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LSRCLNR-200-300PC

REDSABRE

200/300 PC LASER CLEANERS

Compact, Air Cooled Fiber Laser Cleaner
200/300 Watt Output
1064 nm wavelength

*Safety, Setup and General Use Guide for Hand Held Operation**

FDA Accession#:;
FDA Product Code:

**This is a safety and general use guide. It is considered to be a functional manual based off of engineering/factory supplied data that covers necessary and essential operation information. It also provides basic information for safe operation of the laser cleaning systemr.*

Contact:
Everlast Welders: sales@everlastwelders.com
380 Swift Ave. Unit 12
South San Francisco California, 94080
1-877-755-9353 Sales: Ext 201, Technical Support: Ext 207, Parts Ext. 206
Serial Number:_____
Manufacturing Date:_____ Purchase Date:_____
LSO Officer:_____ Employee Initials and Review Date:_____

IMPORTANT NOTICE: This Laser Cleaner is classified as a CLASS 4 Laser.

NOTICE: *The purchase or use of this product may require a trained Laser Safety Officer (LSO) to be present on premises and/or installation of a Class 1 laser safety enclosure. Annual reports and/or registration with local and state authorities may also be required.*

If you are using this product for the first time, please read this manual carefully before installation and use. Please carefully read the contents marked "Danger", "Warning" and "Caution" in this manual, and carefully identify the Safety signs and Warnings to ensure the safety of you and the people around you.

Symobol	Signal Word	Meaning
	**ELECTR0CUTION SHOCK DANGER!**	**DANGER!** Risk of electric shock or electrocution. Do not touch any area that bears this symbol.
	**LASER PRESENT WARNING!**	**WARNING!** Watch out for lasers. Note the wavelength of laser radiation. There is a danger of laser radiation. Take appropriate protective measures. Don appropriate PPE while in this area.
	**CAUTION!**	**CAUTION!** Be careful. Possible or emerging hazard. If you do not follow the instructions, it may cause damage and malfunction of the equipment or harm to yourself and others.
	**FIRE WARNING!**	**WARNING!** Watch out for fires and combustible materials. The use of a laser creates sparks. The laser beam itself may create a fire if directed in the wrong area or carelessly handled.

WARNING! Never point the laser gun/torch toward anyone. Always watch angles of reflection. Never allow the laser to reflect from shining or the mirrored surface or off of other highly reflective materials.

WARNING!

California Proposition 65 Warning:

This product, when used for welding or cutting, produces fumes or gases which contain chemicals known to the State of California to cause birth defects and in some cases, cancer. (California Health & Safety Code § 25249.5 et seq.)

Warning: Cancer and/or Reproductive Harm

www.P65warnings.ca.gov

WARRANTY NOTICE:

Fiber lasers are reliable and can be of service for relatively long periods of time if proper care is taken. The warranty will cover against breakage and repair of the main components in general. However, It does not cover or protect against damage, breakage or wear of consumable items or damaged caused by misuse, neglect or failure to follow operation instructions and warnings. Consumable items are defined as items such as nozzles, wire feed tubes, protective cover lenses, focus lenses etc. that wear when used or have a service life based off of recognized patterns of use.

NOTICE: The fiber laser welder is built as strong and durable as technology allows. However, there are parts of the system that are vulnerable to damage. Proper maintenance and handling of the following items must be observed to keep warranty in effect. Damage occurring to the following as a result of the causes listed will not be covered in any circumstance unless it occurred during shipping.

- The gun (torch head). To prevent gun (torch head) damage:
    - Handle the gun gently. Do not bang or throw it around as is commonly done with a MIG gun or even a TIG torch. The gun contains sensitive adjustments and lenses which can become permanently damaged, broken or misaligned.
    - Do not drop the gun at any time. Make sure the gun cable arranged so that it is not a trip hazard. Tripping over the cable may jerk the gun off the table and damage the cable.
    - Store the gun properly. Keep the gun cable coiled lightly on the cable holder located on the side of the cleaner or in its designated spot. Do not let it remain on the table or in the work area if the gun is left unattended. Follow and maintain a proper storage routine.
- The fiber cable. To help prevent damage to the fiber cable that carries the beam to the gun exercise care and caution in handling. *Be sure not allow the following to happen.*
    - Do not drive over or step on the fiber (torch) cable. Do not roll the welder itself over the cable This will damage the fibers in the cable or the cable coating/covering.

- **Do not kink the cable.** Do not bend the fiber cable more than 60° angle. It should not have a sudden or sharp bend in the cable, rather the cable should be radiused to form the 60° angle.
- **Make sure the gun is not dragged or pulled against a sharp edge, corner or table top which may kink the gun or cut the fiber cable.**

NOTICE*:* Failures of the gun and cable are rare, but when they do fail, the failure is almost always due to one of the above listed issues. The warranty does not guarantee against such damage.

- Protective Lens
  - The Protective lens is considered a consumable. Also the protective lens is relatively cheap and a generous supply should always be on hand. It is also important to regularly replace the protective lens of the laser mounted in the gun (torch head).
  - The unit should never be operated with a known defect, or burn in the lens.
  - Inspect these frequently until you understand the "wear" time of a protective lens. Smudging, smoke etc. all play a factor in this. If you notice any change or decline in laser quality or strength, stop and change the protective lens right away. Failure to do so may result in other cascade damage and failures of the focus lens, the reflective mirrors etc. *Damage occurring to the gun (torch head) assembly and its related components as a result of failure to change the protective lens is not covered under warranty. Make sure any employee is instructed on this and shown how to change the protective lens. Make sure to maintain an adequate stock of them.*

Product Overview:

The REDSABRE 200/300 models are pulsed- wave fiber-type hand held laser cleaning systems that are designed for designed for paint, rust/scale, and finish removal activities found in general automotive and welding applications. However, the laser cleaning system can be used for cleaning in several other notable applications as well.

1. Pre and Post Weld cleaning and surface preparation or for use in the passivation process on stainless steel.
2. De-scaling of metal mill finish, coatings and light to medium rust removal is used on metal.
3. Removal of oxidation and coating layers on metals such as aluminum.
4. General paint and finish removal on multiple surfaces such as wood.
5. Near surgical-removal of protective coatings on other items such as paint/varnish on wood.
6. Refreshing and removal of surface mold and contaminants of surface of brick, stone, and concrete.

Laser cleaning technology has been around for over 50 years, but fairly recent advancements in modern fiber laser technology has made laser cleaning a compact and affordable solution to sand, media, and water blasting technology. Technological advancements in Fiber laser technology have made laser cleaning an appealing, affordable and generally more accessible process than it was previously. to smaller and more diverse operations.

Two basic forms of laser cleaning technology exist

1. Continuous wave technology. With this technology the laser is on continuously, using a single point laser that scans side to side or in a pattern to provide cleaning action of the surface. The strength of this laser is suited for heavier objects where moderate heating isn't a concern. This type of laser can also deeply etch and resurface the metal if not used properly.
2. Pulse laser technology has improved the ability of lasers to be applied in more applications with reduced heat input and deformation of the base material while using less continual wattage than a continuous wave. The increased ablation efficiency is accomplished through the pulsed impact of the laser on the surface and through incineration.

The pulsed wave laser scans across the area using a pulsing laser beam that rapidly oscillates to create a cleaning pattern. The cleaning pattern can be selected from a number of patterns, each with its own unique suitability for particular items to be cleaned. To some extent the cleaning pattern selected affects the speed and the efficiency of cleaning. '

WARNING! It's important to understand and remember that this is a Class 4 laser. This is the strongest and most powerful class of lasers. The FDA controls distribution and operation of lasers in this country regardless of application or industry in which it is to be used. Rules and governing bodies are different for the operation of laser welders than they are for traditional arc welders. Lasers should not be operated in open environments, especially where other people are present. A class 1 laser enclosure is typically required where other people cannot be excluded from the work place. At a bare minimum, a Laser Safety Officer should always be present during the operation of the laser. Training and certification to be a Laser Safety Officer is relatively inexpensive and is available from multiple sources including in-person seminars and online courses. Many Lase related OSHA regulations also are specific to lasers and different from conventional arc welders. Be aware of these differences and practice them.

The laser beam is invisible to the naked eye but it can create great harm to unprotected eyes and skin in an instant. Never point or aim a laser at anyone, even if the machine is turned off. **Never defeat any safety or interlock for the purpose of convenience**. If any part fails, remove the unit from service immediately. Secure the unit by unplugging the unit, removing the key and tagging out the unit as properly as regulations require. Seek immediate technical help and professional repair from Everlast. Repairs should not be made by unqualified people. Never allow any untrained person to use or demonstrate the welder. Always make safety priority.

Always observe and identify and generally look out for any reflective surfaces that may create a bounce-back (reflection) of the laser beam. Reflected laser light can also burn and damage eyes and skin. It can also start fires.
Keep a suitable fire extinguisher handy. Keep all chemicals and flammable items out of the effective range of the laser (laser hazard distance or LHD). Modification or misuse of this product is prohibited and can result in prosecution by authorities.

Be advised that this unit uses a visible red "Pilot" laser to represent where the invisible class 4 laser beam is actually is targeted before welding. This is a class 1 laser but it should not be misconstrued that this is the actual laser and actual location of the beam. These lasers can become misaligned with the Class 4 laser. The beams can become out of sync with each other over time and may need to be properly aligned for efficient and accurate use.

Use properly rated eye protection, rated for protection against 1064 nm wavelength pulsed lasers with a rating of 300 watts with a 30,000 second protection. The eye protection device must remain undamaged by scratches or cracks to provide sufficient protection. They must fit properly. Do not rely on traditional welding helmets or welding shades, including Oxy-Fuel safety glasses to provide the protection needed. Look for the Optical Density Number (OD number). It is suggested to use eye protection with at least an OD of 6 as a minimum protection.

Main Technical Parameters:

MODEL:	REDSABRE 200PC	REDSABRE 300PC
Power Input Requirements	1x220~240V± 10%, 50/60Hz	
Input Watts	<700W	<1000W
Laser Wave Length	1064nm ± 10nm	
Laser Output Power	200W	300W
Laser Input KW	≤ 0.7KW	≤ 1KW
Frequency	0-5 kHz	
Cleaning Patterns	Straight Line, Circle, Ellipse, Floral Pinwheel, Spiral, Square, Sine	
Fiber length	5m (10m optional)	
Protective Lens	D43T2	
Max. Scanning Speed	3000mm/s	
Max. Effective Scan Width	<200mm (<7.9") with proper focal length	
Cleaning Head Model	DHCP200	DHCP300
Fiber Optic Interface Type	QCS[17/20/24]	

Working conditions and working environment:

- Working environment:
    - Operation temperature range 10 -40℃ (50-104° F). Optimal Temp: 25°C-35°C (77-95°F)
    - Keep humidity levels under 70%. Maximum permissible use is <95% in limited conditions.
    - Keep operation climate stable. Do not allow dramatic swings in temperature if possible. Never store in open shelters or use in outdoors in exposed humid conditions.

Avoid the following places:

- Dusty, oily, foggy or damp/wet areas, including areas prone to dew such as open structures.
- Vibration and areas subject to drops, shock loading and impacts.
- Areas subject to chemical sprays or mists, or potential fuel sources.
- Places near sources of High Frequency and EMF.
- In environments where high concentrations of certain gases exist such as CO2, NOX etc.
- If the temperature or environmental conditions change quickly, the YAG crystal, fiber end face and the optical lens will be exposed to moisture and damaged. Stains and cloudiness may form on them causing issues with operation. Be sure to keep the operation environment as stable as possible. If exposed to moisture, make sure all components are thoroughly dry before use.

Need to Know Before Use:

Laser-In-Use Safety Warning Mark: Know this Symbol and Its Implications.

- The light that this laser generates is in the invisible wave length band. It cannot be seen with the naked eye. However, it can do significant, instant and permanent damage to the eyes and skin. Do not watch or contact the laser beam without the proper safety equipment. Reflected beams can also do damage. Keep bystanders and non-essential personnel out of area.
- This is a Class 4 laser product, the most hazardous class. The beam from the laser welder can be reflected back to the eyes and skin. Retinal damage can occur when using this unit without the proper eye protection. If the skin is exposed to the beam directly or indirectly through reflection, the intense nature of the exposure may result in burns, pigmentation, ulcers, scars or subcutaneous tissue damage. Long term health risks are also posed such as skin cancer, cataracts and blindness.
- The laser warning symbol should be placed on both sides of the beam expanding mirror arm of the welding machine.
- Do not open the chassis of the welder. There are high-voltage components inside. Pay attention to safety procedures to prevent electric shock. The laser should only be repaired, maintenance or overhauled by trained professionals.
- Anywhere the laser is in use, these signs, or similar regulation-conforming versions must be posted to comply with safety regulations. This signals to bystanders and unauthorized personnel to avoid the area.

- Do not modify or adapt this laser welder in anyway that is not provided for or approved by the manufacturer. This welding system shall not be used with any cover, shield, lockout, safety or guard disabled or be used with otherwise nonfunctioning safety equipment.
- Do not use this equipment for any other purpose than general welding applications for which this unit is designed. Medical use or other uses not related directly to performing welding, cutting or cleaning/derusting/descaling functions is prohibited.
- Do not watch the laser beam (visible and invisible beams, because both are present and occupying the same approximate area) without safety eyewear. Do not contact the laser beam or a laser generating component or this welder. Failure to comply will result in retinal damage, blindness or burns.
- If you or any worker has a pacemaker, do not approach the equipment operating area. The laser welding machine generates an electro- magnetic field, which may affect the operation of a pacemaker.
- In the area where there may be direct or indirect laser radiation, a class 1 laser enclosure should be set up. Laser Class 4 warning posters/plaques should be posted on the enclosure or in the operating area to distinguish it from other areas to warn and exclude bystanders and unauthorized personnel.
- During the routine maintenance and replacement of the torch or output components of the laser, do not touch the parts that are not related to the replacement of the lenses and serviceable components. Hold lenses carefully, making sure they are not touched with bare fingers on the focusing surface of the lens. Hold by the edges with laser lens paper.

Laser Operation Safety Notice:

This laser welding machine uses a closed laser light path fiber(optic) design, which helps to prevent the leakage of laser radiation. Before, during and after the operation of the Red Sabre laser welding machine, please note the following important information:

- Non-authorized and untrained personnel are not allowed to disassemble, repair and modify the equipment by themselves. Electric shock and fire can be caused by the above reasons. Conduct safety knowledge education and command production process for field operators. Do not perform operations other than maintenance as indicated in the instructions.
- Safety interlocks should be installed on the enclosure doors and connected to the machines to prevent accidental laser exposure.
- This power equipment must be wired correctly and grounded in compliance with code. Use only licensed electricians, otherwise the use of this machine may cause severe electric shock, or fire may as a result.
- Use the correct gauge wire, receptacle, and breaker/fuse for this unit.
- All covers and seals should remain in place while in use. Do not open the machine chassis while the unit is on. The cover should only be opened for cleaning and maintenance reasons.
- Even though the pulsing setting of the laser minimizes heat input, the work piece will be hot after welding and may continue to experience a rise in temperature after cleaning is completed as the heat diffuses through the metal.
- The laser should always be backed up approximately 1/8" to 3/16" behind the part being welded with a thick piece of metal or non-combustible, non-reflective item to prevent unwanted burning and damage to materials behind it. A stray beam that has penetrated through metal can still burn through to the legs and feet or any item in its path.

Electrical Safety:

- Do not damage power lines and fiber cable. Regularly inspect for damage to the fiber cable. Inspect for signs of cuts, crushing or kinking of the cables. Replace any damaged fiber cable immediately. Replace cut or damaged power cords and plugs.
- Avoid twisting, jerking, or kinking the fiber cable. Cable damage can cause electric shock, short circuit or fire.
- Stop immediately and shut the machine town and remove the key if you detect a burning smell or see smoke or notice any signs or warnings of the equipment overheating. Fire or electrical shock may occur if these symptoms are ignored.
- Do not use the equipment in a wet or excessively humid or dew-covered environment. Use only in a clean dry environment to help prevent electrical failure and electrical shock.
- You must shut off the equipment and unplug the laser cleaner anytime during service or while replacing the diode pump or cleaning the unit.
- Do not allow the unit to continue to run when no work is being performed. Always shut the machine down rather than let it stand idle when pauses in work are greater than ten minutes. Always turn off the welder when taking breaks or going on lunch breaks. Do not leave the laser unattended.
- Remove the key and secure it in a safe place when the unit is not being use to prevent unwanted and unqualified personnel from operating the equipment.

Material Safety Notice

- Keep the unit clean from dust and debris. Do not place any items on top or around the unit. Keep a free area space of 24 inches all around the machine cabinet/chassis. Dust and dry off the machine before use.
- Do not place any sort of beverages or beverage containers on the welder. This includes coffee cups, soda cans, and drink cups. Any spills can damage the unit and lead to shock or electrical fire. If anything is spilled onto the unit, dry immediately.

Fire Safety

- Do not use near flammable and materials or potentially combustible materials. Remove all flammable liquids from the area. The beam can stray or reflect at considerable distance. Make sure your LSO has determined the laser hazard area and all combustible materials are nowhere near this zone. There is also a spark ignition risk created during the welding process which can lead to fire.
- Do not point the beam at any material not intended to be welded. Fuel, oil or grease that the beam contacts will quickly explode or ignite.
- Do not use covers blankets or non-fire-resistant materials to cover equipment in the welding area. The beam can ignite these instantly.
- Keep a dry chemical type ABC fire extinguisher present that is current on its inspection and testing date readily accessible. However, do not put the fire extinguisher directly in the area where the weld beam may contact it. Evaluate and consider an additional need for a "D" type extinguisher and/or a sand bucket to put out any metal fire that may occur.

Installation, Setup and Maintenance

Upon receiving the laser cleaner, immediately open the box and evaluate the condition of the product. Also check to make sure all parts and accessories are present and in working order. This should be done within 72 hours of receiving the unit. Also be sure to:

- Keep the original packing box for return if needed.
- Check the packing list for missing accessories. If anything is missing contact Everlast parts support immediately.
- Inspect the components for damage, including the chassis case and torch and fiber components.

Confirm the following before use:

- Input power supply is rated as "clean powered: THD < 5%.
- 240V 1 phase input ±10%.
- The circuit is properly grounded and no other welders are being used or are running on the circuit.

Assembly and Adjustment

- Install and attach all components. Do not force bend or modify any component.
- Turn on the main power supply, calibrate the unit properly to start working. (See following information on calibration found later in this manual).

IMPORTANT! Note the following before use:

- Only allow trained personnel to work with and assemble the unit.
- Review laser safety guidelines.
- Appoint a Laser Safety Officer and make sure all registration requirements (some states require registration) and record keeping are carried out before use
- Any supply power and wiring is to be carried out by a licensed electrician.

IMPORTANT! Note the following during use.

- Only operate the control panel with hands. Do not use a stylus, pen or pencil on the touch screen.
- Only operate one switch or panel button at a time. Operating multiple simultaneously may cause failure.
- After disassembly for cleaning or inspection, Make sure all panels are installed on the chassis and the ground wire is connected from the control board to the connection on the chassis. Do not operate without it . Do not remove or cut ground wire.

- When connecting and using the laser torch/gun, do not drop the gun or damage any mating surfaces or connections. Make sure the optical faces of the connections are not damaged or dirty.

Optical System Care and Routine Maintenance

The optical pump (Laser LED light generator) and fiber optic system, along with the laser gun, collimating lenses, focus mirror, protective lense and safety switches are key components of this system. Any damage to one or the other can result in poor function or damage to the unit. Always remember the following:

- The coating layer of the optical elements is easily damaged. Avoid damage and impact to the lenses. Do not drop gun or carelessly handle it. Always have a secure method of storing the gun when not in use.
- Avoid exposure of the lens to smoke and flame. This can happen if the laser accidentally drifts off target to painted metal surfaces or unprepared areas that are not intended for immediate welding. If smoke or flame is released from the accidental exposure, stop operation and remove gun from the area to help prevent the gun optics being exposed to the smoke.
- Do not touch or handle the surface of the optical lenses by hand or fingers. Use special tissues designed for laser optical use to handle during changes. These are inexpensive and economical. Do not touch the zinc selenide coatings directly with your fingers
- If the optical elements need to be wiped, use high concentration ethanol (99% or greater) and use laser/optical cleaning paper to handle the lens and clean.
- Handle the protective lens and optical lens only by the edges.
- Make note of the installation direction of the lens. This is important. Make sure the direction is noted before removal of the old lenses and before installation of the new lenses.
- Always wear eyewear approved for 1064 nm wavelength, rated for 300 watt pulsed laser useuse @30k seconds duration. Use at least an OD6 rated for this wave length.
- Avoid allowing anyone to directly view the laser. If necessary, stop operation immediately.
- Before opening the welder chassis cover or servicing the diode pump, the power switch should be switched off and the unit unplugged.
    - Wait 5 minutes and measuring the voltage between the positive and negative electrodes of the power box with a multimeter, the voltage should be read below 5V before servicing.

CAUTION! Make sure air is connected and compressor is turned on for laser cleaning. Connect air for cutting and de-rusting/de-scaling, otherwise damage will result to the gun and gun lenses. Always make sure they are turned on before use. Damage resulting in failure to operate with cutting/descaling gas/air flow is not covered under warranty.

Basic Setup and Operation

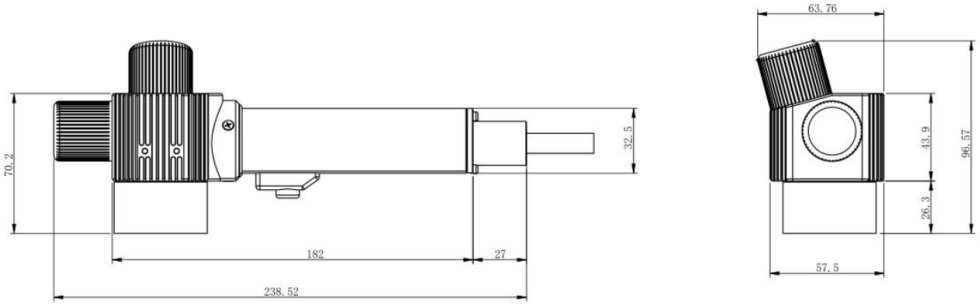
- Confirm that the torch(gun) trigger switch is not engaged or otherwise stuck down.
- Check that the emergency stop switch is not engaged.
- Confirm that the key switch is turned on.
- Check to ensure the power light has come on and everything is lighting up properly.
- Turn on the laser and select the external control mode. (Some versions vary, consult Everlast tech support before the first start if you have a different version than what is listed below);
- After the laser program boots up and the automatic diagnostic completes (this may take up to 30 seconds) the touch screen will be functional.

- Set the first parameter on the touch screen to the welding selection.
- Touch/Select the “Start” option.
- Connect the safety clamp to the part being welded. The torch trigger is then used to weld.
- Keep the fiber optic cable and gun (torch) stored in the cable holder when not in use (as shown below).

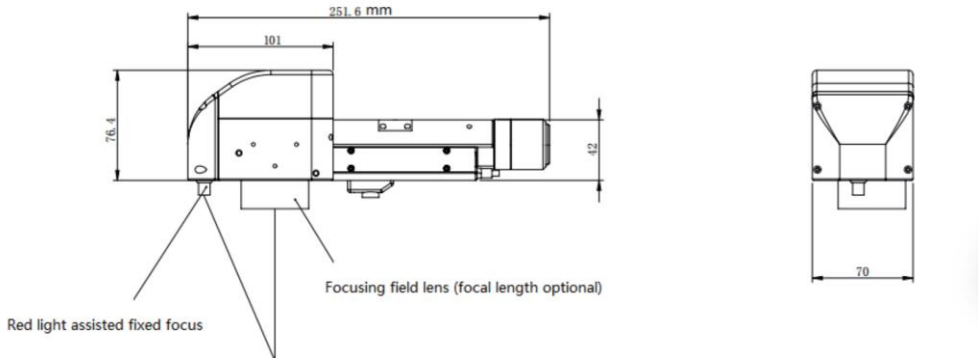
- .IMPORTANT! Always make sure compressed air is connected to the unit. This helps to remove debris and dust and extends lens life. The pressure should be adjusted until it is able to cleanly blow away the carbon dust and debris left over from the cleaning process.
- Wear safety glasses with an appropriate OD of 6.
- Do not point the gun (torch head) at anyone. Safety equipment can fail. Do not rely upon safety devices. Only the operator can ultimately control safety.
- Never touch or play with the trigger until ready to fire the laser. Accidental firing of the laser can occur resulting in severe eye injury, burns or fire. The beam can bounce off of shiny or reflective surfaces, including metal surfaces. Watch out for reflected beams. Keep cleaning (gun/torch) at proper angles and distances to avoid this. If the surface is too reflective, denature the surface by sanding or using a stainless steel brush (for aluminum).

Handheld Gun Information.

Models: DHCP 200 and DHCP 300 Hand held Scanning Cleaning Guns



MODEL: DHCP 200



MODEL: DHCP 300

NOTICE: If gun service or adjustment is needed, contact Everlast Technical Support.

Connecting the Gun.

The gun should be connected to the lower left side of the front panel of the unit. The connector should be carefully watched to prevent contamination. Do not touch the mating surfaces of the connector.

Laser Cleaning Head (Gun) Maintenance.

The DHCP model guns must be kept free from dirt and debris and should be serviced as needed.

- Keep internal parts of the gun protected from dust and contamination by only servicing gun in a clean environment.
- Store Gun properly when not in use.
- Never touch the optical surfaces with bare fingers or hands. Use gloves when handling.
- Only use pure ethanol or similar anhydrous lens cleaning solution to clean lens and optical surfaces in conjunction with special lint free lens paper used for cleaning optical surfaces on cameras and other high value optic surfaces.
- Hold lenses by the edge with gloved fingers when you are servicing or changing them out.
- When servicing, note the orientation of the lenses and related assemblies. If necessary, take a picture of the direction the lenses and parts face during disassembly.

Laser Calibration and Adjustment

- WARNING!: If the cleaning laser does not appear when activated or its cleaning effect is weaker than normal, the cleaning pattern is not correct, or it is completely lost, stop use immediately and examine

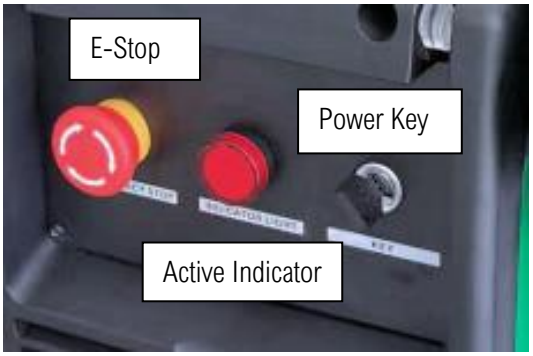
gun head components. Continued use will damage the gun and components. It is likely the lens has become damaged, or an internal problem has occurred from rough handling resulting breakage of the internal components. Discontinue use and contact Everlast technical support immediately if this happens.

- The Pilot (Target) Laser Spot Location (DHCP 300):
    - The pilot laser is a visible class 1 laser used to represent the position of the ultraviolet cleaning laser beam which cannot be seen. It represents the "target point" of the cleaning laser. It should line up with the beam and project the pattern and point that the cleaning beam will create.
    - WARNING! For your safety, turn off the laser with the safety switch and key, and unplug the laser before examining the laser cleaning head or optic pump. Wait 10 minutes before servicing to all ow capacitors to discharge properly. Only power the unit on when fully assembled and in serviceable condition. The unit should never be operated with any cover open or with any gun component or safety measure missing or defeated.
    - The two beams should be adjusted so that the actual target spot is synchronized with the actual cleaning beam. This involves making sure the reflector and lens are properly aligned and the pilot laser is targeted at the focal point of the cleaning laser. If the cleaning beam creates a cleaning swath that is different from what the pilot laser indicates, contact Everlast for adjustment instructions.

Control Panel and Operation

The operator's panel of the Red Sabre Laser Cleaner is mainly composed of a detachable touch screen and control box. The screen is magnetic and can be attached to any convenient location close to the user location to help reduce the amount of walk-back time needed for adjustment and setup.

Power Controls



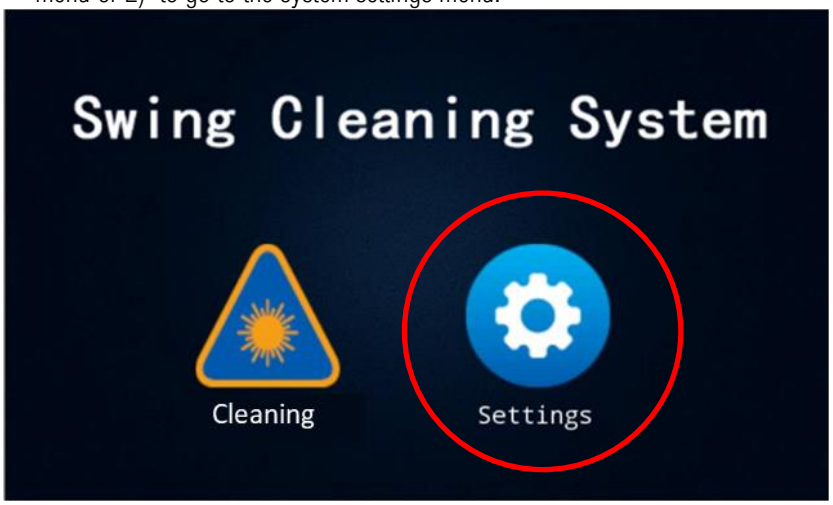
The unit has a basic power control panel that includes an Emergency Stop (E-Stop), Key Switch and an ON Indicator light. The E-Stop should be pressed in any emergency, but should not be used as a power down switch. The E Stop will deactivate the unit immediately. The E-Stop Knob must be rotated clockwise to reset. The key switch is a master safety switch, which is used to prevent access to unauthorized users. It should be removed and securely stored when the machine is not in use. **The main power switch is located on the rear of the machine and should be used to turn the unit on or off.** This is the only approved method of completely turning the machine on and off when not in use to ensure the unit has no power flowing through the machine. The key switch can be used for temporary stoppage and breaks. The E-Stop may not be used except in the event of an emergency. If the E-Stop fails, contact Everlast Technical support immediately and seek replacement options. Do not attempt to bypass the E-Stop.

Startup

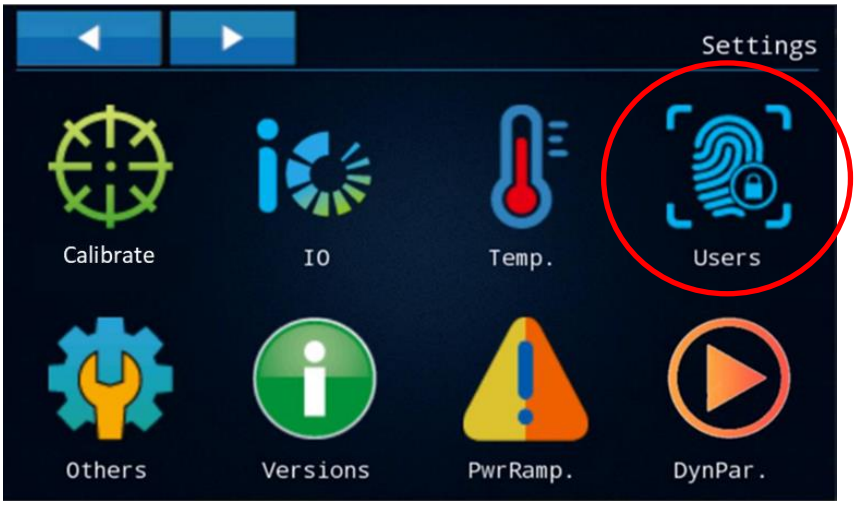
The unit must be connected to all required control cables, safety lockouts and communication lines before use located on the front of the machine. When the unit is first turned on, it will go through a boot up process before it reaches up full power. Allow time before using for this process to take place. The machine is usually fully booted within 30 seconds.

Setting Up Password and Gaining Access to the User Settings

- After turning the machine on at the rear, enable the E-Stop Button. Then switch the key switch to the on position.
- The first screen to appear after boot up offers two choices,: 1)to go direct to the cleaning authorization menu or 2) to go to the system settings menu.

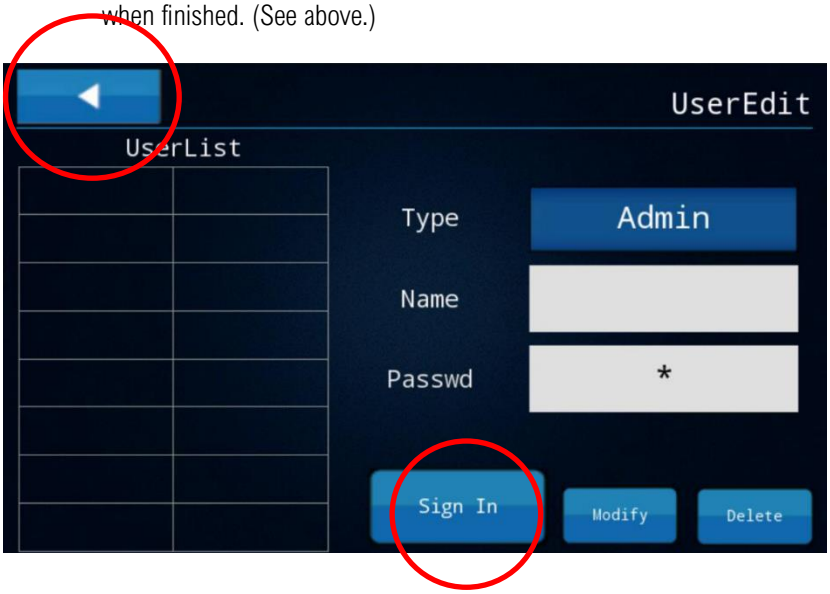


- Select “Settings” on the touch screen. This will open up the settings menu and will offer several feature selections which include, input/output safety settings, temperature overheat threshold setting/ monitoring, power ramping (slope/taper of power) and calibrate. Note, depending on the unit, not all settings may be accessible or are allowed during certain types of operation.
- To begin with, it is advisable to reset factory set password and/or establish a finger print id for users and administrators. To begin, press “Users”. NOTICE: When prompted, enter the



password of “6”. This is the default password (The default admin level password is “1”.)

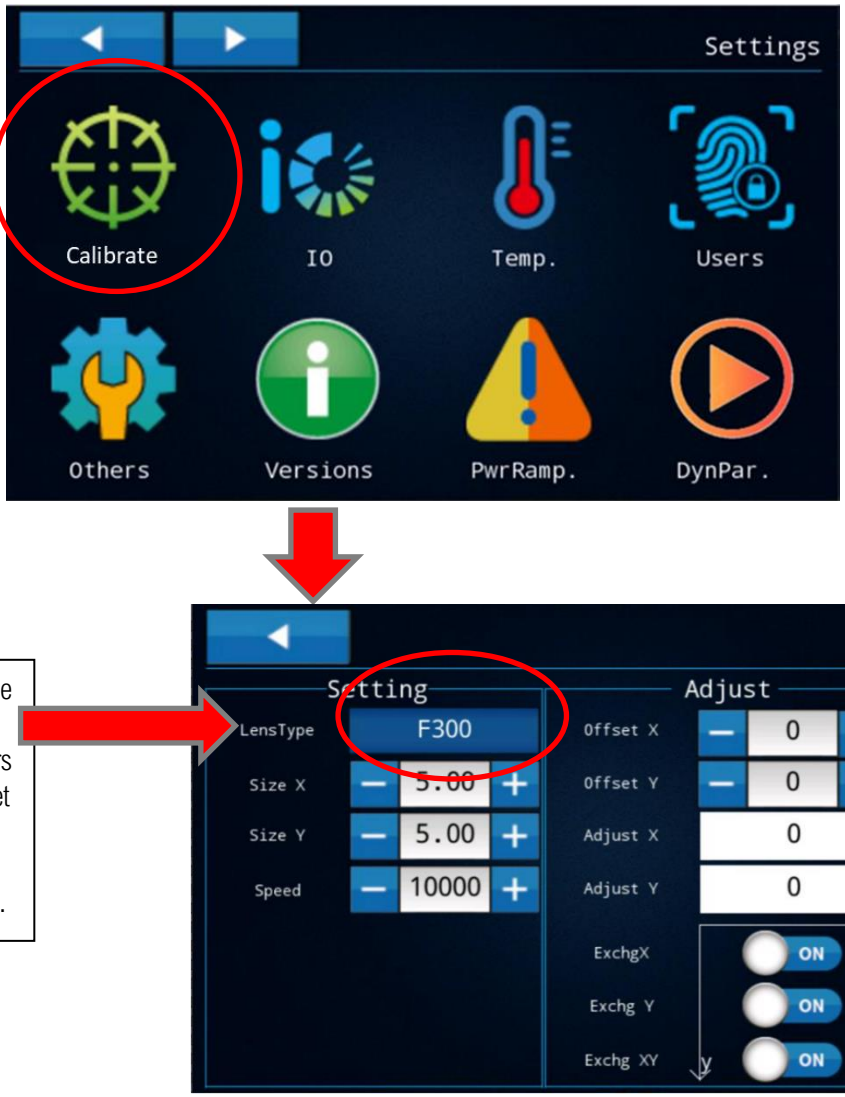
- The user menu will open and the soft keys will allow you to navigate and setup user and admin passwords, along with a fingerprint menu if desired. (Keep in mind Admin access utilizes a separate password which is, by default set to “1”). The “Sign-In” and “Modify” prompts located in the block shaped buttons will bring up the related soft key menu on the screen touch pad to enter passwords or names.
- Use the navigation keys at the top left to return to the main settings and quick setup screen when finished. (See above.)



Calibration

The Calibration menu is selected through the setting main screen. The calibration screen offers simple selection of the focal lens. The rest of the values are preset by the factory and are offered as information only. **The focal lens for this machine is the 254mm lens. No other lens should be selected for use in this model even though there are other options for it.** This cleaning programming has been developed to use with future units that have different focal length lens and different options that will require more adjustment. This is why some functions and parameters are not available for adjustment at this time.

(See next page for image)



Select and use only the F254 lens for these units. Other parameters on this page will be set by default and will not adjust. These are for informational use only.

I/O Programming

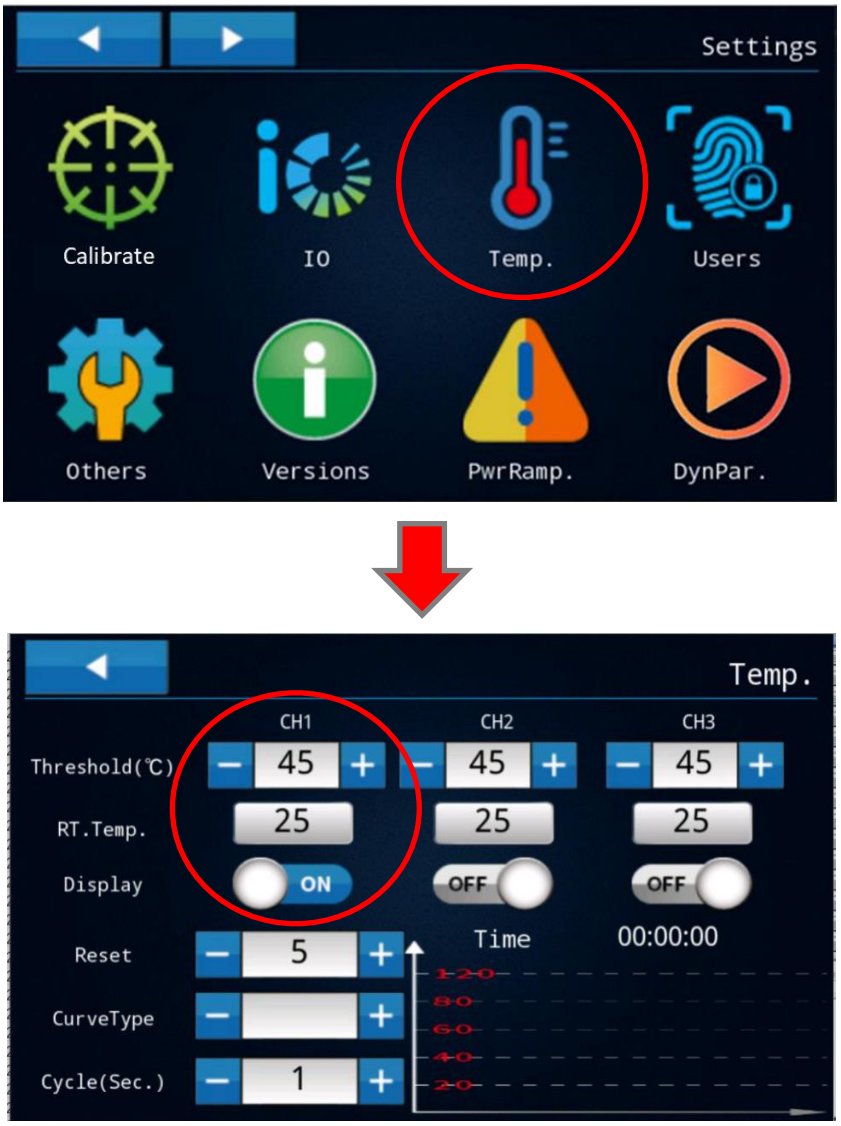
Even though the I/O (Input/Output control) menu is selectable The Input/Output functions of this unit are fixed and are non-adjustable. The I/O menu screen only indicates the status of the I/O functions.

Temperature Settings

The temperature threshold settings are indicated on the temperature screen. These settings indicate the threshold settings of the gun before overheat warning is given. The operating temp of the unit is also displayed via a time/temperature graph.

- The suggested maximum temperature threshold is 35°C. However, if duty cycle issues become a problem, it may be increased to 40 or 45°C.

- Only Channel one is used on this unit.

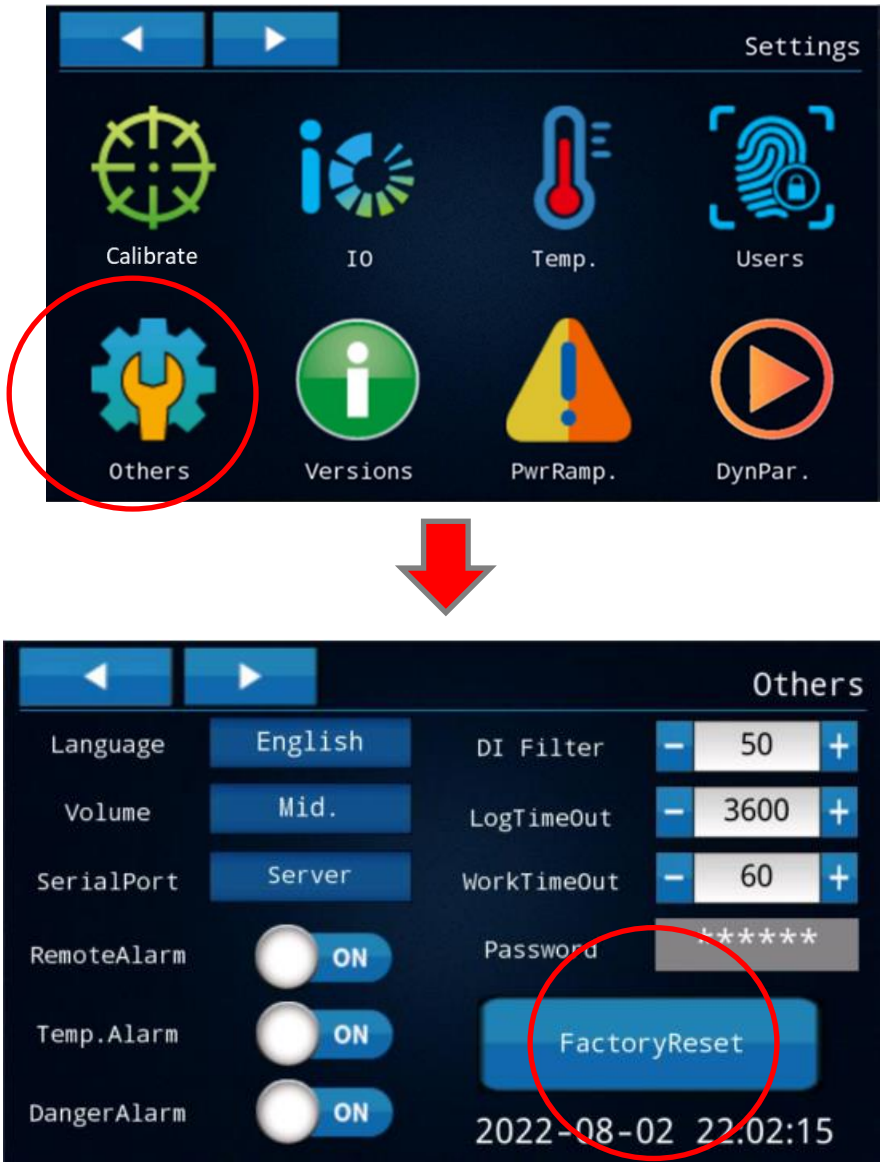


Other Settings

The other settings page offers limited useful settings. Most are concerned with function of the machine itself and are preset for the user at the factory. Even though some are adjustable, it is not advisable to make changes to the status.

- The Temperature Alarm should always be switched to on.
- The Danger/Warning Alarm should always be switched to on.
- Log Time Out and Work Time out should be left at factory settings

- If any adjustments have made the unit perform poorly or not work as it should, pressing "Factory Reset" will restore all factory settings throughout the machine, where factory presets are used.



Versions

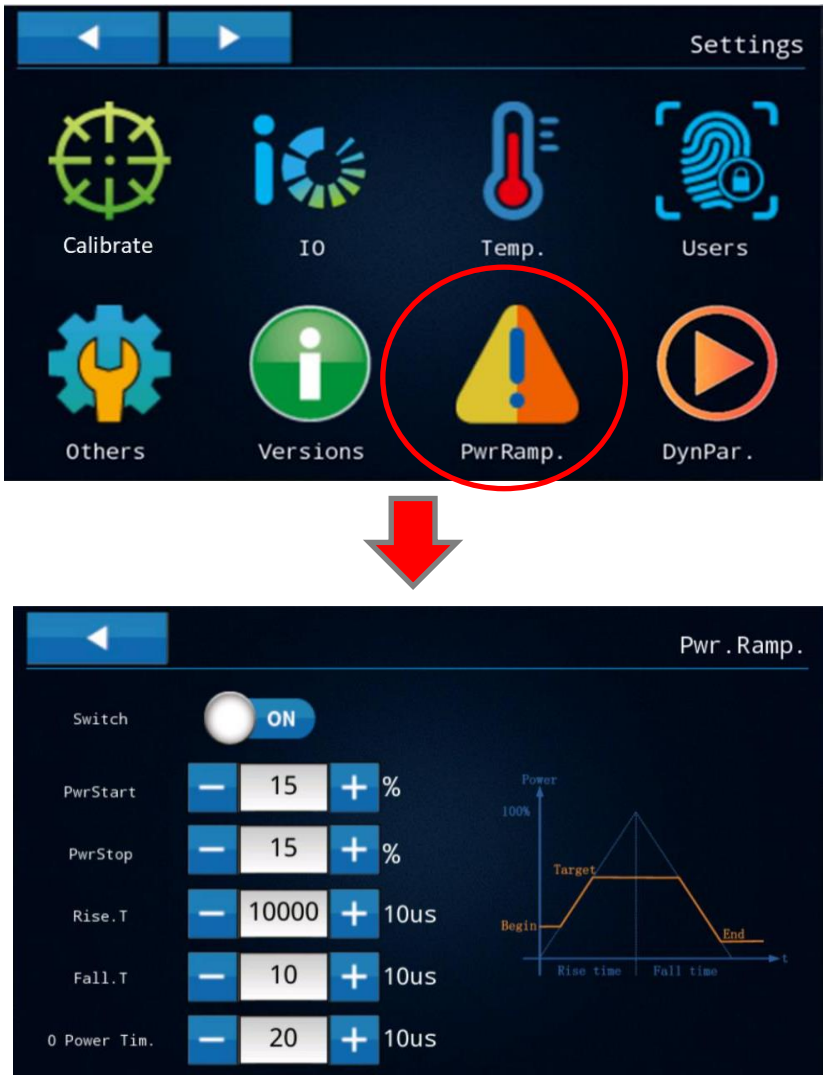
The versions tab has only information about factory programming. No useful settings or information is found under this tab unless the unit needs to be serviced or programming updated at the repair facility or information needs to be retrieved for technical support. The unique unit serial number/ID can be found under this screen on some models.

Power Ramping

Power ramping helps taper the power (cleaning wattage) up and down at the start and end of the cleaning cycle. This is useful to help prevent abrupt starts and stops on delicate material or on material where the user needs time to transition. Serves a similar function to up or down slope on welding machines.

- Keep "Pwr Start" set to 100 if gradual ramping up of power is not desired. This is set as a percentage of cleaning power. As an example, setting at 50% starts the cleaning cycle off at 50% of set cleaning power at the start of the cleaning cycle just before ramping up the power.

- Keep “Pwr Stop” set to 100 if gradual ramping down of power is not desired. This is set as a percentage of cleaning power. As an example, setting at 75% tapers the final cleaning stage power to 75% of set cleaning power before the cycle is terminated.
- Rise/Fall Time (T) are listed in Nanoseconds. This sets the length of time it takes to ramp cleaning power output up or down from start to end stage of the cleaning cycle. This is the equivalent of up or down slope on a welder.

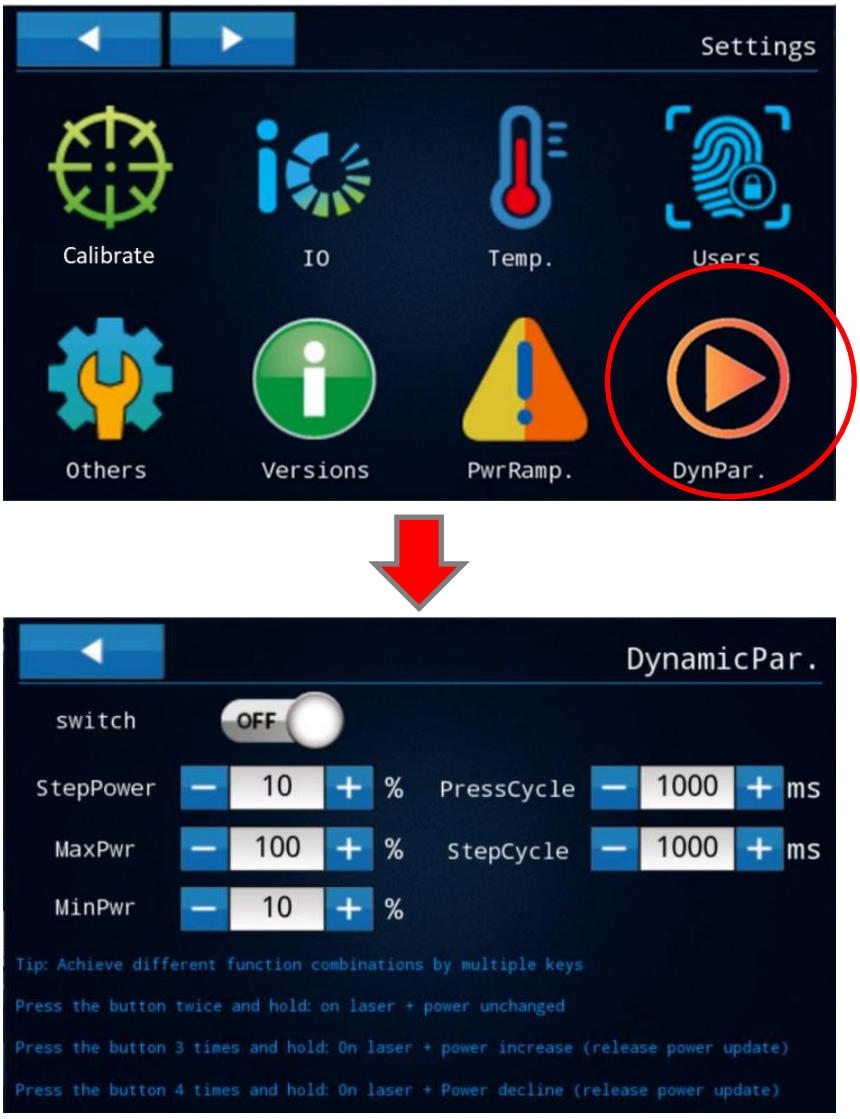


Dynamic Parameters

Dynamic Parameters determine how the power of the laser is controlled and switched. **Normally it is switched off to reduce the chance of confusion**. However, when switched on, number of successive button presses allow the user to increase or decrease power remotely. Holding the button continuously will continue to step the power up or down in the increments assigned under “Step Power” Use 3 button presses to increase power remotely. Use 4 button presses will decrease power remotely..

- Step Power increases or decreases cleaning power by the entered percentage when the button is pressed 3 times. When it is pressed for times successively, the power is decreased by this much.
- Min/Max Power. These settings set guide limits on the minimum and maximum allowed settings that can be achieved remotely.
- Press Cycle determines the delay on how long it takes to begin to increase or decrease the power when the button on the cleaning head is held in.

- Step Cycle is the delay between incremental increases/decreases in the steps of power as the cleaning head button is held.

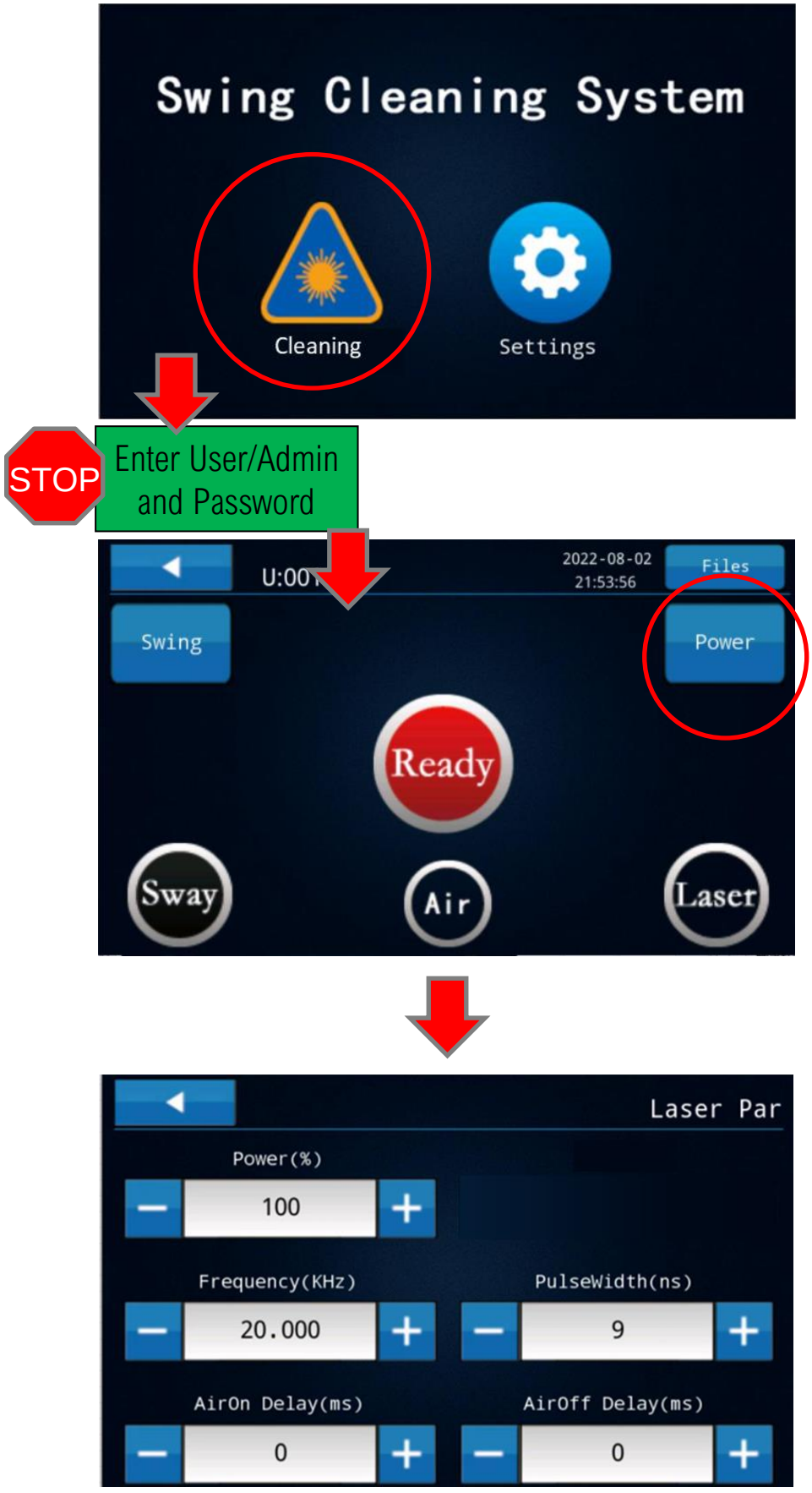


Cleaning Process and Operation

The cleaning process is simple and easy to use. But there is an order and process to be able to engage the cleaning cycle. This is done for safety and to prevent accidental engagement by providing a 2 layers of safety to assure the laser cleaning head is ready for activation and the user is prepared for operation.

- After turning the machine on at the rear, enable the E-Stop Button. Then switch the key switch to the on position.
- The first screen to appear after boot up offers two choices, 1)to go direct to the cleaning authorization menu or 2) to go to the system settings menu.

- Select Cleaning on the start up page. The system will require the User/Password to enter this page. (Default admin password: 1)



- Once the Cleaning Main Screen appears, you have several options. The Power Setting which controls the strength of the laser output (wattage) should be selected first if starting a different cleaning job or if cleaning power or the laser pulse frequency and width needs to be adjusted. Also, this gives access to the air flow start and end time.
- Maximum Laser Cleaning Power is controlled through setting a percent of maximum possible power (200 or 300W, depending upon the machine model). This is the main setting.
- Frequency is the number of times per second (in KHz) that the pulse fires per second. This creates the forceful ablative "impact" of the laser and also controls the heating. This improves the effectiveness of the laser for each power setting. Range is from .001KHz to 2500.000 KHz. Frequency settings only work correctly if Duty Cycle is <100%
- Pulse Width is the amount of time in nano seconds that the laser pulses on.
- Air On/Air Off Delay. These settings control how long the air is flowing before and after the laser cycle. This helps to clear the air and surface of dust before and after the cleaning session.

  It's important to understand that these settings can come into conflict with each other and result in poor performance if they are not kept in proportion. Please use this chart below to maintain proper settings and follow the below rules:

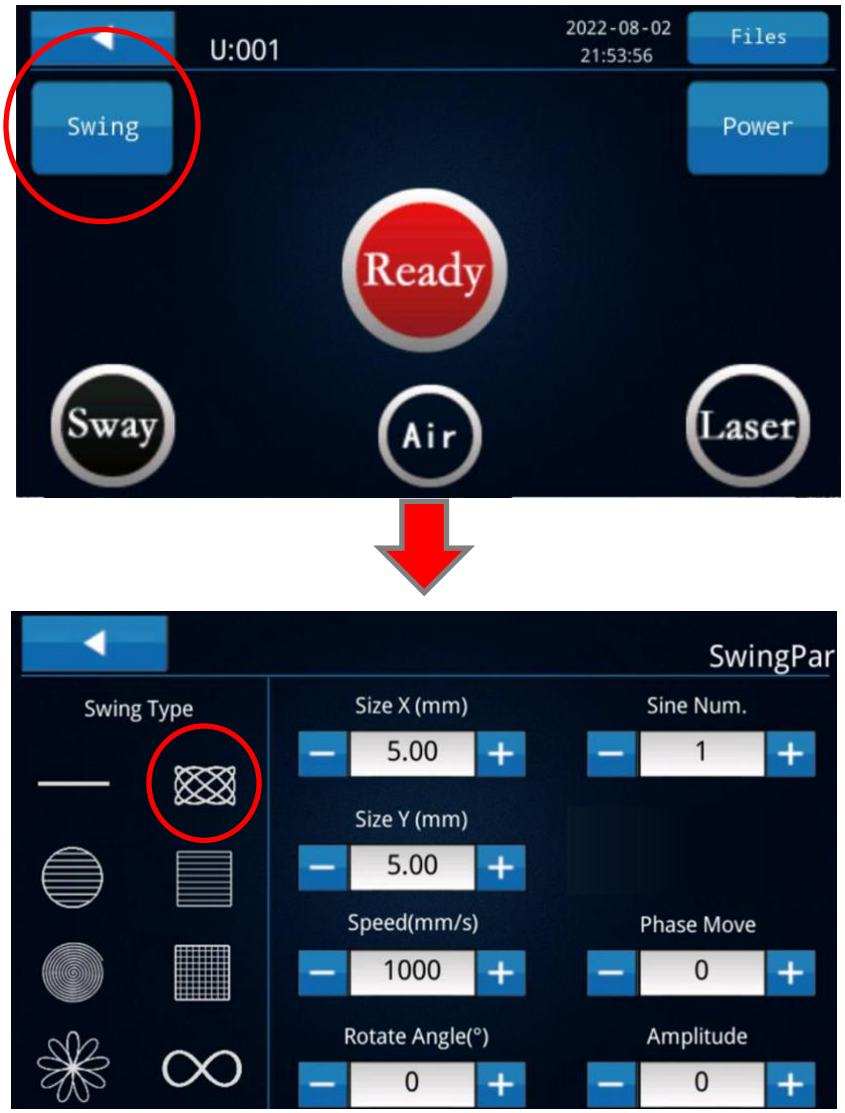
  - *Set the Pulse Width first.* This determines the maximum (optimal) allowable frequency.
  - Set the unit at the frequency prescribed below to achieve maximum cleaning ability for the power setting.
  - The pulse width settings can be set in between the settings listed, but the maximum frequency will also be proportionately affected. The settings given below are common, useful settings to use.

Pulse Width Settings in Nanoseconds	Frequency in KHz
13	1200
20	900
30	650
45	400
60	360
80	280
100	360
150	180
200	150
250	130
350	110
500	100

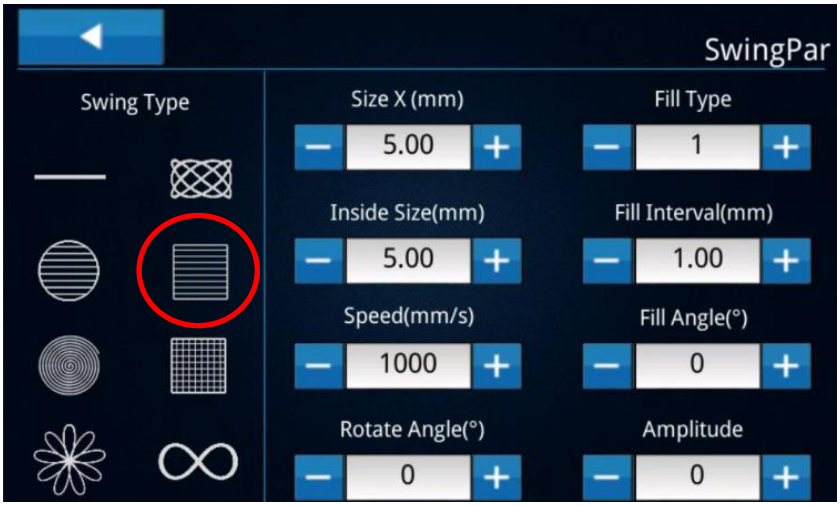
Setting Up Swing Parameters (Scan Pattern Parameters)

The Swing parameters are parameters that control the pattern shaping as the laser scans (swings) across the surface creating the scouring action in both the X and Y axis. The visible Pilot laser will demonstrate the actual pattern of the invisible cleaning laser beam during setup of the swing parameters. The Gun will be held over the surface of the item to be cleaned and the scan pattern will be shown as the red pilot laser simulates the travel path and shape created by the pulsing cleaning laser.

- Select swing on the cleaning page to bring up the swing (scanning and pattern parameters). Each pattern is different in shape and effectiveness. Oddly shaped items may be easier to clean by changing the pattern shape. Pattern shape can affect consistency and speed of cleaning on different items. No one pattern shape is ideal for every situation. However, the straight-line pattern is a good choice for flat, even items. The circular pattern works well for rounded objects. The sine and block patterns work well for odd shapes and uneven surfaces. With that said, there is plenty of overlap in capability of each pattern shape. Other patterns should be experimented with to determine the best pattern for the application. Not all patterns use the same settings, although the X and Y axis and scan speed are common to all. For example: Selecting the sine pattern (the swing type selected above) brings up a slightly different version of this screen, which includes the sine number.
- The sine number represents the number of waves compressed in the pattern. Increasing the number of sine patterns compresses the sine wave and makes the pattern appear more dense. (Sine pattern only)
- Size X is the width (in mm) of the scan area. (all patterns)



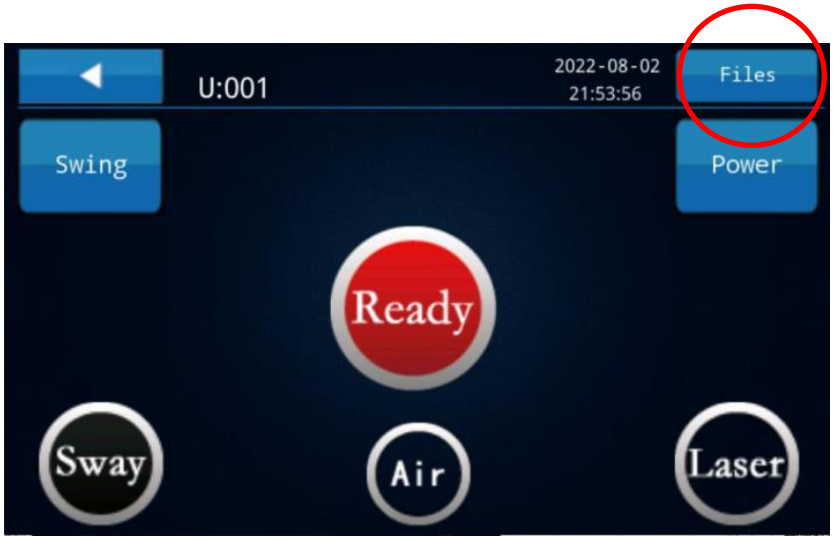
- Size Y is the height of the scan area. (Maximum is 130mm) (all patterns)
- Speed is the distance of travel of the scan (swing distance of the laser) in one second. (Maximum is 130mm) (all patterns)
- Phase Move (Phase Shift), is the alternating overlap of the sine wave as multiple sine waves are formed over each other from a visual perspective. In other words, this shifts the pattern with each scan pass so that the successive sine waves are out of sync with each other and do not land in the same position (if the gun were held still). (Sine pattern only)
- Amplitude is the dynamic height. This is limited by the scan height and width.
- Start Width is the spacing of the scan lines as the spiral pattern develops. This affects the compactness of the spiral pattern (Spiral pattern only)
- Rotation Angle. rotates the pattern the number of degrees so that the scan covers the area more efficiently. (all patterns)
- Fill Type transforms the circular (ellipse) and square (rectangle) patterns behavior. It determines how the scan pattern transitions from one pattern line to the other. The pattern can be straight across which will cut laser power as it transitions down to the next line which will create a series of parallel scan lines or keep the laser active, creating more of a “Z” pattern as it scans down and across. (Rectangle and Circular patterns)
- Fill Interval determines the distance spacing between the scanning lines of the laser.

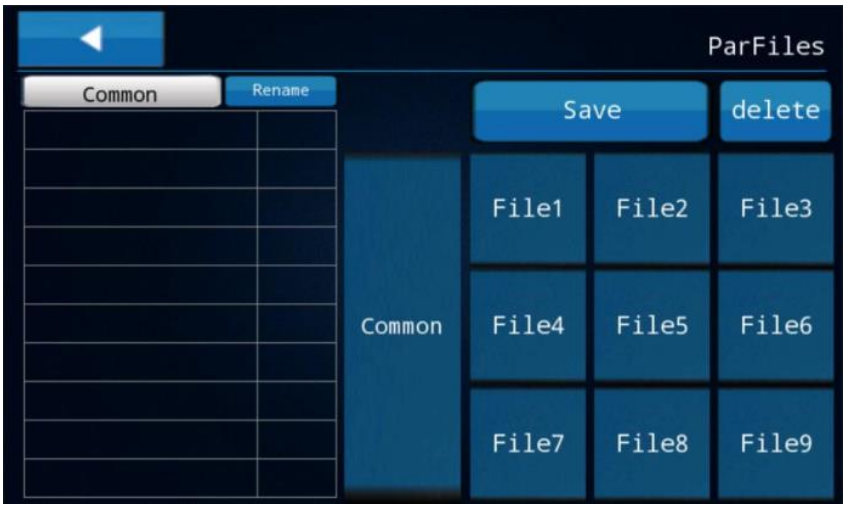


NOTE: The above image indicates a different cleaning pattern selected and highlights how the menu changes.

File Saving

After the parameters have been set, and programming is complete, the programming can be saved and assigned a program name. This is helpful for quick setup and recalling programs needed for various common applications. Up to 9 programs can be saved.





- Select desired file number to recall or save the current program.
- Use save or delete to store or remove the file/program contents
- Use common to name the program file by type or name with the soft key pop up pad.
- Use the back arrow when all file work of selecting/saving/deleting or recalling is completed. If a file has been selected for loading, the program will be recalled once the back arrow has been selected
- NOTICE: If a file has already been saved, then selecting a file will load the stored file under that file number after using the return button if the file has not been resaved or deleted.

Using the Sway Button

Normally the target laser will project a pinpoint light for focusing the laser distance to ensure the optimum distance is used to achieve the correct focal length of the cleaning laser. The sway button (the term sway is used to avoid confusion with other scan/swing functions of gun head and relates specifically to the target laser) serves to project the actual pattern selected under the swing/scan settings. The red pilot laser will project the scan image on the target until the laser is activated. This is a safer way to operate the laser so that the laser isn't accidentally activated until the user is fully ready to begin cleaning.

- When selected the button will turn green.
- The Red "Ready" button will turn yellow.
- The target laser will begin to scan and demo the pattern selected under the swing settings but it will not begin to clean.
- The sway button should be deactivated before entering/reentering the Swing/Mode.

Activating and Adjusting the Air Flow

Air Flow is used to help keep the lens clean by blowing dust and smoke away from the lens and by blowing incinerated carbon and dust off of the cleaned metal. The Air button on the cleaning screen (see above) will activate the air flow so that it can be adjusted before the laser is in use. When in use the pre and post flow of the air will be controlled automatically. Simply press the button to open the air flow and set air pressure and flow so that it is efficiently clearing dust and debris. Press again to stop the air flow testing process. The cleaning head does not need a large amount of flow, but the compressor should be large enough that it should not drop air pressure to the point the flow is no longer effective.

Activating the Cleaning Laser Mode

WARNING: Do not activate the laser button with the laser cleaning head trigger button held down.

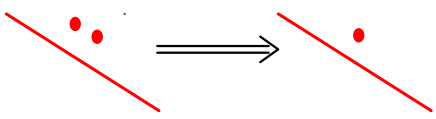
- The cleaning laser can be selected once the user is prepared and ready for cleaning. Make sure all safety gear and equipment is in place and no bystanders are in the area.

- Select Sway so that the Target laser will become active
- Select Laser
- After selecting the Laser function, the warning page will appear. It will give both warning and instruction on proper activation of the cleaning laser.
- As soon as the warning page appears, the Laser is ready to be activated.
- After the warnings appear, the page will return to the Cleaning menu after the warning time has expired.
- **To activate the cleaning laser, Trigger the button on the cleaning head two (2) consecutive times and hold. The laser will begin to clean. If the trigger is only triggered once, it will not activate the cleaning laser, only the target laser will appear. The triggering of the button should be consecutive and not delayed between presses.**
- **Keep in mind that both the sway and laser buttons must be touched to activate the laser (Sway first, then Laser)**

Focusing the Laser

The laser must be held at the optimal distance from the material being cleaned for cleaning to be effective. This distance is approximately 30cm (approximately 1 foot). To help with focusing, the unit is equipped (300 model) with a special target laser function to help guide the user in creating the correct stand off distance.

- Pull the Trigger once to activate the target laser.
- If the target displays two pinpoints, move the laser in or out until they converge into one point.



- Alternatively, the laser can be activated and the height of the laser cleaning head can be moved up or down until maximum cleaning efficiency is achieved.

- At the optimal distance, the beam cleaning action will be sharp and bright and the cleaning action will maximize. (Unless smoke or particles enter the beam, the beam itself will remain invisible. The point of contact with the part being cleaned the beam will illuminate as the particles are being incinerated.)

Shutting the Laser Cleaning System Down

- Stop using the Cleaning Head.
- Hit the Stop Icon on the Cleaning Screen
- Turn off key switch
- Turn of the unit at the rear
- Return the cable and hand held cleaning head back to the carrier bracket on the cleaner.
- Do not bend the fiber cable sharply.

Key Points of Safe Pulsed Laser Cleaning Operation

- Make sure all safety gear is worn, including respirators before using. In the main administrative "Settings" menu, the
- Check the following:
    - Ensure the correct focal length and gun has been selected with the target laser system as a guide,
    - Ensure the correct lenses and nozzles have been installed.
    - Ensure the air flow is on and the pressure is set between 45 and 70 PSI
    - When the Laser is enabled (Laser should only enabled when the unit is immediately ready for use.)
- Adjust the cleaning wattage to 100% and test. Then, adjust downward if the action is too strong.
- Set scan width to maximum setting if it is a large piece. Set to a low setting for small or narrow objects
- Holding the gun approximately 1 feet away from the metal, aim the gun toward the part being cleaned. (It's recommended that the first operation be performed on a test piece.)
- The gun should be held at a slight angle. Do not hold perpendicular in case the beam is accidentally reflected back to the user or back into the lens.
- Double press the trigger and hold it on the second press. The beam will energize and the cleaning process will begin.
- Adjust the cleaning head distance to achieve the best cleaning action and pattern width. Move the gun in and out while moving to see the pattern and width.
- Slowly move the gun up and down or back in forth over the part being cleaned. Move the gun steadily watching as the weld is cleaned. If the gun is traveling too fast, there will be a fine zig zag pattern. If the zig zag pattern persists after slowing, increase the Scan Frequency.
- If it takes multiple passes to clean an object or cleaning travel is too slow, increase wattage percentage and speed
- If too slow of scan travel speed is selected, the cleaning will be coarse and will require extra effort and time.

CAUTION: Pay close attention to the beam scan width. If it is not carefully managed, the beam along the edges or the beam is too wide for the part being cleaned, the beam will strike the objects in the over-run path and they may become damaged. Keep hands, feet and all body parts out of the way of the beam.

IMPORTANT: User Service of this unit is limited. Keep all items clean and dry. If service is need or malfunction is suspected, contact Everlast Technical Support for proper servicing information. This includes laser head calibration and mirror servicing.

Call 1-877-755-9353 ext 207 for Service/technical support.

Call 1-877-755-9353 ext 206 for Parts Support

The unit lens may be replaced by the user, but take care when removing it to keep it lint and dust free. Handle the lens with oiless, lint-free and powder-free gloves. The coating of the lens can be toxic if absorbed into the body. Handle free lenses only by the edges.