midi TECH

⚠ This equipment has been designed in accordance with IEC 61010-1 and IEC 60825-1 safety regulations to prevent operator accidents if correctly and properly used. However, no engineering design can make this equipment safe if it is not used and maintained with due care and according to standards. This manual must be carefully and thoroughly read before performing any operation. Failure to follow the instructions and safety regulations can cause damage to the operator and to the equipment.

Contents

General information

Manual distribution list: Shipper - Installer - User - Maintenance technician- Demolisher.
Please carefully and thoroughly read this manual which contains important information on safe and efficient equipment operation. This manual is an integral part of the product and only accompanies the equipment to which it refers.
This manual must be carefully preserved throughout the working life of the equipment so that it can be readily accessible and consulted. In case the used equipment is sold, it must be sold complete with this manual and its annexes. The manufacturer cannot be held liable for direct or indirect damages to persons, property or pets, due to equipment use in conditions other than those provided. The manufacturer reserves the right to make changes to this documentary material or the equipment to which it refers without prior notice.

Safety pictograms:

	**Danger** indicates the occurrence of a condition or situation that might **cause death or serious injury**.
	**Warning** indicates the occurrence of a condition or situation that might cause moderate injuries.
	**Note** indicates that the text provides **additional information, explanations or helpful tips**.

Identification

Manufacturer:

OROTIG S.p.A.
Via dell'Elettronica, 5
37139 – Verona (VR), Italy
Tel: +39 045 6400865, FAX +39 045 6401104
Email: info@orotig.com – web: www.orotig.com

Equipment:

MWOM0045

The equipment data plate contains information on product identification and its electrical specifications.

Safety information

General safety rules

Touching live electrical components can cause fatal injuries or serious burns.
Improper equipment installation or incorrect grounding may be hazardous. Do not touch live parts. Remove the power plug from the mains before installing or servicing the machine. Install this equipment properly and ground it in accordance with the operating instructions and in accordance with local regulations and standards. Always turn off the machine after use. Do not use weak, damaged, inadequate, or poorly connected cables. Be careful not to have cables near heat sources. Only use the equipment if in perfect condition. Always immediately repair or replace damaged parts.

Do not open panels, repair or modify the equipment.
These manoeuvres can lead to electric shock and fires. Do not operate the equipment except as described in the maintenance section. Always keep all the cover panels secured in their housings.

Do not look at or touch the LASER beam.
Class 4 LASER equipment. Uncontrolled reflections of the LASER beam may result in burning or, in the worst cases, irreparable damage to the eyes.

- Never introduce mirrors or reflecting objects while the equipment is operating
- Inspection of manufactured products inside the welding chamber should be exclusively through the viewing window located on the front of the equipment.
- Accidental exposure of the eye to LASER radiation can cause cataracts and, in the worst cases, burn the retina.
- Do not remove the hand introduction curtains for any reason whatsoever.
- Persons of small stature should not be near the hand introduction curtains when the equipment is in use.

Operators are advised to protect hands by wearing appropriate UV protection gloves, which are suitable and approved by the regulations in force.

Wear the protective goggles supplied.
With the welding chamber open, or when the bottom of the chamber is removed, it is **MANDATORY** to wear the safety glasses provided, in order to prevent damage to the retina.
Safety glasses must have an OD 7 optical density and an L9 protection level for pulsed LASERS with a wavelength of 1064 nm, in compliance with the relevant BS EN 207 standard.

The LASER welder can be dangerous.
Protect yourselves and others from possible serious injury or death. Keep out of the reach of children. Keep persons wearing pacemakers away, unless they are provided with specific medical consent. Welding, as with most jobs, involves risks. Welding is safe if the due precautions are taken. The welding risk is limited to handling the manufactured products inside the welding chamber. The process in itself is absolutely safe; in all cases, it is important that the equipment is operated by authorised personnel only. INSTALLATION, MAINTENANCE AND REPAIR SHOULD ONLY BE PERFORMED BY HIGHLY QUALIFIED PERSONNEL.

Do not touch manufactured products during or immediately after welding.
Recently welded manufactured products can be hot.

Immediately stop operations in the event of an unexpected event.
Stop the device immediately if a problem occurs or a burning smell is perceived, an abnormal noise is heard, abnormally hot parts are present or smoke is seen, etc. Electric shock or fire hazard. Contact OROTIG S.p.A. immediately.

The welding processes produce fumes and gases. Inhaling them can be hazardous to health.


Keep the head away from the fumes. Do not inhale the fumes. Do not cover the vents on the equipment. Carefully read the instructions supplied concerning the various types of metals, detergents and protection gases. The equipment should ideally be installed in a large, specially dedicated room. If the room is small, ensure that it is sufficiently ventilated. The protection gases used for melting can gradually saturate the air causing discomfort or death. Do not weld in the proximity of areas used for degreasing, cleaning or spraying. The heat could react with the vapours, producing toxic and irritant gases. Make sure that the metals do not have impurities such to cause fumes or gases during melting. Envision the use of an auxiliary extractor system or, alternatively, the use of a face mask.

LASER welding can cause fire or explosion.


The sparks produced during welding can escape and cause fire or burns. It is prohibited to introduce inflammable gases and liquids into the welding chamber. Cylinders and objects containing highly flammable gases or liquids should be moved a safe distance away from the welding chamber.

Fire warning, keep an extinguisher in the immediate vicinity.

Do not use water to clean the equipment.


Avoid using water near the running equipment. Do not place liquid containers over the equipment. Do not place the equipment in very humid environments (permissible relative humidity from 30% to 80%) or near heat sources or that produce moisture.

Protective clothing should be worn.

Wear protective clothing such as gloves, long-sleeved jackets, leather aprons, etc. Melted metal sparks can cause burns on the skin.

Do not cover the LASER with blankets or fabrics.

Do not cover running equipment with blankets or fabrics, which may overheat and burn.

Perform periodic maintenance.

Consult the relevant chapter and perform the maintenance recommended. If there is a problem, do not use the equipment; Consult the manual and contact technical support.

The manufacturer cannot be held liable for direct or indirect damage to persons, property or pets, due to failure to comply with the safety regulations and the information contained in this documentation.

Protections

All the safety measures that consist in the use of specific technical means (guards, safety devices) to protect persons from hazards that cannot be reasonably limited through design are considered as protections.

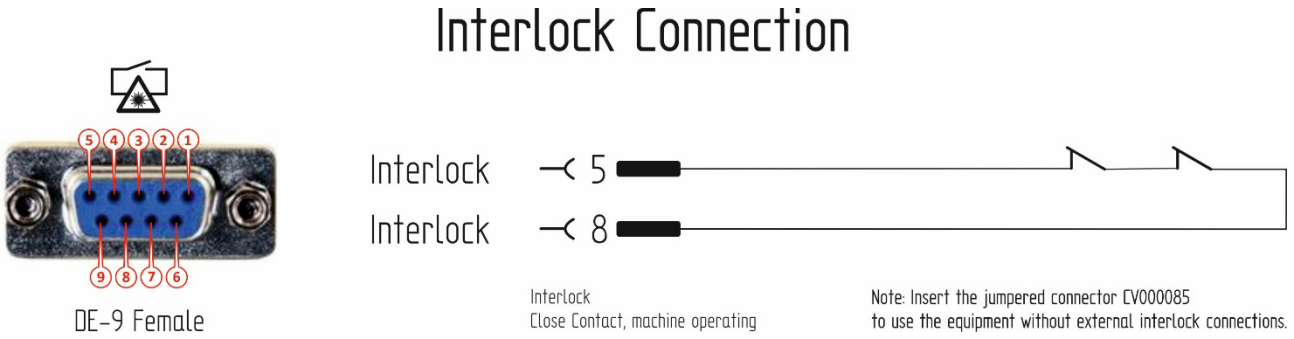
Tampering with protections or any modification of the equipment can cause risks for the users and for other exposed persons.

Interlock contact

Description The interlock is a switch with normally closed contact, which must be positioned on the access door/s to the premises where the equipment is located. The electric connections of the switch are shown in the figure below.

Purpose The interlock contact is used to prevent LASER operation where the safety standards envision the same. This safety device is mandatory if operating with the welding chamber open or when the welding chamber bottom is removed. A blind interlock connector is supplied for use of the equipment with welding chamber bottom inserted and in normal operating conditions.

Operation When the contact opens, all normal equipment operations are blocked and a warning message is displayed on the screen, until the contact is restored.



The male DE-9 connector (OME00192) with case (RS000080) is supplied with the equipment; cables and switches are not supplied.

Leather barrier

Description Several layers of strips of leather form a mobile and permanent barrier at the access aperture to the welding chamber, through which the operator can introduce his hands and the manufactured products to be welded.

Purpose The set-up of this safety device is made necessary in order to prevent every possible leak of radiation from the welding chamber, prevent the exposure of the operator or persons nearby to the product flashes during the welding operations and prevent the easy leakage of any protections gases used.

Operation The leather barrier, which blocks the passage of LASER radiation, can be easily replaced if most of the strips should be damaged through use, be bent, broken or cut.

Resonator shutter

Description This device consists of motor-driven flag and is located inside the LASER resonator system. The shutter intervenes by cutting off the LASER beam path within the resonator when the welder is in stand-by or in the event of an anomaly.

Purpose This device prevents the generation of unwanted LASER radiation.

Operation The shutter is activated when the power supply is turned on, before the equipment is activated.
On activation, the shutter clears the LASER path, and the equipment is ready for normal operation. A microprocessor control checks that the shutter is disabled in a timely manner: any anomalies are indicated by a warning on the display.

When the equipment is turned off, the shutdown procedure is performed, which closes the shutter; a check is then performed to ensure correct closure. Any anomalies will always be signalled on the display.
Resonator shutter movements are detected by an infra-red sensor controlled by the movement of the motor shaft. The breakdown of this infra-red sensor is detected by the microprocessor, which puts the system in the alarm mode, preventing normal operation of the equipment and highlighting the anomaly with relevant wording on the display.
The breakdown of the motor or its control driver is detected by the microprocessor by checking the ON/OFF movement implementation times of the flag and is highlighted on the display by relevant warnings.

Infra-red microscope filter

Description This filter is a 1.064 nm optical glass that is opaque to LASER radiation. It appears light grey and transparent to our eyes. It is inside the microscope.

Purpose This filter protects the operator's eyes from leaks of LASER radiation along the optical path of the microscope.

Operation Since it is opaque at the wavelength of 1.064 nm, it prevents the passage of LASER radiation.

Welding chamber infra-red filter

Description This filter is a 1.064 nm optical glass that is opaque to LASER radiation. It appears transparent light green to our eyes in compliance with the BS EN 207 and BS EN 208 Standards classified as OD6 for protection 800-1090 DIR LB6. It constitutes the inspection window of the welding chamber and can be replaced if broken.

Purpose This filter protects the operator's eyes from the LASER radiation during normal operation of the equipment and allows the manufactured products to be inspected in complete safety.

Operation Since it is opaque at the wavelength of 1.064 nm, it prevents the passage of LASER radiation.

Emergency button

Description The emergency button is a red mushroom-shaped switch. It is positioned in a point of the equipment that is easy to access by the user.

Purpose It stops the equipment immediately and must be used in the event of danger for the operator or equipment.

Operation It removes the power supply to all electric/electronic parts of the equipment, switching it off immediately.

Enabling key/PIN

Description It is an enabling switch with key or, alternatively, an electronic PIN.

Purpose To prevent operation of the equipment by unauthorised personnel.

Operation Once the key has been turned or the PIN entered, the equipment starts, loading the internal circuits and enabling LASER emission.

Hazardous areas and residual risks

Hazardous Area is defined as any area within or near the equipment where a person is exposed to injury or health damage. There are some residual risks to the operator during certain equipment procedures. These risks can be eliminated by following the basic rules of work and behaviour or, more specifically, the procedures in this manual, adopting the personal protection equipment as indicated.

Only trained personnel who have taken note of the safety instructions in this manual should install the equipment.

General rules

Before proceeding with the normal equipment use, we recommend you check that it is in good working order and check that its parts are not defective or worn. If necessary, carry out all necessary maintenance operations.

- Pay attention to the risk of electric shock due to direct and indirect contact due to unexpected electrical failure.
- Do not subject the equipment to violent impacts.
- Do not expose the equipment to fire, welding sparks or extreme temperatures.
- Do not allow the equipment to come into contact with corrosive substances.
- Do not clean the equipment with water jets.

Before all use of the equipment

For correct use of the equipment, keep the following indications in mind:

- Do not place objects in the equipment slits.
- Always stop the equipment after each work session using the red key present on the display. Switch it off using the master switch only when it has stopped.
- Perform the maintenance listed in the appropriate chapter.
- If the LASER outlet nozzle is dirty, clean using a dry or slightly dampened cloth. If it is very dirty, use a neutral detergent such as alcohol. Never use thinners, petrol, etc. since they could discolour or alter the plastic parts. If the protective glass slide is damaged or excessively saturated with metal, replace it with a new one.
- Operate very delicately on the touch-screen buttons with the fingers. The use of metal or plastic tips can damage the devices. Press the buttons one at a time; if multiple buttons are pressed simultaneously, the equipment may not respond properly or may even be damaged.

Transportation precautions

- During transport ensure that the equipment is properly supported at the lifting point.
- Do not stand directly in the path of applied force and do not place personnel where loads are not suitably supported by mechanical devices.

Risk or danger	Foreseen PPE
Hand or limb crushing	Reinforced gloves, protective overalls
Abrasion, cut	Reinforced gloves
Vision damage due to projection of material	Protective goggles and overalls

Packaging precautions

Keep the original packaging for future use.

- Always package the equipment for transport and/or handling.
- The packaging consists of a cardboard box, a bottom and a top stratocell(R) or expanded foam shield.
- On receipt of the equipment, inspect the packing. In the event of faults, the customer must "accept with reserve" explaining the reason.
- The customer must take care opening the box using an exacto-knife or other cutting tools.

Package contents

The following items are found in the package:

GAS conveyor terminal	LE100100	3 PZ	
Stainless steel plate 20x30, thickness 1.5 mm	SLXA1001	2 PZ	
Glass slide AF45 @ 1064 nm D.40 1 mm Laser protection	ATE00043	1 PZ	
LTS 2.0 and 2.5 hex wrenches	GAL01000 and GAL01001	1 + 1 PZ	
Microscope eye pieces	MOT00010	1 PZ	
Double-distilled water (available only in the winter period, in order to ship the equipment without water inside)	FIR03002	2 LT	
RL 3/8 – 4 FOX adapter/s for air/argon	MWW00240 + MWW00241 + MWW00707	1 +1 + 0,3mt PZ	
Blue Rilsan pipe d. 8x6	MWW00710	2 mt	
Power cable	LE000034	1 PZ	
Control pedal	RIC0056M	1 PZ	
Protection glass slide and glass slide-holder flange spacer ring	D2109234 – LS000670	1 PZ	
Conical flange (normally already mounted in the machine)	D2103640 + MWW00126	1 PZ	
Interlock display key wiring	CV000085	1 PZ	
Aisi 302 stainless steel wire d. 0.35	LXA10002	25 cm	
Pen drive USB	OME00366	1 pz	

Installation

Transport

The indications contained in this paragraph must be observed when transporting the Laser Welder for:

- Storage
- First installation
- Relocation

The machine is normally supplied complete with special packaging that allows for easy transport and handling.

Crates should be handled with lifting vehicles with due care and strictly respecting the direction indicated on the packaging. Adopt normal and logical precautions to avoid bumps and tipping.
When storing the welder in its packaging, do not tilt it, do not place it vertically and do not overturn it. If this is not the case, the coolant may leak.

Protect equipment and any accessories from atmospheric agents. Water and moisture may oxidise some equipment parts, irreversibly damaging them.

Unpacking

After removing the packaging, make sure the machine is integral by checking that there are no visibly damaged parts. If in doubt **DO NOT USE THE EQUIPMENT** and contact the manufacturer.

All packaging items should be kept for future use

Positioning

The equipment must be placed in a position and environment suited to its intended use (use in a laboratory protected from atmospheric agents); such placement must be carried out by qualified personnel.

Permissible temperature	from + 10° C to + 40° C
Permissible relative humidity	from 30% to 95%
Maximum height at sea level	2000 m

When positioning the LASER welder, keep in mind the following recommendations:

- Position the equipment on a flat, stable surface that extends beyond the base of the machine in all directions, leaving more than 10 cm between the rear panel and the wall.
- Guarantee sufficient space to allow for adequate ventilation.
- Avoid places subject to abrupt changes in temperature and humidity. Keep the device away from direct sunlight, strong light or heat sources.
- Do not position it near appliances that produce moisture, dust or heat (sanders, vaporisers, EDMs, ovens etc.).
- Position it near an electrical outlet at a maximum distance of 1.5 metres.

Preliminary checks

The equipment is delivered with liquid in the cooling circuit. During the winter months, the liquid is not present inside the machinery. Rinsing is carried out with a 20% alcohol solution for the inspection. This situation is signalled by the presence of a container of liquid coolant (demineralised water) inside the package.
In this case, it is necessary to:

- Perform two rinses with the following procedure: fill the tank half full with the liquid supplied (with the machine off), turn the machine on and hold the encoder button down to trigger the pump manually, wait one minute and then empty the tank.
- Fill the tank completely with the machine off.

Electric connection

Before connecting the power cable, be sure to have a proper power outlet.

Make sure that the electrical outlet of the mains supply is the Schuko type; and is dimensioned on the basis of the characteristics of the equipment. Make sure there is an Earth connection.

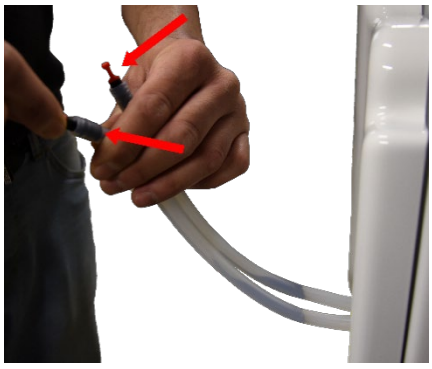
Apply a "D" type disconnect device upstream of the equipment connection cable with the mains. The disconnect device must be paired with an overcurrent protection device equipped with a circuit breaker. The characteristics of such devices must be such as to meet the applicable regulations in the country of installation, and are dimensioned according to the equipment specifications.

Power supply tolerances

- Working voltage ± 10% of rated voltage.
- Frequency: ± 1% of rated current in continuous mode ± 2% of rated current for a short period
- Harmonic distortion for the sum of the second to fifth harmonics not over 10% of the total voltage rms among conductors. A further distortion is allowed for the sum of the harmonics from the sixth to thirtieth of 2% on the total voltage rms among conductors.
- Voltage pulses should not be longer than 1.5ms with a rise/decay time between 500ms and 500µs and a peak value not exceeding 200% of the effective value of the rated power supply voltage.
- The power supply must not be interrupted nor drop to zero for more than 3ms at any instant of the power wave. There must be no more than 1s between two subsequent breaks
- The voltage dips must not exceed 20% of the power supply peak voltage for more than one cycle. There must be no more than 1s between two dips.

Filling the tank for the first time

Remove the two silicone caps, which are found in the front part of the machine (Fig. 1). Fill the syringe with double-distilled water and introduce it inside one of the two pipes. Fill the tank to maximum level. Once the tank has been topped-up, replace the previously-removed caps on the two pipes and push the two pipes inside the machine, leaving a few centimetres outside.

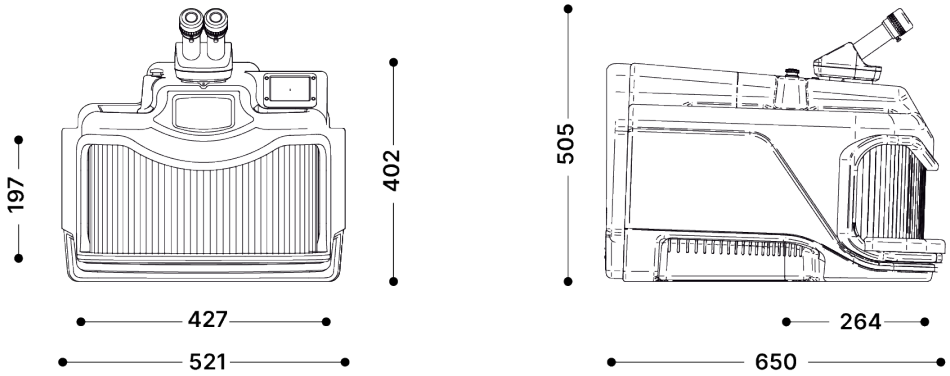


ATTENTION! When starting the machine for the first time, it is recommended to fill the tank as much as possible and to activate the pump manually to ensure the correct water flow. To do this, switch the machine on and, from the stand-by menu, press "Options" and activate the pump with the ON button. Wait about 1 minute (the flow meter shows the flow rate in litres/min), switch off the pump and check the liquid level in the tank again. If necessary, top up to the maximum level.

Equipment specifications

Technical specifications

Characteristics/Model	MIDI TECH
Power supply	115-230 VAC±10%, 1P + N + PE, 50/60Hz, 1.8kW
Pulse power and duration	45 J at 8 mS
Peak power	5.6 kW
Average power	30 W
Repetition frequency	8 Hz
Welding spot size	From 0.2 to 1.5 mm
Stereo-microscope	45° with 10X magnification and crosshair
Weight	27 Kg



Applied Standards and Directives:

The equipment has been manufactured in compliance with the provisions of the European Community Low Voltage (LVD) 2014/35/EC, Electromagnetic Compatibility (EMC) 2014/30/EC and RoHS 2015/863/EC Directives and the following reference Standards:

BS EN 60825-1	Safety of LASER products Part 1: Equipment classification and requirements
BS EN 61326-1	Electrical equipment for measurement, control and laboratory use. EMC requirements.
BS EN 61010-1	Safety requirements for electrical equipment for measurement, control, and laboratory use.

Intended use

Use the equipment to weld specific metal alloys. Only the following alloys can be used:

- gold
- palladium
- cobalt chrome (CrCo)
- silver
- titanium
- platinum
- steel

The metals and alloys listed above must not contain any of the metals indicated among those in the "Non-declared uses".

The protection gas recommended for the welding procedures Argon. Only use original Orotig S.p.A. parts and consumables.
For technical assistance, contact Orotig S.p.A. Once the consumables have worn out, they must be replaced.
Follow all of the prescriptions and the safety standards indicated in this manual.

Non-declared uses

Do not modify the equipment. Do not weld metals or alloys that include one of the following materials: Beryllium, Uranium, Plutonium, Cadmium, Magnesium, Sodium, Mercury, Potassium, Lead, Arsenic.
Do not use toxic or inflammable gases such as: Hydrogen, Oxygen, Fluorine, Chlorine, every type of hydrocarbon gas, any mixture of Hydrogen and Nitrogen.
Do not use Nitrogen during welding. Do not put inflammable material along the LASER beam path. Don not use toxic materials or materials that emit explosive gases. Do not stare at the LASER beam without protective eye wear.
Do not leave clothing of any kind along the LASER beam path. Do not introduce any living or dead organisms into the LASER beam. Do not use the LASER welder to heat food. Do not use the LASER welder to dry clothes and materials in general.

Labels and safety devices:

1. Emergency button. When pressed, disconnects the power supply from the device. ETI00361

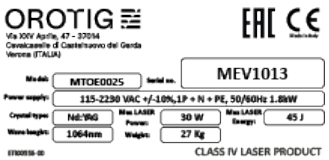
2. LASER OPENING signal label (ETI00129): **LASER OPENING**. This label indicates the exit point of the LASER beam

3. LASER Emission Characteristics Label (ETI00693):
This label provides information about the emission characteristics of the laser beam, including:
- The delivered energy (E)
- The wavelength (λ)
- The pulse duration (t)
- The average power (P)

It also shows the reference standard for LASER device safety.

4. LASER device classification label (ETI00131):
LASER RADIATION. AVOID EXPOSURE OF THE EYE OR SKIN TO DIRECT OR SCATTERED RADIATION. CLASS 4 LASER DEVICE.
This label highlights the hazardous nature of the laser system if it is used improperly. In fact, the laser generator used is Class 4.

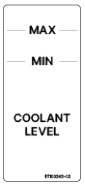
5. Nameplate label:
This label contains the machine's construction data.



6. Label indicating the type of liquid to be used:
ETI00276 This label indicates the use of deionised water only.

7. Hazardous voltage warning label inside the device. ETI00140

8. Water level warning label ETI00242



The following devices are used on the equipment:

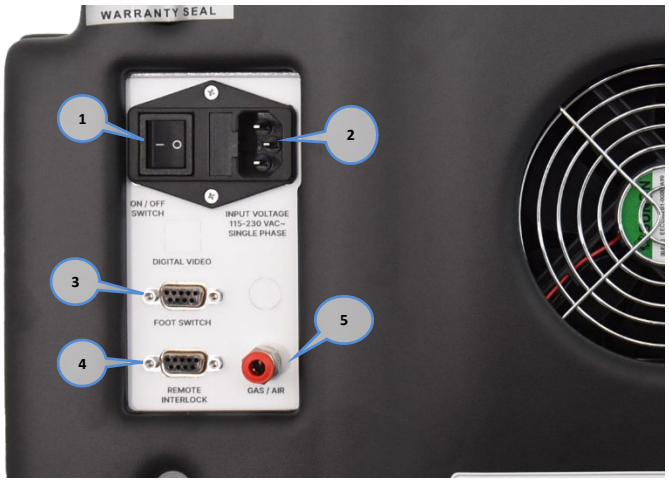
- KG3 LASER radiation protection glass, under the microscope
- Leather curtains for access to the welding chamber.
- LASER radiation protective glass on inspection window
- Emergency button
- Remote block connector
- Flashing indicator, on the display, when the device is ready to emit LASER radiation.
- A PIN code can be set at will by the user to prevent involuntary use by unauthorised personnel.

Operator interface

Controls and signals

1. Stereo microscope.
2. Inspection window with filter for LASER beams at 1064 nm (OPTIONAL).
3. Hands entrance.
4. Touch-screen display for setting welding parameters.
5. Emergency key.
6. Liquid cooling system; do not cover the vent, leave at least 5 cm between the vent and the wall.
7. Coolant level, for correct efficiency of the equipment: the level MUST always be at maximum mark. Use double-distilled water only for top-up/replacement.
8. Compartment for extraction of the liquid top-up pipes.
9. Rear connections (see “Rear Connections” paragraph).

Rear connections



1. Master switch.
2. Power supply socket.
3. Control pedal.
4. Interlock remote connection (see paragraph).
5. Protection Air/GAS inlet (OPTIONAL).

WARNING! Always refer to the operating voltage indicated near to the power supply outlet. Check the electric conditions before connecting the equipment.

Use

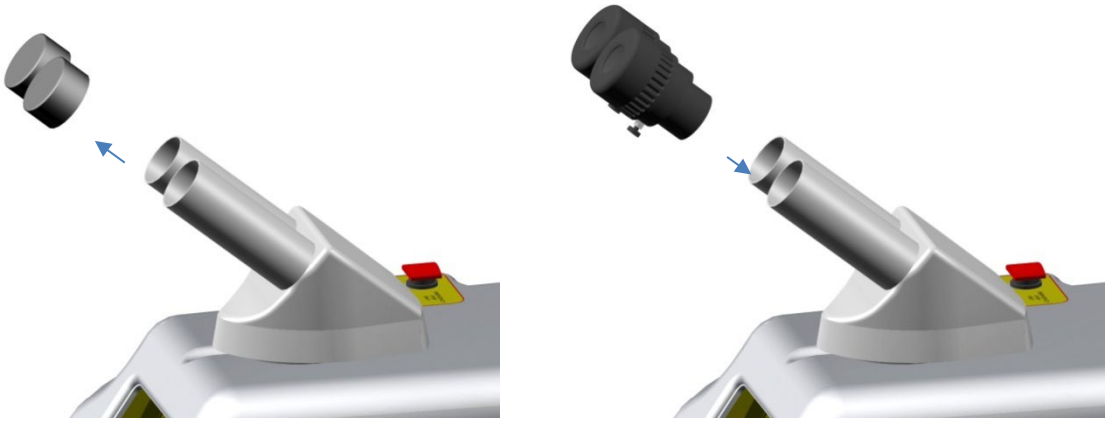
See the **Safety Information** chapter before using the equipment.

Recommendations

Before proceeding with the normal equipment use, we recommend you check that it was correctly installed and in good working conditions. Check that its parts are not defective, damaged or worn; if necessary carry out all the necessary routine and extraordinary maintenance operations.

Positioning and ergonomics

Microscope eye pieces



Remove the caps that protect the stereo microscope, insert the eyepieces and, once positioned in their seat, tighten the fixing screw. Keep the caps and eyepiece wrappers for future use.

One of the eyepieces has a crosshair for sighting. Position it on the right tube of the stereo microscope. The diopter dial may be adjusted by rotating the dial clockwise or anti-clockwise depending on the type of correction required. Refer to the scale printed on each eyepiece.

Safety glasses must have an OD 7 optical density and an L9 protection level for pulsed LASERS with a wavelength of 1064 nm, in compliance with the relevant BS EN 207 standard.

Turning on the equipment

Move the power supply switch located on the rear panel of the equipment to position I. Wait until the display shows the access screen. Introduce the password (default value "0000"). Press the Start button to start-up the laser and access the welding parameters. Set the desired parameters according to the metal to be welded. Use the control pedal to perform welding.

Emergency stop

The emergency button is used to stop the equipment immediately. This safety device has a locking function and therefore must be re-armed manually. Use this button only in the case of a hazard and not for normal shut down of the equipment.

Using the LASER welder

This section describes the use of the LASER welder and explains the menu present on the display.

Display

Switching the device on

Move the power supply switch located on the rear panel of the device to position I. Wait until the display shows the PIN introduction screen.

Emergency stop

The emergency button (see page 14) is used to stop the device immediately. This button has a safety function; once pressed, it must be released in order to switch the device back on. Use this button only in the case of a hazard.

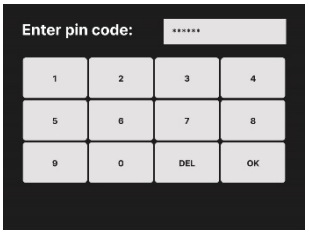
Example of practical use

This section describes the practical use of the device and explains the LASER welder menu.

Display

START-UP SCREEN

After pressing the general power button on the rear of the machine (see page 17), the loading screen will appear. Wait until the UNLOCK PIN page appears.



UNLOCK PIN

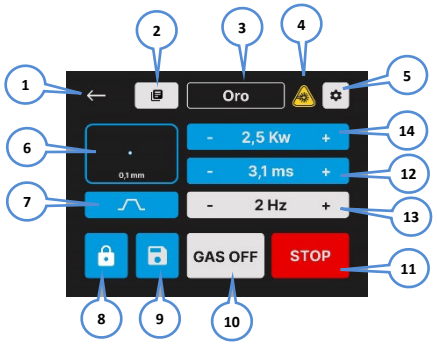
Before accessing the main menu, the machine requests the unlock PIN.
Enter "0000" as the default PIN. The access PIN can be changed in the settings.

MAIN MENU SCREEN

This menu allows you to select the type of metal to be welded (1), to access the settings/options menu (2) and to select the library of predefined and new programmes (3). Pressing the START button (4) will start the machine.

- The operator can choose to select the type of metal to be welded and then press START. Or select a programme from the library. Or press START directly without selecting the metal (*).
- - In subsequent machine starts, pressing the START button directly will load the last used welding settings.

(*)**Please note: Pressing the START key without selecting the metal inhibits the possibility of binding, pulse power and duration, to spot size and metal type (lock key disabled).**



WORK SCREEN (access from the main menu)

This menu appears after the operator has chosen the type of metal to be welded.

1. Return to the MAIN MENU SCREEN (without deactivating the laser)
2. Program library
3. Information on the chosen metal or programme
4. Active laser
5. Machine settings
6. Spot size
7. Laser pulse waveform
8. Lock button:
   ACTIVE: padlock closed and white on a blue background. In this case, the POWER and DURATION parameters (light blue icons) are linked to the size of the SPOT (light blue icon) and adjust automatically when the SPOT changes.

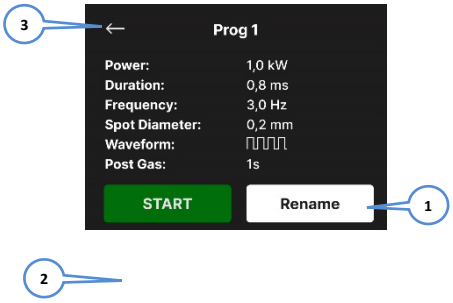
   INACTIVE: lock open and black on a blue background. In this case, the POWER and DURATION parameters (grey icons) ARE NOT bound to the size of the SPOT (grey icon).

   DISABLED: lock open and white on a white-blue background. The button is not selectable because you have pressed the START button without selecting the metal or you have selected a programme from the library. In this case the FW cannot know which metal is to be machined, so it is unable to bind power and duration to the size of the spot.

9. **Saving work** settings in the PROGRAMMES MENU: up to 12 programmes can be saved or previously saved programmes can be overwritten.
10. GAS: The duration of post-gas ranges from a minimum of 0 seconds (No post-gas) to a maximum of 9 seconds in steps of 3 seconds
11. **STOP**: laser lock and return to MAIN MENU
12. Laser pulse duration I adjustable from 0.5ms to 25ms in 0.1ms steps
13. Frequency of the laser pulse can be set from 0Hz (single firing at each press of the pedal) to 20Hz in 1Hz steps. By holding down the pedal, the firing frequency will follow the set value
14. Laser pulse power adjustable from 0.5kW to 5.6kW in 0.1kW steps

PROGRAMME LIBRARY

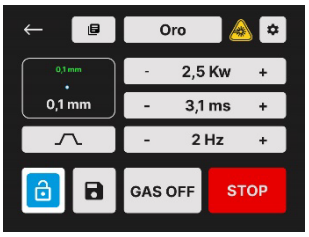
This menu contains previously saved work programmes.



PROGRAMME LIBRARY (selected programme)

The screen shows previously saved parameters. It is possible to:

- Rename the programme (1)
- Start the work session by pressing START (2)
- Return to the PROGRAM LIBRARY MENU (3)

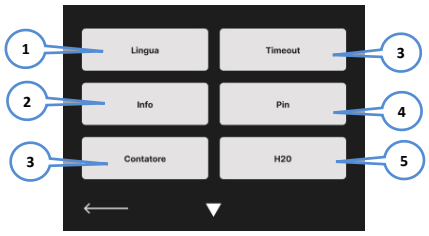


WORK SCREEN (access from programme library)

SPOT size stored. If the SPOT size is shown in green on the screen, it means that the size is the one currently in use.

LOCK DISABLED: lock open and white on white-blue background. In this condition, the POWER and DURATION parameters are always disengaged and the SPOT size constraint cannot be applied.

SETTINGS MENU



1. **Language**: Menu to select the language in which the menu will be presented.
2. **Info**: In this screen you can see information about the device in use, in particular the currently installed firmware version.
3. **Counter**: From this menu it is possible to check the total number of shots made by the machine. A partial counter is also available, which is useful for checking how often the machine is serviced.
4. **Timeout**: Selecting Display Time-out: 1m or 5m, with the Laser in Standby state automatically activates the Screen Saver after 1m or 5m of inactivity. If Time-out LASER: 10m is selected, the Laser goes into Standby status after 10 minutes of inactivity.
5. **PIN**: The start-up PIN can be changed via this menu. The default PIN for the user is 0000. By pressing the New PIN button, the start-up PIN can be changed via the touchscreen keyboard. You will first be prompted to enter the Old PIN. Enter the Old PIN and press OK. If the

entered PIN is correct then you are asked to enter the new PIN (New 1); Enter the New PIN and press OK. You are now asked to confirm (New 2). Enter the PIN again and press OK. If the procedure has been carried out correctly, you will automatically return to the PIN Management Menu.

6. **H2O**: Menu concerning the operation of the liquid cooling system. Pressing the ON button activates the cooling system pump and the pointer indicates the flow in litres per minute circulating. If the system is operating correctly, after a few seconds, the needle indicates a flow of more than 4 litres per minute in the green arc. If the needle remains in the yellow or even red arc, it is necessary to check the fluid level and if necessary add or completely replace the coolant.

SETTINGS MENU

1. **Pre-gas**: In this menu it is possible to set the operating mode of the solenoid valve that controls the delivery of the protective GAS. If OFF is selected, the solenoid valve is activated simultaneously with the firing of the laser when the pedal is pressed. If ON is selected, pressing the pedal activates the solenoid valve, then the pedal must be released and then pressed again to start firing (Pre-Gas active).
2. **Firmware Upgrade**: Via this menu, the laser firmware can be updated using the USB key. Remove the USB key from the connector inside the welding chamber, insert it into a PC and copy the update files to it:
   XXSEvoFW.hex

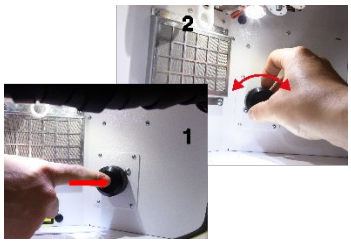
ATTENTION: DO NOT open and DO NOT modify these files under any circumstances!

Re-insert the key into the LASER and select the FW Upgrade Menu; Press the Upgrade button: On the screen appears some messages informing not to disconnect the power because the upgrade is in progress...; After a few seconds the screen turns completely white and remains there for about 30 seconds until the upgrade is completed. After the update is complete, the initial screen appears asking you to switch the system off and

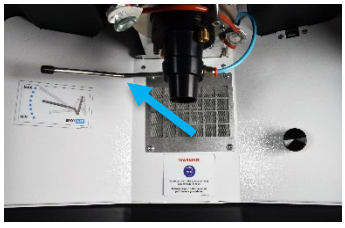
on again. Check for correct update via the Info Menu.

3. **Service**: Password-protected menu accessible only to authorised device maintenance personnel.
4. **Date and Time**: Through this screen you can set the time shown on the display when the machine is in stand-by mode.

Use of the Rotary switch



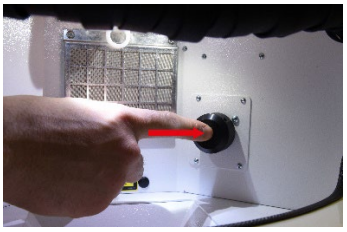
By pressing the rotary switch (Fig. 1) change the shot frequency value. If, instead, the operator turns the rotary switch (Fig. 2), the power value will be modified.



To modify the diameter of the shot, the lever must be made to run forwards and backwards. The smallest dimension of the shot is obtained by setting the lever totally towards the machine side. If the lever is set at end run of the operator side, the diameter of the shot will be bigger.

Pump activation

The pump can only be activated in STAND-BY, by running water through the circuit without starting the machine. This operation is useful when the tank is filled after a complete emptying cycle or when the machine is commissioned. Release the handle to interrupt pump operation.



Press the rotary switch for 3 seconds, triggering the pump, which makes water circulate in the hydraulic circuit. The pump will be switched off when the rotary switch is released.

Operation of the accessories

Using the protection air/gas supplier

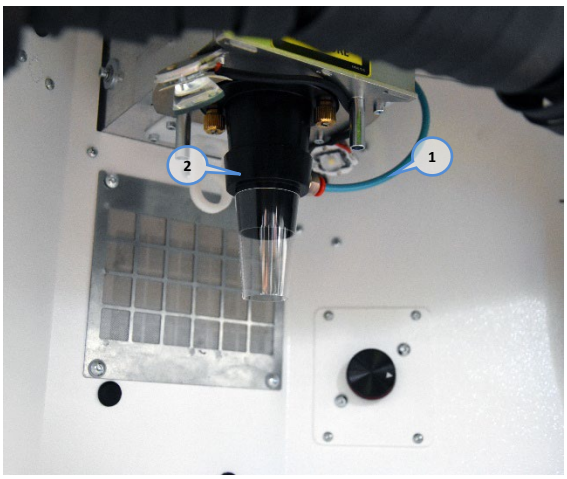
All of the Laser Welders are supplied with:

- An anodised aluminium conical glass slide-holder with quick coupling for the gas/air pipe (2). (OPTIONAL).
- A glass slide-holder flange without dispenser (3).
- A pipe to direct the protection air or gas (1).

The outlet of the gas/air is controlled by a solenoid valve, which is activated by pressing the pedal. The solenoid opening time is set by default at 3 seconds. When the afore-said time has passed, the solenoid valve closes automatically.

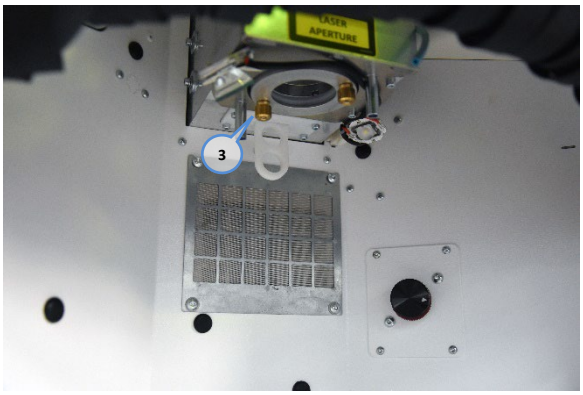
The maximum inlet pressure is 4 Bar. Over-pressure can damage the control solenoid valve.

Figure 1 – Example of use of the glass slide-holder with the cone-holder



This configuration is recommended to weld titanium, Cobalt Chrome and steel.
The pressure advised with the use of protective gas (Argon) is 0.8/1 bar. Use the relevant transparent cone inserted into the cone-holder to convey the flow into the welding point, as shown in figure 1

Figure 2 – Example of use of the glass slide-holder without dispenser



This configuration is recommended for welding Silver or Gold objects.

Maintenance

See the **Safety Information** chapter before proceeding.

Every maintenance operation, even small, relative to the Laser Welder and electric plant, requires the intervention of qualified personnel.

Only original spare parts can be used. Using non-original spare parts exempts the manufacturer from any liability.

Periodic inspections

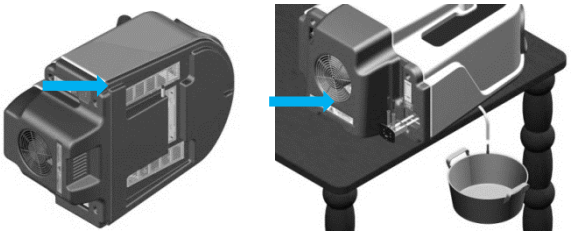
Check the integrity of the LASER radiation safety glass on the KG3 inspection window and the leather curtains for hand access to the welding chamber daily; if they need replacement, contact the manufacturer. Use of the equipment with broken glass or without the curtains is DANGEROUS and can damage health. Check the status and integrity of the safety labels and the data plate every six months. Contact the manufacturer if they are discoloured or legible.

Checking the coolant

The machine has a liquid coolant system (double-distilled water). The liquid must be replaced at least once every 12 months, to prevent the formation of alga and/or lime scale.

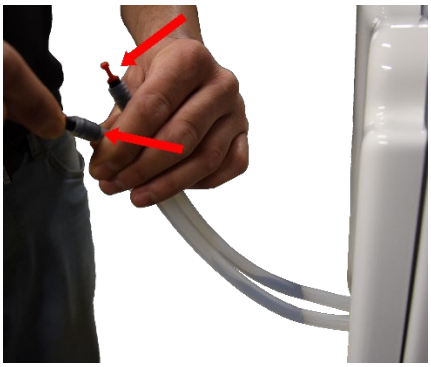
Removing the liquid

Slide the small pipe, present on the bottom of the machine, out. Remove the cap (see photo); position the recipient under the manifold and wait for the tank to empty completely. The circuit contains approx. 2 litres of liquid.



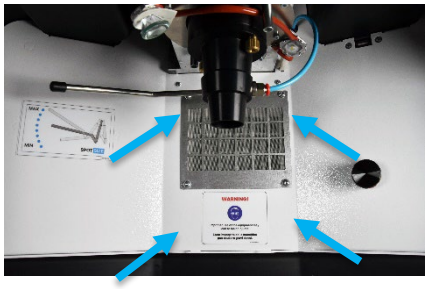
Topping-up the liquid

Remove the two silicone caps, which are found in the front part of the machine (Fig. 1). Fill the syringe with double-distilled water and introduce it inside one of the two pipes. Fill the tank to maximum level. Once the tank has been topped-up, replace the previously-removed caps on the two pipes and push the two pipes inside the machine, leaving a few centimetres outside.



WARNING! Do not use the equipment without or with only a small amount of water inside the tank.

Checking the internal filter



Loosen the 4 screws shown in the photo and remove the grid.

Clean by blowing with compressed air and vacuum the internal part where the fumes extractor fan is found.

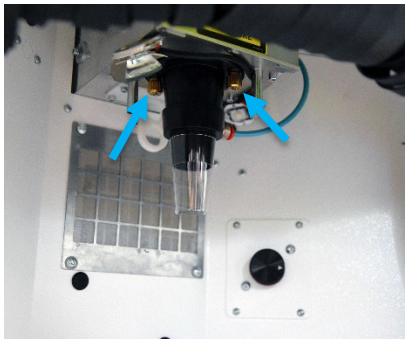
Failure to replace this filter can compromise operations of the equipment.

Checking the air vents and grid

Periodically vacuum the lateral air vents on the hood and the cooling fan grid.

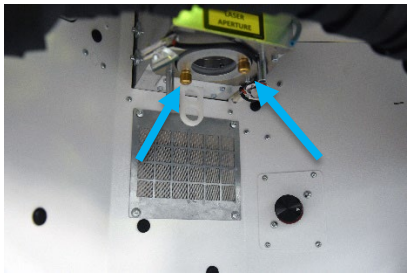
WARNING! Lack of maintenance of the filters can compromise operation of the equipment and damage it.

Replacing the mirror protection glass slide



Check the status of the glass slide inside the welding chamber at least once a month. To remove the glass slide support, loosen the 2 brass pawls indicated in the photo. If the glass slide is marked by sprays of metal, is scratched, cracked or broken, replace it with a new one (Code ATE00043).

Glass slide support with gas conveyor



When using the standard glass slide support, the blue gas pipe must be pushed inside the machine for a few centimetres, in a way that the laser does not hit the pipe.

Standard glass slide support

WARNING! If the glass slide is very dirty, the power of the equipment may be reduced by up to 80% with respect to normal performance. If the glass slide is damaged or broken, there can be serious consequences for the focal lens positioned above it.

Lack of maintenance of the filters can compromise equipment performance.

Do not cover the vents with cloths or other materials. Leave a space of at least 10 cm between the vents and the walls. The efficiency of the Laser Welder could be compromised.

Aligning the shot on the crosshair

WARNING! Inspect the inside of the welding chamber only through the relevant window. Always keep the hands away from the path of the LASER beam.

When the welding spot does not hit the centre of the crosshair, it can be corrected as described below:

Checking alignment

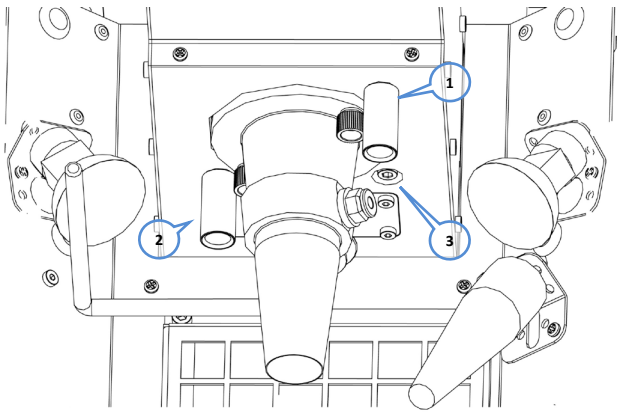
1. Set the following parameters 1.0 KW, time 1.0 mS, frequency 0 Hz and minimum SPOT size.
2. Position a piece of flat metal on the Focusing support plate (D2116466) and carry out a shot.
3. Check the position of the spot with respect to the crosshair; if the spot intersects the crosshair in the centre, alignment is not required.

Correcting alignment

WARNING! Take great care to avoid inadvertently activating LASER emission when performing realignment operations.

Correcting alignment

Take great care to avoid inadvertently activating LASER emission when performing realignment operations.



With the equipment in stand-by, locate the screws near to the glass slide-holder cone, as shown in the figure.

Never touch the screw 3 positioned between the other two screws without a guide. This screw is positioned by the manufacturer. Using the 3 mm Allen key supplied, operate on screws 1 and 2.

- Moving screw 1 shifts the welding point vertically.
- Moving screw 2 shifts the welding point horizontally.

Use small movements and use small shots to verify correct positioning of the shot on the crosshair on a piece of metal. Continue until the shot coincides perfectly with the centre of the crosshair.

The alignment screws have aluminium guides to make them easier to identify.

To facilitate the alignment procedure on the crosshair, the ▲ symbol is present, which indicates the north tip. Make sure this symbol points upwards and proceed with alignment as described above.

Inspect the inside of the welding chamber only through the relevant window. It is good practice to put the equipment in stand-by before operating on the adjustment screws to prevent accidental activation of the LASER.

Extraordinary maintenance

Extraordinary maintenance is envisioned only following an anomaly. Consult the **Diagnostics** chapter for additional information

Extraordinary maintenance may only be carried out by OROTIG S.p.A. personnel or authorised by the same.

Recommendations

For a good Laser Welder efficiency, we recommend:

- Installation in an environment not too hot and away from heat sources; the higher the ambient temperature, the lower the efficiency of the cooling circuit/heat exchanger.
- Keeping it away from equipment that produces moisture or dust, such as sandblasters, vaporisers, and so on.
- Following the indications in the manual, reading the safety and maintenance paragraphs.
- Only use the original spare parts listed in this manual.
- Use only demineralised water as a coolant. Using water or liquids other than the indicated one can compromise operations.
- Do not remove the safety devices and keep them in good working order.

Diagnostics

Errors and warnings

If one of the following messages appears on the display, operate as described in the "Solution" section of the message.

Error 1: H2O flux failure

Problem: The flow sensor does not detect any liquid in the cooling circuit

Solution: Check the correct level of the liquid
Check the water filter is not clogged
Contact the technical after-sales assistance

Error 2: Charge fail Chap.

Problem: The internal capacitors are not charged correctly

Solution: Check suitability of the electric plant
Check there are no problems with the electricity supply
Check the correct operating voltage
Contact the technical after-sales assistance

Error 3: Simmer failure

Problem: The lamp is not working or is not in pre-switch on (Simmer)

Solution: Check the number of shots performed
Contact the technical after-sales assistance

Error 4: Shutter failure

Problem: The safety shutter in the resonator does not close or does not work correctly

Solution: Contact the technical after-sales assistance

Error 5: RS-232 fail

Problem: Communication between the internal circuit boards does not work

Solution: Contact the technical after-sales assistance

Warning signals

The "Warning" signals appear for conditions outside the job and can be solved without having to switch the equipment off

Warning 1: Remote interlock

Symptom: The remote interlock switch contact is open

Solution: Close the contact to restore the work session

Warning 2: H2O too hot

Symptom: The temperature of the coolant is too high.

Solution: Wait for the equipment to reset automatically, do not switch off, leave it on to quicken up the cooling process.
If it does not take place automatically, contact the technical after-sales assistance

Warning 3: CCPS too hot

Symptom: The temperature of the internal electronics is too high

Solution: Wait for the equipment to reset automatically, do not switch off, leave it on to quicken up the cooling process.
If it does not take place automatically, contact the technical after-sales assistance

WARNING! The equipment must NOT be installed in an environment that is too hot and away from heat sources; the higher the ambient temperature, the lower the efficiency of the cooling circuit/heat exchanger will be.

Warning 4: USB Pendrive not found

Symptom: The pendrive has not been detected in the relevant housing.

Solution: Check the correct insertion of the pendrive in the housing. If it is not detected or the Pendrive is not inserted, the data of the current work session cannot be saved. The message disappears automatically after 10 seconds

Warning 5: Filters Cleaning

Symptom: The filters positioned on the vacuum nozzles have reached 300 operating hours.

Solution: Touch the screen to remove the indication and replace the filters present in the equipment.

Warning 6: LASER temperature too cold

Symptom: The temperature of the internal electronics is too low

Solution: Install the equipment in a warmer place, avoid high temperature changes. Wait for the equipment to reset automatically, do not switch off, leave it on to quicken up the process. If it does not take place automatically, contact the technical after-sales assistance

Warning 10: Safety Panel Open

Symptom: The panel has been removed or not inserted correctly

Solution: Re-position the panel in its seat.

Note:

Revision:	Issue date	
00	27/06/2024	S.P.
01	07/08/2024	S.P.