USER MANUAL

Translation of Original instructions

CE

Laser welding machine

Model	**DaDo**
Serial numbers	**from D2_1000**
Year of manufacture	**2023**
Manual code	**EL0002D**
Review / date	**2.3 / June 12, 2025**

1 General index

2 Warranty and liability

2.1 Warranty

This Warranty covers the product it accompanies at the time of purchase.

This Warranty guarantees the product against any material or manufacturing faults for a period of TWO YEARS from the original date of purchase.

Should any material or manufacturing defects be found during the warranty period, we will provide repairing or replace (at our discretion) the product or its defective components according to the terms and conditions listed below, free of any charges for labor costs or spare parts. Our support service reserves the right to replace defective products or their components with new or overhauled products or parts. All replaced products and components will become property of ELETTROLASER S.R.L..

2.2 Conditions

Repairs under warranty will be performed only if the defective product is presented within the warranty period, along with the original sale invoice or a purchase receipt (indicating the date of purchase, the type of product and the name of the dealer).

ELETTROLASER S.R.L. reserves the right to refuse repairs under warranty in the absence of the aforementioned documents or if the information they feature is incomplete or illegible. This Warranty will cease to apply if the indication of the model or serial number on the product have been changed, cancelled, removed, or have become illegible.

This Warranty does not cover the costs and risks involved in transporting your product to our FACILITIES.

The following are excluded from this Warranty:

- Periodic maintenance operations and repairs or replacements of parts due to wear and tear.
- Consumption materials (components which foreseeably require periodic replacing during the lifespan of a product, such as tools, lubricants, filters, etc.).
- Damage or faults due to incorrect operating, use or treatment of the product, for different purposes than normal professional use.
- Damage or modifications to the product caused by incorrect use, including:
  - Treatments that cause physical, aesthetic, or superficial damage or alterations.
  - Incorrect installation or use of the product for different purposes than those it is designed for, or failure to observe instructions for its installation and use.
  - Incorrect maintenance of the product, non-compliant with instructions for its correct maintenance.
  - Installation or any use of the product that is not in compliance with technical and safety laws of the Country where the product is installed or used.
  - Conditions or defects in the systems the product is connected to or in which it is incorporated.
  - Repairs or attempted repairs by unauthorized staff.
  - Adjustments or changes to the product carried out without prior written authorization from the manufacturer, update of the machinery exceeding the technical specifications and functions described in the instruction's manual, or changes made to the product to make it compliant with different national or local technical or safety laws than those for which the product was specifically designed and built.
  - Negligence.
  - Accidents, fires, liquids, chemical substances or other types of substances, flooding, vibrations, overheating, inadequate ventilation, excessive or incorrect electrical supply, radiations, electrostatic discharge, including lightning and other external forces or sources of impact.

2.3 Exclusions and restrictions

With the exception of the above, ELETTROLASER S.R.L. does not release any warranty (explicit, implicit, statutory or of any other nature) for the product in terms of quality, performance levels, precision, reliability, suitability for specific uses or other aspects.

If this exclusion not admissible, fully or partially, on the basis of currently applicable laws, ELETTROLASER S.R.L. excludes or restricts its warranties to the maximum limit allowed by applicable laws.

Any warranty that cannot be fully excluded will be restricted (according to terms allowed by applicable laws) to the duration of the present Warranty.

The only obligation held by ELETTROLASER S.R.L. in the framework of this Warranty consists of repairs or replacements of products based on the present warranty terms and conditions. ELETTROLASER S.R.L. declines any liability for losses or damage concerning products, services, the present Warranty, or other aspects, including economic or intangible losses – the price paid for the product – loss of profits, income, data, employment, or use of the product or of other associated products – indirect, incidental, or consequential losses or damage. This is also valid for losses and damage deriving from:

- Compromised functioning or breakdowns of the product or of associated products due to defects or lack of availability while under assessment in the facilities of Elettrolaser or other authorized support centers, with consequent downtime, loss of production time or interruptions in operations.
- Imperfect performances of the product or associated products.

This is also valid for losses and damage in the context of any legal theories, including negligence and other illegal acts, contractual violations, explicit or implicit warranties and strict liability (including cases in which ELETTROLASER S.R.L. or the support center have been warned of the possibility of such damage occurring).

If currently applicable laws prohibit or restrict these liability exemptions, ELETTROLASER S.R.L. excludes or restricts its liability to the maximum limit allowed by applicable laws

Some nations, for example, prohibit the exclusion or restriction of damage due to negligence, grave negligence, intentional non-compliance, fraud, and similar acts. In the framework of this Warranty, in no event will the liability held by ELETTROLASER S.R.L. be greater than the price paid for the product, notwithstanding that if applicable laws require higher liability limits, these limits will be applied in compliance with the law.

2.4 Reserved legal rights

Applicable national laws grant (statutory) legal rights to purchasers in the context of consumer product sales.

This Warranty does not affect purchaser rights set by currently effective laws, nor rights that cannot be excluded or restricted, nor the client's rights in relation to the dealer. The client will decide, at his sole discretion, whether to enforce the rights to which he is entitled.

3 Use of the manual

This manual was prepared by the Manufacturer and is an integral part of the supply of the machinery.

The information featured in the DaDo manual addresses the staff in charge of operating and maintaining the machine.

The manual offers information that all qualified staff must mandatorily be familiar with, and which allows for use of the machine in safe conditions.

OBLIGATION! All relevant staff, because of their tasks and responsibilities, must read and understand the contents of this manual before installing, using, or performing any other operation on the machine!

3.1.1 Definitions

- **Safety component**: a component or device used to ensure safety functions; failures or malfunctions of these components can jeopardize the health and/or safety of exposed persons (e.g., fixed, and mobile guards, electronic safety devices, etc.).
- **Protection device**: device (other than guards) designed to reduce risks, either by itself or in combination with guards.
- **Operator**: individual(s) in charge of installing, running, regulating, cleaning, repairing, or moving a machine or in charge of its maintenance.
- **Hazard**: a potential source of injuries or harm.
- **Exposed person**: any person located fully or partially within a hazardous area.
- **Guard**: element of the machine used specifically to ensure protection via a material barrier.
- **Risk**: combination of the probability and gravity of injuries or harm caused by a hazardous situation.
- **Residual risk**: risk that remains after the implementation of protection measures.
- **Expected use**: use of the machinery compliant with information provided in the instructions for use.
- **Foreseeable incorrect use**: different use of the machine than that indicated in the instructions for use, but deriving from easily predictable human behavior.
- **Hazardous area**: any area inside and/or near the machine in which the presence of a person constitutes a risk for his/her health and safety.

3.2 Structure of the manual

3.2.1 Division of the manual

This manual is divided into chapters. Each chapter may in turn be divided into paragraphs. The lower external margin of each page indicates the page number and the total number of pages in the manual.

A general summary is included at the end of the manual for quick consultation.

3.2.2 Illustrations and tables

Illustrations and tables are normally included within the text. When this is not possible, they are linked to the page and listed as a connected illustration or table. All tables and illustrations are numbered and feature a caption (Tab. 2.2-1, Fig. 2.2-1, etc.).

3.2.3 Annexes

We intend as annexes all technical documents that are an integral part of the user and maintenance manual, such as electrical and pneumatic diagrams, declarations of conformity for components, technical specification sheets, etc. These documents are included at the end of the manual (after the summary and the illustrations index).

3.3 Units of measurement

The following units of measurement have been used in this manual, as defined by the International System (S.I.), under the ISO 80000-1 standard. The units of measurement normally used in this manual are:

- **Linear dimensions** – The chosen unit of measurement for length is the meter, symbol [**m**], or its submultiples (centimeters and millimeters, i.e., [**cm**] and [**mm**]). The inch is used in some cases.
- **Time** - The chosen unit of measurement for time is the second [**s**]. When convenient, the manual may also use minutes [**min**] and/or hours [**h**].
- **Mass** - The chosen unit of measurement for time is kilogram [**kg**]. When convenient, the manual may also use grams [**g**].
- **Electric current intensity** – Electric current intensity is measured in Ampere [**A**].
- **Thermodynamic temperature** – According to the SI system, the essential unit of measurement for thermodynamic temperature is the Kelvin degree [**K**]. The temperature unit used in this manual is Celsius degree [**°C**]. The temperature will be left in Fahrenheit degrees [**°F**] only when specific sections refer to parts for which the manufacturer is supplying technical specifications.
- **Light intensity** – Light intensity per surface unit is measured in [**lux**].
- **Plane angle** – Based on international standards, plane angles are measured in radians [**rad**]. This manual uses sexagesimal degrees, according to the ratio: 360° = 2p [**rad**].

3.3.1 Derived units

Derived units of measurement are all based on the essential units described above. In addition to units derived from essential metric units, some essential Anglo-Saxon units and their derived units may be used in certain parts of the manual.

3.4 Conservation of the manual

3.4.1 How to conserve the manual

This manual, the original copy of the declaration of conformity and all the technical annexes must be stored with care for the entire lifespan of the machine, including the disassembly phase.

3.4.2 Where to store the manual

The manual should be kept in a dry place near the machine and must always be available for consultation by the staff in charge of running and monitoring the machine.

3.4.3 How to reproduce the manual

This manual can be photocopied only from the original copy, given that photocopies made from other copies will decrease the clarity of the images and therefore of the information.

PROHIBITION! Reproducing this manual is permitted only for the purpose of making a spare copy.

In compliance with the law, ELETTROLASER S.R.L. reserves ownership of this manual, prohibiting its transfer to third parties and/or its unauthorized reproduction.

3.4.4 What to do in the event of loss or damage

If this manual is damaged or lost, the Client can ask for a certified copy. When forwarding the request, please indicate the code and version of the manual. This data can be found at the top of each page (Fig. 3-1).

code: EL0002D | review: 2.3 | date: June 12, 2025

Fig. 3-1 – Manual ID data

3.4.5 What to do if ownership of the machine is transferred

If the machine is sold to a third party, the manual must be delivered to the new owner.

3.4.6 What to do in the event of changes to the machine

Before making any changes to the machine, contact the manufacturer or the dealer to receive the necessary clarifications on feasibility of the operations without altering the machine characteristics or safety conditions.

If substantial changes are made to the machine or its control units, the machine certification and consequently this manual **will no longer be considered valid**.

4 General instruction

4.1 Working in safe conditions

Safety instructions included in the user and maintenance manual refer to operations which can be performed on the machine.

Safety symbols are included in the text to highlight items which require particular attention. It is essential that these safety instructions be always observed. Failure to observe the instructions may cause injuries to persons and/or damage to machinery or to other equipment.

Keeping this in mind, please find below a series of key safety instructions:

- Read and learn this section of the safety instructions before installing, using, maintaining, or repairing the machine.
- Read and follow the safety signs included in the text and refer to specific operations.
- When required, wear personal protective equipment (P.P.E.) such as protective glasses, safety gloves and shoes.
- Know and observe the safety instructions provided by ELETTROLASER S.R.L., as well as general standards for prevention of injuries and safety laws.

4.2 Safety signs

When pertinent, the symbols illustrated below are used in this user and maintenance manual. These symbols were inserted to warn the staff of hazards or potential sources of danger. **Learn their meaning**.

Failure to pay attention to these symbols may cause personal injuries, death, and/or damage to the machine or to equipment.

There are three types of signs (Tab. 4-1):

Symbol	*Shape*	*Type*	*Description*
	Framed triangle	**Hazard signs**	Indicate instructions concerning present or potential hazards
	Barred circle frame	**Prohibition signs**	Indicate instructions concerning actions that must be avoided
	Full circle	**Obligation signs**	Indicate information the staff must read and observe
	Circle frame	**Information**	Indicate useful information, **different** than the hazard / prohibition / obligation type

Tab. 4-1 – Type of safety signage

According to the information they intend to transmit, the signs may feature a series of symbols to help understand the type of hazard, prohibition, or obligation they refer to, via an association of ideas.

4.3 Symbols used

The following symbols are used in this manual.

These symbols have been included to help understand performed / described activities; they are generally featured in paragraphs 7.4 and 7.5 and in chapters 8 and 9.

Symbol	*Description*
	Indicates the use of control devices. May be accompanied by text (e.g.: ON/OFF, Start/Stop), indications on the rotation direction, etc.
	Indicates locking/unlocking, opening/closing, screwing/loosening actions to be performed with specific tools (e.g., wrenches, screwdrivers).
	Indicates operations concerning the tools (assembly, disassembly, replacement).
	Indicates measuring or detection operations (product dimensions, positioning of guides or clamps).
	Indicates regulation operations.
	Indicates the need to perform checks.
	Indicates lubrication operations.

Tab. 4-2 – Symbols used

4.3.1 Hazard signs

Generic hazard

This sign is used to highlight hazardous situations which may cause damage to persons, animals, and things. Failure to observe instructions associated with this sign can cause danger.

Hazard due to the presence of voltage

This sign is used to highlight the danger of electrocution due to direct or indirect contact with live parts of the machine. Failure to observe instructions associated with this sign can cause serious injuries to persons or even their death.

Hazard due to laser radiation

This sign is used to highlight the danger deriving from the presence of sources of artificial optical radiation. Failure to observe instructions associated with this sign can cause the risk of damage to sight.

Danger of burns

This sign is used to highlight the danger of burns due to contact with hot surfaces (> 60 °C). Failure to observe instructions associated with this sign can cause the risk of burns to the hands or upper limbs.

4.3.2 Prohibition signs

Generic prohibition

This sign is used to highlight that certain maneuvers, operations, or forms of behavior are not permitted. Failure to observe instructions associated with this sign can cause damage to things, animals, and people.

No touching

This sign is used to highlight that the operator is not permitted to touch specific parts of the machine. Failure to observe instructions associated with this sign may cause hand injuries.

No introducing hands

This sign is used to highlight that the operator is not permitted to introduce his/her hands in specific areas. Failure to observe instructions associated with this sign may cause injuries to the hands and upper limbs.

No smoking and no use of naked flames

This sign is used to highlight that smoking and/or the use of naked flames are not permitted. Failure to observe instructions associated with this sign may cause explosions and/or fires.

No extinguishing with water

This sign is used to highlight that flames and/or incipient fires must not be extinguished by using water. Failure to observe instructions associated with this sign can cause damage to things, animals, and people.

4.3.3 Obligation signs

Generic obligation

This sign is used to highlight that the operator must observe the specific instructions. Failure to observe instructions associated with this sign can cause damage to things, animals, and people.

Mandatory use of specific P.P.E.

These signs are used to highlight the mandatory use of specific personal protective equipment during operations. Failure to observe instructions associated with this sign can cause serious injuries or the death of the operator.

Mandatory grounding

This sign is used to highlight the mandatory connection of the machine to an efficient grounding system. Failure to observe instructions associated with this sign can cause damage to things, animals, and people.

Mandatory disconnection of plug from socket

This sign is used to highlight the mandatory disconnection of the electrical supply plug before performing any operations. Failure to observe instructions associated with this sign can cause damage to things, animals, and people.

Mandatory guard efficiency check

This sign is used to highlight a mandatory efficiency check of the guards (removed during maintenance, repairs, cleaning, or lubrication operations). Failure to observe instructions associated with this sign can cause damage to things, animals, and people.

Obligation to read instructions

This sign is used to highlight the obligation to read instructions (the user and maintenance manual, technical diagrams, etc.) before installing, using, or performing any other operation on the machine!

4.4 General information on classification of lasers

Classification of lasers follows this standard:

- CEI EN 60825-1:2017 Safety of laser products Part 1: Classification of devices and requirements.

4.4.1 Hazard potential of laser classes

The concept of laser is insufficient to describe the hazard presented by a device emitting coherent electromagnetic radiation.

The risk potential can vary according to the device in question and the conditions in which it is used. This is why international laws recommend the assignment of a specific class to each laser system, for the danger potential to immediately be clear to all. The higher the class number, the greater the risk level.

4.4.2 Classification obligation

Producers of laser devices can deliver a product to the user only after attributing it to one of the seven classes defined in the standard on lasers (failure to assign a class would result in the user having to follow the strict rules set for class 4).

Class	*Risks*	*Necessary measures*
1	Harmless in normal operation conditions[1].	No necessary measures.
1M	Harmless without optical tools.	Warn individuals using optical tools.
2	Harmless is exposure is temporary.	• Do not look directly at the laser ray. • Do not direct the laser towards the face.
2M	Without optical tools: same as class 2.	Warn individuals using optical tools.
3A	Eliminated.	Treat the same as classes 1m or 2m.
3R	Moderately dangerous.	For use by qualified staff only.
3B[2]	• Direct rays are dangerous for the eyes. • Scattered radiation is not dangerous.	• Appoint a head of laser safety. • Delimit the area of use with architectonic elements. • Control access to the area. • Declare the presence of lasers at the entrance. • Allow use by qualified staff only. • Wear protective glasses if necessary.
4	• Rays are dangerous for the eyes and skin. • Scattered radiation is potentially dangerous for the eyes. • Risk of fire.	• Same precautions as per class 3b. • Use the necessary P.P.E.

Tab. 4-1 – Classification of lasers in compliance with standard CEI EN 60825-1:2017

Based on the active material and the pumping source, the laser can operate continuously (cw = continuous wave, with an emission duration > 0,25 s), in pulsed mode or in repetitive pulsed mode, or can emanate its energy in the form of a single giant pulse.

[1] In normal conditions of use, class 1 lasers must be safe even in the absence of specific instructions.

[2] If safety depends on instructions provided, the non-hazardous state of the device should be indicated not as class 1, but with a declaration such as “No hazard in the demarked area”.

4.5 Effects of laser radiation on biological tissues

4.5.1 General information

The mechanism by which laser radiation causes damage is similar for all biological systems and can lead to heat interactions, transitory thermoacoustic events, photochemical processes, and non-linear effects.

In the event of damage, the level of responsibility of each of these mechanisms can be referred to certain physical parameters of the radiation source, the most relevant of which are the **wavelength**, the **duration of the pulse**, the **dimensions of the image**, the irradiance, and the radiant exposure.

In general, in the case of exposures exceeding the threshold, the predominant mechanism depends on the duration of the exposure pulse.

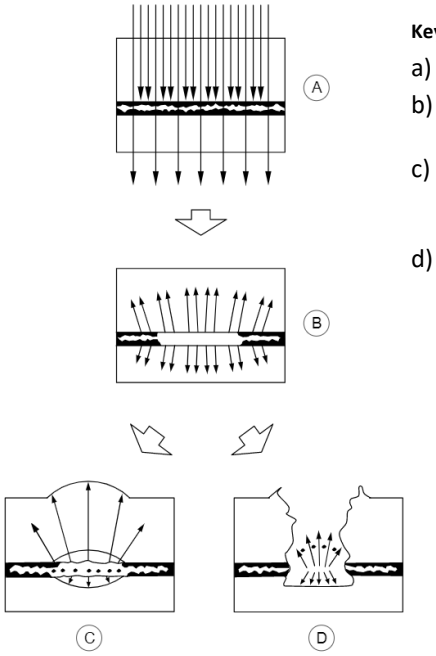
Thus, following an ascending order of duration of the pulse, **the predominant effects in the following time intervals** are:

- **For exposures lasting nanoseconds and lower than one nanosecond**, micro-cavitation, transitory acoustic events, and non-linear effects.
- **Between 100 µs and a few seconds**, thermal effects.
- **Above approximately 10 seconds**, photochemical effects.

Laser radiation differs from all other known types of radiation due to its high radiance and collimation of the beam.

This fact, together with the high initial energy content, results in the transmission of noteworthy quantities of energy towards biological tissues.

The main event in any type of damage caused by laser radiation to a biological system **is the absorption of optical radiation by the system in question**. This absorption occurs on the atomic or molecular level and represents a specific process of the wavelength. Thus, the wavelength determines which tissue may be damaged by a specific laser beam.



Key:

a) Laser energy absorbed by the system.

b) The absorbed energy generates heat which is transmitted to surrounding tissues.

c) In the case of long pulsed or continuous wave lasers, the persistence of the thermal front causes a progressive widening of the lesion.

d) In the case of short pulsed lasers, the noteworthy power density causes an explosive rupture of the cells and movement-induced injury.

Fig. 4-1 – Examples of absorption of laser radiation based on time of exposure and dimensions of the beam

4.5.2 Hazards to the eyes

4.5.2.1 Physiology of the eye

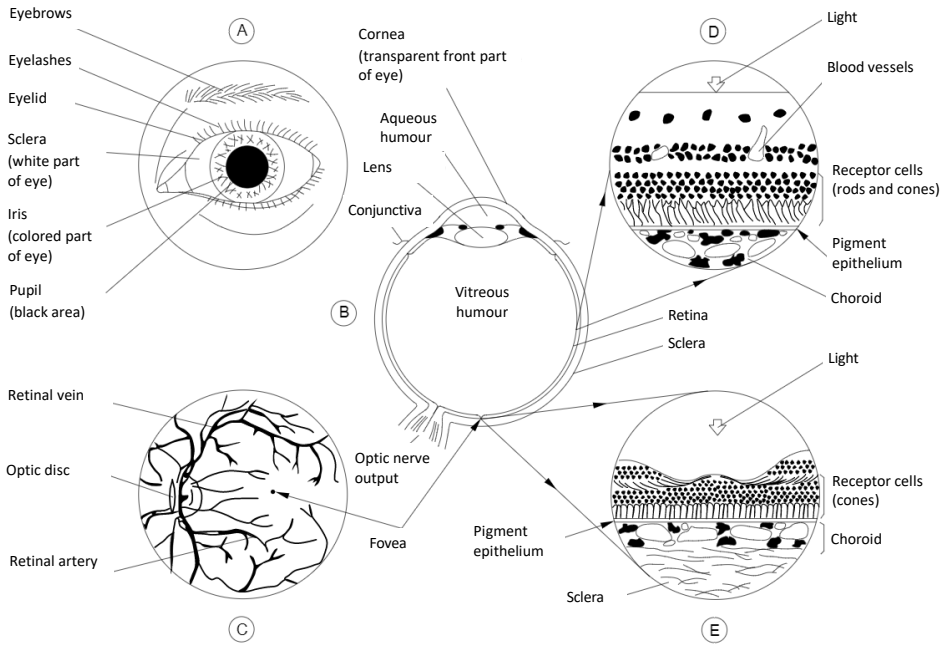


Fig. 4-2 – Physiology of the human eye

Section (A) of Fig. 4-2 displays the external structure of the left eye.

The distance between the eyelids limits the field of vision (FOV) of the eye to an almond-shaped surface. The main elements of the front part of an eye are also indicated.

Section (B) displays the horizontal section of the left eye. The eye is divided into two parts, the anterior or front chamber limited by the cornea, iris and lens, and the posterior chamber limited by the retina, which contains the gelatinous-looking vitreous humour.

Section (C) displays the inside of an intact eye as observed through an ophthalmoscope. This tool directs a light beam through the pupil and illuminates the inside of the eye, thus allowing for its observation. The image seen in this way is called back of the eye. It appears reddish in color, but the main retina vessels are clearly distinguishable. The other main elements are the optic disc, whitish in color, and the fovea. The fovea is a small depression of the retinal surface which may be more pigmented than the surrounding retina and is the most distinguished area of vision. The fovea is the center of the macula; the macula is responsible for sharp vision.

Section (D) displays the structure of the retina as seen in the section of its surface shown in Fig. 4-2 (B) but enlarged a few hundred times from its natural size. The retina consists of a series of nervous cell layers which cover the photosensitive cells: the cones and rods; in other words, light arriving on the retinal surface must move through the nervous cell layers before reaching the photosensitive cells. Beneath the layer of cones and rods is a layer known as pigment epithelium which contains a black-darkish melanin pigment; under this is a thin layer of blood vessels, the choriocapillaris. The last absorbent layer is the choroid, which contains both pigment cells and blood vessels.

Section (E) displays the structure of the fovea region, enlarged a few hundred times from its natural size. This area only features cones. The nervous cells are located radially towards the external part of this area of sharper vision. The macular pigment, which absorbs wavelengths between 400 nm and 500 nm, is in Henle's fiber layer.

4.5.3 Pathological effects of laser radiation

4.5.3.1 Hazards to the eyes

Fig. 4-2 features a brief description of the anatomy of the eye. The eye is particularly well-suited to receiving and transmitting optical radiation.

Associated pathologies due to excessive exposures are summarized in Tab. 4-2, below. Lasers emitting radiation in the ultraviolet and far infrared represent a hazard for the cornea, while radiation from systems emitting at wavelengths in the visible and near infrared is transmitted to the retina.

Spectral region[3]	*Pathological effects on the eyes*	*Pathological effects on the skin*
Ultraviolet C (180 nm to 280 nm)	Photokeratitis.	• Erythema (sunburn). • Acceleration of skin ageing process. • Increased pigmentation.
Ultraviolet B (280 nm to 315 nm)		
Ultraviolet A (315 nm to 400 nm)	Photochemical cataract.	• Darkening of pigment. • Photosensitive reactions. • Burnt skin.
Visible (400 nm to 780 nm)	Photochemical and thermal lesion to the Retina.	
Infrared A (780 nm to 1 400 nm)	Cataract, burnt retina.	Burnt skin.
Infrared B (1,4 μm to 3,0 μm)	Inflammation of aqueous humour, cataract, burnt cornea.	
Infrared C (3,0 μm to 1 mm)	Burnt cornea.	

Tab. 4-2 – Pathological effects of lasers in relation to spectral region

Lasers visible in the near infrared represent a special danger for the eye, specifically because the necessary properties for the eye to be an effective light transducer subject highly pigmented tissues to high radiant exposure.

Lasers outside the specter of visible light are particularly hazardous as there is no optical perception of the beam and the protection deriving from palpebral reflexes is absent.

4.5.3.2 Hazards to the skin

In general, skin can withstand a much higher exposure to the energy of a laser beam then the eye.

The biological effect of skin irradiation with lasers operating in the spectral regions of the visible (from 400 nm to 700 nm) and of the infrared (greater than 700 nm) can **vary from a slight erythema to large blisters.**

Ash-colored carbonization is prevalent in tissues with high superficial absorption levels following exposure to short pulsed lasers with high peak power. This may not be followed by an erythema.

Pigmentation, ulceration, the appearance of skin scars and damage to underlying organs may be caused by extremely high irradiation. It has been established that latent or cumulative effects of laser radiation are not frequent.

However, some limited studies have suggested that repeated local exposures may sensitize small areas of human tissue, causing changes to the levels of exposure behind minimal reactions and a worsening of tissue reactions to low levels of exposure.

[3] Spectral regions defined by the CIE are only synthetic annotations used to describe biological effects and may not correspond exactly to the spectral intervals indicated in the CEI EN 60825-1 standard.

Studies concerning biological thresholds indicate that, with wavelengths between 1500 nm and 2600 nm, the risk of skin lesions follows a similar pattern to that of the eye. The EMP increases within this spectral region for exposures with a duration of up to 10s.

4.6 Classification and specific hazards of radiation emitted by DADO

Based on the CEI EN 60825-1:2017 standard, DaDo is classified as indicated in the following Tab. 4-3:

Parameter	***Value***
Laser class	***LASER Class 4***
Wavelength	***1064 nm***
Type of emission	***Pulsed, non-continued***
Pulse duration	***3 ms***
Repetition rate (selectable from the App.)	***1,5 - 4 Hz***
Divergence of the laser beam (in the output window located on the optical channel)	***7,153°***
Average Power	***10 W***
Peak pulse	***2,5 kWp***

Tab. 4-3 – DADO classification according to CEI EN 60825-1:2017

WARNING! Class 4 lasers are laser products in relation to which direct viewing of the beam and skin exposure are hazardous and in which the viewing of diffuse reflections can also be dangerous. These lasers often also represent fire hazard.

This laser emits radiation in the non-visible specter and is therefore particularly dangerous, as it is not perceivable by the human eye.

Furthermore, non-visible laser radiation decreases the (natural) protective effect of palpebral reflexes[4].

- N.O.H.D [5] for direct or specularly reflected radiation: 15 m.
- N.O.H.D for diffuse radiation: 0,5 m.

WARNING! Only the use of personal protective equipment can protect the operator from the effects of laser radiation.

OBLIGATION: The Employer must mandatorily assess the risks deriving from exposure and choose to make adequate personal protective equipment available to the workers.

[4] The eyelid closes due to the reflected effect of glare.

[5] Nominal Optical Hazard Distance.

4.7 Graphic signs and written warnings

Please find below the graphic signs and written warnings located on the machine. These signs were inserted to make the operator aware of hazards or residual potential sources of danger. An explanatory comment can be found next to each exclusively graphic sign. **Make sure you learn the meaning of these signs**.

For information on the position of these signs, please refer to paragraph 4.7.5.

WARNING! Failure to understand or pay attention to the meaning of signs and warnings can cause personal injuries, death, and/or damage to the machinery or to equipment.

4.7.1 Hazard graphic signs and written warnings

Fig. 4-3 – Hazard pictogram

This sign highlights the **hazard** (residual risk) deriving from exposure of the eyes and skin to direct or diffuse radiation.

Fig. 4-4 – Hazard pictogram

This sign highlights the **hazard** (residual risk) deriving from laser radiation near an opening (access to the welding chamber).

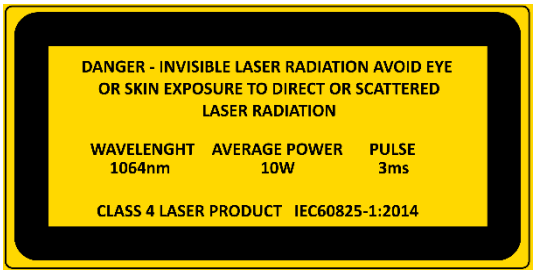


Fig. 4-5 – Explanatory label

This sign highlights the **hazard** (residual risk) deriving from exposure of the eyes and skin to direct or diffuse radiation and additionally provides information on characteristics of the laser source.

4.7.2 Obligation graphic signs and written warnings

Fig. 4-6 – Obligation pictogram

This sign highlights that the operator has an **obligation** to read and understand the manual before using the machine.

Failure to observe instructions can cause death or serious injuries.

4.7.3 Other graphic signs and written warnings

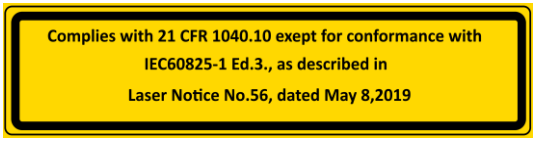


Fig. 4-7 – Conformity pictogram

This sign highlights the manufacturers' conformity to FDA[6] performance standards for laser products.

Fig. 4-8 – Peak pulse pictogram

This sign highlights the peak pulse power.

4.7.4 Label machine

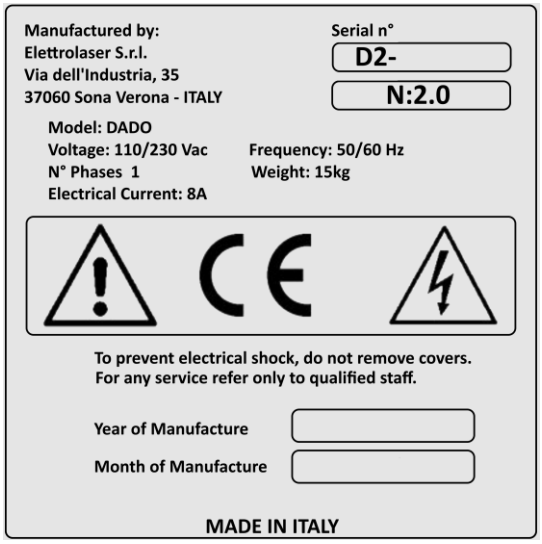


Fig. 4-9 – Conformity pictogram

This signal highlights the CE marking and the equipment plate data.

[6] Food and Drug Administration.

4.7.5 Position of graphic signs and written warnings

Fig. 4-10 – Position of graphic signs and written warnings

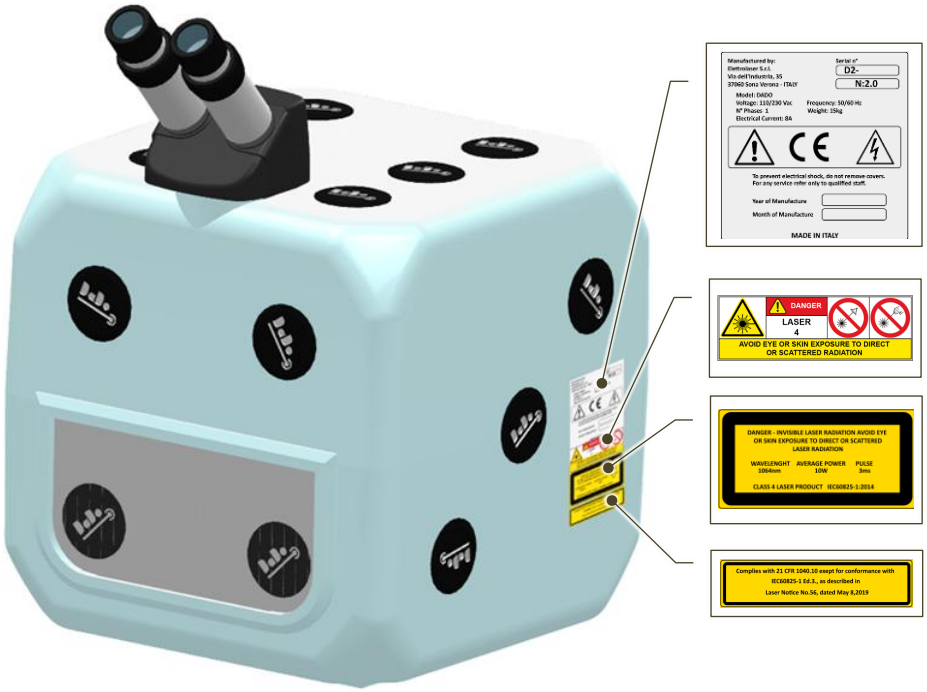


Fig. 4-11 – Position of CE plate, graphic signs, and written warnings

4.8 Physical and intellectual requirements of personnel

The personnel must be capable – also on a physical level – of performing necessary operations and of familiarizing with instructions and safety laws. This staff will have been trained (according to performed/assigned tasks) to be able to safely use the machine and/or to perform maintenance operations on the machinery in safe conditions.


WARNING! Failure to understand or pay attention to the meaning of signs and warnings can cause personal injuries, death, and/or damage to the machinery or to equipment.

PROHIBITION! Staff members cannot operate on the machine if they have taken substances that reduce reaction times.

The staff can be divided into:

- Staff in charge of extraordinary maintenance (support service).
- Laser safety officer.
- Staff in charge of operating the machine.

Each of these profiles is characterized by specific skills described below.

4.9 Staff in charge of extraordinary maintenance (support service)

In terms of maintenance staff, standard EN 15628 (Maintenance – Qualification of maintenance personnel) identifies the following three professional figures and defines their correspondent necessary skills:

- Maintenance manager (indicatively referable to EQF levels 6 and 7[7]).
- Maintenance supervisor and maintenance engineer (indicatively referable to EQF levels 5 and 6).
- Specialist maintenance technician (indicatively referable to EQF levels 4 or 5).

The skills of the **specialist maintenance technician** consist of the capacity to carry out autonomous maintenance activities, including the following key skills:

- Perform or ensure safe performance of maintenance plans in observance of company strategies.
- Promptly intervene in the event of any malfunctions or anomalies, ensuring effectiveness of recovery operations.
- Observe or ensure full observance of laws and procedures concerning health and safety, as well as protection of the environment.
- Ensure availability of materials, equipment and tools needed for performing maintenance operations.
- Coordinate and/or supervise maintenance operations.
- Ensure quality standards of maintenance operations.
- Use and ensure use of ICT (information and communication technology) systems.

OBLIGATION! Extraordinary maintenance operations (support service) can be performed <u>exclusively</u> by personnel of ELETTROLASER S.R.L. or by dealers / installation technicians authorized by ELETTROLASER S.R.L.

[7] EQF is the European Qualifications Framework, a Standard reference list of job qualifications that implements a system based on learning results obtained at the end of a training process. Learning results are defined in terms of Knowledge, Skills and Responsibility/Autonomy. The overall result is an index, included between 1 and 8, which aims to promptly and univocally identify the learning level achieved in a specific context.

4.10 Laser safety officer

In many countries, in case of class 3B or 4 laser products, the employer must appoint a LASER SAFETY OFFICER. Consult local laws in this regard.

4.11 Staff in charge of operating the machine

The machine must be run by a **professional** operator, as described under paragraph 5.5, which also describes his/her position and tasks.

The operator must never perform different tasks on the machine than those described for its operation, with the exception of those described under paragraphs 9.2 (ordinary maintenance) and 9.5 (cleaning the machine); all extraordinary maintenance operations, repairs or other actions different than those required for operation of the machine are reserved to qualified staff.

PROHIBITION! Never take the personal initiative of intervening to solve machine downtime situations unless strictly linked to operating the machinery.

Absolutely do not try to help staff in charge of maintenance or tooling operations.

4.12 Training of staff

The machine can be used exclusively by trained staff that has passed the training period set during the sale contract phase and is therefore authorized to use the machinery. In any case, the machine cannot be used by personnel that is not adequately trained with regards to its operation and safety devices.

WARNING! ELETTROLASER S.R.L. declines any liability deriving from incorrect operations performed by staff not trained to use the machinery, and from failure to observe general laws on work safety.

4.13 Incorrect use

The machine is designed to be used exclusively for the purposes described in the specific section of this manual (paragraph 5.4). Different forms of use than those described in this manual are to be considered incorrect and therefore not compliant with safety laws.

WARNING! Non-compliant use of the machine can cause personal injuries, death, and/or damage to the machine or to equipment.

Please find below a series of possible incorrect forms of use which can cause personal injuries or damage to the machine or to equipment, for which ELETTROLASER S.R.L. refuses to respond and rejects any liability:

- Unauthorized modifications or replacements of parts of the machine.
- Failure to observe safety instructions.
- Failure to observe instructions concerning the installation, use, functioning, maintenance, repairs of the machine or performance of any of the above by unqualified staff.
- Use of incorrect or incompatible materials or of auxiliary equipment.
- Failure to observe rules or currently effective laws concerning safety in the workplace.

5 Characteristics and technical data

5.1 Description of the machine

DaDo (Fig. 5-1) is a welding machine that uses electromagnetic radiation as energy source for the heating of metals to melting temperature levels.

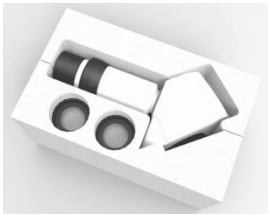
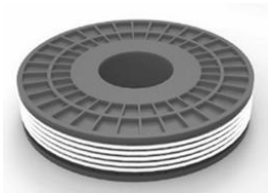
The machine consists of the following elements:

- Machine body.
- Binocular.
- Welding chamber.
- Control and notification devices.

Fig. 5-1 - DaDo

5.2 Equipment

DaDo is supplied in its box with the necessary components, accessories, and consumables for its operation, as detailed in the following Tab. 5-1:

Description	
Binocular package (for installation, supplied inside the welding chamber)	
Coolant can (1 liter, supplied inside the welding chamber)	
2,5- and 3-mm hex keys	
Metal tweezers	
Fiberglass brush	
Cleaning cloth	
Welding alloy	
Smart phone support	

Description	
INTERLOCK and KEY connectors (supplied in a dedicated case)	

Tab. 5-1 – DaDo equipment

5.3 Applicable technical regulations and laws

The machine was designed in observance of the following community standards concerning the safety of laser products:

- CEI 76-11:2011 Safety of laser products Part 14: User guide.
- IEC 61000-6-1:2016 Electromagnetic compatibility (EMC) - Part 6-1: Generic standards - Immunity standard for residential, commercial, and light-industrial environments.
- CEI EN 61000-6-3:2007 Electromagnetic compatibility (EMC) Part 6-3: Emission standard for residential, commercial, and light-industrial environments.
- IEC 61000-3-2:2018 Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current ≤16 A per phase).
- IEC 61000-3-3:2013 Electromagnetic compatibility (EMC) - Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤16 A per phase and not subject to conditional connection.
- CEI EN 60825-1:2017[8] Safety of laser products Part 1: Classification of products and requirements.

Furthermore, the following European Community Directives were also observed:

- Directive 2006/42/EC of the European Parliament and of the Council of 17 May 2006 on machinery and amending Directive 95/16/EC (recast).
- European Parliament and Council Directive 2014/30/UE dated February 26th, 2014, and concerning the harmonization of member State legislations on electromagnetic compatibility (recast).
- European Parliament and Council Directive 2014/35/UE February 26th, 2014, and concerning the harmonization of member State legislations on making available on the market electrical material for use within specific voltage limits.

INFORMATION! While the machine is compliant with applicable EU Directives, we cannot exclude that these may be (or have been) implemented via specific legislation at a local (national) level.

5.4 Intended conditions of use

DaDo was designed exclusively to perform operations described under paragraph 5.1 of this manual.

The machine must operate in environmental conditions that comply with the descriptions featured in the specific section (Permissible environmental values) of Tab. 5-4.

In terms of typology and dimensions, the product on which the machine operates must comply with requirements listed in the paragraph on characteristics of the product (5.7).

5.5 Residual risks

The machine requires the preparation of workstations as indicated in the following Tab. 5-2:

Workstation	*N° of operators*	*Operations*
In front of the machine	1 operator	Welding

Tab. 5-2 – Workstations

[8] Identical to EN 60825-1:2014 identical to IEC 60825-1:2014.

In normal work conditions, the residual risks described below (Tab. 5-3) may still be present:

Stage	*Risks*	*P.P.E. **
Transportation and handling	**Risk of impact and crashing**: due to incorrect use of lifting and transportation tools, or during manual transportation of the machine (if the machine is dropped by accident).	
Installation, assembly, and connections	**Risk of impact and crashing**: due to incorrect use of lifting and transportation tools, or during manual transportation of the machine (if the machine is dropped by accident).	
	Risk of impact, tripping and falling: if the area where the system is installed is not sufficiently illuminated.	
	Risk of electrocution and electric shock: if the machine is connected to a non-suitable/damaged electrical system or if the device was damaged during transportation or assembly.	
Loading and unloading of the product	**Risk of muscular-skeletal injuries**: if the operator lifts heavy materials incorrectly (or by himself/herself) (please also refer to paragraph 6.3).	
Regulations and use	**Risk of electrocution and electric shock**: if the machine is connected to a non-suitable/damaged electrical system or if the device or the cable connecting it to the electrical power supply network are damaged.	
	Risk of exposure to laser radiation: direct viewing of the laser beam and exposure of the skin are hazardous, and the viewing of diffused radiation can also be dangerous. Furthermore, these types of laser often represent a fire hazard.	
	Risk of anoxia: if the inert gas (which does not represent a health hazard in itself) dangerously reduces the concentration of oxygen in the air due to inadequate natural ventilation.	
	Residual risks deriving from the presence of persons unrelated to operations near the machine.	
	Risk of impact, tripping and falling: if the area where the system is installed is not sufficiently illuminated.	
Maintenance	**Risk of electrocution and electric shock**: the machine is powered by electricity, and therefore operations on live or disconnected electrical parts must be performed exclusively by the specifically responsible technician, in observance of all necessary precautions (EN 50110-1).	
	Risk of exposure to laser radiation: direct viewing of the laser beam and exposure of the skin are hazardous, and the viewing of diffused radiation can also be dangerous. Furthermore, these types of laser often represent a fire hazard. Perform maintenance operations only when the machine is disconnected from the electrical network.	

Stage	*Risks*	*P.P.E. **

* Based on the specific operations to be performed, the employer must assess the adequacy of the P.P.E. in relation to the residual risk linked to use of the machine, also in relation to the presence of further risks during operations.

Tab. 5-3 – Residual risks

The risks listed above are reduced to acceptable levels if the personnel operates in adequate conditions, as described at the beginning of this paragraph.

5.6 Technical data of the machine

5.6.1 Technical data

Data		*Description*	*Data*
Dimensions		Minimum length of installation area	***2340 mm***
		Minimum width of installation area	***2340 mm***
		Minimum height of installation area	***2700 mm***
		Maximum length of machine	***340 mm***
		Maximum width of machine	***340 mm***
		Maximum height of machine (with binocular installed)	***510 mm***
Connections		Electricity	
		Inert gas	
Masses		Overall weight of machine and packaging	***24 kg***
		Net weight of machine (without coolant)	***15 kg***
Power supply		Supply voltage for electrical equipment	***110/220 V AC +/- 5%***
		Supply frequency	***50/60 Hz***
		Max. Electric Current consumption	***8 A***
		Type of connection to ground circuit (IEC 60364-3) *Different electric distribution systems must first be checked and approved by the manufacturer.*	***TN-S***
		Supply voltage for auxiliary circuits	***24 VCC +/- 10%***
Laser characteristics		Class	***LASER Class 4***
		Wavelength	***1064 nm***
		Type of emission	***Pulsed, non-continue***
		Pulse duration	***3 ms***
		Repetition rate (select. from the App.)	***1,5 - 4 Hz***
		Divergence of the laser beam (in the output window located on the optical channel)	***7,153°***
		Average power	***10 W***
		Peak pulse	***2,5 kWp***
		Duty Cycle	***0 ÷ 100 %***
		Dimensions of laser beam	***0,2 ÷ 1,5 mm***
		Type of cooling system	***Liquid***
		LASER crystal type	***Nd:Ce: YAG***

Data	*Description*	*Data*
Permissible environmental values	Operating temperature	***+17 °C ÷ +35 °C*** [9]
	Storage temperature	***-25 °C ÷ +55 °C***
	Environmental temperature variations	***max 1.1 °C / Min***
	Average temperature	***Not above +35 °C in 24 h***
	Relative humidity (RH) range	***65 % or less***
	Vibrations	***≤ 0,5 G***
	Altitude	***Up to 1000 m.a.s.l.***

Tab. 5-4 – Technical data

5.6.2 Noise levels

The machine was designed to reduce noise emissions at their source. In normal conditions of use, the sound power level of the machine is:

Acoustic pressure	
(A)-weighted equivalent continuous acoustic pressure	***< 70 dB***
Weighted instantaneous acoustic pressure	***< 130 dB***

Tab. 5-5 – Acoustic pressure

The noise levels indicated above are emission levels measured in normal conditions of use in observance of the EN ISO 3744, 3745, 3746 and 11200-11204 standards. These values may vary if any modifications are made to the machine and will therefore need to be re-determined in relation to such changes.

The noise levels indicated above are emission levels and do not necessarily represent safe operating levels.

Despite the existence of a relation between emission levels and exposure levels, this cannot be used in any reliable way to establish if further precautions are necessary or not. The factors that determine the level of exposure workers are subjected to include duration of the exposure, environmental characteristics of the workplace and the presence of other sources of noise (number of machines, adjacent processes, etc.). Furthermore, even permissible exposure levels may vary from country to country. In any case, this information will help the user to assess the danger and risk to which he/she is exposed.

WARNING! The acoustic impact produced by the machine in the surrounding environment can be considered of little relevance in test conditions.

In any case, it is important to keep in mind that the level of exposure of the operator in charge of running the machine will have to be assessed in the actual operating conditions of the machine, in conformity with current legislation (of the country where the machine is placed on the market).

Pursuant to Community Directive 2003/10/CE, given that in test conditions the acoustic pressure of the machine does not cause a worker located appropriately and continuously in the installation area to be exposed to pressure equal or above 80 dB (A) on a daily basis, the manufacturer is not required to provide information concerning the noise levels of the machine.

[9] Electrical equipment is capable of functioning correctly when relative humidity does not exceed 50% at a maximum temperature of +40 °C. Higher relative humidity levels can be permissible at lower temperatures (e.g. 90% at +20 °C).

5.6.3 Vibrations

The vibration levels produced by the machine are very low, and do not represent a hazard for the operator.

In any case, the levels were determined in compliance with the ISO 5349 standard for vibrations transmitted to the hand/arm system (HAV).

Vibrations	
Vibrations transmitted to hand/arm system	***≤ 2,5 m/s²***

Tab. 5-6 – Vibrations

OBLIGATION! No specific measures are required to protect the operator from the effects of vibrations produced by the machine. The operator must immediately stop the machine in the presence of any abnormal vibrations and notify the maintenance staff of the issue.

5.6.4 Levels of protection

Protection level of electrical equipment (IP[10])	
Protection level against solid foreign objects (dust-tight)	***2***
Protection level against water (water-tight)	***X***
Protection level against access to dangerous parts	***B***

Tab. 5-7 – Levels of protection

Flame protection rating of the housing (shell)	
Degree of protection against ignition of the shell	***UL 94 HB***

Thermal properties	**Test Condition**	**Unit**	**Standard**	**Value**
Temperature of deflection under load	1.80 Mpa	°C	ISO 75-1,-2	93
Temperature of deflection under load	0.45 Mp	°C	ISO 75-1,-2	97
Vicat softening temperature	50 N	50 °C/h °C	ISO 306	98
Burning behavior UL 94 (1.6 mm) [UL listed]	1.6 mm	Class	UL 94	HB
Coefficient of linear thermal expansion, parallel	23 to 55 °C	10-4/K	ISO 11359-1,-2	0.9
Burning rate (US-FMVSS)	2.0 mm	mm/min	ISO 3795	60
Glow wire test (GWFI)	2.0 mm	°C	IEC 60695-2-12	700

Tab. 5-8 – Flammability of the shell

The plastic casing of the product (shell) is classified according to UL 94, with a class HB for a thickness of 1.6 mm. This classification indicates a low propensity to flame propagation, making the material suitable for applications requiring fire resistance. Compliance with UL 94 HB ensures that the material does not ignite and its combustion is limited, thus contributing to product safety in environments potentially exposed to heat or flame sources.

[10] As set by CEI EN 60529.

5.7 Product characteristics

5.7.1 Technical characteristics of processable products

Products processable by the machine (examples shown in Fig. 5-2) consist of:

- Gold / jewelry sector: jewels and glasses, watches, and bracelets.
- Dental sector: orthodontic braces, dental prostheses, etc.

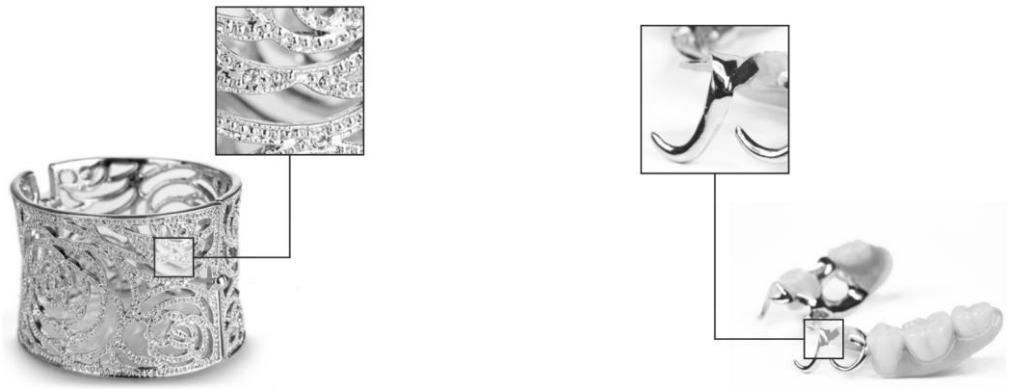


Fig. 5-2 – Examples of processable products

To be processable with DaDo, products must be made exclusively with the materials listed in the following Tab. 5-9.

Technical characteristics of processable products		
Dimensions	Maximum size of the product (L x W x H)	***100x100x100 mm***
Materials		***Chromium-cobalt alloy***
		Steel
		Titanium
		Yellow gold
		Rose gold
		White gold
		Platinum
		Bronze
		Copper
		Aluminum
		Brass
		Silver

Tab. 5-9 – Usable materials

PROHIBITION! Use of the welding machine to weld <u>different</u> materials than those indicated in the table above IS STRICTLY PROHIBITED. If you need to weld different materials, we invite you to contact the manufacturer. Do not attempt to weld different materials than those indicated above, in any way.

5.7.2 Weld material characteristics

If the type of welding requires it, you can use welding materials; DaDo is supplied with a welding alloy coil.
In any case, use of the following weld materials is permitted:

- Silver.
- Monel.
- Steel.
- Chromium-cobalt alloy.
- Titanium.

6 Transport and installation

6.1 Transport

The machine and its equipment (please refer to paragraph 5.2) are normally supplied packaged in a cardboard box; for air transport, the box is packaged within a wooden crate.

INFORMATION!

- ***Conserve the box for future storage, transportation, and/or sale.***
- ***Unnecessary packaging materials must be disposed of based on their typology and in compliance with currently effective laws concerning waste management.***

6.2 Handling and removal of packaging

WARNING! Observe the following instructions.

The box containing DaDo (or DaDo itself, once removed from its packaging) can be lifted and/or handled manually:

- By observing safety conditions described under paragraph 6.3;
- By gripping with both hands positioned on the two lower edges.
- By making sure:
  - You do not knock and drop the machine, to avoid damage to its electrical parts and internal optical components,
  - You do not tilt or flip the package (and/or the machine).

Go to the place of installation and, after opening the box:

- Extract the supply cable and the control pedal (both of which connect to the lower side of the machine) from the upper part of the internal packaging and place them next to the machine.
- Remove the upper lid (where some of the equipment supplied is inserted).
- Extract DaDo from the box and place it on the worktable (please also refer to paragraph 6.5);
- Take the binocular, its package and the coolant can out of the welding chamber.
- Assemble the binocular (please refer to paragraph 6.6.1).
- Input the coolant in the machine (this operation can only be performed by the dealer / installation technician, please refer to paragraph 6.6.2)
- Connect the plug to the power supply network (paragraph 6.8).

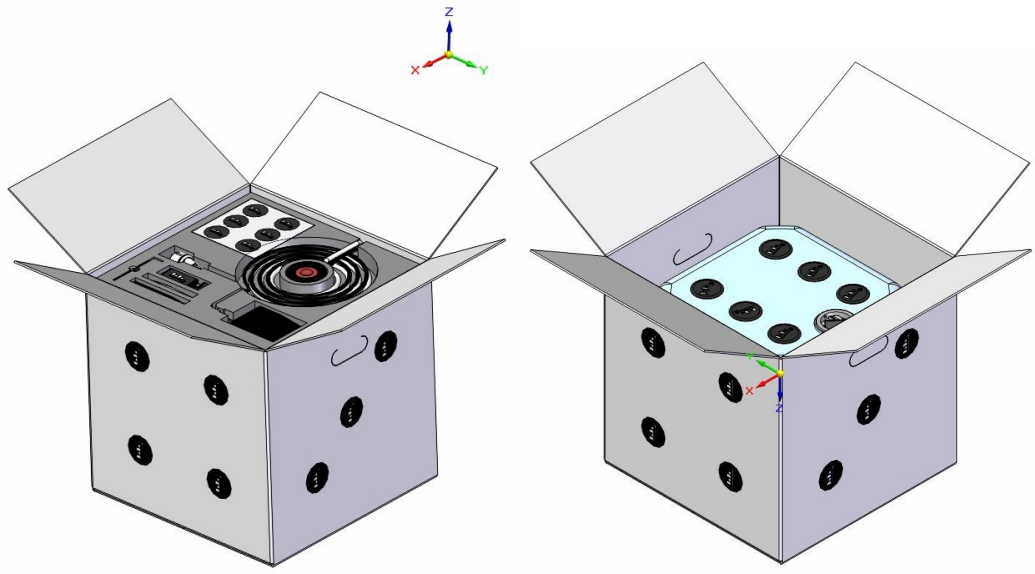


Fig. 6-1 – Open box with accessories (positioned on the upper part of the internal packaging) and DaDo

6.3 Manual handling of loads

Manual handling of loads (MHL) must be carried out in safe conditions to avoid overloading the dorsal-lumbar tract of the spine.

Please find below a series of safety instructions concerning manual handling of loads.

WARNING! Lifting and handling operations must be performed in compliance with maximum weight liftable by a person[11]; use specific lifting devices to avoid the risk of any back injuries.

PROHIBITION! Do not manually lift products that exceed the permissible limit!

In any case, it is important to remember that during manual handling activities, operators are subject to the following risks:

- Falling of loads.
- Crushing of feet.

To prevent risks deriving from incorrect handling of loads, please observe the following general indications:

- Make sure the floor is stable and smooth.
- If possible, use suitable transportation devices (e.g., hand pallet trucks Fig. 6-2, forklifts or cranes).

[11] 25 kg for men and 15 kg for women, according to the ISO 11228-1 standard (also check the limits set by national laws regarding the health and safety of workers).

Fig. 6-2 - Transportation devices

- Hold a stable position.
- Flex your knees (at a 90° angle) and use the muscles in your legs to lift the load. Lift the load slowly, while keeping your back straight (Fig. 6-3).

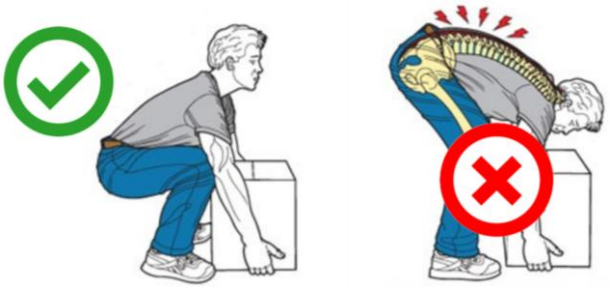


Fig. 6-3 – Lifting technique

- Avoid torsions of the bust (Fig. 6-4).

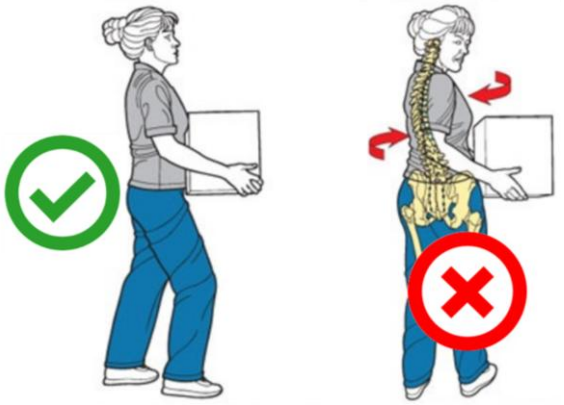


Fig. 6-4 – Handling technique

- Keep the load as close as possible to your body.
- Distribute the load on both sides.
- Keep your view clear.
- Ensure at least two operators manage the lifting of bulky loads (Fig. 6-5).
- Observe the limits concerning maximum weight liftable by one person.
- If the load is too heavy or lifting it requires a noteworthy physical effort, it is advisable to opt for one of the following solutions:
  - Use auxiliary tools,
  - Divide the load into multiple parts that can be transported individually,

- Transport the load with help from another person.

If certain components need to be moved by pushing or pulling, observe the following general indications:

- Always operate in a stable position.
- If possible, place the load on devices with wheels.
- It is preferable to push by leaning your back against the load and keeping your arms parallel to your body; if you push the load frontally, make sure you keep your back straight.
- Remember it is always preferable to push rather than pull.
- If pulling is required, always use secure gripping points (ones that will not break due to the pulling operation).

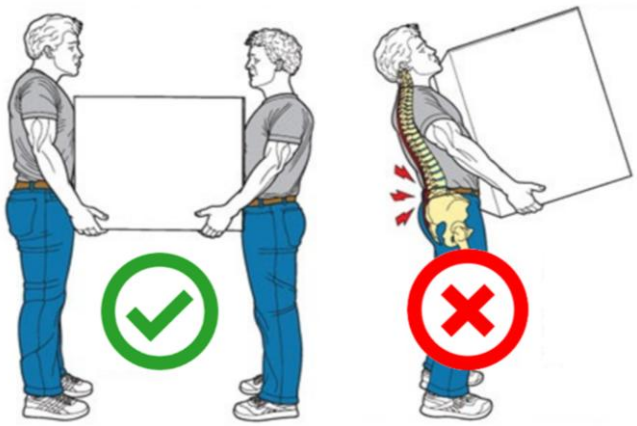


Fig. 6-5 - Handling technique

6.4 Installation

WARNING! Before proceeding with installation of the machine, carefully read the instructions below.

Failure to observe the following warnings can cause injuries, death, or damage to equipment.

ELETTROLASER S.R.L. declines any liabilities for damage to persons or things due to installation in an environment characterized by one of the situations described below.

6.4.1 Installation limits

PROHIBITION! The machine cannot be installed in explosive atmosphere environments as defined by standards EN 60079-10-1 "Explosive atmospheres. Part 10-1: Classification of places – Explosive atmospheres due to the presence of gas" and EN 60079-10-2 "Explosive atmospheres. Part 10-2: Classification of places – Explosive atmospheres due to the presence of combustible dusts". Machines, components, and devices designed to operate in explosive atmospheres must feature the (ATEX) label as set forth by standard EN 60079-14 "Explosive atmospheres. Part 14: Design, choice, and installation of electrical systems".

PROHIBITION! The line cannot be installed in environments requiring a higher IP protection level than 2X.

6.5 Preparation of installation site

The machine can be installed exclusively in a specifically prepared site, positioned on a stable worktable that is perfectly horizontal and adequately sized to allow for machine operations.

The site is an indoor and covered area featuring a smooth coated floor.

The minimum dimensions of the installation area are 2340 x 2340 mm, in order to ensure adequate access to the machine and suitable space for maneuvering around it. The minimum height of the building where the machine is installed must correspond to 2700 mm.

The client is responsible for preparing the power supply network (electricity). This network must be designed and sized to guarantee correct functioning of the machine and compliance with safety laws.

The work environment must feature an independent lighting system and an adequate aspiration system for fumes deriving from machine operations; in terms of the latter, the *ideal* configuration (to obtain a healthy environment and protect the operator's health) is one that features a suction vent (to be connected to an aspiration system via a duct – *these elements are not supplied with the machine*) located directly on the worktable, under the machine (as schematically illustrated in Fig. 6-6).

The installation site must be suitable for class 4 lasers (CLA controlled laser area), as set forth by currently effective legislation.

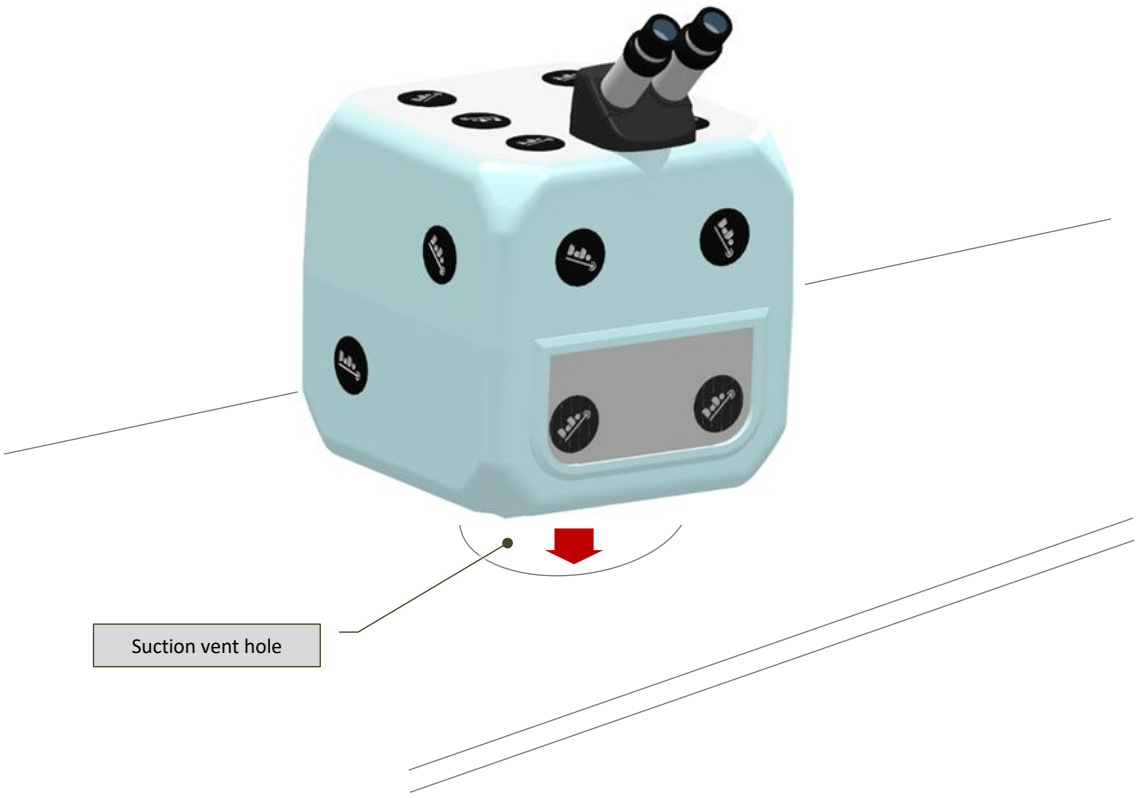


Fig. 6-6 – Ideal installation on worktable

6.6 Assembly

The machine is supplied fully assembled. The only operations required before starting the machine are the assembly of the binocular and the filling of the coolant system.

6.6.1 Assembly of the binocular

Follow the indications below to assemble the binocular:

- Take the binocular package (after removing it from the welding chamber) (Fig. 6-7) and extract the binocular from the package.
- Check that the LCD filter on the upper part of the machine is intact (if it is damaged, stop the assembly process and contact the support service).
- Place the binocular in the installation point, as shown in Fig. 6-8;
- After aligning the binocular, tighten the screw on the rear side (do not tighten excessively), by using the 2,5 mm hex key (detail in Fig. 6-8).

In the binocular box (Fig. 6-7) there are also two blinkers, which can be attached to the eyepieces, in case the user wears prescription glasses.

For information on regulating the binocular, please refer to paragraph 7.5.1.

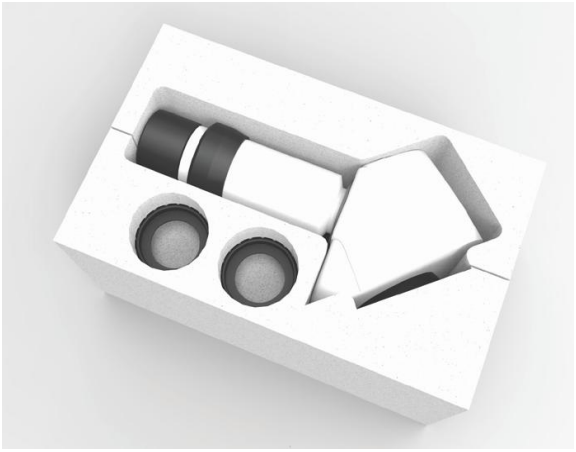


Fig. 6-7 – Binocular package

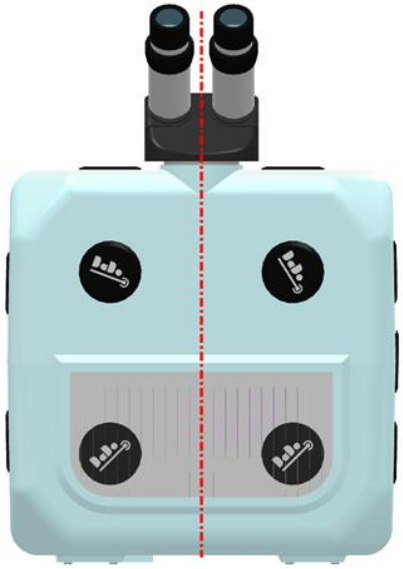


Fig. 6-8 – Binocular alignment

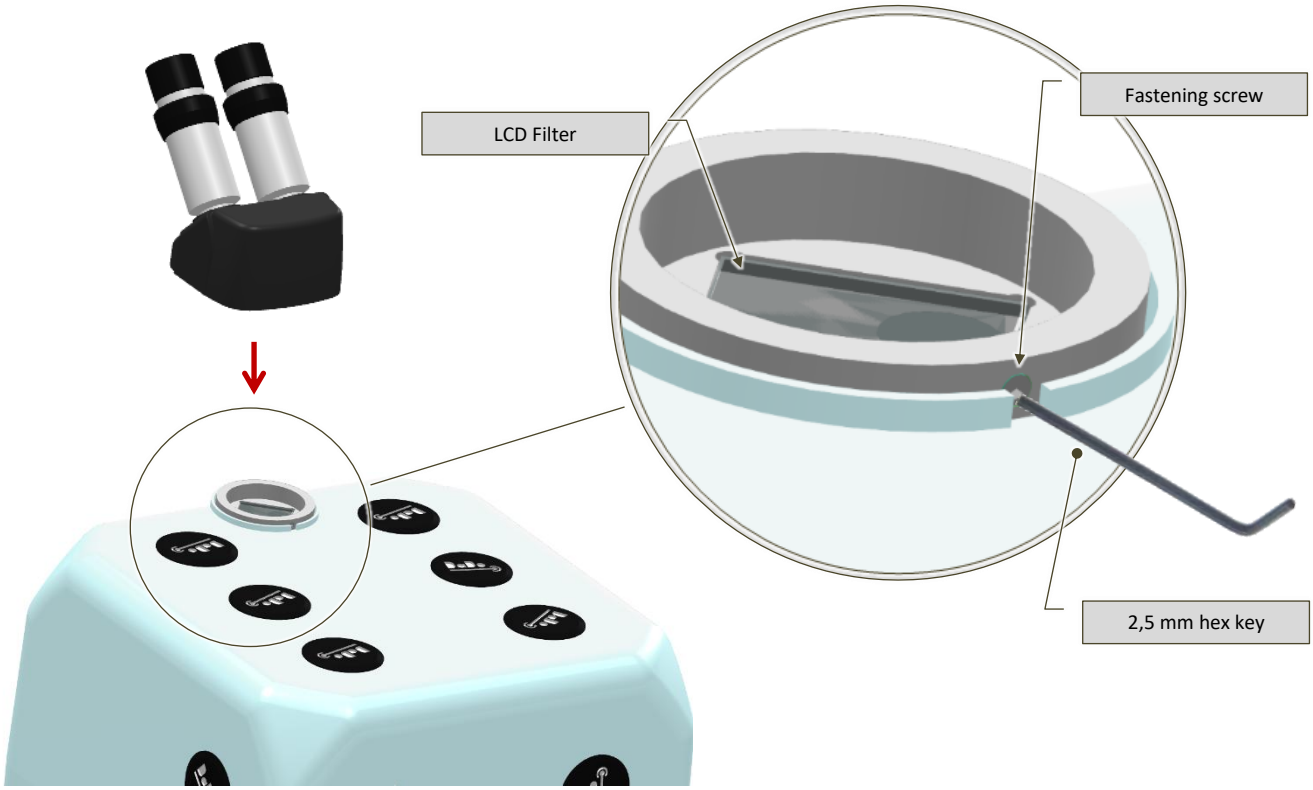


Fig. 6-9 – Assembly of the binocular

6.6.2 Coolant system filling operations

OBLIGATION! Authorized dealers / installation technicians can exclusively perform this operation!
ELETTROLASER S.R.L. declines any liability if the client proceeds to fill in the cooling system.

The coolant (distilled and deionized water) is necessary for cooling of the laser source.
To fill in the coolant system, proceed as described below:

- Manually remove the black plastic lid located on the upper left rear of the machine (Fig. 6-10).
- Extract the plastic tube and remove the red cap (the other is the vent).
- Take the coolant can, remove its cap and cut the tip of the nozzle with a cutter.
- Insert the can nozzle in the plastic tube of the machine and pour all the liquid into the tube (Fig. 6-11).
- Re-cap the plastic tube with the red cap.
- Re-insert the tube in its seat (paying attention not to damage it) and put the black lid back in its original place.

Fig. 6-10 – Removable lid

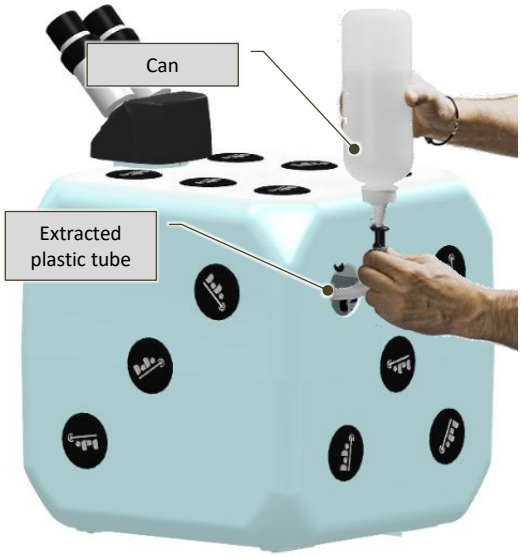


Fig. 6-11 – Coolant insertion

PROHIBITION! If the machine needs to be moved, pay attention not to tilt or flip it, to avoid the risk of coolant spilling into the machine.

INFORMATION! If the coolant needs to be topped up over the course of time, please contact your dealer / installation technician!

6.7 Lighting

WARNING! The installation site must feature sufficient lighting for the performance of use and maintenance operations.

The optimal lighting level obviously varies according to the type of operations to be performed; please refer to the EN 12464-1 standard (paragraph 5.3) for detailed information concerning the type of activity and the work environment.

If you intend to equip the machine with an additional lighting system, and you intend to use the same electrical line that supplies the machine, all wiring (both inside and outside the electrical panel) must be prepared in compliance with currently effective technical legislation and laws on safety in the workplace.

In particular, the rules below must be followed:

- Feed the lamps with low voltage via a fuse-protected isolation transformer.
- Manage the grounding of a terminal of the secondary circuit of the transformer and of any metallic parts outside the electrical panel.
- Protect electrical cables located outside the panel with metal sheathing designed for industrial use.
- Use filament lamps (fluorescent lamps may generate stroboscopic effects).

6.8 Connection to the electrical network

6.8.1 Instructions

WARNING! The machine must be connected to the grounding system. Grounding continuity must be ensured for all electrical equipment. For this purpose, the client must supply the connection points for the grounding system of the building, making sure the system is compliant with requirements set forth by current legislation.

The machine is powered by inserting the plug in the socket.

The supply line the machine is connected to must be protected by a circuit breaker with adequate capacity.

220V models

- used everywhere in Europe
- 2 pins
- grounded
- 16 A
- 220 – 240 V
- socket compatible with plug types C, E & F

Fig. 6-12 – Plug Type F (SCHUKO) / 2 pin + grounding connector

110V models

- USA, Canada & Mexico
- 3 pins
- grounded
- 15 A
- always 100 – 127 V
- socket compatible with plug types A & B

Fig. 6-13 – Plug Type B (NEMA 5-15P)/ 2 pin + grounding connector

6.8.2 Protection from electric shocks

6.8.2.1 Direct contact

Direct contact is when “persons or animals come in contact with live parts,” i.e., with dangerous voltage levels (EN 60204-1).

All electrical devices are inserted within specific casings for electrical material, which require a tool to be opened.

Electrical devices which cannot be enclosed in casings for technical reasons must feature suitable isolation systems for the correspondent voltage level and for the environment in which they are used.

6.8.2.2 Indirect contact

Indirect contact is when “persons or animals come in contact with masses[12] that are live due to faulty conditions” (EN 60204-1).

The following method was selected to protect persons from indirect contact:

- Automatic interruption of power supply.

Coordination against indirect contact takes place by checking that, at the time of the fault current from one of the phases of the equipment, the devices used to intercept the fault current (fuses, automatic switches and circuit breakers) open the faulty circuit within time frames that are compatible with the safety of persons, in relation to the electricity distribution system.

In the case of TT distribution systems, the fault current generated in the circuit must correspond to the following relation:

$$\mathbf{Ra * Ia \leq 50\ V}$$

In which:

- **Ra** = earth resistance.
- **Ia** = current level that triggers the protection device within times set by law.
- **50V** = conventional safe voltage value.

[12] Conductive part of a machinery which can be touched and is not live in normal operating conditions but may become live in faulty conditions (EN 60204-1).

6.9 Other connections

6.9.1 Inert gas connection

OBLIGATION! Authorized dealers / installation technicians can exclusively perform this operation!

DaDo can be set up for the use of inert gas (e.g., argon), which is ideal when welding materials such as titanium and aluminum, for the purpose of protecting the material from oxidation and improving the quality of the welding.

The machine is equipped (Fig. 6-14 and Fig. 6-15) with an articulated dispenser for diffusion of the gas (near the welding area) and with a quick connection for the inert gas canister (not supplied with the machine, to be procured by the client / user).

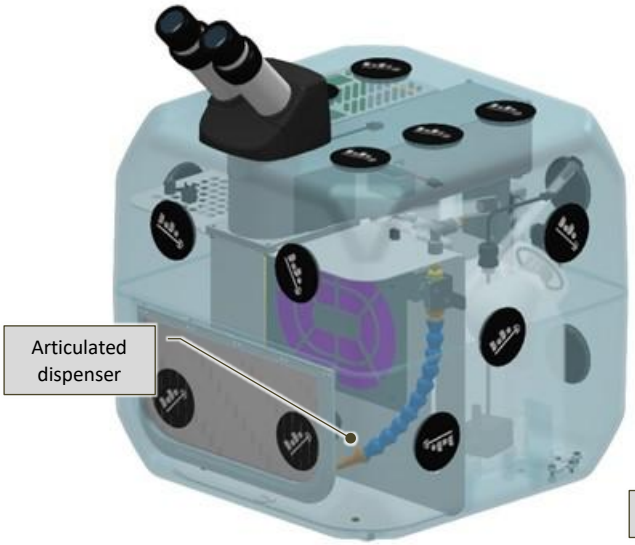


Fig. 6-14 – Inert gas dispenser

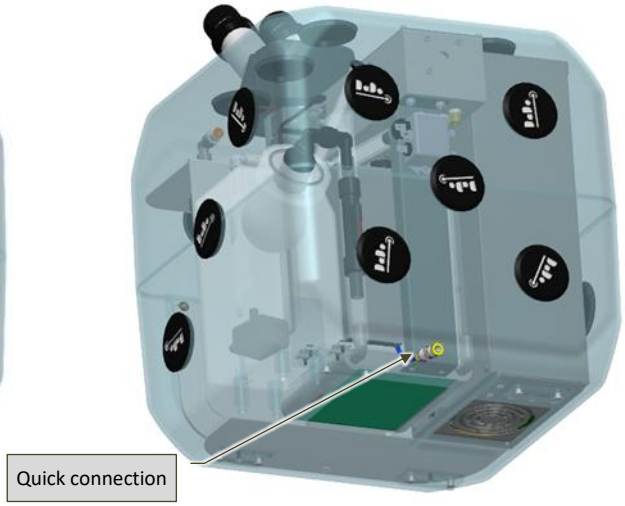


Fig. 6-15 – Quick connection to inert gas canister

WARNING! Although not a health threat, inserting gas can dangerously lower the concentration of oxygen in the air, and therefore cause anoxia!

The employer must assess this hazard and if necessarily make sure the workplace features sufficient natural ventilation.

7 Operation

7.1 Machine operation

DaDo (Fig. 7-1) is a welding machine that uses electromagnetic radiation as energy source for heating metals to melting temperature levels.

The machine consists of the following elements:

- Machine body.
- Binocular.
- Welding chamber.
- Control and notification devices.

Fig. 7-1 - DaDo

7.1.1 Operating principle

The physical principle behind the generation of laser electromagnetic radiation is stimulated light emission. LASER is indeed the acronym of Light Amplification by Stimulated Emission of Radiation.

This means that lasers are light amplified by a photonic chain emission, originating from a first photon (light particle) that – by interacting with an excited atomic system – stimulates the emission of two photons which, in turn, interact with other atoms and so on, resulting in a "snowball" effect.

Excitement of the atomic system requires a suitable external energy supply to trigger the laser effect. This technique, known as "optical pumping," is successful when the emitted radiation (in this case from a light source) involves an "active" material (one that emits laser light when stimulated) exciting the atoms as an effect of energy absorption.

Amplification of the laser effect is achieved by letting the light emitted by the material cross the material multiple times. This takes place by placing the active medium between two opposing mirrors, i.e., by building and "aligning" what is defined as an "optical resonator."

When the resonator is "aligned" perfectly, the crystal and the mirrors are centered along the optical axis. The faces of the crystal, the front mirror, and the face of the rear mirror closest to the crystal are parallel. In this optical configuration, the resonator extraction of laser energy is at maximum level, the beam is circular, and its intensity is uniform (consistent).

After being amplified, the laser beam can exit the resonator via the partially reflective mirror and being concentrated by a focus lens (with different focal length values) and can now be deviated into the welding chamber (in this case by a 45° mirror).

Focusing allows the energy to be concentrated in a specific spot (measuring just a few tenths of a millimeter), making the rising of temperature levels to metal melting points possible.

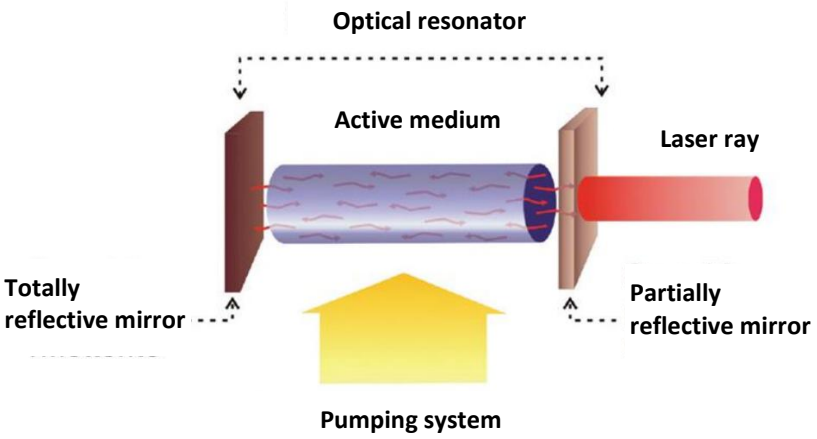


Fig. 7-2 – Operating principle

7.1.2 Specific glossary

The following Tab. 7-1 features definitions of specific laser application terminology, for the purpose of making the contents of this manual more comprehensible

Term	*Definition*
Aperture, diaphragm	Aperture means any opening in the laser device protective casing through which the laser radiation is emitted, thus allowing human access to the radiation in question. A diaphragm is an aperture which defines the surface on which the radiation is measured.
Beam	Laser radiation can be characterized by direction, divergence, diameter or by scanning specifications. Diffusing radiation from a reflection is not considered a beam.
Beam expander	Combination of optical elements used to increase the diameter of a laser beam.
Beam stop device	Device that interrupts the trajectory of a laser beam.
Diffuse reflection	Change in the spatial distribution of a radiation beam when it is diffused in multiple directions by a surface or medium. A perfect diffuser eliminates any correlation between the directions of the incident and emergent radiation.
Class 4 laser device	Every laser device which allows human access to laser radiation exceeding accessible emission limits defined under Class 3B.
Stray laser radiation	Laser radiation that deviates from the expected beam trajectory. This includes unexpected secondary reflections from optical components located in the beam trajectory, radiation deviated by misaligned or damaged components and reflections from workpieces.
Direct viewing of the beam	All visual conditions in which the eye is exposed to a direct or specularly reflected laser beam. This is different from the viewing of diffuse radiations, for example.
Maintenance	Execution of regulations or procedures indicated in the user instructions supplied by the manufacturer along with the laser machinery, which must be performed by the user to ensure the machine meets expected performance levels. This does not include operation of the machine, nor support services.
Nominal Ocular Hazard Distance (NOHD)	Distance at which the irradiation or the energy beam exposure is equal to the maximum permissible exposure (MPE) for the cornea. If the NOHD includes the possibility of optically assisted vision, it is called “extended NOHD.”
Pulsed laser	Laser that supplies its energy in the form of a single pulse or as a pulse train. Each pulse lasts less than 0,25 s.
Tool	Screwdriver, coin, or any other object that can be used on screws or similar means of fastening.

Term	*Definition*
Transmission factor	Ratio between the transmitted radiant flow and the incident flow in specifically set up conditions.
Visible radiation (light)	Every optical radiation capable of directly causing a visual perception (IEV 845-01-03). Indicates the electromagnetic radiation for which the wavelengths of the monochromatic components are included between 400 and 700 nm.
Workpiece	Object to be processed with laser radiation.

Tab. 7-1 – Specific glossary

7.1.3 Machine

The body of the machine (Fig. 7-3) consists of a cube-shaped injection molded techno polymer casing.

The casing is closed with screws. It contains the laser source (lamp and resonator), all power and control devices for the laser source, the coolant system, the laser channeling and focus unit and the resonator shutter (a shutter controlled by an electromagnet, which has the function of interrupting the laser beam within the resonator).

The top of the machine body features the cylindrical connection (optical channel) for the binocular, while the front is where the welding chamber is located.

The outermost part of the optical channel features a liquid crustal (LCD) filter that, if subjected to specific tension, will turn completely dark. The shutter will intervene, interrupting the operator's view in the binocular in the moment when the laser pulse causes the workpiece to melt.

The function of this device is to prevent the effect of glare caused by the visible radiation light flash emitted by the weld bath.

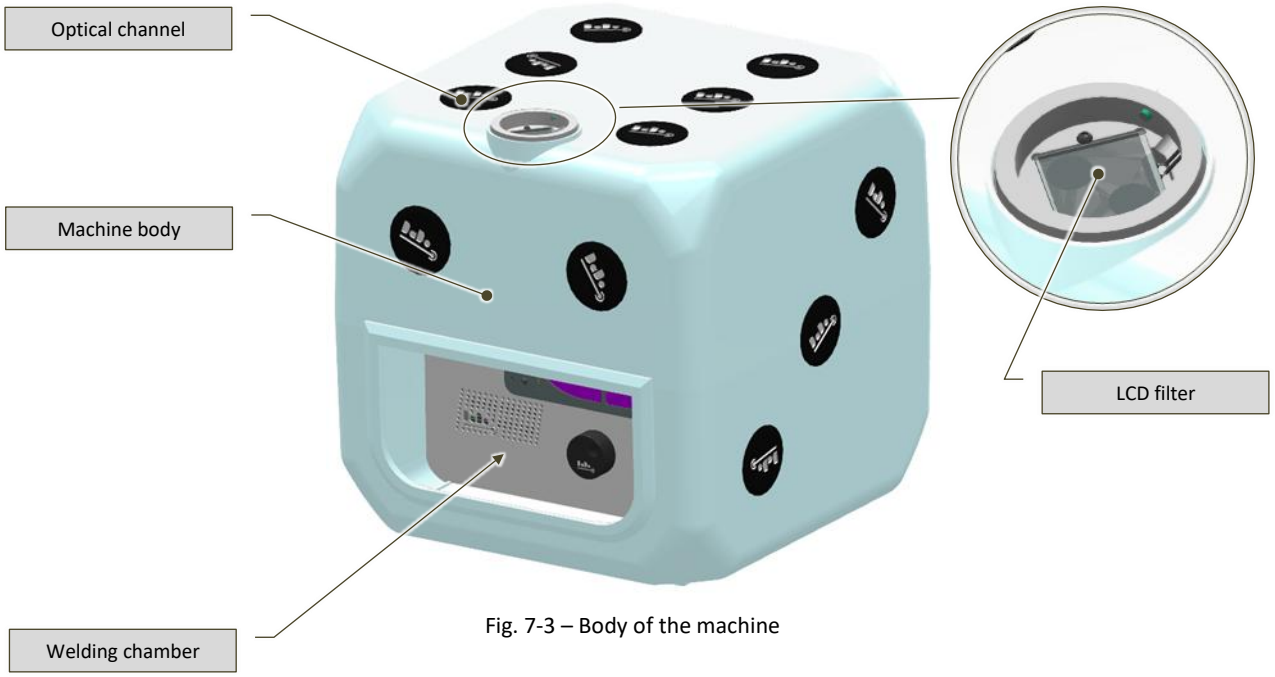


Fig. 7-3 – Body of the machine

7.1.4 Binocular

The binocular (or stereoscopic binocular microscope, Fig. 7-4) consists of an optical magnifying tool which allows for framing of the laser target during welding operations. This type of microscope is designed to produce a stereoscopic view of an object.

This result is achieved thanks to two separate and differently aligned optical paths in the microscope, both of which end with two lenses and two oculars. These two optical paths display differently angled images in the right and left eye. It consists of two articulated oculars featuring (removable) eye cups. Each ocular features a ring that allows the user to focus on each single ocular and correct any visual defects (dioptric correction, Fig. 7-4).

A filter (in optical glass, opaque when struck by laser radiation of 1064 nm) is installed inside the binocular (in the optical tube).

This grey-colored and perfectly transparent filter is opaque at a wavelength of 1064 nm and therefore impedes the passing of laser radiation generated by the source through the oculars.

Fig. 7-4 – Dioptric correction ring

7.1.5 Welding

The welding chamber is incorporated within the welding machine casing. The access compartment of the welding chamber is closed by a sector curtain with the function of containing laser radiation, as this may be diffused or reflected during welding operations (e.g., by the surface of welded parts or by tools used to support the welded parts).

The machine control devices are located inside the chamber, and more specifically:

- Slot for the coded keys (jack plugs) used to enable the welding machine (Fig. 7-6).
- Control knob of the welding machine.
- Cursor for focus regulation (beam expander).
- Chamber lighting and status and alarm notification lamps.
- Laser exit optical channel protected with special protective glass with a fine crosshair reticle pointer.
- Ceramic insert to contain the laser radiation.

The slot for the coded keys consists of a 2,5 mm audio jack socket and a 5,5 mm DC Plug socket.

The correspondent coded jack plugs (interlock and key) must be inserted in the sockets to enable operations by the welding machine.

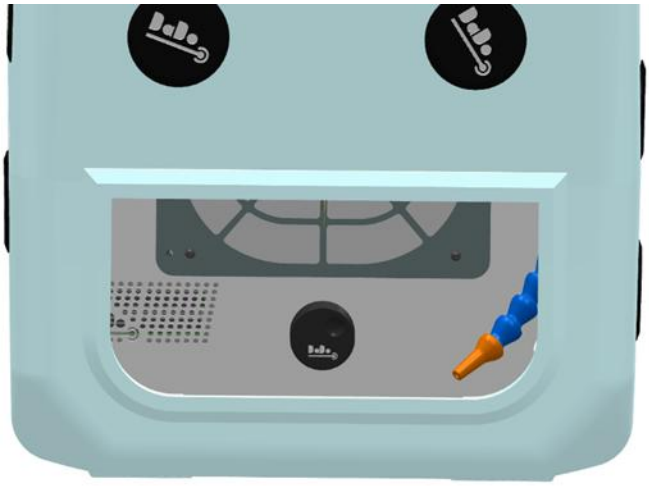


Fig. 7-5 – Welding chamber

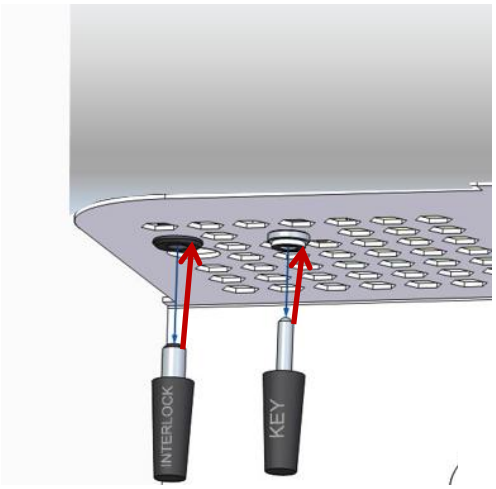


Fig. 7-6 – Detail of coded keys

The welding machine control knob (Fig. 7-7) manages two types of function:

- Pressing the knob will turn it into a button that allows the user to activate the welding machine.
- Turning the knob allows the user to select pre-loaded work programs.

The cursor for optical regulation of the beam surface (beam expander, Fig. 7-8) allows the user to regulate the dimensions of the laser beam within pre-set thresholds.

The chamber lighting and status and alarm notification lamps (Fig. 7-8) consist of two RGB led strips capable of generating colored light. During normal operations, the lamps will illuminate the chamber with white light. These same lamps can emit different colored light to signal the welding machine status (continuous light) or any faults (blinking light).

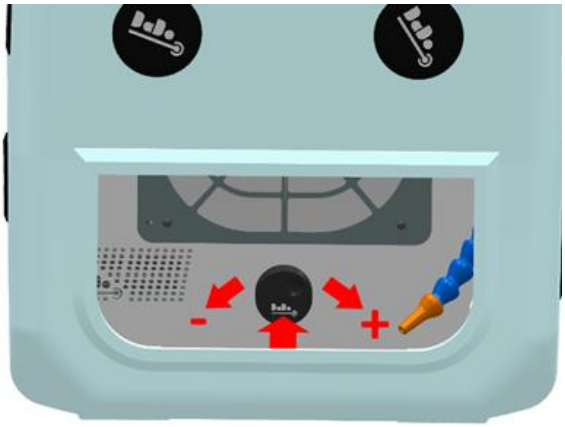


Fig. 7-7 – Control knob

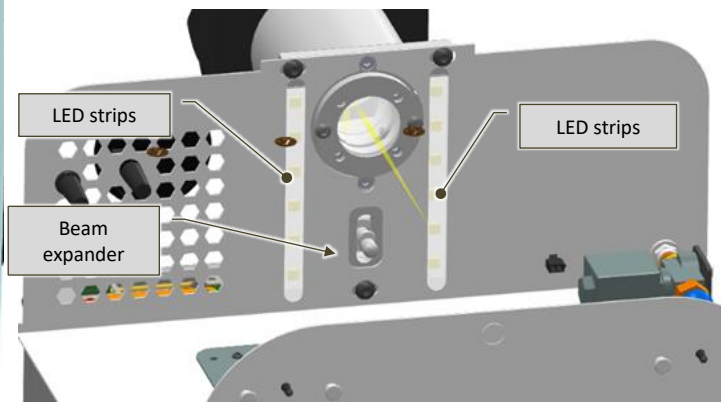


Fig. 7-8 – Beam expander

The optical channel is the channel through which the laser beam is introduced into the chamber. The channel is enclosed by a protective glass which has the function of protecting the optical channel from fused particle projections that may occur during welding operations. The fine crosshair reticle pointer used to channel the laser beam to the welding point is engraved on the protective glass.

The “tablet”-shaped ceramic insert, located on the base of the welding chamber, has the function of stopping the laser beam; it resists the action of the laser beam and contains it within the chamber, thus protecting the plastic casing.

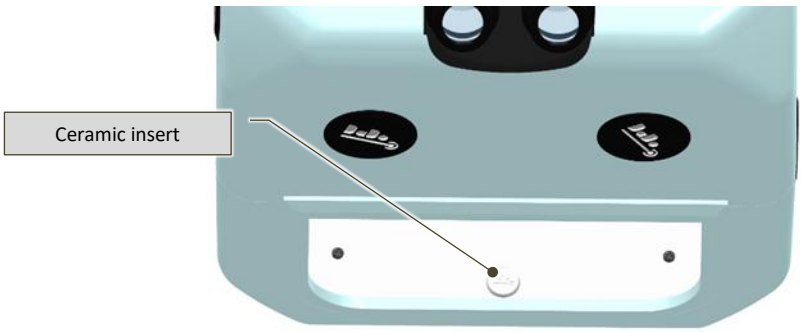
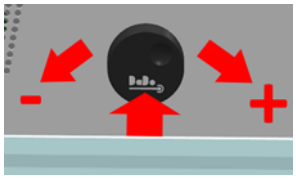
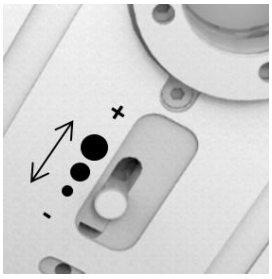
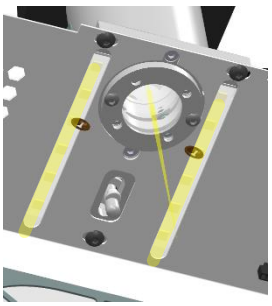


Fig. 7-9 – Ceramic insert

7.2 Control and notification devices

The following table (Tab. 7-2) describes the control, notification and emergency devices installed on DaDo.

CONTROL	NOTIFICATION
 Fig. 7-10 – Control knob Dual function control knob: • **When pressed**, it allows the user to perform an initial check or to set the machine in stand-by. • **When turned**, it allows the user to select the chosen setting.	
 Fig. 7-11 – Control pedal Control pedal for activation of single laser pulse (welding).	
 Fig. 7-12 – Laser spot selection pawl Cursor for optical regulation of the laser beam surface (beam expander): • **Minimum** (towards rear of the machine). • **Medium** (central position). • **Maximum** (towards the operator).	
	 Fig. 7-13 – LED strips LED notification strips: • Fixed white light, lighting of the welding chamber. • Continuous light, machine status (please also refer to paragraphs 8.2 and 8.4.1) or type of selected setting (please refer to Tab. 8-3 for details); • Colored **blinking** light, fault (please refer to Tab. 8-7 for details).

CONTROL	NOTIFICATION	
		Acoustic notification warnings (each one is different): • Safety key not inserted. • Machine in stand-by. • Machine ready for welding.
		Fault notification voice warnings *(please refer to Tab. 8-7 for details)*

Tab. 7-2 – Control and notification devices

7.2.1 “Dado Wapp” Application

In addition to the control devices listed above, DaDo can be managed via an application called “Wapp Dado” – “Dado Welding” (Fig. 7-15).

To download the application, simply access the web store for the device you intend to connect:

- Apple App Store
- Google Play Store

For details on how the app works, please refer to the specific section of the manual (paragraph 8.5).

Fig. 7-14 – App icon

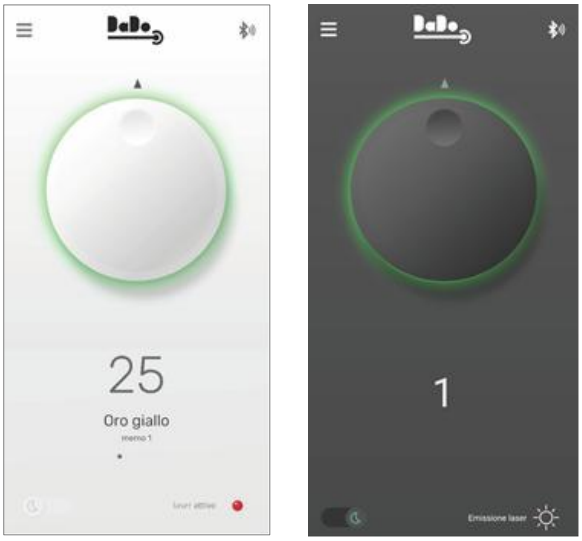


Fig. 7-15 – “Dado Wapp” Application (day and night version)

7.3 Safety devices

The machine features a series of safety devices described in the following paragraphs.

7.3.1 Interlock

The interlock (Fig. 7-16) is a safety device (that must be inserted **before using the machine for the first time**) which stops the laser from turning on – and therefore DaDo from functioning – if not inserted.

To use the interlock, you need to "remote" the contact (which is closed on the supplied connector) on the specific safety device (e.g.: opening of work area door, or safety guard when required).

OBLIGATION! Connection of the interlock to the specific safety device must be performed by qualified maintenance staff (please refer to paragraph 4.9).

Please contact the manufacturer for further information on this installation procedure.

7.3.2 High-coded safety key

The high-coded key (Fig. 7-16) is a safety device (that must be inserted before using the machine) which closes the shutter (thus blocking the laser) and prevents DaDo from functioning if not inserted.

Fig. 7-16 – Interlock and safety key

7.3.3 Resonator shutter

This device consists of a piston operated by an electromagnet, located within the laser resonator; when the welding machine is in stand-by, the shutter will interrupt the laser trajectory within the resonator.

The function of this device is to impede the generation of undesired laser radiation.

When the electricity is connected, the block is active. To unlock it, press and hold the control knob within the welding chamber for three seconds; an acoustic warning will signal that the device has been successfully unlocked.

The block will operate:

- If any faults are detected.
- If the control knob is pressed to set the machine in standby.
- If the electric power supply is unplugged.

7.3.4 Microscope infrared filter

The infrared filter is an optical glass, opaque at a laser radiation level of 1064 nm, which impedes passage in any direction of the laser radiation in use; it is located within the optical tube.

It appears light grey and perfectly transparent.

The function of the filter is to protect the operator's eyes from stray laser radiation in the optical path of the microscope.

7.3.5 Microscope shutter filter

This device (Fig. 7-17) consists of a liquid crystal (LCD) filter, which turns completely dark when subjected to a specific level of tension. It is located between the 45° mirror and the microscope focus lens. The shutter intervenes and blocks the operator's visual path in the microscope, in the moment when the laser pulse causes the workpiece to melt.

The function of this device is to prevent the effect of glare caused by the visible radiation light flash emitted by the weld bath.

The shutter is open in the normal position of the device, both when the machine is in stand-by (resonator shutter ON), and in start status (resonator shutter OFF).

This allows the operator to use the microscope in any moment; after starting the machine, the operating logics of the shutter are the following:

- Pressure on the control pedal.
- The microprocessor detects the pedal contact closing and commands the shutter to close.
- The microprocessor enables activation of the laser lamp.
- The shutter remains in ON condition for a time measured based on the activation of the laser lamp, plus a suitable window of time to allow the weld bath to cool down and therefore lose its luminosity.
- Return to "rest" position with detection of full opening of the shutter.

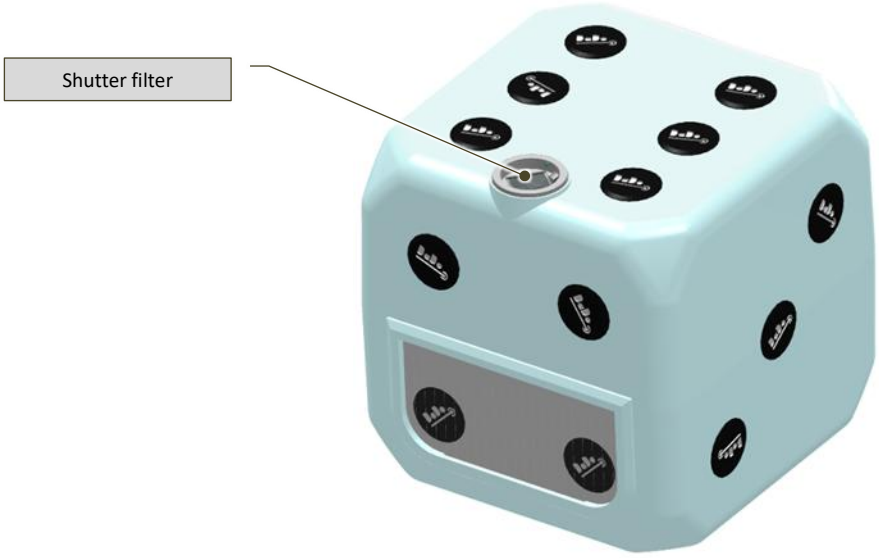


Fig. 7-17 – Microscope shutter filter

7.3.6 Guards

Guards are parts of a machine used specifically to provide protection via the presence of a physical barrier. Based on their build, guards can be called headset, lid, door, total segregation guard, etc.

Guards can operate autonomously and are only functional when closed or associated with an interlock device, which may or may not feature a system for blocking of the guard; when it does, protection is guaranteed regardless of the position of the guard.

Please find below a description of the types of guard used on this machine:

- **Fixed guard** – this guard is held in position (i.e. closed) either permanently (via welding, etc.) or with fastening elements (screws, nuts, etc.), which make it impossible to remove/open without using tools (Fig. 7-18);
- **Flexible shielding** – Closes the access compartment of the welding chamber. Allows workpieces to be introduced and limits the emission of diffuse or reflected laser radiation.

Fig. 7-18 – Guards

7.4 Preliminary operations

This machine requires no preliminary operations.

7.5 Preliminary regulation operations

WARNING! Failure to perform preliminary regulation operations can cause damage to the machine and/or installed equipment.

WARNING! All preliminary regulation operations must be performed with the machine switched off.

If certain regulation operations require activation of the machine devices, strictly follow indications listed in chapter 8 "Operation instructions".

Before starting the machine, you may need to perform a series of preliminary regulation operations described in the following paragraphs.

7.5.1 Regulation of the binocular

Regulation of the binocular requires particular care, as imprecise regulation of this device can jeopardize the entire focus process and consequently the quality of welding operations.

The right ocular features a reticle pointer which must be aligned with the laser to start welding in the correct position.

To regulate the binocular, please follow the sequence of operations described in the following Tab. 7-3.

Symbol	*Action*	*Feedback / notes*
	• Use the ring to regulate both oculars on the neutral diopter (●). • Keep using the ring (**+** / **-**) to focus your view. • Operate on each single ocular to perform dioptric corrections, if required.	 Fig. 7-19 – Focus / dioptric regulation
	*If you do **not** use glasses, we recommend using the (removable) eye cups supplied with the machine.*	 Fig. 7-20 – Eye cups

Symbol	*Action*	*Feedback / notes*
	Place an object under the focal lens at a height where it is in focus and then proceed to regulate the binocular width so that you have a single shadowless circle and a clear view when observing its contents.	 Fig. 7-21 – Binocular width

Tab. 7-3 – Regulation of the binocular

8 Operation instructions

8.1 Safety instructions

WARNING! Failure to observe the following safety instructions may result in injuries, death, or damage to the machine.

This machine must be operated exclusively by "**qualified staff**," based on the correspondent indications included in this manual.

Please find below a series of checks that must mandatorily be performed before and after performing operations with the machine.

8.1.1 Necessary checks before starting the machine

- ***Check that attire worn by the operator is suitable. The operator must not wear wide clothes, wristwatches, rings, necklaces, and similar objects. Long hair must be tied back.***
- ***Check that no individuals uninvolved in operations with the machine are present in the operational area of the machine.***
- ***Check that no foreign bodies (tools, cloths, etc.) are present within the machine.***
- ***If operations require the use of personal protective equipment, check that this is compliant with currently effective correspondent laws.***

8.1.2 Required checks and behavior after starting the machine

- ***Immediately stop the machine if, once it started, it is making unusual noises. Restart the machine after removing the source of the noise.***
- ***Immediately stop the machine if the fault notification LEDs within the welding chamber are flashing (for further details, please refer to Tab. 8-7). Restart the machine only after having identified and removed the fault.***
- ***During operations, they remain within the operator area.***
- ***Never leave the machine unguarded during operations; remove the safety key when leaving the workstation.***
- ***Do not allow anyone to near the machine during operations.***
- ***Monitor that the machine performs its work cycle correctly and stop it immediately in the event of anomalous operations.***
- ***Do not deactivate protection and safety devices.***

8.1.3 Behavior in the event of fire/incipient fire

- ***In the event of fire or incipient fire, the operator must immediately shut down all aspiration systems in the plant; Ventilation supplies oxygen-rich air and facilitates the propagation of fires.***
- ***Quickly use hand-held extinguishers (we recommend the use of C02 extinguishers). In the absence of aspiration, extinguishing agents can potentially make the air unbreathable. Act promptly and with great care. Remain within the hazardous environment as little as possible.***
- ***If the fire cannot be controlled, abandon the building and make sure to close the doors.***

8.1.4 Non permissible operations

The following uses of the welding machine are explicitly prohibited:

- ***The DaDo welding machine is designed for professional use. Its use by children (between 0 and 14 years of age) and vulnerable persons (with decreased physical, sensorial, or mental capacities) IS PROHIBITED. The machine can be used by individuals between 14 and 18 years of age only under surveillance by an adult.***
- ***Use of the welding machine when it presents signs of tampering or damage (cracks in the casing and protection curtain) or when it is emitting different noises or (luminous or acoustic) signals than those described in the instructions IS PROHIBITED. Do not try to repair the welding machine. Only the manufacturer is authorized to repair the welding machine.***
- ***Direct observation of the laser source IS PROHIBITED, even when wearing personal protective eye equipment! No personal protective eye equipment can protect the eyes from direct radiation!***
- ***Use of the welding machine for the welding of flammable or combustible materials IS PROHIBITED. We remind the user that many metals (e.g., magnesium, sodium, aluminum) are easily flammable (especially when small in dimensions).***
- ***Introducing or depositing different materials than the workpieces – such as tools, supports or other objects, for example – IS PROHIBITED. The welding chamber must always be left empty. Any tools used to support the workpiece must be made of non-reflective materials.***
- ***Use of the welding machine for the welding of different materials than those indicated in the "table of materials" of this manual IS PROHIBITED. If you need to weld different materials, we invite you to contact the manufacturer. Never try to weld different materials than those indicated in the table.***
- ***Use of the machine is environments characterized by a potentially explosive atmosphere (due to flammable dusts or gases) IS PROHIBITED. Laser radiation can trigger fires or explosions.***

8.1.5 Requirements for safe use

WARNING! safe use of the welding machine is dependent on strict observation of the following indications:

- ***Use the welding machine only after wearing suitable personal protective equipment to protect your eyes and skin from laser radiation effects, based on requirements set by your Employer.***
- ***Before performing any welding operations, check that the ceramic tablet located at the base of the welding chamber is present and undamaged. Absence of this tablet may cause the effects of the laser to trigger combustion of the plastic material of the casing.***
- ***Pay particular attention when welding reflective materials. Reflective surfaces can deviate the laser beam towards the opening of the welding chamber. If this occurs, only the protection curtain and suitable personal protective equipment can guarantee the operator's safety.***
- ***Before performing any welding operations, always make sure that the chamber protection curtain is undamaged and positioned in such a way that it covers all openings of the chamber.***
- ***Although it features a system for extracting smoke from the chamber, the welding machine does not guarantee the filtering of fumes. Re-emission of smoke in the work environment can be dangerous. Carefully assess the hazard represented by emissions during welding. You may need to use a localized extraction system and/or personal protective equipment. In any case, always observe the following indications during welding operations:***
  - ***Keep your head far away from smoke. Do not inhale any fumes.***
  - ***Do not cover any part of the machine.***
  - ***Carefully read the instructions on the various types of material which can be laser welded.***

- ***Use the welding machine in a suitably ventilated environment.***
- ***Only weld clean surfaces. Many substances used to degrease or clean workpieces, as well as any inclusions in the materials, may react to the laser energy by producing fumes which can be dangerous for your health.***

8.1.6 Non-evident hazards

WARNING! Both the qualified operator and the technical personnel of ELETTROLASER S.R.L. in charge of operating on the machine must be aware of additional less evident hazards that are often underestimated in production sites:

- ***Protruding parts of the machine.***
- ***Parts of the machine which may present sharp surfaces and/or edges.***
- ***Electrostatic charges that are still present after switching off the machine.***
- ***Hot parts of the machine.***

8.2 Preparation for start-up

Before starting DaDo, you must make sure that the electrical system of the building where the machine is installed is activated. Please refer to indications supplied by the respective manufacture-installation service to activate the electrical system.

8.3 Tensioning

Follow the sequence of operations described in the following Tab. 8-1 to perform the tensioning of DaDo.

Symbol	*Action*	*Feedback / notes*
	Insert the plug in the network socket (please refer to paragraph 6.8).	• An acoustic signal will flag that the machine is in stand-by mode. • The LEDs within the welding chamber will turn on with continuous **light blue** lighting.

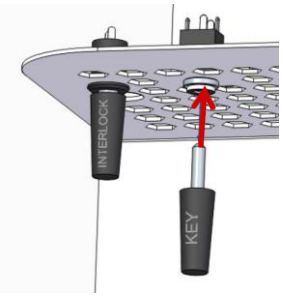
Tab. 8-1 – Tensioning

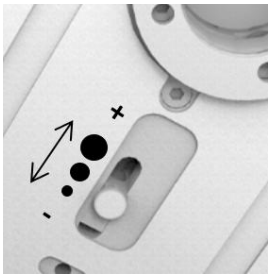
8.4 Start-up

8.4.1 Operation

After switching DaDo on (tensioning), you need to enable its operation (insertion).

To enable DaDo to operate, please follow the sequence of operations described in the following Tab. 8-2.

Symbol	*Action*	*Feedback / notes*
	Check that preliminary regulations have been performed (please refer to paragraph 7.5).	
	Insert the high-coded safety key in the respective slots within the welding chamber.	• An acoustic signal will flag any unsuccessful insertion of the key. • The LEDs within the welding chamber will turn on with continuous **purple** light.  Fig. 8-1 – Insertion of safety key
	Press the control knob inside the welding chamber and the machine will perform a system check.	• An acoustic signal will flag that the machine is ready to weld. • The LEDs within the welding chamber will turn on with continuous **white** light.
	If necessary, regulate the binocular.	Please refer to paragraph 7.5.1

Symbol	*Action*	*Feedback / notes*
	Turn the control knob in the welding chamber to select the setting you want from the 12 pre-loaded ones.	Each time the setting is changed: • An acoustic signal will flag that the machine is ready to weld. • The LEDs within the welding chamber will turn on *temporarily* with continuous lights of different colors (and will then return to a white light, illuminating the chamber). For details on the colors displayed by the LEDs, please refer to Tab. 8-3. Alternatively, you can use the analogous command on the "DaDo Wapp" application instead (please refer to paragraph 8.5). *Place the smart phone on the top side of DaDo, using the specific support supplied with the machine.*
	If necessary, according to the type of welding you need to perform, you can increase or decrease the size of the laser beam surface by operating on the cursor (beam expander) located inside the welding chamber.	 Fig. 8-2 – Beam expander
	Manually introduce the workpiece(s) in the welding chamber – viewing these through the binocular – and position the welding point in correspondence with the reticle pointer.	 According to the size of the product, you can also use the tweezers supplied with the machine. For details on permissible products, please refer to paragraph 5.7
	Press the control pedal to weld. *Pressure on the pedal generates **a single pulse**; press the pedal once more to weld again.*	For pulse characteristics (based on the product to be welded), please refer to Tab. 8-3.
	***We recommend carrying out some preliminary welding tests on a sample of the material you intend to weld, to identify the correct welding setting among the twelve available options.***	

Tab. 8-2 – Operation

8.4.1.1 Welding programs

DaDo offers twelve different work programs for the function of the materials to be welded; the following Tab. 8-3 lists, for each program:

- The (temporary) color displayed by the LEDs.
- Characteristics of the settings (power and duration of the pulse).

#	LED	Program name
1		CHROMIUM-COBALT ALLOY
2		
3		STEEL
4		
5		TITANIUM
6		
7		YELLOW GOLD
8		
9		ROSE GOLD
10		
11		
12		
13		WHITE GOLD
14		
15		PLATINUM
16		
17		BRONZE
18		
19		COPPER
20		
21		ALUMINIUM
22		
23		BRASS
24		
25		SILVER

Tab. 8-3 – Programs available

8.5 "DaDo Wapp" Application

The following paragraphs will cover the various pages of the "DaDo Wapp" application, with which you can:

- Change the settings of the machine.
- Solve temporary machine issues.
- Customize a series of settings.
- Receive real time information on the machine status (in addition to the various acoustic, voice and luminous signals emitted by the machine).

8.5.1 Home page

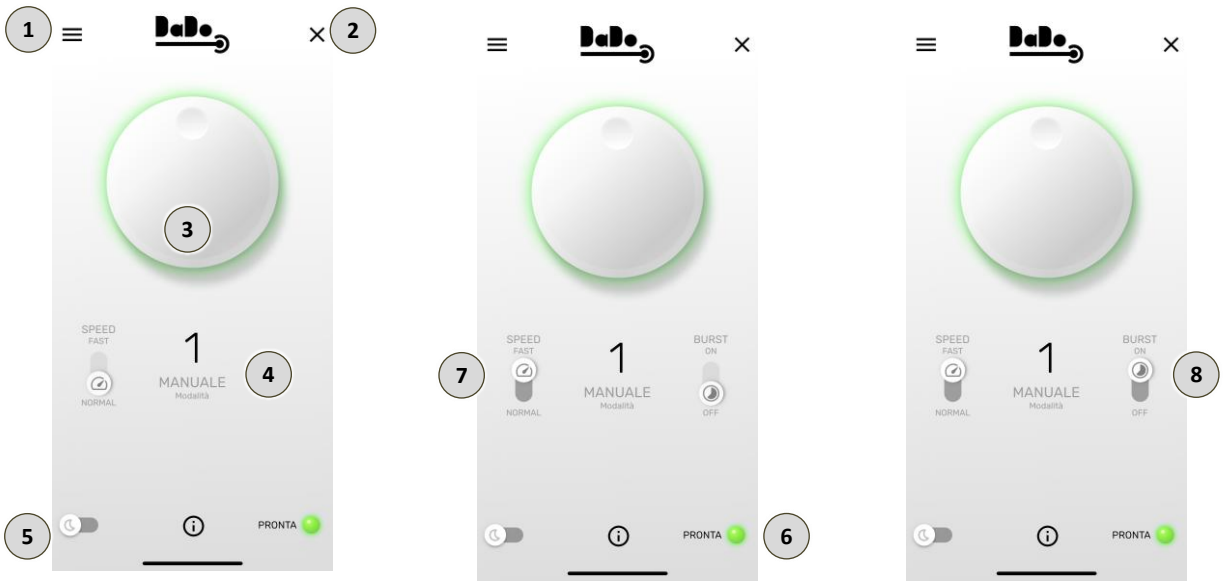


Fig. 8-3 – Home page

1 When pressed, this control area allows the user to access the "Menu" page (Fig. 8-4), where he/she can:

a) Return to the "Home page."
b) Access the "Memory" page (paragraph 8.5.2).
c) Access the "Info" page (paragraph 8.5.3).
d) Access the "Settings" page (paragraph 8.5.4);

Fig. 8-4 – Menu Page

2 When pressed, this control area allows the user to access the "Connections" (Fig. 8-5) page, which lists all paired devices and all devices ready for pairing; by clicking on a device, the user can establish a Bluetooth connection between DaDo and the mobile device in question.

Fig. 8-5 – Connections page

3 When turned, this control area allows the user to select the chosen setting (program) – analogously to the control knob in the welding chamber.

Note: the edge of the control knob displays a different color according to the selected setting (please also refer to Tab. 8-3).

4 Display-only area for information concerning the setting (number, name).

5 When pressed, this control area allows the user to toggle between the white background screen (designed for well illuminated environments) and the black background one (designed for poorly illuminated environments).

Note: This function (according to the smart phone/tablet you are using), can be activated via the dusk sensor of the device the application is installed on.

6 Display-only area for the laser status, which appears in the form of a dot in various colors:

- GREEN, laser in function.
- Continuous RED, laser ready for welding.
- Blinking RED, laser in use.
- Continuous RED with an "ALARMS!" notification, flagging of anomalies (for details, please refer to Tab. 8-7).

7 When pressed, this control area allows the user to toggle between Speed Fast 4 Hz and Speed Normal 1,5 Hz.

8 This control appear only if Speed Fast is selected. When pressed, this control area allows the user to toggle Burst mode ON: pressing the pedal continuously 5 shots are generated, then it stops, and you need to release the pedal and press it again for new shots.

8.5.2 Memory page

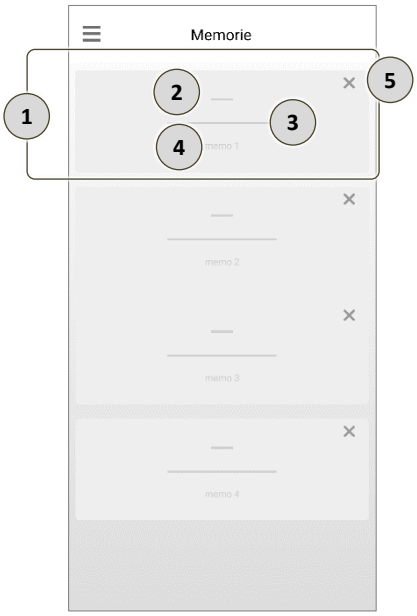


Fig. 8-6 – Memory page

1. Display-only area for information related to each single welding program.
2. Display-only area indicating the welding power level (displayed as a number from 1 to 12) of the memory in question.
3. Display-only area indicates the welding program name.
4. Display-only area indicating the memory index (from 1 to 4).
5. When pressed, this control area allows the user to cancel the welding program.
   Note: the user also has the possibility of overwriting the program.

8.5.3 Info page

Fig. 8-7 – Info page

1. Display-only area indicating the number of shots performed by the machine.
2. Display-only area indicating the number of shots performed by the lamp.
3. Display-only area indicating the machine firmware.
4. Display-only area indicating the machine status (stand-by, emission, etc.).
5. Display-only area indicates the number of active alarms.
6. Display-only area indicating the temperature (°C) of the coolant liquid.
7. Display-only area indicating the temperature (°C) of the PFC source.
8. Display-only area indicating the temperature (°C) of the IGBT (simmer).
9. Display-only area indicating the serial number of the machine.
10. Display-only area indicating the ID number of the dealer.

8.5.4 Settings page

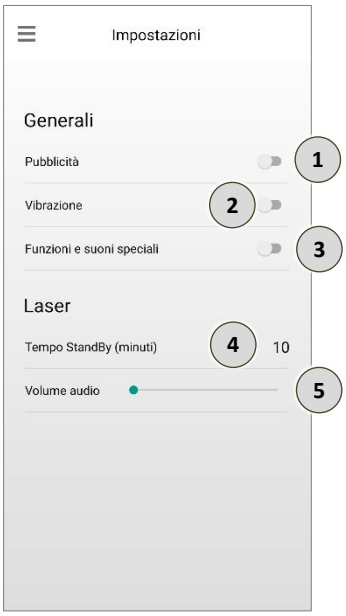


Fig. 8-8 – Settings page

1. This control area allows the user to enable / disable promotional banners.
2. This control area allows the user to enable / disable vibration on the mobile device.
3. This control area allows the user to enable / disable special functions and sounds.
4. Display area indicating the duration of the “stand-by” status; if pressed, it allows the user to edit the setting.
5. This control area allows the user to adjust the acoustic warnings volume.

8.6 How to stop the machine

8.6.1 Introduction

Please find below details on operations required to stop the machine. The operations described below are the only ones permitted by the manufacturer.

8.6.2 Stand-by

To stop the automatic work cycle temporarily (for operator breaks, visual checking of workpieces, etc.), please follow the sequence of operations described in the following Tab. 8-4.

Symbol	*Action*	*Feedback / notes*
	To set the machine in stand-by, press the control knob for three seconds. *When you need to proceed with the work cycle, simply press the control knob again.*	• An acoustic signal will flag that the machine is in standby • The LEDs in the welding chamber will turn to **light blue**

Tab. 8-4 – Stand-by

8.6.3 How to turn the machine off

To turn the machine off, please follow the sequence of operations described in the following Tab. 8-5.

Symbol	*Action*	*Feedback / notes*
	Remove the high-coded safety key from the welding chamber.	
	Disconnect the plug from the network socket.	

Tab. 8-5 – How to turn the machine off

8.7 Troubleshooting

The following table (Tab. 8-6) lists a series of potential issues which may take place (due to incorrect use / operations with DaDo and/or due to machinery faults) and cause:

- Inadequate processing quality (and consequently insufficient quality of the product).
- Inadequate efficiency / productivity levels.
- Hazards for the machine and/or operator.

The table lists the possible cause and solution(s) to be implemented for each issue.

If you require the intervention of technical support, please refer to chapter 12 for details on how to contact ELETTROLASER S.R.L.

#	*Issue*	*Cause*	*Solution(s)*
1	The shutter impedes vision through the microscope and turns dark, but no effect is visible on the workpiece.	• Low power. • Broken protection glass.	• Increase power level. • Decrease the spot. • Replace the protection glass (please refer to paragraph 9.2.3).
2	The red lights in the welding chamber fail to turn on.	No electricity.	Check connection to electrical supply network.
3	When a laser pulse (shot) is performed, the fumes from the welding rise towards the microscope and obscure the view.	• The filter on the internal fan of the welding chamber is too dirty. • The fan has stopped.	• Clean the fan filter. • *Contact the Support Service.*
4	The laser fails to turn on.	No electricity.	Check connection to electrical supply network. *Contact the Support Service if the problem persists.*

Tab. 8-6 – Troubleshooting

8.7.1 Faults

The following Tab. 8-7 describes faults flagged by **blinking** led lights in the welding chamber; the table lists the possible cause and solution(s) to be implemented for each issue.

#	*LED**	*Voice warning*	*Issue*	*Cause*	*Solution(s)*
1		ERROR NUMBER 1: PFC TEMPERATURE WARNING!	PFC temperature is too high	The PFC source has exceeded 85°C or the thermal sensor has broken.	Wait 15 minutes with the machine switched on, then turn it off and back on again. *Contact the Support Service if the problem persists (please refer to chapter 12).*
2		ERROR NUMBER 2: SIMMER TEMPERATURE	Simmer temperature too high	The simmer source has exceeded 80°C or the thermal sensor has broken.	Wait 15 minutes with the machine switched on, then turn it off and back on again. *Contact the Support Service if the problem persists.*

#	LED*	Voice warning	Issue	Cause	Solution(s)
3		ERROR NUMBER 3: WATER TEMPERATURE TOO HIGH	Coolant liquid temperature is too high	The coolant liquid has reached the temperature threshold of 50°C or the thermal sensor has broken due to: a) High number of machine work cycles. b) Insufficient coolant in machine. c) The cooling fan stopped. d) Too much dust or dirt deposited on the vent.	a) Wait 15 minutes with the machine switched on until the error disappears. *If this is not the case, contact the Support Service*. b) Check that the coolant tank is correctly filled. *If it needs topping up, contact the dealer / installation technician or the Support Service*. c) Check that the fan is functioning correctly: in the event of an error, it will be turning very fast. *Contact the Support Service if necessary*. d) Use a suitable vacuum tool to aspirate between the slits and free the exchanger from dust. ***Do not** open without first having contacted the Support Service.*
4		ERROR NUMBER 4: FLOW FAILURE	No coolant flow	• Malfunction of the pump. • Faulty sensor. • Lack of coolant.	*Contact the Support Service.*
5		ERROR NUMBER 5: SIMMER FAILURE	Simmer malfunction	The laser lamp fails to turn on.	*Contact the Support Service.*
6		ERROR NUMBER 6: INTERLOCK	Interlock is open	Disengaged interlock connector.	Switch the machine off and back on again (please refer to paragraphs 8.6 and 8.4).

* when flagging a fault, the red lights will blink (intermittent signal).
Red LED also flags faults + “ALARM!” flag on the “DaDo Wapp” application.

Tab. 8-7 – Faults

9 Maintenance

9.1 Maintenance safety rules

OBLIGATION! All EXTRAORDINARY maintenance operations must be performed exclusively by qualified ELETTROLASER S.R.L. staff (please refer to paragraph 4.9) or staff authorized by this company, with the necessary technical know-how to perform these operations in conditions of maximum safety and in full compliance with currently effective regulations and laws on the subject.

WARNING! Failure to observe these safety instructions can cause injuries, death, or damage to the machine.

WARNING! Every maintenance operation must be performed with the machine switched off, after having disconnected all sources of electrical power supply from it. This is the only way to make sure that no accidental start of the machine will occur while the maintenance staff is working.

9.2 Ordinary maintenance

9.2.1 Checking safety signs

Check the presence (in the pre-established points, please refer to paragraph 4.4), integrity and readability of all safety signs on the machine, ***every six months***.

Replace any damaged labels or signs.

WARNING! The absence of safety signs can expose the worker to hazards, as he/she may not perceive the presence of any residual risks.

9.2.2 Guards

The guards must be checked ***at least every 6 months***.

In particular, the following elements need to be checked:

- Check that no part of the guard is missing or damaged, especially if this diminishes its safety functions.
- Replace any worn parts (e.g., the flexible shielding).
- Check the correct functioning of the interlocks.
- Check the wear levels of joints and fastening points.
- Check for any deterioration caused by corrosion, temperature variations, chemical effects.

9.2.3 Alignment of reticle pointer

The reticle pointer may sometimes not be aligned with the actual shot point. This can occur when the welding machine is moved or lifted.

Impacts with the microscope can also cause misalignments between the reticle pointer and the actual shot point. In any case, these minor optical defects can be compensated for by performing regulation of the pointer.

First, you will need to align the binocular:

- Unscrew the binocular from its base (using the 2,5 mm hex key supplied with the machine).
- Reassemble the binocular, following indications provided under paragraphs 6.6.1 and 7.5.1.

To check and - if necessary - correct the alignment of the reticle pointer, please follow the indications below (Fig. 9-1):

- Place a small piece of sheet metal in the welding chamber, in a stable position and in full visual focus.
- Shoot a single low pulse at the previously inserted sheet metal.
- Looking through the microscope, use a 3 mm hex key to turn screws 1 and/or 3 with very small movements, until the reticle overlaps with the point in which the shot hit the sheet metal.

It is important to operate on one screw at a time as each one causes a distinct movement:

- Screw 1 controls vertical movements (North-South).
- Screw 3 controls horizontal movements (East-West).

PROHIBITION! DO NOT touch screw 2 (which must remain fixed), as this will jeopardize the entire alignment system.

Operate progressively on screws 1 and 3, alternating actions on one and the other as many times as necessary to make sure that the reticle pointer focused on the object and the shot point coincide perfectly.

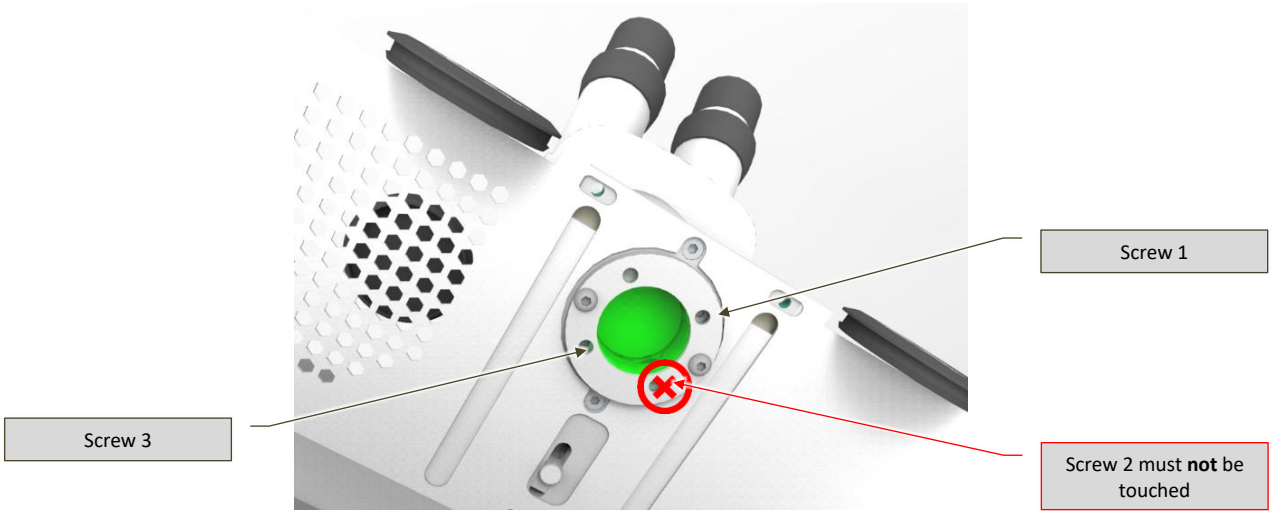


Fig. 9-1 – Alignment of reticle pointer

WARNING! During alignment operations, pay attention to the position of your hands, as they may interfere with the passing of the laser beam.

INFORMATION! Always perform small movements when seeking the point of alignment and making sure the sheet metal used for testing is in a stable position.

Never unscrew the regulation screws (1 and 3) entirely and DO NOT touch screw 2 (Fig. 9-1).

9.2.4 How to check and replace the cooling liquid

The cooling liquid in the tank must be checked (level) ***every 8-12 months*** and refilled if necessary, only with distilled water, and replaced ***every 3 years***, to avoid the formation of micro-algae in the closed cooling circuit, which could decrease or impede the efficacy of the heat exchange process.

INFORMATION! We recommend replacing the water before the end of the hot season.

To remove the cooling liquid from the machine:

- Connect the supplied cooling liquid top-up tube to the female connector (Fig. 6-10 - Fig. 6-11) on the rear of the machine;
- Place the free end of the top-up tube in a container to collect the water.
- Manually remove the black cap (Fig. 6-10 - Fig. 6-11) of the “overflow” tube on the upper rear of the machine;

WARNING! Hold the overflow tube firmly (Fig. 6-11) when removing its black cap, to ensure it does not become dislodged.

- Let the cooling liquid flow out, until the tank is completely empty.
- Next, proceed to re-fill the cooling system, by following instructions provided under paragraph 6.6.2.

9.3 Extraordinary maintenance (support service)

9.3.1 Safety devices checks and maintenance

The integrity and functionality of the safety devices must be checked by a qualified expert technician (please refer to paragraph 4.9 for details on staff in charge of extraordinary maintenance) ***at least every six months***.

9.3.2 Replacement of special protective glass

OBLIGATION! This procedure can be performed ONLY by expert and qualified ELETTROLASER S.R.L. staff (or by personnel authorized by ELETTROLASER S.R.L.).

For details on how to contact ELETTROLASER S.R.L., please refer to chapter 12 (Support Service).

The power of the laser will decrease each time the special protective glass is “dirty;” therefore, when its surface is dirtied by a high concentration of metal sprays, the glass will need to be replaced.

Periodically check the protection glass of the microscope lens in the welding chamber; this special glass with 1064 nm anti-reflective treatment is held in place by an aluminum ring.

To replace the special protection glass, please follow the indications below (Fig. 9-2):

- Use a 3 mm hex key to unscrew the two fastening screws of the support ring.
- Remove the ring from the optical body and then extract the glass.
- Clean the surface with a soft and non-abrasive cloth.
  - Do not try to remove any metal spray deposits from the glass.

INFORMATION! We recommend replacing the protection glass if it is dirtied by a considerable amount of metal sprays, as the laser pulses may lead to further overheating and even cause the glass itself to break, in some cases.

- Return the glass to its original place, carefully re-position the ring and tighten the two previously removed screws.

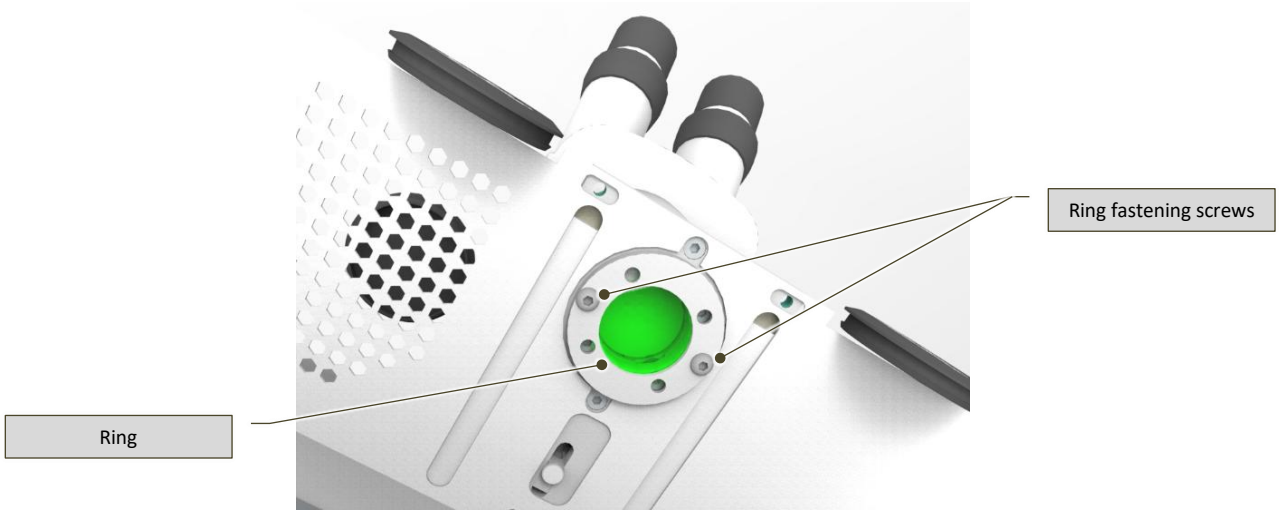


Fig. 9-2 – Replacement of special protective glass

9.4 Further maintenance operations

DaDo must undergo overhauling and extraordinary maintenance that also involves the replacement of the laser lamp and cleaning of the mirrors (***every 7 million laser pulses***); this must be performed by expert and qualified ELETTROLASER S.R.L. staff (or by personnel authorized by this same company).

9.5 Cleaning the machine

WARNING! Every cleaning operation must be performed with the machine switched off, after having disconnected all sources of electrical power from it. This is the only way to make sure that no accidental start of the machine will occur while the staff in charge of cleaning it is working.

Please observe the following warnings when cleaning the machine or some of its parts:

- ***Do not use water or other fluids to clean electrical equipment. To remove any dust deposits, simply use a clean brush or a dry rag.***
- ***Do not use pressurized air or water sprays to clean the machine. If necessary, use an aspirator.***
- ***Do not clean the plastic surfaces with alcohol or solvents. Use specific detergents only.***
- ***Dispose of cleaning materials in compliance with currently effective laws on the subject. Do not disperse used materials or clean residues in the environment.***

Periodically, you will need to remove dust accumulations and/or processing waste to avoid their dispersion in the workplace.

Frequency of cleaning operations depends on the quantity of waste on the machine. In any case, we recommend cleaning the machine at the end of the work shift ***every day***.

Waste is removed manually by using a suitable industrial aspirator.

Based on use, the fan should be cleaned periodically by using a normal aspirator and accessing it via the welding chamber.

OBLIGATION! Suitable personal protective equipment for the respiratory tract and the eyes must be worn during all cleaning operations.

WARNING! Do not use pressurized air for cleaning operations. Use an industrial aspirator.

9.6 Spare parts

If you need to purchase spare (or consumable) parts:

- Contact the support service (please refer to chapter 12).
- Visit the online shop (www.dadowelder.com/en/3-shop).

10 Storage conditions of the machine

10.1 Temporary decommissioning

If the machine needs to be put out of service for short periods of time, simply unplug it from the electrical socket.

10.2 Decommissioning for long periods of time

If you expect to put the machine out of service for particularly long periods of time, we recommend that you first clean it thoroughly. Next, repeat operations listed under paragraph 10.1.

Once these operations are completed, put the machine and its accessories back in the original package.

The coolant liquid level will need to be checked (by the dealer / installation technician) before you can start the machine after a long out-of-service period.

11 Disassembly of the machine

11.1 Disassembly of the machine

The machine must be disassembled by an operator authorized to perform these operations. In any case, you will need to remember to perform a series of mandatory operations before its demolition and after it has been put out of service.

PROHIBITION! Disposal of the machine or parts of the machine via the normal solid urban waste collection system is prohibited (even if sorted).

OBLIGATION!

- ***Remove any accumulators (buffer batteries, dry-cell batteries, etc.). All accumulators you remove must be disposed of in compliance with currently effective laws on the subject.***
- ***Remove all ID labels from the machine and then proceed to destroy these and any other documents concerning the machine (manuals, diagrams, etc.).***

11.2 General rules on disposal of industrial waste

As different rules are in force in single countries, you will need to observe requirements set in place by the laws and competent institutions within the country in question.

For member countries of the EU, the legal framework is the following:

- Directive 91/156/CEE on waste products.
- Directive 91/689/CEE on hazardous waste products.
- Directive 94/62/CE on packaging and packaging waste products.

According to currently effective legislation, the machine will classify as a special waste product once disassembled.

For extra-EU countries, you will need to check and apply the correspondent legislative requirements.

11.3 Waste management by companies

WARNING! The following rules do not apply if the holder of the waste product is a private subject.

By waste management we intend all activities aimed at managing the entire process from the production of the waste up to its final disposal, including collection, transportation, treatment, and recycling.

The European Union strategy defines a series of priorities for the question of waste management:

- Reduction of waste production via the development of clean technology, the design and commercialization of products that do not contribute to waste production and pollution, as well as technological improvements to eliminate the presence of hazardous substances in waste products.
- Prevention of waste production via a correct assessment of the environmental impact of each product during its full lifespan.
- Recovery of waste products via recycling, including recycling for energy-saving purposes.

Actual disposal solutions, such as the sending of products to landfills, can be implemented only for materials which cannot be recycled.

A thorough check of the entire production chain of the waste producer will be required for waste products deriving from production operations of any sort.

Producers of **hazardous and non-hazardous special** waste products are required to:

- Codify and classify their waste products.
- Keep them in observance of instructions on temporary storage conditions.
- Manage their recovery or disposal by delivering them to **qualified entities** (disposal or recovery via third parties).
- Observe all administrative obligations.

WARNING! Regardless of the destination country, environmental laws are vast and complex (and are also in constant development); we therefore invite you to read these carefully (with your consultants on the subject), to check all obligations and rules you will need to apply.

WARNING! Environmental laws usually sets various types of onerous penalties in the event of failed and/or incorrect application.

12 Support service

To request an intervention by our support service or to order spare parts, please cite the following data, which are also featured on the EC label on the machine:

- **MODEL** of the machine.
- **SERIAL** number.
- **YEAR** of manufacturing.

Every request must be addressed to:

ELETTROLASER S.R.L.

Via dell'Industria, 35 - 37060 Sona (VR) Italy

Telephone: +39 045 6082415 / Fax +39 045 6088650

e-mail: info@elettrolaser.com

web www.elettrolaser.com

Technical support is available from Monday to Friday from 8:30 am to 12:30 am and from 2:00 pm to 6:00 pm.

13 Summary and index of figures

13.1 Summary

13.2 Index of figures

A1 Copy of EC Declaration of conformity

CE

Dichiarazione di conformità - Allegato II A - 2006/42/CE
Declaration of conformity - Annex II A – 2006/42/EC
Konformitätserklärung - Anhang II A – 2006/42/EG
Déclaration de conformité - Annexe II A – 2006/42/CE
Declaración de Conformidad - Anexo II A - 2006/42/CE

ELETTROLASER

La sottoscritta ditta:
The undersigned company:
Die Unterzeichnerfirma:
L'entreprise soussignée:
La empresa abajo firmante:

ELETTROLASER S.R.L.

Via dell'Industria, 35 - 37060 Sona (VR) ☎ +39 045 6082415

Dichiara sotto la propria responsabilità che la MACCHINA nuova:
Declares, under its own responsibility, that the new MACHINE:
Erklärt auf eigene Verantwortung, dass die neue MASCHINE:
Déclare sous sa propre responsabilité que la nouvelle MACHINE:
Declara bajo su responsabilidad que la MÁQUINA es nueva:

Modello:
Model: - Modell: - Modèle: - Modelo:

DaDo

Tipo:
Type: - Typ: - Type: - Tipo:

Saldatrice laser
Laser welding machine – Laser-Schweißgerät - Soudeuse laser - Máquina de soldadura por láser

Matricola/e:
Serial /s n: - Serial n: - Matricule/s:

Anno di fabbricazione:
Year of manufacture: - Baujahr: - Année de fabrication: - Año de fabricación:

Descritta in appresso:
Described below:
Nebenstehende Beschreibung:
Décrite ci-après:
Se describe a continuación:

Saldatrice per manufatti in materiale metallico, che utilizza la radiazione elettromagnetica laser come sorgente di energia per riscaldare i metalli fino a portare gli stessi alla temperatura di fusione.
Welding machine for artefacts made of metal materials, using electromagnetic laser radiation as an energy source for heating metals to melting temperature.
Schweißgerät für Werkstücke aus Metallmaterial, das die elektromagnetische Laserstrahlung als Energiequelle zum Erhitzen der Metalle bis zum Erreichen ihrer Schmelztemperatur verwendet.
Machine à souder les produits manufacturés en métal, qui utilise le rayonnement électromagnétique laser comme source d'énergie pour chauffer les métaux jusqu'à ce qu'ils atteignent la température de fusion.
Máquina de soldar para trabajos en material metálico, que utiliza la radiación electromagnética del láser como fuente de energía para calentar los metales hasta alcanzar la temperatura de fusión.

È conforme alle seguenti Direttive Comunitarie:
Is compliant with the following Community Directives:
Den folgenden EG-Richtlinien entspricht:
Conforme aux directives communautaires suivantes:
Cumple con las siguientes Directivas Comunitarias:

Direttiva Macchine
Machinery Directive - Maschinenrichtlinie - Directive Machines - Directiva «Máquinas»
2006/42/CE - *2006/42/EC* (ex 98/37/CEE - 89/392/CEE - 91/368/CEE - 93/44/CEE – 93/68/CEE)
(ehemals 98/37/EWG - 89/392/EWG - 91/368/EWG - 93/44/EWG - 93/68/EWG)

Direttiva Compatibilità Elettromagnetica
Electromagnetic Compatibility Directive - Richtlinie für elektromagnetische Verträglichkeit - Directive Compatibilité électromagnétique - Directiva sobre la compatibilidad electromagnética
2014/30/UE - *2014/30/EU* (ex 89/336/CEE)
(ehemals 89/336/EWG)

Soddisfa gli obiettivi di sicurezza indicati dalla Direttiva bassa tensione (2014/35/UE).
It meets the safety objectives given in the Low Voltage Directive (2014/35/EU).
Die von der Niederspannungsrichtlinie (2014/35/EU) angegebenen Sicherheitsziele erfüllt..
Répond aux objectifs de sécurité de la directive basse tension (2014/35/UE).
Cumple los objetivos de seguridad especificados por la Directiva de Baja Tensión (2014/35/UE).

Tuttavia, come previsto dal paragrafo §63 della Linea Guida all'applicazione della direttiva "macchine" 2006/42/CE, redatta dalla Commissione Europea imprese e industria, la presente Dichiarazione CE di conformità NON fa riferimento alla Direttiva bassa tensione.
However, as indicated in paragraph §63 of the Guidelines on how to apply the Machinery Directive 2006/42/EC, written by the European Commission for business and industry, this EC Declaration of Conformity DOES NOT refer to the Low Voltage Directive.
Wie vom Abschnitt § 63 der von der europäischen Kommission für Unternehmen und Industrie verfassten Leitlinien zur Anwendung der Maschinenrichtlinie 2006/42/EG vorgesehen, nimmt die vorliegende CE-Erklärung jedoch NICHT auf die Niederspannungsrichtlinie Bezug.
Cependant, comme prévu par le paragraphe §63 des Lignes Directrices pour l'application de la directive «Machines» 2006/42/CE, rédigée par la Commission Européenne pour les entreprises et l'industrie, la présente déclaration de conformité CE NE fait PAS référence à la Directive Basse Tension.
Sin embargo, tal y como establece el apartado §63 de la Directriz para la aplicación de la directiva «Máquinas» 2006/42/CE, elaborada por la Comisión Europea para Empresas e Industrias, esta Declaración de Conformidad CE NO hace referencia a la Directiva de Baja Tensión.

Soddisfa, ove pertinenti, i requisiti delle seguenti Norme Armonizzate:
Satisfies, when pertinent, the requisites set by the following harmonized rules:
Die Anforderungen der folgenden harmonisierten Richtlinien, sofern relevant, erfüllt.
Satisfait, le cas échéant, aux exigences des normes harmonisées suivantes:
Cumple, cuando es pertinente, los requisitos de las siguientes Normas Armonizadas:

EN ISO 12100 – EN 60204-1 – CEI 76-11 – EN 60825-1 – EN 61000-6-1 – EN 61000-6-3 – EN 61000-3-2 – EN 61000-3-3

Costituzione del fascicolo tecnico:
Constitution of the technical file:
Verfassung der technischen Unterlagen:
Constitution du dossier technique:
Creación del expediente técnico:

Responsabile:
Technical File Manager: - Verantwortlicher: - Responsable: - Responsable:

Ing. Guerrino Ferrarini

Luogo di conservazione:
Storage: - Aufbewahrungsort: - Lieu de conservation: - Lugar de almacenamiento:

Via dell'Industria, 35 - 37060 Sona (VR)

Nome:
Name: - Name: - *Nom:* - Nombre:

Massimo Grigoli

Posizione:
Position: - Stellung: - *Position:* - Posición:

Quality Manager

Luogo e data:
Place & date: - Ort und Datum: - *Lieu et date:* - Lugar y fecha:

Sona (VR)

Firma:
Signature: - Unterschrift: - *Signature:* - *Firma:*

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