Important Safety and Handling Instructions - Fiber Laser Welding Machine (FL-LCW)

RSD-SUNMAX Series

SUNMAX LASER

About this document: This is an English translation of the Japanese original prepared by SUNMAX LASER for reference purposes. In case of any discrepancy, the Japanese original shall prevail. Specifications are subject to change without notice.

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1. Safety Precautions

1. **Wear protective equipment**
   - Always wear appropriate laser safety glasses, protective gloves, and protective clothing during use.
   - The laser beam can cause serious injury to the eyes and skin.
   - When welding highly reflective materials (such as aluminum), strong reflected laser light is generated. Never allow people or flammable materials in front of the laser gun.
2. **Machine installation**
   - Install the machine in a well-ventilated location and keep flammable materials away from it.
   - Place the machine on a stable, flat surface so that it cannot move.
3. **Operating environment**
   - Before use, always make sure that no one is nearby and secure the work area.
   - Do not use the machine in hot, humid, or dusty environments.
4. **Precautions during use**
   - Operate the machine correctly, following the instruction manual.
   - If you notice anything abnormal, stop using the machine immediately and have it inspected by a qualified technician.

2. Required Equipment

The following items are required for installation.

Assist Gas

Assist gas is essential equipment. Gas is always required for welding, rust removal, and cutting.

> Operating the machine without gas will quickly cause it to break down.

Process	Gas pressure
Welding	0.05–0.1 MPa
Cutting	0.3–0.4 MPa
Rust removal	0.1–0.4 MPa

Nitrogen

Nitrogen gas can be used for every process (welding, rust removal, and cutting). Among the available gases, it is relatively inexpensive and easy to obtain.

Argon

Argon gas is more expensive than nitrogen, but it is not affected by nitriding. It is ideal for welding titanium.

Clean Air

Clean air can be used for cutting and rust removal. Compressed air may also be used (oil and moisture must be removed), but if the air is not clean, the lenses inside the laser gun will become contaminated, which can cause lens damage.

> If the machine is damaged because it was operated with contaminated air, the damage is not covered by warranty.

Regulator

- Adjustment range: 0.01–0.6 MPa. Reference model: GF1-2506-RX-V
- Required coupler for connection: one-touch coupler, Rc1/4 male thread
- Where to buy: LCW gas cylinder regulator set — https://tinyurl.com/2byatawb

Air Hose (from the machine to the gas supply)

- Inner diameter: 6.5 mm / Outer diameter: 10 mm

Cooling Water

Prepare 6 L of one of the following: tap water, purified water, or coolant.

Reference replacement intervals: tap water or purified water — once every 2–3 months; coolant (containing preservative) — once every 6 months to 1 year.

Power Supply

Model	Power supply
1500W machine	3-phase 200V, 30A
2000W machine	3-phase 200V, 40A
3000W machine	3-phase 200V, 50A

> Always connect the grounding.

Welding Wire (Solid)

A 1.0 mm mild steel wire is included with the machine. Prepare the appropriate wire for each material you weld.

Supported wire diameters: 0.8 mm, 1.0 mm, 1.2 mm, and 1.6 mm.

Cooling Water (Details)

The machine is water-cooled. Use water or coolant. In winter, if the temperature may drop below freezing, use antifreeze or coolant to prevent freezing. If the water freezes, the machine will be damaged. Any coolant concentration is acceptable as long as the liquid does not freeze; however, if the concentration is too high, it can damage the hoses. Use an appropriate concentration.

Replacing the cooling water

Liquid	Replacement interval
Water	Once every 2 months
Antifreeze / coolant (containing preservative)	Every 6 months to 1 year

3. Lens Replacement

Replacing the protective lens and the focusing lens are tasks you will eventually need to perform. Always perform lens replacement in a clean location.

> Do not perform lens replacement in locations where dust, dirt, or drafts are present.

Lenses can be damaged by various causes:

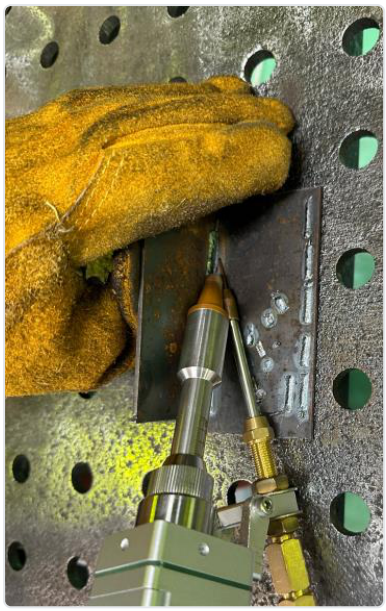
- **Laser beam path misalignment**
  Welding or processing while the laser beam path is misaligned will damage the lens.
- **Insufficient gas**
  Processing without supplying gas, or welding with an insufficient gas supply, will damage the lens.
  Welding: 0.05–0.1 MPa / Cutting: 0.3–0.4 MPa / Cleaning: 0.1–0.4 MPa
- **Welding at a vertical angle**
  If you weld with the laser gun held perpendicular to the workpiece, the reflected laser beam may enter the inside of the laser gun and damage the lens.
- **Welding that generates heavy fumes**
  Welding galvanized steel sheet or material coated with anti-rust paint generates large amounts of smoke. The smoke can enter the inside of the laser gun and damage the lens.
- **Debris attached during lens replacement**
  If debris attaches to the lens during replacement, the laser beam can pass through it and burn the lens.

4. Reflected Laser Light

Reflected laser light is generated during laser welding.

> Welding highly reflective materials (such as aluminum and copper) generates strong reflected laser light.
> Never place your hand in front of the laser gun, never look into it from the front, and always confirm that no one is standing in front of it!

Example: When strong reflected light occurred, the reflected laser beam shot straight forward as shown in the figure below, setting the glove on fire.



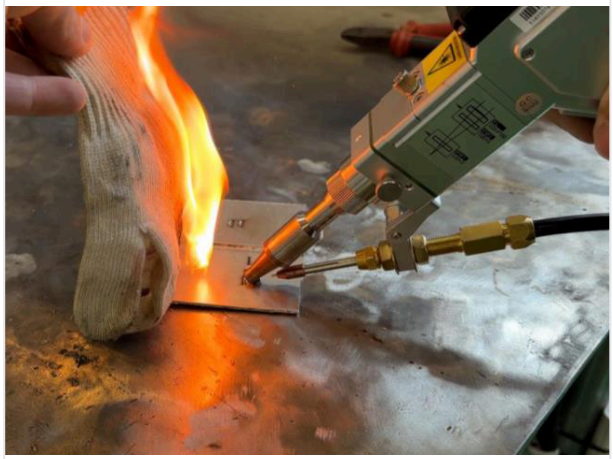


Figure labels: Reflected light / Laser / Danger!

4. Maintenance

1. After use, always turn off the power and unplug the machine.
2. Regularly clean the outside and inside of the machine to remove dust and foreign matter.
3. Keep the laser lenses and mirrors clean and inspect them regularly.
4. Replace the cooling water of the water-cooled unit. Guideline: water — once every 2 months; coolant — every 6 months to 1 year.

4. What to Do in Case of Malfunction

1. If you notice anything abnormal, stop using the machine immediately.
2. Use the self-diagnosis function and check the error message.
3. If the problem cannot be resolved, contact the seller or the manufacturer and request an inspection by a qualified technician.

5. Storage

1. When the machine is not in use, store it in a dry, cool, dark place.
2. For long-term storage, cover the machine with a dust cover and store it in a moisture-free environment.
3. For long-term storage, drain the cooling water.

6. Contact Information

For malfunction inquiries, please contact us by email with a video or photos attached:

Email: webmaster@laser-machine.com

7. External Links

- How to replace the lens [Fiber Laser Welding Machine] SUNMAX-FL-LCW
  https://www.youtube.com/watch?v=8vaM63fJwYE
- Consumables purchase site (nozzles, lenses, etc.)
  https://www.e-inzai.com/shop/www/shop/sunmax/product_lcwparts1.html
- Optional items purchase site (laser safety glasses, welding wire, etc.)
  https://www.e-inzai.com/shop/www/shop/sunmax/product_lcwparts2.html
- Connection diagram
  https://www.laser-machine.com/cspt/conn/lcw1-2kw.png
- Instruction manual download page (our website)
  https://www.laser-machine.com/download.shtml#welding

The manual files can be downloaded directly — no password is required.

This concludes the Important Safety and Handling Instructions for the fiber laser welding machine. Please use the machine safely, and we hope it serves you well for many years to come.
