NEUTEC®
Creative technology from RIO GRANDE

IMPORTANT:
Please read this handbook before using
the Neutec/USA® PulsePoint™ Plus
Laser Welder

PulsePoint Plus 140

L071F07N

LASER UNIVERSAL WELDING

USER MANUAL

This device has been designed in compliance with IEC EN 61010-1 and IEC EN 60825-1 safety standards to prevent injury to the operator if used correctly and properly. However, no engineering design can make this device safe if it is not used and maintained properly and in compliance with safety standards. This manual should be read carefully and in its entirety before performing any operation. Failure to follow instructions and safety standards may cause injury to the operator and the device.

Contents

General Information

This manual is intended for: Transporters - Installers - Users - Maintenance and Disposal personnel
Please read this manual carefully and in its entirety, as it contains important information relating to the safe and efficient operation of the device. This manual is an integral part of the product and is included only for the device to which it relates.
This manual should be stored securely for the entire useful life of the device so that it may be referred to as needed. In the event a used device is sold, it must be sold together with the manual and any appendices. The manufacturer assumes no liability for direct or indirect damages to persons, property or animals caused by use of the device in conditions other than those set out in this manual. The manufacturer reserves the right to make changes without notice to this documentary material or to the device to which it refers.

Safety pictograms:

	**Danger** indicates a condition or situation that may **cause death or serious injury**.
	**Warning** indicates a condition or situation that may **cause moderate injuries**.
	**Note** indicates **additional information, explanations or hints.**

Identification

Manufactured in Italy from:
OROTIG S.r.l.
Via XXV Aprile 47
37010 Cavalcaselle di Castelnuovo
del Garda (Verona) ITALY
for:
Neutec/USA®
7500 Bluewater Road NW
Albuquerque, NM 87121
USA

☎ +39 045 64 00 865
🖷 +39 045 64 01 104

e-mail: info@orotig.com

Phone: 505.839.3550
Fax: 505.839.3525

e-mail: neutecusa@neutec.com

Device:
L071F07N LASER WELDER, MOD. 'TOP ELEVEN' - 140J s0,1 C/W. CAMERA

The identification plate on the device displays its electrical characteristics and complete identification information.

Safety information

General safety rules

Touching live electrical parts can cause fatal damage or serious burns.
Improper installation or improper earthing of this appliance can be dangerous. Do not touch live electrical parts. Remove the power plug from the mains before installing or making repairs to the machine. Properly install and earth this device according to the instruction manual and in accordance with local standards and regulations. Always turn off the machine after use. Do not use weak or damaged cables, or cables of insufficient diameter or that are poorly connected. Make sure that cables are not near heat sources. Use the device only if in perfect condition. Repair or replace damaged parts immediately.

Never open covers, or attempt to repair or modify the device.
These actions may lead to electric shock and fire. Do not attempt to perform work on the device except as described in the maintenance section. Always keep all covers tight and in their proper location.

Do not look at or touch the laser beam.
Class 4 laser product: uncontrolled reflections of the laser beam may result in burning or, in the worst cases, irreparable damage to the eyes.

- Never use mirrors or reflective objects while the device is in operation
- Objects inside the welding chamber should be viewed exclusively through the viewing window located on the front of the device.
- Accidental eye exposure to laser radiation can cause cataracts and, in the worst cases, burning of the retina.
- Do not remove the hand curtains for any reason.
- Persons of small stature should not be near the hand curtains when the device is in use.

Operators are advised to protect hands by wearing appropriate UV protection gloves.

Wear provided safety glasses.
When the welding chamber is open or the bottom of the chamber is removed, the safety glasses provided MUST be worn, 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 EN 207 standard.

Laser welding can be dangerous.
Protect yourself and others from possible serious injury or death. Keep children away. Keep persons wearing pacemakers away, unless they are provided with specific medical consent. Welding, as with most work, involves risks. Welding is safe as long as proper precautions are taken. The welding risk is limited to manipulation of objects within the welding chamber. The process in itself is absolutely safe; in any case, it is important that the device be operated only by authorized personnel. INSTALLATION, MAINTENANCE AND REPAIR SHOULD ONLY BE PERFORMED BY HIGHLY QUALIFIED PERSONNEL.

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

Stop operations immediately if an unforeseen problem arises.
Stop the device immediately in the event a problem involving a burning smell, abnormal noise, abnormally hot parts, smoke, etc. occurs. There is a risk of electric shock or fire. Contact OROTIG Srl immediately.

Welding processes produce fumes and gas. Breathing these can be hazardous to your health.
Keep your head out of the fumes. Do not breathe fumes. Do not cover the vents on the device. Carefully read the instructions concerning the various types of metals, detergents and shielding gas. The device should optimally be installed in a large, specially dedicated room. If the room is small, please ensure that it is sufficiently ventilated. The shielding gas used for melting can gradually saturate the air causing discomfort or death. Do not weld near areas used for degreasing, cleaning, or spraying. Heat may react with vapors, producing toxic and irritating gases. Ensure that the metals are free from impurities that may cause fumes or gases during melting. Provide for the use of an auxiliary intake system or, alternatively, the use of a face mask.

Laser welding can cause fire or explosion.
Sparks and weld splashes can cause fire or burns. Never place gas or flammable liquids in the welding chamber. Bottles and objects containing gas or highly flammable liquids should be moved a safe distance away from the welding chamber. **Keep a fire extinguisher nearby in case of fire**.

Do not use water to clean the device.
Do not use water near the device when it is in operation. Do not place liquid containers above the device. Do not place the device in a moist environment (acceptable relative humidity is between 30% to 80%)or near sources which produce heat or moisture.

Protective clothing should be worn.
Wear protective clothing such as gloves, long-sleeved jackets, leather aprons, etc. Sparks and molten metal splashes can cause burns on the skin.

Do not cover the laser with blankets or fabric materials.
Do not cover the device during operation with blankets or fabric materials, as these may overheat and burn.

Perform regular maintenance.
Refer to the specific chapter in this manual and perform the suggested maintenance. In the event a problem arises, do not use the device; consult the manual and call for service.

The manufacturer assumes no liability for direct or indirect damages to persons, property or animals resulting from failure to comply with safety standards and the instructions contained in this manual.

Safeguards

Safeguards include all safety measures that employ the use of specific technical means (guards, safety devices) to protect people from dangers that cannot be reasonably limited by design.

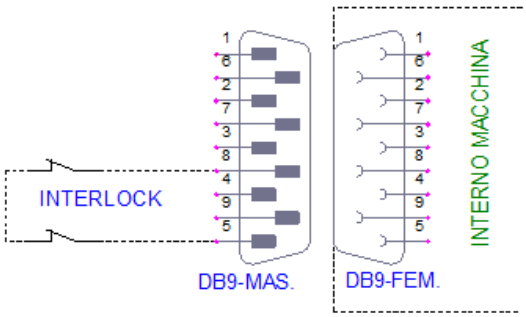
Tampering with the safeguards or any modification of the device may cause risks to users and other exposed persons.

Interlock

Description The interlock is a normally closed switch that should be placed on the access door(s) to the room where the device is located. The interlock switch electrical connections are shown in the figure below.

Purpose The Interlock switch serves to prevent operation of the laser when safety issues arise. This precaution is mandatory if working with the welding chamber open or when the bottom of the welding chamber is removed. A blind interlock connector is provided for use on the device with the bottom of the welding chamber inserted and under normal operating conditions.

Operation When the switch is opened normal device functions are disabled and a warning message is displayed on the screen until the switch is closed again.



The DB9 male connector, cables and switches are provided only upon request.

Leather curtains

Description Several layers of leather strips form a movable and permanent barrier at the access openings to the welding chamber through which the operator can insert hands and objects to be welded.

Purpose This safety device is necessary to prevent any potential radiation escaping from the welding chamber, and to prevent the operator or people close by from exposure to the flashes produced during welding operations, as well as to prevent any leakage of shielding gas in use.

Operation The leather curtain, which blocks the passage of laser radiation, is easily replaceable in the event the majority of the strips are damaged, bent, broken or cut through usage.

Resonator shutter

Description This device consists of motor-driven flag located inside the laser resonator system. The shutter cuts off the laser beam path within the resonator when the welding machine is in stand-by or in the event of an anomaly.

Purpose The purpose of this device is to prevent the generation of unwanted laser radiation.

Operation The shutter is activated when the power is turned on, before the device is activated.
Upon activation the shutter clears the laser path, and the device 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 machine is turned off the shutdown procedure closes the shutter; a check to ensure proper closure is then performed. Any anomalies will be shown on the display.
The resonator shutter movements are detected by an infrared sensor controlled by the movement of the motor shaft. Failure of the infrared sensor is detected by the microprocessor, which puts the system on alert, preventing normal operation of the device and showing the anomaly on the display.
Failure of the motor or its control driver is detected by the microprocessor by checking the ON/OFF movement times of the flag and showing an appropriate warning message on the display.

Infrared microscope filter

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

Purpose The purpose of this filter is to protect the operator's eyes from laser radiation leaks along the optical path of the microscope.

Operation Opaque at a wavelength of 1.064 nm, it prevents the passage of laser radiation.

Infrared welding chamber 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 EN 207 and EN 208 standards and is classified as OD6 for 800-109 DIR LB6 protection. It forms the viewing window of the welding chamber and is replaceable in case of breakage.

Purpose The purpose of this filter is to protect the operator's eyes from laser radiation during normal operation of the device and permit inspection of objects in complete safety.

Operation Opaque at a wavelength of 1.064 nm, it prevents the passage of laser radiation.

Emergency button

Description The emergency button is a red, mushroom-shaped switch positioned on the device for easy access by the user.

Purpose The button immediately stops the device, and is for use in the event of danger to the operator or the device.

Operation The button cuts power to all electrical parts/electronic equipment instantly.

Enabling key/PIN

Description An enabling switch operated by key or, alternatively, by an electronic PIN.

Purpose It prevents operation of the device by unauthorized personnel.

Operation Once the key is turned, or the PIN is entered, the device starts charging the internal circuitry and enabling laser emission.

Danger zones and residual risks

A danger zone is defined as any area within or near the device in which a person is exposed to risk of injury or damage to health. Residual risks for the operator exist during some device operation procedures. These risks can be eliminated by following basic work and behaviour rules or, more specifically, the procedures in this manual, and by using personal protective equipment if indicated.

This device should be installed solely and exclusively by personnel trained in its handling and who have completely read the safety instructions in this manual.

General rules

Before beginning regular use of the device it is recommended checking to ensure that it is in suitable working condition and that there are no defective or worn parts. Perform any necessary maintenance operations.

- Pay attention to the danger of electric shock from both direct and indirect contact caused by unexpected failures of the electrical system.
- Do not subject the device to severe impacts.
- Do not expose the device to fire, weld splashes, or extreme temperatures.
- Do not allow the device to come in contact with corrosive substances.
- Do not wash the device with water jets.

Before every use of the device

For proper use of the device, keep in mind the following guidelines:

- Never insert objects into the slots on the device.
- Always stop the machine by using the red button on the display after each work session, and turn off the main switch only after the machine has shut down.
- Perform the maintenance operations indicated in the maintenance section.
- If the laser output nozzle is dirty, clean it with a dry or slightly damp cloth. If it is very dirty, use a mild detergent such as alcohol. Never use thinner, gasoline, etc., as these may discolor or otherwise damage plastic parts. If the protective glass is damaged or overly saturated with metal, replace it with a new one.
- Use fingers delicately on the buttons and touch-screen. The use of metal or plastic points can damage the device. Press buttons one at a time; if multiple buttons are pressed simultaneously, the device may not respond properly or may even get damaged.

Transport precautions

- Make sure that the equipment is properly supported at the lifting point when moving.
- Do not stand directly in the path of applied force and do not place personnel where loads are not adequately supported by mechanical means.

Risk or Danger	PPE available
Crushing of the hands or limbs	Work gloves, protective overalls
Abrasion, cuts	Work gloves
Eye damage due to projected material	Protective eyewear and overalls

Precautions for packaging material

Keep the original packaging for future use.

- Always pack the device during transport and/or movement.
- The packaging consists of a cardboard box, a bottom and top layer of cell or expanded foam.
- Inspect the packaging when the device is delivered. In the event any anomaly is found, the customer should "conditionally accept" the delivery and provide an explanation.
- The customer should be careful when using box cutters or other cutting tools when opening the package.

Package content

The package contains the following items:

- Top Eleven/Top Twelve Laser Welder by OROTIG
- Enabling key
- User Manual (MAN00011)
- 8 m of polyethylene tube (6 mm I.D.) for compressed air and 3 m for shielding gas (MWW00703)
- Control pedal (RIC00W56)
- Hex keys: 2.5 mm, 3 mm, 8 mm (GAL01000, GAL01001, GAL01006)
- Plastic gas diffusor cones 3 pcs (ELC00042)
- Interlock switch (CV000085)
- 5-liter jug deionized water (FIR03001)
- Plastic syringe to fill/drain the coolant (LXA10004)
- Non-reflective protective glass (ATE00043)
- Fuses (OME00268) 6.3 x 32 type T 16A fuse
- Welding steel wire 30 cm (LAX10002)
- Steel test pieces 4 pcs (LVBEA002)
- Leica stereo microscope (LEI00050)
- Liquid drain pipe 1 m (EDI00012)
- USB key (OME00295)
- Armrest 2 pcs (RIC00222).

Installation

Transport

The information in this section must be followed when the machine is in one of the transport phases below:

- Equipment storage;
- Initial installation;
- Relocation;

The machine is normally supplied complete with special packaging that allows for easy transport and handling.
In the event the aforementioned packaging has not been provided, the machine must be moved using a forklift capable of lifting the machine mass (refer to the plate located on the machine), with the lifting forks positioned under the plate at the base of the device. Secure the machine to the lifting forks and ensure that it is perfectly balanced before lifting.

The crates should be moved using the lifting equipment taking the proper precautions and strictly observing the sense of direction indicated on the packaging. Please take normal and logical precautions to avoid collisions and overturning.
When storing the welding machine in its packaging, do not tilt it, place it in the upright position or turn it upside down. Doing so may cause the coolant to spill out.

Protect the device and any accessory equipment from the elements. Water and moisture can oxidize some parts of the device, causing irreversible damage.

Unpacking

After removing the packaging, check to ensure that the machine is complete and that there are no missing or damaged parts. If in doubt **DO NOT USE THE DEVICE**, and please contact the manufacturer.

Please keep all packaging materials for future use

Positioning

The device should be positioned in a location and environment suited to the use for which it was designed (laboratory use sheltered from the weather); such positioning should be performed by qualified personnel.

Acceptable temperatures	from + 10 °C to + 40 °C
Acceptable relative humidity	from 30% to 80%
Maximum height above sea level	2000 m

When positioning the laser welding machine, please take the following recommendations into consideration:

- Position the device on a flat, stable surface that extends beyond the base of the machine in all directions. Position the device so that there is more than 10 cm between the back of the machine and the wall.
- Leave enough space around the welder to permit adequate ventilation.
- Do not position the machine in places subject to rapid changes in temperature and humidity. Keep the device away from direct sunlight, strong light or heat sources.
- Do not position the welding machine near appliances that produce moisture, dust or heat (sanders, vaporizers, EDMs, ovens etc.).
- Position the device no farther than 1.5 m from an electrical outlet.

Preliminary checks

The device is delivered with liquid inside the cooling circuit. During the winter months the liquid is not placed inside the machine, rather a rinse is made with a 20% alcohol solution for the inspection. In this case a container of liquid coolant (deionized water) is placed in the package with an attached note.
In this case it is necessary to:

- run two rinses in the following manner: fill the tank half full with the supplied liquid (with the machine off), turn the machine on and the "on" button under the option H2O (Options > H2O), wait one minute and then drain the tank.
- Fill the tank completely with the machine turned off.

Electrical connections

Make sure that the power outlet is appropriate before connecting the power cable. Check the information on the plate located on the back of the machine for more information.

Make sure that the electrical outlet of the mains supply has a Schuko socket; the welder absorbs 10A at 230Vac.

Install a general duty safety switch upstream of the device's cable connection with the power grid.
The safety switch should be used in combination with a surge protection device equipped with an emergency shut-off switch (SPD).
The features of these devices should be designed to meet the regulations of the country where the device is being installed, and sized according to the specifications of the device.

Power supply tolerances

- Voltage at ± 10% of the rated voltage.
- Frequency: ± 1% of the rated voltage for continuous use ± 2% of the rated voltage for short periods
- Harmonic distortion for the sum of the second to fifth harmonics no more than 10% of the total voltage RMS between live conductors. Further distortion is permitted for the sum of the sixth to thirtieth harmonics up to 2% on the total RMS between live conductors.
- The voltage pulses should be no longer than 1.5 ms with a rise/fall time of between 500ms and 500µs and a peak value that does not exceed 200% of the effective value of the nominal supply voltage.
- The power supply should not be interrupted nor go to zero for longer than 3ms at any moment during power. There should be no more than 1s between two successive interruptions
- The voltage dips should not exceed 20% of the peak voltage for more than one cycle. There should be no more than 1s between voltage dips.

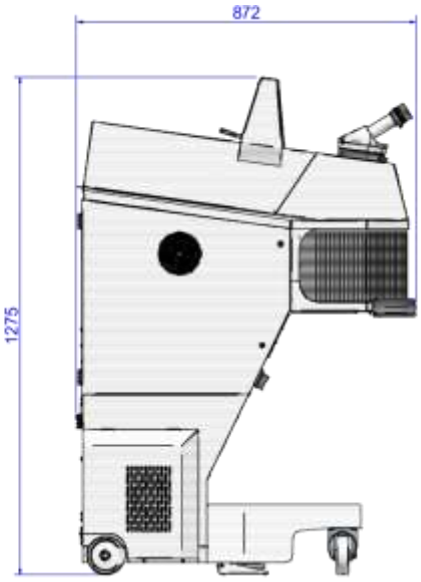
Device specifications

Technical specifications

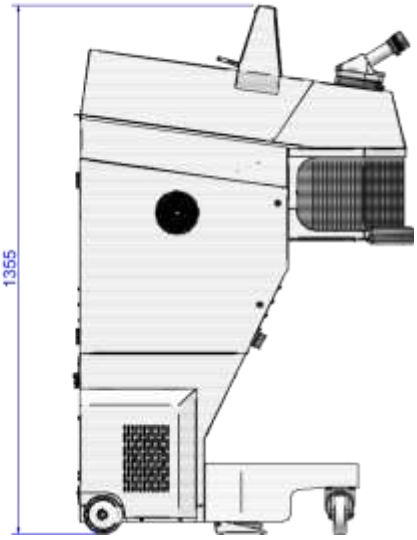
Model	L071F07N	
Operating voltage	230 Vac ± 10% 50/60Hz, single phase 10A	
Weight	95kg	
Noise	dBA < 70 LwA	
Operating temperature	10 - 40 °C (50 - 104 °F)	
Storage temperature	0 – 60 °C (32 – 140 °F)	
Humidity	30 – 90 %	
Cooling type	Liquid with internal chiller	
Laser class	Type 4	
Crystal laser	Nd:YAG	
Laser beam wavelength	1064 nm	
Max. power pulse laser	140 J	
Max. pulse duration	25mS	
Peak laser power	5.6 kW	
Average power	75W	
Max. firing repetition rate	20Hz	
Spot Size	0.1 ÷ 2.0 mm	
Duty Cycle (strokes/hour) (Tested at: 2kW 2ms 10Hz with room temperatures of 25 °C/77 °F)	Continual	
Dimensions (max.)		
Stereo microscope	Leica with 10X eyepieces	Leica with 10X eyepieces

The device offers the ability to adjust the height of the welding chamber using external controls:

Lowest height



Greatest height



Applicable standards and directives:

The device has been constructed in accordance with the provisions of the directive low voltage (LVD) 2014/35/CE, directive EMC 2014/30/CE and the following reference standards:

EN60825-1:2007-10	Safety of laser products Part 1: Product classification and requirements
IEC 60825-14:2014-02	Safety of laser products Part 14: User's guide
EN61326-1:2006-05	EMC standard for measurement, control and laboratory use
EN61010-1:2010-10	EMC standard for measurement, control and laboratory use
EN ISO 12100:2010	Safety of machinery. General principles of design. Risk assessment and risk reduction.

Intended use

Use the device for the welding of specific metal alloys. Only the following alloys may be used:

- Gold
- Palladium
- Cobalt chrome (CoCr)
- Silver
- Titanium
- Platinum
- Steel

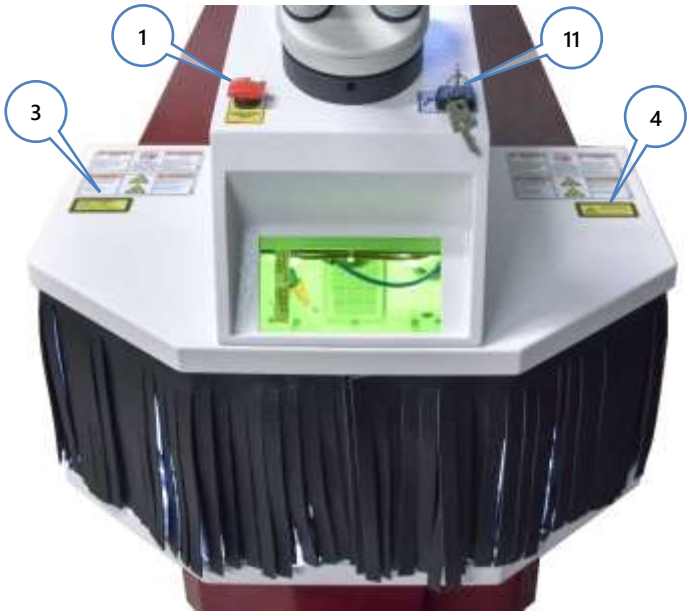
The metals and alloys listed above must not contain any of the metals listed in the section "Improper use".

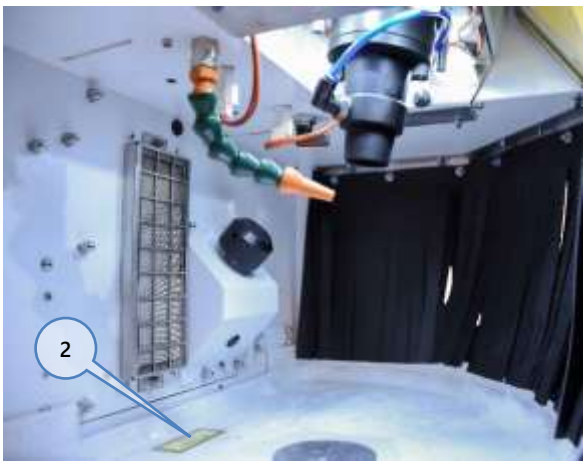
The shielding gas recommended for the welding process is Argon. Use only genuine parts and consumable materials from Neutec USA®. For technical assistance, please contact Neutec USA® Consumable materials should be replaced after use. Follow all regulations and safety instructions in this manual.

Improper use

Do not modify the device. Do not weld any metals or alloys that include any of the following materials: Beryllium, Uranium, Plutonium, Cadmium, Magnesium, Sodium, Mercury, Potassium, Lead, Arsenic.
Do not usetoxic orinflammable gasessuch as: Hydrogen, Oxygen, Fluorine, Chlorine, any form ofhydrocarbon gas, anymixtureof Hydrogenand Nitrogen.
Do not use Nitrogen when welding. Do not place any flammable materials along the path of the laser beam. Do not use any toxic materials or materials that emit explosive gas. Do not stare at the laser beam without protective eyewear.
Do not leave clothing of any kind along the laser beam path. Do not place any living or dead organisms in the laser beam. Do not use the laser welder to heat up food. Do not use the laser welder to dry clothes and materials.

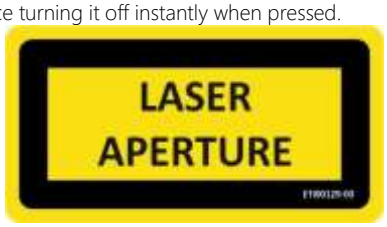
Labels and safeguards:





1. Emergency button, use only in case of emergency. Disconnects the power supply from the device turning it off instantly when pressed.

2. LASER aperture warning label located near the laser beam output inside the welding chamber (ETI00129):
LASER APERTURE This label indicates the laser beam output side

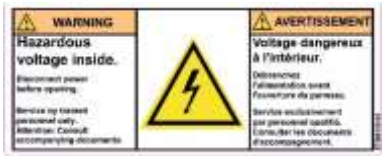


3. Laser emission characteristics label (ETI00375):
This label provides information about the emission characteristics of the laser beam, including:
   - Energy emitted (E)
   - Wavelength (λ)
   - Pulse duration (t)
   - Average power (P)

   It also displays the reference standard for laser product safety.

4. Laser product classification label (ETI00131):
LASER RADIATION AVOID EYE OR SKIN EXPOSURE TO DIRECT OR SCATTERED RADIATION.
CLASS 4 LASER PRODUCT:
This label indicates the dangers that might arise if the laser system is used improperly. In fact, the energy level of the laser generator used in this device is Class 4.

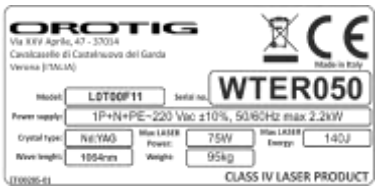
5. Danger of hazardous voltage (ETI00131):
This label indicates the presence of high voltage and possible electric shock: there is a risk of electric shock if the blanking panels are removed from the device.



6. Do not lift by the chamber (ETI00194):
This indicates the danger of damage to the welding chamber moving device if the equipment is lifted from this side.

7. Moving parts (ETI00193):
This indicates the presence of moving parts operated by the user and warns of the danger of crushing.

8. ID plate (ETI00285):
The laser generator included with the device is classified as Class 4. This means that the energy emitted is enough to cause serious damage to the eyes and skin.



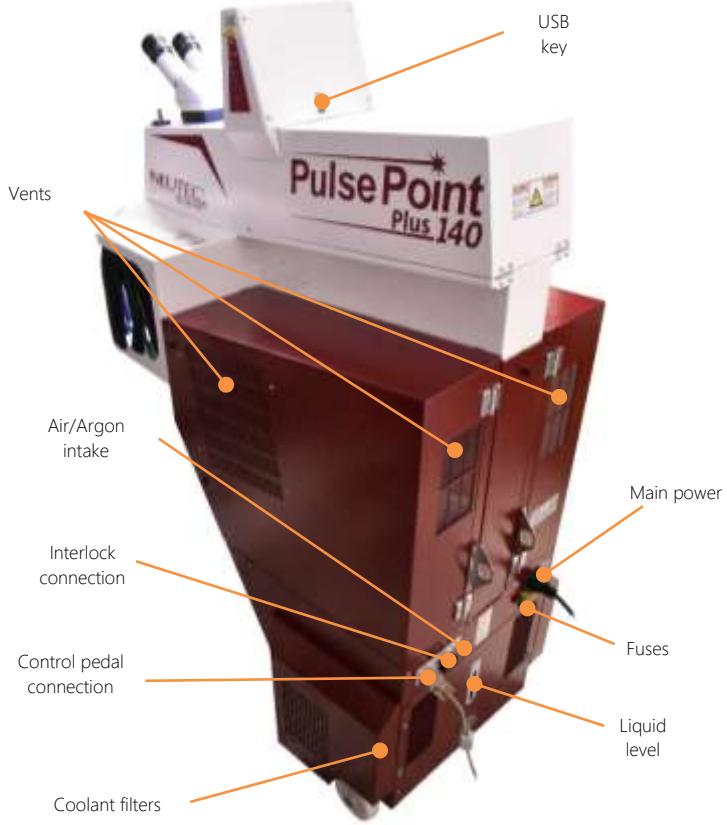
9. Use deionized water (ET00276):
This warning label indicates the type of coolant to use: only use deionized water, do not use additives or coolants.

10. Power input fuse type.
6.3 x 32 type-T 16A fuse.

11. Device enabling key:
Allows the use of the device only by authorized personnel possessing the enabling keys.

Operator interface

Controls and indicators



Use

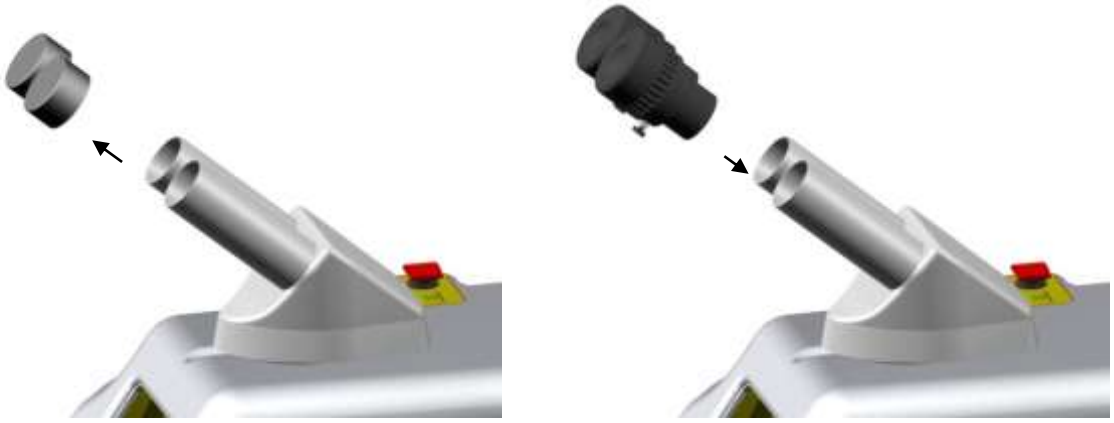
Please read the **Safety Information** section before using the device.

Recommendations

Before beginning regular use of the device it is recommended checking to ensure that it is in suitable working condition and that there are no defective or worn parts. Make sure that there are no defective, damaged or worn parts; perform any regular maintenance or repairs that may be required.

Positioning and ergonomics

Microscope eyepieces



Remove the caps that protect the stereo microscope, insert the eyepieces and, once positioned properly in the housing, tighten the fixing screw. Store the caps and eyepiece wrappers for future use.

One of the eyepieces has a crosshair for sighting, this is usually positioned on the right tube of the stereo microscope. The diopter dial may be adjusted: once the eyepieces are positioned properly, rotate the dial clockwise or counterclockwise depending on the focus you wish to achieve. Refer to the scale printed on each eyepiece.

Removing the bottom of the welding chamber

It is possible to remove the bottom of the welding chamber in order to work on particularly large objects. To do this, and to ensure compliance with safety regulations, a "controlled" laser operation area**,** or secure work area with restricted access must be created that is properly defined and marked with signs (Warning: Laser radiation), that may only be accessed by personnel wearing protective eyewear. The entrance to the controlled laser operation area must be connected to the interlock switch that prevents operation of the unit (please refer to the chapter Using the Interlock Switch). To remove the bottom of the chamber, unscrew the 6 screws indicated in the figure and push the panel downward, keep it for future use.

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 EN 207 standard.

Positioning of the welding chamber

By using the control shown in the figure, located inside the welding chamber, the position of the welding chamber may be adjusted in order to adapt it to different user needs. The chamber may be adjusted to height differences of about 10 centimeters.

Caution: Danger of crushing! Do not place any object in the chamber's path of motion.

Visual display and coaxial chamber

The device has an 8.4" high-resolution, touch-screen TFT display, which permits both viewing and setting of welding parameters. The same display shows the welding area through the coaxial chamber of the stereo microscope; in this mode a crosshair is displayed on the screen to indicate the point of impact of the laser beam. Switching between the display of the welding area and working parameters is possible by touching any point on the touch-screen or by activating the encoder. The display view switches automatically from the welding parameters to the welding area when the welding parameters are not in use (see display timeout) or by using the "CAM" button.

It is possible when viewing the welding chamber to access an OSD menu to improve the chamber image. There are 5 buttons for the OSD display settings:

1. SW1 - Menu
2. SW2 - Down
3. SW3 - Up
4. SW4 - Exit
5. SW5 - Input

Using the OSD GUI (welding area view only)

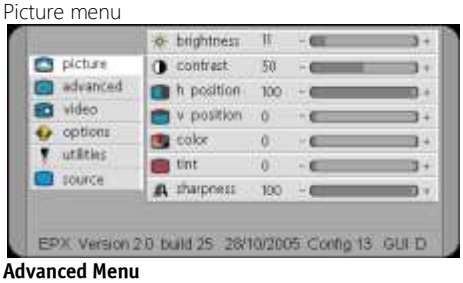
- Press the SW1 button to bring up the GUI
- Select the desired menu by pressing the SW2 - SW3 buttons
- Press the SW1 button to confirm the menu selection
- Select the desired submenu by pressing the SW2 - SW3 buttons
- Press the SW1 button to confirm the submenu selection
- Make changes by pressing the SW2 - SW3 buttons
- To deselect the menu/submenu and exit from the GUI, press the SW4 button

GUI Quick menu (OSD)

- Press the SW2 - SW3 buttons to bring up the Contrast/Brightness quick menu
- Press the SW1 button to change quick menu
- Make changes by pressing the SW2 - SW3 buttons

GUI Organization

Picture menu



Advanced Menu

- **Brightness:** adjusts the brightness
- **Contrast:** adjusts the contrast
- **H position:** adjusts the horizontal hold of the image
- **V position:** adjusts the vertical hold of the image
- **Color:** adjusts the color percentage
- **Tint:** compensates for tint errors with NTSC signals
- **Sharpness:** adjusts the definition

- **Sharpness:** adjusts the image definition
- **Range:** sets the range correction between linear and CRT
- **Color matrix:** enables or disables the ability to vary the color temperature
- **Color temp:** adjusts the color temperature using preset settings
- **User red/green/blue:** adjusts the temperature for every single color (function only enabled when Color Matrix is selected)

Turning on the device

Move the power switch located on the front of the device to position I. Wait until the display shows the startup screen. Insert the enabling key and turn it to position I. After a few seconds the welding parameters screen will appear.
Use the chamber adjustment controls to adjust the desired height, then set the desired parameters on the display according to the metal to be welded. Use the control pedal to perform the welding.

Emergency Stop

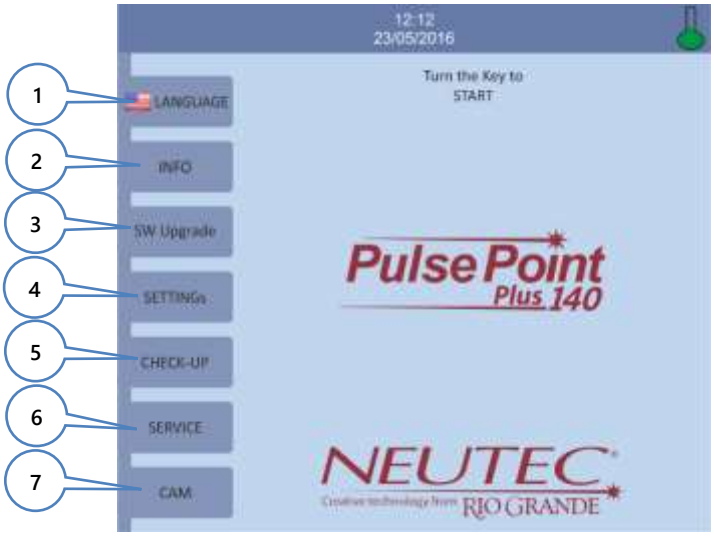
The emergency button (see Ch. 14) is used to immediately switch off the device; This pulsed is equipped with a safety feature, once it is pressed it must be pressed again to release it. Use the button only in case of danger or failure.

Example of practical use

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

Stand-by menu

At startup, the welding machine is in standby mode and the following screen appears:



The device status bar informs you of the device's status: Standby, Ready, the date and time of the work, etc.), and the status of critical components of the device, such as for example, the temperature of the cooling liquid. This screen permits the selection of parameters such as:

1. Select LANGUAGE

This menu allows the user to select the language for the device. Available languages are: Italian, English and Chinese.

2. Menu INFO

This screen allows the user to view product information, in particular the firmware version currently installed.

3. Firmware Update

This allows the user to update the laser's firmware using the USB key. Remove the USB key from the connector and insert it into a PC to copy the update files.

DO NOT open OR edit these files for no reason!

Put the key back in the laser and select the Firmware Update button
Press the Upgrade button and follow the instructions that appear on the screen.

DO NOT disconnect or turn off the device during the update process.

After a few seconds the screen will go completely white and remain so for about 30 seconds until the upgrade is complete. After the update is complete the initial screen appears requesting the user to power cycle the system. Check the successful firmware update using the Info button.

4. Settings

This menu allows the user to set the date and local time.

5. Check-up

Allows the user to view the temperature of critical components (pool and electronics), activate the liquid pump and check the liter reading of the flow sensor and check the status and the number of full and partial shots of each lamp.

6. Service

The service menu is protected by password and is accessible only to personnel authorized for the repair of the device.

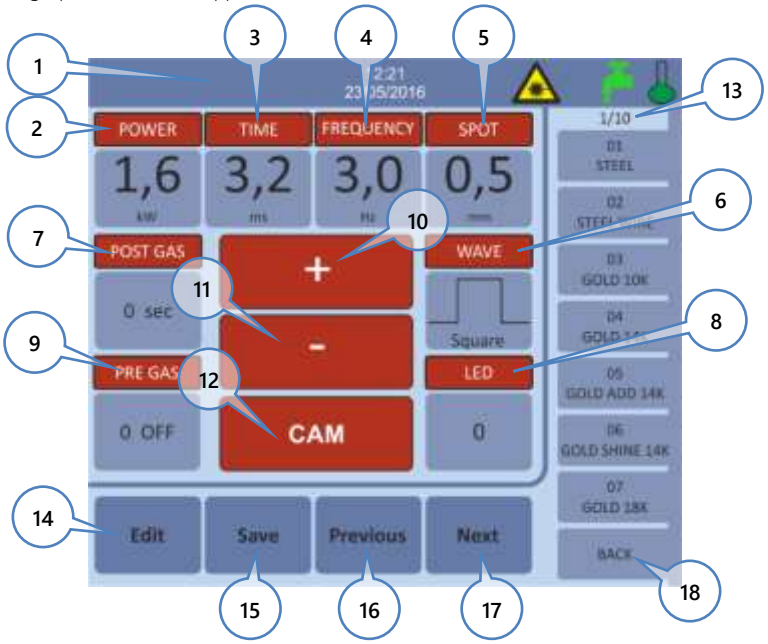
7. Cam

This button switches the view to the welding chamber, after a few seconds of inactivity on the touch screen the display automatically shows the welding area; by touching anywhere on the touch screen the display returns to the Standby menu

Turn the key from O to I to start the work session. After the preliminary checks and the charging of the internal circuits has completed the Operation menu will appear.

Operation menu

From the Home menu (Standby), turn the key to I (ON) to start the work session; at this point a screen appears with the message "Charging ..." to indicate for the user to wait while the checks and preparations for starting work are being performed. Once this phase is completed, the welder is ready, and the following operation screen appears:



Buttons 2 - 8 may be selected either from the touch-screen or the encoder located inside the welding chamber. To select a field with the touch screen, press on the label of the parameter. To select a parameter with the encoder rotate up to highlight the desired parameter and press the encoder to activate the parameter change; the field containing the value turns green when selected.

1. **Machine status bar:** Provides information about the machine's status.
2. **Power:** Indicates the laser pulse power from a minimum of 0.5kW up to 5.2kW.
3. **Time:** Indicates the laser pulse duration from a minimum of 0.5ms up to 25ms.
4. **Freq:** Indicates the laser pulse repetition rate from a minimum of 0 Hz (single shot at every pedal push) up to 20Hz.
5. **Spot:** Indicates the diameter of the welding spot at the focal point of the microscope, from 0.1 mm up to 2.0 mm.
6. **Wave:** Indicates the shape of the laser pulse wave: there are 5 waveforms (see Pulse Shaping).
7. **Postgas:** Indicates the time that the solenoid valve of the shielding gas remains open after the pedal is released, from 0 seconds (no activation of the solenoid valve) up to 9 seconds.
8. **LED:** increases/decreases the intensity of the lamps inside the welding chamber.

9. **Pregas:** This button switches the operation mode of the solenoid valve for the release of shielding gas: when OFF, the pedal activates the solenoid valve and the laser simultaneously; when ON, pressing the pedal activates only the solenoid valve and pressing it again activates the laser.

If the Postgas parameter is set to 0, the solenoid valve is not activated and the "Pregas" parameter is ignored.

10. **+** Increases the selected parameter.
11. **-** Decreases the selected parameter.
12. **Cam:** This button switches the view to the welding chamber, after a few seconds of inactivity on the touch screen the display automatically shows the welding chamber; touching anywhere on the touch screen the display returns to the welding parameters.
13. Location of the memory cell pages, there are 70 memory cells displayed 7 at a time.

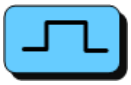
Refer to chapter "Memory Cells and Saving of Welding Parameters" for more information on the use of the following buttons:

14. **Edit:** To change the name of a memory cell.
15. **Save:** To overwrite the parameters in a memory cell.
16. **Previous:** To view the previous page of memory cells (see Ch. 13)
17. **Next:** To view the next page of memory cells (see Ch. 13)
18. **Back:** Recalls the parameters used in the last session, cancels the "Edit" and "Save" functions.

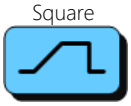
Pushing the pedal will generate a laser pulse with an energy amount corresponding to the "Power" value multiplied by the "Time" value, and a diameter equal to the "Spot" value and a repetition frequency equal to the "Frequency" value. The center of the crosshair viewed through the eyepieces of the microscope indicates the point of impact of the laser beam.

Waveform (Pulse Shaping)

The laser pulse can make the following waveforms:


Square

A universal wave form where the set energy is delivered for the set time, ideal for all types of metals


Slope Up

Using this waveform the first 20% of the set time provides a gradual increase in the energy until it reaches the set value, ideal for highly reflective metals


Slope Down

Using this waveform the last 20% of the set time provides a gradual decrease to 0, ideal for opaque or poorly reflecting metals.


Trapezoid

This waveform is a combination of the previous two, ideal for silver-rich metals.


Pulsed

Using this waveform the energy is generated as a chain of pulses for greater piercing effect, ideal for all metals.

Memory Cells and Saving of Welding Parameters (EDIT/SAVE)

Using the "EDIT" button allows the user to rename the programs in the welding machine. When the "Edit" button is pressed the user will be prompted to select a cell from those available, press the "Edit" button again to edit and confirm the new name.

Using the "SAVE" button allows the user to overwrite a memory cell with the parameters currently in use. Press the SAVE button once and select the memory cell to overwrite, then press the SAVE button again to confirm.

Accessory functions

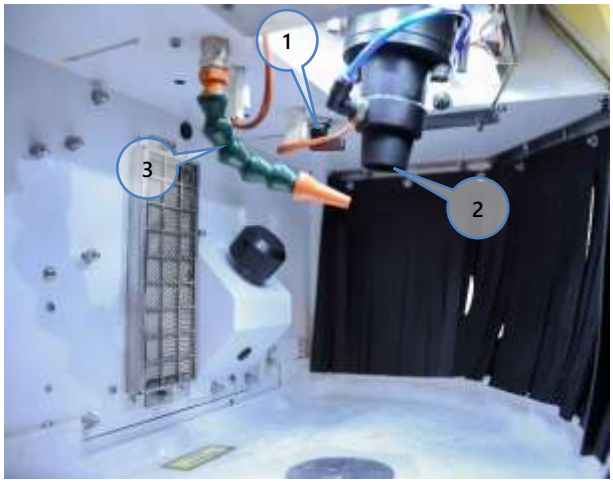
Use of the air dispenser/shielding gas

All devices are equipped with:

- An adjustable tube to direct air or shielding gas.
- A slide holder with holder cone.
- A slide holder without dispenser.

Either system may be used as desired to dispense the shielding gas or cooling air.
The gas/air output is controlled by a solenoid valve, which is activated by pushing the pedal if the "POSTGAS" parameter on the display has a set value other than 0. (See "Work Session").

The input pressure must not exceed 4 bar. Do not use pressures that exceed the limit as this may damage the control valve.



It is generally recommended to use shielding gas with the coaxial cone only for welding titanium, cobalt-chrome and steel.
The recommended pressure for shielding gas (argon) is 0.1/0.2 bar, a light puff is generally sufficient to shield titanium, cobalt-chrome and steel objects. Use the transparent cone in the cone holder to direct the flow to the welding point.
Be sure that the lever (1) is turned to a position that releases the gas from the conveyor cone (2).

It is recommended to use compressed air for welding silver or gold objects. Connect compressed air (maximum 4 bar) to cool the metal during long welding processes. Position the adjustable tube (3) near the item to be welded.
Be sure that the lever (1) is turned to a position that releases the air from the adjustable tube (2).

Maintenance

Please read the chapter on **Safety Information** before proceeding

Every maintenance operation, even minor ones for machine parts and the electrical system, requires the use of professionally qualified personnel with training on the features of the device.

Original spare parts should be used. The use of non-original spare parts releases the Manufacturer from any liability.

Regular inspections

Check the integrity of the laser radiation safety glass on the KG3 viewing window and the leather curtains for hand access to the welding chamber daily**;** if they need to be replaced, contact the manufacturer. Using the device with broken glass or without the curtains is DANGEROUS and can cause health damage. Check the status and the integrity of the safety labels and ID plate every six months**,** contact the manufacturer if they are discolored or illegible.

Checking the coolants

Check the level of coolant each month, a label on the back of the machine indicates the minimum and maximum level for proper operation. Remember that the coolant should be changed at least once a year, if possible before a lengthy machine downtime period.

Checking the filters
Check the status of the filters in the welding chamber and front compartment each month. Please refer to the section "Cleaning the filters".

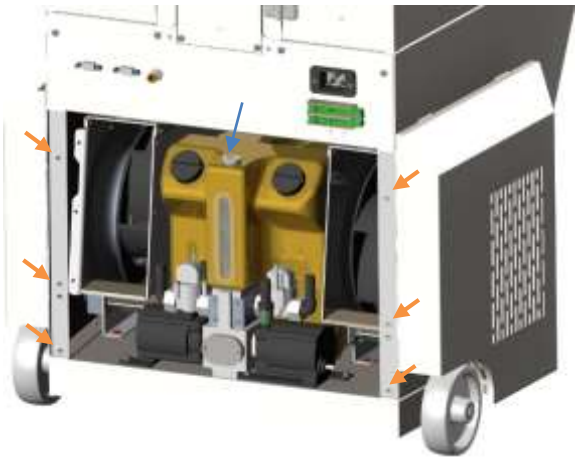
Checking the resin filters
The integrated cooling system has two resin filters to soften the liquid. These filters should be replaced once every 12 months.

Checking the protective glass slide
Check the AR glass at least every three months, if it is damaged or very dirty with metal, replace it. Dirty or damaged glass can decrease the energy yield.
This special anti-reflective glass is attached to the optical path outlet by means of an aluminum ring; this ring is held in place by two knurled brass latches. If necessary, clean the glass using delicate paper without degreasers or other solutions.

Routine Maintenance
The routine maintenance operations described in this chapter do not required special training, they can be performed by any operator, provided that the directions concerning the risk associated with routine maintenance are followed. The maintenance operations indicated in this manual are authorized by Neutec USA® and do not involve changes to the general conditions of warranty.

Removal of the liquid
Remove the back panel of the unit by removing the screws shown in the illustration, open the cap on the rear tank of the device. Insert the enclosed silicone tube and use the syringe to cause the liquid to come out. Collect the liquid in a container, waiting until the tank is completely empty.

Filling/refilling the liquid
Remove the back panel of the unit by removing the screws shown in the illustration, open the cap on the rear of the device. Fill with deionized water until the level in the sight glass reach the highest level indicator; the tank holds about 8 liters of liquid (cod. FIR03001).



Cleaning the filters

Failure to maintain these filters can impair the device's performance.

Do not cover the vents on the device with cloth or other materials. Leave at least 10 centimeters of space between the vents and walls or obstacles. Failure to do so may compromise the efficiency of the device.

Welding chamber filter

Welding chamber filter: remove the two nuts indicated in the illustration using key number 7, replace the filter with a new one (cod. RIC00229).

The welding chamber filter is made of fire-retardant polyester material, but if very dirty and filled with dust and smoke, it can catch fire.

Front filter

Front filter: unscrew the knobs shown in the illustration and remove the panel to access the filter, remove it and clean it with compressed air; replace it if necessary (cod. IFA00313).

Removal/Replacement of resin filters

Remove the back panel of the unit by removing the screws shown in the illustration, unscrew the caps that block the filters and remove them. Replace with new filters (cod. RIC00254).

Replacing the protective glass slide

To access the glass slide, do the following:

- Unscrew the two brass latches of the support ring;

- Move the glass cone holder-ring so that comes out;

- Clean the surface with a soft, non-abrasive cloth; NEVER ATTEMPT TO REMOVE ANY METAL FORMATIONS WITH A TOOL; REPLACE THE SLIDE WITH A NEW ONE IF NECESSARY;

- Replace the glass into position, place the glass cone holder-ring and carefully tighten the two brass latches.

Replace the glass (cod. ATE00043) any time it is covered with metal and/or chipped, further use of glass in these conditions can result in damage as well as a decrease of the output power.

Replacing fuses

Disconnect the equipment from the power supply before removing the fuses

- Using a flat screwdriver turn the caps on the back of the machine counter-clockwise.
- Remove the fuses from their position and replace them with new ones. OME00268 6.3 x 32 type-T 16A fuse.
- Replace the fuse holder.

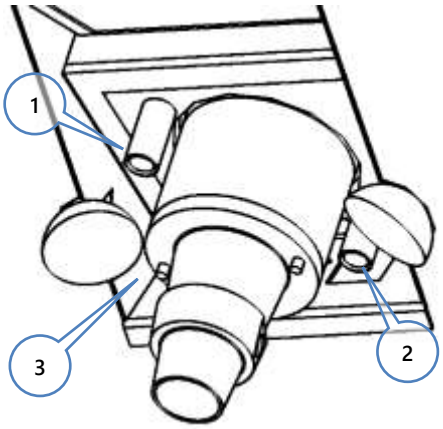
Replacing with fuses of a type or amperage different from those supplied may result in malfunction and damage to the device.

Checking alignment

- Set the following parameters 1.0KW, 1.0mS 0Hz and minimum SPOT size.
- Insert a piece of flat metal and fire a shot.
- Check the location of the spot produced against the crosshair; if the spot intersects the crosshair in the center is not necessary to correct the alignment.

Correcting the alignment

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



With the device in standby, locate the screws close to the cone slide holder as shown in the illustration.

Never touch the screw no. 3, the one between the other two screws without a guide. This screw has been placed there by the manufacturer. Using the 3 mm hex key, loosen screws 1 and 2.

- Turning screw no. 1 moves the welding point horizontally.
- Turning screw no. 2 moves the welding point vertically.

Use slight movements and small shots on a piece of metal to verify the correct positioning of the crosshairs. Continue until the crosshairs coincide perfectly with the welding spot.

The screws for the alignment have brass guides to make them easier to identify.

To facilitate the alignment procedure, the crosshairs bear the symbol ▲, which indicates the highest point. make sure this symbol is pointed upwards and complete the alignment as described above.

Only use the viewing window to inspect the inside of the welding chamber, it is a good rule to put the device in standby before adjusting the screws to prevent accidentally activating the laser.

Repairs

Repairs should only be made in the event of an anomaly, see the chapter **Diagnostics** for more information.

Repairs should only be performed by Neutec USA® personnel or personnel it has authorized.

Recommendations

The following recommendations will optimize the efficiency of the device:

- The device should be stored in a location that is not too hot and away from heat sources; the higher the temperature of the environment, the lower the efficiency of the cooling circuit/heat exchanger.
- Keep away from equipment that produces moisture or dust, such as sand blasters, vaporizers, etc.
- Follow the directions in the manual, and read the sections on safety and maintenance.
- Use only original spare parts specified in this manual.
- Only use deionized water as a cooling liquid, the use of water or liquids different from that indicated may affect device operation.
- Ensure that safety devices are working properly.

Diagnostics

Errors and Warnings

In the event one of these messages appears on the display, take the action described in the "Solution" section of the message.

ERROR: Cod. 1 Flux 1

Problem: The flow sensor of the first hydraulic circuit does not detect any liquid.
Solution:
- Check that the liquid level is correct.
- Make sure that the cooling circuit line filters are not clogged.
- Contact technical support.

WARNING: Cod. 2 Remote

Problem: The remote interlock switch contact is open
Solution: Close the contact to restore the work session.

ERROR: Cod. 3 Precharge 1

Problem: The first circuit of the pre-charging of the capacitors does not activate.
Solution:
- Check the electrical system.
- Make sure there are no problems with the electricity.
- Ensure the correct operating voltage.
- Contact technical support.

ERROR: Cod. 4 Shutter

Problem: The safety shutter on the cavity does not close or does not work properly.
Solution: Contact technical support.

WARNING: Cod. 5 H2O Hot

Problem: The temperature of the cooling liquid is too high.
Solution:
- Wait for the device to automatically return to normal; do not turn it off, leave it on to speed up the cooling process.
- Check that the vents are open and not blocked.
- Check the condition of side filters and clean or replace if necessary.
- If automatic recovery does not happen, contact technical support.

WARNING: Cod. 6 CCPS Hot 1

Problem: The temperature of the electronic circuits for the first lamp is too high.
Solution:
- Wait for the device to automatically return to normal; do not turn it off, leave it on to speed up the cooling process.
- Check that the vents are open and not blocked.
- Check the condition of side filters and clean or replace if necessary.
- If automatic recovery does not happen, contact technical support.

ERROR: Cod. 7 Simmer 1

Problem: The firing circuit of the first lamp is not working or the lamp does not light.
Solution: Contact technical support.

ERROR: Cod. 8 MPP Zero

Problem: The motor of the focus for the welding spot does not move or does not reach the zero point.
Solution: Contact technical support.

WARNING: Cod. 9 H2O Cold

Problem: The temperature of the cooling liquid is too low.
Solution:
- Wait for the device to automatically return to normal, do not turn off the device.
- Check that the vents are open and not blocked.
- Check the condition of side filters and clean or replace if necessary.
- If automatic recovery does not happen, contact technical support.

ERROR: Cod. 10 Flux 2

Problem: The flow sensor of the second hydraulic circuit does not detect any liquid.
Solution:
- Check that the liquid level is correct.
- Make sure that the cooling circuit line filters are not clogged.
- Contact technical support.

ERROR: Cod. 11 Vcap low 1

Problem: The voltage on the first bank of capacitors has not reached the required value or is not charged.

Solution:
- Check the electrical system.
- Ensure the correct operating voltage.
- Contact technical support.

ERROR: Cod. 12 Vcap High 1

Problem: The voltage on the first bank of capacitors has reached its limit.

Solution:
- Check the electrical system.
- Ensure the correct operating voltage.
- Contact technical support.

WARNING: Cod. 13 IMS hot 1

Problem: The temperature of the first IMS circuit for the flash guide lamp is too high.

Solution:
- Wait for the device to automatically return to normal, do not turn off the device.
- Check that the vents are open and not blocked.
- Check the condition of side filters and clean or replace if necessary.
- If automatic recovery does not happen, contact technical support.

ERROR: Cod. 14 Precharge 2

Problem: The second circuit of the pre-charging of the capacitors does not activate.

Solution:
- Check the electrical system.
- Make sure there are no problems with the electricity.
- Ensure the correct operating voltage.
- Contact technical support.

WARNING: Cod. 15 IMS hot 2

Problem: The temperature of the second IMS circuit for the flash guide lamp is too high.

Solution:
- Wait for the device to automatically return to normal, do not turn off the device.
- Check that the vents are open and not blocked.
- Check the condition of side filters and clean or replace if necessary.
- If automatic recovery does not happen, contact technical support.

ERROR: Cod. 16 Vcap High 2

Problem: The voltage on the second bank of capacitors has reached its limit.

Solution:
- Check the electrical system.
- Ensure the correct operating voltage.
- Contact technical support.

ERROR: Cod. 17 Vcap low 2

Problem: The voltage on the second bank of capacitors has not reached the required value or is not charged.

Solution:
- Check the electrical system.
- Ensure the correct operating voltage.
- Contact technical support.

WARNING: Cod. 18 CCPS Hot 2

Problem: The temperature of the electronic circuits for the second lamp is too high.

Solution:
- Wait for the device to automatically return to normal; do not turn it off, leave it on to speed up the cooling process.
- Check that the vents are open and not blocked.
- Check the condition of side filters and clean or replace if necessary.
- If automatic recovery does not happen, contact technical support.

ERROR: Cod. 19 Simmer 2

Problem: The firing circuit of the second lamp is not working or the lamp does not light.

Solution: Contact technical support.

ERROR: Cod. 20 COM fail

Problem: There is no communication between the internal circuit boards.

Solution: Contact technical support.

ERROR: Cod. 21 Syncronizing

Problem: There is a problem with the synchronization signal between the circuit boards.

Solution:
- Wait for the device to automatically return to normal, do not turn off the device.
- If automatic recovery does not happen, contact technical support.

Revision:	Date	RM	Drafted by:	Approved by	Notes
00	12/05/2011	-	-	-	First draft
01	17/06/2016	-	-	-	