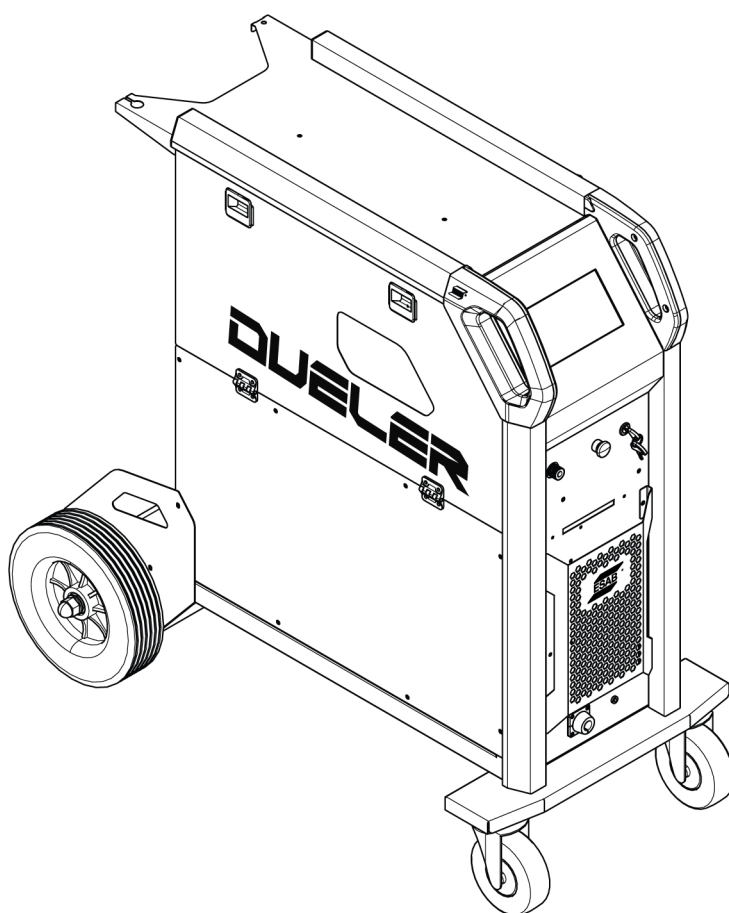


DUELER EHL 1500



Instruction manual



EU DECLARATION OF CONFORMITY

According to:

The Low Voltage Directive 2014/35/EU; The EMC Directive 2014/30/EU;
Machinery Directive 2006/42/EC;

Type of equipment

Handheld Laser Welding Machine

Type designation

Dueler EHL 1500 from serial number MP514 YY XX XXXX
X and Y represents digits, 0 to 9 in the serial number, where YY indicates year of production.

Brand name or trademark

ESAB

Manufacturer or his authorised representative established within the EEA

ESAB AB
Lindholmsallén 9, Box 8004, SE-402 77 Göteborg, Sweden
Phone: +46 31 50 90 00, www.esab.com

The following EN standards and regulations in force within the EEA has been used in the design:

ISO 12100: 2010	Safety of machinery – General principles for design – Risk assessment and risk reduction
ISO 11553-2: 2008	Safety of machinery – Laser processing machines-Part 2: Safety requirements for hand-held laser processing devices
EN 60204-1: 2018	Safety of machinery - Electrical equipment of machines - Part 1: General requirements
EN 60825-1: 2014+A11:2021	Safety of laser products - Part 1: Equipment classification and requirements
EN IEC 61000-6-2: 2019	Part 6-2: Generic standards - Immunity standard for industrial environments
EN IEC 61000-6-4: 2019	Part 6-4: Generic standards - Emission standard for industrial environments

Additional Information:

Restrictive use, Class A equipment, intended for use in locations other than residential.

By signing this document, the undersigned declares as manufacturer, or the manufacturer's authorised representative established within the EEA, that the equipment in question complies with the safety and environmental requirements stated above.

Place/Date

Signature



Gothenburg
2026-04-01

Peter Burchfield
VP, Global Products

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1 SAFETY

1.1 Meaning of symbols

As used throughout this manual: Means Attention! Be Alert!



DANGER!

Means immediate hazards which, if not avoided, will result in immediate, serious personal injury or loss of life.



WARNING!

Means potential hazards which could result in personal injury or loss of life.



CAUTION!

Means hazards which could result in minor personal injury.



WARNING!

Before use, read and understand the instruction manual and follow the laser safety practices, all labels, employer's safety practices and Safety Data Sheets (SDSs).



1.2 Laser introduction

The essential safety information and operational guidelines to protect operators and ensure safe operation of the **ESAB Class 3A and Class 4 handheld laser welding system**.

Class 3A

Laser products of class 3A are mostly dangerous in combination with optical instruments which change the beam diameter or power density, though even without optical instrument enhancement, direct contact with the eye for over two minutes may cause serious damage to the retina.

Class 4

Laser products of class 4 have a high output power and might cause immediate serious permanent skin hazards and eye hazards to the users under the direct or reflected beam. In some cases, they might even lead to fire hazards.

1.3 General safety measures

Safety first

Prioritize safety by following these guidelines and adhering to the manufacturer's instructions.

Ongoing training

Operators must regularly participate in safety training and refresh courses to stay updated on the best practices for safe laser welding.

Laser safety officer

Each organization must deploy a qualified Laser Safety Officer (LSO) who is responsible for:

- **Hazard evaluation:** Assess beam and non-beam hazards to identify risks to operators and observers.
- **Control measures:** Ensure all safety measures, such as barriers, proper eye and skin protection are implemented and followed.
- **Procedure approval:** Review and approve operational procedures related to laser use, including safety protocols.
- **Training:** Provide training for operators and observers on safe laser use and potential hazards.

**CAUTION!**

A certified Laser Safety Officer (LSO) must always be available to ensure proper operation in and around the Laser Controlled Area (LCA).

1.4 Personal Protective Equipment (PPE) safety precautions

**WARNING!**

Only trained and authorized personnel should operate the system. Operators should be familiar with laser classifications, hazards, and protective measures.

**Laser safety glasses**

Bystanders in the laser area are obliged to wear laser safety glasses, or preferably the ESAB certified laser-specific welding helmet, when the system is being operated.

**WARNING!****Eye hazard**

Exposure to laser light can cause severe retina and cornea injuries, leading to permanent eye damage. Invisible laser light, such as the welding beam (e.g., 1070 nm), requires proper protection. Direct beams are particularly hazardous, and eyewear is intended for incidental exposure only. Never look directly into a laser aperture or point the torch at others. Always inspect all the equipment for damage before use and wear a full laser welding helmet designed specifically for the laser welding operation. Traditional arc welding helmets do not provide adequate protection against laser hazards.

**Protective clothing**

Wear non-reflective clothing and avoid flammable materials.

**Hand protection**

Utilize appropriate gloves that abide by the local and global laser safety standards to prevent laser burns and ensure safe handling of hot or sharp workpieces.

**Laser welding helmet**

ESAB laser-specific welding helmets are designed for use with the handheld laser welding systems that operate as class 4 energy at 900 - 1100 nm wavelength range. The laser-specific helmets feature carbon fibre shells with both UV and IR filters that have passed the minimum required standard of **EN207:2017 D LB6** protection level. Additionally, ESAB's laser-specific helmets also pass applicable eye and face impact protection according to **EN ISO 16321-1:2022; EN ISO 16321-2:2021; AS/NZS 1337.1:2010; AS/NZS 1338.1:2012**.

**WARNING!**

Infrared (IR) and ultraviolet (UV) radiation, along with heat and sparks, can harm the skin. All personnel in the Laser Controlled Area (LCA) must wear appropriate personal protective equipment (PPE). UV exposure and welding plasma can cause sunburn, increase skin cancer risk, and accelerate aging.

1.5 Workspace safety

- Ensure the work area is free of clutter.
- Use laser warning signs to alert others to the presence of a laser in operation.

- Use barriers or shields to prevent laser beams from leaving the work area.
- Ensure ventilation systems are operational to reduce exposure to fumes and gases generated during welding.

Warning labels and signs

- Keep all warning labels intact and visible.
- Post warning signs indicating the use of laser equipment in the area.

	Class 4 Laser welding machine
	Laser welding
	Avoid eye contact
	Avoid hand contact
	Radiation or radioactive materials
	Safe workplace



CAUTION!

Assess the work site to identify surfaces that could cause hazardous reflections and review the Laser Controlled Area (LCA). End-user companies must appoint a qualified Laser Safety Officer (LSO) or ensure that personnel are trained.

1.6 Laser reflection safety



CAUTION!

Highly reflective metals can produce hazardous mirror-like reflections. The intensity varies based on the metal type and surface finish. Thermally conductive metals like aluminum and copper can reflect some laser energy due to delayed plasma ignition, but this is minimized once plasma is initiated.



CAUTION!

The normal direction of the laser reflection from a metal surface can produce a hazardous beam reflected from one surface of the targeted weld site. Additionally, the normal direction of the laser reflection can produce a hazardous beam reflected back from two surfaces oriented at an angle termed "retroreflection".



CAUTION!

Specular reflections can present eye and skin hazards to the operator as a portion of the beam can be reflected from multiple surfaces.

Laser beam hazards



WARNING!

Welding produces both visible and invisible light radiation. High-power laser beams interacting with welded materials can generate plasma, emitting ultraviolet radiation and “blue light,” which may cause conjunctivitis, retinal injury and skin burns. Welders exposed to ultraviolet light without protection risk permanent eye damage.

Direct exposure: Avoid exposure to the laser beam or its reflections. Serious injuries can occur in seconds.

Diffuse reflections: Even scattered laser beams can cause damage. Do not direct the laser at any reflective surfaces.

Laser safety interlocks

- Ensure all machine safety interlocks are functioning.
- Never bypass interlocks or safety mechanisms.

How to reduce exposure

Read and follow all labels and the Instructional manual before using this laser welding equipment. Adhere to all applicable standards and regulations. Only qualified personnel should install, operate, maintain and repair the equipment. Ensure it includes essential safety features for Class 4 lasers, such as:

Key switch: Secures equipment and prevents unauthorized use.

Emergency stop button: Immediately halts laser emission.

External interlock connection: Shuts down the laser if unauthorized personnel enter the area.

Laser Controlled Area (LCA) requirements

- Each point of use must have an LCA, including demonstrations.
- An LCA should be a light-tight enclosure with laser-blocking panels, an interlocked access door, and a “Laser On” warning sign.
- Barriers and windows in the welding area must be made of laser-safe materials that can withstand direct and reflected beams.
- Appropriate laser warning signs must be posted throughout the controlled area, especially at entrances and exits.

1.7 Dust and smoke explosion hazards



WARNING!

Dust from handheld laser welding poses fire and dust explosion risks. Explosions occur when oxygen and dust above the lower explosion concentration and minimum ignition energy are present. A first explosion can scatter accumulated dust, leading to more severe secondary explosion.

- Clean scrap boxes, pre-boxes, and dust collector boxes daily.
- Avoid laser cutting magnesium and its alloys, as they have the highest dust explosion risk.



WARNING!

Welding smoke composed of tiny particles and gases that come from welding materials, fillers, protective gases, paints, coatings and chemical reactions can harm the lungs, heart, kidneys and central nervous system.

- When welding, keep your head away from the smoke. Be sure to weld in a well-ventilated area to ensure the safety of breathing air.

- Use the smoke exhaust system to remove particles, steam and hazardous fragments from the welding process.
- Routine air monitoring should be performed to determine the harmful smoke level in the welding area.
- In closed space and other cases, the respiration mask/helmet like ESAB Laser-specific welding helmet is recommended.

1.8 Thermite reaction hazards

When dust from aluminum and iron oxide ignites, it triggers a thermite reaction, producing intense heat and an explosion. Dust from handheld laser welding titanium, aluminum, zinc and their alloys also cause dangerous reaction when mixed with oxidized iron or copper dust.

- Use dedicated machines for different materials, fully clean dust before switching materials, and prevent dust mixing.
- Metal dusts reacting with water generate heat and hydrogen gas, posing explosion risks. Do not use water on metal fires—install proper fire extinguishers.

1.9 Operational safety

Pre-operation checklist

- Inspect essential components of the system for visible damage.
- Ensure that the laser is calibrated and properly aligned.
- Verify that safety equipment, such as goggles and shields, are in place.
- Ensure the ventilation system is operational.

Starting the machine

- Follow the manufacturer's procedure for powering on and initiating the welding process.
- Ensure all protective devices, including safety curtains and barriers are in position before activating the laser.

During operation

- Never leave the power source unattended during operation.
- Do NOT look directly at laser beam, even with protective glasses.
- Refrain from using reflective materials in proximity to the welding area to reduce the risk of unintended laser reflections.

Shutdown procedure

- Power OFF the system following the correct shutdown procedure.
- Ensure that the laser power source is completely powered down.
- Lockout/tagout procedures must be followed during maintenance or repair.

1.10 Fire safety



WARNING!

- Laser welding can ignite flammable materials. Keep combustibles away from the laser beam and welding area.
- Ensure that appropriate fire extinguishers (Class D for metal fires) are available and nearby.

Emergency procedures

- In case of a fire, immediately shut down the laser and use appropriate fire extinguisher.
- Evacuate the area and follow the facility's emergency response plan.

1.11 Electrical safety



DANGER! **Electrical hazards**

- Laser welding power source often use high-voltage power supplies. Exercise caution when working with electrical components.
- Do not perform repairs or maintenance without disconnecting the power supply.

Grounding

- Ensure that the power source is properly grounded to prevent electrical shock.

1.12 Maintenance and inspections

Routine maintenance

- Follow the manufacturer's recommended maintenance schedule.
- Inspect and clean protective window and filters regularly to prevent laser misalignment or beam scattering.

System inspections

- Periodically check for wear or damage to system components as explained in the Maintenance section of the instruction manual.
- Inspect the fume extraction system to ensure it is effectively removing fumes and gases.

Laser source maintenance

- Only qualified personnel should service the laser source.
- Follow the manufacturer's guidelines for replacing or servicing the laser module.

1.13 Emergency procedures

Laser-related injuries

- In case of laser exposure to the eyes or skin, seek medical attention immediately.
- Report all accidents and incidents to a supervisor and complete an incident report.

Power failure or machine malfunction

- Turn OFF the machine and follow lockout/tagout procedures.
- Notify maintenance personnel for inspection and repair.

1.14 Product safety



CYLINDER HANDLING

Cylinders, if mishandled, can rupture and violently release gas. A sudden rupture of cylinder valve or relief device can injure or kill. Therefore:

1. Locate cylinders away from heat, sparks and flames. Never strike an arc on a cylinder.
2. Use the proper gas for the process and use the proper pressure reducing regulator designed to operate from the compressed gas cylinder. Do not use adaptors. Maintain hoses and fittings in good condition. Follow manufacturer's operating instructions for mounting regulator to a compressed gas cylinder.
3. Always secure cylinders in an upright position by chain or strap to suitable hand trucks, undercarriages, benches, wall, post or racks. Never secure cylinders to work tables or fixtures where they may become part of an electrical circuit.

4. When not in use, keep cylinder valves closed. Have valve protection cap in place if regulator is not connected. Secure and move cylinders by using suitable hand trucks.



MOVING PARTS

Moving parts, such as fans, rotors and belts can cause injury. Therefore:

1. Keep all doors, panels, guards and covers closed and securely in place.
2. Stop engine or drive systems before installing or connecting unit.
3. Have only qualified people remove covers for maintenance and troubleshooting as necessary.
4. To prevent accidental starting of equipment during service, disconnect negative (-) battery cable from battery.
5. Keep hands, hair, loose clothing and tools away from moving parts.
6. Reinstall panels or covers and close doors when service is finished and before starting engine.



WARNING! FALLING EQUIPMENT CAN INJURE

- Only use lifting eye to lift unit. Do NOT use running gear, gas cylinders or any other accessories.
- Use equipment of adequate capacity to lift and support unit.
- If using lift forks to move unit, be sure forks are long enough to extend beyond opposite side of unit.
- Keep cables and cords away from moving vehicles when working from an aerial location.



WARNING! EQUIPMENT MAINTENANCE

Faulty or improperly maintained equipment can cause injury or death. Therefore:

1. Always have qualified personnel perform the installation, troubleshooting and maintenance work. Do not perform any electrical work unless you are qualified to perform such work.
2. Before performing any maintenance work inside a power source, disconnect the power source from the incoming electrical power.
3. Maintain cables, earthing wire, connections, power cord and power supply in safe working order. Do not operate any equipment in faulty condition.
4. Do not abuse any equipment or accessories. Keep equipment away from heat sources such as furnaces, wet conditions such as water puddles, oil or grease, corrosive atmospheres and inclement weather.
5. Keep all safety devices and cabinet covers in position and in good repair.
6. Use equipment only for its intended purpose. Do not modify it in any manner.

**CAUTION!**
ADDITIONAL SAFETY INFORMATION

For more information on safe practices for electric arc welding and cutting equipment, ask your supplier for a copy of “Precautions and Safe Practices for Arc Welding, Cutting and Gouging”, Form 52-529.

The following publications are recommended:

- ANSI/ASC Z49.1 - “Safety in Welding and Cutting”
- ANSI/AWS F4.1 - “Recommended Safe Practices for Welding and Cutting of Containers That Have Held Hazardous Substances”
- ANSI Z136.9 - "American National Standard for Safe Use of Lasers in Manufacturing Environments "
- ANSI Z87.1, "Occupational and Educational Personal Eye and Face Protection Devices"
- AWS SP - “Safe practices” - Reprint, Welding Handbook
- CEN-EN 207 - "Personal eye-protection equipment - Filters and eye-protectors against laser radiation (laser eye-protectors)"
- CGA Standard P-1, “Precautions for Safe Handling of Compressed Gases in Cylinders”
- CSA W117.2 - "Code for safety in welding and cutting"
- IEC 60825-1 - "Safety of laser products emitting laser radiation in the wavelength range 180 nm to 1 mm"
- IEC TC76 - "Optical radiation safety and laser equipment"
- IEC 61000-6-4 - "Emission standard for industrial environments"
- IEC 61000-6-2 - "Immunity standard for industrial environments"
- ISO 11553-1 - "Safety of machinery — Laser processing machines"
- ISO 12100 - "Risk assessment and risk reduction"
- NFPA Standard 51B, “Fire Prevention During Welding, Cutting, and Other Hot Work"
- OSHA 29 CFR 1910 - "Safety and health standards"
- OSHA 21 CFR 1040 - "Performance standards for manufacture of laser products"

2 INTRODUCTION

The **Dueler EHL1500** is a compact handheld laser welding power system (Class 4 laser) with a lightweight torch designed to weld with or without filler metal.

The laser power source has built-in wheels and gas cylinder brackets to move easily around the workplace and provide better reach.

Main features of Dueler EHL1500:

- High performance
- High reliability and efficiency
- High electro-optical conversion rate
- Maintenance-free high-power laser
- Compact design
- Wide material compatibility
- Precise power control
- User-friendly interface

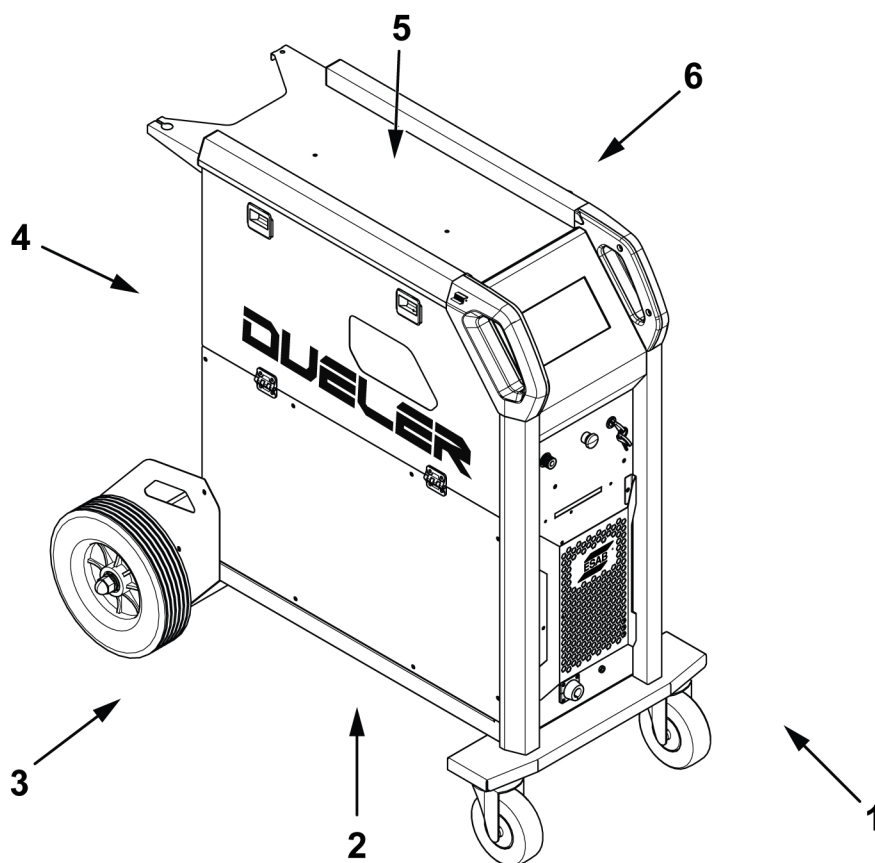
ESAB accessories for the product can be found in the "ACCESSORIES" chapter of this manual.

2.1 Equipment

The **Dueler EHL1500** laser power system is supplied with:

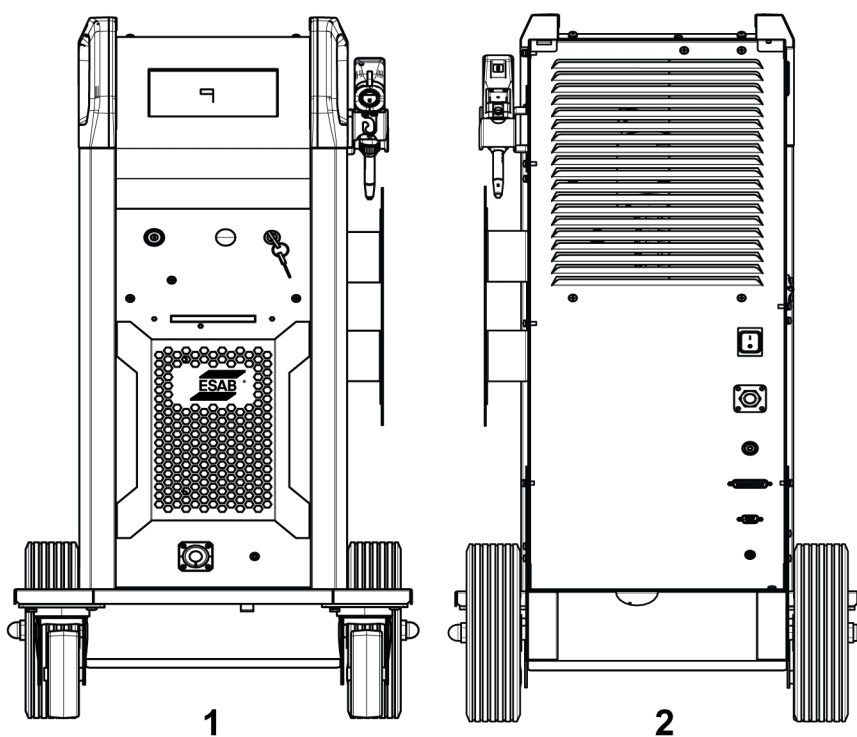
- Instruction manual
- Quick start guide
- Wire feeding conduit - steel, 4 m
- Wire feeding conduit - aluminum, 3 m
- Wire feeding rollers - steel V 0.9/1.0+1.2, installed at the Precidrive
- Wire feeding rollers - aluminum U 1.0+1.2, inside the toolbox
- Wire feed nozzles - contact tips 0.8/1.0/1.2/1.6 mm
- Different laser torch copper nozzles - brass nozzle 1, 3, A, B and flat nozzle
- Laser torch lens protectors - 5 pcs
- DB25 connector with 3 m cable for the security interface
- Mobile laser torch holder
- Paper tape
- Vinyl cap for torch tip
- Plug 32 A - P232-6S- CEE 32A-6h/220-250V
- Shielding gas hose - 4.5 × 6 mm
- Shielding gas hose adaptor - 6.5 × 10 mm
- Two gas hose quick connectors
- Wire feeder fixture
- Round cotton swab
- Pointed cotton swab
- Power cord
- Safety loop cable

2.2 Views of the product



- 1. Front
- 2. Bottom
- 3. Left

- 4. Rear
- 5. Top
- 6. Right



1. Front view

2. Rear view

3 TECHNICAL DATA

Parameter	Dueler EHL 1500
INPUT	
Input voltage range	1~230 ± 10% VAC
Frequency	50/60 Hz
Input Power	6 kW
Circuit breaker	32 A
LASER SOURCE	
Laser class	Class 2 (Positioning) / Class 4 (Welding)
Laser modes	CW/Pulsed
Laser technology	Fiber
Max laser output power	1500 W
Laser output power range	150-1500 W
Laser cooling method	Air cooled
WELDING LASER TORCH	
Dimensions l × w × h	300 × 237 × 36 mm
Weight	680 ± 10 g
Cooling	Air cooled (gas)
Fiber cable length	5.6 m
Adjustable wobble width	0 - 4 mm
Adjustable wobble frequency	0 - 220 Hz
WIRE FEEDER	
Wire speed	2 - 30 mm/s
Max weight of wire spool	18 kg
Wire dimension range	0.8- 1.0 - 1.2 -1.6 mm
GENERAL CHARACTERISTICS	
Dimensions l × w × h	1042 × 1014 × 479 mm
Weight	105 kg
Operating temperature	10 to +40 °C
Storage temperature	-10 to +60 °C
Operating ambient relative humidity	10 to 85%
Enclosure class	IP21
Application classification	S

Enclosure class

The **IP** code indicates the enclosure class, i.e. the degree of protection against penetration by solid objects or water.

Equipment marked **IP21S** is intended for indoor and may be used outdoors if sheltered during precipitation.

Application class

The symbol  indicates that the power source is designed for use in areas with increased electrical hazard.

3.1 Optic parameters

Parameter	Nominal value (Test condition)
Emission wavelength	1080 ± 10 nm (CW (1500 W))
Spectrum width	3 nm (CW (1500 W))
Short-term power instability	± 1% (CW (100%)>1h)
Long-term power instability	± 2% (CW (100%)> 24h)
Laser switching ON time	50 µs (10% to 90% output)
Laser switching OFF time	50 µs (90% to 10% output)
Fiber core size	20 µm
Fiber cable minimum bending radius	200 mm
Laser continuous output time (s)	Emission 120 s, cooling 6 s

4 INSTALLATION

The installation must be carried out by a qualified professional.

**CAUTION!**

This product is intended for industrial use. In a domestic environment this product may cause radio interference. It is the user's responsibility to take adequate precautions.

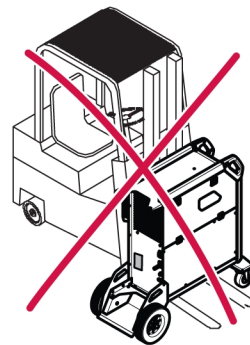
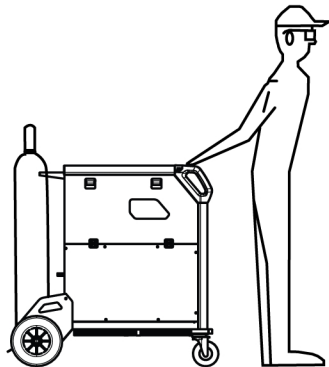
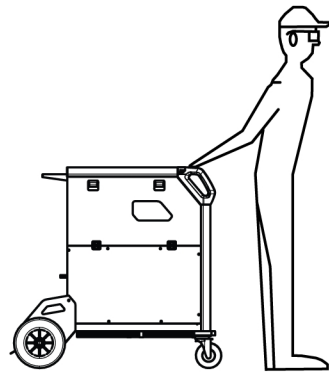
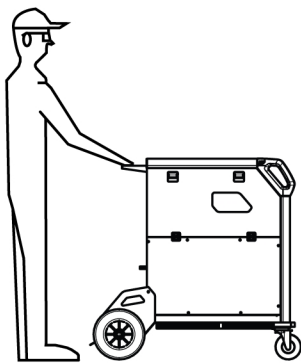
**CAUTION!**

Remove any packaging material prior to use. Do not block the air vents at the bottom, rear and side panels of the laser power system.

4.1 Moving instructions

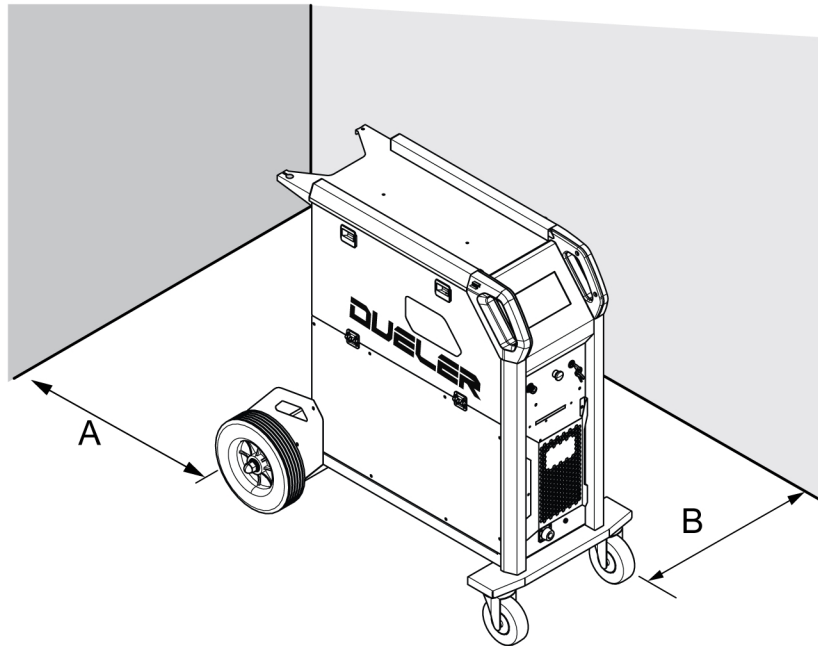
Refer to the following image for instructions on how to move the laser power system.

Do **not** lift the laser power system.



4.2 Location

Position the laser power system so that cooling air inlets and outlets are not obstructed.



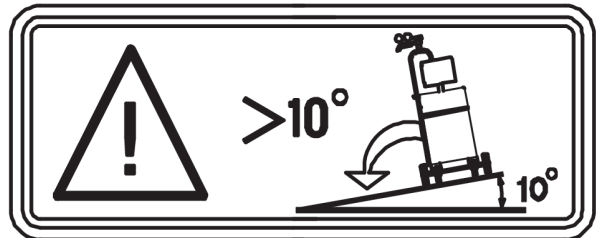
A. Minimum 200 mm (8 in.)

B. Minimum 200 mm (8 in.)



WARNING!

Secure the equipment - particularly if the ground is uneven or sloping.



NOTE!

When moving the equipment use intended handle. Never pull the cables.

4.3 Main power supply

The laser power source needs to be supplied with input voltage of $230 \pm 10\%$ VAC; make sure it is protected by the correct fuse rating. A protective earth connection must be made, in accordance with regulations.

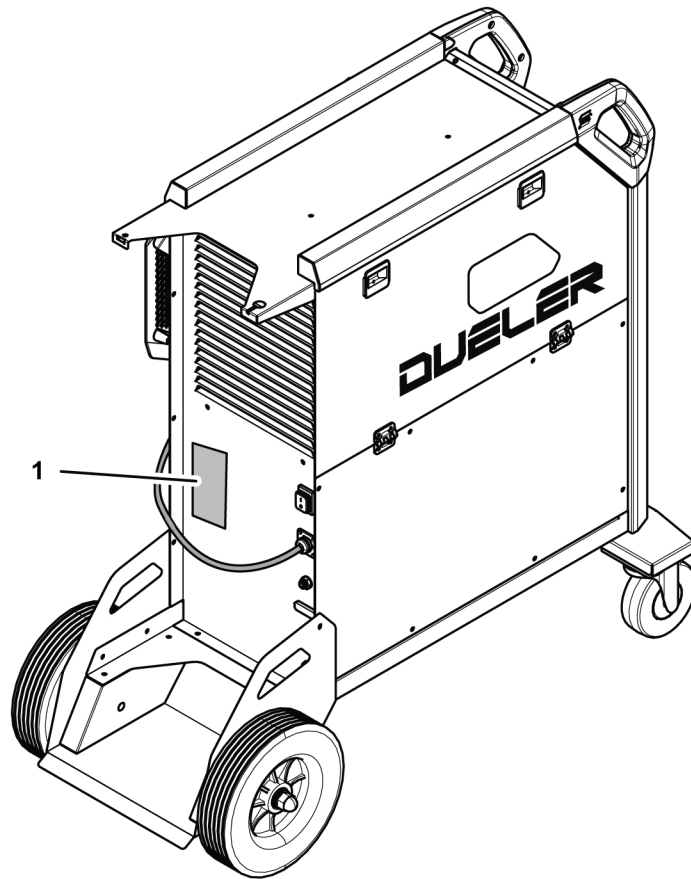


NOTE!

Make sure that the Dueler EHL 1500 casing is well grounded; any interruptions in the grounding connection may result in personal injury.

Before using the system, ensure that the power supply is also connected to the protective ground.

Make sure that the correct AC mains voltage range is present. Improper wiring may lead to personal injury or system damage.



1. Rating plate with supply connection data

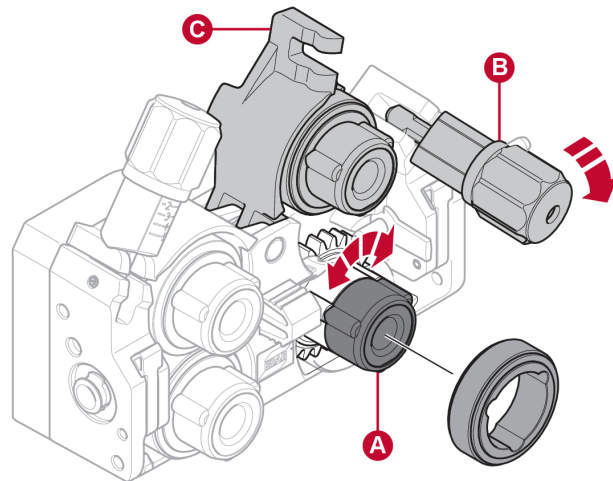
Parameter	Dueler EHL 1500
Mains cable area	3 × 4 mm ²
Mains voltage	230 V ± 10%
Maximal current rating $I_{\max}$	25 A
Circuit breaker	32 A

4.4 Changing feed rollers

When changing to a different type of wire, the feed rollers should be changed to match the new type of wire. For information about correct feed roller depending on wire diameter and type, see the WEAR PARTS appendix.

- 1) Open the left door of the laser power system.
- 2) Unlock the feed rollers to be exchanged, by rotating the roller quick lock (A) for each roller.

- 3) Relieve the pressure on the feed rollers, by folding the tensioner units (B) down and thereby releasing the swing arms (C).

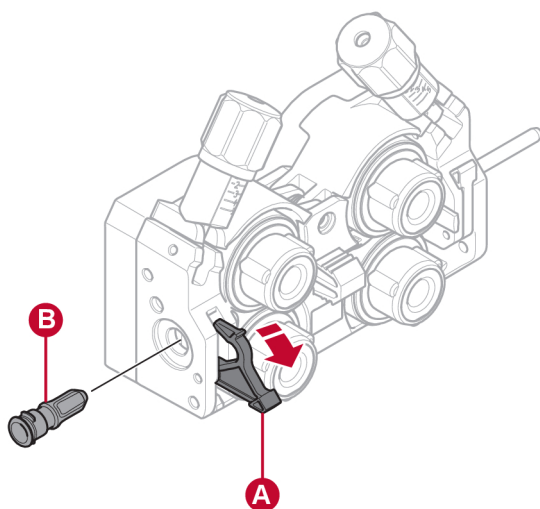


- 4) Remove the feed rollers and install the correct ones (according to the WEAR PARTS appendix).
- 5) Reapply the pressure on the feed rollers, by pushing the swing arms (C) down and secure them using the tensioner units (B).
- 6) Lock the rollers by rotating the roller quick locks (A).
- 7) Close and lock the left door of the laser power system.

4.5 Changing the wire guides

When changing to a different type of wire, the wire guides may have to be changed to match the new type of wire.

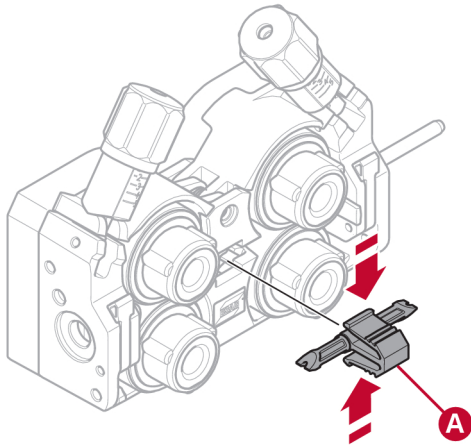
4.5.1 Changing the inlet wire guide



- 1) Unlock the inlet wire guide quick lock (A) by folding it out.

- 2) Remove the inlet wire guide (B).
- 3) Install the correct inlet wire guide.
- 4) Lock the new inlet wire guide using the wire guide quick lock (A).

4.5.2 Changing the middle wire guide



- 1) Apply a little pressure on the middle wire guide clip and pull out the middle wire guide (A).
- 2) Push in the correct type of wire guide. The clip automatically locks the wire guide when in the correct position.

4.6 Installing the wire bobbin (Spool)

- 1) Open the left door of the laser power system.
- 2) Loosen and remove the brake hub nut and remove the old wire spool.
- 3) Insert a new wire spool into the unit and straighten out the new welding wire 10–20 cm. File away burrs and sharp edges from the end of the wire before inserting it into the feeder mechanism.
- 4) Lock the wire spool onto the brake hub, by tightening the brake hub nut.
- 5) Thread the wire through the feeder mechanism.



NOTE!

Replace the brake hub nut and the brake hub sleeve if they are worn out and do not lock properly.

- 6) Close and lock the left door of the wire feeder compartment in the laser power system.

4.7 Laser torch accessories

The laser torch accessories are brass nozzles, protective window, and wire feed conduit.

4.7.1 Nozzle tip selection

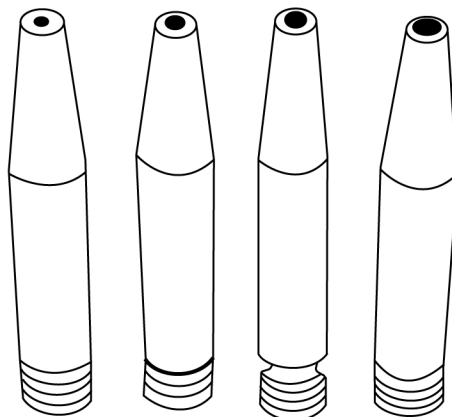
Nozzle tips switch out quickly and easily to accommodate fusion welding, wire welding, optimizing and increasing productivity. The nozzle tips screw onto the tip of the welding torch and the nozzle can be selected based on the type of joint to be welded and whether the application is with filler wire or not.

Check the table below for a reference on how to select the correct nozzle tip.

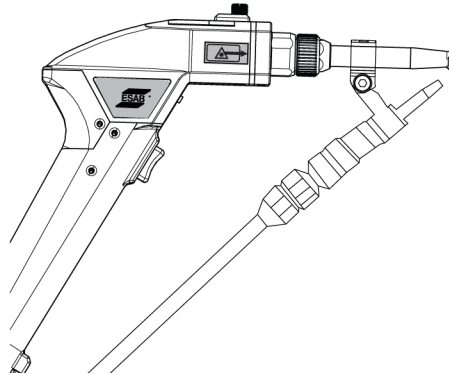
JOINT TYPE	LAP	BUTT	CORNER	EDGE	STACK
1					
3					
A or B					
Flat					

4.7.2 Installing the wire conduit

The main types of wire feed conduits available for use are made of graphite, stainless steel and Teflon. The wire feed conduit should be selected depending on the material of the wire to be used in the application.



The wire feed conduit has a quick connector on one end, which is used to connect to the wire outlet on the front panel. On the other end, it has a connector used to install the wire contact tip, which will be selected according to the wire diameter used in the application. The end of the conduit with the wire contact tip is attached to the focal tube of the welding torch through a holder provided with the machine.



- 1) Connect one end of the wire feed conduit to the front panel of the Dueler system.
- 2) Install the correct wire contact tip on the extreme of the wire feed conduit.
- 3) Adjust the focal value at the focal tube in the welding torch.
- 4) Attach the wire feed conduit to the focal tube using the holder provided with the system.
- 5) Make sure that the wire contact tip is well aligned with the wire groove in the welding nozzle at the tip of the torch.
- 6) Adjust the position of the wire contact tip so it is close to the welding nozzle.

4.7.3 Protective window

A protective window is an essential component of a laser welding torch. It will safeguard the focusing lens from damage caused by spatter, debris, and high temperatures during the welding process. Protective windows are made from high-quality materials, these lenses are engineered to withstand the intense heat and energy of the laser beam, ensuring precise welding performance and extending the service life of the torch components.



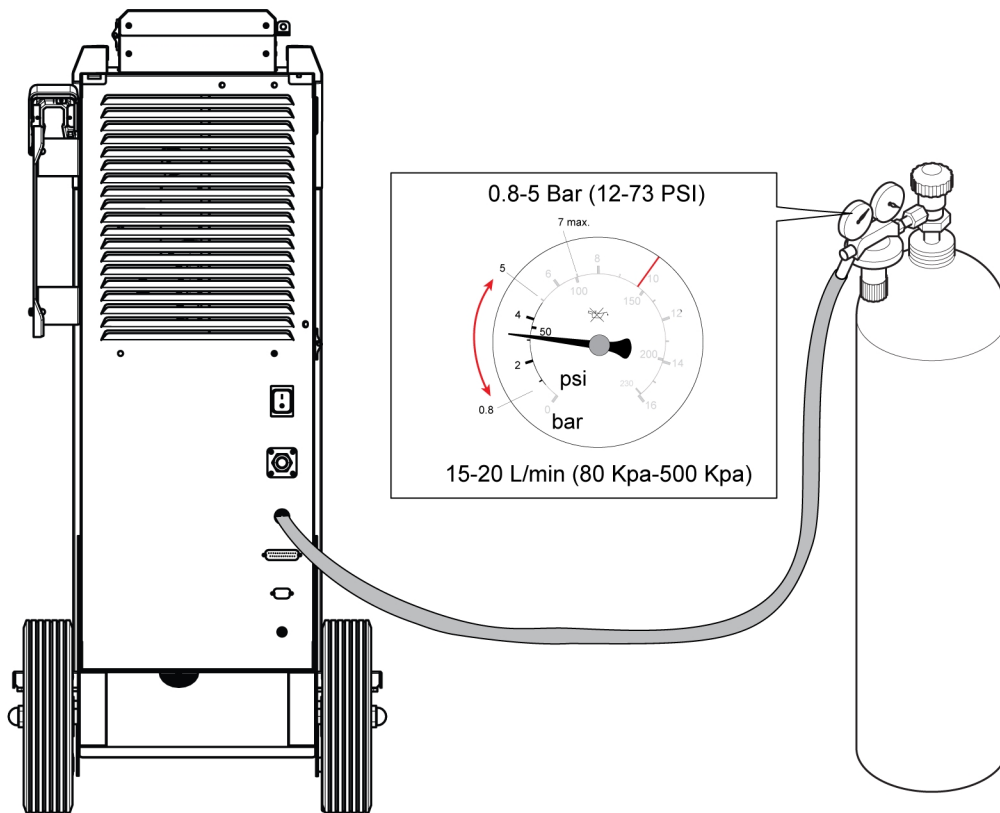
NOTE!

Before switching ON the laser system, make sure that the protective window is clean and free from damage. Operating with a contaminated or compromised lens can lead to damage of the welding torch components and poor welding quality.

To replace the protective window, see the maintenance section.

4.8 Connecting the shielding gas

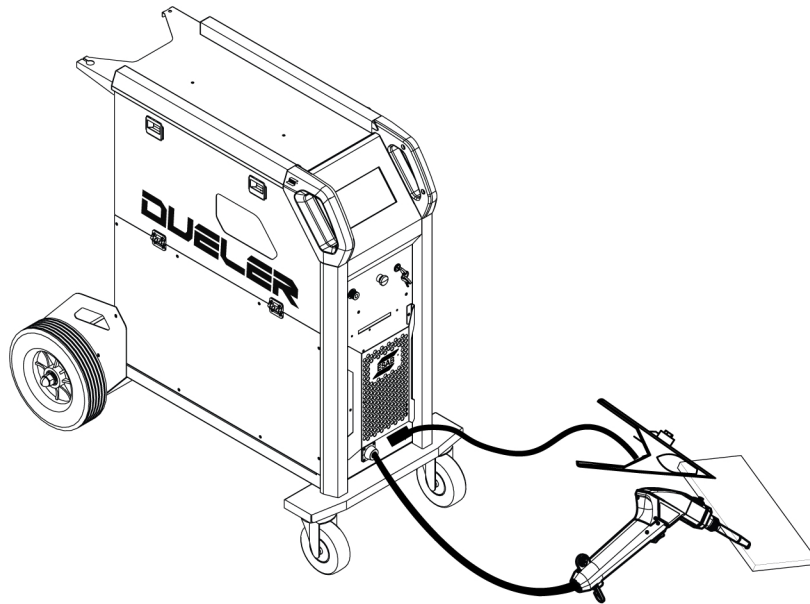
Typically, nitrogen and argon inert gases are used as shielding gases in the laser welding process. At the Dueler system, the welding laser torch is cooled by the inert gas used as shielding gas for the welding process. For an effective welding process, it is essential to use a pressure regulator with a flowmeter to accurately control the airflow. The shielding gas should maintain optimal gas purity and pressure. The shielding gas purity must be 99.99%, and the input gas pressure should range from 80 kPa to 500 kPa.



- 1) Connect one end of the 6 mm gas hose to the gas input at the rear panel on the Dueler system.
- 2) Connect the other end of the gas hose to the gas regulator.

4.9 Connecting the workpiece safety cable

The Dueler system uses a safety cable to output laser energy in a safe way. The connection of this safety cable ensures that the laser beam can be activated only when the nozzle or wire at the welding torch is in contact with the workpiece closing a circuit with the safety cable.



- 1) Insert the connecting pin in one end of the cable to the safety cable connector cable in the front panel of the Dueler system.
- 2) Connect the other end of the cable with a clamp on the workpiece.

**NOTE!**

If the safety cable is not correctly connected to the front panel and the workpiece, the Dueler system will not start the laser beam, when the welding torch touches the workpiece.

5 OPERATION

General safety regulations for handling the equipment can be found in the "SAFETY" chapter of this manual. Read it through before you start using the equipment!

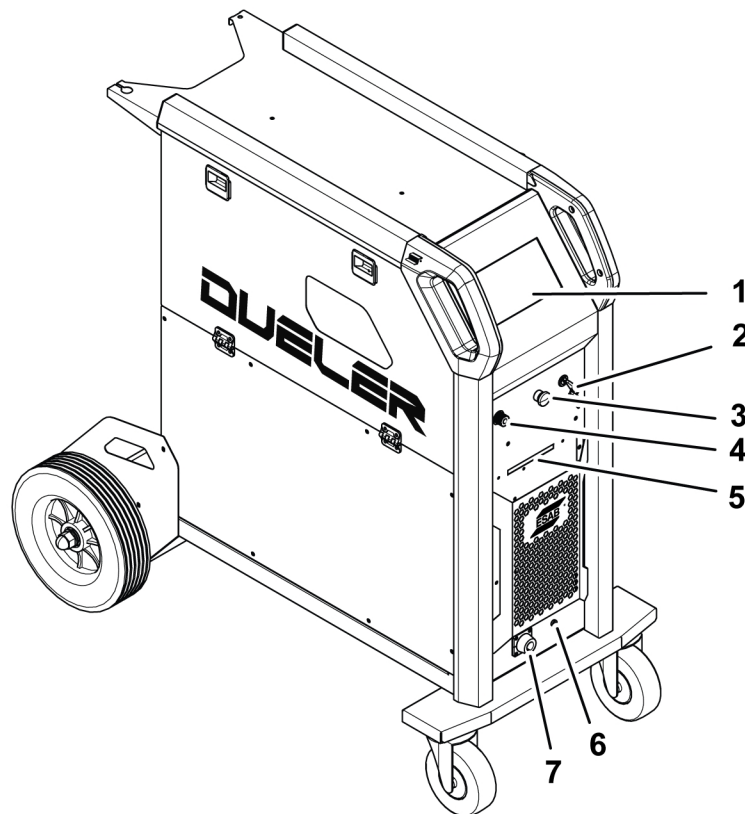


NOTE!

When moving the equipment use intended handle. Never pull the cables.

5.1 Connections and control devices

5.1.1 Front controls



1. 7" touch screen display

The touch screen display allows to configure all welding parameters through an intuitive user interface. It also displays in a simple and clear way all the warnings that the system generates so that the user can take the necessary actions to make the system ready to work again.

2. Key switch

The key switch, is a safety device that is used to manually enable or disable the laser module of the system. In the 0 (OFF) position, the laser module is disabled and there will be no possibility to activate the laser module through the display. In position 1 (ON), the laser module is manually activated and there is now the possibility to activate or deactivate the laser module via the display. When the key is at the position 1 (ON) it is not possible to remove the key.

3. Emergency stop switch

The emergency stop switch is a safety device that is used to manually disable the system in case of an emergency. Once the emergency is solved the system can be reactivated again releasing the switch by rotating it clockwise.

4. Wire feed output

The wire feed output is where the welding wire comes out from the wire feeder compartment. At this wire feed output is where the wire feeder conduit is connected through a quick connector.

5. Status indicators light

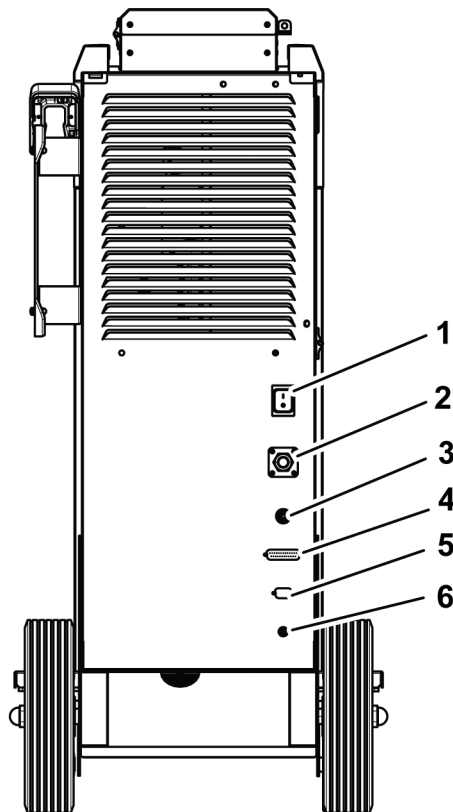
The light at this indicator depends on the status of the system. When the system is in its normal state the light is green, when the system is in an abnormal state the light is blinking red and blue. When the system starts welding the light becomes red.

6. Safety cable connector

The safety cable is connected to this connector.

7. Laser fiber optic cable

This is the output of the laser fiber cable that connects to the welding laser torch.

5.1.2 Rear controls**1. Mains power supply switch, O/I**

Mains power supply switch is used to turn ON (I) or OFF (o) the Dueler system.

2. Mains cable connector

This connector is used to install the main power cable that connects the system to the 220 VAC grid through the corresponding plug.

3. Connection for shielding gas

This quick connector is the input of shielding gas used at the welding.

4. External control interface

This DB25 interface connector allows the Dueler system to be integrated on a Laser Controlled Area or to be controlled by a COBOT.

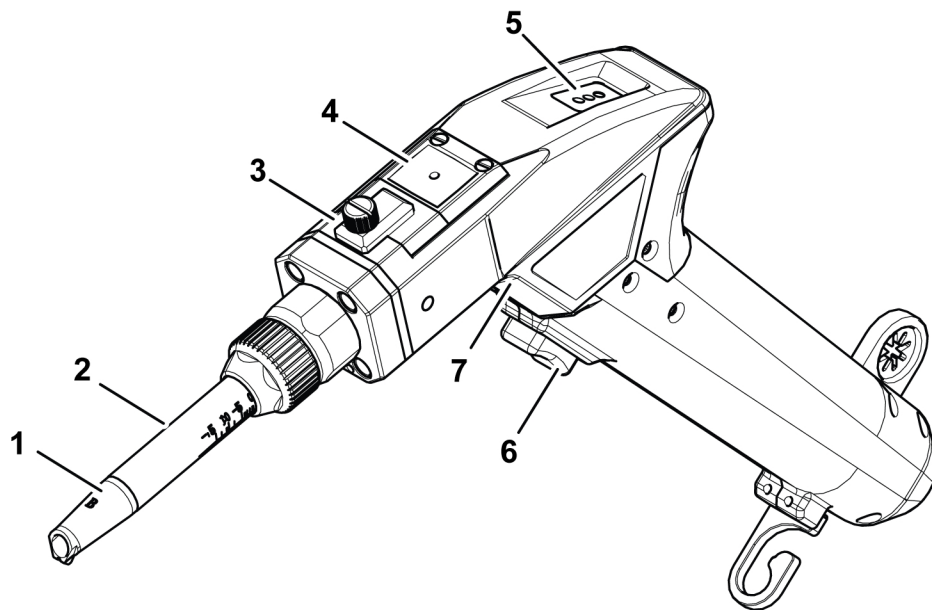
5. Laser module interface (RS232)

This RS232 interface (DB9) is used by ESAB for system diagnosis, control and updates.

6. Ground stud

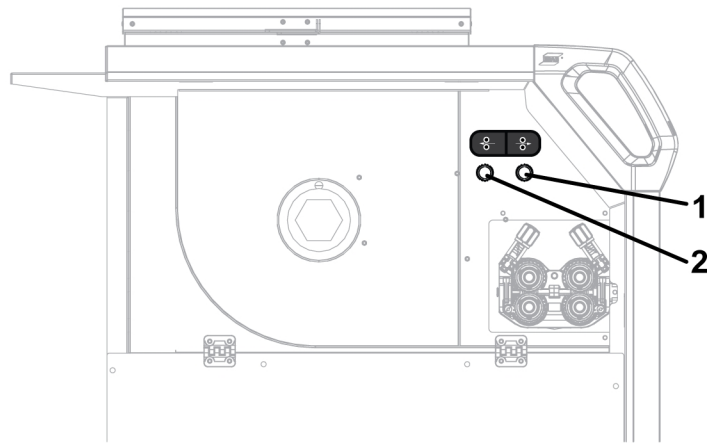
Grounding stud used to prevent any potential damage to the laser due to static electricity. It is highly recommended to ground the laser welder properly while using the same welding table for HF TIG welding.

5.1.3 Torch controls



1. **Nozzle**
The nozzle screws onto the focal tube of the welding torch and can be selected based on the type of joint being welded and whether the application is with filler wire or not.
2. **Focal tube**
The torch focal tube is used to adjust the required defocus value for various parameters. Adjusting the focal tube allows you to modify the distance from the workpiece to adjust the defocus value. For this purpose, it features a printed scale that is used as a reference.
3. **Protective window**
The protective window is used to protect the focusing lens from damage caused by spatter, debris, and high temperatures during the welding process.
4. **Focus lens**
This holder contains a second protective window and the focus lens. The focus lens is a convex lens used to focus the laser beam on the material to be welded.
5. **Status indicator**
The status indicator light displays various operating states. Proper communication between the torch and laser, along with normal equipment operation, activates a yellow indicator light. When the safety cable connected to the Dueler system and the torch nozzle simultaneously contact the material to be welded and the laser trigger switch is pressed, the laser beam is emitted, and the indicator light turns green. If an abnormality is detected with the torch or the laser source, the indicator light turns red.
6. **Laser trigger switch**
When all system safety conditions are met and there are no warnings, the laser trigger switch is used to release the welding laser beam.
7. **Feed wire switch**
This switch is used to turn ON or OFF the wire feeding.

5.1.4 Wire feed controls



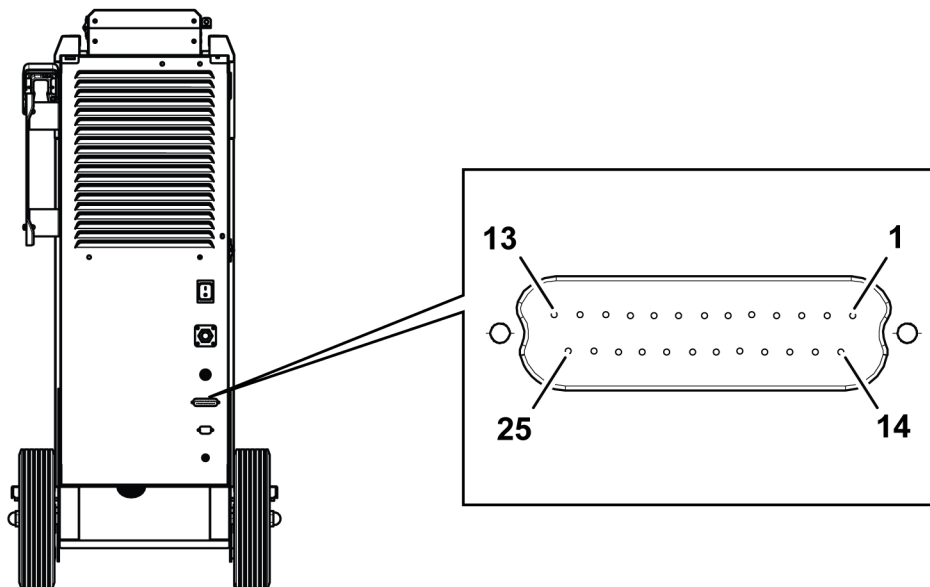
1. Manual feeding button

This button is used for manual wire feeding, typically during daily troubleshooting or maintenance procedures. Pressing the button will result in a green light turning on, indicating that the wire feeding process is ongoing.

2. Manual pull-back button

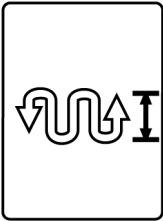
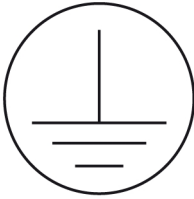
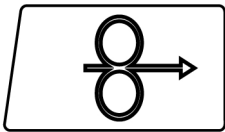
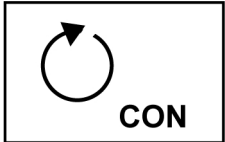
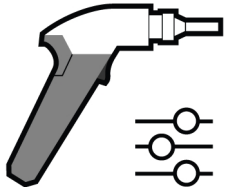
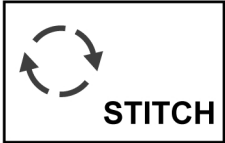
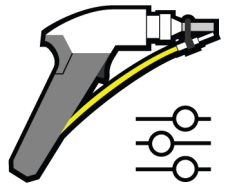
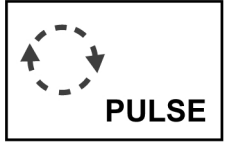
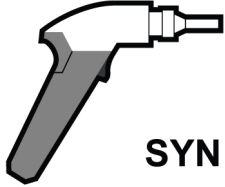
This button serves for manual wire retraction and is generally used during daily troubleshooting or maintenance procedures. Upon pressing the button, a green light will be turning on, indicate that the wire is being retracted.

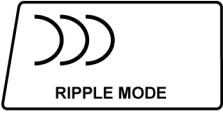
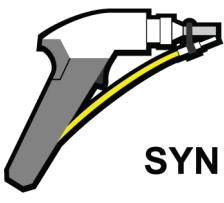
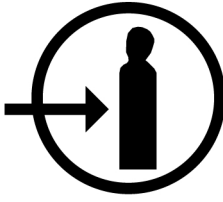
5.1.5 External controls (Security interface DB 25)



Pin no.	Signal name	Type	Functionality
16	EX-CTRL+	IN	Laser emission Laser emission ON/OFF; When the voltage is high (24 V), laser emission is ON; When voltage is low (0 V), laser emission is OFF. When laser enable and laser emission are ON, laser beam is emitted.
3	EX-CTRL-		
18	Enable+		Laser enable Laser enable ON/OFF; When the voltage is high (24 V), laser enable is ON. When voltage is low (0 V), laser enable is OFF.
5	Enable-		
14	LaserON1	OUT	Laser enabled alarm These two pins are relay output pins. They are connected to an external indicator light to signal the status of the laser beam emission. When the laser beam is being emitted, both pins are open. When there is no laser emission, both pins are closed.
1	LaserON2		
7	EXLOCK1-	Contact closure	Interlock1 input External safety interlock; Potential free contacts. Laser cannot be started without the two pins connected together. Do not connect an external voltage.
20	EXLOCK1+		
9	EXLOCK2-		Interlock2 input External safety interlock; Potential free contacts. Laser cannot be started without the two pins connected together. Do not connect an external voltage.
22	EXLOCK2+		
19	EMG1+	IN	Emergency stop input1 When the voltage is high (24 V), the emergency stop is triggered (valid); When the voltage is low (0 V), the emergency stop is not triggered (invalid).
6	EMG1-		
21	EMG2+		Emergency stop input2 When the voltage is high (24 V), the emergency stop is triggered (valid); When the voltage is low (0 V), the emergency stop is not triggered (invalid).
8	EMG2-		

5.2 Symbols

ON  OFF	Mains power supply switch		Wobble width
	Protective earth		Wobble frequency
	Laser aperture		Feeder
	Continuous mode		Manual without wire
	Stitch mode		Manual with wire
	Pulse mode		Synergy without wire

	Ripple mode		Synergy with wire
	Gas input		

5.3 Starting the laser power source

Once the installation is complete, the startup process is as follows:

- 1) Open the cylinder's shielding gas valve.
- 2) Turn ON the power switch on the rear panel of the laser system. The touchscreen display will turn ON.
- 3) If necessary, release the emergency stop switch on the front panel of the laser system.
- 4) Use the manual feed button inside the feeder compartment to feed the wire through the conduit until it appears at the tip of the laser torch.
- 5) Adjust the bobbin (spool) brake and rollers pressure.
- 6) Adjust the shielding gas flow to 15-20 L/min using the purge button on the touch screen display.
- 7) Turn ON the laser enable switch.
- 8) Adjust the welding parameters and enable the laser on the touch screen display.
- 9) Press and hold the laser torch switch to start welding.

5.4 Bobbin brake

The bobbin brake force should be increased just enough to prevent wire feed overrun. The actual brake force needed dependent on the wire feed speed and the size and weight of the spool.

Do not overload the bobbin brake! A too high brake force may overload the motor and reduce the welding result.

The bobbin brake force is adjusted using the 6 mm hexagon Allen screw in the middle of the brake hub nut.



5.5 Roller pressure

The roller pressure should be adjusted separately on each tensioner unit, depending on used wire material and diameter.

Start by making sure that the wire moves smoothly through the wire guide. Then set the pressure of the wire feeder's pressure rollers. It is important that the pressure is not too high.

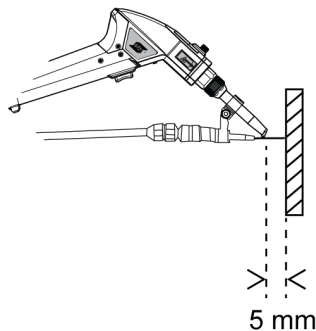


Figure A.

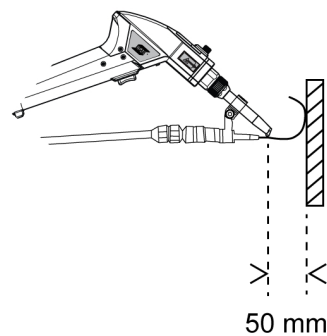


Figure B.

To check that the feed pressure is set correctly, you can feed out the wire against an insulated object, using the wire feeding button inside feeder compartment.

When you hold the welding torch approx. 5 mm from the piece of wood (figure A) the feed rollers should slip.

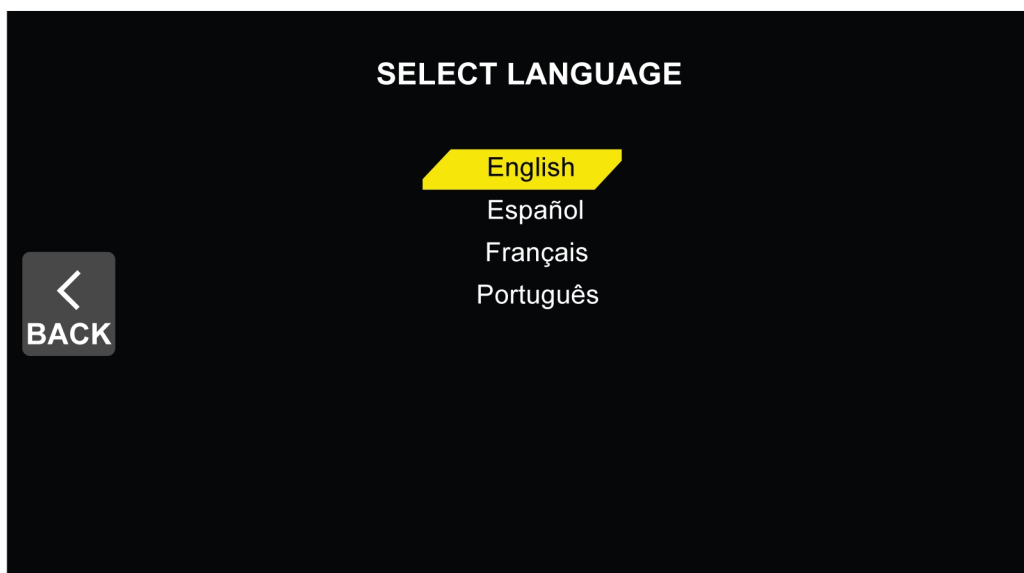
If you hold the welding torch approx. 50 mm from the piece of wood, the wire should be fed out and bend (figure B).

6 USER INTERFACE

6.1 Startup screen

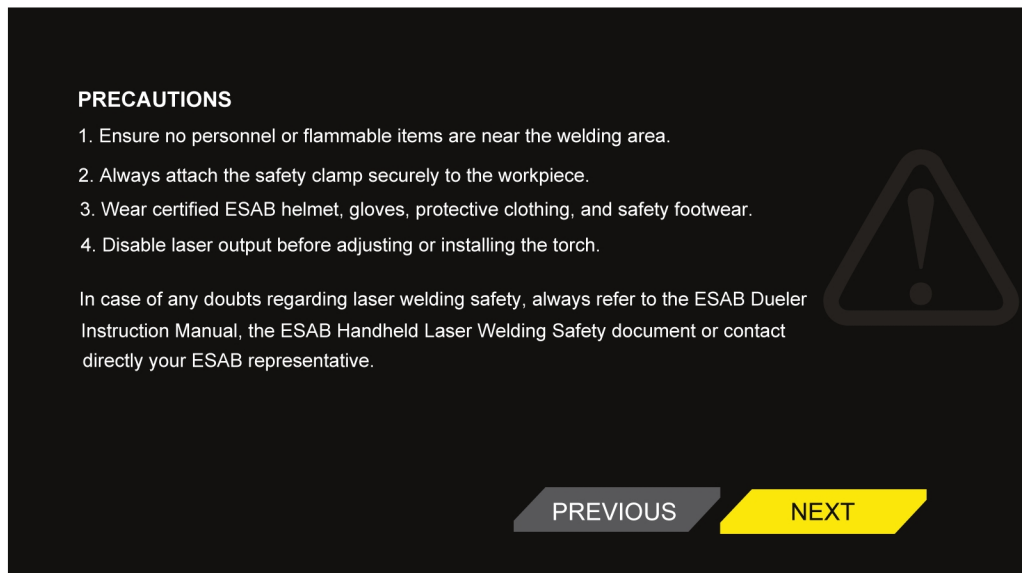


When the user turns ON the key switch for the first time in Dueler system, the screen starts up with the ESAB logo and then moves on to the select language screen (if applicable on the software version).



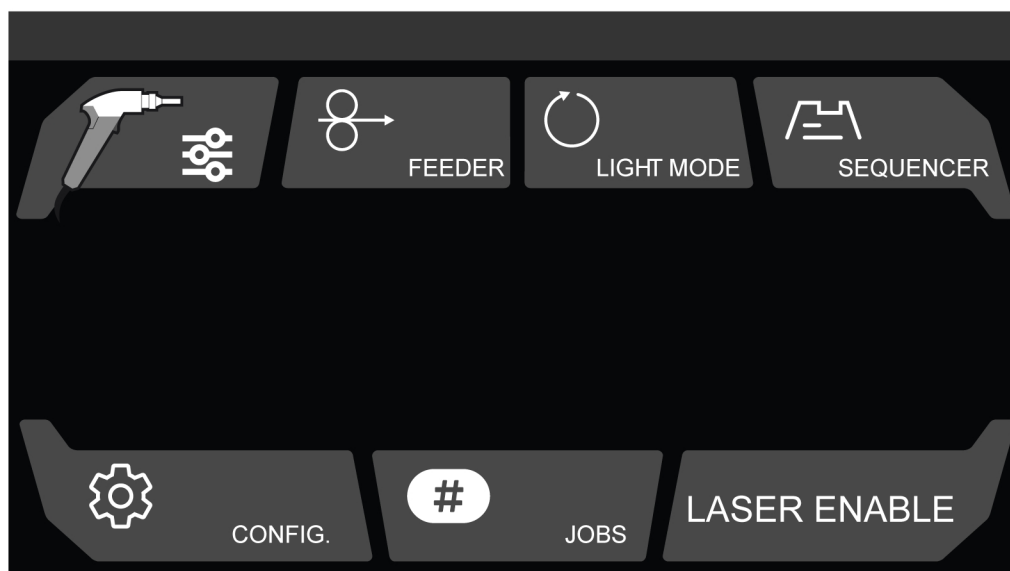
After selecting the language, the safety template will be visible to the user. User needs to read the safety template and click agree to proceed to main menu.

When the user starts the Dueler system again, the precautions screen will pop-up and the user needs to click next to enter the main menu.



6.2 Main menu

The following buttons are available in the main menu to access different menus or functions:



PROCESS: This button will allow you to select the desired process. The Dueler EHL 1500 has four processes available: SYNERGIC NO WIRE, SYNERGIC WITH WIRE, MANUAL NO WIRE, and MANUAL WITH WIRE.

FEEDER: The feeder is used when the MANUAL WITH WIRE process is selected. Press this button to access the settings for all parameters related to the wire feeder.

LIGHT MODE: The light mode menu is accessible when in the MANUAL NO WIRE and MANUAL WITH WIRE processes are selected. Press this button to select the laser beam behavior from three options: CONTINUOUS, STITCH, and PULSE.

SEQUENCER: The sequencer menu is only available when the MANUAL NO WIRE or MANUAL WITH WIRE processes are selected. The contents of the sequencer depend on the type of laser beam behavior selected in the light mode menu and allows you to adjust different parameters used from the start to the end of a weld bead.

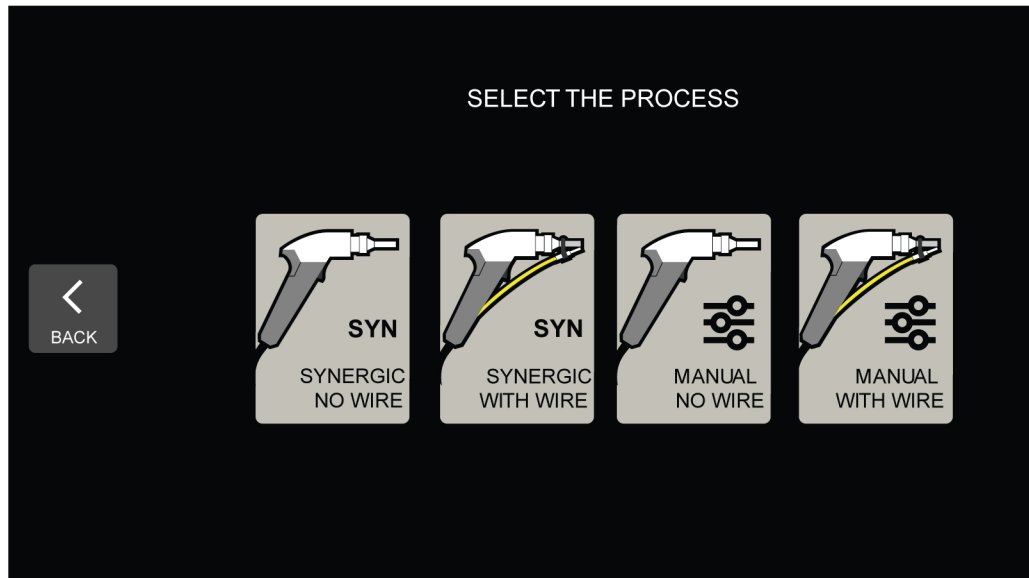
CONFIG: The config button allows you to access the WARNINGS, SYSTEM INFO, SETTINGS, STATUS and GAS PURGE menus.

JOBS: The jobs menu allows you to save parameters to memory and recall them when necessary.

LASER ENABLE: This button enables the laser source and leaves it ready to emit the welding laser beam when the torch trigger is activated.

6.3 Process menu

The process menu consists of four types of processes used in a Dueler system. When the process button in the main menu is pressed, it takes you to four process icons in the screen namely SYNERGIC NO WIRE, SYNERGIC WITH WIRE, MANUAL NO WIRE and MANUAL WITH WIRE.



SYNERGIC NO WIRE: This process allows welding without filler wire and configures the system parameters automatically by selecting the type of material, thickness and type of joint to be welded.

SYNERGIC WITH WIRE: This process allows welding with filler wire and configures the system parameters automatically by selecting the type of material, thickness, type of joint and wire diameter to be used.

MANUAL NO WIRE: This process allows welding without filler wire and setting all system parameters manually.

MANUAL WITH WIRE: This process allows welding with filler wire and setting all system parameters manually.

6.3.1 SYNERGIC NO WIRE

Once the type of material, thickness and type of joint is selected the system is automatically configured with the correct parameters.



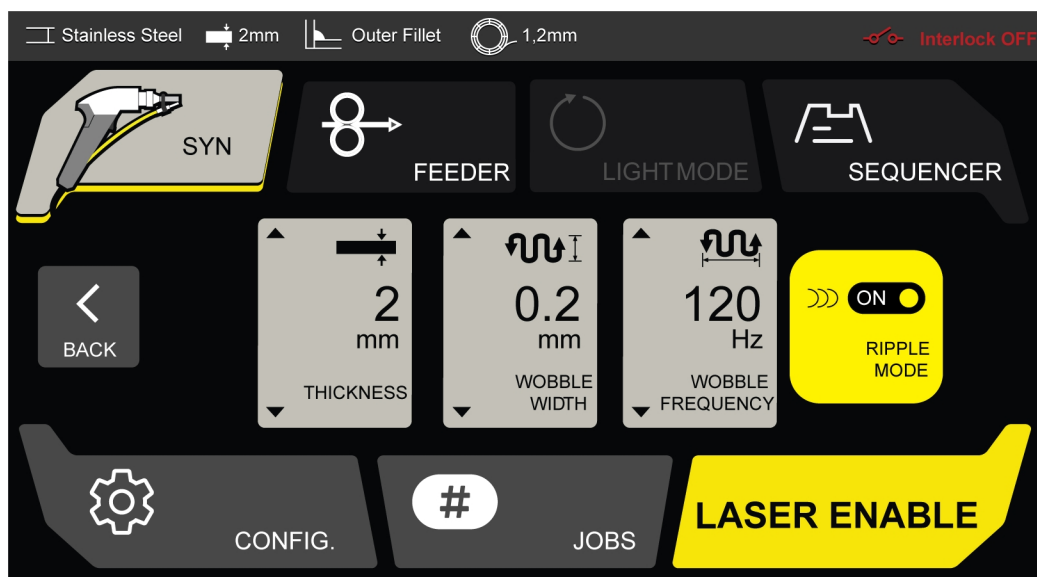
The Synergic no wire screen allows you to make manual adjustments to the main parameters (thickness, wobble width, and wobble frequency) using the corresponding buttons if needed.

When the parameters settings are ready, press the LASER ENABLE button to activate the laser source and leave the system ready to weld.

From this process screen, it is possible to access the CONFIG and JOBS menus.

6.3.2 SYNERGIC WITH WIRE

Once the type of material, thickness, type of joint and wire diameter is selected the system is automatically configured with the correct parameters.



The synergic with wire screen allows you to make manual adjustments to the main parameters (thickness, wobble width, and wobble frequency) using the corresponding buttons if needed.

In this process, it is possible to activate the RIPPLE MODE function. This function is automatic and allows you to have a welding seam with an appearance like a manual arc process.

When the parameter settings are ready, press the LASER ENABLE button to activate the laser source and leave the system ready to weld.

From this process screen is possible to access the FEEDER, CONFIG and JOBS menus.

6.3.3 MANUAL NO WIRE

The MANUAL NO WIRE process allows the user to make manual adjustments of all the parameters available in the system.

On this process the light mode and sequencer menus are available.

- The first step is to enter the light mode menu and select the laser beam behavior from three options: CONTINUOUS, STITCH, and PULSE.
- Once the light mode is selected, at the sequencer menu it is possible to adjust different parameters used from the start to the end of a weld bead.



In the process screen the user can configure Laser Power, Wobble Width and Wobble frequency.

When the parameters settings are ready, press the LASER ENABLE button to activate the laser source and leave the system ready to weld.

From this process screen is possible to access the CONFIG and JOBS menus.

6.3.4 MANUAL WITH WIRE

The MANUAL WITH WIRE process allows manual adjustments of all the parameters available in the system.

In this process the Feeder, the Light Mode and Sequencer menus are available.

- The first step is to enter the light mode menu and select the laser beam behavior from three options: CONTINUOUS, STITCH, and PULSE.
- Once the light mode is selected, at the sequencer menu it is possible to adjust different parameters used from the start to the end of a weld bead.
- In the Feeder menu the user can set all the parameters related to the wire feeder.



In the process screen the user can configure the wire feed speed, laser power, wobble width and wobble frequency.

When the parameters settings are ready, press the LASER ENABLE button to activate the laser source and leave the system ready to weld.

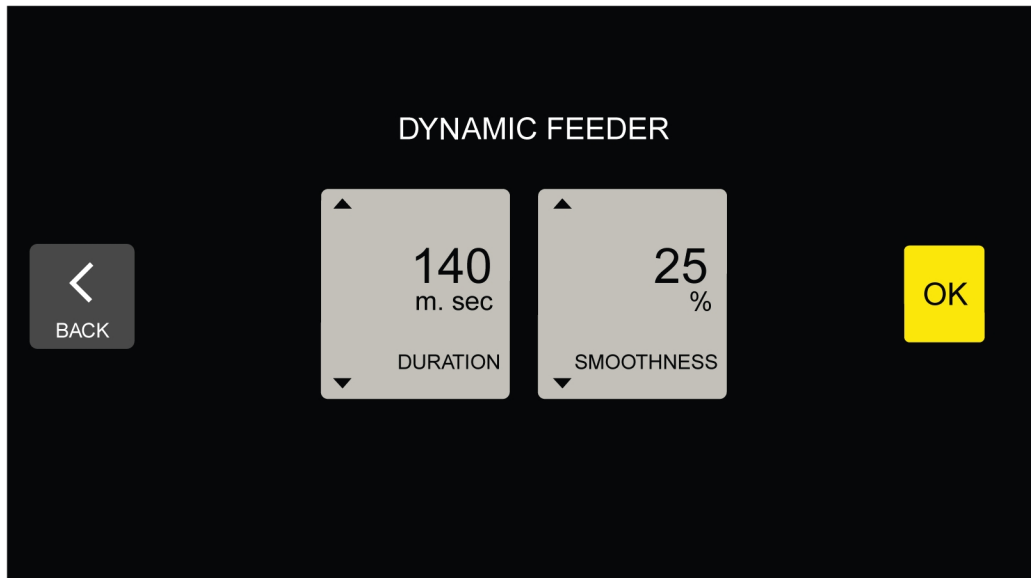
From this process screen is possible to access the CONFIG and JOBS menus.

6.4 Feeder menu

The feeder menu is accessed in the manual with wire process, where the parameters like feed delay, wire feed speed, refeed delay, withdraw length, withdraw speed and refeed length are adjusted manually by the user based on the requirements.



The DYN. FEEDER button allows the user to configure pulsed wire feed operation. This function sets the pulse duration and smoothness value, which determines the shape of the weld bead.



6.5 Light mode

The light mode is accessed in the two manual processes, where the laser mode is selected. In a Dueler system the user can select between three different types of laser beam light mode: CONTINUOUS, STITCH, PULSE.



CONTINUOUS: A continuous mode operates by continuously emitting laser beam without interruption.

STITCH: The stitch mode uses multiple laser pulses spaced apart in time to create the weld. The stitch duration and interval between stitches are configured in the sequencer menu.

PULSE: The pulse mode uses short, time-delayed laser pulses. The Duty cycle and frequency of the pulses are configured at the sequencer menu.

6.6 Sequencer

The sequencer menu is accessible for the two manual modes after the light mode is enabled. The parameters at sequencer menu depends on the light mode selected.

Continuous



Pulse



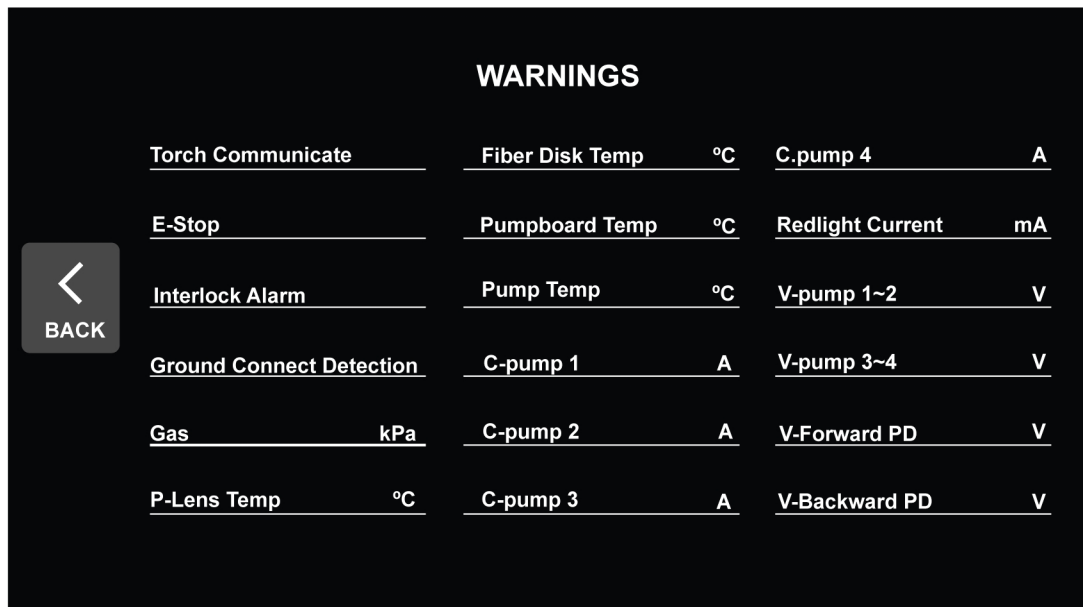
Stitch**6.7 Config menu**

The Config menu consists of options like WARNINGS, SYSTEM INFO, SETTINGS, STATUS, GAS PURGE.



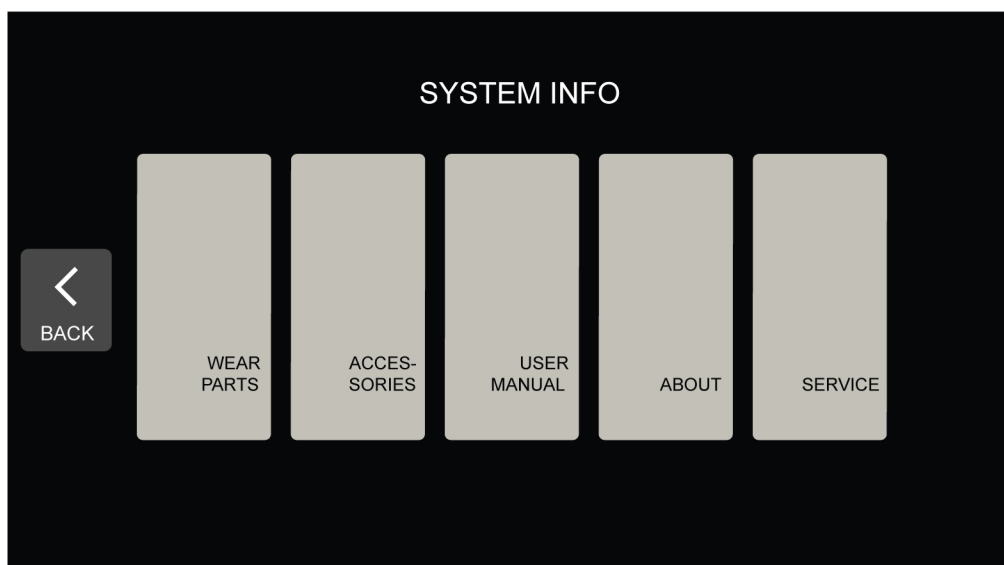
6.7.1 Warnings

The warnings button is used to check the status of the warnings created in the system.



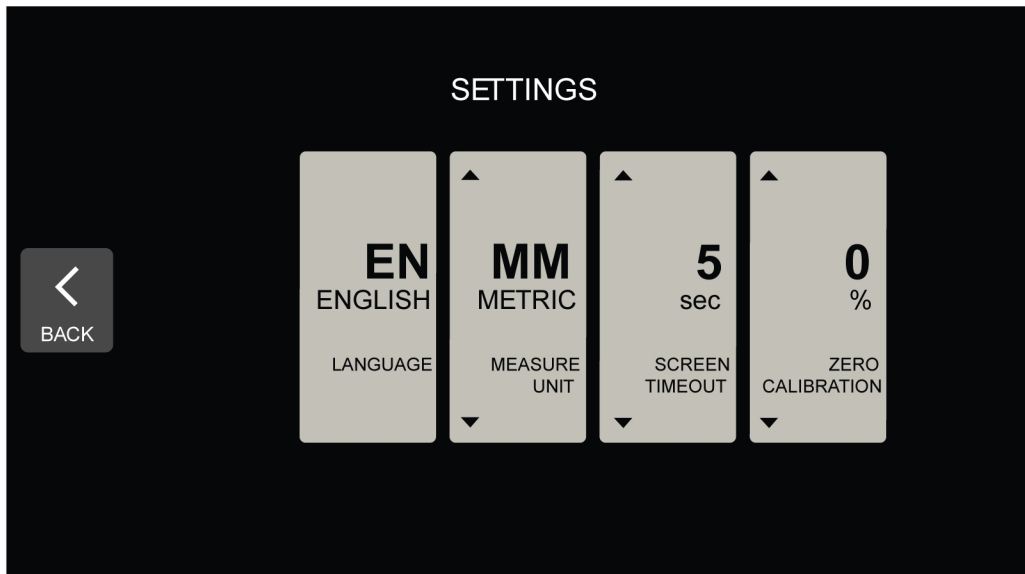
6.7.2 System info

The system info button has five sections: WEAR PARTS, ACCESSORIES, USER MANUAL, ABOUT and SERVICE.



6.7.3 Settings

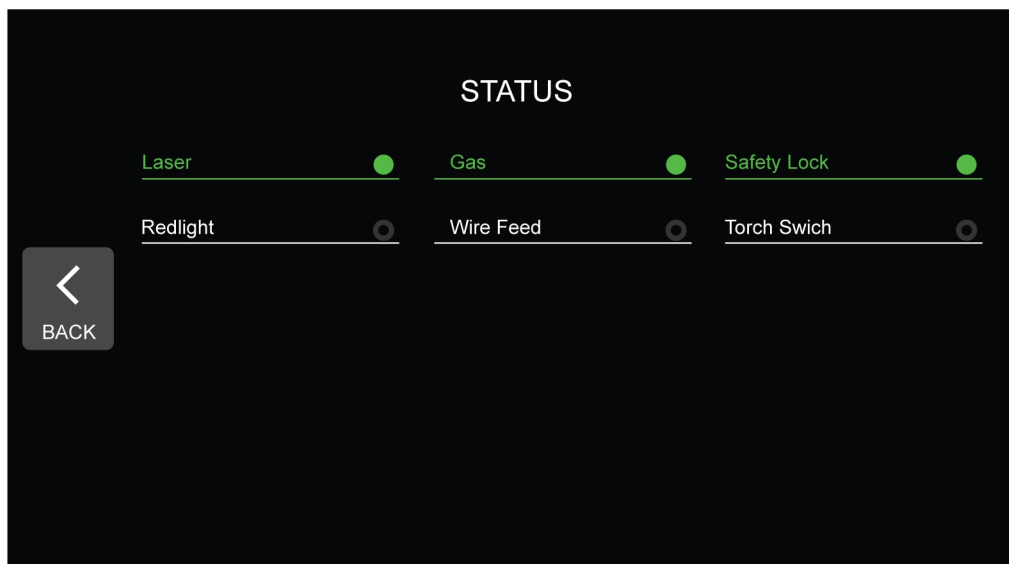
The setting section has details about LANGUAGE, MEASURE UNITS, SCREEN TIMEOUT, SCREEN BRIGHTNESS, and ZERO CALIBRATION.



6.7.4 Status

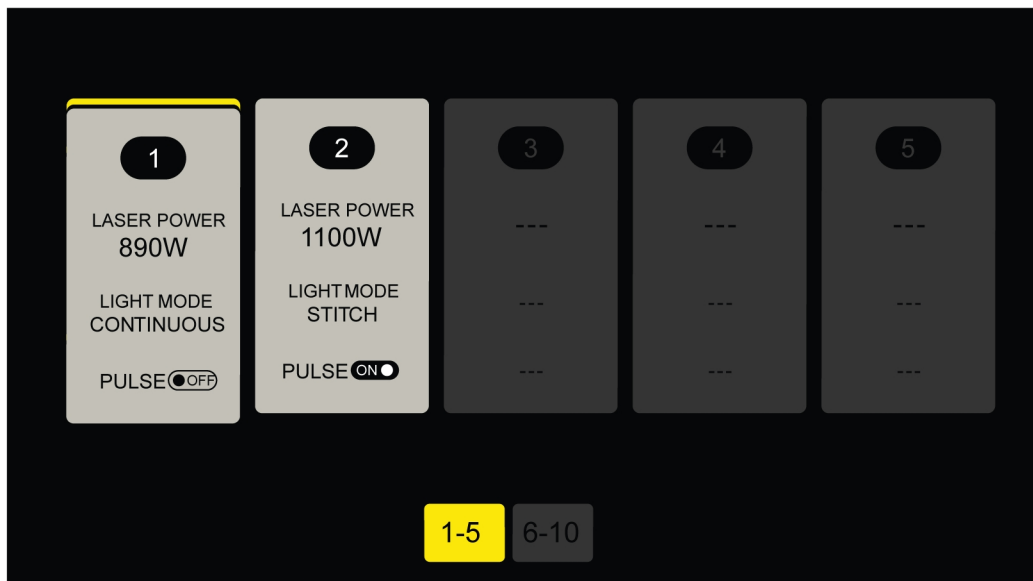
The status section has the status of the Laser, Gas, Safety lock, Red light, Wire feed, and Torch switch.

The active components are shown in green, while the inactive components are shown in grey.



6.8 Jobs

In the jobs, the welding parameter can be stored (SAVE) or called (LOAD). The jobs list displays up to ten jobs.

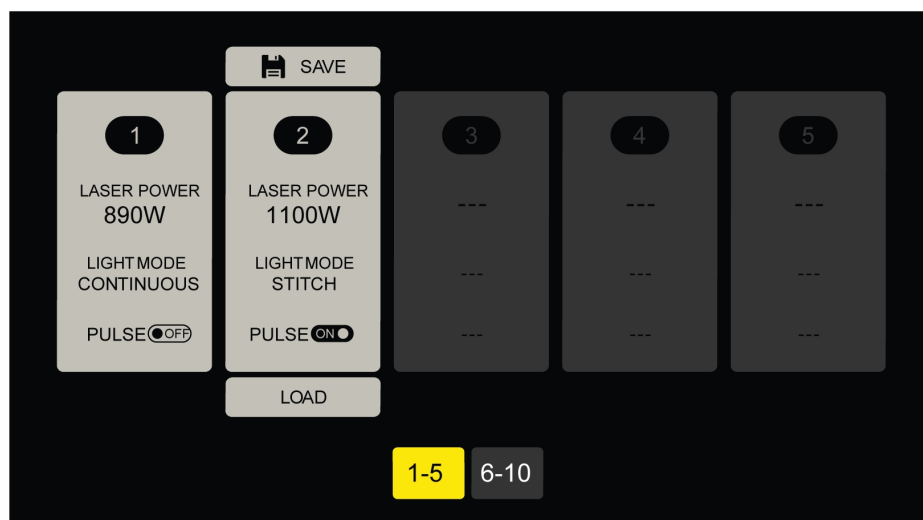


6.8.1 Setting a job

- 1) Press the JOBS button and the first page with five jobs will appear.
- 2) Press an empty job position at any of the two jobs pages.
- 3) Select SAVE.

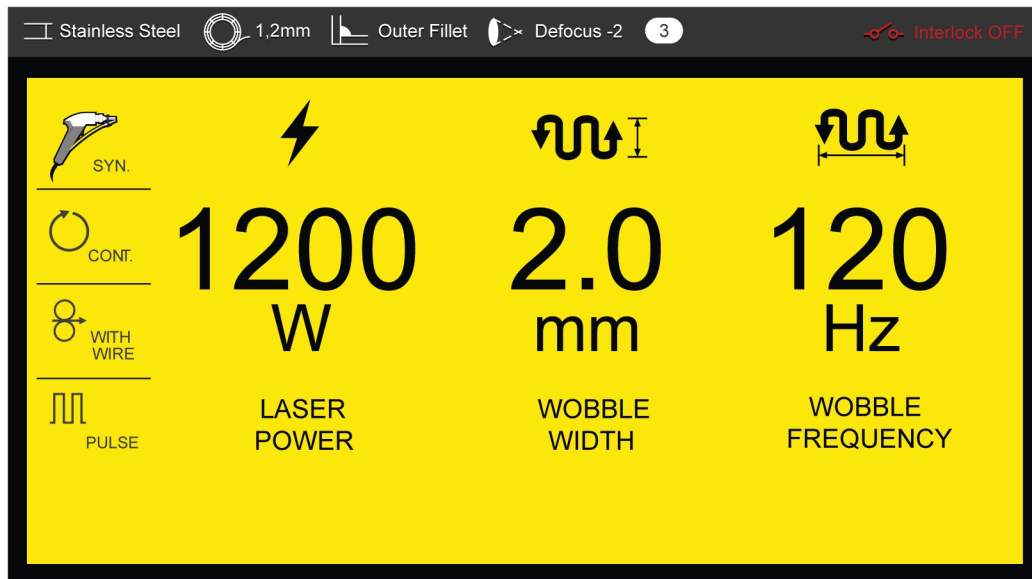
6.8.2 Loading a job

- 1) Press the JOBS button and the first page with five jobs will appear.
- 2) Press the desired job position at any of the two jobs pages.
- 3) Select LOAD.



6.9 Welding screen

Once all the parameters are selected, the LASER ENABLE button is activated and the weld starts, the welding screen will appear showing a summary of the parameters selected. After welding, the welding screen will remain active for five seconds and then it will return to the latest process screen.



6.10 Parameter settings

Parameters	Function	Setting range		Default values	Unit
Laser parameters		Min	Max		
	Laser power	150	1500	300	W
	Gas on delay	200	10000	1000	ms
	Gas off delay	200	10000	2000	ms
	Light off delay	0	10000	0	ms
	Ramp up period	0	10000	0	ms
	Ramp down period	0	10000	0	ms
	Stitch time	1	10000	0	ms
	Stitch interval	0	10000 (1~15 cannot select)	0	ms
	Laser frequency	0	2000	100	Hz
	Duty cycle	0%	100%	100%	/
Torch parameters	Wobble frequency	0	220	10	Hz
	Wobble width	0	4	2	mm

Parameters	Function	Setting range		Default values	Unit
Wire feeder parameters	Wire feed speed	2	100 (80 in pulse)	10	mm/s
	Feed delay	0	2000	0	ms
	Withdraw speed	50	100	100	
	Withdraw length	0	100	0	ms
	Refeed length	0	100	0	ms
	Refeed delay	0	2000	0	ms
	Pulse duration	50	1000	130	ms
	Texture smoothness	10%	80%	20%	/

7 MAINTENANCE

**WARNING!**

The mains supply must be disconnected during cleaning and maintenance.

**WARNING!**

Unauthorized disassembly and reassembly of the handheld laser welding machine are strictly prohibited.

**CAUTION!**

Only persons with the appropriate electrical knowledge (authorised personnel) may remove the safety plates.

**CAUTION!**

The product is covered by manufacturer's warranty. Any attempt to carry out repair work by non-authorised service centers or personnel will invalidate the warranty.

**CAUTION!**

Make sure that the cleaning procedure is done in a suitable prepared workspace.

**NOTE!**

Regular maintenance is important for safe and reliable operation.

**NOTE!**

Perform maintenance more often during severe dusty conditions.

**NOTE!**

Users should not attempt to repair parts, components, or assemblies other than the welding laser torch consumables. All maintenance operations should be performed by ESAB service professionals.

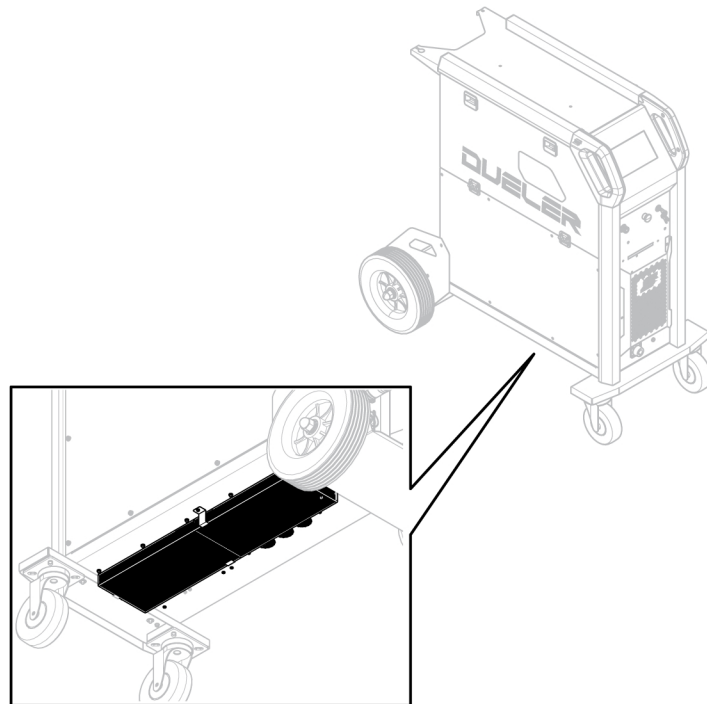
Before each use - make sure that:

- Product and cables are not damaged,
- The laser torch is clean and not damaged.

7.1 Laser power source

It is not necessary to perform routine cleaning inside the laser power source. As the machine is air cooled and takes fresh air from the base, it is advisable to clean the filter in the base of the Dueler EHL 1500 at regular intervals or when it becomes very dirty, to avoid obstructing the air flow.

The filter is a metal mesh that is fixed to the base with two clamps and screws.



7.2 Wire feed mechanism

Check the wire feed unit and accessories like wire feed rolls, wire feed conduit and motor regularly.

1) Inspect the wire feed rolls:

- Examine the groove section of each wire feed roll and its wear condition, check that there are no impurities in the groove. Replace them, if necessary.

2) Inspect the wire feed conduit:

- Check that the connectors at both ends of the wire feed conduit are attached properly and the wire conduit is not clogged.
- Use compressed air to remove any minor blockages caused by metal shavings. Replace the wire feed conduit, if the blockage is more severe or if it is damaged.

3) Inspect the motor:

- Check the motor for any abnormal noises.
- Check that the motor is free from dust, dirt, and oil.

4) Clean the wire feeder compartment:

- Clean the wire spool area of the wire feed compartment at least once a month with low-pressure, dry compressed air.
- Clean the drive mechanism once a month with dry compressed air.

7.3 Bobbin holder

Inspect the brake hub sleeve and the brake hub at regular intervals. Make sure that the nuts are not worn out and lock properly.

Replace if necessary.

7.4 Welding laser torch



NOTE!

Unauthorized disassembly of the welding laser torch will void the ESAB warranty.

7.4.1 Nozzles and wire contact tips maintenance

Laser welding torch wear parts such as nozzles and wire contact tips must be cleaned and replaced periodically to achieve quality welding and trouble-free wire feeding.

If the nozzles or wire contact tips are damaged or deformed, they must be replaced with new ones.

If the wire contact tips have an enlarged hole due to wear caused by friction with the welding wire, they must also be replaced.



WARNING!

When cleaning the laser welding torch in a dust-free environment wear powder-free glove. ESAB is **not** responsible for damage to laser welding torch tips due to improper use or incorrect cleaning procedures.



CAUTION!

Make sure that the Dueler machine disconnected from the power supply while working in the laser torch.

7.4.2 Maintaining the protective window

Follow this procedure to maintain the protective window of the laser welding torch:



NOTE!

Establish a proper workspace of at least 1.5 meters around the unit. Make sure area is free of traffic and all lock-out tag-out procedures have been followed. Use the proper PPE.

- 1) Seal the torch tip with the masking tape.



NOTE!

The fiber bend radius at back of torch to ensure no less than 20 cm.

- 2) Blow the entire torch with low pressure air to remove any loose particles.
- 3) Use IPA and particle free cloth or 70% IPA cleanroom wipes to clean the entire torch outer surface.
- 4) Place the torch horizontally on flat surface.
- 5) Cut a piece of Kapton tape to cover the protective window opening.
- 6) Place the tape above the lens opening.
- 7) Loosen the thumb screw for the protective window counterclockwise. The screw is captive and does not need to be entirely removed.
- 8) Carefully break the seal, stop, and pull the entire lens assembly outwards.
- 9) After the lens housing is removed, use your thumb of the hand supporting the torch to seal the open cavity with Kapton tape immediately. Push the protective window and sealing ring out of housing.
- 10) Use low pressure air to clean particles from lens housing. Use IPA and particle free cloth or 70% IPA cleanroom wipes to clean entire lens housing outer surface.

- 11) Install new protective window with seal facing outward while the lens housing faces vertically.
- 12) Remove the Kapton tape to expose the lens cavity slowly, and reinstall the lens assembly in the torch.
- 13) Tighten the thumb screw clockwise.
- 14) Clean work area and resume operation.

8 WARNINGS

Warnings are used in order to indicate and identify an error in the equipment.

WARNINGS AND ALERTS					
 BACK	Torch Communicate	Fiber Disk Temp	°C	C.pump 4	A
	E-Stop	Pumpboard Temp	°C	Redlight Current	mA
	Interlock Alarm	Pump Temp	⚠ 99°C	V-pump 1~2	V
	Ground Connect Detection	C-pump 1	A	V-pump 3~4	V
	Gas	⚠ 125kPa		V-Forward PD	V
	P-Lens Temp	°C		V-Backward PD	V
		C-pump 2	A		
		C-pump 3	A		

The following table describes the warning and the possible faults, the causes and solutions.

Warning	Fault	Cause	Solution
Torch communicate	The communication between the laser source and the welding torch is not normal.	- The control cable between the laser source and the welding torch could be damaged. - The torch is not working properly. - The control board is damaged.	Restart the laser source. If the problem persists, contact the service support.
E-STOP	The emergency stop switch is activated.	- The emergency stop switch was enabled by the user. - The emergency stop switch was not enabled by the user	- Disable the emergency stop switch at the front panel. - Restart the laser system. If the problem persists, contact the service support.
Interlock alarm	The safety interlock connection is not electrically closed.	- The safety interlock device installed in the laser system was opened intentionally. - The safety interlock installed is closed automatically.	- Close the safety interlock device. - Restart the laser system. If the problem persists, contact the service support.

Warning	Fault	Cause	Solution
Ground connect detection	The system will alarm when it is not detected continuity to the ground system of the grid.	- The PE (ground) wire at the power cable is not properly connected to the plug. - The PE wire is securely connected to the plug at the correct pin.	- Reconnect the PE wire to the ground terminal of the plug. - If the problem persists, contact the service support.
Gas	The system will alarm when the shielding gas pressure is not within the acceptable range.	- The shielding gas valve is close or there is a lack of gas in the cylinder. - Shielding gas circuit inside the laser system is not working properly.	- Open the shielding gas valve and adjust the regulator or change the new gas cylinder. - If the problem persists, contact the service support.
P-Lens temp	The system will alarm when the temperature of the protective window is not within the acceptable range.	- The shielding gas pressure is not in the range. - The protective window is dirty or damaged. - Optical system malfunctions.	- Adjust the gas pressure within the range. - Clean or change the protective window. - If the problem persists, contact the service support.
Fiber disk temp	The system will alarm when the temperature at these internal components exceeds the threshold alarm.	- The air inlets or outlets of the laser system are blocked. - The ambient temperature around the laser system is too high. - The fans not working properly or other internal problem.	- Clean the air inlets and outlets from the obstacles. - The ambient temperatures will be in the acceptable range. - If the problem persists, contact the service support.
Pumpboard Temp			
Pump Temp			
C-pump (1, 2, 3 or 4)	The system will alarm when the current at any of the diode's modules exceeds the threshold alarm.	The diodes modules or system around them failed.	- Restore the system to the factory settings and restart the laser system. - If the problem persists, contact the service support.
Redlight current	The system will alarm when the current at the red light module exceeds the threshold alarm.	The redlight module or system around it failed.	- Restore the system to the factory settings and restart the laser system. - If the problem persists, contact the service support.

Warning	Fault	Cause	Solution
V-pump 1-2	The system will alarm when the voltage at any of the optical parts exceeds the threshold alarm.	• V-Backward can alarm if the user is welding reflective materials without correct angle on the welding torch. • The optical parts failed in the system.	• Correct the angle of the torch while welding to 45°. • Restore the system to the factory settings and restart the laser system. • If the problem persists, contact the service support.
V-pump 3-4			
V-Forward PD			
V-Backward PD			

9 TROUBLESHOOTING

Perform these checks and inspections before sending for an authorised service technician.

Check that the mains voltage is disconnected before starting any type of repair action.

FAULT	CORRECTIVE ACTION
When the trigger is pressed on the laser welding torch, the laser system does not activate the laser welding beam	• Check that the LASER ENABLE button is activated on the display. • Check that there is no warning symbol active on the display. • Check that the nozzle at the welding torch and the safety clamp have good electrical contact with the workpiece. • Check that the safety loop cable is properly connected to the front panel of the laser system.
Poor welding performance	• Check the flow of shielding gas in correct range. • Check that the correct weld parameters are set on the display. • Check that the correct welding wire is used and the correct feed rate is set. • Check that the nozzle at the welding torch and the safety clamp have good electrical contact with the workpiece.
The wire feed is slow or does not move through the wire feed mechanism	• Check that the correct feed rollers are used according to the wire diameter and type selected. • Clean the liners and other mechanical parts of the wire feed mechanism using pressurized air. • Clean and adjust the roller pressure.

10 ORDERING SPARE PARTS



CAUTION!

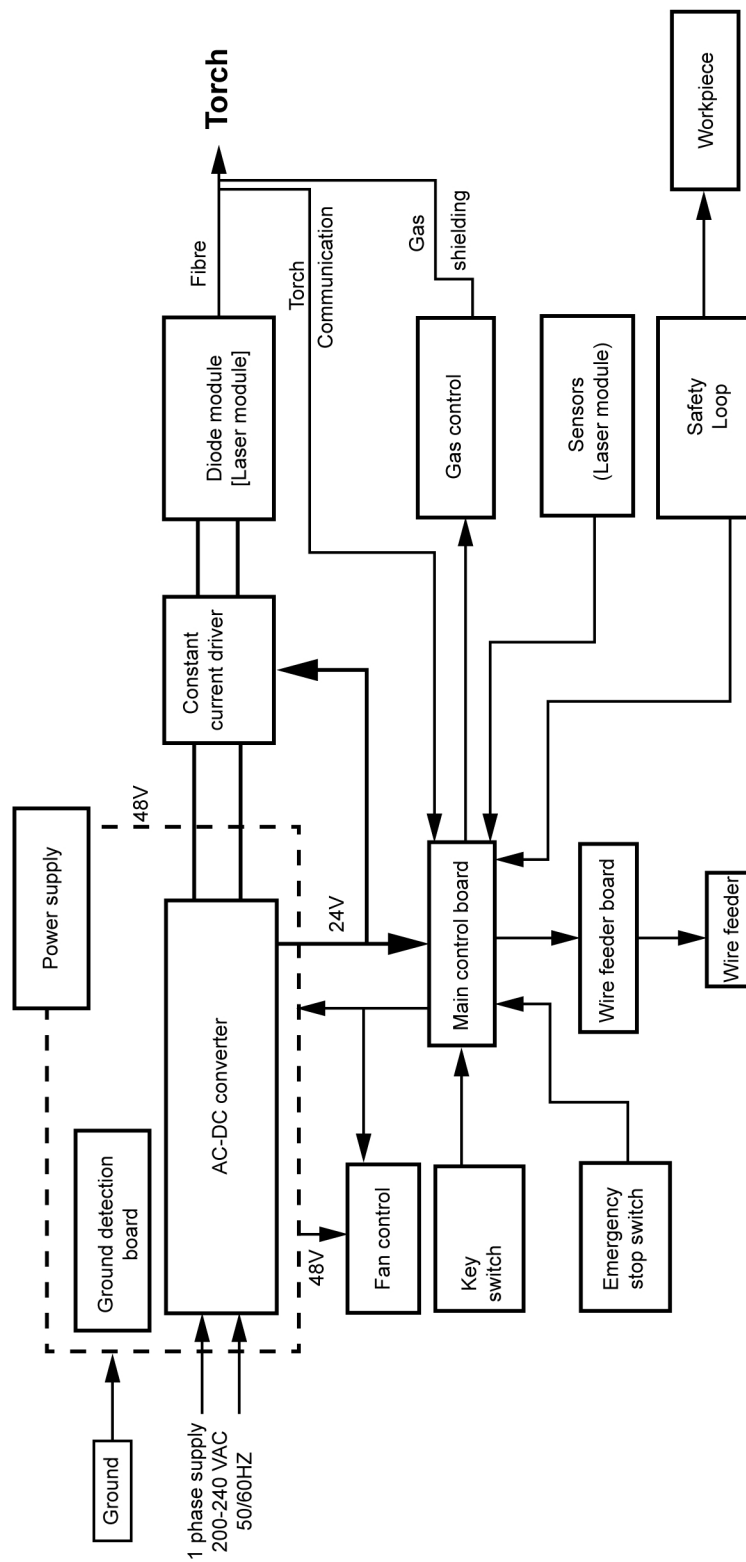
Repair and electrical work should be performed by an authorised ESAB service technician.
Use only ESAB original spare and wear parts.

The Dueler EHL 1500 is designed and tested in accordance with international and European standard **EN IEC 60825-1, Class 4**, on completion of service or repair work, it is the responsibility of the person(s) performing the work to ensure that the product still complies with the requirements of the above standards.

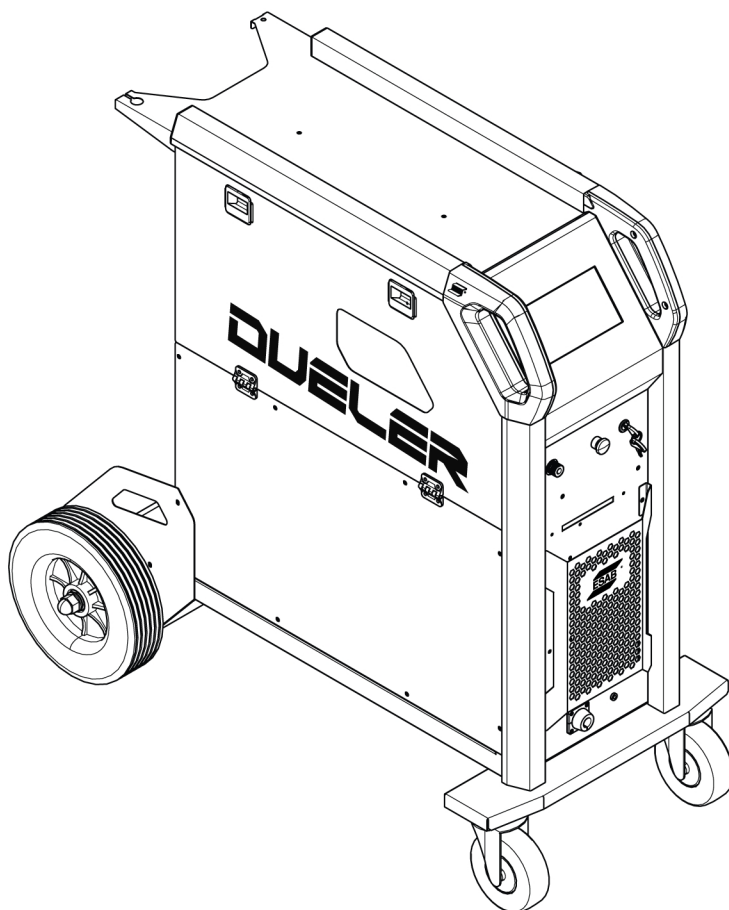
Spare parts and wear parts can be ordered through your nearest ESAB dealer, see [esab.com](https://www.esab.com). When ordering, please state product type, serial number, designation and spare part number in accordance with the spare parts list. This facilitates dispatch and ensures correct delivery.

APPENDIX

BLOCK DIAGRAM



ORDERING NUMBERS



Ordering number	Denomination	Notes
0700 028 000	Dueler EHL 1500	
0448 575 *	Instruction manual	Dueler EHL 1500
0448 576 001	Spare parts list	Dueler EHL 1500
0448 577 001	Service manuel	Dueler EHL 1500

The three last digits in the document number of the manual show the version of the manual. Therefore they are replaced with * here. Make sure to use a manual with a serial number or software version that corresponds with the product, see the front page of the manual.

Technical documentation is available on the Internet at: www.esab.com

WEAR PARTS

0700028001	Protection window
0700028002	Nozzle connecting pipe
0700028003	Nozzle 1
0700028004	Nozzle 2
0700028005	Nozzle A
0700028006	Nozzle B
0700028007	Flat nozzle
0700028009	SS wire feeder cable
0700028010	Wire feeding graphite conduit
0700028011	Wire feeder connector
0700028012	Wire feeder nozzle 0.8
0700028013	Wire feeder nozzle 1.0
0700028014	Wire feeder nozzle 1.2
0700028015	Wire feeder nozzle 1.6
0700028016	Wire feeding parts movable one
0700028018	Cleaning swabs
0700028019	Shielding gas hose (3 m)
0700028020	Set of nozzles (1, 3, A, B, flat)

ACCESSORIES

0700028008	Support bracket for welding head
0700028017	External control cable 3M with PLD
0445850002	Feed roller V 0.8 1.0
0445850003	Feed roller V 1.0 1.0
0445850004	Feed roller V 1.0 1.2
0445850005	Feed roller V 1.2 1.2
0445850006	Feed roller V 1.4 1.6
0445850050	Feed roller U 0.8 1.0
0445850051	Feed roller U 1.0 1.2
0445850052	Feed roller U 1.2 1.6



A WORLD OF PRODUCTS AND SOLUTIONS.



For contact information visit [esab.com](https://www.esab.com)

ESAB AB, Lindholmsallén 9, Box 8004, 402 77 Gothenburg, Sweden, Phone +46 (0) 31 50 90 00

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