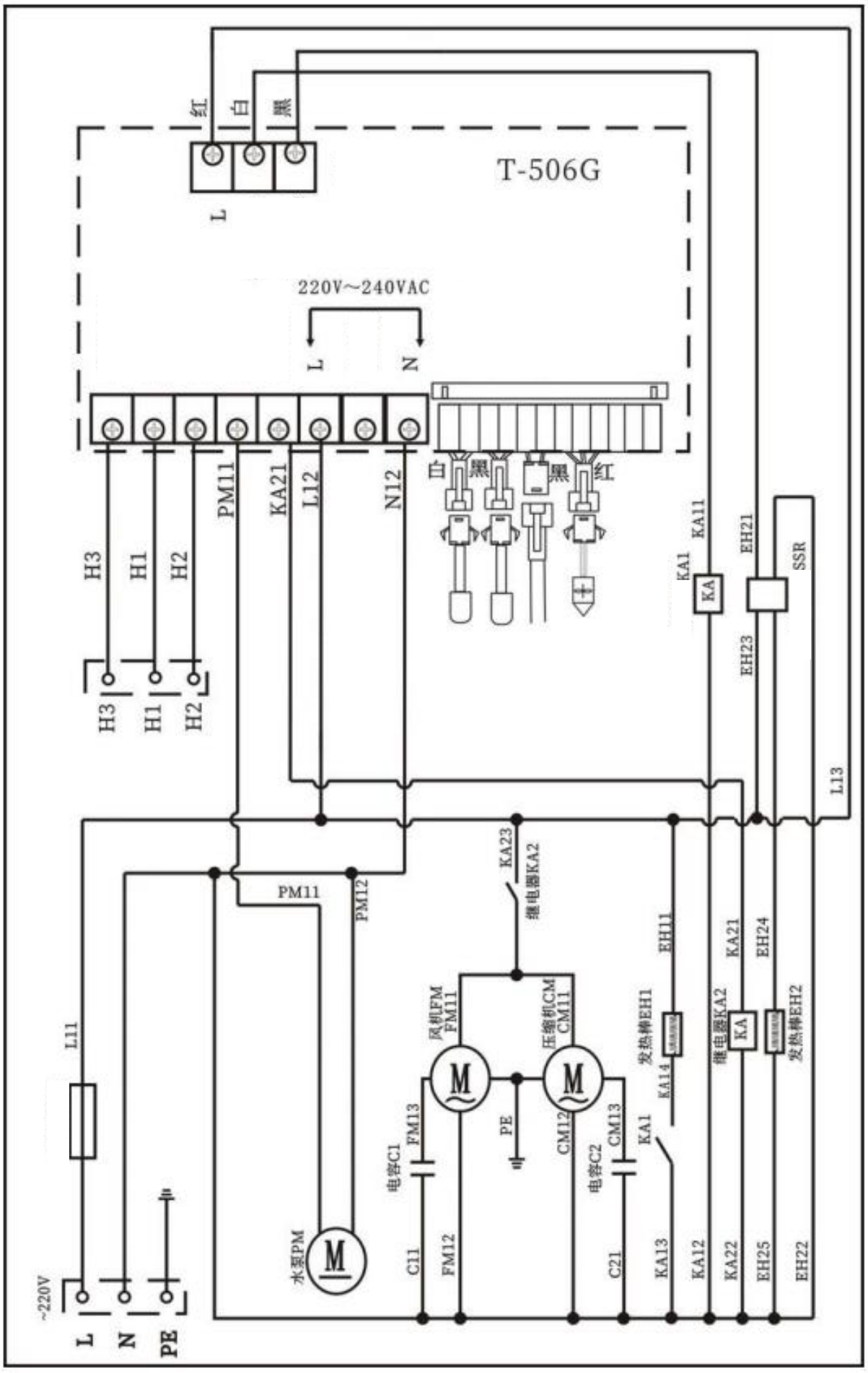
For further information on Jasic product warranty terms and product warranty registration please visit:

www.jasic.co.uk/warranty-information

POWER SOURCE SCHEMATIC



WATER COOLER SCHEMATIC



Single Wire Feeder Packing List

Category	Name	Description	Qty.	Unit	Placement Location
Main Power Source	Laser welding machine	Handheld laser welding machine: LS-15000F/LS-20000F	1	Set	Main packaging
	Earth clamp and wire	Earth clamp + 8m cable + 2 pin female connector	1	PC	On top of machine
Wire Feeder	Wire feeder	Wire feeder is equipped with 2 pcs 0.8-1.0 V type rollers	1	Set	Wire feeder packaging
	Accessory box	Divided into three layers	1	Box	
	Liner	φ1.6 red 5m	1	PC	Wire feeder accessories kit
	Liner	φ1.0 blue 3m	1	PC	
	Liner	Soft φ1.6 3m	1	PC	
	Power cable	Total length of 5 meters, with 7 core aviation plugs (hole type) at both ends	1	PC	
	Confirmation form	JASIC Handheld Laser Welding Installation and Debugging Training Confirmation Form-A0	3	PCS	Top layer of accessory box
	Protective lens	D18T2 lens	10	PC	Middle layer of accessory box
	Gas tube	φ6 transparent 5m	1	PC	
	Gas tube	φ10 blue 0.2m	1	PC	
	Gas connector	φ10 to φ6	1	PC	
	QBH shielding sleeve	Black sleeve	1	PC	
	Cotton swab		1	Bag	
	Clean cloth		1	Bag	
	Operation guide	Brief guide to laser operation	1	PC	
	U Key		1	PC	Bottom layer of accessory box
	Roll	1.2/1.6U	2	PC	
	Roll	1.2/1.6V	2	PC	
	Serial port line	USB to 232 serial port, in the pink box	1	Box	
	Tool packet	Including liners, 12/14 wrench, 14/17 wrench, tips φ0.8/φ1.0/1.2/φ1.6 large Allen wrench, small Allen wrench	1	Box	
	Copper tips	1 box including AS-12 *2, BS-16, CS-12, ES-12, FS-16, tip C, cutting tip M8 1.5 and graded tube	1	Box	

Single Wire Feeder Accessory List

Part No.	10094629	10094740	10094648	10094964	10094650	10104723
Code	AS12	BS16	ES12	FS16	C	
Wire Diameter (mm)	0.8/1.0/1.2	1.2/1.6	0.8/1.0/1.2	1.2/1.6	Without Wire	Without Wire
Joint Type	All Positions	All Positions	Outside Corner	Outside Corner	All Positions	T-Fillet
						

Part No.	10094647	10103739	10103746	10094637	10094635	10094633	10094631	10094961	10101105	10094654	10103741
Code	M8 1.5										
Wire Diameter (mm)				0.8mm	1.0mm	1.2mm	1.6mm	2.0mm			
Description	For Cutting Only	Extension tube	Cleaning Only	Wire Guide	Wire Guide	Wire Guide	Wire Guide	Wire Guide	Straight wire guide 60mm	Straight wire guide 100mm	Circle Buckle
											

Part No.	10094957	10094741	10094660	10094946	10094651	10103734	10094667	10094663	10094668	10094670
Code					D18T2	D20-3K				
Wire Diameter (mm)	Steel	Steel	Aluminium	Aluminium						
Description	Solid Wire Liner 1.2mm 5M Red	Solid Wire Liner 1.6mm 5M Red	Soft Wire Liner 1.6mm 3M Black	Soft Wire Liner 1.6mm 5M Black	Protective Lens	Focus Lens	Wire Feed Roller 'V' Groove 0.8mm/1.0mm	Wire Feed Roller 'V' Groove 1.2mm/1.6mm	Wire Feed Roller 'V' Groove 0.8mm/1.0mm	Wire Feed Roller 'U' Groove 1.2m/1.6mm
										

Dual Wire Feeder Packing List

Category	Name	Description	Qty.	Unit	Placement Location
Main Power Source	Laser welding machine	Handheld laser welding machine: LS-20000F dual wire	1	Set	Main packaging
	Earth clamp and wire	Earth clamp + 8m cable + 2_pin female connector.	1	PC	On top of machine
Wire Feeder	Wire feeder	Wire feeder is equipped with 4 pcs 1.2-1.6 V type rollers	1	Set	Wire feeder packaging
	Wire feeder and accessories	Liners+power cable+communication cable	1	Bag	Cabinet of wire feeder
	Machine bottom universal wheel	2 per row	2	Row	Inside wire feeder
	Accessory box	Divided into three layers	1	Box	Wire feeder packaging
	Single wire liner	φ1.6 red 5m single head	1	PC	In the wire feeder accessory package
	Double wire liner	φ2.0 black 3m single head	2	PC	
	Power cable	Total length of meters, with 3core aviation plugs (hole type) at both ends	1	PC	
	Signal line	Total length is 10 meters, with one end being a seven core aviation plug (hole type) and the other end being a two core aviation plug (hole type)"	1	PC	
	Double wire adjustment connection block	Dual wire feeding arm	1	PC	
	Guide wire straight tube		1	PC	
	Double wire guide nozzle	1.2/1.6	1	PC	
	Double wire copper nozzle	AS-16D, AS-12D, AS-20D	2	PCS	
	Confirmation form	Jasic Handheld Laser Welding Installation and Debugging Training Confirmation Form	1	PC	Top layer of accessory box
	Protective lens	D18T2 lens	10	PCS	Middle layer of accessory box
	Gas tube	φ6 transparent 5m	1	PC	
	Gas tube	φ10 blue 0.2m	1	PC	
	Gas connector	φ10 to φ6	1	PC	
	QBH shielding sleeve	Black sleeve	1	PC	
	Cotton swab		1	Bag	
	Clean cloth		1	Bag	
	Operation guide	Brief guide to laser operation.	1	PC	

Dual Wire Feeder Packing List

Category	Name	Description	Qty.	Unit	Placement Location
Wire Feeder	Ukey		1	PC	Bottom layer of accessory box
	Roll	1.2/1.6V	2	PC	
	Roll	0.8/1.0V	2	PC	
	Serial port line	USB to 232 serial port, in the pink box	1	Box	
	Tool packet	Including liners, 12/14 wrench, 14/17 wrench, tips φ0.8/φ1.0/1.2/φ1.6, large Allen wrench, small Allen wrench	1	Box	
	Copper tips	1 box including AS-12 *2, BS-16, CS-12, ES-12, FS-16, tip C, cutting tip M8 1.5 and graded tube	1	Box	

Dual Wire Feeder Accessory List

Part No.	10103749	10103751	10103753	10103748	10103750	10103752	10103754	10103755	10107242
Code	120W50888A	120W50889A	120W50890A						
Wire Diameter (mm)	2 x 1.2mm	2 x 1.6mm	2 x 2 mm	1.2mm	1.6mm	2.0mm		Steel 3m	Graphite 5m
Joint Type	All Positions	All Positions	All Positions						
Description				Dual Wire Guide	Dual Wire Guide	Dual Wire Guide	Dual Feeding Arm	Dual Wire Liner	Dual Wire Liner
									

RECOMMENDED SPARES

Jasic laser recommended spares					
Pt No.	**Description**	**Qty**	**Pt No.**	**Description**	**Qty**
10103724	Jasic Protective Lens Pressure Ring	1	10094635	Jasic Threaded Guide 1.0mm	5
10103734	Jasic Focusing Lens D20*4.75 F150	5	10094637	Jasic Threaded Guide 0.8mm	5
10103735	Jasic Protective Lens Pressure Ring Gasket	1	10094647	Jasic Cutting Nozzle M8 1.5	10
10103739	Jasic Extension Tube	2	10094648	Jasic Nozzle (RTES12) External 1.2mm)	5
10103743	Jasic Lock Nut	1	10094650	Jasic Nozzle (no wire)	5
10103746	Jasic Welding Seam Cleaning Nozzle	1	10094651	Jasic Protective Lens (D18T2)	50
10103749	Jasic Dual Wire Nozzle 1.2mm (BW101-GS)	5	10094654	Jasic Straight Wire Guide 100mm	2
10103751	Jasic Dual Wire Nozzle 1.6mm (BW101-GS)	5	10094660	Jasic Soft Wire Liner 1.6mm 3M Black	3
10094629	Jasic Nozzle RTIS12 (Internal 1.2mm)	10	10094740	Jasic Nozzle (RTIS16) (Internal 1.6mm)	5
10094631	Jasic Threaded Guide 1.6mm	5	10094946	Jasic Soft Wire Liner 1.6mm 5M Black	3
10094633	Jasic Threaded Guide 1.2mm	5	10094964	Jasic Nozzle (RTES16) External 1.6mm)	5

Appendix 1

UK Laws and legislation with class 4 handheld laser welding machines Guidance

Please Note: The information offered below is intended for guidance only and does not constitute as technical or legal advice. When using class 4 handheld laser welding systems the legal responsibilities are for both the employer and employee and below offers information that sets out the applicable standards.

The Health and Safety at Work Act (HASAWA) 1974

These are the primary UK legislation for workplace health and safety. It sets out the general principles for creating and maintaining a safe and healthy workplace and outlines the duties of employers and employees.

In summary, this Law states that it's the employer's duty "to safeguard so far as reasonably practicable the health, safety and welfare of employees and other workers affected by the work".

It is also noted that it's the employee's duty " to take reasonable care for the safety of themselves and others; to cooperate; not to be reckless".

BS EN 60825 Parts 1 and Part 2

These 2 standards set out the safety requirements for the use of lasers in the workplace.

Part 1: sets out the requirements for the design, construction, and testing of laser equipment.

Part 2: sets out the requirements for the safe use of laser equipment.

These requirements include the provision of appropriate protective equipment, such as eye protection, protective clothing, and laser welding enclosure, as well as training on the safe use of lasers.

The standards also set out requirements for the management of the risks of lasers, including the conducting of regular risk assessments.

Management and use of work regulations 2009

These regulations require employers to assess and manage the risks to the health and safety of their employees. It requires employers to identify and assess all potential hazards in the workplace and put in place the appropriate control measures to reduce or eliminate the risk.

It also requires employers to provide suitable information, instruction and training to their employees (and visitors) to these health and safety matters. To manage this, the employer would also need to appoint a competent person (usually noted as a Laser safety officer) to oversee the management of health and safety in the workplace.

The Provision and Use of Work Equipment Regulations 1998 (PUWER)

These regulations require employers to provide and maintain safe equipment for the use of all employees in the workplace and to also ensure they are competent to use it.

It covers all equipment used for work purposes, including hand tools, machinery, ladders, hoists, vehicles and so on. It requires employers to conduct regular risk assessments and provide training and instruction to employees in the safe use of said equipment.

In summary, the Provision and Use of Work Equipment Regulations 1998 (PUWER) requires the employer to provide documentation, instruction, and training to the employee on how to safely use the laser welding machine and accessories. This would include the appropriate safety equipment, such as eye protection, protective clothing, the laser welding enclosure, as well as how to set up and operate the equipment correctly.

The employer would also need to carry out and document regular risk assessments to ensure the safety of employees (and others working within the area) when using the laser welding machine.

Appendix 1

UK Laws and legislation with class 4 handheld laser welding machines Guidance

The Control of Artificial Optical Radiation at Work Regulations 2010 (AOR Regs)
These regulations set out the requirements for controlling risks from artificial optical radiation (AOR), such as laser beams, in the workplace.
It requires employers to assess and manage the risks of AOR to ensure the safety of employees and other persons in the workplace. It also sets out requirements for the provision of protective clothing, eye protection, and information and training on the safe use of AOR equipment.
In summary, the Control of Artificial Optical Radiation at Work Regulations 2010 (AOR Regs) require the employer to assess the risks associated with using the laser welder and put in place appropriate measures to control them. This would include the provision of protective clothing, such as goggles, face shields, laser welding enclosure and eye protection, as well as operator training in the safe use of the laser welder.
The employer would also need to create and provide information on the risks and control measures to employees and other persons in the workplace.

The Management of Health and Safety at Work Regulations 2009 (MHSWR)
The MHSWR regulations provides more detailed guidance on how employers must manage health and safety in the workplace, which includes the risks associated with lasers.
The MHSWR requires employers to assess the risks posed by laser radiation and to ensure that adequate control measures are in place to protect operators and all workers within the work area.
In summary, The Management of Health and Safety at Work Regulations 2009 (MHSWR) would require the employer to identify and assess any risks associated with using the laser welder, such as the risk of eye damage or burns from the laser beam.
To manage this, as stated previously, appointing a competent person (Laser safety officer) to oversee the management of health and safety in the workplace.
The employer would then need to document and put in place appropriate control measures, such as the provision of eye protection, protective clothing, and training on the safe use of the laser welder.

Compliance and Standards
Please Note: In compliance with EU and national standards and requirements, lasers must be categorized based on their output power and wavelength.
All Jasic laser machines fall under Class 4 classification, as per EN 60825-1, Chapter 8.

Reference Standard
Electromagnetic compatibility immunity:
EN IEC 61000-6-4:2019
EN IEC 61000-6-2:2019

Power supply safety:
EN 62368-1:2014+A11:201728

Laser Safety:
ISO 12100:2010
ISO 11553-2017

Functional Safety:
EN 60825-1:2014+A11:2021
CDRH 21 CFR 1040.10

Declaration
We believe we have carried out our due diligence to ensure accuracy with the above information offered. However, we do not accept any responsibility for any errors, omissions or changes to local regulations and as such any use of this information contained is done so at the readers/user's discretion and we do not accept any liability for any consequences that may arise from its use.

Appendix 2

European Standards Related to Laser Welding Machine Safety

Please Note: The information offered below is intended for guidance only and does not constitute as technical or legal advice. When using class 4 handheld laser welding systems the legal responsibilities are for both the employer and employee and below offers information that sets out the applicable standards.

EC Laser Safety Conformity to Type A, B and C-Standards. EC-Directive Machinery - Basic requirements on safety and health. Directive 89/392/EEC (consolidated by 98/37/EC, 2006/42/EC).

Type A-Standards: Design principles and basic concepts for machines - Basic standards

- Basic safety requirements

ISO 12100 P1, P2 "Safety of machinery - Basic concepts, general principles for design"
Type B-Standards: Generic standards

- **Type B1 Safety aspects**

1. ISO 13857 "Safety of machinery - Safety distances to prevent hazard zones being reached by upper and lower limbs"
2. ISO 13849-1 „Safety of machinery - Safety-related parts of control systems - Part 1: General principles for design"

- **Type B2 Safety related devices**

1. ISO 13850 "Safety of machinery - Emergency stop - Principles for design"

ISO 14119 „Safety of machinery - Interlocking devices associated with guards - Principles for design and selection".
Type C-Standards : Product Standard - Detailed safety requirements for a particular machine or type of machines.
ISO 11553-2 „Safety of machinery - Laser processing machines - Part 2: Safety requirements for hand-held laser processing devices.

Machinery Directive 2006/42/EC - ANNEX 1
To apply on portable Laser Welding
ANNEX I
Essential health and safety requirements relating to the design and construction of machinery, the essential health and safety requirements laid down in this Annex are Mandatory!

1. **ESSENTIAL HEALTH AND SAFETY REQUIREMENTS**
   1.5. RISKS DUE TO OTHER HAZARDS
   1.5.12 Laser radiation
   Where laser equipment is used, the following should be taken into account:

Laser equipment on machinery must be designed and constructed in such a way as to prevent any accidental radiation, laser equipment on machinery must be protected in such a way that effective radiation, radiation produced by reflection or diffusion and secondary radiation do not damage health, optical equipment for the observation or adjustment of laser equipment on machinery must be such that no health risk is created by laser radiation.

Responsibility of IEC
IEC 60825 Safety of laser products

- P1: Equipment classification and requirements
- P2: Safety of optical fibre - communication systems (OFCS)
- P4: Laser guards

Appendix 2

European Standards Related to Laser Welding Machine Safety

Laser welding machines should conform to the following CE regulations and the below is the minimal European Standards related to Laser Safety.

Responsibility of ISO

ISO 11553 Safety of machinery - Laser processing machines

- P1: General safety requirements
- P2: Safety requirements for hand-held laser

In general handheld laser welding machine should adhere to the following CE regulations….

- EC 2006/42/EC – EC Directive Machinery
- EC 2006/35/EU – Low voltage directive
- ISO 12100 P1,P2 – Basic Standards Safety of Machinery
- ISO 13857 Generic Standards Safety on hazard zones around Machinery
- ISO 13849-1 Generic Standards Safety related Parts of Control System
- ISO 13850 Generic standards Safety design of emergency stops
- ISO 14119 Generic standards interlocking devices associated with guards
- ISO 11145 laser equipment Vocabulary and symbols
- ISO 11553-1 Safety standards of laser processing devices
- ISO 11553-2 Safety standards of handheld laser processing devices
- EN 60204-1
- EN 60825-1

Declaration

We believe we have carried out our due diligence to ensure accuracy with the above information offered. However, we do not accept any responsibility for any errors, omissions or changes to local, national or regional regulations and as such any use of this information contained is done so at the readers/user's discretion and we do not accept any liability for any consequences that may arise from its use.

NOTES

NOTES

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